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Knowledge, Attitude, and Practices Toward Snakes and Snakebites among Non-Medical College Students in Cebu, Philippines: A Mixed Method Approach

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Abstract. Understanding community perceptions and behaviors toward snakes is crucial for effective prevention and management in regions where snakebites are a public health concern. Non-medical college students, a significant demographic, can influence broader community health practices and awareness. This study aims to assess the knowledge, attitudes, and practices (KAP) towards snakes and snakebites among non-medical college students in a technological university in the fifth district of Cebu, Philippines. Employing a convergent parallel research design, quantitative data were collected through structured questionnaires, while qualitative insights were obtained via semi-structured interviews. The sample included 546 non-medical college students selected through random sampling. The findings revealed significant gaps and misconceptions, with students exhibiting moderate knowledge about snakes and snakebites. Attitudes were predominantly negative, characterized by fear and aversion. Practices concerning snakebite management needed to be revised, with many students relying on traditional rather than evidence-based methods. The study highlights considerable areas for improvement in the knowledge and practices of non-medical students regarding snakebite management, coupled with generally negative attitudes toward snakes. The novelty of this research lies in its focus on non-medical college students and specific demographics within a technological university, providing insights that can inform targeted educational interventions. Implementing educational programs to improve KAP among students is recommended, emphasizing correct snakebite first aid and fostering a more informed and balanced view of snakes. This research has significant implications for public health, suggesting that targeted education can enhance community health practices and awareness regarding snakebite prevention and management.

Keywords: KAP; non-medical college students; snakes; snakebites

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INTRODUCTION

Snakebite envenomation is a significant global health concern, causing many deaths and disabilities annually (Hifumi et al., 2015; Ochola et al., 2018). In the Philippines, particularly in Cebu, residents have urged the government to establish snakebite treatment facilities due to numerous incidents (Cruz et al., 2018; Piquero, 2024). Despite the availability of polyvalent antivenom at Vicente Sotto Memorial Medical Center, the specific Philippine cobra antivenom is only available in Manila (Fuentes, 2024; Palaubsanon & Magsumbol, 2024). Understanding non-medical college students' knowledge, attitudes, and practices (KAP) towards snakes and snakebites is crucial for developing effective educational interventions and improving management strategies (Harrison & Gutierrez, 2016).

Several studies have examined the Knowledge, Attitude, and Practices (KAP) towards snakes and snakebites, revealing common themes (Ahsan et al., 2017; Alves et al., 2014; Braitberg et al., 2021; Krishnaleela et al., 2018; Taieb et al., 2018). Togridou et al. (2018) found misconceptions and insufficient knowledge about snakebites in rural Indian communities, while da Silva et al. (2019) highlighted similar issues in the Brazilian Amazon, stressing the need for better education. Kumar et al. (2019) discovered persistent misconceptions among medical interns in Kerala despite their awareness of venom risks. Subedi et al. (2018) and He et al. (2024) identified

significant gaps in knowledge and first-aid practices, underscoring the need for global education on snakebite management.

Studying the knowledge, attitudes, and practices (KAP) towards snakes and snakebites among non-medical college students is crucial due to significant correlations with key variables. Understanding their knowledge helps identify snake species and assess risks accurately (Bravo-Vega et al., 2021). Attitudes towards snakes affect fear levels and behaviors like wearing protective footwear or avoiding snake-prone areas (Zu, 2019). Assessing their practices in encountering snakes and administering first aid is vital for evaluating their readiness to respond effectively to snakebite incidents.

Despite existing research on KAP towards snakes and snakebites, significant gaps still need to be found among non-medical college students in the Philippines. More empirical data on the prevalence and severity of snakebite incidents in this group needs to be collected (Inthanomchanh et al., 2017). Knowledge gaps in snake ecology, behavior, and identification hinder prevention and first aid (Pandey et al., 2023). Additionally, practical skills in snakebite management and standardized assessment tools for measuring KAP are needed for better comparative analysis (Sulaiman et al., 2020).

This study addresses the knowledge gap by assessing the KAP towards snakes and snakebites among non-medical college students in the Philippines. It will use surveys and interviews to explore students' knowledge of local snake species, attitudes toward snakes, and practices responding to snake encounters and bites. The study will also examine the influence of socio-demographic factors on KAP, contributing to SDG 4 by enhancing students' awareness of environmental hazards and SDG 15 by promoting behaviors that reduce human-snake conflicts (Hák et al., 2016). The research aims to develop targeted educational campaigns and interventions for effective snakebite prevention and management by filling this gap.

The expected outputs of this study include a comprehensive understanding of the knowledge, attitudes, and practices towards snakes and snakebites among non-medical college students in the Philippines. This will be disseminated through academic publications, conference presentations, and possibly policy briefs to relevant stakeholders, including educational institutions, public health agencies, and snakebite treatment centers. Furthermore, the findings will be a foundation for designing evidence-based interventions to improve snakebite awareness, prevention, and management strategies among non-medical college students. Ultimately, the study aims to reduce snakebite-related morbidity and mortality, contributing to the overall public health agenda in the Philippines.

This study assessed the level of knowledge, attitudes, and practices (KAP) towards snakes and snakebites among non-medical college students in Cebu, Philippines. It also aims to qualitatively explore non-medical college students' underlying beliefs, perceptions, and experiences towards snakes and snakebite incidents through in-depth interviews. Lastly, the study seeks to integrate quantitative and qualitative findings to provide a comprehensive understanding of KAP towards snakes and snakebites among non-medical college students, facilitating the development of targeted interventions for education and prevention.

METHODS

Design

A mixed-method approach using convergent parallel design was used in this study. The researcher simultaneously conducted both the quantitative (descriptive-correlational) and qualitative (descriptive phenomenological) phases parallel to each other, weighed the method equally, examined the findings of each phase, and interpreted the results (Creswell, 2021).

Participants

Using a random sampling technique, 546 non-medical college students in four college departments were recruited from a technological university in Cebu, Philippines. According to Hair et al. (2019), to obtain the sample number, each item in the questionnaire must be multiplied by 5. In this respect, this study's total number of questions was 65, 65 x 5 =325. Thus, the sample complies with Hair et al.'s (2019) condition and suggestion. For the qualitative part, twelve (12) participants were recruited as participants for the interview. Sampling continued until data were saturated. There were five males and seven females. Table 1 shows the demographic profile of the respondents. Most students are aged 20-22 years (69.05%), with a majority being female (59.89%) and primarily from the College of Education, Arts, and Science (41.94%). Most are in their second year (68.87%), and over half (55.13%) reside in rural areas.

Table 1. Demographic Profile of the Students

Variables	Profile	Responses	
		f	%
Age	17-19 years old	93	17.58
	20-22 years old	377	69.05
	23-25 years old	58	10.62
	26 years old and above	18	3.30
Sex	Male	219	40.11
	Female	327	59.89
College Department	College of Education, Arts, and Science	229	41.94
	College of Engineering	85	15.57
	College of Management and Entrepreneurship	78	14.29
	College of Technology	154	28.21
Year Level	First Year	57	10.44
	Second Year	376	68.87
	Third Year	64	11.72
	Fourth Year	49	8.97
Geographical Location	Rural	301	55.13
	Urban	245	44.87

Instrument

An instrument adapted from Eid et al. (2021), Kumar et al. (2019), and Pathak and Metgud (2017) was utilized in the study. This instrument assessed students' knowledge, attitudes, and practices regarding snakes and snakebites. Experts (a licensed veterinarian, a language teacher, and an expert on research instrumentation) conducted and authenticated the instrument's content validity. Items that do not fit the Philippine context were either modified or removed. They were asked to evaluate if the items were essential or not. Results were tallied, and content validity ratios (CVR) were computed using the formula proposed. Out of 70 items, 65 items were included in the draft. The draft was administered to 50 non-medical students online through Google Forms. The research instrument's reliability testing yielded a Cronbach's alpha ranging from 0.75 to 0.84 across its components, indicating acceptable to good reliability. The average Cronbach's alpha of 0.79 suggests that the instrument is reliable. The qualitative data collection and analysis were conducted independently yet concurrently with a quantitative study. A semi-structured open-ended instrument was utilized in the study. The interview guide directed the researchers toward gathering pertinent details essential to understanding non-medical college students' underlying beliefs and behaviors.

Data Gathering Procedures

The Local Research Ethics Office of Cebu Technological University-Danao Campus approved the study, adhering to respect, beneficence, and justice principles. Data was collected using a multifaceted approach. A quantitative survey with multiple-choice and Likert scale items was distributed to non-medical college students to measure their knowledge, attitudes, and practices regarding snakes and snakebites. Additionally, qualitative data was obtained through focus group discussions, allowing an in-depth exploration of students' experiences and beliefs and through direct observations of behaviors related to snakebite prevention on campus. This integrated approach provided a comprehensive understanding of the students' perspectives and practices regarding snakes and snakebites, facilitating a nuanced analysis of the topic.

Data Analysis

Quantitative data was analyzed using descriptive statistics to summarize participant responses and inferential statistics (Pearson r-correlation) to examine relationships between variables. For qualitative data, semi-structured interviews were conducted until thematic saturation was reached, and thematic analysis (Nowell et al., 2017) was employed to identify and refine themes. Findings from both quantitative and qualitative analyses were compared for convergence, complementarity, or contradictions, providing a well-rounded conclusion about non-medical college students' knowledge, attitudes, and practices regarding snakes and snakebites.

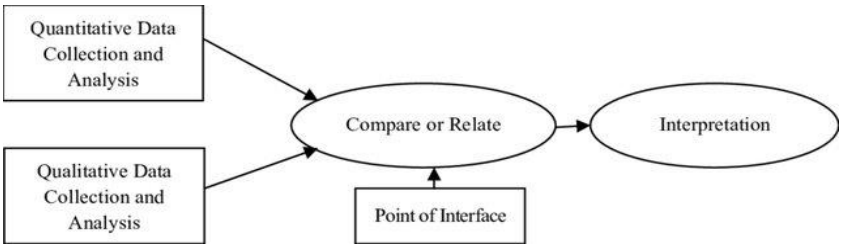

Figure 1. Convergent parallel mixed methods design

RESULTS AND DISCUSSION

Snake Species and Venomosity Identification

Table 2 shows that while most respondents could correctly identify the venomosity of snakes, their ability to identify snake images accurately was generally lower. The Philippine common cobra had the highest correct identification rates for image and venom, suggesting more familiarity with this species. These findings indicate a need for educational programs to improve the identification skills of venomous snakes to enhance public safety and effective response to snake encounters.

Table 3 presents the distribution of respondents' knowledge regarding nonvenomous snakes, focusing on their ability to identify snake species from images correctly and their understanding of the nonvenomous nature of these species. The data reveal varying levels of accuracy among respondents, with some species, like the Luzon bronze back snake and Common Tree Snake, being identified correctly by approximately half of the respondents. However, there were significant challenges in correctly identifying species such as the Gervais Worm Snake and the Common Wolf Snake, where correct identification rates were notably lower. This disparity suggests a need for improved education and awareness among the public regarding nonvenomous snakes, as inaccurate identification could lead to unnecessary fear or mishandling of these harmless species. Enhancing public knowledge about nonvenomous snakes is crucial for fostering a more accurate understanding of local biodiversity and promoting coexistence and conservation efforts. Educational programs should emphasize distinguishing features of nonvenomous snakes to reduce misunderstanding and facilitate safer interactions in community settings.

Table 2. Distribution of Respondents According to Knowledge regarding Venomous Snakes

Snake Species	Image Identified Correctly N (%)	Image Identified Incorrectly N (%)	Venomosity Identified Correctly N (%)	Venomosity Identified Incorrectly N (%)	Both Image and Venomosity Identified Correctly N (%)	Both image and venomosity were identified incorrectly N (%)
King Cobra	261 (47.80)	285 (52.20)	475 (87.00)	71 (13.00)	253 (46.34)	69 (12.64)
Oriental whipsnake	299 (54.76)	247 (45.24)	434 (79.49)	112 (20.51)	238 (43.59)	55 (10.07)
Chinese Sea Krit	474 (86.81)	72 (13.19)	385 (70.51)	161 (29.49)	339 (62.09)	42 (7.69)
Philippine common cobra	524 (95.97)	22 (4.03)	540 (98.90)	6 (1.10)	518 (94.87)	4 (0.73)
Philippine Pit Viper	495 (90.66)	51 (9.34)	455 (83.33)	91 (16.67)	416 (76.19)	11 (2.01)

Table 3. Distribution of Respondents According to Knowledge regarding Nonvenomous Snakes

Snake Species	Image Identified Correctly N (%)	Image Identified Incorrectly N (%)	Venomosity Identified Correctly N (%)	Venomosity Identified Incorrectly N (%)	Both Image and Venomosity Identified Correctly N (%)	Both image and venomosity were identified incorrectly N (%)
Gervais Worm Snake	147 (26.92)	399 (73.08)	349 (63.92)	197 (36.08)	116 (21.25)	177 (32.42)
Common Tree Snake	241 (44.14)	305 (55.86)	320 (58.61)	226 (41.39)	166 (30.40)	154 (28.21)
Philippine rat snake	229 (41.94)	317 (58.06)	243 (44.51)	303 (55.49)	135 (24.73)	211 (38.64)
Luzon bronze back snake	257 (47.07)	289 (52.93)	273 (50.00)	273 (50.00)	158 (28.94)	183 (33.52)
Common Wolf Snake	114 (26.37)	432 (79.12)	252 (46.15)	294 (53.85)	144 (26.37)	166 (30.40)

Percentage of Non-Medical College Students Who Answered Snakes Species and Venomosity Identification Correctly

Table 4 presents data on the performance of non-medical college students in identifying snake species and determining their venomosity. The mean frequency of correct identification for snake species is 6.30 out of 10 items, translating to a 63.00% correct identification rate. This indicates a moderate level of knowledge among the students regarding snake species identification. Similarly, students scored slightly higher in identifying whether a snake is venomous or non-venomous, with a mean frequency of 7.14 out of 10 items, corresponding to a 71.40% correct identification rate.

Table 4. Percentage of Non-Medical College Students Who Answered Snakes and Venomosity Identification Correctly

Topics	No. of Item	Mean Frequency	Percent (n=546)
Snake Species Venomous or	10	6.30	63.00
Non-venomous	10	7.14	71.40

Results suggest a reasonable understanding among students; there remains room for improvement, particularly in recognizing specific snake species. Targeted educational initiatives could address these gaps, ultimately enhancing public safety and reducing the incidence of snakebite incidents. This was parallel with the quantitative and qualitative data, which led to the emergence of ***Theme 1: Moderate Idea on Snakes*****.** These non-medical students express moderate confidence in identifying snakes, acknowledging proficiency with common species while admitting difficulty with lesser-known ones. They also recognize the importance of enhancing their understanding of venomosity for improved public safety, suggesting a willingness to educate themselves further. Some of the non-medical students' statements are as follows:

> *"... my knowledge of snake identification is relatively good. I can recognize common species, but I might need help with some of the lesser-known snakes…" (P1, P6, P9)*
>
> *"As for venomosity, I understand which snakes are venomous and which are not, but I am not an expert. I think there is a need for more education and awareness on this topic to improve public safety." (P3)*

Combining quantitative data with qualitative statements from non-medical college students provides a comprehensive understanding of their knowledge and attitudes toward snake species and venomosity. The quantitative data reveals a moderate level of knowledge, while qualitative statements show confidence levels and areas needing improvement. Students' proficiency with common snake species but difficulty with lesser-known ones aligns with higher correct venomous identification rates, indicating a need for targeted educational interventions. Kumar et al. (2019) and Alqahtani et al. (2022) found moderate knowledge among non-health students and emphasized educational improvements, highlighting students' willingness to learn more. This integration suggests that tailored educational initiatives and targeted awareness campaigns could improve knowledge and reduce snakebite incidents.

Knowledge on Snakes and Snakebites Among Non-Medical Students

Table 5 and Figure 2 present data on the knowledge of snakes and snakebites among non-medical students, indicating varying levels of awareness and misconceptions. A significant portion of students, 41.03%, believe that most snakes are aggressive, while 33.88% think that only some are aggressive (K1). This suggests that many students may have misconceptions about snake behavior, leading to unnecessary fear or inappropriate reactions during encounters. Additionally, 63.55% of respondents correctly understand that snakes can be encountered both day and night (K2), while 67.58% recognize that snakes are more likely to be encountered during the dry season (K3).

Table 5. Knowledge of Snake and Snakebite Among Non-Medical Students

Question Number	Answer	Frequency (%)
K1. Do you think snakes are an aggressive species?	All snakes are aggressive.	102 (18.68)
	Most snakes are aggressive.	224 (41.03)
	Snakes are not aggressive.	35 (6.41)
	Some snakes are aggressive.	185 (33.88)
K2. When you encounter a snake, when will snakes be encountered?	Day Time	101 (18.50)
	Nighttime	98 (17.95)
	Day and Nighttime	347 (63.55)
K3. At what season will snakes be encountered?	Wet Season	177 (47.97)
	Dry Season	369 (67.58)

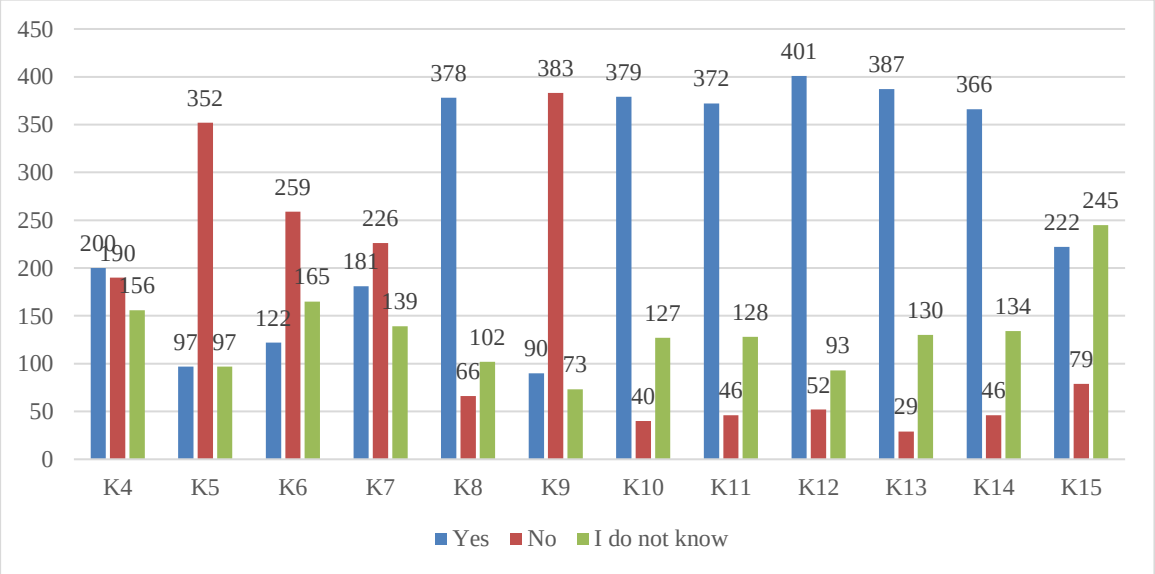

Figure 2. Knowledge of Snake and Snakebites (cont.)

The responses reveal gaps in knowledge regarding venomous and non-venomous snakes, with only 36.63% of students confident in their ability to distinguish between the two (K4). This lack of confidence is further compounded by the fact that 28.57% admitted they need to learn how to identify venomous snakes. Misconceptions are evident, as 17.77% of students erroneously believe all snakes are poisonous (K5), and 22.34% think snake venom has supernatural healing properties (K6). These gaps highlight the need for educational programs to provide accurate information on snake identification and the properties of snake venom.

The data also show that a majority of students, 70.15%, disagree with the notion that killing snakes is the best way to prevent snakebites (K9), which indicates an understanding of the ecological importance of snakes. However, misconceptions persist, with 40.66% incorrectly believing that applying a tourniquet above a snakebite site helps prevent the spread of venom (K15). Encouragingly, most students, 73.44%, are aware that medical treatment is available for snakebites (K12), and 70.88% understand that antivenom is effective if administered promptly (K13). This awareness underscores the importance of disseminating accurate first-aid information to improve snakebite response and reduce fatalities.

On the qualitative analysis, ***Theme 2: Snakes are Defensive rather than Aggressive*** emerged. Most non-medical students (10 out of 12) view snakes as defensive creatures rather than inherently aggressive. They believe snakes tend to avoid humans and only exhibit defensive behavior when they feel threatened. Participants shared that,

> *"... snakes are generally defensive rather than aggressive." (P1, P2, P7, P12)*
> *"... only attack when threatened." (P6)*
> *"Snakes usually avoid humans and are defensive rather than aggressive." (P8)*

Educational programs must address misconceptions about snakes' aggressiveness, promote coexistence, and reduce unwarranted fear or harm by humans. The study reveals significant knowledge gaps among non-medical students,

who mistakenly perceive snakes as aggressive and need help distinguishing between venomous and non-venomous species. Despite these misconceptions, students recognize snakes' ecological importance and the effectiveness of medical snakebite treatments, underscoring the need for comprehensive educational initiatives. Arumugam et al. (2019) and Kharusha et al. (2020) found similar misconceptions among non-medical and medical students, with educational interventions improving understanding and reducing fear. These studies highlight the crucial role of education in fostering accurate understanding and appropriate reactions during snake encounters.

Attitude on Snakes and Snakebites Among Non-Medical Students

The attitudes of non-medical students towards snakes and snakebites reveal fear, awareness of the need for conservation, and recognition of the importance of education and training (Table 6 and Figure 3). When encountering a snake (A1), the predominant reaction is to run away and avoid it (67.95%), reflecting a high level of fear and aversion. Only a small percentage (6.59%) consider conservation, and very few would engage with the snake in any capacity, such as taking a photo from a distance (2.38%). The primary reason behind people's panic about snakes (A2) is the inability to distinguish between toxic and non-toxic species (42.49%), followed by the sudden behavior of snakes (21.43%) and myths and rumors (20.26%). This highlights the need for improved education on snake identification and behavior to alleviate unnecessary fear.

Table 6. Attitude on Snakes and Snakebites Among Non-Medical Students

Question Number	Answer	Frequency (%)
A1. If you encounter a snake, what will be your first reaction?	Chase it until it is killed.	12 (2.20
	I do not care about it at all.	14 (2.56)
	I am in a hurry to get help to get rid of them.	88 (16.12)
	I tell no one since these species should be conserved.	36 (6.59)
	Run away and avoid it.	371 (67.95)
	Take a photo of it from a distance.	13 (2.38)
	Try to capture it for a photo and then kill it.	0
	Try to capture it for a photo and then release it.	13 (2.38)
A2. In your opinion, what is the reason behind people's panic about snakes?	Inability to distinguish the toxic type from the non-toxic and which part is venomous.	232 (42.49)
	It is a strange shape, and how it crawls on the ground.	78 (14.29)
	National Geographic programs	9 (1.65)
	Rumors, myths, and stories revolve around it.	110 (20.26)
	Sudden behavior and manner of appearance,	117 (21.43)
A3. What would be the best tools to raise awareness of snakes in the Philippines?	Education (schools and workshops)	108 (19.78)
	Media and social media tools	41 (7.51)
	Printed materials	7 (1.28)
	Training, especially first aid kits and snake precautionary measures	390 (71.43)

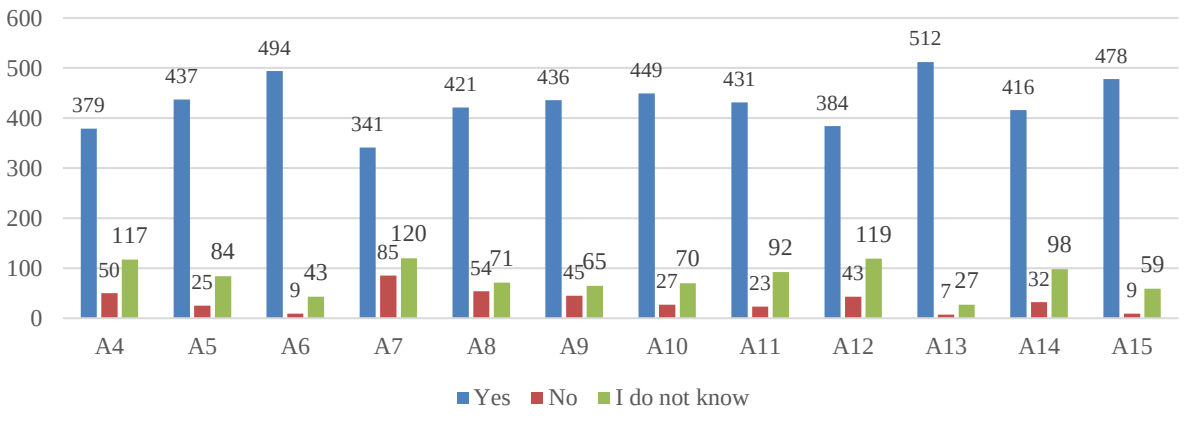

Figure 3. Attitude on Snake and Snakebites (cont.)

Students strongly support educational initiatives as the best tools to raise awareness about snakes (A3), with a significant majority favoring training in first aid and precautionary measures (71.43%) (A8). This is supported by their belief that healthcare professionals should receive specialized training in snakebite management (90.48%) (A6). Furthermore, a substantial proportion (80.04%) acknowledge the ecological importance of snakes, and many believe that raising awareness could reduce snakebite incidents (82.23%) (A10). This suggests that there is a recognition of the importance of conserving snake populations and ensuring public safety through proper education and preparedness.

Based on the analyses of the narratives on the respondent's attitude towards snakes and snakebites, ***Theme 3. Fear and Respect Influenced by Knowledge and Education Snakes.*** This theme captures the dual nature of students' attitudes towards snakes and snakebites. While there is a prevalent fear and discomfort, there is respect for snakes and an acknowledgment that better education could alleviate fears and promote a more balanced understanding of these creatures. This suggests that educational initiatives could be crucial in shifting perceptions from fear to informed respect and caution. Participants highlighted that,

> *"I'm terrified of snakes; just seeing them makes me uncomfortable." (P3)*
>
> *"I think proper education on snake behavior and first aid could reduce fear, as snakes are often misunderstood." (P8).*
>
> *"I am mostly indifferent to snakes unless I come across one. My main concern is the risk of snakebites. I think it is important for colleges to provide information on what to do in case of a snakebite, as I would not feel confident handling one." (P10)*
>
> *"I have respect for snakes. They can be dangerous if provoked, but they usually avoid humans. The thought of a snakebite is scary, but the fear would be lessened if we had better education on identifying venomous snakes and first aid." (P12)*

The statements highlight varying attitudes towards snakes, ranging from fear and discomfort to indifference and respect tempered by caution. The implications suggest a need for comprehensive education on snake behavior, first aid, and snakebite management to alleviate fear and enhance preparedness. Such education could foster a more informed and balanced perspective, emphasizing respect for snakes while equipping individuals with practical knowledge to mitigate risks effectively. Addressing these perspectives could lead to more excellent safety and confidence in snake encounters.

Several studies highlight gaps in students' knowledge of snakebite first aid and prevention, affecting their attitudes and practices (Pandey et al., 2016; Subedi et al., 2018; Uyeda et al., 2022). In Nepal, only 12.6% of preclinical students had sufficient knowledge compared to 69% of clinically trained students, with school textbooks as a primary source (Subedi et al., 2018). Negative attitudes in Indonesia, such as advocating killing snakes, underscore the need for better education (Subedi et al., 2018). Enhancing snakebite education in schools could promote safer behaviors and effective medical responses (Pandey et al., 2016; Uyeda et al., 2022), highlighting the importance of medical training in snakebite management (Subedi et al., 2018). Comprehensive educational campaigns and public health policies should address misconceptions, promote coexistence, and include first-aid training to improve responses and support snake conservation.

Practices on Snakes and Snakebites Among Non-Medical Students

Table 7 and Figure 4 reveal significant gaps in the knowledge and attitudes of non-medical students regarding snakebites and appropriate responses. When asked about immediate measures following a snakebite (P1), the majority (55.49%) correctly identified the need to rush to the nearest health facility. However, a substantial proportion (17.40%) still believed in the outdated practice of tying a tourniquet, which can do more harm than good by restricting blood flow. Similarly, misconceptions about treating snakebites, such as washing the wound with soap (14.29%) and spitting out blood (11.17%), were also prevalent. This indicates a critical need for educational interventions to correct these harmful beliefs and promote evidence-based practices.

Table 7. Practices on Snakes and Snakebites Among Non-Medical Students

Question Number	Answer	Frequency (%)
P1. What immediate measures should be taken if a snake bites you?	Rush to the nearest health facility	303 (55.49)
	Tie a tourniquet at the site	92 (17.40)
	Wash with soap.	78 (14.29)
	Spitting out the blood.	61 (11.17)
	Home-based remedies	8 (1.47)
	Visit a local quack or faith healer	4 (0.73)
P2. What measure will you take upon seeing a snake?	Remain calm and slowly back away from the snake	260 (47.62)
	Alert others nearby to the snake's presence and maintain a safe distance.	115 (21.06)
	Attempt to identify the species of snake from a safe distance if you are knowledgeable about local snakes	28 (5.13)
	Call local wildlife authorities or snake removal services for assistance in safely relocating the snake if it is in a population.	143 (26.19)

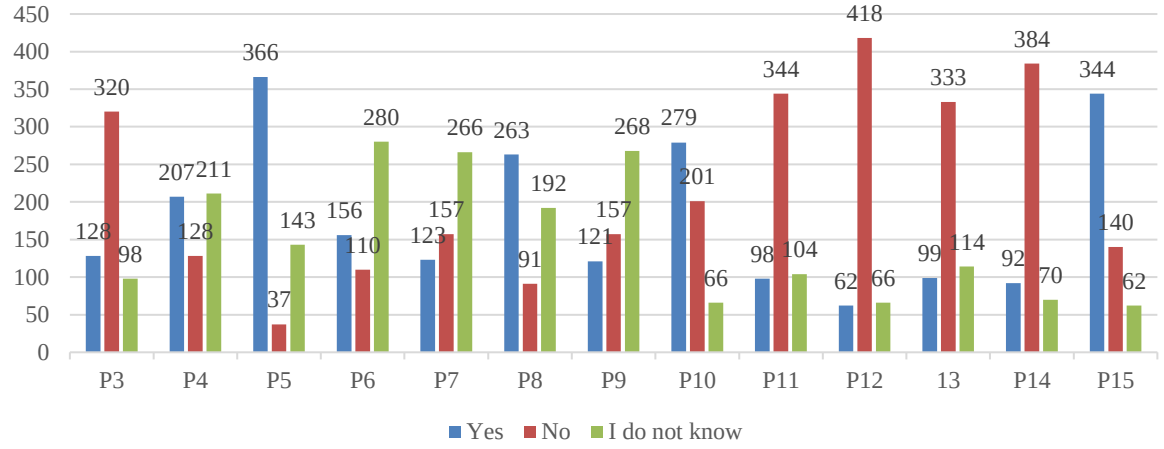

Figure 4. Practices on Snake and Snakebites (cont.)

Respondents' reactions to encountering a snake generally demonstrate cautious behaviors (P2), with 47.62% remaining calm and backing away and 26.19% calling wildlife authorities. This indicates awareness of personal safety and professional assistance. However, only 5.13% would attempt to identify the species, reflecting a lack of confidence or knowledge, and only 23.44% feel confident identifying venomous snakes (P3). Many students need to correct their beliefs about first aid for snakebites, such as the effectiveness of incision (28.57%) (P6) and leg elevation (22.53%) (P7), and 63% need to be made aware of the local emergency contact number for snakebite response (P11). These findings underscore the need for comprehensive educational programs to improve snakebite awareness, first-aid knowledge, and emergency response understanding.

Based on the narratives of the respondents, ***Theme 4. Proactive Safety and Preparedness on Snakes and Snakebites.*** This theme emphasizes the students' efforts to take proactive measures to prevent snake encounters and bites, combined with a readiness to respond effectively if such incidents occur. The responses highlight the importance of being informed, staying cautious, and having practical tools and knowledge to manage snake-related risks. Participants highlighted that,

> *"I try to avoid places where snakes are likely to be, like tall grass or rocky areas. I always wear long pants and boots to protect myself outdoors. it's important to be prepared even if the risk seems low." (P1)*
>
> *"I've attended a couple of workshops on wildlife safety that included information on snakes." (P9)*
>
> *"My approach is mostly about awareness and caution. I clear the area and keep it clean to avoid attracting snakes. If I see a snake, I remain calm and slowly back away. Additionally, I've read up on basic first aid steps for snakebites." (P11)*

Non-medical college students demonstrate proactive safety measures and preparedness regarding snakes and snakebites. They engage in preventive actions such as avoiding snake-prone areas, wearing protective clothing, and staying on established paths. Some students have learned to identify local snake species and attended wildlife safety workshops to enhance their readiness. They also educate themselves on using snakebite kits and practice campsite cleanliness to deter snakes. Additionally, they remain composed during snake encounters and are familiar with basic first aid, including local emergency contacts stored on their phones. Subedi et al. (2018) and Kharusha et al. (2020) revealed significant gaps in community knowledge about snakebite management, with widespread misconceptions and harmful practices like tourniquet application. Despite recognizing the need for medical assistance, many participants needed to understand proper first-aid measures and identify venomous snakes. Both studies emphasize the need for targeted educational interventions to promote evidence-based first-aid practices.

Correlation of Snakes and Venomosity Identification, Knowledge, Attitude, and Practices

Table 8 shows significant correlations among snake identification, venomosity identification, knowledge, attitude, and practices. There is a weak negative correlation between identification skills and both knowledge and attitude, suggesting better identification skills are associated with lower knowledge and less favorable attitudes. However, knowledge has a strong positive correlation with attitude and practices, and attitude strongly correlates with practices. These findings highlight the need for educational interventions to enhance knowledge and address attitudes and practices toward snakes. Onishi et al. (2021) and Pandey et al. (2023) also found positive correlations between knowledge, attitudes, and practices related to snakes, supporting the effectiveness of educational efforts. Such interventions can improve public understanding and safety by fostering positive behaviors towards snakes and snakebite management.

Table 8. Correlation of Snakes and Venomosity Identification, Knowledge, Attitude, and Practices

Construct		Snakes and Venomosity Identification	Knowledge	Attitude	Practices
Snakes Species and Venomosity Identification	Pearson Correlation	1			
	Sig. (2-tailed)				
Knowledge	Pearson Correlation	-.150**	1		
	Sig. (2-tailed)	.000			
Attitude	Pearson Correlation	-.210**	.640**	1	
	Sig. (2-tailed)	.000	.000		
Practices	Pearson Correlation	-.077	.592**	.623**	1
	Sig. (2-tailed)	.074	.000	.000	

Note: **. Correlation is significant at the 0.01 level (2-tailed).

CONCLUSION

The study revealed that non-medical college students in Cebu possess moderate knowledge about snakes and snakebites. However, significant gaps and misconceptions must be addressed, particularly in understanding snakebite management and first aid practices. Additionally, students predominantly hold negative perceptions towards snakes, driven by fear and cultural beliefs, which influence their inadequate practices in snakebite scenarios. To bridge these knowledge gaps and rectify misconceptions, comprehensive educational programs targeting non-medical college students are imperative, focusing on accurate information about local snake species, preventive measures, and evidence-based snakebite first aid. Future research should explore the long-term effectiveness of these educational interventions and investigate the impact of integrating snake education into the broader curriculum to foster more balanced and informed perspectives toward snakes.

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REFERENCES

Ahsan, H. N., Rahman, M. R., Amin, R., & Chowdhury, E. H. (2017). Knowledge of snake bite management among health service providers in a rural community of Bangladesh. *Journal of Current and Advance Medical Research*, *4*(1), 17-22.

Alqahtani, S. S., Banji, D., Banji, O. J., Syed, M. H., Syed, N. K., Meraya, A. M., ... & Alshlali, O. M. (2022). Knowledge and attitude of first-aid treatments for snakebites and the perception of snakes among the students of health sciences at Jazan University, Saudi Arabia. *In Healthcare*, *10*(11), 1-14.

Alves, R. R., Silva, V. N., Trovão, D. M., Oliveira, J. V., Mourão, J. S., Dias, T. L., ... & Souto, W. M. (2014). Students' attitudes toward and knowledge about snakes in the semiarid region of Northeastern Brazil. *Journal of ethnobiology and ethnomedicine*, *10*, 1-8.

Arumugam, K. A., Ismail, N. H. S., Shohaimi, S., & Annavi, G. (2019). Evaluating the effectiveness of wildlife educational program on knowledge, attitude and awareness among three selected secondary school students in perak, Malaysia. *International Journal of Education and Social Science Research*, *2*(2), 176-189.

Braitberg, G., Nimorakiotakis, V., Yap, C. Y., Mukaro, V., Welton, R., Parker, A., ... & Story, D. (2021). The snake study: Survey of national Attitudes and Knowledge in envenomation. *Toxins*, *13*(7), 1-10.

Bravo-Vega, C., Renjifo-Ibañez, C., Santos-Vega, M., Leon Nuñez, L. J., Angarita-Sierra, T., & Cordovez, J. M. (2021). Estimating real snakebite incidence in Colombia by using mathematical modelling and statistical inference. *bioRxiv*, *12*, 1-34.

Creswell, J. W. (2021). *A concise introduction to mixed methods research*. SAGE publications.

Cruz, P. H. P. G., Afuang, L. E., Gonzalez, J. C. T., & Gruezo, W. S. (2018). Amphibians and reptiles of Luzon Island, Philippines: the herpetofauna of Pantabangan-Carranglan watershed, Nueva Ecija Province, Caraballo Mountain range. *Asian Herpetological Research*, *9*(4), 201-223.

da Silva, A. M., Colombini, M., Moura-da-Silva, A. M., de Souza, R. M., Monteiro, W. M., & Bernarde, P. S. (2019). Ethno-knowledge and attitudes regarding snakebites in the Alto Juruá region, Western Brazilian Amazonia. *Toxicon*, *171*, 66-77.

Eid, E., Al Awaji, M., Nasarat, H., & Alhiyasat, A. (2021). A perceptions and knowledge towards snakes: A study from Jordan. *Herpetological Conservation and Biology*, *16*(2), 345-354.

Fuentues, K. J. (2024). *Antivenom for cobra bites available in Cebu*. Sunstar. https://www.sunstar.com.ph/cebu/antivenom-for-cobra-bites-available-in-cebu

Hair Jr, J. F., LDS Gabriel, M., Silva, D. D., & Braga, S. (2019). Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Management Journal*, *54*(4), 490-507.

Hák, T., Janoušková, S., & Moldan, B. (2016). Sustainable Development Goals: A need for relevant indicators. *Ecological indicators*, *60*, 565-573.

Harrison, R. A., & Gutiérrez, J. M. (2016). Priority actions and progress to substantially and sustainably reduce the mortality, morbidity and socioeconomic burden of tropical snakebite.

Hifumi, T., Sakai, A., Kondo, Y., Yamamoto, A., Morine, N., Ato, M., ... & Kuroda, Y. (2015). Venomous snake bites: clinical diagnosis and treatment. *Journal of intensive care*, *3*, 1-9.

He, L., Lv, C., Song, X., Hao, W., Wang, J., Hu, Y., ... & Yan, S. (2024). Knowledge and practices related to snakebite prevention, China: a cross-sectional study. *Bulletin of the World Health Organization*, *102*(4), 234-243.

Inthanomchanh, V., Reyer, J. A., Blessmen, J., Phrasisombath, K., Yamamoto, E., & Hamajima, N. (2017). Assessment of knowledge about snakebite management amongst healthcare providers in the provincial and two district hospitals in Savannakhet Province, Lao PDR. *Nagoya journal of medical science*, *79*(3), 299-311.

Kharusha, I. K., Sulaiman, S. S., Samara, A. M., Al-Jabi, S. W., & Zyoud, S. E. H. (2020). Assessment of knowledge about first aid methods, diagnosis, and management of snakebite among nursing students: a cross-sectional study from Palestine. *Emergency medicine international*, *2020*, 1-10.

Krishnaleela, G., Selva, M. M., & Praveena, D. A. (2018). A KAP study on snake bite among the rural population in Tirunelveli district. *International Journal of Community Medicine and Public Health*, *5*(5), 1762-1765.

Kumar, A., Gopakumar, S., Sathyan, S., Singh, S. B., & Bhasy, B. I. (2019). A KAP study on snakebite and its management among medical interns in a tertiary care medical college and hospital in Trivandrum district, Kerala. *International Journal of Community*

Medicine and Public Health, *6*(3), 1340-1344.

Magsumbol, C. N. & Landiza, A. (2024). *Man with 'snakebite' found dead in Dalaguete.* The Freeman. https://www.philstar.com/the-freeman/cebu-news/2024/01/31/2329853/man-snakebite-found-dead-dalaguete

Nowell, L.S., Norris, J.M., White, D.E., & Moules, N.J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, *16*, 1-13.

Ochola, F. O., Okumu, M. O., Muchemi, G. M., Mbaria, J. M., & Gikunju, J. K. (2018). Epidemiology of snake bites in selected areas of Kenya. *Pan African Medical Journal*, *29*(1), 1-14.

Onyishi, I. E., Nwonyi, S. K., Pazda, A., & Prokop, P. (2021). Attitudes and behaviour toward snakes on the part of Igbo people in southeastern Nigeria. *Science of the total environment*, *763*, 1-8.

Palaubsanon, M. L. & Magsumbol, C. N. (2024). *No anti-venom supply in Cebu*. The Freeman. https://www.philstar.com/the-freeman/cebu-news/2024/02/02/2330477/no-anti-venom-supply-cebu

Pandey, D. P., Subedi Pandey, G., Devkota, K., & Goode, M. (2016). Public perceptions of snakes and snakebite management: implications for conservation and human health in southern Nepal. *Journal of ethnobiology and ethnomedicine*, *12*, 1-25.

Pandey, D. P., Subedi, G., Sapkota, S., Dangol, D. R., & Devkota, N. R. (2023). Attitudes, knowledge and practices of traditional snakebite healers in Nepal: implications for prevention and control of snakebite. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, *117*(3), 219-228.

Pathak, I., & Metgud, C. (2017). Knowledge, attitude and practice regarding snakes and snake bite among rural adult of Belagavi, Karnataka. *Int J Community Med Public Health*, *4*(12), 4527-31.

Piquero, P. (2024). *King cobra sightings in Cebu City: Residents call for snakebite treatment in barangays.* Cebu Daily News. https://cebudailynews.inquirer.net/558014/residents-call-for-snakebite-treatment-in-each-brgy-amid-king-cobra-sightings

Sharma, G. (2017). Pros and cons of different sampling techniques. *International journal of applied research*, *3*(7), 749-752.

Subedi, N., Paudel, I. S., Khadka, A., Shrestha, U., Mallik, V. B., & Ankur, K. C. (2018). Knowledge of first aid methods and attitude about snake bite among medical students: a cross sectional observational study. *Journal of occupational medicine and toxicology*, *13*, 1-7.

Sulaiman, S. S., Kharusha, I. K., Samara, A. M., Al-Jabi, S. W., & Zyoud, S. E. H. (2020). An assessment of medical students' proficiency in the diagnosis and management of snakebites: a cross-sectional study from Palestine. *Journal of occupational medicine and toxicology*, *15*, 1-11.

Taieb, F., Dub, T., Madec, Y., Tondeur, L., Chippaux, J. P., Lebreton, M., ... & Nkwescheu, A. S. (2018). Knowledge, attitude and practices of snakebite management amongst health workers in Cameroon: Need for continuous training and capacity building. *PLoS neglected tropical diseases*, *12*(10), 1-10.

Togridou, A., Graham, S. A., Owens, J. B., Santra, V., Bharti, O., & Malhotra, A. (2019). Prevention is better than cure: snakebite education in India. *Education Sciences*, *2019*(4), 75-96.

Uyeda, L. T., Iskandar, E., Wirsing, A. J., & Kyes, R. C. (2022). Snakebite Envenomation, Attitudes, and Behavior toward Snakes in Banten, Indonesia. *Animals*, *12*(16), 2051.

Zu, M. M. (2019). *A study on knowledge, attitude and practice on snakebite prevention and treatment in rural area (case study in ngazun township)*. Doctoral dissertation, MERAL Portal.