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Assessment of Knowledge, Attitude, and Practice toward Responsible Self-Medication among Pharmacy Students in Uganda: A Web-Based Cross-Sectional Survey

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Abstract

For healthcare students, adopting judicious self-medication habits is vital for promoting the safe, effective, and economical use of drugs for conditions they have diagnosed themselves. This investigation sought to evaluate students' understanding, views, and behaviors regarding responsible self-medication.A one-month online cross-sectional survey was carried out from March 1 to March 31, 2024, targeting pharmacy students in Uganda. Eligibility was open to those enrolled in diploma, bachelor's, and master's degree programs. Initial consent was obtained online by asking the participant about their willingness to take part. A non-probability snowball sampling strategy was used for recruitment. Data on demographics, self-medication practices, and knowledge, attitudes, and practices (KAP) related to responsible self-medication were collected using a pre-validated questionnaire. Binary and multivariable logistic regression models were applied to identify factors associated with KAP regarding responsible self-medication. The rate of self-medication practice among the pharmacy students was exceptionally high at 96.73%. The most frequently treated conditions were headaches (78.97%) and colds/coughs (79.91%). Analgesics (90.19%) and antibiotics (53.97%) were the most commonly chosen drugs for self-care. A significant majority of students displayed good knowledge (87.38%) and positive attitudes (96.03%) regarding responsible self-medication. However, only 27.34% of the students were found to practice rational self-medication. The institution a student attended and their parents' occupation were significantly correlated with having good knowledge. Conversely, factors such as gender, place of residence, and the nature of the illness were significant determinants of engaging in rational self-medication. Self-medication was highly prevalent among Ugandan pharmacy students, with analgesics and antibiotics being the favored choices. While most students had commendable knowledge and attitudes, their actual rational self-medication practices were low. The study recommends targeted training initiatives to foster safer self-medication behaviors among these future pharmacists.

Keywords: Attitude, Knowledge, Pharmacy students, Practices, Self-medication, Uganda

Introduction

The World Health Organization (WHO) [1] defines self-medication as the utilization of pharmaceutical products to manage self-diagnosed ailments or symptoms, or the re-use of previously prescribed drugs for recurring conditions. This practice encompasses the use of over-the-counter (OTC) drugs, prescription-only medications, and complementary and alternative medicines (CAM) [2]. Actions constituting self-medication include taking drugs without a medical prescription, using an old prescription for a similar issue, taking medications found at home without professional advice, and sharing medicines with family or friends who have analogous symptoms [3].

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Globally, self-medication presents a significant public health challenge, driven by a mix of cultural, economic, and political elements [4]. This behavior is markedly more frequent in developing nations (with prevalence rates ranging from 12.7% to 95%) than in developed nations (around 3%) [5]. This disparity is largely attributed to differences in cultural norms, socioeconomic standing, healthcare system structures (including compensation rules), ease of access to healthcare, and policies governing the distribution of medicine [6, 7]. In low- and middle-income countries (LMICs), self-medication is a common approach to managing illnesses, which consequently adds to the issue of irrational drug use [8]. In developing countries, it is increasingly becoming an unavoidable strategy to reduce the financial burden of healthcare for many common illnesses [7]. Evidence indicates that common drivers for self-medication include a lack of time to see a doctor, the low cost of self-medication, easy availability of medicines, the mild nature of symptoms, previous prescriptions for the same ailment, recommendations from friends or peers, and perceived knowledge about drug usage [7-10].

Self-medication is not inherently safe and carries several risks, including resource wastage, the development of antibiotic resistance, adverse drug interactions, unwanted side effects, polypharmacy, incorrect diagnoses, extended treatment duration, and unnecessary prolongation of suffering [3, 7, 9]. Despite these risks, responsible self-medication can offer benefits such as saving time and money, avoiding unnecessary medical visits, providing life-saving intervention in certain acute situations, conserving limited medical resources for more serious conditions, and empowering patients to take an active role in their own health [11].

Prior research indicates that the most common ailments for which people self-medicate are headaches, abdominal pain, colds, coughs, fever, sore throats, cramps, and conditions such as respiratory and urinary tract infections, eye infections, malaria, and gastrointestinal disorders [10, 12, 13].

Numerous international studies have examined self-medication prevalence, revealing significant variation across different countries: 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 focusing on pharmacy and medical students also show a wide range of prevalence, for example, in 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]. Similarly, within Uganda, the prevalence of self-medication among university students is quite high, with rates of 63.5% in Mbarara, 74.2% in Lira, and 93.8% in Busitema [25-27]. These prior Ugandan studies were primarily conducted among general university or medical students, highlighting a gap in research specifically focused on pharmacy students.

Pharmacy students differ from non-healthcare students in their formal education on medications and diseases, which equips them with the knowledge to engage in self-medication. Thus, evaluating their KAP related to safe self-medication is crucial. Upon graduation and entering the profession, these students will become pharmacists who are ideally positioned to provide patients with appropriate guidance on responsible self-medication. This study directly addresses the current knowledge gap regarding Ugandan pharmacy students' KAP regarding responsible self-medication. The findings can help shape educational programs to improve their own practices and, by extension, positively influence patient behavior in the future. As far as we are aware, no prior study has specifically assessed KAP regarding self-medication among this group in Uganda. Therefore, this research aimed to assess KAP regarding self-medication among pharmacy students and identify the predictors of responsible self-medication practices in terms of KAP.

Materials and Methods

Study design and ethical clearance

This research employed a cross-sectional design, utilizing an online survey distributed to pharmacy students across Uganda over one month (March 1–31, 2024). Ethical approval for the study protocol, questionnaire, and consent process was obtained from the Kampala International University School of Pharmacy Research Committee (KIU SPRC/004/24). The conduct of this online study adhered to the ethical standards for research with human participants as outlined in the Declaration of Helsinki.

Study cohort

The research population encompassed students actively pursuing pharmacy qualifications at diploma, undergraduate, and postgraduate levels across three Ugandan universities: Kampala International University (KIU), Mbarara University of Science and Technology

(MUST), and Makerere University (MU). Institutional approval was secured in advance by contacting the respective faculty deans or department heads of pharmacy at each university. Participants provided their consent electronically after reviewing the study's purpose and objectives on the opening page of the online form. Eligibility was confirmed through two mandatory screening questions requiring affirmative responses: "Are you currently a pharmacy student?" and "Are you willing to volunteer for this web-based investigation of self-medication behaviors among pharmacy students?"

Sample size determination and recruitment approach

The required participant count for this web-based investigation was derived using the standard single-population proportion equation. We based our calculation on an estimated 50% prevalence of responsible self-medication behavior, accepting a 5% margin of error, a design effect of 1, and 80% statistical power. This produced an initial target of 384 students, which was subsequently increased to 403 to account for a 5% allowance for potential non-response. To identify and enroll eligible students, we used a nonprobability snowball sampling method, in which individuals who completed the survey were encouraged to share the invitation with their peers and contacts within the pharmacy student community. While this approach may limit the broad applicability of our results, it was selected as the most feasible strategy to achieve the necessary sample size.

Survey instrument

The data collection tool was organized into five principal sections: 1) Student demographic background; 2) Knowledge evaluation concerning responsible self-medication; 3) Attitude assessment regarding responsible self-medication; 4) Behavioral evaluation of responsible self-medication practices; and 5) Detailed inquiry into participants' own self-medication habits.

Demographic information

The demographic portion captured details including age, biological sex, academic level or year of study, university affiliation, residential location, marital status, housing arrangement, parental occupation, existence of any ongoing health condition, and total household monthly earnings.

Knowledge assessment

To gauge participants' understanding, seven questions were formulated: one addressing the definition of self-medication (K1); four probing different safety dimensions of self-medication (K2-K5); one examining whether self-medication could interact with physician-prescribed treatments (K6); and one exploring how self-medication might conceal symptoms of other pathological states (K7). Each item offered two response choices (Yes/No or True/False). Scoring was 1 point per correct selection and 0 for incorrect ones, yielding total scores ranging from 0 to 7. Utilizing Bloom's established threshold, scores of 6–7 (80%–100% correct) indicated good knowledge, 4–5 (60%–79% correct) signified moderate knowledge, and below 4 (< 60% correct) denoted poor knowledge [28].

Attitude evaluation

Attitudes were appraised through ten statements: one framed self-medication as an element of self-care (A1); two concerned adverse drug reactions and their oversight during self-medication (A2 and A3); one addressed prolonged self-medication (A4); one pertained to over-the-counter product use (A5); one questioned the necessity of formal instruction on self-medication (A6); one considered offering self-medication guidance to all demographics (A7); one focused on advice during pregnancy (A8); one examined the relevance of seeking professional input (A9); and one investigated how information availability influences self-medication choices (A10). Responses were recorded on a 5-point Likert scale from strongly agree (5) to strongly disagree (1), with reverse scoring applied to statements 5 and 6. Aggregate scores ranged from 10 to 50, with a cutoff of ≥25 designating a positive attitude and scores below 25 reflecting a negative disposition toward responsible self-medication [10].

Practice assessment

Six items evaluated self-medication behaviors: consulting package inserts before use (P1); sharing medications with others manifesting comparable symptoms (P2); engaging in self-medication without prior professional consultation (P3); continuing self-medication over extended intervals without physician oversight (P4); self-medicating irrespective of the illness type (P5); and having participated in formal training on responsible self-medication (P6). These items used a binary response format, with accurate answers earning 1 point and incorrect ones 0, yielding totals from 0 to 6. A

score of 5 or above indicated responsible self-medication practice, whereas scores below 5 indicated irrational practice.

Self-medication behavior details

This segment queried participants about the frequency of self-medication, preferred therapeutic systems, common ailments for which they self-medicate, frequently used drug categories, motivational factors, information sources, and any adverse effects.

Instrument development and psychometric properties

A structured English-language KAP instrument focused on self-medication was developed, drawing on prior investigations involving pharmacy and healthcare students [3, 10, 18, 29]. The preliminary version underwent face validity review by a multidisciplinary expert committee composed of a clinical pharmacist, a community pharmacist, a physician, a clinical pharmacologist, and an epidemiologist. The final tool comprised 30 total items distributed across domains (knowledge = 7; attitude = 10; practice = 6; self-medication specifics = 7). Experts rated each item's relevance using a 4-point Likert scale. Domain-specific scale-level content validity indices were computed, with S-CVI/average and S-CVI/universal agreement values registering 0.86 and 0.9 for knowledge, 0.9 and 1 for attitude, 0.9 and 1 for practice, and 0.94 and 0.9 for the self-medication details section—all exceeding the accepted threshold of 0.8. Internal consistency was confirmed through a pilot administration, yielding Cronbach's alphas of 0.78 for knowledge, 0.80 for attitude, and 0.76 for practice.

Data collection procedures

The survey was administered electronically via a Google Forms link disseminated through popular messaging platforms (WhatsApp, WeChat, and IMO) and social media outlets (Twitter, Instagram, and LinkedIn). The opening screen informed potential respondents about the research background, principal objectives, anticipated contributions, and estimated completion time of 5–10 minutes. From an estimated cumulative pharmacy student population of 1160 (KIU = 650, MUST = 235, MU = 275), we received 497 responses, representing a 42.8% participation rate. Following exclusion of 69 submissions that were substantially incomplete, the final analytical dataset comprised 428 valid responses (KIU = 288, MUST = 59, MU = 81).

Statistical procedures

All analyses were conducted using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). Before formal analysis, the data were cleaned, organized, and processed in Microsoft Excel. Descriptive statistics—including frequencies, percentages, means, and standard deviations—summarized participant characteristics and KAP levels.

Bivariate logistic regression initially assessed associations between independent sociodemographic variables and dependent outcomes (good knowledge, positive attitude, rational practice, and self-medication prevalence). Variables demonstrating p-values ≤ 0.2 in these preliminary analyses were subsequently entered into multivariate logistic regression models to adjust for confounding influences. Statistical significance was established at a two-sided P-value threshold of < 0.05.

Results and Discussion

From the initial 497 respondents, 69 incomplete records were discarded, leaving 428 for final analysis. The mean participant age was 24.8 years (standard deviation = 2.92). The sample was predominantly Christian (85.75%), free from any diagnosed medical conditions (75.70%), and had parents employed outside the healthcare field (84.11%). **Table 1** provides comprehensive demographic characteristics of the study population.

Table 1. Sociodemographic characteristics of pharmacy students (n = 428).

Characteristics	Frequency (%)
Age in years (Mean ± SD)	24.28 ± 2.92
≤ 24 years	272 (63.55)
> 24 years	156 (36.45)
Gender	
Male	252 (58.88)
Female	176 (41.12)

Pharmacy program	
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)
Residence	
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	
Hostel	97 (22.66)
Resident student	61 (14.25)
Rented house	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

An overwhelming 96.73% of pharmacy students practice self-medication, as detailed in **Table 2**. When managing their own health, these students most frequently target minor ailments, with coughs and colds (342 instances) and headaches (338 instances) being the most common complaints. To treat these conditions, they primarily turn to painkillers (386 instances), though a notably high number also self-administer antibiotics (231 instances). The driving force behind this widespread behavior is the general perception among students that their illness is not serious enough to require a formal medical consultation (346 instances)

Table 2. Distribution of self-medication practices among pharmacy students.

Category	Response	N (%)
Annual frequency of self-medication	Never	14 (3.27)
	Once per year	94 (21.96)
	Twice per year	112 (26.17)
	Three times per year	66 (15.42)
	More than three times per year	142 (33.18)
Type of medicines used	Conventional medicines	299 (69.86)
	Traditional remedies	111 (25.93)
	Other preparations	18 (4.21)
Health problems managed through self-medication	Cold/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)
	Skin conditions	102 (23.83)
	Insomnia	29 (6.78)
	Stress	43 (10.05)
	Fitness-related use	17 (3.97)
	General body pain	182 (42.52)
	Muscle pain	43 (10.05)
	Fever	149 (34.81)
	Oral ulcers	57 (13.32)
	Others	47 (10.98)
Medication categories preferred	Analgesics	386 (90.19)
	Antibiotics	231 (53.97)
	Contraceptives	78 (18.22)
	Antacids	183 (42.76)
	Hypnotics/sedatives	52 (12.15)
	Vitamins	148 (34.58)
	Cough medications	210 (49.07)
	Antihistamines	155 (36.21)
	Antipyretics	102 (23.83)
	Corticosteroids	58 (13.55)
	Topical agents	141 (32.94)
	Hormonal drugs	28 (6.54)
	Cardiovascular agents	4 (0.93)
	Neurological drugs	4 (0.93)
	Others	37 (8.64)
Reasons for self-medication	Illness considered minor	346 (80.84)
	Save time	235 (54.91)
	Reduce cost	253 (59.11)
	Maintain privacy	114 (26.64)
	Immediate need for treatment	172 (40.19)
	Confidence in own knowledge	214 (50.00)
	Distrust of physician advice	31 (7.24)
Sources of information used	Academic training	161 (37.62)
	Advertisements	2 (0.47)
	Friends/relatives	32 (7.48)
	Pharmacist consultation	50 (11.68)
	Internet sources	40 (9.35)
	Fellow health students	17 (3.97)
	Old prescriptions (similar illness)	41 (9.58)
	Personal past prescriptions	76 (17.76)
	Other sources	9 (2.10)
Adverse effects experienced after self-medication	Yes	170 (39.72)
	No	258 (60.28)

Most students demonstrated a good level of awareness regarding self-medication and its associated safety considerations. They recognized that all categories of medicines may cause side effects and that medical consultation is necessary if any adverse reactions occur during self-treatment. In addition, students understood

that self-medication can interact with prescribed therapies and may occasionally conceal the symptoms of other underlying conditions. The pattern of pharmacy students' knowledge related to self-medication is shown in **Table 3**.

Table 3. Awareness of responsible self-medication among pharmacy students.

Item	Statement	Correct responses n (%)
K1	Self-medication refers to using medicines without a physician's guidance	410 (95.79)
K2	Self-medication is considered safe	352 (82.24)
K3	All medicine types (prescription, OTC, and herbal) can cause side effects	390 (91.12)
K4	Adjusting medication dosage without medical advice may be harmful	414 (96.73)
K5	Experiencing side effects during self-medication requires medical consultation	410 (95.79)
K6	Self-medication may interact with drugs prescribed by a physician	418 (97.66)
K7	Self-medication can hide or delay recognition of disease symptoms	381 (89.02)

Abbreviation: OTC = Over The Counter.

Most pharmacy students showed a positive overall attitude toward responsible self-medication across the evaluated statements. The distribution of these attitudes is summarized in **Table 4**. A large proportion of students reported engaging in self-medication across various illnesses (381) and continuing the practice for extended periods (335). More than half reported reading medicine leaflets or package inserts when self-medicating (251). In addition, around one-third of participants reported practices such as sharing medicines for similar symptoms (164), using medicines without professional guidance (177), and receiving training on responsible self-medication (141). **Table 5** presents the distribution of self-medication practices among pharmacy students.

Table 4. Perceptions of responsible self-medication among pharmacy students

Item	Statement (reworded)	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
A1	Self-medication is considered part of self-care practices	92 (21.50)	125 (29.20)	76 (17.76)	85 (19.86)	50 (11.68)
A2	Self-medication is associated with possible adverse drug reactions	205 (47.90)	119 (27.80)	29 (6.78)	33 (7.71)	42 (9.81)
A3	Monitoring symptoms and side effects is necessary during self-medication	185 (43.22)	156 (36.45)	44 (10.28)	25 (5.84)	18 (4.21)
A4	Prolonged use of self-medication is generally discouraged	274 (64.02)	115 (26.87)	11 (2.57)	17 (3.97)	11 (2.57)
A5	Over-the-counter medicines are always safe for self-use	65 (15.19)	110 (25.70)	56 (13.08)	112 (26.17)	85 (19.86)
A6	Formal training is unnecessary for practicing self-medication	50 (11.68)	90 (21.03)	28 (6.54)	145 (33.88)	115 (26.87)
A7	Self-medication is not appropriate for individuals of all age groups	228 (53.27)	136 (31.77)	18 (4.21)	28 (6.54)	18 (4.21)
A8	Self-medication during pregnancy is considered unsafe	316 (73.83)	75 (17.52)	10 (2.34)	16 (3.74)	11 (2.57)
A9	Guidance from healthcare professionals improves outcomes of self-medication	196 (45.79)	158 (36.92)	33 (7.71)	23 (5.37)	18 (4.21)
A10	Easy access to health information contributes to self-medication among pharmacy students	186 (43.46)	171 (39.95)	25 (5.84)	28 (6.54)	18 (4.21)

Abbreviation: ADRs = Adverse Drug Reactio

Table 5. Practice toward responsible self-medication among pharmacy students

Question	Correct no. (%)
P1. Do you take medicines without checking the leaflet or package information?	251 (58.64)
P2. Have you ever given your medicines to someone with similar symptoms?	164 (38.32)
P3. Do you use medicines without seeking any advice from a healthcare professional?	177 (41.35)
P4. Do you continue self-medication for extended periods without medical guidance?	335 (78.27)

P5. Do you generally prefer self-medication for all kinds of illnesses?	381 (89.02)
P6. Have you received any formal training on responsible self-medication practices?	141 (32.94)

The results on KAP adequacy indicate that most pharmacy students demonstrate strong knowledge (374 participants) and a favorable attitude (411 participants) toward responsible self-medication. However, only a small proportion (117 participants) show appropriate or rational self-medication practices. The levels of KAP adequacy regarding responsible self-medication are summarized in **Table 6.**

Table 6. Adequacy of KAP toward responsible self-medication among pharmacy students

Variable	Frequency (%)
Knowledge	
High level	374 (87.38)
Average level	50 (11.68)
Low level	4 (0.94)
Attitude	
Favorable	411 (96.03)
Unfavorable	17 (3.97)
Practice	
Appropriate practice	117 (27.34)
Inappropriate practice	311 (72.66)

The results of the logistic regression analysis showed that the institution attended was significantly linked to students' knowledge of responsible self-medication (AOR = 2.76; 95 percent CI: 1.08–7.08), while parents' occupation was also a significant predictor but in a negative direction (AOR = 0.28; 95 percent CI: 0.14–0.57). In terms of practice, gender (AOR = 0.55; 95 percent CI: 0.35–0.88), place of residence (rural: AOR = 0.48; 95 percent CI: 0.24–0.96; semi-urban: AOR = 0.54; 95 percent CI: 0.32–0.89), and absence of any chronic illness (AOR = 2.20; 95 percent CI: 1.18–4.11) were all significantly related to rational self-medication behavior. However, no significant determinants of a positive attitude toward responsible self-medication were identified in the multivariate model. The influencing factors related to adequate knowledge, a favorable attitude, and appropriate practice are summarized in **Table 7**. At the same time, detailed bivariate and multivariate logistic regression results, along with corresponding p-values, are provided 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
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= Crude Odds Ratio; CI= Confidence Interval; MUST= Mbarara University of Science and Technology; NV= No value; Ref= Reference; NA= Not Applicable.

The present study found an extremely high prevalence of self-medication among pharmacy students, reaching 96.73%. This rate is considerably higher than those reported in Ethiopia (38.5%), India (78.6%), Malaysia (57.2%), and Egypt (62.9%), where lower levels of self-medication were observed among medical students [30-33]. Similarly, studies from developed countries, such as the Netherlands (59.4%) and Colombia (34.3%), also report comparatively lower prevalence rates [34, 35]. Research conducted in Saudi Arabia showed intermediate figures, including 55.2% among students in Riyadh and 60.0% in Najran [36, 37]. However, findings from Palestinian students (98.0%) closely align with our results [38]. Overall, self-medication appears to be more common in developing countries than in developed ones. This difference may be explained by better access to healthcare services, stronger financial capacity to afford medical care, and more effective regulation of pharmaceutical supply chains in developed settings.

Earlier Ugandan studies reported varying prevalence rates of self-medication, including 63.5% at Mbarara University of Science and Technology, 74.2% at Lira University, and 79% internet-based self-antibiotic use among patients attending Kawempe private clinics [25, 26, 39]. These inconsistencies across the country may be due to variations in study design, data collection tools, the types of medication assessed, study settings, and participant characteristics. Our research used a self-

administered online survey among pharmacy students from three universities. Generally, students tend to engage more in self-medication than the general population, and pharmacy students in particular are more likely to do so due to their academic knowledge, exposure to pharmacological information, and easier access to medicines. Additionally, increased internet use and pharmaceutical advertising further encourage self-medication behavior.

The study also revealed that the most frequently used self-treatment medications were analgesics for headaches, cough and cold remedies, and antibiotics. Similar patterns have been documented in Uganda, Nigeria, Pakistan, and India. The prevalence of self-antibiotic use in this study was 53.97%, which is higher than reported in Ethiopia (35.2%), Serbia (44.0%), Palestine (50.0%), and Malaysia (39.3%) [29, 38, 40, 41]. Antibiotic self-medication is generally more widespread in developing regions compared to developed countries. Although national treatment guidelines in Uganda restrict antibiotic use to prescription-only access, weak enforcement due to socioeconomic challenges allows widespread and uncontrolled availability [42]. Evidence also suggests that healthcare students and professionals are more likely to self-medicate with antibiotics than the general population [43]. Improper antibiotic use without professional diagnosis increases the risk of antimicrobial resistance. Therefore, in addition to standard curriculum content, it is recommended that educational programs, such as workshops, seminars, and symposia, be introduced to strengthen awareness of pharmacists' role in combating antimicrobial resistance.

A large proportion of students reported that self-medication was influenced by perceptions that their illness was not serious (80.8%), as well as by motivations such as saving time (54.9%) and reducing costs (59.11%). In contrast, a Nigerian study identified factors such as dissatisfaction with healthcare providers, distance to health facilities, and perceived ineffectiveness of prescribed treatments as key reasons for self-medication [6]. Similarly, an Iranian study reported that keeping medicines at home and previous experience with similar illnesses contributed to self-medication practices [12]. Consistent with our findings, studies from Iran, China, Brazil, and Rwanda also identified financial limitations, early symptom management, and perceived mildness of illness as major drivers [44-46]. In contrast, a Brazilian study found that a lack of awareness of medication side effects and consequences was a key factor among nursing students [45]. Although self-medication may provide short-term relief in mild conditions, students should be encouraged to seek professional medical consultation when symptoms persist or worsen to ensure appropriate diagnosis and treatment.

A key observation from this study is that many students rely on their academic knowledge to guide self-medication. While pharmacy education provides substantial understanding of drugs and disease management, students should still seek advice from qualified healthcare professionals before using medications. Self-medication carries risks such as incorrect dosing, improper use, and harmful drug interactions, particularly when combining prescription and non-prescription medicines. Therefore, all pharmacy and medical students should be adequately trained in responsible self-medication practices.

Regarding knowledge, attitude, and practice (KAP), the findings showed that most students possessed good knowledge and a positive attitude toward responsible self-medication. However, rational practice was notably low. Similar patterns of high knowledge and positive attitudes but poor practice have been reported among pharmacy students in India [10]. This indicates a clear gap between theoretical understanding and actual behavior. To address this, the study recommends incorporating targeted training sessions, workshops, and educational interventions to promote safe and rational self-medication practices among students.

The analysis also showed that enrollment at KIU University was significantly associated with greater knowledge of responsible self-medication. A higher proportion of final-year students from that institution participating may explain this. Additionally, factors such as gender, residence, and type of illness were significantly associated with rational self-medication practices. Previous evidence suggests that females may have lower odds of rational self-medication, potentially due to higher medication use for menstrual and gynecological conditions, which may influence their self-medication behavior [47]. Students from rural areas often face limited access to healthcare services, leading them to self-medicate before seeking professional care, which may explain variations in rational practice [48]. Similar associations between residence and self-medication have also been reported in India [10].

Parental background also appears to influence behavior. Students whose parents are healthcare professionals may

receive better guidance regarding which conditions require medical attention. However, contrary to expectations, this study found that students with non-medical parents had higher odds of good knowledge than those with medically trained parents. These findings highlight the importance of designing targeted educational strategies to improve rational self-medication practices among pharmacy students.

A key strength of this study is that participants were drawn from three leading universities in Uganda, representing diverse sociodemographic backgrounds. This enhances the external validity of the findings and allows for reasonable generalization to comparable academic settings. Additionally, the use of an online survey was advantageous, as it improved response rates and enabled the collection of a relatively large sample.

Despite these strengths, several limitations should be acknowledged. The reliance on an online data collection method may have unintentionally excluded students living in regions with poor internet connectivity or limited access to social media platforms. Furthermore, because participation was voluntary, there is a risk of selection bias, which may mean the sample does not fully represent the target population. Another potential source of bias is that one of the investigators and some participants were affiliated with the same university, which may have influenced responses, particularly among acquaintances.

The cross-sectional design of the study also limits the ability to establish causal relationships between influencing factors and levels of knowledge, attitude, and practice (KAP) regarding responsible self-medication. Since KAP can change over time with increased experience and exposure, longitudinal studies are recommended better to understand trends and determinants of self-medication behavior among students.

In addition, the use of a non-probability snowball sampling technique may have compromised the sample's representativeness, thereby limiting generalizability. The data were collected via a self-administered online questionnaire rather than face-to-face interviews, which may have introduced reporting bias, as participants might not have provided fully accurate responses to questions about their self-medication behaviors and attitudes. More objective approaches—such as verifying medication use through home medicine inventories or collecting data from community pharmacies—could help reduce such bias in future studies.

Recall bias is another limitation, as participants were asked to report self-medication practices over the previous one-year period, which may have affected the accuracy of their responses.

Conclusion

In conclusion, the study demonstrates a very high prevalence of self-medication among pharmacy students across three Ugandan universities. Analgesics and antibiotics were the most frequently used drug categories for self-medication. While most students demonstrated good knowledge (87.38%) and a positive attitude (96.03%) toward responsible self-medication, their actual rational practice remained notably low.

The study highlights the need for targeted educational interventions, including structured training modules on safe self-medication practices. Addressing the identified influencing factors and integrating practical training into the curriculum may help bridge the gap between knowledge and practice. Although students already possess a strong theoretical understanding and positive attitudes gained through their academic programs, converting this knowledge into rational, safe practice requires focused, continuous educational reinforcement.

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