

**Original Article****Snakebite Incidence, General Awareness and Belief of Snakebite Management at a Rural Municipality of Eastern Nepal**Surya Bahadur Parajuli<sup>\*1,2</sup>, Heera KC<sup>3</sup>, Anish Luitel<sup>1</sup>, Menuka Shrestha<sup>4</sup>, Baidehi Upadhyaya<sup>5</sup>

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Understanding people's awareness on snakebite management would be highly beneficial to develop strategic program at local levels of Nepal. We aimed to identify snakebite incidence, general awareness and beliefs of people regarding snakebite management in rural communities.

**Materials and Methods**

A community-based cross-sectional study was conducted at Budhiganga Rural Municipality from September to November 2022 among 245 households. Ethical clearance was taken from institutional review committee of Birat Medical College. Microsoft Excel 2019 and SPSS software version 2025 were used for data analysis.


**Results**

Annual snakebite incidence rate was 2332 per 100000 populations. Majority (71%) could not identify biting snake and attended traditional healers (70%). Among study participants, 25% had false belief that banded krait is not poisonous. Various false beliefs on snakebite first aid management were reported such as use of tourniquet (81%), washing bite sites (53.47%), cutting bite site (52%) and so on. Further, prevalent false beliefs on food-related practices were snake drinks milk (85.31%), giving victim water following the snakebite was beneficial (47%), giving chilly to those bitten was beneficial (41.63%) and so on.

**Conclusion**

Despite the existing burden of snakebites, people are not aware about the correct ways to manage them and were still attending traditional healers as a means of treatment. The misbeliefs about snakebite first aid management are very much prevalent.

**Keywords:** *First aid, Nepal, Rural Communities, Snakebite*

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## Introduction

Snakebite is a neglected public health problem in most of the tropical and subtropical countries, including Nepal [1]. Globally about 55 million people encounter snakebites, with about 0.14 million deaths, and 0.4 million amputations resulting due to severe injuries. Countries including Nepal, Bangladesh, India, Pakistan and Sri Lanka are the major south-east Asian countries that together account for 70% of the global snakebite mortality [2]. In Nepal, there are about 40,000 cases of snakebite that are recorded annually, with 3000 fatalities, attributed to them, which means that each day we lose 8 lives, despite having the means to prevent them. The actual burden is in fact higher and the cases detected/reported can be rather considered just the tip of the iceberg. The World Health Organization (WHO) has formally listed snakebite as the highest priority neglected tropical disease (NTD) as of June 2017 [3]. Deaths as well as the serious consequences that result due to snake bites are entirely preventable by raising awareness in communities that have a high burden of snake bite, and teaching them appropriate pre-hospital first aid care [4].

The Department of Health Services (DoHS) of Nepal has endorsed that that awareness of snakebite and its timely management is vital to prevent death from snakebite [1]. The recent WHO Snakebite envenoming: a strategy for prevention and control 2019-2030, has set targets of a 50% reduction in deaths and disabilities before 2030, and one of the major strategic objectives listed is to empower and engage communities [5]. Understanding the snakebite incidence and its attributes would be vital to meeting the WHO strategic objectives.

Hence, we conducted this study with the objective to identify the snakebite incidence, assess the general awareness, and investigate the beliefs regarding snakebite management prevalent in the rural communities of the Budhiganga Rural Municipality of Eastern Nepal.

## Materials and Methods

A community-based cross-sectional study was conducted at Budhiganga Rural Municipality from September 2022 to November 2022. Ethical clearance was taken from the institutional review committee of Birat Medical College Teaching Hospital. Written informed consent was taken from each participant before enrollment. The sample size was calculated based on a previous study in the Ilam district which reported that 70 % people had false beliefs regarding the use of tourniquets during snakebite first aid management [6]. We

enrolled 245 study participants through a consecutive sampling technique. A specifically designed questionnaire was used to collect data. Our questionnaire contained the socio-demographic data of participants, the status of snakebites in the community in the last 1 year; it assessed the general awareness of people regarding snake bites, and recorded if any false beliefs about snakebite first aid and false belief in food-related practices were present. The questionnaire was delivered through individual household visits, conducting face to face interviews. The completeness of the data was checked every day. The confidentiality and anonymity of participants was maintained. Data was collected using the Open data kit (ODK) collect software and was extracted into Microsoft Excel 2019 and analyzed by IBM SPSS (Statistical Package for Social Sciences) statistics 2025. Descriptive statistics were calculated in frequency and percentage and presented through tables and graphs.

## Results

Among the 245 study participants, a majority, 147 (60%) were female with a mean age of 35.8 years and 103 (42%) were illiterate. The majority 213 (87%) were married, and farmers by occupation 142 (58%). In the community, more than half the people lived in nonconcrete households 140 (57.1%) and below the poverty line (Less than \$1.90 a day) 184 (75.1%). Among the 245 households of 1372 inhabitants, 32 were bitten by a snake in the last 12 months. The annual snakebite incidence rate was thus calculated as 2,332 per 100,000. Most (71%) failed to identify the biting snake, and a majority (70%) went to traditional healers for treatment purposes. None of the residents had previously attended any snake bite management related programs (Table 1).

**Table 1: Status of snakebite since last 1 year (n=245)**

Variable	N (%)
<b>Annual incidence of snakebite</b>	32 (13.1)
<b>Snake types (n=32)</b>	
Unidentified	23 (71)
Poisonous	5 (15)
Non-Poisonous	4 (14)
<b>Treatment modalities: Visit traditional healers (n=32)</b>	22(70)
<b>Gone to appropriate treatment center: Koshi</b>	10 (30)
Hospital, Itahari Army Managed snakebite center, BP Koirala Institute of Health Sciences	100
<b>Outcome of treatment: Cured</b>	500 (Median)
<b>Money spent for treatment (NPR)</b>	100
Not attended any previous snakebite awareness program (n=245)	100
Know the snakebite treatment place (n=245)	186 (76)



The general awareness regarding snakebites was assessed. Most participants correctly answered that the most common season of snakebite is the summer (90%), that the leg is the most common site to be bitten (94%), agriculture/farming is the most common occupation (92%) where people were vulnerable to snake bite, 6 pm to 12 midnight time is when most people are likely to get bitten by a snake (54%), the Common Krait is most abundantly found inside the houses (75%), commonly a 2 fang mark is a sign for a poisonous snakebite (60%). Only some understood that not all poisonous snakebites cause envenomation (15%), that the victims may not always require ASV (9%), ASV manufactured in India (12%), and that they did not have to pay for ASV (9%) if they required it. Most people were unaware about the common signs of a Cobra bite (24%), the common signs of a Krait bite (23%) and about the availability of anti-snake venom (50%). There were many misconceptions in people, which resulted in incorrect responses of when inquired about for example, attributes such as banded Krait not being poisonous (25%), rat snake considered poisonous (50%), and water snake considered poisonous (30%). It was found that wearing shoes was the most common preventive method (53%) for the people (Table 2).

**Table 2: General awareness of snakebite (n=245)**

Variable	N (%)
<b>What is the most common season of snakebite?</b> Summer (Right Answer)	221 (90)
<b>Which is the commonest part of snakebite?</b> Leg (Right Answer)	230 (94)
<b>Which occupation is more favourable for snakebite?</b> Agriculture/farming (Right Answer)	225 (92)
<b>Which time is more prone for snakebite?</b> 6 pm-12 midnight (Right Answer)	132(54)
<b>Common krait is more abundant inside the house</b> (Right Answer)	184 (75)
<b>Commonly 2 fang mark is the sign of poisonous snakebite.</b> Yes (Right Answer)	147 (60)
<b>Do all bites by poisonous snakes cause envenomation?</b> No (Right Answer)	73 (15)
<b>Could you tell me the common signs of cobra bite?</b> I don't know	59 (24)
<b>Could you tell me the common signs of Krait bite?</b> I don't know	56 (23)
<b>Banded krait is not poisonous.</b> Yes (Wrong Answer)	61 (25)
<b>Rat snake is poisonous.</b> No (Wrong answer)	123(50)
<b>Water snake is poisonous.</b> No (Wrong answer)	74 (30)
<b>Common preventive methods:</b> Wear Shoes	130 (53)
<b>Don't know about ASV (Anti snake venom)</b>	123 (50)
<b>Victim of snakebite always need ASV:</b> No (Right Answer)	22(9)
<b>ASV available in Nepal manufactured in India</b> (Right answer)	29 (12)
<b>Do you need to pay for ASV?</b> No (Right Answer)	22 (9)

The study participants had many false beliefs involving snakebite first aid as well. The use of a tourniquet (81%) was still prevalent, people preferred attending a traditional healer (80%) for management of snake bites, washing the bite site or wound (54%) was prevalent, some followed dangerous practices like cutting on bite sites (52%), and sucking on the bite site by mouth (34%) in an attempt to remove the venom. They use traditional plants like *Jharmauro* (14.3%), use of Ice cubes at the bite site (9%), believe that drinking alcohol (4%) when bitten is beneficial, and use of electric sparks (1%) to burn the snake bite area is beneficial (Table 3).

**Table 3: False beliefs on snakebite first aid (n=245)**

Variable	N (%)
Use of tourniquet	198 (81)
Attending traditional healer	196 (80)
Wash bite site or wound	132 (54)
Cut bite site	127 (52)
Suck by mouth	83 (34)
Use of traditional plant <i>Jharmauro</i>	35 (14.3)
Use of Ice cubes at bite site	22 (9)
Drinking alcohol	10 (4)
Use of electric sparks	2 (1)

Many participants had false beliefs centered around the food-related practices such as snakes drink milk (85.3%), giving water to victims after snakebite (47%) benefited the victim, giving chilly after snakebite (41.6%) helped in the management, some also believed that the poison can be transmitted to another if they consumed the food taken by the victim (33.5%) They also believed that people would be immune to poisoning if they consumed the "nimpatta" regularly for many years (31.9%), that no poisoning occurred during alcohol intake (14.3%), that honey could cure snakebites (11.8%), and that eating earthworms could cure the victim who were bitten (4.1%) (Table 4).

**Table 4: False beliefs on food-related practices (n=245)**

Variable	N (%)
Snakes' drinks milk	209 (85.3)
Give water after snakebite	115 (47)
Give chilly after snakebite	102 (41.6)
Poisoning transfer to another if consumed the food taken by victim	82 (33.5)
No poisoning if taken <i>nimpatta</i> for many years	78 (31.9)
No poisoning during alcohol intake	35 (14.3)
Honey will cure snakebite	29 (11.8)
Eating earthworm will cure the snakebite	10 (4.1)





## Discussion

Both the physical effects and psychological effects of snakebites are under-recognized. There is evidence from Sri Lanka that snakebite causes long-term psychological sequelae [7]. Ironically, most deaths and serious consequences from snakebites are entirely preventable by providing good pre-hospital care. We found that among 245 households' of 1372 inhabitants, 32 were bitten by a snake in the last 12 months. The annual snakebite incidence rate was thus calculated as 2332 per 100000. Another study from Nepal reported the annual incidence rate of snakebite was 1162/100000 [8]. A recent publication from Nepal reported an annual crude incidence rate of 262 (adjusted incidence of 251.1 [95% CI 201.7-312.6]) per 100000 population [9]. In Nigeria, it was reported as 497 per 100,000 populations per year [10]. Following a study conducted in typical rural Sri Lanka, it was found that the one-year point prevalence of snakebites was 17.6 per 1000 residents (95% CI: 15-20.6) and 6.12 per 100 households (95% CI: 5.25-7.13), while the lifetime prevalence was 9.4 per 100 residents (95% CI: 8.8-10.0), and 30.5 per 100 households (95% CI: 28.6-32.2) [11]. Further, the annual incidence of snakebite in Myanmar was 15.4 per 100,000 [12]. In our study, we found that the majority of the people (71%) failed to identify the biting snake. Similarly, a study from rural Sri Lanka also reported that 30.1% people had unidentified snakebites [11]. Another study from Malaysia reported that 52.9% of snake species were unidentified by their denizens [13]. Others studies have also reported that there have been unidentified snake bites 21% [14], 77% [15] and 74.1% [16]. We found the majority of the people (70%) went to traditional healers following snakebite, for treatment. Similar findings were reported from Nigeria (91.5%) [10] and central Nepal 56% [17]. Another study also found many snakebite victims use traditional healing [18]. The possible reasons for opting a attending traditional healers may be transport difficulties, low cost for traditional healing, the inadequacy of anti-snake venom in the formal healthcare sector, and traditional beliefs, as traditional healing practices are rooted in many cultural and traditional factors [18]. The victims get false assurances of cure by traditional healers because of a high number of dry bites, and non-venomous snakebites [18]. If the health care provider at the health post and primary health care center can be trained on the management of snakebite, many lives can be saved [19]. When we assessed the general awareness regarding snakebites, we found that not a single

participant had attended any snakebite awareness program previously. A study suggested the importance of general awareness by strengthening education curricula on snakebite that would surely inculcate an adequate level of primary skill in ignorant societies [20]. The importance of awareness is vital as the Royal Society of Tropical Medicine and Hygiene advocates snakebite awareness through International Snakebite Awareness Day 2021 [21]. In our study, the participants correctly answered that the most common season of snakebite is the summer (90%). A study from Nepal found that the highest numbers of snakebite cases (80%) were recorded during the monsoon season from June to October [22]. However, another research reported about 51% of snakebites occurred during summer [23]. In our study, the participants correctly answered that leg is the most common bitten part (94%). Similar findings were reported by other studies, 66% [17], 60% [24], 56.3% [6]. Another study also found the most frequently bitten sites were the lower limbs, particularly the feet [25]. In our study, the participants correctly answered that agriculture/farming is the most common occupation (92%) prone to snakebite. A study reported that 57.5 % of the snakebite victims were agriculture workers [26]. Snakebite overwhelmingly affects agricultural workers who are among the poorest populations on the planet [7]. In the study, the participants correctly answered that the most common time for snakebite is 6 pm to 12 midnight (54%) and similar findings were reported by another study [27]. In the study, the participants correctly answered that Common Krait is more abundant inside the house (75%) and a similar finding was reported by another study [19]. In the study, the participants correctly answered that commonly 2 fang mark is the sign of poisonous snakebite (60%) and that not all poisonous snakebites cause envenomation (15%). A similar finding is also supported by another study [28]. In the study, the participants correctly answered that ASV is not always necessary following a snake bite (9%), ASV is manufactured in India (12%), and victims did not need to pay for AVS if they required it (9%). The awareness level of these attributes is very low. The community people are still lack the basic knowledge about such vital information.

In our study, we found that participants didn't know about common signs of a Cobra bite (24%), the common signs of a Krait bite (23%), and about anti-snake venom (50%). The wrong answers were given for attributes such as banded krait is not poisonous (25%), rat snake is poisonous (50%), and water snake is poisonous





(30%). Another study also reported similar findings [29]. The misleading information regarding the identification of snakes as venomous or non-venomous is very crucial. This might be fatal due to the wrong belief in the identification of snakes, as people may not seek treatment, believing that they got bitten by a non-poisonous snake. In the study, the participants correctly answered that wearing shoes is the most common preventive method (53%). Another study suggested that never go barefoot or wear sandals when walking in areas where you cannot clearly see where you are placing your feet. Wearing hiking boots and long pants offer an extra layer of protection from unexpected encounters with snakebite [30]. In this study; participants had false beliefs about snakebite first aid regarding the use of tourniquets (81%) A study also found that the application of a harmful tourniquet as the first aid for snakebite was practiced by the tribal community [31].

In this study, participants had false beliefs about snakebite first aid as they believed in attending a in traditional healer (80%) for cure. There are myths and superstition about snakes, with illness from snakebite considered a supernatural phenomenon best treated by traditional medicine since healers can explore causes through communication with the ancestors. Traditional consultations, however, cause significant delays and the remedies offered may cause further complications. Deep-seated cultural beliefs were the most important reasons for people in choosing traditional medicine, the success of which is largely attributed to the 'placebo effect' and positive expectations [32].

In this study, participants had false beliefs about snakebite first aid like washing the bite site or wound (54%), cutting the bite site (52%), suckling by mouth (34%), using traditional plant Jharmauro (14.3%), using ice cubes at the bite site (9%), drinking alcohol (4%) and use electric sparks (1%). A study reported that the common first aid methods of snakebite were making local incisions or "tattooing" at the site of the bite, attempts at suctioning venom out of the wound, and use of tight bands (tourniquets) around the limb, and/or local application of ice packs [9]. It is suggested that none of the traditional remedies have any proven medical benefit. They should be thus discouraged as they do more harm than good and delay transport to a medical facility. Incision, suction, electric shocks, cryotherapy, or washing of the wound are contraindicated as any interference with the wound introduces infection, increases bleeding from the site, and hastens the

absorption of the venom [9]. CDC suggested that people do not try and grab the snake or try to trap it (this may put you or someone else at risk for a bite), not to apply a tourniquet, not to slash the wound with a knife, not to suck out the venom, not to apply ice or immerse the wound in water, not to drink alcohol as a pain killer and not to drink caffeinated beverages [33].

Our study participants had false beliefs on food-related practices such as snakes drink milk (85.3%), to give water to victims after a snakebite (47%), to give chilly after a snakebite (41.6%), they also believed that poisoning transfer to another if they consumed the food taken by the victim (33.5%), they believed no poisoning could occur if a person took 'nimpatta' for many years (31.9%), they believed that no poisoning occurred during alcohol intake (14.3%), that honey could cure snakebites (11.8%) and that eating earthworms could cure the snakebite (4.1%). Similar type of finding was reported by other study [34]. As per research, animal rights activists and veterinary experts say snake's system cannot digest Milk. "Snakes are cold-blooded and carnivorous reptiles whereas milk is consumed by mammals" [35]. We have three tiers of government viz. federal, provincial and local after the promulgation of the new constitution of Nepal 2072. The local government has the authority and responsibility to manage basic health services. They are more focused on hospital-based care than community-engaged programs. Community-engaged snakebite program will be instrumental in preventing snakebite and its consequences. Budhiganga Rural Municipality of Morang district has a burden of snakebite, so the community engaged in snakebite health literacy programs needs to be organized.

### Conclusion

We found a significant number of snakebite victims, with traditional harmful first aid management practices, and inadequate awareness of snakebite.

### Recommendation

Snakebite awareness programs engaging the local community and government should be geared up.

### Acknowledgement

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### Conflict of Interest

We declare no conflict of interest.



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