



Knowledge and Practices Regarding Over-the-Counter Drug Use for Self-Care Among Students from Various Medical Faculties in a Low- and Middle-Income Country

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ABSTRACT:

Background:

Over-the-counter (OTC) medications are vital for promoting self-care, especially in low- and middle-income countries (LMICs) such as Nepal. Since health science students will play a key role in future healthcare delivery, their knowledge and behavior regarding OTC drug use are particularly important. This study aimed to evaluate and compare the knowledge and self-care practices related to OTC drug use among students of medicine, pharmacy, and nursing, and to assess how their educational background influences these practices.

Methods:

A multicenter comparative cross-sectional study was carried out in three health science colleges affiliated with different universities in Nepal. The study included a total of 129 students from various health science disciplines: 77 from medicine, 23 from pharmacy, and 29 from nursing. The research assessed students' knowledge and practices related to OTC drug use and analyzed the relationship between these factors and various socio-demographic characteristics

Results:

The majority of students demonstrated a moderate to low level of understanding and practice concerning the use of OTC drugs. While understanding scores were similar among the different faculties, medical students had the highest percentage of good understanding (7.8%). Pharmacy students recorded the highest average practice scores (4.34%). A considerable portion of the students reported using OTC medications without seeking advice from healthcare professionals, primarily due to convenience. No statistically significant differences were found in the levels of understanding or practice related to OTC drug use across socio-demographic variables, including academic discipline.

Conclusion:

The study revealed a widespread deficiency in knowledge and suboptimal practices regarding OTC drug use among health science students. These results emphasize the importance of enhancing educational efforts and implementing stronger regulations to encourage safe and responsible self-medication.



HIGHLIGHTS

- **Widespread Practice of Self-Medication:** Self-medication is commonly observed among medical students in low- and middle-income countries (LMICs), regardless of their specific field of study.
- **Limited Knowledge and Poor Practices:** Medical students generally demonstrate insufficient understanding and inappropriate practices when it comes to the use of over-the-counter (OTC) medications.
- **Responsibility as Future Healthcare Providers:**
 - As future healthcare professionals and influencers among their peers, medical students carry an important responsibility to model proper and responsible medication use.
- **Need for Comprehensive Interventions:**
 - There is a strong need for enhanced educational initiatives, stricter legal frameworks, and effective implementation of guidelines and programs aimed at reducing unsafe self-medication habits.

Introduction

OTC medications are defined by the World Health Organization (WHO) as pharmaceuticals that are available for sale without a prescription [1]. These medications address mild illnesses like headaches and heartburn in addition to providing preventive care. (LMICs), driven by factors, such as patient dissatisfaction with government healthcare facilities and physicians, the high cost of prescription drugs, limited education, unregulated medicine distribution, untrained pharmacy personnel, and inadequate doctor-patient ratios in healthcare systems[5,6].

The use of over-the-counter medications with sufficient knowledge of their indications, dosages, possible side effects, interactions, precautions, warnings, duration of use, and when to seek medical advice is known as responsible self-medication [7]. Healthcare systems around the world have incorporated responsible self-medication practices along with educational and awareness initiatives, taking socioeconomic factors and healthcare resources into consideration [8]. Self-care management, self-care monitoring, and self-care maintenance are the three primary components of self-

care, a naturalistic approach to decision-making that emphasizes the prevention and control of chronic illnesses [9].

of self-care is self-medication [10]. The benefits of proper self-medication for patients, healthcare professionals, the pharmaceutical industry, and governments are becoming more widely acknowledged [11]. People have demonstrated an increasing willingness in recent years to take more control of their health by looking for trustworthy information from credible sources to aid in making well-informed healthcare decisions [12]. Antibiotics, antacids, acid inhibitors, oral rehydration solutions, and non-steroidal anti-inflammatory medicines (NSAIDs) are the most often self-medicated medications in LMICs [13]. However, there are ethical and clinical issues with the general public's and health science students' overuse or abuse of over-the-counter medications [14,15]. Increased hazards are a result of significant media exposure and drug advertising, which can lead to problems including self-diagnosis errors, dangerous drug interactions, and the use of medications for unexpected causes. Adverse drug responses (ADRs), poor drug selection, delayed diagnosis, drug dependency, drug-drug and drug-food combinations, and the possibility of poisoning or overdose are only a few of the hazards associated with improper self-medication [16]. The market for over-the-counter medications is still growing and their usage is nevertheless common in spite of these hazards [17]. Self-medication, when utilized properly, can lessen the strain on healthcare institutions, help sustain scarce medical resources for more serious ailments, and save patients' time and money [18]. Because OTC medications are easily accessible, self-medication has increased in popularity in recent years. Since health science students will eventually work as healthcare providers and must advise patients on the benefits and risks of self-medication, this practice is very pertinent to them. Given their increased exposure to medical information, health science students are predicted to self-medicate at a higher rate than the general population

[18]. In addition to having an effect on their own health, their health-related actions, attitudes, and knowledge also have an effect on the healthcare system overall [8]. Self-medication is very common worldwide, with



prevalences ranging from 32.5% to 81.5% [19]. The prevalence is approximately 68% in European nations and 59% and 31%, respectively, in LMICs such as Nepal and India [19].

Methods

Ethical approval

The study was conducted in adherence to the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Committee of the Nepalese Army Institute of Health Sciences (IRC-NAIHS), under registration number 1073. Additional ethical clearance was granted by Nobel College, referenced as 080/081.292. Informed consent was also obtained from all participants prior to their involvement in the study.

Study design

A multicenter comparative cross-sectional study design was utilized in accordance with the STROCCS 2021 guidelines (Strengthening the Reporting of Cohort, Cross-sectional, and Case-control Studies in Surgery) as outlined in Supplementary File 1 (<https://links.lww.com/MS9/A770>) [20]. The study was registered in the Research Registry under the ID 10617.

Study setting

The study was carried out between June 14 and August 19, 2024, across multiple colleges affiliated with three universities that offer health science programs in the Kathmandu Valley, Nepal. The institutions involved included the Nepalese Army Institute of Health Sciences (NAIHS), affiliated with Tribhuvan University for medical students; the Valley College of Technical Sciences (VCTS), affiliated with Purbanchal University for pharmacy students; and Nobel College, affiliated with Pokhara University for nursing students.

Nepal is categorized as a low- and middle-income country (LMIC). Kathmandu, the nation's capital, encompasses the districts of Kathmandu, Lalitpur, and Bhaktapur. As the primary center for education, healthcare, and government services, the city attracts students from all regions of Nepal. These students are admitted through a centralized entrance exam administered by the Medical Education Commission

(MEC). Therefore, the selected study area effectively represents Nepal's health science educational institutions.

Study population and Sample size

The study included final-year students from various health science disciplines, such as MBBS students from NAIHS under Tribhuvan University, BPharm students from VCTS affiliated with Purbanchal University, and BSc Nursing students from Nobel College associated with Pokhara University, all located in Kathmandu.

The sample size was calculated using Cochrane's formula^[21]:

$$n = Z^2 \times p \times q / d^2 = 384.16 - 385,$$

Certainly! Here's an accurate paraphrase of the passage:

Where **n** represents the required sample size; **Z** is 1.96, corresponding to a 95% confidence level; **p** is the estimated prevalence (50%); **q** is the complement of **p** (i.e., 100% - **p**); and **d** denotes the allowable margin of error (5%). A 5% margin of error was selected to strike a balance between accuracy and feasibility. The 50% prevalence was used because it reflects the highest variability, resulting in the largest possible sample size. Given that the total number of final-year health science students in the selected institutions (**N**) was 168, the adjusted sample size (**n'**) was determined using the following formula:

$$n' = n / [1 + (n - 1) / N] = 117.$$

Certainly! Here's an accurate paraphrase of your content:

The formula applied was:

$$nh = (Nh/N) \times n,$$

where **nh** represents the sample size for the *h*th stratum, **Nh** is the population size of the *h*th stratum, **N** is the total population size, and **n** is the total sample size.

Taking into account a 10% non-response rate (11.7), the final adjusted sample size (**n'**) was calculated as **128.89**, which was rounded to **129**.



Stratified random sampling was employed for data collection, using the proportionate stratified random sampling method as described by the formula above.

- For 100 medicine students, the required sample size (n_m) = $(129/168) \times 100 = 76.78 \approx 77$.
- For 30 pharmacy students, the required sample size (n_p) = $(129/168) \times 30 = 23.03 \approx 23$.
- For 38 nursing students, the required sample size (n_n) = $(129/168) \times 38 = 29.17 \approx 29$.

Thus, a total of 77 medical, 23 pharmacy, and 29 nursing students (total sample size = 129) were selected for the study.

Sampling technique

All health science universities and colleges were identified through the Ministry of Education and Sports, along with the respective Medical, Pharmacy, and Nursing Councils of Nepal. Three academic programs were then purposively selected for the study. A sampling frame comprising final-year students from each selected program was developed, and representative samples were drawn from each stratum using a sampling fraction. Systematic random sampling was applied, selecting every third student from the different programs.

Study tool and data collection

After a thorough literature study, a structured questionnaire was created for the purpose of gathering data. It was divided into three sections: sociodemographic information, knowledge, and self-care practices with over-the-counter medications.

Ten percent of the sample size that was excluded from the final data set underwent pre-testing to ensure the tools were reliable. The Cronbach alpha score from the reliability analysis was 0.73. As a result, the instruments were employed to get the data.

After that, a self-administered survey method was used to gather data.

Data management and statistical analysis

Data were entered into MS Excel and subsequently exported to

The understanding and practice sections each included ten items, with a maximum possible score of 50 per section.

For positively worded statements reflecting good understanding or practices, responses were scored as follows: *strongly agree* = 5, *agree* = 4, *neutral* = 3, *disagree* = 2, and *strongly disagree* = 1. For negatively worded statements (opposing appropriate understanding or practices), reverse coding was applied.

Scores for understanding and practice were classified based on modified Bloom's cut-off criteria: "**Good**" (≥ 40 , i.e., $\geq 80\%$ of 50) and "**Moderate-to-Poor**" (< 40 , i.e., $< 80\%$ of 50).

Socio-demographic characteristics were summarized using frequencies and percentages. Binary logistic regression analysis was used to identify factors predicting understanding and practice of over-the-counter (OTC) drug use. A box plot was used to visualize the distribution of scores across different variables.

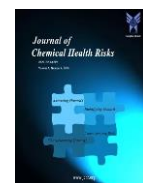
Spearman's rank correlation coefficient was applied to examine the relationship between understanding and practice scores. A p -value of < 0.05 was considered statistically significant.

Results

The study included a total of 129 students, comprising 77 (59.75%) from the medicine program, 23 (17.8%) from the pharmacy program, and 29 (22.5%) from the nursing program. Among the participants, 53.5% were male. The majority of the respondents, particularly those from the medicine (68.8%) and pharmacy (65.2%) programs, were in their mid-20s (Table 1).

Most students across all faculties showed a **moderate to poor** level of understanding regarding over-the-counter (OTC) medications. Only a small proportion of students demonstrated **good understanding**: 7.8% from medicine, 4.3% from pharmacy, and 3.4% from nursing. Similarly, **practice scores** indicated **moderate to poor practices** across all groups, with a small percentage demonstrating **good practice**. Among them, pharmacy students had the highest percentage (4.34%) (Table 2).

Regarding understanding-related items, the majority of students from all programs strongly agreed on the need to stop using OTC drugs immediately upon experiencing side effects—this included 55.8% of medical, 47.8% of pharmacy, and 58.6% of nursing students. A significant



number of students from pharmacy (52.2%) and medicine (57.1%) agreed that OTC drugs are cost-effective, whereas most nursing students (62.1%) responded neutrally. Moreover, a large proportion of students from medicine (63.6%) and pharmacy (43.5%) strongly agreed that irrational use of OTC drugs can be harmful (Supplementary Table A, <http://links.lww.com/MS9/A770>).

In terms of practice-related responses, the majority of students reported self-medicating with OTC drugs—85.7% in medicine, 91.3% in pharmacy, and 82.8% in nursing. Over half of the students from medicine (70.1%) and pharmacy (69.6%) used OTC drugs for minor health issues, in contrast to 48.3% of nursing students. A

considerable number of participants did not consult a healthcare provider before self-medicating—54.5% in medicine, 52.2% in pharmacy, and 37.9% in nursing. Additionally, only a small percentage regularly checked the expiry dates of OTC medications: 5.2% of medicine, 8.7% of pharmacy, and 20.7% of nursing students (Supplementary Table B, <http://links.lww.com/MS9/A770>).

95.9% of those above the age of 23 demonstrated moderate to poor knowledge, compared to 87.5% of those under 23. The younger group had a 3.32-fold higher chance of having good understanding (odds ratio [OR]: 0.301, 95% CI]: 0.071–1.182, $P = 0.088$). Women had a somewhat superior

Socio-demographic characteristics of the participants ($N = 129$)

S.N. Characteristics	Medicine ($N_1 = 77$)	Pharmacy ($N_2 = 23$)	Nursing ($N_3 = 29$)
1 Age (years)			
Early 20s (20–23)	15 (19.5%)	3 (13%)	14 (48.3%)
Mid 20s (24–26)	53 (68.8%)	15 (65.2%)	14 (48.3%)
Late 20s (27–29)	9 (11.7%)	5 (21.7%)	1 (3.4%)
30 and above	–	–	–
2 Gender			
Male	52 (67.5%)	17 (73.9%)	–
Female	25 (32.5%)	6 (26.1%)	29 (100%)
3 Living Status			
With Family	48 (62.3%)	15 (65.2%)	21 (72.4%)
Alone	29 (37.7%)	8 (34.8%)	8 (27.6%)
4 University			
Tribhuvan University	77 (100%)	–	–
Purbanchal University	–	23 (100%)	–
Pokhara University	–	–	29 (100%)



S.N. Characteristics	Medicine (N ₁ = 77)	Pharmacy (N ₂ = 23)	Nursing (N ₃ = 29)
5 Faculty			
Medicine	77 (100%)	–	–
Pharmacy	–	23 (100%)	–
Nursing	–	–	29 (100%)
6 Religion			
Hindu	70 (90.9%)	22 (95.7%)	27 (93.1%)
Buddhist	2 (2.6%)	–	1 (3.4%)
Christian	1 (1.3%)	–	1 (3.4%)
Muslim	2 (2.6%)	1 (4.3%)	–
Others	2 (2.6%)	–	–
7 Monthly Household Income (NPR)			
<30,000	10 (13%)	5 (21.7%)	6 (20.7%)
30,000–50,000	17 (22.1%)	9 (39.1%)	6 (20.7%)
51,000–100,000	35 (45.5%)	7 (30.4%)	14 (48.3%)
>100,000	15 (19.5%)	2 (8.7%)	3 (10.3%)
8 One Parent's Profession			
Medical	10 (13%)	6 (26.1%)	5 (17.2%)
Non-medical	67 (87%)	17 (73.9%)	24 (82.8%)
9 Permanent Address			
Koshi Pradesh	6 (7.8%)	2 (8.7%)	3 (10.3%)
Madhesh Pradesh	20 (26%)	9 (39.1%)	1 (3.4%)
Bagmati Pradesh	26 (33.8%)	6 (26.1%)	15 (51.7%)
Gandaki Pradesh	11 (14.3%)	1 (4.3%)	1 (3.4%)
Lumbini Pradesh	6 (7.8%)	5 (21.7%)	3 (10.3%)



S.N. Characteristics	Medicine (N ₁ = 77)	Pharmacy (N ₂ = 23)	Nursing (N ₃ = 29)
Karnali Pradesh	4 (5.2%)	–	4 (13.8%)
Sudurpaschim Pradesh	2 (2.6%)	–	2 (6.9%)
India	2 (2.6%)	–	–
10 Area (Permanent Address)			
Urban	42 (54.5%)	14 (60.9%)	22 (75.9%)
Rural	35 (45.5%)	9 (39.1%)	7 (24.1%)

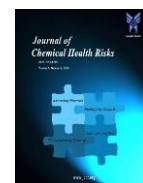
Females showed slightly better understanding (6.7%) compared to males (5.8%), with 1.16 times higher odds of having good understanding (OR = 1.16; 95% CI: 0.28–4.86; $P = 0.83$). Students living with their families were 1.65 times more likely to have good understanding, although this was not statistically significant (OR = 0.605; 95% CI: 0.12–3.13; $P = 0.55$). Similarly, students from Tribhuvan University had 2.11 times higher odds of good understanding compared to those from other universities (OR = 0.473; 95% CI: 0.092–2.442; $P = 0.33$). The majority of students from Bagmati Province (95.7%) and urban areas (96.2%) demonstrated moderate to poor understanding

Table 2 - Understanding and practice scores of the participants

S.N. Particulars	Characteristics	Medicine	Pharmacy	Nursing
1 Understanding	Median (Min–Max)	35 (25–45)	36 (26–41)	33 (27–42)
	Mean ± SD	34.77 ± 3.7	34.57 ± 3.6	33.45 ± 3.02
	Q1 – Q3	33 – 37	31 – 36	31 – 35
	Good Understanding	7.8% (6/77)	4.3% (1/23)	3.4% (1/29)
	Moderate to Poor Understanding	92.2% (71/77)	95.6% (22/23)	96.6% (28/29)
2 Practice	Median (Min–Max)	27 (10–46)	24 (15–40)	28 (18–44)
	Mean ± SD	27.31 ± 5.9	24.4 ± 6.1	27.9 ± 5.5
	Q1 – Q3	24 – 30	20 – 27	24 – 30
	Good Practice	1.3% (1/77)	4.34% (1/23)	3.4% (1/29)
	Moderate to Poor Practice	98.7% (76/77)	95.66% (22/23)	96.6% (28/29)

In the understanding-related items, a majority of students across all disciplines strongly agreed that OTC drug use should be discontinued immediately upon experiencing side effects (medicine: 55.8%, pharmacy: 47.8%,

nursing: 58.6%). A significant portion of pharmacy (52.2%) and medicine (57.1%) students perceived OTC medications as cost-effective, while most nursing students remained neutral on this point (62.1%).



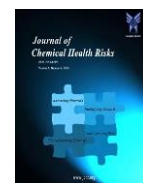
Furthermore, a considerable number of medicine (63.6%) and pharmacy (43.5%) students strongly agreed that irrational use of OTC drugs could be harmful (Supplementary Table A, <https://links.lww.com/MS9/A770>).

Regarding practice-related items, the majority of students reported self-medicating with OTC drugs (medicine: 85.7%, pharmacy: 91.3%, nursing: 82.8%). More than half of the medicine (70.1%) and pharmacy (69.6%) students used OTCs for minor illnesses, compared to 48.3% of nursing students. A substantial proportion did not seek medical advice before using OTC drugs (medicine: 54.5%, pharmacy: 52.2%, nursing: 37.9%). Routine checking of expiration dates was notably low across all groups (medicine: 5.2%, pharmacy: 8.7%, nursing: 20.7%) (Supplementary Table B, <https://links.lww.com/MS9/A770>).

Participants aged 23 or younger had 87.5% moderate-to-poor understanding, compared to 95.9% among those older than 23. The younger age group had 3.32 times greater odds of demonstrating good understanding (OR: 0.301, 95% CI: 0.071–1.182, $P = 0.088$). Female participants showed slightly better understanding (6.7%) than males (5.8%), with 1.16 times higher odds (OR: 1.16, 95% CI: 0.28–4.86, $P = 0.83$). Those living with family had 1.65 times greater odds of good understanding (OR: 0.605, 95% CI: 0.12–3.13, $P = 0.55$). Students from Tribhuvan University had 2.11 times higher odds of good understanding than those from other universities (OR: 0.473, 95% CI: 0.092–2.442, $P = 0.33$). Most students from Bagmati Province and urban areas exhibited moderate to poor understanding (95.7% and 96.2%, respectively), and no statistically significant associations were found for other variables such as household income, parental occupation, or religion (Table 3).

Table 3 - Factors Affecting the Understanding of Participants About the Self-Medication of OTC Drugs

S.N.	Characteristics	Understanding		Binary Logistic Regression		
		Moderate to Poor (%)	Good (%)	OR	95% CI	P-value
1	Age (Years)					
	Upto 23	28 (87.5)	4 (12.5)	1 (Ref)	0.071–1.282	0.088
	Above 23	93 (95.9)	4 (4.1)	0.301		
2	Gender					
	Male	65 (94.2)	4 (5.8)	1 (Ref)	0.277–4.856	0.830
	Female	56 (93.3)	4 (6.7)	1.16		
3	Living Status					
	With Family	78 (92.9)	6 (7.1)	1 (Ref)	0.117–3.127	0.545
	Alone	43 (95.6)	2 (4.4)	0.605		
4	University					
	Tribhuvan University	71 (92.2)	6 (7.8)	1 (Ref)	0.092–2.442	0.326
	Others	50 (96.2)	2 (3.8)	0.473		



5 Religion

Hindu	111 (93.3)	8 (6.7)	1 (Ref) 0.889–0.979 0.397
Others	10 (100)	-	0.933

6 Monthly Household Income

<50,000	52 (98.1)	1 (1.9)	1 (Ref) 0.629–44.213 0.090
>50,000	69 (90.8)	7 (9.2)	5.275

7 Parent's Profession

Medical	19 (90.5)	2 (9.5)	1 (Ref) 0.105–2.979 0.490
Non-medical	102 (94.4)	6 (5.6)	0.559

8 Permanent Address

Bagmati	45 (95.7)	2 (4.3)	1 (Ref) 0.344–9.178 0.488
Others	76 (92.7)	6 (7.3)	1.77

9 Area (Permanent Address)

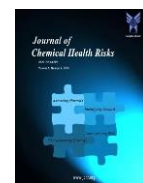
Urban	75 (96.2)	3 (3.8)	1 (Ref) 0.620–11.910 0.170
Rural	46 (90.2)	5 (9.8)	2.71

10 Faculty

Medicine	71 (92.2)	6 (7.8)	1 (Ref) 0.09–2.44 0.362
Others	50 (96.2)	2 (3.8)	0.473

Participants aged 23 or younger exhibited 100% moderate to poor practice. In contrast, those older than 23 had slightly better odds of good practice—1.03 times higher (OR: 1.03, 95% CI: 0.996–1.069, $P = 0.31$). Males showed marginally better practice (2.9%) compared to females, with 1.7 times higher odds (OR: 0.37, $P = 0.38$). Those living with family demonstrated improved practice (3.6%), although the association was not statistically significant (OR: 1.91, $P = 0.52$). Students

from universities other than Tribhuvan University had 1.5 times greater odds of good practice (OR: 0.568, 95% CI: 0.050–6.423, $P = 0.643$). Among Hindus, 2.5% reported good practice, with negligible difference in odds (OR: 0.97, 95% CI: 0.95–1.003, $P = 0.61$). Participants with a significant household income below 50,000 showed slightly better practice (3.8%), though this was not statistically (OR: 0.34, 95% CI: 0.030–3.849, $P = 0.362$) (refer to Table 4).



S.N.	Characteristics	Practice		Binary Logistic Regression	
		Moderate to Poor (%)	Good (%)	Moderate to Poor (%)	Good (%)
1	Age (Years)				
	Up to 23	32 (100)		0 (0)	
	Above 23	94 (96.9)		3 (3)	
2	Gender				
	Male	67 (97.1)		2 (2.9)	
	Female	59 (98.3)		1 (1.7)	
3	Living status				
	With family	81 (96.4)		3 (3.6)	
	Alone	45 (100)		0 (0)	
4	University				
	Tribhuvan University	76 (98.7)		1 (1.3)	
	Others	50 (96.2)		2 (3.8)	
5	Religion				
	Hindu	116 (97.5)		3 (2.5)	
	Others	10 (100)		0 (0)	
6	Monthly household income				
	< 50,000	51 (96.2)		2 (3.8)	
	> 50,000	75 (98.7)		1 (1.3)	
7	One of the parent's profession				
	Medical	21 (100)		0 (0)	
	Non-medical	105 (97.2)		3 (2.8)	
8	Permanent address (Province)				
	Bagmati	45 (95.7)		2 (4.3)	



S.N.	Characteristics	Practice	Binary Logistic Regression
	Others	81 (98.8)	1 (1.2)
9	Area (Permanent address)		
	Urban	76 (97.4)	2 (2.6)
	Rural	50 (98.0)	1 (2.0)
10	Practice		
	Medicine	76 (98.7)	1 (1.3)
	Others	50 (96.2)	2 (3.8)

Regarding understanding, 7.8% of medicine students demonstrated good understanding, compared to 3.8% from other faculties, with medicine students having 2.11 times higher odds of good understanding (OR: 0.473, 95% CI: 0.092–2.442, $P = 0.362$). For practice, 1.3% of medicine students and 3.8% of students from other faculties showed good practice, with the latter group having 3.04 times higher odds of good practice (OR: 3.040, 95% CI: 0.27–34.42, $P = 0.346$). However, faculty affiliation did not significantly affect participants'

understanding or practice of self-medication with OTC drugs.

None of the examined factors showed a statistically significant effect on the participants' understanding or practice of self-medication (all P -values > 0.05).

The box plot illustrated that understanding scores were generally higher than practice scores across all faculties (Fig. 1).

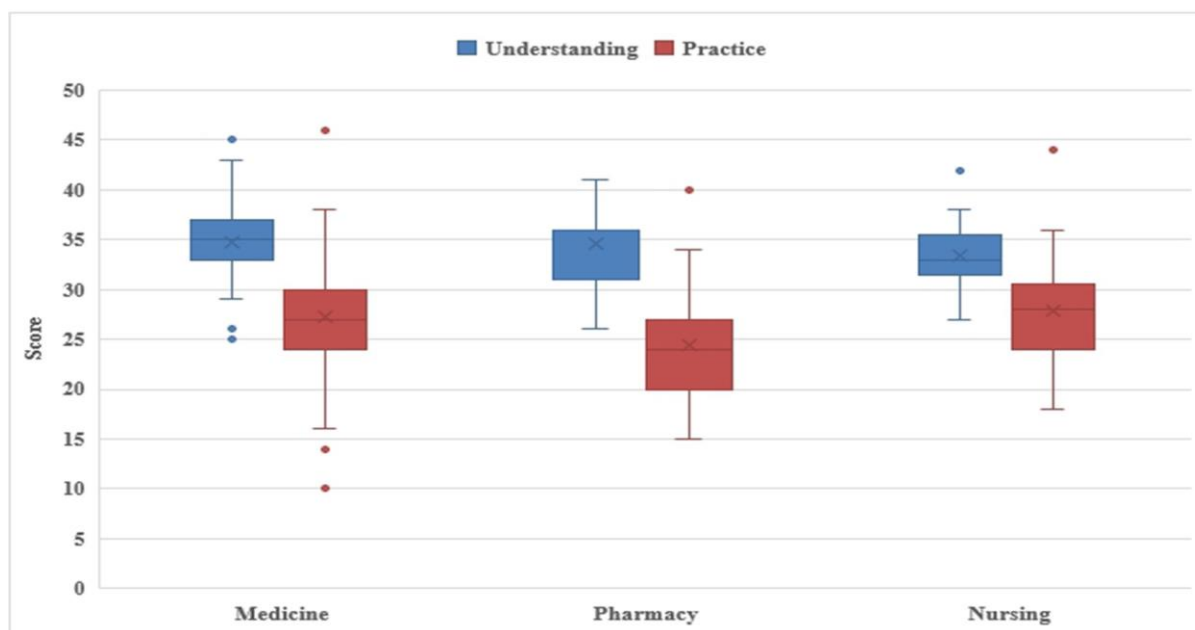
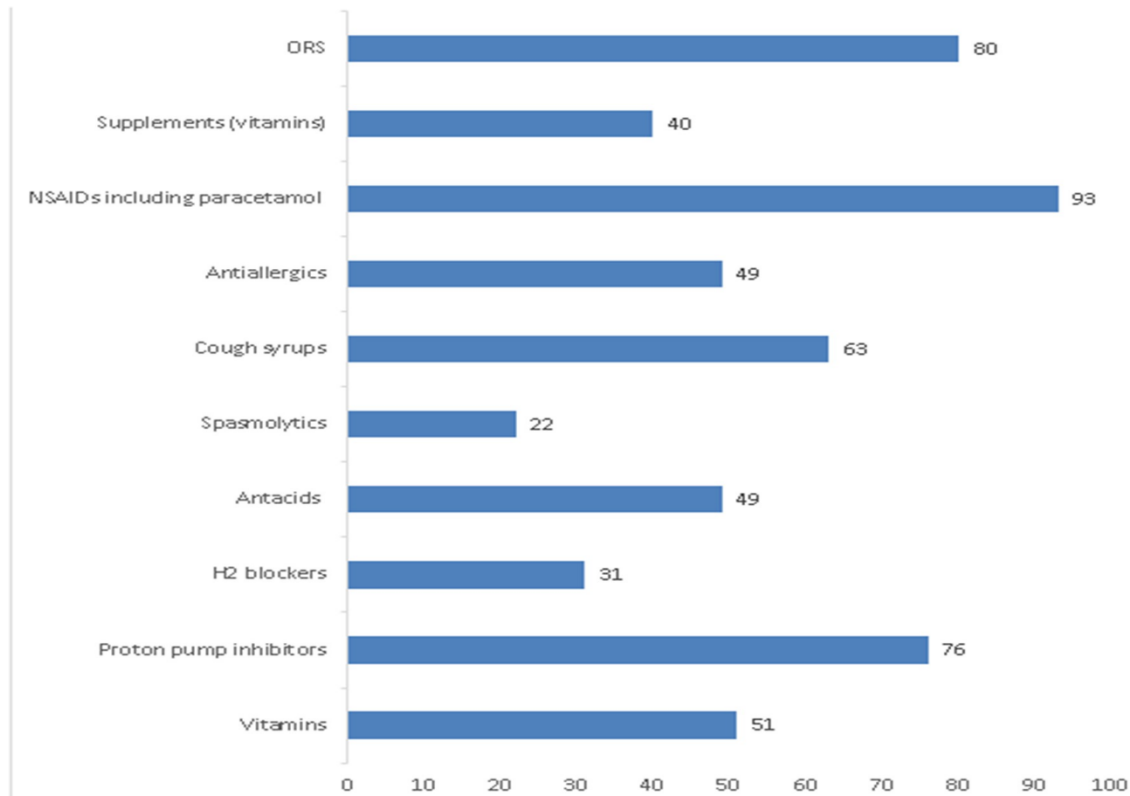


Figure 1.: Box plot showing the distribution of understanding and practice scores based on faculties.



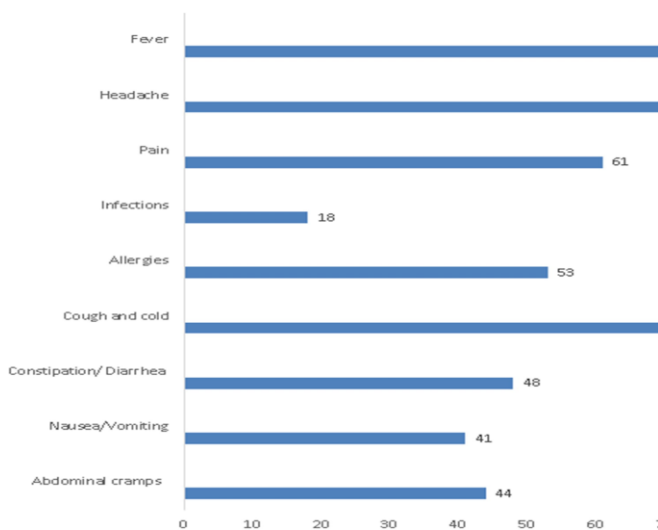
There was no notable relationship between

Figure 2.: Reasons (Illnesses) for self-medication with OTC.



understanding and practice scores, as indicated by Spearman’s rho of 0.114 and a P-value of 0.197.

The main reasons for self-medicating with over-the-counter (OTC) drugs were fever and symptoms of cough or cold, with headache and pain being the next most common reasons (see Fig. 2).



The respondents most frequently used NSAIDs, including paracetamol, for self-medication with OTC drugs. This was followed by the use of oral rehydration solutions (ORS) and proton pump inhibitors (PPIs). H2 blockers and spasmolytics

were the least commonly used (refer to Fig. 3).

Figure 3.: Commonly self-medicated OTC drugs.

Discussion

Over-the-counter (OTC) medications play an important role in the healthcare system, offering a convenient solution for managing common health problems. As healthcare expenses continue to rise, both men and women have increasingly turned to OTC drugs and self-medication in recent decades. In Nepal, the regulation of such substances is governed by the Drugs Act, which was introduced by the Government of Nepal. This act assesses drugs based on their medical use, potential for misuse, safety, and risk of dependency. For students in health sciences, having a clear understanding of the Drug Act is crucial—not only to grasp the legal framework



surrounding drug use but also to recognize the risks and consequences associated with inappropriate self-medication.

A 2018 study conducted by Hashemzaei et al. revealed that self-medication was more common among male students, aligning with the results of our research. However, their study indicated that pharmacy students possessed higher levels of drug knowledge, which differs from our findings that showed greater understanding among medical students. This discrepancy could be due to differences in academic curricula and the students' year of study.

A 2020 study found that self-medication was more prevalent among students who had healthcare professionals in their families, suggesting that exposure to medical knowledge at home boosted their confidence in using medications independently. In contrast, our study showed different results, possibly because many of the participants were living away from their families during their academic years. Additionally, a considerable number of students from medicine (42.9%), pharmacy (39.1%), and nursing (27.6%) backgrounds admitted to recommending OTC medications to friends or family. This trend is consistent with a study by Akici and Basaran, where 31% of university students reported suggesting medications to relatives. This behavior is concerning, as health science students—being future healthcare providers—should discourage the inappropriate sharing of medications and serve as role models for responsible drug use.

A 2018 study by Goyal et al. in India reported that the use of OTC medications was common among rural communities. This finding aligns with our current study, which observed that participants from rural backgrounds demonstrated relatively lower levels of good practice. However, these respondents showed a higher level of understanding. This contrast may be explained by the tendency of urban residents to seek direct medical care from hospitals or physicians, whereas those in rural areas may rely more on self-medication due to limited access to healthcare services and higher associated costs. Furthermore, as our participants are health science students, their medical knowledge may also influence their self-medication practices.

Unlike a study conducted in Nigeria, which found strong links between self-medication and variables such as age, gender, and academic discipline, our research did not identify any statistically significant effects of demographic factors on the understanding and practice of self-medication. This indicates that self-medication behaviors may be influenced by elements beyond socio-demographic characteristics. Our results are consistent with a study from Pakistan, which also reported no significant influence of demographic factors on self-medication habits.

A study conducted in Guntur, India, reported that 78.1% of pharmacy students believed the medications they used for self-medication were safe. Similarly, in our study, 52.5% of pharmacy students viewed OTC drugs as safe for self-treatment.

Regarding students' confidence in diagnosing symptoms, 39% of medicine students in our study disagreed that undergraduate health science students possess adequate diagnostic ability. In contrast, 39.1% of pharmacy students were neutral, while 44.8% of nursing students agreed. These results differ from a study in Ethiopia, where the majority of pharmacy students believed that health science students were competent in self-medication.

Our findings also showed that 29.9% of medicine students supported allowing undergraduate health science students to self-medicate with OTC drugs. Meanwhile, 39.9% of pharmacy students disagreed, and 37.9% of nursing students held a neutral stance. Comparatively, another study found that 37.3% of participants agreed that self-medication is acceptable for health science students. These variations may be attributed to differences in sample size and the characteristics of the study populations.

Although none of the characteristics showed a statistically significant influence on participants' understanding and practice of self-medication with OTC drugs, certain trends were observed. Males, Hindus, and individuals from Bagmati province and urban areas exhibited higher odds of having good understanding and practices. Better understanding was more common among older participants, those living with their families, students from Tribhuvan University, individuals with



higher family incomes, and those whose parents did not have medical backgrounds.

On the other hand, better self-medication practices were noted among younger participants, those living independently, students from other universities, individuals from lower-income families, and those with parents in the medical field. The type of faculty did not show a significant impact on either understanding or practice. However, medical students tended to have a better understanding, while students from pharmacy and nursing faculties demonstrated better practical application. These variations may be attributed to differences in curriculum structure, university environments, family backgrounds, and overall living conditions.

Our study also revealed limited knowledge about self-medication, aligning with findings from research conducted among university students in Portugal. This lack of awareness may be due to outdated curricula that do not adequately address self-medication. In contrast, studies from Ethiopia have reported strong knowledge of self-medication among health science students. Similarly, research from Jordan found that pharmacy students were more likely to engage in self-medication compared to medical students, which is consistent with our results. This may stem from pharmacy students' belief that they have sufficient knowledge, though this confidence can sometimes lead to unsafe practices.

The differences in understanding among students from various faculties and universities may be influenced by variations in curriculum content, faculty focus, age, family background, and living arrangements. To ensure consistent understanding across all health science disciplines, it is important to standardize and regularly update curricula based on faculty and institutional requirements.

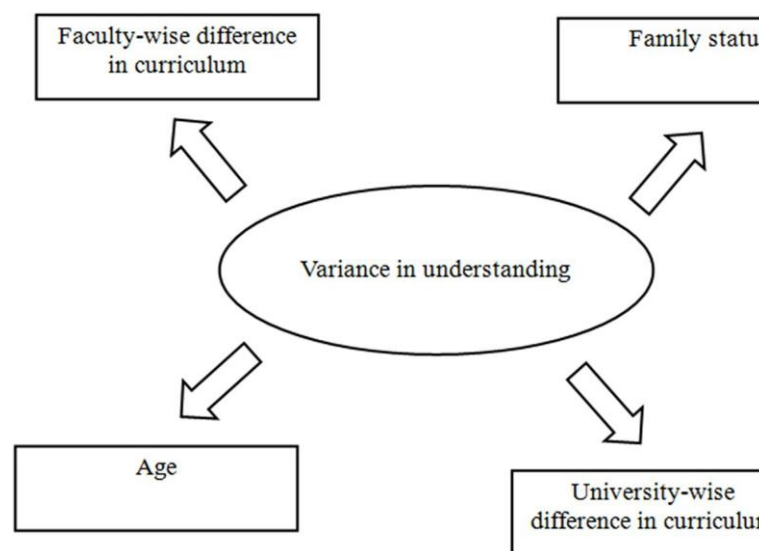


Figure 4.: Reasons for variance in understanding.

A study by Jawahir and Aziz reported that 49.9% of participants stored leftover medications for future use. Similarly, our study found that 42.9% of medicine students, 52.2% of pharmacy students, and 27.6% of nursing students used leftover OTC drugs for self-medication. This behavior may be driven by the convenience of avoiding the purchase of new medicines, although keeping leftover medications is generally discouraged. Another study showed that 71.3% of students checked the expiry dates of OTC drugs before use, which is comparable to the 93.4% of students in our study who followed this practice. Specifically, 39.4% of medicine students, 56.5% of pharmacy students, and 44.8% of nursing students reported checking expiry dates prior to using the medications.

Regarding the primary reasons for self-medication, our participants most commonly reported treating fever and headaches, with NSAIDs being the preferred medications. These findings align with those of Kiron et al. and Bekele et al. It is often expected that health science students, due to their medical knowledge, would engage in responsible self-medication. However, our study revealed otherwise, indicating that factors such as their lack of experience, immaturity, and overconfidence may contribute to unsafe practices. Additionally, stress, concerns about privacy, financial constraints, and



misunderstanding the risks related to drug interactions and side effects may also play a role.

important public health concern, particularly in LMICs where OTC drugs are commonly used for self-care. By focusing on undergraduate health science students, the study provides valuable insights into the knowledge and

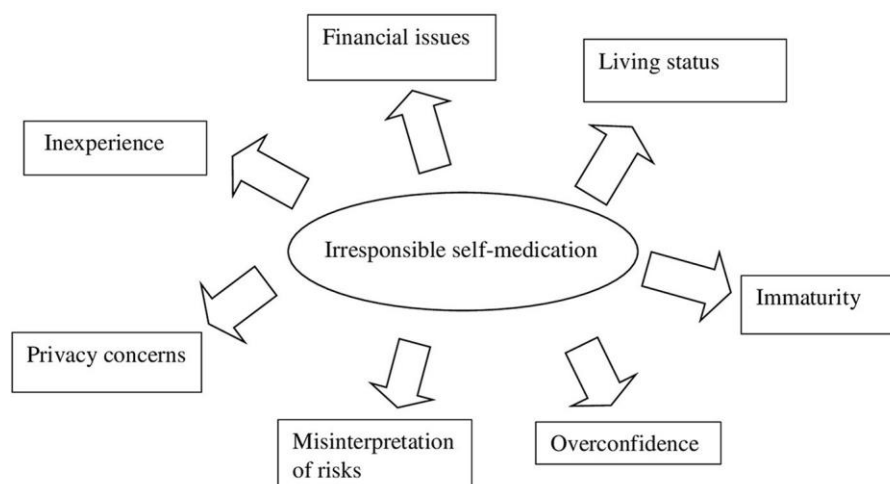


Figure 5.: Reasons for irresponsible self-medication practice.

Self-medication offers both advantages and potential dangers. When done responsibly, it can effectively address minor health issues. However, improper use carries significant risks. Although many OTC drugs are safe, a lack of understanding about drug interactions and side effects can lead to misdiagnosis and harmful outcomes. People who are well-informed about the appropriate and safe use of OTC medications for their specific conditions can make better decisions and manage symptoms on their own. Nevertheless, it is crucial to approach self-medication with caution and base decisions on accurate information. Professional medical advice should be sought if symptoms continue, worsen, or if there are indications of a more serious health problem.

Strengths and limitations of the study

This study is the first of its kind conducted in low- and middle-income countries (LMICs) like Nepal, using a multicenter approach across various faculties to capture a wider representation of the population. Its purpose was to identify interdisciplinary gaps and differences in the use of OTC medications. The research tackled an

practices of future healthcare professionals, which could inform future policy and educational improvements.

However, several limitations should be acknowledged. The study faced sampling bias, as the participants were drawn from medical colleges and universities in Kathmandu, which may not reflect the broader population of Nepal or other LMICs. Time constraints also affected the study's scope. Response bias is another concern, as participants might have given inaccurate or socially acceptable answers, especially on sensitive topics. Furthermore, being a cross-sectional study, it collected data at a single point in time, limiting the ability to assess changes over time.

Although the findings may not be universally applicable, they provide meaningful insights into the broader discourse on OTC drug use and self-medication. Further studies in comparable settings can help validate and extend these results, deepening our understanding of such practices.

We acknowledge the limitation of categorizing participants' knowledge and practices into broad groups of "good" and "moderate-to-poor." While this approach streamlines data analysis, it may obscure important individual differences. Future research should consider using more nuanced classification methods or continuous scoring systems to more accurately reflect the spectrum of knowledge and behaviors. Such approaches could



better identify specific gaps and trends, supporting the design of more targeted and effective interventions.

Recommendations

Health science students must be made aware of the risks associated with improper medication use, including toxicity, heightened side effects, and worsening of health conditions.

Addressing the issue of self-medication is essential, and efforts should be made to strengthen students' knowledge and practices to better equip future generations against the dangers of unregulated self-medication.

Faculty members should actively educate students on both the advantages and risks of self-medication.

Curricula should be updated to include comprehensive content on self-medication practices. Stricter policies and regulatory measures are needed to control self-medication and the distribution of OTC drugs.

Promoting the concept of responsible self-medication among health science students through seminars, workshops, and similar initiatives is strongly encouraged. Such efforts will enhance their knowledge and behaviors, ultimately supporting the safe and rational use of OTC medications.

Expanded multi-center research involving both health science students and the general public is necessary to investigate the various factors influencing self-medication.

These studies should be conducted at regular intervals to provide insights into the evolving trends in medication use within society.

Conclusion

The study found that respondents had limited knowledge of self-medication, heightening the risk of inappropriate and unsafe use of OTC drugs. Despite differences in academic disciplines, self-medication was widespread among health science students in LMICs such as Nepal. Notable concerns included the use of leftover medications, failure to check expiry dates, and reliance

on nearby pharmacies for self-medication. Fever and cough/cold were the most common reasons for self-medication, with NSAIDs and ORS being the most frequently used drugs.

These results underscore the urgent need for stricter enforcement of legislation, compliance with the Drug Act, and the implementation of effective programs and guidelines to curb unsafe self-medication practices among health science students. As future healthcare providers and influential figures among their peers, these students carry a vital responsibility to model the rational and responsible use of medications.

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