Final Report

on

Snakebite Prevention and First Aid Through Community Engagement in Bangladesh

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Toxicology Society of Bangladesh

Final Report
on

Snakebite prevention and first aid through community engagement in Bangladesh

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Submittedto-
Integrated health science research and development fund
Bangladesh.

Submission of report "Snakebite prevention and first aid through community engagement in Bangladesh"

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Acknowledgment

Snakebite is an old but important rural health emergency in Bangladesh. But there was very little scientific endeavor to understand the true impact of interventions in the community on the prevention and first aid practices. Such a study will help the National Program to design the health education activities for prevention of snakebite and providing first aid by the community. Eleven Bangladeshi scientists from different organizations under the leadership of Toxicology Society of Bangladesh (TSB) successfully conducted this study. Besides the investigators, several individuals and organizations made important contribution in conducting this community-based cluster randomized trial. We are grateful to all of them.

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Prof.Md. Abul Faiz
Principal Investigator

Snakebite prevention and first aid through community engagement in Bangladesh

Abstract

Background

Snakebite is a critical but overlooked public health issue in Bangladesh having one of the highest global incidence rates.Despite efforts to improve clinical management, traditional first aid practices and reliance on traditional healers delay proper treatment. Effective community engagement is essential for improving prevention and management. This study aims to address these challenges by implementing a community-led program to enhance awareness and first aid practices.

Objective

To assess the impact of community engagement and awareness on snakebite prevention and the implementation of appropriate first aid practices in Bangladesh.

Methodology

This cluster randomized trial assessed the impact of health literacy through community engagement on snakebite prevention and management. Conducted over 24 months (September 2022 to August 2024), in two upazilas: Kalapara, Patuakhali (intervention area) and Shibganj, Chapainwabganj (control area). Thirty community clinic catchment areas were randomly selected from each upazila. The study employed both qualitative and quantitative methods of intervention; also arranged register and service provision for snakebite in two upazila health complexes.

Results

Analysis of baseline and endline data showed a -43.4% reduction in snakebite incidence in the intervention area, Kalapara, from 294.4 to 166.5 per 100,000. Incidence among males decreased by 16.3%, and among females by 61.5%. Shibganj saw a 10.6% increase, with male incidence more than doubling by 107.1%, while female incidence decreased by 52.4%.

At Kalapara, the proportion of victims visiting traditional healers after snakebite dropped by 22%, and hospital visits increased by 154.3%; at Shibganj, visits to traditional healers increased by 31%. Time to reach hospital in Kalapara decreased by 14.8%, while Shibganj showed a 2.2% increase. Despite limited changes in quantitative measures of snakebite prevention knowledge, qualitative findings indicated a positive shift toward health literacy in Kalapara. Hospital admission and antivenom use increased in both the upazila hospital.

Conclusion

The community-based intervention in rural Bangladesh effectively reduced snakebite incidence and improved health-seeking behavior. However, it had limited impact on enhancing immobilization as first aid practiceand did not significantly improve community knowledge on snakebite prevention. Hospital-based surveillance was feasible, community surveillance faced challenges, indicating the need for improved strategies in rural settings.

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List of Abbreviations	
CAPI	Computer-Aided Personal Interviewing
CHCP	Community Health Care Provider
CMCH	Chattogram Medical College
DGHS	Directorate General of Health Services
IDI	In-depth interview
IEC Material	Information, Education, and Communication materials
KAP	Knowledge, Attitude, Practice
NCD	Non-Communicable Disease
NCDC	National Centre for Disease Control
PSU	Primary sampling units
SACMO	Sub Assistant Community Medical Officer
SBSG	Snakebite Support Group
SOP	Standard Operating Procedure
STATA	Software for Statistics and Data Science
UHFPO	Upazila Health & Family Planning Officer
UZHC	Upazila Health Complex
VRC	Venom Research Centre
WHO	World Health Organization
WHO SEAR	World Health Organization South-East Asia Region

Executive Summary

Snakebite Prevention and First Aid Through Community Engagement in Bangladesh

Background

Snakebite is an under-recognized public health problem not only in Bangladesh but also in other low-resource settings in the tropics. This problem was overlooked as a global health issue until the World Health Organization (WHO) classified it as a neglected tropical disease (NTD) in 2017. Nonetheless, Bangladesh has given importance to deal with this neglected health issue through drafting a strategy, implementing a number of activities towards creating community awareness, capacity building in management of snakebite, provision of antivenom, other necessary logistics and supplies. However, there are insufficient credible evidences to determine how best to allocate resources in order to prevent these avoidable deaths and disabilities from taking place**.**

Bangladesh is one of the most severely snakebite-affected countries worldwide. The incidence of snakebites in Bangladesh is among the highest globally, estimated at 623 per 100,000 persons per year (1). This high rate is attributed to factors such as high population density, extensive agricultural activities, a variety of venomous snake species, and inadequate snakebite control programs (2). Bangladesh has achieved internationally recognized progress in improving the clinical management of snakebite envenoming for over two decades. However, there is incongruous management of first aid persists in the community mainly due to ignorance, cultural norms, and pressure from the traditional healers' groups present in the community. First aid following a snakebite is typically administered by the victims or their relatives at the scene of the incident. A common traditional practice involves using one or multiple ligatures (ranging from 1 to 8; mean of 3 ± 0.02) on the bitten extremity. Although there is no evidence supporting the effectiveness of such ligatures, it is well documented that they can cause or worsen local necrosis, nerve and other tissue damage. Despite this, tourniquets remain the most commonly used first aid method in developing countries. In Bangladesh, more than 95% of snakebite patients applied tourniquets (3). Besides, 42% of patients with envenoming seek treatment from traditional healers ('ohza') as first contact providers, spend around one hour with them and arrive late in hospitals spoiling precious time and putting them at the risk of poor outcome (3). Pressure-immobilization is currently recommended first aid following snakebite in the National Guideline for Management of Snakebite which was mostly based on the latest edition of the Guidelines for the Management of Snakebites in the WHO SEARO Region (4). In reality, pressure immobilization is hardly practiced in the community, and the feasibility of applying it with the correct pressure in rural settings has been questioned. All these indigenous practices need to be changed to reduce deaths and disabilities from snakebite in Bangladesh. But for these changes in providing appropriate first aid after snakebite, rapid transfer to the modern health facilities, and to ensure proper management, it requires strong community engagement.

Community engagement is a well-recognized approach to addressing health-related issues, promoting well-being, and taking action on the social determinants of health. It involves building relationships based on trust and working together to develop more effective health

interventions, programs, services, and policies and to empower communities as key actors for health. It is based on a whole-of-society approach with people as the driving force. As snakebite mostly happens in rural community, first aid provided by the community people, decision on further management taken by community, and all these phenomena are influenced by the deep-rooted belief, culture and trust on societal norms, changes for appropriate management scenario, a strong community engagement is a necessity. For the community-based snakebite prevention and it's proper management including appropriate first aid practices, a dynamic relational process that facilitate communication, interaction, involvement and exchange between health care system and community people is essentially required. However, the approach for community engagement to achieve a positive change in the community towards the prevention and management of snakebite in rural community of Bangladesh has not been explored.

This study aims to address this gap by introducing a community-led program focused on snakebite prevention and first aid. By educating communities on effective prevention strategies and proper first aid, and ensuring that snakebite victims are quickly referred to the nearest Upazila Health Complex (UHC), we hope to reduce the number of deaths and serious injuries caused by snakebite.

Objectives

To determine the impact of community engagement/awareness on snakebite prevention and appropriate first aid practices after snakebite in Bangladesh.

Specific Objective

1. To depict the snakebite scenario in the study areas.
2. To conduct formative research for designing the intervention for prevention and management of snakebite in rural Bangladesh.
3. To design and strategize the implementation framework for awareness building, community engagement, and developing community-based snakebite support group for prevention and proper management of snakebite in rural Bangladesh.
4. To implement the implementation programme according to designed strategies.
5. To evaluate the impact of implementation programme in increasing awareness for prevention of snakebite and improving the management practice for snakebite.

Methodology

This study was a cluster randomized trial to assess the impact of community health literacy provided through community engagement on the prevention and appropriate first aid and management of snakebite.

This study was conducted in two upazilas, one from the southern part and one from the northern part of Bangladesh; Shibganj upazila of Chapainwabganj (greater Rajshahi) in the north and Kalapara upazila of Patuakhali in the south. To evaluate the effectiveness of the intervention, 30

randomly selected community clinic catchment areas were included from the intervention upazila in one district, and a similar number of community clinic areas served as the control group in the other district.

The study utilizes both qualitative and quantitative study methods for designing, implementation and evaluation of the intervention. The following types of study design and data collection methods adopted in this trial.

Purpose	Study type	Data collection methods
Designing the intervention	Formative study	FGD, IDI
Identification of intervention strategies	Qualitative study	IDI, FGD
		Workshops
		Expert consultation
Evaluation		
Effectiveness	Cross-sectional Baseline Endline	Face to face interview
Process	Cross-sectional Qualitative	Face to face interview FGD and IDI
Surveillance	Hospital based surveillance	Hospital case records

Study Period

This study was conducted over a 24-month period, from September 2022 to August 2024. The implementation of the study was divided into five distinct phases, each contributing to the overall objectives and outcomes of the research. Figure 1 presents the several stages that show how the study was progressing.

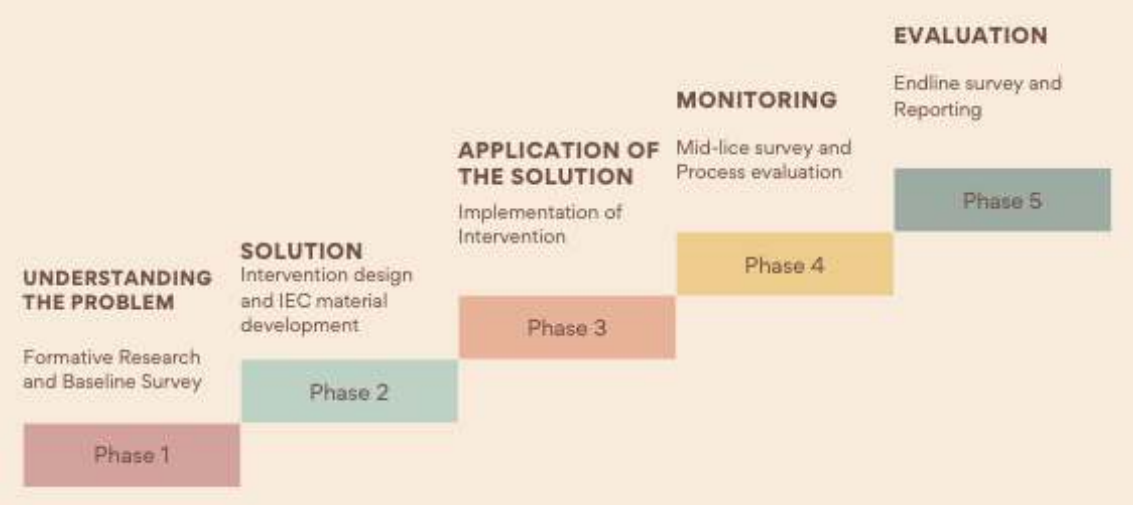


Figure 1: Phases of the study

The data collection phase for the survey was included as part of this structured approach in figure 4.

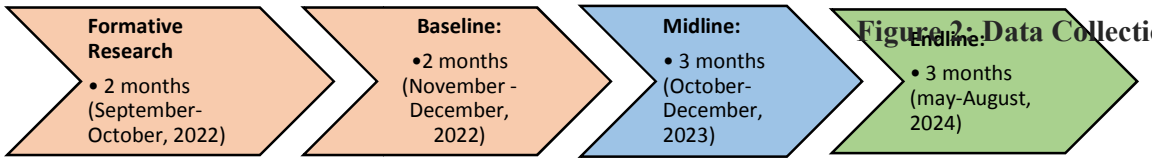


Figure 2: Data Collection periods

Formative Research

The participatory study was conducted with the aim of:

1. Understanding which type of participation would be more engaging in raising awareness among the rural population to prevent snakebite.
2. Investigating how community members enhanced their first aid competencies in response to snakebite incidents.
3. Identifying the kinds of rapid responses needed to reduce the frequency of morbidity and mortality from snakebites in Bangladesh.

In the formative research phase, we conducted in-depth interviews (IDIs) and key informant interviews (KIIs) with healthcare professionals at the Upazila Health Complexes (UHC) in

Kalapara and Shibganj to understand their perceptions of snakebite management. The IDIs involved 24 health professionals, including doctors, nurses, and sub-assistant community medical officers, working at the two UHCs in the intervention and control upazilas. These interviews were carried out by a team of anthropologists.

Additionally, we conducted 12 focus group discussions (FGDs) on the prevention and first aid of snakebite. These FGDs, led by the anthropologist team, included 114 participants from various community stakeholders across the two upazilas.

Intervention design

The intervention package was developed utilizing (a) findings from the baseline survey and formative research, (b) a review of existing literature, including recommendations from the 'Guidelines for the Management of Snakebites' published by the WHO SEAR Office in 2016, which was prepared by a team of experts, including one of us (MAF, PI); adopted recommendations in the National Guideline for the Management of Snakebite 2019, and training modules prepared by Non-communicable Diseases (NCDC), DGHS, Government of Bangladesh for providing training to community health workers (in Bengali) and medical doctors (in English). The investigators (MAF, AG, AAS, RR, AS) were involved in developing the guidelines and the learner's guide by organizing a workshop with key stakeholders.

Following strategies were identified for designing and implementation of the intervention.

1. Community engagement strategy: It includes stakeholder's engagements at the rural community (upazila)-Local Government, local administration, health services, schools and other institutions, livestock services, local media, volunteers, and general people;
2. Communication strategy
3. Community health literacy strategy

Besides these strategies, a number of communication materials were developed for community literacy and engagement.

The list of IEC materials included:

- Posters
- Flip charts
- Leaflets and pamphlets
- Video films
- Radio talks and short radio advertisements, with a focus on local community radio
- Popular writing
- Traditional song— 'Boyati'
- Laminated pictures of common venomous snakes

Community Engagement

I. We identified key stakeholders crucial for snakebite prevention and first aid by engaging community groups, including two representatives from each of three community support groups, as well as Health Assistants, Assistant Health Inspectors, and Family Welfare Assistants. Our focus was on community education and enabling self-organized first aid and primary care for snakebite, with a central emphasis on the community clinic.

II. We established Snakebite Support Groups (SBSGs) by forming a 5-member team for each community clinic area, creating three SBSGs—one for each ward. These groups conducted health education sessions on prevention and first aid, holding at least five sessions per ward, which totaled 450 sessions in the intervention upazila. They also organized a network of motorbike and vehicle drivers, sharing their contact details with the community. These volunteers were available to transport snakebite victims, with transportation costs reimbursed. The community could also choose alternative transportation methods, such as ambulances, if necessary.

Best Practice Model Establishment

We established a best-practice model for the clinical management of snakebite in the UHCs of both control and intervention areas. This was crucial for ensuring that snakebite patients arriving at the UHC were managed appropriately; otherwise, community trust could be compromised. We provided training and retraining to a team of health professionals, including doctors, nurses, and sub-assistant community medical officers, at selected Upazila Health Complexes (UHC) on the clinical management of snakebite. Essential logistics were arranged, including the supply of antivenom and other necessary drugs for managing snakebite envenoming, through coordination with relevant operation plans (Ops) and government sources. Health education was delivered by health professionals on snakebite prevention and appropriate first aid to snakebite victims, their families, and the public attending the UHC. Supportive supervision was provided to UHC health care professionals through a 24/7 online connection with a dedicated medical college or district hospital ('hub'), following the National Eye Care (NEC) Operational Plan as a model of best practice. This activity involved a pool of volunteers from the medicine and pediatrics departments of the 'hub' hospital/Toxicolgy Society of Bangladesh who offered telemedicine support to the UHC staff. We also studied the perceptions of snakebite treatment, including antivenom delivery, among the health care professionals in the UHC using key informant interviews (KII)

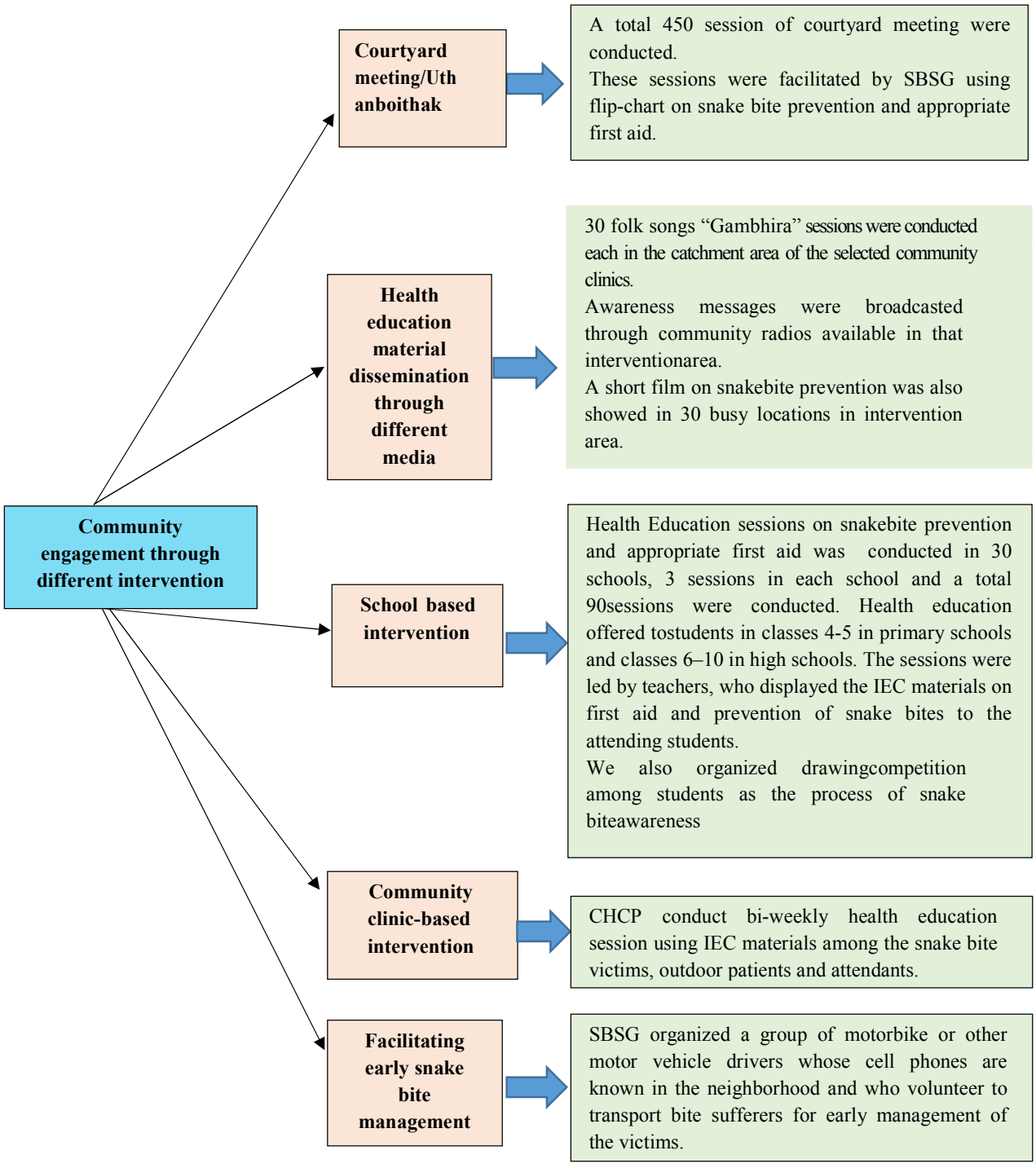


Figure 3: Different Intervention Methods

Evaluation

Baseline survey

To evaluate the impact of the implementation program on snakebite prevention awareness and management practices, community surveys were conducted in both control and intervention areas. A baseline cross-sectional survey, initiated concurrently with formative research, was conducted from November to December 2022. Structured questionnaire, adapted into Bangla, were used for household surveys. The data collection tool was pretested before fieldwork and is included in this report.

Mid-line Survey and Process Evaluation

To evaluate the impact of the interventions after about one year, a midline survey was conducted ten months later, from October to December 2023. This survey was conducted among a subset of the population utilizing the same methodology adopted in baseline survey.

During October to December, 2023, all the interventions including community engagement activities, communication material distributions, activities related to community health literacy were assessed both quantitatively and qualitatively. Additionally, we carried out a qualitative study that included six in-depth interviews with snakebite victims to gather their insights on snakebite treatment, as well as two focus group discussions with community members, volunteers, and leaders to assess their knowledge of snakebite prevention and first aid management.

Endline survey

To evaluate the impact of the implementation program on snakebite prevention awareness and management practices, community surveys were conducted in both control and intervention areas. After two years, an endline survey was conducted among the same population. The effect of the community awareness created was assessed by comparing the results of a baseline cross-sectional survey with an endline cross-sectional survey. A structured questionnaire, adapted into Bangla, was used for household surveys. The endline survey took place from May to August 2024.

Hospital Surveillance

For hospital surveillance, we maintained a 'snakebite register' to record all human cases of snakebite attending the UHC and replicated this for cases involving domesticated animals at the upazila veterinary hospitals.The patients with snakebite attending the UHC in intervention areas were reimbursed for quick transport arranged by the SBSG at the community level. We also made arrangements to keep any killed snake specimens brought by victims or their attendants, ensuring they were appropriately labeled and preserved in the facility using ethanol or formalin.

Results

Baseline, midline, and endline data were analyzed to determine the intervention's effectiveness as part of the evaluation process. To identify the changes in the snakebite incidence, health seeking behaviour of snakebite victims, and the general people's understanding and behavior about first

aid and management, as well as prevention of snakebite, mostly the baseline and endline data were considered for analysis. However, midline data provided people's perception regarding the snakebite intervention in their area.

Changes in the incidence of snakebite

There was a positive trend in reduction of the incidence of snakebite at the intervention area,Kalapara, over time. Although Kalapara initially had a high baseline incidence rate of 294.4 per 100,000 population, by the endline, the rate had significantly decreased by -43.4%, reaching 166.5 per 100,000. This reduction suggests a positive impact of interventions or preventive measures in the region. Despite the high baseline rate, the drop in incidence highlights progress in mitigating snakebite risks in Kalapara. In contrast, Shibganj experienced a smaller increase of 10.6% in the incidence rate from baseline to endline, showing a less pronounced change compared to Kalapara's overall improvement.

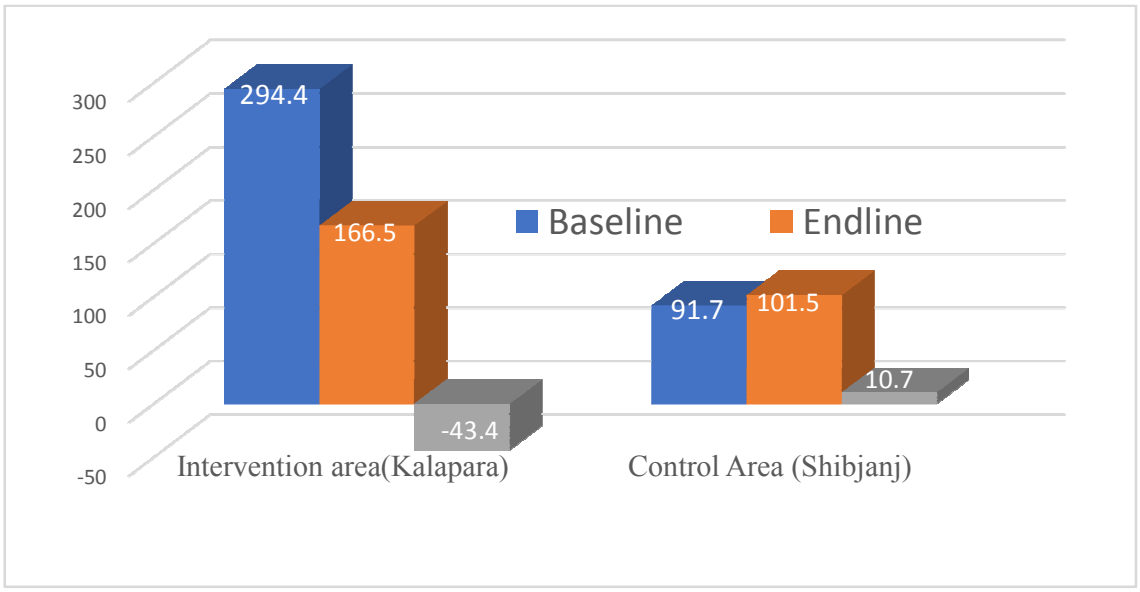


Figure 4: Changes in the incidence of snakebite

In intervention area, the rates for males declined by 16.3%, and the incidence among females significantly dropped by 61.5% whereas in control area the rate among male more than doubled, rising by 107.1%, while among females, there was a 52.4% reduction.

Positive trend towards treatment seeking behaviour

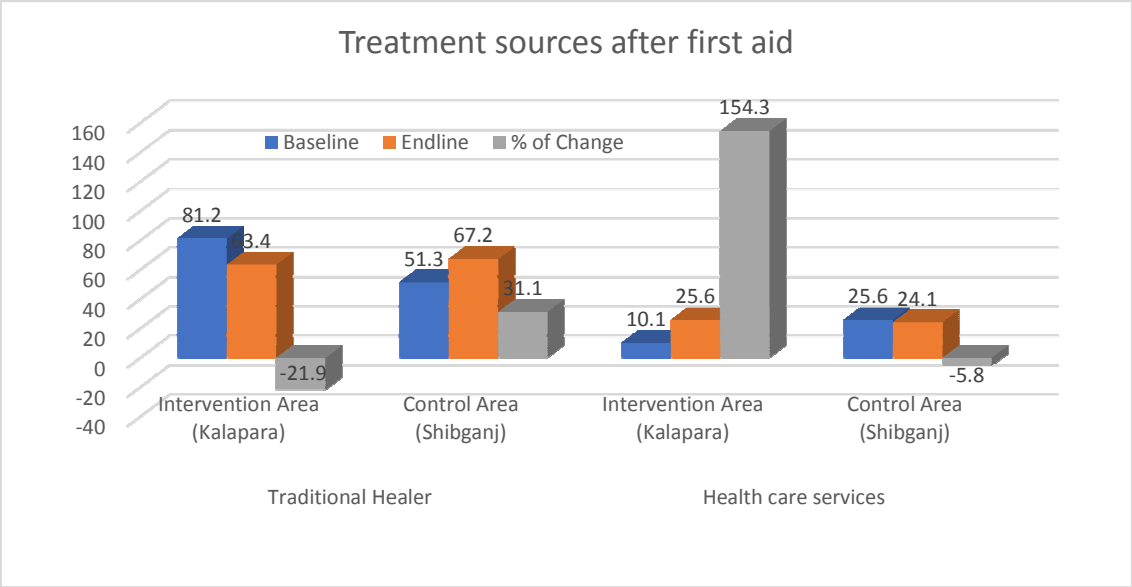


Figure 5: Treatment sources after first aid

The proportion of snakebite victims visiting traditional healers after first aid in Kalapara, the intervention area, dropped significantly by 22%, from 81.2 at baseline to 63.4 at endline, suggesting a shift toward modern care, whereas more than 31% increased in control area. Most importantly, after first aid, there are notablechanges (154.3%) in the percentage of snakebite victims in the intervention area who sought medical attention from hospitals, compared to -5.8% reduction in the control area.

Hospital surveillance

The average time to reach a hospital directly in Kalapara decreased by 14.8 minutes, from 58.6 minutes at baseline to 43.8 minutes at endline, demonstrating quicker access to medical care. In contrast, Shibganj showed a slight increase of 2.2 minutes. The use of motorized vehicles to transfer the snakebite victim to health care facilities increased in both intervention and control areas.

The changed scenarios of health seeking behaviour was also portrayed in the hospital surveillance data. The number of snakebite victims who visited the Upazila Health Complexes in both the intervention and control upazilas is shown in Figure 5. In both locations, there was an increasing trend for snakebite victims to use the closest hospitals; however, the intervention area had a larger rate of increase in hospital attendance for the treatment of snakebite cases than the control area.

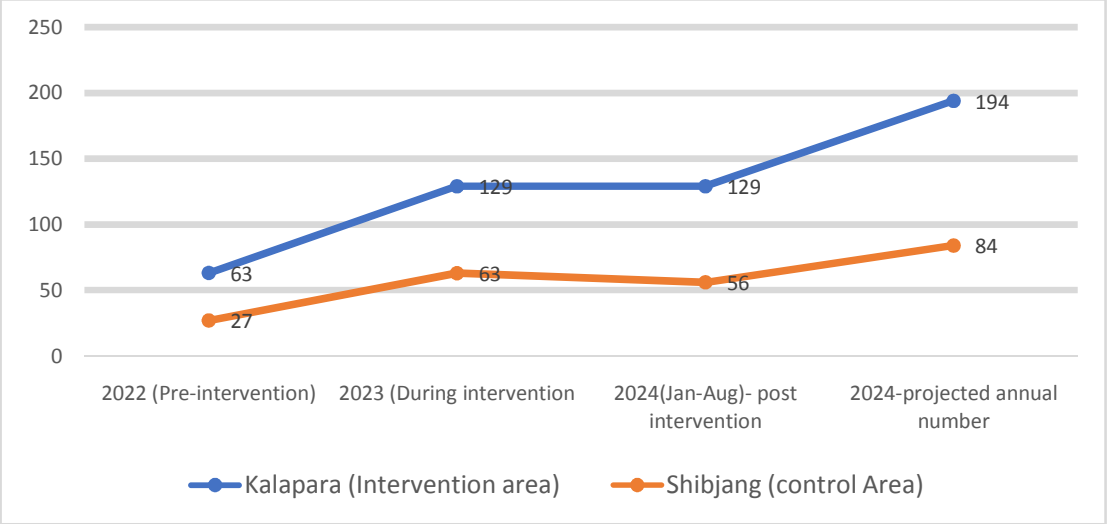


Figure 6: Number of snakebite cases attended in hospital (Upazial Health Complex) by different phases of intervention

Knowledge and practices related to snakebite prevention and first aid

Changes in knowledge of preventive measures and first aid

There wasnotable in changes in knowledge about snakebite prevention and safety over time. In Shibganj, the control area, the belief that snakebites were preventable increased marginally by 5.05% from baseline to endline, while Kalapara, the intervention area, saw a more substantial rise of 14.2% in the same period, reflecting the positive impact of interventions.

Variable	Shibganj				Kalapara			
	Baseline n=1460	Midline n=750	Endline n=1515	% Change (Baseline vs Endline)	Baseline n=1494	Midline n=756	Endline n=1479	% Change (Baseline vs Endline)
Knowledge regarding the preventability of snakebite	764 (52.3)	526 (70.1)	829 (54.9)	5.05	1118 (74.8)	602 (79.6)	1263 (85.4)	14.2
Knowledge regarding the self-protection for snakebite	515 (35.3)	444 (59.2)	864 (57.3)	62.52	667 (44.7)	460 (60.9)	1020 (69.1)	54.5

In intervention area, knowledge about using mosquito nets while sleeping on the floor rose by 17.7%, and there was a notable decrease in negative behaviors such as guarding/sleeping in crop fields at night (-71.8%). Both areas showed improvements in cleaning surroundings, but Shibganj had a slightly higher increase (58.1%) compared to Kalapara (54.8%). There was a significant improvement in using torches while moving at night (85.5%) in Kalapara, the intervention area, compared to Shibganj (54.9%), the control area.

The knowledge on first aid after snakebite has been improved in intervention area, however, the change of knowledge was not significant in some areas.

Community Perception regarding the intervention programme

The community was now more aware of snakebite first aid and treatment, particularly women who had learned through yard meetings and volunteers. They understood the need for proper first aid and hospital care and were aware of initiatives to prevent snakebite. However, many men and older community members lacked sufficient knowledge, with some men not recalling any health education activities. Women and adolescents, who were more restricted to the home, had attended courtyard meetings but missed folk song events. Although they had gained valuable knowledge, they requested more frequent courtyard meetings. Students also showed some awareness, mostly from flip charts.

"We never keep our chickens inside the house. We know that snakes are attracted to them, so we keep them in a separate coop outside "- ***(FGD with female member snakebite victim)***

"We use a flashlight whenever we're walking around at night. It helps us see potential hiding places for snakes "- ***(FGD with male member snakebite victim)***

"I always wear boots when I'm working in the fields. It's a small extra step, but it can help protect my feet from snakebites "- ***(FGD with male member snakebite victim)***

"Sleeping under a mosquito net every night has been a lifesaver. I used to get bitten so often, but now I can sleep peacefully"- ***(FGD with female member snakebite victim)***

"I always make sure to tap the ground with a stick before stepping anywhere, especially in the fields. It's a simple precaution that can make a big difference" - ***(FGD with male member snakebite victim)***

In conformity with community people, they always found an easier way of medication for any disease. So, they searched for the nearest treatment system, such as 'Ojha/kobiraj' and village doctors. Moreover, people also believed in their ancestors and what they used to do. The most important problem was that people were not willing to go to the hospital. They considered that taking medication from the hospital was a complicated process. Besides, most of the people believed in what their ancestors did during snakebites.

> *"Our ancestor used to do many things while snakebite, such as tourniquet, bleeding (Door), using herbal medicine. But now, doctors suggest that we shouldn't do this but our ancestors were able to survive"* ***- (IDI from a male snakebite victim)***

On a different KII session with a doctor at Kalapara UHC, these issues were discussed elaborately. According to the doctor, by taking some steps people could protect themselves from snakebites. For instance, using a torch light while going out at night, keeping clean around the house, and using gumboots while working in the farmland. Besides, using a mosquito net before going to bed at night, and not keeping food and domesticated birds in the bedroom. However, if people were aware, they would not be bitten by snakes. There was no substitute for awareness.

Conclusions and Recommendations

Conclusions

- A community-based intervention centered on community engagement with the utilization of the existing healthcare system has been successfully adopted to prevent snakebite and proper first aid use.
- Snakebite incidence varies by region. The baseline survey revealed significant difference in snakebite incidence in Kalapara, the intervention area, and in Shibganj, the control area.
- Strong community engagement involving health care system at local level is found effective in reducing the incidence of snakebite in rural community in Bangladesh
- Though the intervention had an impact on rural people's health-seeking behavior regarding snakebite, it did not change the important first aid practices, immobilizing the afflicted limb.
- Hospital surveillance revealed that there was an increasing trend to seek hospital care for snakebite incident.
- The intervention has had little effect on rural Bangladeshi people's knowledge about preventing snakebite.
- Hospital record keeping system as part of hospital passive surveillance is possible even in Upazila Health Complex level, however, community clinic-based community surveillance on snakebite has not been succeeded.

Recommendations

1. Information, Education and Communication materials developed in Bengali for prevention of snakebite and providing first aid through community engagement like formation of snakebite support group should be used across the country.
2. Positive impact of multiple interventions on prevention, first aid and rapid transport to hospital and lessons learned from conducting courtyard meeting ('UthanBaithok') using flip chart, periodic health education sessions at the community clinic and upazila health complex, displaying posters on prevention, first aid and 'what not to do' , holding community meetings, performing educational institution based sessions, performing traditional songs, using social media can be used in different locations of the country.
3. Further research are needed to transfer the knowledge into practice related to providing first aid following snakebite like 'not to use tourniquet', to practice pressure immobilization.
4. Method of training provided to the community to be tested/developed on prevention of snakebite highlighting for example use of 'cot-and net', not to share bedroom with livestock and food grains, using boot, stick, torch, safe handling of firewood, stay, bricks and fishing safety.
5. Anthropological study should be undertaken related to continued treatment seeking from the traditional healers, 'Ohza' to address the change of the behavior of the community.
6. Treatment of snakebite particularly initiation of treatment by antivenom in envenomation at the first contact hospital, Upazila Health Complex has found to be feasible in resource limitations by providing SOP based training to a team of health professionals including doctors, nurse and sub-assistant community medical officer (SACMO).
7. Continued availability of logistics like antivenom, and relevant drugs and logistics like availability of competent health professionals skilled in the delivery of antivenom and initiation of respiratory support by intubation and using Ambo bag will build trust of the community on UZHC. Skills acquired in managing snakebite, a common rural community emergency can also be used by the health care professionals in addressing other acute medical emergencies.
8. Successful supportive supervision 24/7 from Medical Colleges through 'WhatsApp Group' to the medical doctors working at Upazilla Health Complex for managing envenomation should be replicated in different regions of the country.
9. For the development of a community surveillance of snakebite in human and animal more work is needed.
10. Snakebite register should be maintained in UHCs of the country for developing an evidence base of snakebite data.

Chapter 1

1.1 Background

Snakebite envenoming is a significant global health crisis disproportionately affecting rural communities in tropical regions, particularly in Africa, Asia, and Latin America(5–7). The World Health Organization (WHO) recognized this burden by classifying snakebite as a neglected tropical disease in 2018 (8). While global snakebite incidence is estimated at 500,000 cases annually, with historical mortality rates as high as 30,000 to 40,000 in 1954 (9), recent estimates suggest a more alarming toll: 5.4 million bites, 1.8 to 2.7 million envenoming, and between 81,410 and 137,880 deaths each year. The impact extends beyond mortality, with millions experiencing amputations and other permanent disabilities (10). Snakebite was overlooked as a global health issue until the World Health Organization classified it as a neglected tropical disease in 2017. South Asia is the epicenter of this crisis, accounting for 70% of global snakebite deaths (11).

The true burden of snakebite in rural Bangladesh remains largely obscured by a dearth of reliable data. However, these figures are based on limited data from a small study. A survey conducted across 50 upazilas during 1988-89 reported 764 snakebite incidents with a mortality rate of 168 (22%)(12). While alarming, the study's methodology restricts its generalizability to the entire population. Further emphasizing the data gap, a study at Chittagong Medical College Hospital, as reported by Faiz, recorded 1666 snakebite cases between 1993 and 2003, 28.5% of those victims had snakebite, and only eight (0.5%) of them died(13).A study conducted in 1999 estimated the incidence of 4.3 snake bites per 100,000 populations per year in Bangladesh, with approximately 2000 deaths(14). Whereas, a recent study conducted in 2009 showed higher than previous studies, which was 623.4/100,000 person years (1).

Snakebite cases in Bangladesh peak during the monsoon season due to floods, cyclones, storm surges, and bank erosion that force snakes out of their natural habitats and into residential areas (1,15–17). The incidence of snakebites in Bangladesh is among the highest globally, estimated at 623 per 100,000 persons per year(1). This high rate is attributed to factors such as high population density, extensive agricultural activities, a variety of venomous snake species, and inadequate snakebite control programs(2). Out of the 82 snake species in Bangladesh, 27 are venomous, with 6 species being particularly aggressive(17). Snakebites from the Viperidae (e.g; pit vipers) and Elapidae (e.g; kraits and cobras) families are notably harmful, often resulting in severe symptoms ranging from local tissue damage to acute renal failure, necessitating advanced medical treatment (2,18).

The World Health Organization (WHO) has had an interest in snakebite envenoming since immediately after its inception as an organization, and prepared a number of documents related to standardization of antivenom and clinical management guidelines. In its latest and most far-reaching document, the ‘WHO Strategy for prevention and control of snakebite envenoming’ published in 2019, the WHO calls on member states to achieve the target of reducing snakebite deaths and disability by 50% by 2030(10).The four strategic objectives of the strategy leading to this reduction are to (I) empower and engage communities; (II) ensure safe and effective

treatment; (III) strengthen health systems; (IV) increase partnership coordination and resources. Bangladesh Tabled a study for the development of a WHO SE regional strategy and action plan based on this WHO strategy which was adopted.

Bangladesh is one of the most severely snakebite-affected countries worldwide and has achieved internationally recognized progress in improving the clinical management of snakebite envenoming for over two decades. The country established a national guideline on this topic as early as 2000(19).The Director of Non-Communicable Disease (NCD) at the Directorate General of Health Services (DGHS), Government of Bangladesh, has actively encouraged the management of snakebites, supported by the provision of imported antivenom and training for medical doctors in the public sector.

A local initiative by us (MAF & team) led to the establishment of a 24/7 snakebite clinic at Chittagong Medical College Hospital (CMCH), Chattogram, in 1994. This facility quickly became a hub for human resource development in clinical toxicology, professional awareness, and numerous milestone research projects on various aspects of snakebite. These projects attracted collaboration from researchers in Bangladesh and international partner countries. The clinic significantly improved the clinical management of snakebite envenoming in CMCH and its catchment area, dramatically reducing case fatality rates. Notable achievements of the snakebite clinic include the discovery and clinical as well as immunohistochemical characterization of envenoming by the black krait (Bungarus niger), defining a unique clinical syndrome of neuromyotoxicity,(20) and the clinical characterization of monocled cobra (Naja kaouthia) envenoming, its response to Para specific (Indian) antivenom, and anticholinesterase treatment(21). With 70 positively identified cases revealing local tissue necrosis in addition to well-known neurotoxicity, this study remains the largest case series of N. kaouthia bites worldwide(21).

In 2018, a snakebite registry was established at CMCH, where approximately 1,000 snakebite cases are treated annually, with very few deaths. For the first time in Bangladesh, a dedicated Venom Research Centre (VRC) was established at CMCH through the NCDC, DGHS. The VRC focuses on the collection, housing, and rearing of venomous snakes with scientific rigor, conducting collaborative research primarily using collected venom from venomous snakes in Bangladesh. The ultimate aim is to provide scientific guidance and high-quality biological primary materials for producing safe, effective, affordable, and locally appropriate antivenom on a pilot basis(22).

Trained professionals are managing snakebite cases in public medical colleges across the country. For example, at Dhaka Medical College Hospital (DMCH), Wall's krait (Bungaruswalli) was found to be involved in snakebite envenoming for the first time worldwide. Since then, our team and collaborators have demonstrated that this species is a major cause of neurotoxic snakebite envenoming in Bangladesh and Nepal. The recent resurgence of Russell's viper envenoming in various parts of Bangladesh, especially in the Rajshahi division, presents a new challenge. Managing these cases involves addressing rapidly deteriorating multiple organ involvement, including consumption coagulopathy, increased vascular permeability, edema, hemorrhage, myotoxicity, cardiovascular shock, and acute kidney injury (AKI)(23) In Rajshahi

Medical College Hospital alone, more than 100 cases of Russell's viper envenoming were treated in the last 5-6 years.

First aid following a snakebite is typically administered by the victims or their relatives at the scene of the incident. A common traditional practice involves using one or multiple ligatures (ranging from 1 to 8; mean of 3 ± 0.02) on the bitten extremity. Although there is no evidence supporting the effectiveness of such ligatures, it is well documented that they can cause or worsen local necrosis and other tissue damage. Despite this, tourniquets remain the most commonly used first aid method in developing countries. In Bangladesh, more than 95% of snakebite patients applied tourniquets (3). Similarly, in Nepal, 70% of people considered the use of tourniquets appropriate first aid for snakebites (24). Even in Sri Lanka, where communities have relatively sound knowledge about snakes and snakebites, 35% of snakebite victims used tourniquets (25).

Still 42% of patients with envenoming seek treatment from traditional healers ('ohza') as first contact providers, spend around one hour with them and arrive late in hospitals spoiling precious time and putting them at the risk of poor outcome(3). Pressure-immobilization is currently recommended as first aid following snakebite in the National Guideline for Management of Snakebite which was mostly based on the latest edition of the Guidelines for the Management of Snakebites in the WHO SEARO Region(4,19). In reality, pressure immobilization is hardly practiced in the community, and the feasibility of applying it with the correct pressure in rural settings has been questioned. School books providing basic education on snakebite first aid still recommend old harmful methods that are contraindicated(26). A large number of other ineffective but harmful practices, for example giving incision, local application of various substances, is still widely practiced in the rural community and contributes to poor outcomes(3)(27).

Most of the bites happen during working or when walking mostly bare-footed on rural foot walks, in and around homes. Sharing houses with domestic animals like poultry that directly or indirectly (via food provided which in turn attracts rodents) attract snakes puts the inhabitants into an increased risk of bites inside and around houses(28,29). Snakebite inside houses at night time on sleeping people is the hallmark of kraits (Bungarus species) whose venoms causing irreversible neuromuscular paralysis pose particular clinical problems associated with high case fatality(20). Simple sleep safety interventions like the promotion of the use of 'cot and bed net' may have a dramatic effect preventing such bites, but are yet to be scientifically evaluated in the context of Bangladesh. Likewise, a number of simple preventive practices at work like keeping a close watch and using basic preventive tools while fishing or doing cultivation work may be assumed to be highly effective, but their feasibility and acceptance by the population at risk especially during the hot and humid seasons has not been evaluated yet in Bangladesh(29)

In rural areas of South Asia, ambulances are not readily available during an emergency, and the transport of patients during the main snakebite season (monsoon) is never smooth. Usually, a number of different types of transportation is sequentially used by a single patient to seek treatment in different tiers of the health care system, putting the patient's party under great psychological stress and significanteconomic pressure, and greatly delaying treatment which in turn results in poor outcomes(30,31). In the lowlands of south-eastern Nepal, the establishment

of self-organized, community-led motor bike ambulance services for snakebite victims in combination with the provision of community health education and snakebite treatment with antivenom in rural primary health care centers has significantly reduced snakebite mortality(32). Large parts of Bangladesh have the same or similar species of venomous snake as lowland Nepal. Thus, this or a modified approach of rapidly transporting patients to medical care has great promise for reducing snakebite mortality in our national contexttoo, and its suitability and effectiveness can be addressed in this intervention study.

Despite some improvements of the management of snakebite in major public medical college hospitals of Bangladesh, provision of antivenom by the Government of Bangladesh through DGHS, and well-noted research and advocacy achievements, the delivery of basic healthcare to snakebite patients in Bangladesh has not progressed in a satisfactory manner. Although best-practice treatment is available in a couple of hospitals, at the national level snakebite management is so much below the standard of care Bangladesh has achieved for many other diseases that the mortality, morbidity, disability and socio-economic impact of snakebite threaten to affect health and development indicators. This is particularly unfortunate in view of the fact that snakebite envenoming is a preventable, acute disease that is eminently treatable with a highly cost-effective drug. However, most of the doctors working in upazila hospitals are not confident enough (i.e., not trained well enough) to treat snakebite cases at their UzHC and habituated to refer the patients to higher centers (33). This routinely results in delayed treatment and poor outcomes including many avoidable deaths during referral. The snakebite affected population, on the other hand, has little to no knowledge about how to prevent snakebite, what to do if a snakebite happens, and where to turn to for help. This along with little confidence in local healthcare providers (who usually do not provide snakebite treatment but refer patients to medical college hospitals) leads the vast majority of people (98% in our study published in 2012) to first consulting a traditional healer (‘ozha’).

In contrast to most NTDs, the medical treatment for snakebite envenomation is time-critical, requiring an appropriate selection of antivenom by adequately trained staff in a well-equipped hospital (34). However, many victims do not seek biomedical care but from traditional snakebite healers. Generally, and globally, this situation can be explained as “patterns of resort,” which explains typical health seeking behavior; that the first health seeking option tends to be the most basic and cheapest. When it is unsuccessful, people seek more advanced, costly, and unconventional treatment, notably in Lao PDR (35), India (36), Nigeria (37), and South Africa (38). In terms of snakebite treatment, in Bangladesh, Rehman et al in 2009 reported that 86% of the snakebite victims’ first contact was with snakebite healers or snake charmers (snake handlers) after snakebite (1). A different 2003 study by Hossain et al observed that approximately 61% sought treatment from traditional snakebite healer or herbal medicine practitioner (39). However, it is generally understood that ethnomedicinal treatment by traditional healer’s lack of medical evidence.

Despite the importance of basic knowledge and awareness concerning snakebite envenoming, multiple studies have found that many healthcare workers in snakebite endemic regions have poor general knowledge of the snakebite crisis (40). A study by Michael and colleagues reported

that doctors in Nigeria had poor knowledge of venomous snakes, snakebite first aid, treatment, and prevention (5). Similar gaps in baseline knowledge and treatment confidence regarding snakebite patient management were found in doctors across Hong Kong (41), Laos (42), Nepal, and West Bengal (43)(44), with the authors of some studies noting that core text books regarding snakebite patient management were outdated and provided inaccurate information(44,45). This highlights the critical need for effective community engagement in Bangladesh, particularly given the country's high incidence of snakebites and the resultant health burden. The involvement of community members, local leaders, and healthcare professionals is essential in disseminating accurate information and improving snakebite management practices. This research report represents a pioneering effort in Bangladesh, addressing a significant gap that has not been explored before in this context. Through active community participation and education, we can enhance the preparedness and response to snakebite incidents, ultimately reducing mortality and morbidity associated with snakebite envenoming.

Last but not least, snakebite has also recently been considered an important animal health condition because it causes damage to domestic animals thus posing economic pressures on livestock owners and their families and contributing to food insecurity(46,47) However, there is still a dearth of information on snakebite in domestic animals, highlighting the need for dedicated research on this topic and its socio-economic impact.

It seems reasonable to conjecture that the burden of snakebite morbidity and mortality may be reduced by a combination of appropriate use of medicines and equipment, adequate training of healthcare workers, and increased awareness of appropriate health-seeking behavior among the at-risk population. Therefore, it is crucial to understand the level of knowledge of the general population in managing snakebite cases. Currently, there is a paucity of data on domain-level knowledge concerning snakes and snakebite awareness and management in affected communities. This study aims to address this gap by assessing the knowledge regarding the prevention and management of snakebites and first aid through community engagement.

1.2 Rationale of the study

Addressing the challenge of reducing deaths and disabilities from snakebites requires a well-rounded strategy that emphasizes prevention, effective first aid, and timely medical care. Despite the serious threat that snakebites pose in Bangladesh, there is currently no formal national program dedicated to both preventing snakebites and ensuring appropriate first aid is provided. This lack of a coordinated effort leaves many communities, especially in rural areas, at risk of preventable harm.

This study aims to address this gap by introducing a community-led program focused on snakebite prevention and first aid. By educating communities on effective prevention strategies and proper first aid, and ensuring that snakebite victims are quickly referred to the nearest Upazila Health Complex (UHC), we hope to reduce the number of deaths and serious injuries caused by snakebites. Community engagement is a key part of this strategy, as it empowers people to take action and protect themselves and their neighbors.

However, the success of these community efforts also depends on the readiness of healthcare facilities to treat snakebite cases. This includes having a well-trained healthcare team and ensuring that essential medicines and supplies are available at the UHC. By strengthening both the community's response and the healthcare system's capacity, this study aims to create a sustainable model for reducing the impact of snakebites.

In this study not only seeks to fill a crucial gap in snakebite management in Bangladesh but also aims to provide valuable insights that could shape future national policies and programs. By working together with communities and healthcare providers, we hope to create a safer environment and improve outcomes for snakebite victims across the country.

Chapter 2

Objectives Of the Study

2.1 General Objective

To determine the impact of community engagement/awareness on snakebite prevention and appropriate first aid practices after snakebite in Bangladesh.

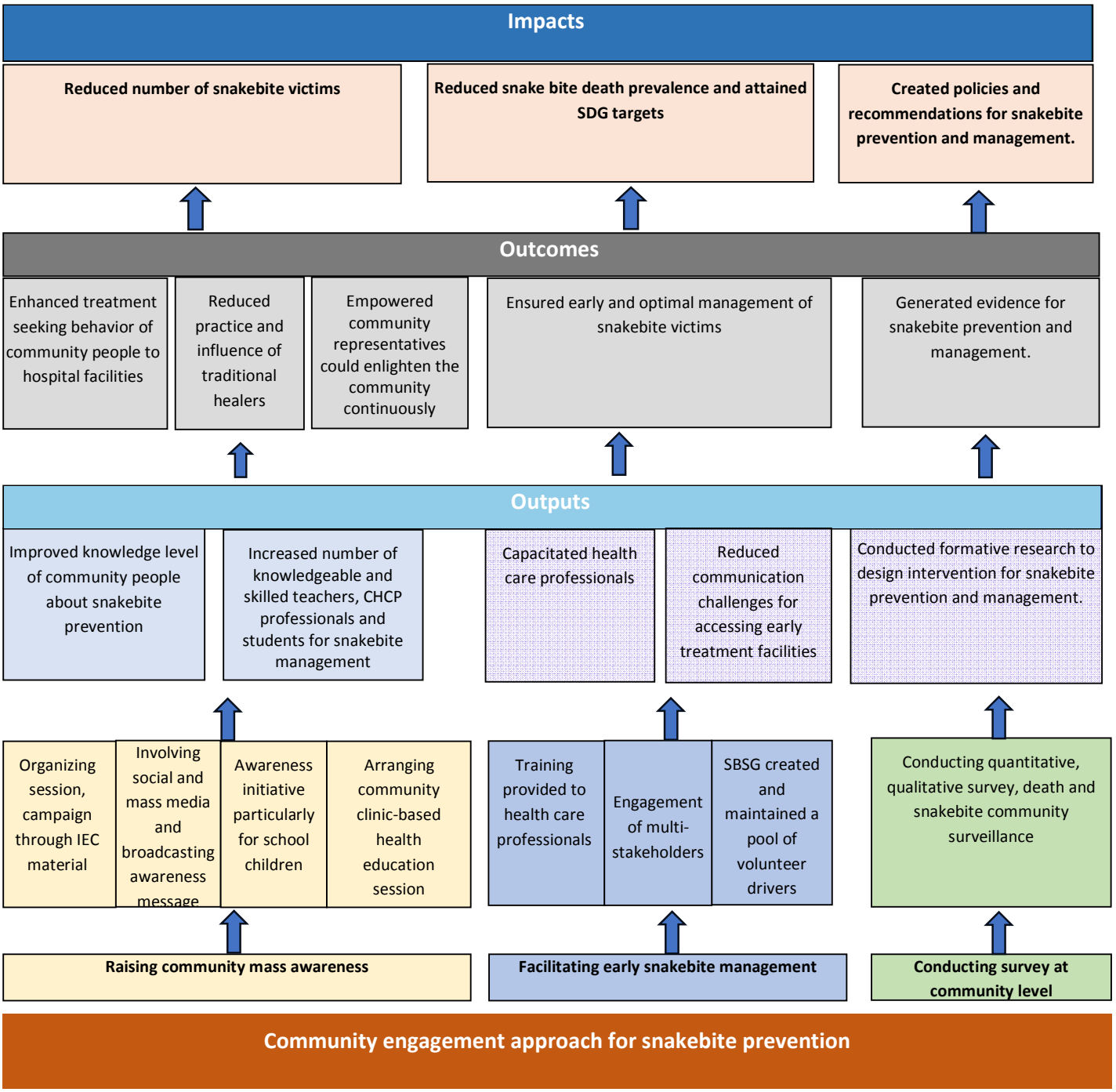
2.2 Specific Objective:

1. To depict the snakebite scenario in the studyareas.
2. To conduct formative research for designing the intervention for prevention and management of snakebite in rural Bangladesh.
3. To design and strategize the implementation framework for awareness building, community engagement, and developing community base snakebite support group for prevention and proper management of snakebite in rural Bangladesh.
4. To implement the implementation programme according to designed strategies.
5. To evaluate the impact of implementation programme in increasing awareness for prevention of snakebite and improving the management practice for snakebite.

Table1: These goals were anticipated to provide the following results

Objectives	Expected Outcome
To depict the snakebite scenario in the study areas.	A baseline information on snakebite in rural community obtained.
To conduct formative research for designing the intervention for prevention and management of snakebite in rural Bangladesh.	A deeper understanding of community perception regarding the snakebite prevention and management for snakebite explored.
To design and strategize the implementation framework for awareness building, community engagement, and developing community base snakebite support group for prevention and proper management of snakebite in rural Bangladesh.	A comprehensive integrated snakebite prevention and management programme developed.
To implement the implementation programme according to designed strategies.	A complete snakebite prevention and management program implemented into the health system of selected Upazila in Bangladesh according to the design strategies.
To evaluate the impact of implementation programme in increasing awareness for prevention of snakebite and improving the management practice for snakebite.	People are knowledgeable about the prevention of snakebite, engaged in proper management of snakebite, communities are empowered to address snakebite in their areas.

2.3 Theory of Change



Chapter 3

Methodology

3.1 Study Type

This study was a cluster randomized trial to assess the impact of health education provided through community engagement on the prevention and first aid of snakebite.

3.2 Study Setting

Bangladesh experienced a substantial burden of snakebite, with Barishal and Rajshahi districts reporting the highest and second-highest incidence rates, respectively. Both regions were endemic for venomous snakes, including elapid and viperid species. Despite the significant impact of snakebite in these areas, no dedicated prevention or intervention programs had been implemented to date. This study was conducted in two upazilas, one from the southern part and one from the northern part of Bangladesh Shibganj upazila of Rajshahi in the north and Kalapara upazila of Patuakhali in the south. To evaluate the effectiveness of the intervention, 30 randomly selected community clinic areas were included from the intervention upazila in one district, and a similar number of community clinic areas served as the control group in the other district.

3.3 Study Area

This survey was conducted thirty selected community clinic areas in Shibganj upazila of Chapainawabganj and Kalapara upazila of Patuakhali district.

3.4 Study population

The study population was the community people residing in 3 wards of the catchment areas of community clinics in both the control and intervention areas. An eligible participant for the household survey was defined as someone residing in the study area for more than six months. In the community survey, the key participant was considered to be the head of the family. Moreover, if other family members could provide relevant information about the victim, they were invited to join the interview.

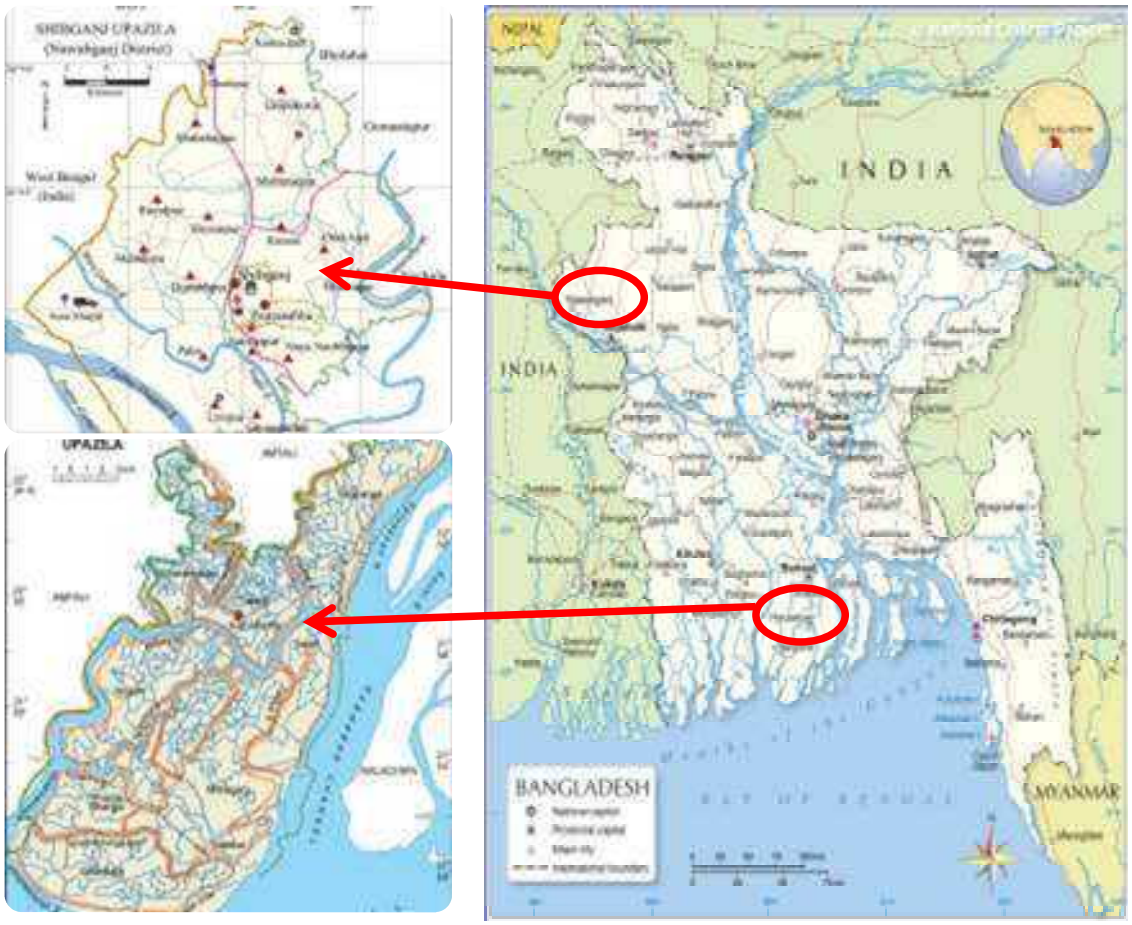


Figure 1: Location of study area

3.5 Study Design

To organize this cluster randomized trial, formative research was conducted in September-October 2022 to design the intervention for snakebite prevention and management in rural Bangladesh. Additionally, a baseline survey with a cross-sectional design was conducted in November-December 2022 in both Kalapara and Shibganj Upazila. After implementing several interventions, a midline survey was conducted in October-December 2023 to assess the effectiveness of the intervention programs in increasing awareness for snakebite prevention and improving management practices. This midline survey included both qualitative and quantitative studies. Finally, at the end of the study, an endline survey was conducted from May to August 2024.

Table2: This study was a community trial. To meet the study objectives, the planned methods were employed for implementation

Objectives	Methods/Tools
To depict the snakebite scenario in the study areas.	Cross sectional survey
To conduct formative research for designing the intervention for prevention and management ofsnakebite in ruralBangladesh.	Qualitative study • FGD • IDI
To design and strategize the implementation framework for awareness building, community engagement, and developing community base snakebite support group for prevention and proper management of snakebite in rural Bangladesh.	1. Workshop with GOB specialist, stakeholders, communication expert 2. Qualitativesurvey • FGD • IDI 3. Cross sectional survey
To implement the programe according to designed strategies.	1) Workshop with GOB specialist, stakeholders 2) Formative research
To evaluate the impact of implementation programe in increasing awareness for prevention of snakebite and improving the management practice for snakebite.	Cross sectional study

The overall methodological framework is provided below:

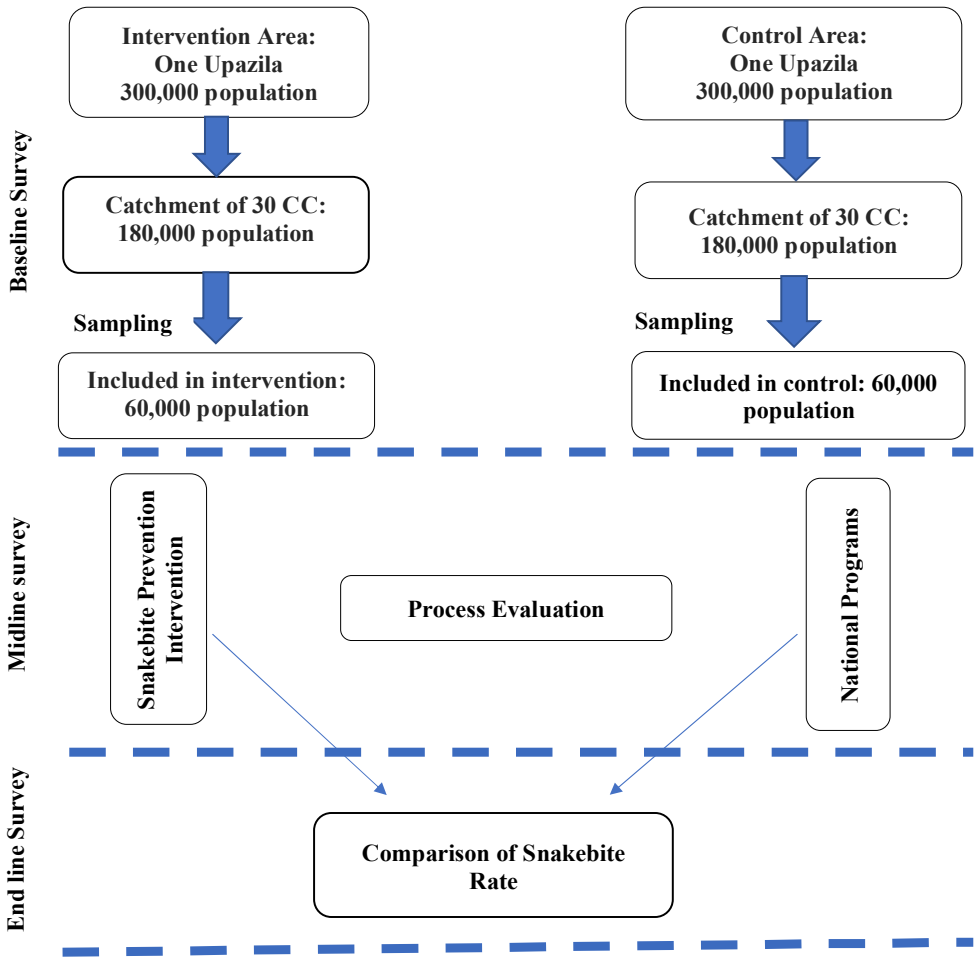


Figure 2: Methodological Framework

Table3: Key deliverables and success indicators for The Study

Deliverable list	Deadline (by) Assumption-initiation 01.09.2022
Deliverable 1: Development of IEC materials on prevention and first aid following snakebite.	01.09.2022 – 31.12.2022
Milestone 1.1: Collection and identification of IEC materials on snakebite prevention and first aid.	31.08.2022
Milestone 1.2: Development of IEC materials on snakebite prevention and first aid in Bengali.	31.10.2022
Milestone 1.3: Focus group discussion (FGD) on prevention and first aid of snakebite.	31.12.2022
Success indicator 1: IEC materials on snakebite prevention and first aid developed.	
Deliverable 2: Community clinic-based community engagement through multi-stakeholder participation.	01.01.2023 - 28.02.2023
Milestone 2.1: Engagement of multi-stakeholders at community clinic for prevention and first aid of snakebite.	30.01.2023
Milestone 2.2: Formation of three snakebite support group (SBSG) in each of the 30-community clinic in intervention upazila	01.02.2023
Success indicator 2: Formation of 3 SBSG in each of the 30-community clinic in intervention upazila.	
Deliverable 3: Community education session on snakebite prevention and first aid conducted.	01.03.2023 - 31.05.2023
Milestone 3.1: Conducted '*UthanBaitak*' on prevention and first aid of snakebite in intervention areas of one upazila.	01.03.2023
Milestone 3.2: Conducted bi-weekly health education session on prevention and first aid of snakebite in community clinic of intervention upazila.	01.03.2023
Milestone 3.3: Conducted 30 folk song session ('Gambira') in intervention upazila.	27.05.2023
Milestone 3.4: Conducted 30 teaching session in school/college on snakebite prevention and first aid.	01.03.2023
Success indicator 3: Provided community education on snakebite prevention and first aid.	
Deliverable 4: Establishing a best practice model for clinical management of snakebite in 2 UZHCs.	31.12.2022
Milestone 4.1: Key informant interview (KII) with health care professional of UZHC on perception of management of snakebite.	01.09.2022

Deliverable list	Deadline (by) Assumption-initiation 01.09.2022
Milestone 4.2: Training provided to a team of health care professionals of 2 UZHCs.	01.11.2022 to be continued until the end of the project
Milestone 4.3: Supportive supervision to health care providers of 2 UZHCs arranged ('hub and spoke model').	30.11.2022 to be continued until the end of the project
Milestone 4.4: Logistics for management of snakebite arranged at 2 UZHCs.	31.10.2022 to be continued until the end of the project
Milestone 4.5: FGD with health care providers on perception of snakebite treatment completed at 2 UZHCs.	01.08.2023
Success indicator 4: Initial treatment of snakebite is provided at UZHC instead of referral only.	
Deliverable 5: Conducting 03 community survey in 2 upazilas, and community & hospital surveillance established in one upazila.	01.11.2022-30.08.2024
Milestone 5.1: Three community survey on snakebite (humans and animals) conducted in two upazila- baseline, 1 (one) year, and 2 (two) years.	12.11.2022 At the end of 1 (one) year (04.10.2023) At the end of 2 (two) years (11.05.2024)
Milestone 5.2: Community surveillance on snakebite (humans and animals) established in one upazila.	01.03.2023 to be continued until the end of the project
Milestone 5.3: Snakebite registry established in two UZHCs.	01.01.2023 to be continued until the end of the project
Success indicator 5: Community and hospital surveillance system on snakebite established.	
Deliverable 6:	
Milestone 6.1: Dissemination of result	30.08.2024
Milestone 6.2: Final Report	30.08.2024

3.6 Study Duration

This study was conducted over a 24-month period, from September 2022 to August 2024. The implementation of the study was divided into five distinct phases, each contributing to the overall objectives and outcomes of the research. Figure 3 presents the several stages that show how the study was progressing.

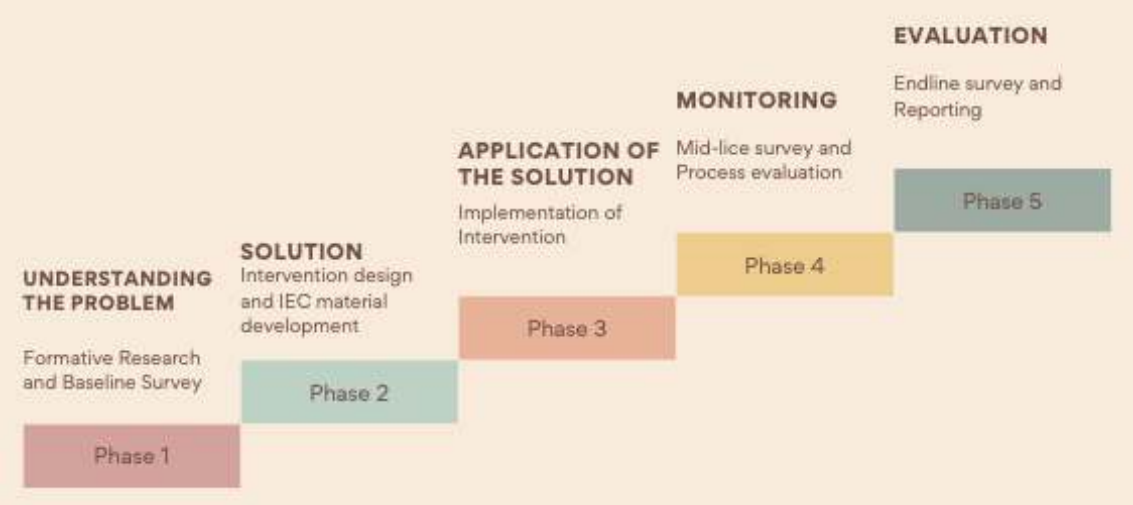


Figure 3: Phases of the study

The data collection phase for the survey was included as part of this structured approach in figure 4.

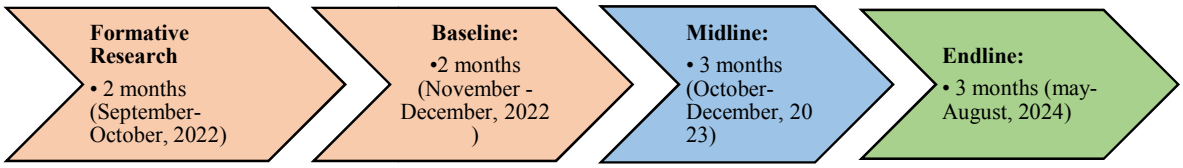


Figure 4: Data collection period of this study

Phase 1- Formative Research and Baseline Survey

3.7 Formative Research

The participatory study was conducted with the aim of:

4. Understanding which type of participation would be more engaging in raising awareness among the rural population to prevent snakebites.
5. Investigating how community members enhanced their first aid competencies in response to snakebite incidents.
6. Identifying the kinds of rapid responses needed to reduce the frequency of morbidity and mortality from snakebites in Bangladesh.

This study contributed to the development of study tools and the design of interventions.

In the formative research phase, we conducted in-depth interviews (IDIs) and key informant interviews (KIIs) with healthcare professionals at the Upazila Health Complexes (UHC) in Kalapara and Shibganj to understand their perceptions of snakebite management. The IDIs involved 24 health professionals, including doctors, nurses, and sub-assistant community medical officers, working at the two UHCs in the intervention and control upazilas. These interviews were carried out by a team of anthropologists.

Additionally, we conducted 12 focus group discussions (FGDs) on the prevention and first aid of snakebites. These FGDs, led by the anthropologist team, included 114 participants from various community stakeholders across the two upazila.



IDI with Ozha



FGD with local community leaders



IDI with SACMO



FGD with female

Table 4: Number of Participants qualitative methods in Formative Research

Technique (n)	Participant type	Participant no.
IDIs (17)	Ozha/Kabiraj	17
FGDs (6)	Female	40
	Male	32
	Community leaders	42
IDIs (24)	Doctors	12
	SACMOs	4
	Nurses	8

3.8 Baseline Study

To evaluate the impact of the implementation program on snakebite prevention awareness and management practices, community surveys were conducted in both control and intervention areas. A baseline cross-sectional survey, initiated concurrently with formative research, was conducted from November to December 2022. Structured questionnaire, adapted into Bangla, were used for household surveys. The data collection tool was pretested before fieldwork and is included in this report. The survey questionnaire is attached in Apendx-D, E

3.9 Sample size and sampling strategy

The sample size and power calculations were based on comparing cases per 100,000 population after two years between the intervention and control areas. Initially, 55 community clinics were identified in Shibganj and 35 in Kalapara. Later, 30 community clinics were randomly selected from each area. Concurrently, 500 arbitrary primary sampling units (PSUs) were established in the catchment areas of the selected community clinics. A total of 125 PSUs were randomly chosen from both study areas, with 120 households surveyed in each PSU. This resulted in a total of 30,234 households surveyed, encompassing a population of 116,019. For the KAP study, 10% of the households were selected. Respondents for the KAP study were chosen using a systematic random sampling technique, selecting every 10th house. If the 10th respondent was unavailable,
the next available respondent was chosen.

3.10 Data Collection Instruments for the Study

The tools were adopted and translated into Bangla for data collection at the study site in Bangladesh. These instruments were pretested before the field data collection began. They were designed to gather information on the relevant indicators.

Indicators for the Study:

1. **Household Information:**

    - Yes/No response for all households (HHs) from control and intervention areas.
    - Details of positive cases only (Yes) for snakebite cases on humans or domesticated animals.

2. **Key Informant Details:**

    - Phone number of the informant.
    - Day after the incident.
    - GPS coordinates of the bite location or its vicinity.

3. **Snakebite Victim Information:**

    - Human/Domestic animal (species name).
    - Age of the victim.
    - Sex: Male/Female/Third gender.
    - Pregnancy status (if female).
    - Bite date and time.
    - Bite site (on body).
    - Circumstances: Daytime/Nighttime.
    - If the snake was seen.
    - Snake identification: Yes/No; choose from photos of representative snakes (venomous and non-venomous).
    - Local name of the snake.
    - Snake killed/brought to hospital.

4. **First Aid Provided:**

    - Pressure immobilization on limbs: Yes/No.
    - Tourniquet (ligatures) applied: Yes/No; number, materials used.
    - Treatment sought: 'Ozha'/directly to UZHC/elsewhere (specify).
    - Time from bite to hospital arrival.
    - Travel time from home to hospital.

5. **Key Symptoms After Bite:**

    - Outcome: Survived/Died (verbal autopsy for fatal cases).
    - Any sequelae (specify).
    - Cost of treatment in Taka: Direct cost/Indirect cost.
    - Treatment cost coverage: Savings/Loan/Sale of material wealth/Other (specify).

6. **Domestic Animal Information:**

    - Snakebite confirmation/probability (case definition provided).
    - Type of animal: Cattle, buffalo, goat, sheep, pig, poultry, dog, cat, other.
    - Bite location: Owner's house/farm/animal shed/field/pasture.
    - Bite site: Limb/head-neck/abdomen/thorax/udder/tail/unknown.
    - Treatment provided and type of treatment.
    - Outcome of the animal.
    - Cost of treatment in Taka: Direct cost/Indirect cost.
    - Treatment cost coverage: Savings/Loan/Sale of material wealth/Other.

At the beginning of the baseline phase, provided training to a team of healthcare professionals in two upazilas:

- Training provided to a team of health care professionals (Doctors, Nurses, Sub-Assistant Community Medical Officer) of two UHCs, Kalapara & Shibganj on management of snakebite using the existing training modules prepared for doctors, and other health care professionals by NCDC, DGHS.
- Several SOPs were developed and used during a two-long structured training. This SOPs attached to Appendix. An orientation meeting was also held in each upazila with the health care professionals of UHC.



Orientationprogramme: Upazila Health Complex, Shibganj



Doctor training: MCH, RMC



Doctor training: MCH, Patuakhali

Phase 2- Intervention Design and Development of IEC Materials

3.11 Intervention

3.11.1 Finalization of Intervention

After the formative research, the development of interventions was in progress. The intervention package was developed utilizing (a) findings from the baseline survey and formative research, (b) a review of existing literature, including recommendations from the 'Guidelines for the Management of Snakebites' published by the WHO SEAR Office in 2016, which was prepared by a team of experts, including one of us (MAF, PI); adopted recommendations in the National Guideline for the Management of Snakebite 2019, and training modules prepared by NCDC, DGHS, GOB for providing training to community health workers (in Bengali) and medical doctors (in English). The investigators (MAF, AG, AAS, RR, AS) were involved in developing the guidelines and the learner's guide by organizing a workshop with key stakeholders.

3.11.2 IEC Material Development and Demonstration

In our study, we developed intervention processes, including information, education, and communication (IEC) materials, to create community awareness about snakebite prevention and first aid. This development was carried out in Bengali with the active participation of relevant stakeholders, such as program personnel, health managers, healthcare professionals, and community members. The preparation of the IEC materials involved the following steps:

- Collection of existing IEC materials on snakebite prevention and first aid, if available.
- Identification of IEC materials on snakebite prevention and first aid were done through a series of meeting, expert consultation with health professional, managers and communication experts.
- Development of new IEC materials in Bengali.



Stakeholder meeting for identification of IEC material

The list of IEC materials included:

- Posters
- Flip charts

- Leaflets and pamphlets
- Video films
- Radio talks and short radio advertisements, with a focus on local community radio and Bangladesh Betar
- Popular writing
- Traditional song— 'Gambira'
- Laminated pictures of common venomous snakes

We also arranged community engagement activities through small group discussions, utilizing the IEC materials with healthcare staff working in the intervention area of the community clinic. Multi-stakeholder involvement was central to the community clinic in the intervention area.

Phase 3- Implementation of Intervention

3.12 Implementation of Interventions

After finalizing the interventions, the next steps involved implementing them to enhance community engagement and raise awareness about first aid management. The following work packages was implemented at the community level:

3.12.1 Community Engagement

I. We completed the process of identifying stakeholders essential for snakebite prevention and first aid.

II. We identified key stakeholders crucial for snakebite prevention and first aid by engaging community groups, including two representatives from each of three community support groups, as well as Health Assistants, Assistant Health Inspectors, and Family Welfare Assistants. Our focus was on community education and enabling self-organized first aid and primary care for snakebites, with a central emphasis on the community clinic.

III. We established Snakebite Support Groups (SBSGs) by forming a 5-member team for each community clinic area, creating three SBSGs—one for each ward. These groups conducted health education sessions on prevention and first aid, holding at least five sessions per ward, which totaled 450 sessions in the intervention upazila. They also organized a network of motorbike and vehicle drivers, sharing their contact details with the community. These volunteers were available to transport snakebite victims, with transportation costs reimbursed. The community could also choose alternative transportation methods, such as ambulances, if necessary.

3.12.2 Community Education

We conducted 450 'Uthan Baitak' (courtyard meetings) using flip-chart materials that were developed for the study on snakebite prevention and appropriate first aid. These materials included photos of relevant venomous and non-venomous snakes found in the area. Public health measures were implemented, such as physical distancing, mask-wearing, and hand sanitizer use. The 'UthanBaitak' sessions covered key topics on prevention strategies, including the use of 'cot and bed nets,' torch lights, boots, cleaning the surroundings and interiors of houses, avoiding risky behaviors, and not keeping poultry in the house. First aid education focused on the 'Do's and Don'ts' based on current evidence, practicing appropriate first aid measures, and acquiring necessary skills. The sessions were organized by the SBSGs with support from community health workers, and an action plan was developed by the UZ coordinator. Additionally, regular bi-weekly health education sessions were conducted at the community clinic by CHCP using the flipchart, and the developed posters on snakebite prevention and first aid were utilized. School and college-based seminars and symposia were held, with at least one conducted in each intervention community clinic area.



Uthan Baitak session

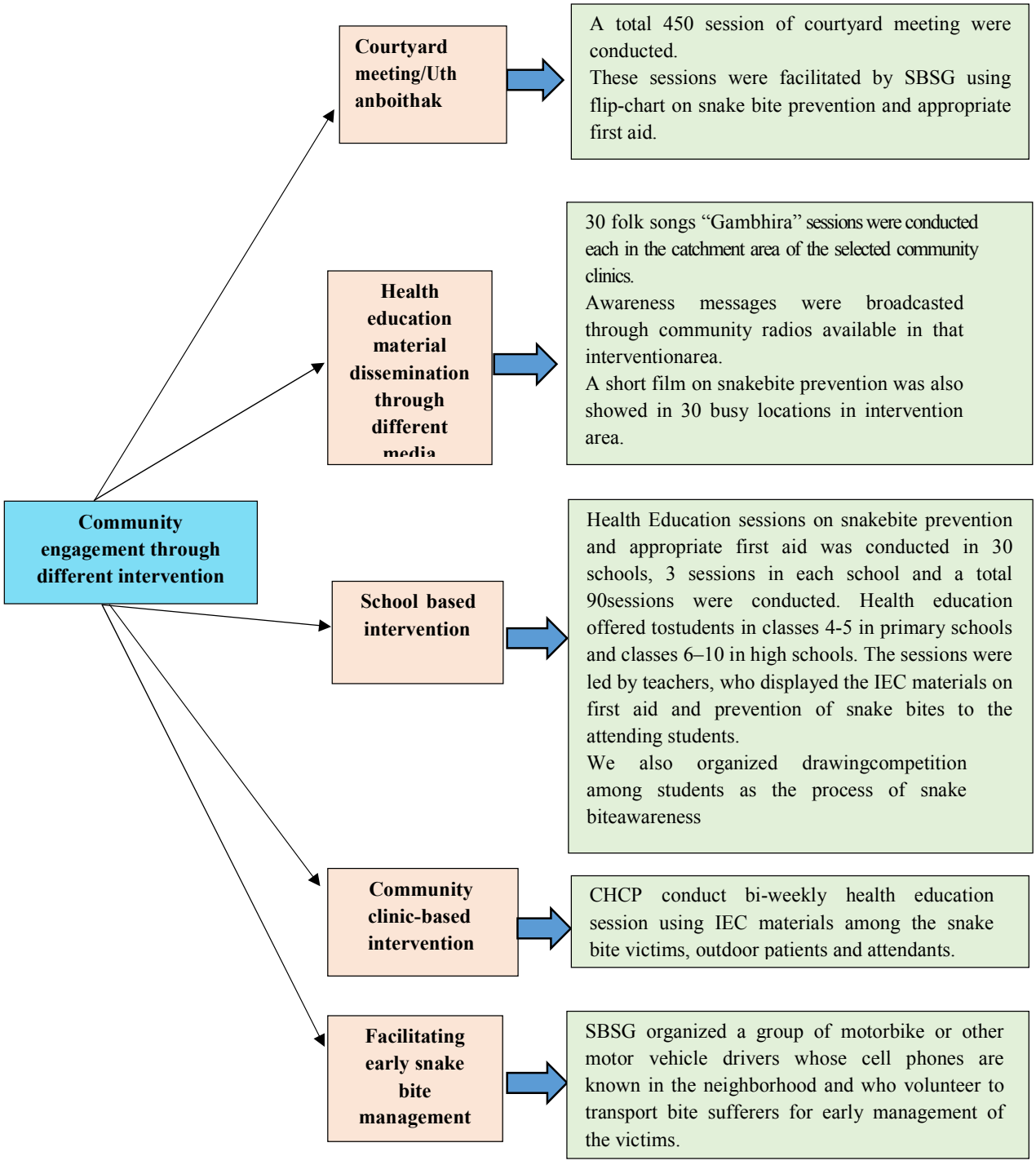


Figure 5: Different Intervention Methods

3.12.3 Best Practice Model Establishment

We established a best-practice model for the clinical management of snakebites in the UHCs of both control and intervention areas. This was crucial for ensuring that snakebite patients arriving at the UHC were managed appropriately; otherwise, community trust could be compromised. We provided training or retraining to a team of health professionals, including doctors, nurses, and sub-assistant community medical officers, at selected Upazila Health Complexes (UHC) on the clinical management of snakebites. Essential logistics were arranged, including the supply of antivenom and other necessary drugs for managing snakebite envenoming, through coordination with relevant OPs and government sources. Health education was delivered by HC professionals on snakebite prevention and appropriate first aid to snakebite victims, their families, and the public attending the UHC. Supportive supervision was provided to UHC health care professionals through a 24/7 online connection with a dedicated medical college or district hospital ('hub'), following the National Eye Care (NEC) Operational Plan as a model of best practice. This activity involved a pool of volunteers from the medicine and pediatrics departments of the 'hub' hospital who offered telemedicine support to the UHC staff. We also studied the perceptions of snakebite treatment, including antivenom delivery, among the health care professionals in the UHC using key informant interviews (KII).

3.12.4 Community and Hospital Surveillance

We established a community surveillance system for snakebites to record all cases involving humans and domesticated animals (e.g., poultry, cattle, goats, pigs, dogs, cats) through a structured questionnaire and house-to-house searches. Any snakebite case occurring in the community was reported to the CHCP of the community clinic by all stakeholders, including SBSG and community health workers, for the monthly transfer of basic snakebite data to the UHC, covering details such as age, sex, date, and locality of the bite.

For hospital surveillance, we maintained a 'snakebite register' to record all human cases of snakebite attending the UHC and replicated this for cases involving domesticated animals at the upazila veterinary hospitals. Patients with snakebites attending the UHC in intervention areas were reimbursed for quick transport arranged by the SBSG at the community level. We also made arrangements to keep any killed snake specimens brought by victims or their attendants, ensuring they were appropriately labeled and preserved in the facility using ethanol or formalin.

Table 5: Below is a summary of all the interventions provided to the community

Activity	Details	Participants	Durat-ion
1. Meeting in Community Clinics (CC)			
i. Community Clinic (CC) meeting	• Trained community health educators to run sessions in their own community clinic areas.	1055 (Male- 544, Female- 511)	1 month
ii. Community Clinic Bi-weekly Sessions	• CHCPs conduct health education sessions twice a month at Community Clinics using flip charts.	19137 (Male- 5312, Female- 13825)	15 months
iii. Courtyard Meetings	• Trained 90 SBSGs on snakebite prevention, first aid, and immobilization; provided toolkits and flip charts; conducted 15 community meetings per clinic area, emphasizing early referral to healthcare centers.	9270 (Male-1405, Female-7865)	1 month
iii. Sessions at Upazila Health Complex	• Community health workers conducted 10–15-minute sessions using flip charts at Kalapara Upazila Health Complex every alternate day.	4250 (Male-1445, Female-2805)	13 months
2. Meeting with Teachers from Schools, Colleges, and Madrasas			
i. Training of Teachers	• Conducted training sessions for principals and teachers; provided educational posters.	60	1 Day, 4 hours
ii. Seminars for Students	Held seminars on snakebite prevention at 30 educational institutions; teachers used posters for three interactive sessions.	6573 (Male-3352, Female-3221)	2 months
iii. Scientific Fair and Art Competition	• Organized a scientific fair and art competition with a snakebite prevention theme.		2 days

Activity	Details	Participants	Durat-ion
3. Awareness through Audio-Visual Content			
i. Performance of Folk Song ('Boyati')	• Local singers performed 30 street shows with theme-based 'Boyati' songs in crowded areas.	5953 (Male-4513, Female-1440)	10 days
ii. Display of Drama	• Staged a drama on snakebite malpractice and early referral; displayed at Kalapara Upazila Health Complex and on social media.		
4. Poster and Leaflet Distribution	• Distributed 7000 posters and 21000 leaflets in various locations, including schools, markets, and government offices.		12 months
5. In collaboration with Center for Injury Prevention and Research (CIPRB), Bangladesh	• The Kalapara SPACE team trained 26 CIPRB "Achal" officers on snakebite prevention and first aid, providing posters and leaflets for use in training "Achal Ma." • "Achal" officers trained "Achal Ma" during monthly cluster meetings. • "Achal Ma" conducted 170 health education sessions at parent meetings, with 15–20 parents attending each session.	3411, (Male: 269, Female: 3142).	3 months
6. Facebook page activity on snakebite	• The Facebook page"সর্পদংশন বিষয়ক সচেতনতা, কলাপাড়া" posted and shared posters, leaflets, dramas, and videos on snakebite prevention and first aid prepared by the Toxicology Society of Bangladesh (TSB). • TSB also shared "Boyati" song performances, "Uthan Boithak" videos, and bi-weekly health education session photos to enhance community engagement.		

Activity	Details	Participants	Durat-ion
7. Video display on snakebite at UHC Kalapara was arranged. The TV screen was arranged from Health Education Bureau, DGHS	• BorgunaLokobetar prepared a 12-minute and a 1-minute drama on snakebite prevention and first aid. • Both dramas were shown every 15-20 minutes on the Kalapara Upazila Health Complex TV screen to raise community awareness.		
8. Participation in Community Clinic Committee Meeting	• Each community clinic had one community group and three support groups, each with 16-17 members. • Monthly committee meetings were held, and the Kalapara SPACE Team attended 20 meetings over four months (January-April) to raise awareness of snakebite prevention and first aid.	256 (Male-102, Female-154)	4 months
9. Conducting Health Education Session in Educational Institutions	• An educational institute was identified from each CC area for seminars/symposia. • In January, February, and March 2024, the SPACE Team planned and conducted health education sessions in 10 additional educational institutions using hanging posters.	708 (Male- 394, Female- 314)	3 months
10. Conducting Health Education Session with Fisherman	• The SPACE Team planned health education sessions for fishermen on snakebite prevention and first aid. • On February 28, 2024, a session was held with fishermen at Mohipur Fishery Ghat on Snakebite prevention and First aid.	25	2 hours
11. Health education session conducted by the SPACE team with existing IEC materials in local bazar	• Four health education sessions on snakebite prevention and first aid were conducted in 4 local bazaars. • Bazar visitors showed strong interest in the topic.		3 days

Activity	Details	Participants	Durat-ion
12. Health Education Session with Imams by the SPACE team	• A session was held with 7-8 Imams from one union at the nearest community clinic, with CHCP present. • Imams were advised to share brief messages during weekly prayers in their mosques.		1 day

Phase 4- Midline Survey and Process evaluation

These activities took place in two phases. After the baseline survey, we have conducted a series of consultative meetings to develop and finalize the IEC materials. The finalized contents had been pretested and validated before the implementation. The intervention programs were used in Kalapara upazilla to create awareness about snakebite preventive measures as well as first aid methods. After 10 months extensive intervention process, we conducted a short survey both in intervention and control area to understand the change.

3.13 Process Evaluation

The interventions have been adapted for community engagement are discussed below:

1. **Meeting in Community Clinics (CC):**

   Initially we planned to train the trainers in thirty community clinic areas. In this regard, A total of ninety "**Snake Bite Support Group (SBSG)**" were formed; three in each community clinic areas and the groups were made with the active participation of multi-purpose health volunteer and members from the community clinic support group. They were trained on preventive measures of snakebite and 'what to do' and 'not to do' after the snake bite. They were also supplied by a protective toolkit that package contained a pair of boots, a piece of 'gamcha' (towel) and a bamboo stick for the immobilization, a torch light, and a flip chart for the health educational session. The trainers also demonstrated the techniques of immobilization of limbs after snake bite incidents. The audiences were also taught how to conduct a health education session or courtyard meetings. The main aim of these the meetings in the community clinics was to train the community level health educators so that they can conduct the session in their own community clinic areas. The health educators have disseminated the messages through different channels which has been discussed as follows. The total participants were ***1055 (Male- 544, Female- 511)*** and the duration of the program was approximately 1 month.

i. Community clinic bi-weekly sessions:

Community Health Care Providers (CHCPs) are one of the effective media to work on the health-related issues inside the community. Although the government has pre-designated snakebite prevention health education session in each calendar year for the community clinic workers still community clinic healthcare providers conduct two extensive sessions in their community clinic in each using the prepared flip chart through this study fund. The target audience for these sessions were community members who visited community clinics for treatment purposes. After completion of the health education sessions, the community healthcare providers report through a web-based software. Here we would also like to mention that community healthcare providers are also responsible for reporting the case to program personnel over phone as well as they are main channel of referral of the patient to higher treatment center without any delay. The total participants were ***9096 (Male- 2290, Female- 6806)*** and the duration of the program was approximately 7 months.

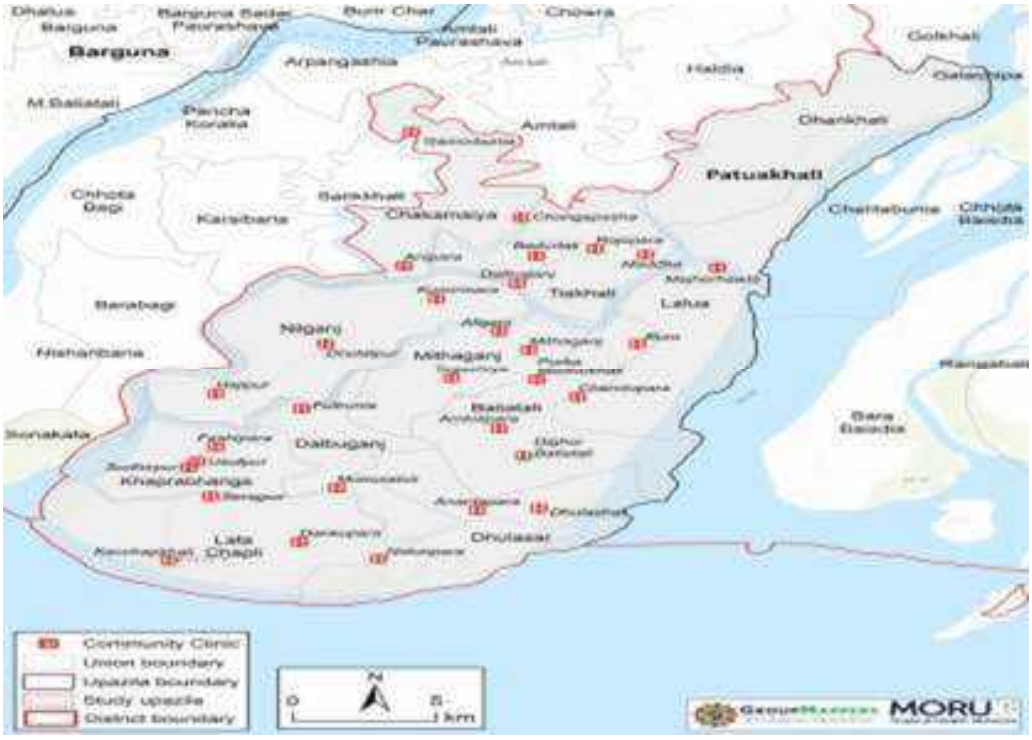


Figure 6: Geographical presentation of community clinic coverage under this program

ii. Courtyard meetings:

The preformed Snake Bite Support Group members were accountable for the courtyard meeting in their community. We already mentioned that three groups were formed in each community clinic area, and each of them conducted 5 courtyard meetings, a total of 15 courtyard meetings in each community clinic area. The multi-purpose health volunteers led the courtyard meetings where they initially informed the community stakeholders for better

engagement. Later they organized a meeting involving 15-20 community people of different age groups at the participant's yard. They took the health education utilizing the flip chart as well as they showed how to use bamboo stick and any cloth to immobilize the limb in case of snakebites. They also put emphasis on early referral to health care centers rather than wasting golden hours to traditional healers. These sessions were highly interactive and lasted 45min to 1 hour. After successful completion of courtyard session, the multipurpose volunteers reported through WhatsApp and digital reporting software. The program personnels often visited the sites and sometimes they monitored the quality via WhatsApp videocall. The total participants were ***9270 (Male- 1405, Female- 7865)*** and the duration of the program was approximately 1 month.

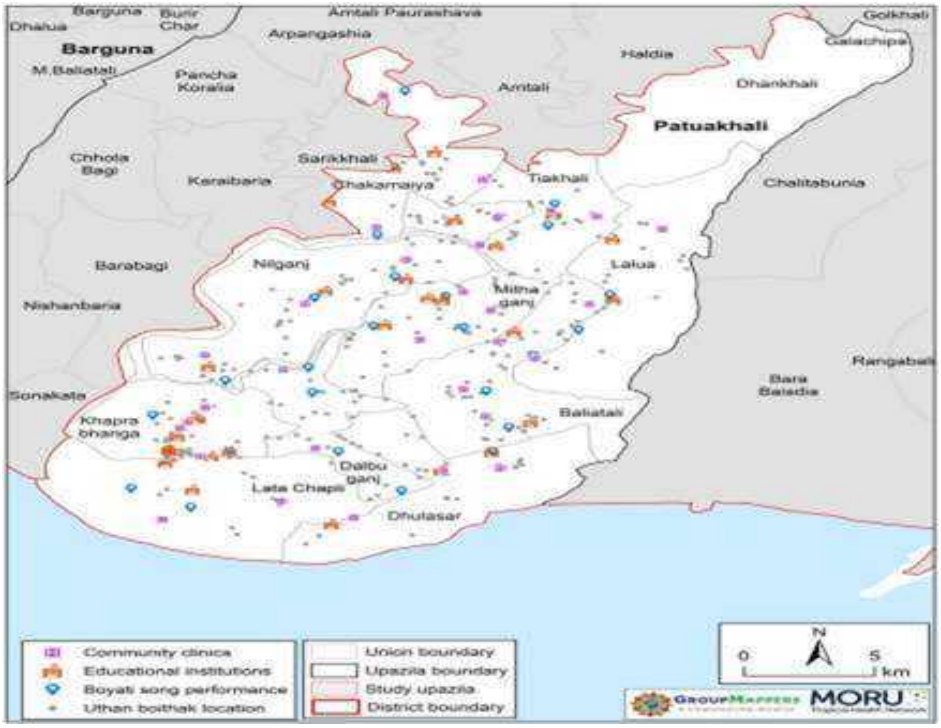


Figure 7: Geographical presentation of courtyard meeting coverage under this program

iii. Sessions at upazila health complex:

Two dedicated community health workers are conducting 10-15 minutes health education sessions using flip chart at the outdoor of Kalapara Upazila health complex in every alternative day. The total participants were ***1349 (Male- 420, Female- 929)*** and the duration of the program was approximately 5 months.

2. **Meeting with Teachers from school, college, and madrasa:**

The program also targeted educational institutions as part of the intervention process. A total of ninety seminars had been organized for the students at their campus. The process involved as follows:

i. **Training of the teachers:**

An official letter was sent by upazila education officer to the thirty pre-selected educational institutions to take participate in the training sessions of snakebite prevention campaigns. The principal and one nominated teacher took part in the training sessions. They were provided posters as educational materials**.** The total participants were ***60*** and the duration of the program was approximately 2 hours.

ii. **Seminars for the students:**

The students from high school, senior madrasha, and college students from thirty academic institutes were educated on snakebite prevention measures and do's and dont's after snakebite. The teachers had conducted three interactive sessions using the posters. The total participants were ***6573 (Male-3352, Female-3221)*** and the duration of the program was approximately 2 months.

iii. **Scientific fair and art competition:**

The research team also organized a scientific fair with the motto to educate the students about poisonous snakes. They also took the initiative to encourage the students by arranging a snakebite prevention theme-based art competition.

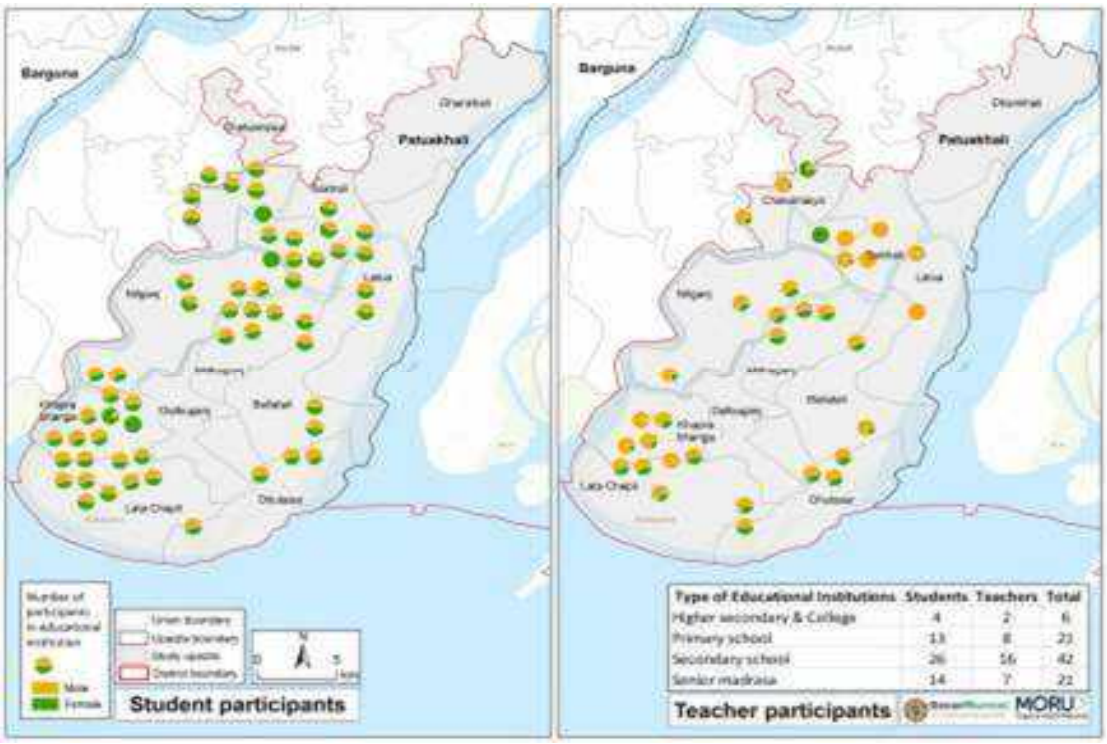


Figure 8: Geographical presentation of school meeting coverage under this program

3. **Awareness through audio-visual content:**

i. **Performance of folk song ('Boyati'):**

The local folk singers performed thirty street shows where they sang theme based 'Boyati' songs to aware and engage the community about the snakebite prevention and first aid measures. These street shows were performed at the most crowded areas like markets and school areas. Each show was one hour in duration. The total participants were ***5953 (Male-4513, Female-1440)*** and the duration of the program was approximately 10 days.

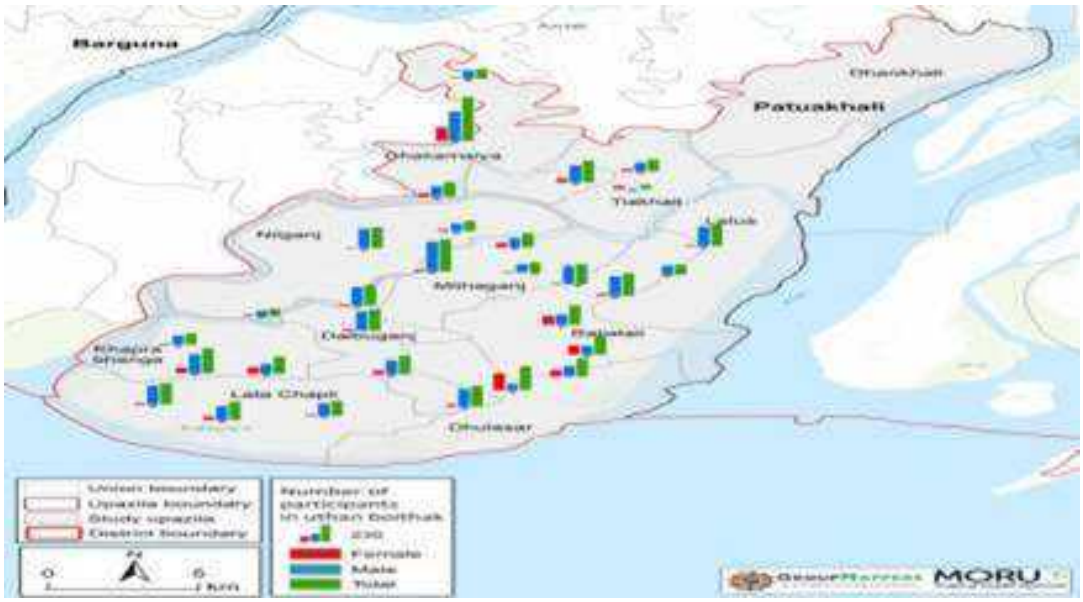


Figure 9: Geographical presentation of Performance of folk song ('Boyati') coverage under this program

ii. **Display of drama:**

A drama has been staged to create awareness against malpractice after snakebite. This drama also conveys the message of early referral to hospital is pivotal to save the life of victims. This was attempted to display on television screen of the outdoor of Kalapara upazila health complex at the daytime. The drama was also telecasted on different social media platforms of Kalapara upazila.

4. **Poster and leaflet distribution:**

These communication materials have been distributed on several occasions. Leaflets were distributed in courtyard meetings, health education sessions in community clinic sessions and during the survey at intervention upazila. However, posters were stuck in important outdoor points e.g. schools, market areas, outside government t offices. In total, ***1300 posters and 3500*** leaflets were distributed in Kalapara Upazila.

3.14 Midline Survey

In the midline study, IEC materials were developed, pretested, and implemented in Kalapara Upazila. To evaluate the impact of these interventions, a post-intervention survey was conducted ten months later, from October to December 2023. This survey utilized a structured questionnaire, translated into Bangla, for household surveys in the study area in Bangladesh. Additionally, a qualitative survey was conducted, involving in-depth interviews with healthcare professionals to gather insights on snakebite treatment, and focus group discussions with community members, volunteers, and leaders to assess their knowledge of snakebite prevention and first aid management.

Table 6: Number of different qualitative methods in this midline survey

Qualitative Study	Participants	Quantity
FGD	Community people, Male-1, Female-1, Students-1	5
	Multi-purpose health volunteers-2	
IDI	Local Government- 3 • Union parishad chairman (male/female) • Female parliament member against reserved seat 1. CHCP -2 2. Religious Stakeholders/ Imams -2 3. Teachers-2 4. Upazila Health Complex -3 (Doctor, Nurse, SACMO)	12
	Total	17

Phase 5- Endline Survey

3.15Endline Study

To evaluate the impact of the implementation program on snakebite prevention awareness and management practices, community surveys were conducted in both control and intervention areas. After two years, an endline survey was conducted among the same population. The effect of the community awareness created was assessed by comparing the results of a baseline cross-sectional survey with an endline cross-sectional survey. A structured questionnaire, adapted into Bangla, was used for household surveys. The endline survey took place from May to August 2024. The survey questionnaire is attached in Appendices.

3.16 Data Collection Instruments for the Study

The tools were adopted and translated into Bangla for data collection at the study site in Bangladesh. These instruments were pretested before the field data collection began. They were designed to gather information on the relevant indicators.

3.17 Data Collection Tool

Quantitative data for the project were collected using Computer-Aided Personal Interviewing (CAPI). A structured questionnaire was employed to conduct the household surveys. Effective use of these methods increased the amount of information gathered, improved data quality, and reduced the risk of bias. The data collection methods were tailored to align with the study's objectives, taking into account the need to gather information in the field and the desired indicators.

3.18 Data Collection

A Primary Sampling Unit (PSU) was surveyed using two data collectors. One data collector conducted face-to-face interviews with 30 households. After consulting with residents, the midpoint of the PSU was identified, and three data collectors interviewed 120 households per PSU in one day. A structured questionnaire was employed for the household surveys. The tool was adapted and translated into Bangla for data collection at the study site in Bangladesh. Prior to field data collection, the data collection tool was pretested.



Data Collection by Data Collectors

3.19 Data Collection Software

Data collection was carried out using RedCap software version- 11.4.4, a free, secure, fast, and flexible web-based application. Our research partner, CIPRB Bangladesh, supported the data collection process through the use of RedCap.

3.20 Data analysis

All the data was cleaned and analyzed through STATA13. Descriptive analysis was performed here to measure the characteristics of population and knowledge, practice analysis. To measure the changes in knowledge and practice from baseline to endline percentage of changes has been performed.
Key parameters to be analyzed:
Estimated cases per year Mean time to hospital
Number of patients who came to hospital for treatment:
Number of patients having tourniquets
Number of patients who visited traditional healers, ('ozha')
Number of patients who arrived with pressure immobilization place

3.21 Recruitment and training of field personnel

3.21.1 Recruitment

Data collection personnel were recruited following standard procedures. Applications were invited, and candidates were selected based on their maturity, prior work experience, group cohesion, education level, and data collection ability. The minimum educational requirement for field personnel was a Bachelor's degree from a recognized university. Initially, all field personnel were recruited as trainees. Trainees were assigned to specific posts based on their performance during training, with the best performers being selected as Supervisors. More trainees were recruited than needed to account for those who might later be deemed unsuitable or who might drop out. Additionally, females were included in the field teams to facilitate easier access to respondents.

3.21.2 Training

A 2-day training session was organized at the CIPRB headquarters (HQ) for all field staff recruited for telephonic interviews. The training room was arranged to maintain social distancing. The training for interviewers included a comprehensive review of the methodology and each study question, practice sessions, and role-playing. Participants were oriented on the project concept, study objectives, purposes, and specific indicators and parameters. The training addressed interview techniques, questionnaire formats, and procedures for data collection and record keeping. Privacy and confidentiality issues were also covered, with interviewers instructed not to discuss interview details or personal information with others. A panel of experienced trainers conducted the sessions to ensure quality data collection, assurance, and management. All key study personnel and senior members of the research team were involved in delivering the training.



Training of Data Collectors

3.22 Monitoring of Field Work and Quality Checking

A quality control team, consisting of senior research team members from both organizations, was deployed to oversee the quality of the survey data. A quality control plan was established to verify the data collection process at the field level. CIPRB reviewed the data on the cloud daily to track progress and ensure data quality. A Research Associate from CIPRB was responsible for observing the overall survey process and monitoring the data collectors. Additionally, CIPRB maintained regular contact with the field supervisors to ensure the quality of the fieldwork.

3.23Data Confidentiality

Maintaining the confidentiality of the data in this survey was a top priority. Given that the data contained personal information about individuals, safety measures were employed to ensure its protection and secure handling. The consent forms, study tools, and any documents linking participant information were stored in a location inaccessible to unauthorized individuals. Access to both hard copy and digital data was granted only with permission from the investigators. A separate session during training was dedicated to data confidentiality and management. Data documentation and storage, including files and protocols, were handled with the utmost care. Regular backups of the data were conducted at appropriate intervals, and all computers used in the study had restricted access to prevent unauthorized use.

3.24Quality assurance

We developed a quality assurance system for the study, with the DPM CBHC and local UHFPO of the two study upazilas serving as co-investigators. Community-led awareness meetings in the intervention upazila were facilitated by locally innovative volunteers from the SBSG, along with

community support groups and local CC-led community health workers, supported by elected local union members. These meetings were monitored by the study team under the guidance of the UHFPO. During community engagement training, we motivated the SBSG with support from senior research team members, including the PI. The healthcare team at UZHC received training on snakebite management using a structured training module and maintained 24/7 digital contact with a 'hub' led by an investigator (Assistant Professor of Medicine) for advice. The PI and other co-investigators conducted periodic monitoring visits throughout the study. We collected survey data using mobile devices, ensuring proper supervision and real-time monitoring. Administrative and monitoring support was provided by TSB through two full-time managers, one coordinator, and one Quality Control Officer, who handled quality control checking of survey data. Data cleaning was performed before locking the database, and statistical analyses were conducted on the cleaned datasets.



Field visit by UHFPO & Health Inspector



Field visit by PI, UHFPO, & Co-investigators

3.25 Risk management

The risks associated with this project were categorized into those at the local level and general contextual factors.

Local Level

Non-cooperation

Various risks or uncertainties may have arisen during the field-level implementation of the survey on socially sensitive issues, such as respondents potentially avoiding the team. To mitigate these risks, the survey teams introduced themselves in the survey area and engaged with social elites and other key individuals.

Nonresponse

Other risks and uncertainties, such as non-response from respondents, were addressed through appropriate approaches as needed. Common practices included building rapport with respondents, obtaining their consent, and informing them about the basic interests and objectives of the survey.

General Contextual Factors

The COVID crisis posed a risk of disrupting the movement of staff, including data collectors involved in the assignment. Government instructions on this matter were followed to ensure the safety of the survey team members. Any issues related to the capacity of research team members were managed through continuous monitoring and communication.

Dropout of the team members

Team members might have dropped out at any time during the survey. To address this risk, we trained more staff than initially required.

3.26 Ethical considerations

Since the survey involved human participants, obtaining ethical clearance was mandatory. Ethical approval was secured from the ethical review committee of CIPRB. We used only a structured questionnaire for interviewing respondents, which was based on prior oral or written consent from each participant. A consent form was developed and used for each interview. The assessment did not involve any clinical tests, drug administration, invasive procedures, or food administration, and there were no human risks associated with data collection. Key ethical issues addressed included:

- Minimizing potential distress and harm to children, parents, and young adults participating in the survey.
- Using oral or written consent forms that clearly explained the research, particularly to parents and children, without causing alarm.
- Ensuring data protection, confidentiality, and understanding its limits.
- Minimizing potential distress to interviewers and researchers, and ensuring interviewer safety.
- Obtaining written consent from every selected respondent before conducting the interview. The consent form or statement was prepared in local languages with clear and simple language. Interviewers were available to answer any questions participants might have. Respondents had the full right to refuse participation at any time during the interview. Questions were designed to avoid any physical, psychological, social, or legal risks to the respondents.

Chapter 4

Results

Baseline, midline, and endline data were analyzed to determine the intervention's effectiveness as part of the evaluation process. To identify the changes in the snakebite incidence, health seeking behavior of snakebite victims, and the general people's understanding and behavior about first aid and management, as well as prevention of snakebite, mostly the baseline and endline data were considered for analysis. However, midline data provided people's perception regarding the snakebite intervention in their area.

Section 1 - Household and population

In this endline survey, a total of 30,234 households were surveyed across the two study areas. Of which 15069 households were from Kalapara and 15165 households from Shibganj. The average household size was 3.84. Among the surveyed population, 3.72 was the average household size for Kalapara and 3.95 was the average household size for Shibganj. **(Table7)**

Table7: Basic Information

Upazilla	HH	Population	HH size
Kalapara	15069	56052	3.72
Shibganj	15165	59967	3.95
Total	30234	116019	3.84

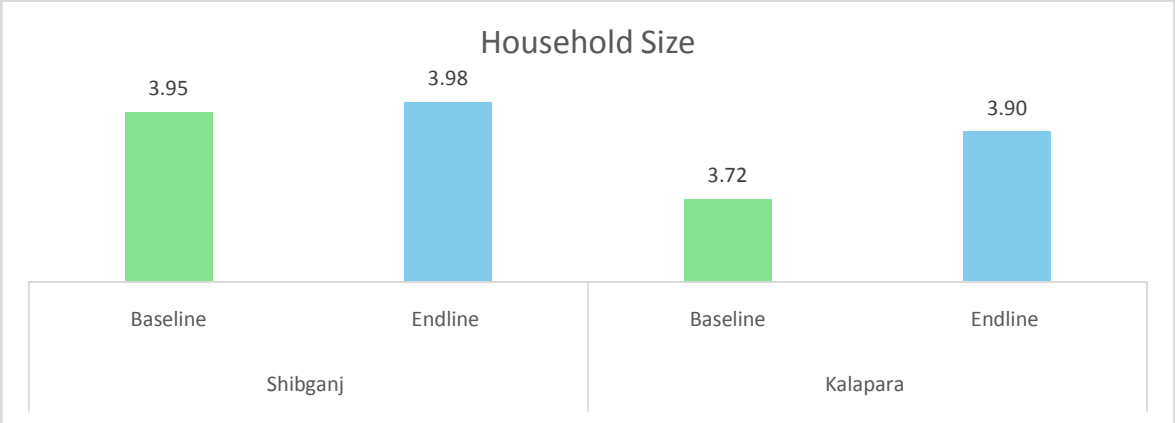


Figure 10: Household size

In both the study areas, the largest age group was 18-39 years, making up 35.2% of the population in Shibganj and 38.6% in Kalapara. The second largest group was 40-59 years old, accounting for 22.5% in Shibganj and 20.4% in Kalapara. There was a nearly equal distribution of males and females in both areas, with a small third-gender population. In terms of occupation, homemakers were the largest group in both Shibganj (31.13%) and Kalapara (30.98%), followed by students, and farmers or fishermen, with Kalapara having a slightly higher percentage of farmers/fishermen (10.87%) compared to Shibganj (8.13%). The proportion of individuals with primary education (grades 1-5) increased significantly from 32.08% to 41.02%. Conversely, those with secondary education (grades 6-10) saw a slight decline from 28.83% to 27.09%. Higher education (11 or more years) remained relatively sTable, with a small increase from 9.38% to 9.91%. Interestingly, the percentage of individuals with no education more than doubled, rising from 1.97% to 4.58%. **(Table8)**

Table 8: Sociodemographic characteristics of Shibganj and Kalapara

Variable	Shibganj	Kalapara
Age Group	59967 (%)	56052 (%)
00-09 years	10960 (18.3)	10645 (18.9)
10-17 years	8975 (14.9)	8134 (14.51)
18-39 years	21128 (35.2)	21620 (38.6)
40-59 years	13475 (22.5)	11418 (20.4)
60+ years	5429 (9.0)	4235 (7.6)
00-17 years	19935 (33.2)	18779 (33.5)
18-59 years	34603 (57.7)	33038 (58.9)
60+ years	5429 (9.0)	4235 (7.6)
Sex		
Male	30235(50.4)	27921(49.8)
Female	29728(49.6)	28125(50.2)
Third Gender	4 (0.01)	6 (0.01)
Occupation		
Farmers/fishermen	4874 (8.13)	6095 (10.87)
Homemaker	18670 (31.13)	17367 (30.98)
Student	13817 (23.04)	13317 (23.76)
Day-labor	7867 (13.12)	5104 (9.11)
Bussiness	3830 (6.39)	3703 (6.61)
Others	10909 (18.19)	10466 (18.67)
Education		
Primary (1-5)	19261 (32.08)	24132 (41.02)
Secondary (6-10)	17305 (28.83)	15935 (27.09)
Higher education (11 or more)	5634 (9.38)	5830 (9.91)

Variable	Shibganj	Kalapara
No education	1184 (1.97)	2692 (4.58)
Not applicable	16651 (27.73)	10231 (17.4)

Section 2 - Snakebite incidence rate

Table 9 shows a positive trend in snakebite incidence reduction of the incidence of snakebite at Kalapara over time. Although Kalapara initially had a high baseline incidence rate of 294.4 per 100,000 population, by the endline, the rate had significantly decreased by -43.4%, reaching 166.5 per 100,000. This reduction suggests a positive impact of interventions or preventive measures in the region. Despite the high baseline rate, the drop in incidence highlights progress in mitigating snakebite risks in Kalapara. In contrast, Shibganj experienced a smaller increase of 10.6% in the incidence rate from baseline to endline, showing a less pronounced change compared to Kalapara's overall improvement.

Table9: Human snakebite incidence rate by upazila per 100,000 populations

Variable	Shibganj				Kalapara			
	Baseline	**Midline**	**Endline**	**% change (Baseline vs Endline)**	**Baseline**	**Midline**	**Endline**	**% change (Baseline vs Endline)**
Population	59967	66590	60105		56052	65457	58858	
Number Of Snakebite Cases (n)	55	110	61		165	121	98	
Incidence Rate (per 100000)	91.7	165.2	101.5	10.6	294.4	184.8	166.5	-43.4

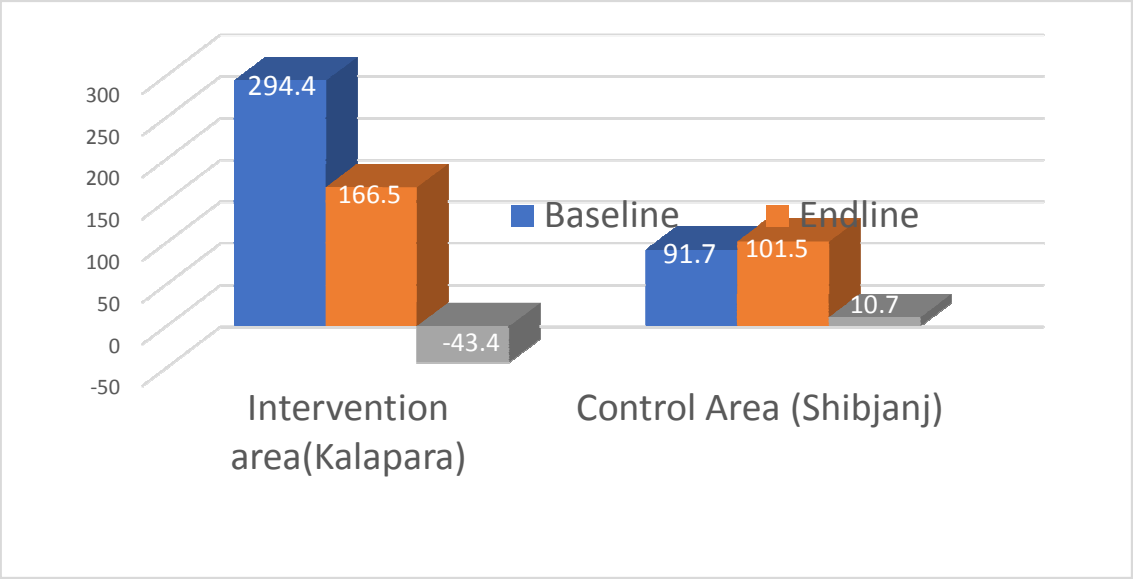


Figure 11: Incidence by upazila

In Shibganj, the snakebite incidence rates increased across several demographic groups between the baseline and endline (Table 8.1). The most striking increase was among the children aged 0-9 years, where there was no incidence found at baseline but an incidence rate of 18.5 per 100,000 by the endline. The age range of (10-17) years experienced a remarkable increase of 318.5%. The rates did, however, reduce slightly for the (18–39) year age group (by 3.8%), and for the 60+ year-age group (by 13.4%). Shibganj saw a notable 516.7% increase in incidence overall for people between the ages of (0 and 17). Among males, the rate more than doubled, rising by 107.1%, while among females, there was a 52.4% reduction. Notably, the incidence among farmers jumped by 159.7%, suggesting an increased vulnerability in this occupation. In contrast, Kalapara saw more favorable trends. Incidence rates fell in numerous age groups, most notably among those aged 18-39 years (58.2% decrease), 40-59 years (51.3% decrease), and 60 years and above (17.9% decrease). However, the 0-9 year old and 10-17 year old age groups experienced large increases, with the latter increasing by 385.5%. Despite these increases in younger age groups, the overall incidence for the 18-59 year old population fell by 54.8%. The rates for males declined by 16.3%, and the incidence among females significantly dropped by 61.5%. The farmer population saw a notable reduction of 25.1%, which contrasts with the rise seen in Shibganj. So, while Kalapara witnessed substantial improvements, particularly in older age groups and females, some vulnerable groups like children and adolescents still showed a concerning rise in snakebite incidence. Shibganj, on the other hand, faced increases across most groups, especially among children and farmers, highlighting areas needing intervention. **(Table 10)**

Table 10: Human Snakebite Incidence Rate by Demographic Characteristics Per 100,000 Populations, Shibganj and Kalapara

Variable	Shibganj			Kalapara		
	Baseline	**Endline**	**% change (Baseline vs Endline)**	**Baseline**	**Endline**	**% change (Baseline vs Endline)**
Age Group						
00-09 years	0	18.5	.	9.3	18.2	93.4
10-17 years	11.1	46.6	318.5	36.9	179.0	385.5
18-39 years	137.2	131.9	-3.8	411.7	172.0	-58.2
40-59 years	155.8	173.0	11.1	543	264.4	-51.3
60+ years	73.7	63.8	-13.4	236.1	193.7	-17.9
00-17 years	5.0	30.9	516.7	21.3	84.9	298.8
18-59 years	144.5	147.7	2.2	457.0	206.6	-54.8
60+ years	73.7	63.8	-13.4	236.1	193.7	-17.9
Sex						
Male	72.8	150.7	107.1	236.4	197.8	-16.3
Female	111.1	52.9	-52.4	352	135.4	-61.5
Occupation						
Farmer	190.1	493.7	159.7	540.0	404.2	-25.1

Section 3 – Snakebite Victims

In this section of the study, we presented the household and population characteristics of snakebite victims, along with their treatment-seeking behaviors. We also explored the different types of treatment they pursued, providing insights into the healthcare choices made by the victims, including traditional remedies, community-level interventions, and formal medical treatment.

In **Table11**, the sociodemographic characteristics of snakebite victims are compared between Shibganj and Kalapara, at both baseline and endline periods. There is a total of 159 snakebite victims in the endline survey of which 61 victims from the Shibganj upazila and 98 victims from the Kalapara upazila. There are a total of 220 snakebite victims in the baseline survey of which 55 victims are from Shibganj upazila and 165 victims from Kalapara upazila. In both the areas, the majority of victims were in the 18-39 age group, representing 52.7% and 45.9% in Shibganj and 53.9% and 37.8% in Kalapara at baseline and endline, respectively. In Shibganj, there was a marked increase in male victims, from 40% at baseline to 73.8% at endline. A similar increase in male victims was observed in Kalapara (from 40% to 59.2%). Most victims in both the areas

were homemakers, but the proportion dropped significantly at the endline in the both Shibganj (56.36% to 16.39%) and Kalapara (57.58% to 31.63%). Education levels showed improvement, with a reduction in victims with no education, particularly in Shibganj, where the percentage dropped from 36.36% to 0% by endline.

Table11: Sociodemographic characteristics of snakebite victims, Shibganj and Kalapara

Variables	Shibganj		Kalapara	
	Baseline n=55	Endline n=61	Baseline n=165	Endline n=98
Age Group				
00-09 years	0 (0)	2 (3.3)	1 (0.6)	2 (2.0)
10-17 years	1 (1.8)	4 (6.6)	3 (1.8)	14 (14.3)
18-39 years	29 (52.7)	28 (45.9)	89 (53.9)	37 (37.8)
40-59 years	21 (38.2)	23 (37.7)	62 (37.6)	34 (34.7)
60+ years	4 (7.3)	4 (6.6)	10 (6.1)	11 (11.2)
00-17 years	1 (1.8)	6 (9.8)	4 (2.4)	16 (16.3)
18-59 years	50 (90.9)	51 (83.6)	151 (91.5)	71 (72.4)
60+ years	4 (7.3)	4 (6.6)	10 (6.1)	11 (11.2)
Sex				
Male	22 (40)	45 (73.8)	66 (40)	58 (59.2)
Female	33 (60)	16 (26.2)	99 (60)	40 (40.8)
Occupation				
Farmers/fishermen	9 (16.36)	7 (11.48)	25 (15.15)	15 (15.31)
Homemaker	31 (56.36)	10 (16.39)	95 (57.58)	31 (31.63)
Student	2 (3.64)	19 (31.15)	8 (4.85)	19 (19.39)
Day-labor	9 (16.36)	3 (4.92)	17 (10.3)	13 (13.27)
Business	4 (7.27)	7 (11.48)	11 (6.67)	5 (5.1)
Others	0 (0)	15 (24.59)	9 (5.45)	15 (15.31)
Education				
Primary (1-5)	12 (21.82)	8 (30.77)	86 (52.12)	40 (50)
Secondary (6-10)	22 (40)	10 (38.46)	53 (32.12)	20 (25)
Higher education (11 or more)	1 (1.82)	3 (11.54)	7 (4.24)	8 (10)
No education	20 (36.36)	0 (0)	16 (9.7)	2 (2.5)

Variables	Shibganj		Kalapara	
	Baseline n=55	Endline n=61	Baseline n=165	Endline n=98
Not applicable	0 (0)	5 (19.23)	3 (1.82)	10 (12.5)

In both Shibganj and Kalapara, a significant proportion of snakebite incidents occurred in agricultural fields, ponds, rivers, or foot walk (ailes) of paddy land. In Shibganj, the percentage of such incidents increased from 54.5% at baseline to 60.7% at endline, while Kalapara saw a slight decrease from 43.6% to 42.9%. Household premises as a site of snakebite dropped in both the areas, with Kalapara experiencing a 40.6% decline. Interestingly, incidents in playgrounds or bushes increased dramatically in both areas, especially in Kalapara, with a 206% rise. Most snakebites occurred during the day in both regions, with little change from baseline to endline. Seasonal variations showed a substantial increase in bites during rainy season in Shibganj, from 27.3% to 62.3%, while Kalapara had a 27% rise in the same season. Weather conditions also played a role, with sunny weather being the most common during bites, although it dropped by 23.9% in Kalapara. Despite recognizing the snake in about half of the cases, most victims did nothing to the snake, with only minor changes between baseline and endline in both areas. **(Table12)**

Qualitative

From qualitative research, we came to know that people were more conscious than before. Most of the community members knew how to protect themselves from snakes. First and foremost, people kept the areas around their houses clean to prevent snakes from living there. In addition, they treaded carefully while working and walking. Moreover, housewives played an important role in mitigating snakebite risks, as the male heads of families were often too busy with their livelihoods. Therefore, mothers took responsibility for the family's safety. Children also assisted their parents in keeping the house clean and safe.

> *"If we keep clean our house, then there will be no more snake here. Besides, if we make noise during taking firewood, so the snakes abandon our kitchen and we can work spontaneously."*
>
> ***- (IDI with a snakebite victim)***

The majority of respondents and participants in the qualitative research identified agricultural fields as one of the most common locations for snakebites. Many participants reported having experienced snakebites while working in these fields during the day.

> *"When we work in the fields, we're always worried about snakes. They can come out of the ground at any time and bite you. I've seen people get bitten right there. It's really scary"*
>
> ***- (IDI with a snakebite victim)***

One participant in our qualitative study, a farmer, described how they responded to encountering snakes. Their responses varied. Some reported that they did not kill the snakes, believing them to be beneficial to the environment based on information they had found on Facebook. Others, however, admitted to killing the snakes.

> *"When I saw the snake, I thought about what I'd read on Facebook about how snakes are good for the environment. So, I just let it go. I didn't want to hurt it"* ***- (IDI with a snakebite victim)***

Table12: Distribution of victims by place of bite, time and seasonal variation at Shibganj and Kalapara

Variable	Shibganj			Kalapara		
	Baseline n=55 (%)	Endline n=61 (%)	% Change (Baseline vs Endline)	Baseline n=165 (%)	Endline n=98 (%)	% Change (Baseline vs Endline)
Incidence place						
Household premises	13 (23.6)	11 (18.0)	-23.7	51 (30.9)	18 (18.4)	-40.6
Agriculture field/ pond/river/ aisle of land	30 (54.5)	37 (60.7)	11.2	72 (43.6)	42 (42.9)	-1.8
Playground/ around the bush	3 (5.4)	8 (13.1)	140.5	11 (6.7)	20 (20.4)	206.0
Others (under construction area/road/workshop/industry/others)	9 (16.3)	5 (8.2)	-49.8	31 (18.8)	18 (18.4)	-2.2
Bite time						
Daytime (6:00 am - 6:00 pm)	44 (8)	47 (77.0)	-3.6	120 (72.7)	72 (73.4)	1.1
Night (6 pm - 6 am)	11 (2)	14 (22.9)	14.7	45 (27.27)	26 (26.5)	-2.7
Seasonal variation						
Rainy season (July-October)	15 (27.3)	38 (62.3)	128.4	57 (34.5)	43 (43.9)	27.0

Variable	Shibganj			Kalapara		
	Baseline n=55 (%)	Endline n=61 (%)	% Change (Baseline vs Endline)	Baseline n=165 (%)	Endline n=98 (%)	% Change (Baseline vs Endline)
Summer (March-June)	17 (30.9)	16 (26.2)	-15.1	57 (34.5)	34 (34.7)	0.4
Winter (November-February)	23 (41.8)	7 (11.5)	-72.5	51 (30.9)	21 (21.4)	-30.7
Weather during the bite						
Sunny weather	40 (72.7)	45 (73.8)	1.4	115 (69.7)	52 (53.1)	-23.9
Cloudy	2 (3.64)	3 (4.92)	35.1	20 (12.12)	18 (18.4)	51.6
Raining	13 (23.6)	13 (21.3)	-9.8	30 (18.2)	28 (28.6)	57.1
Did you recognize the snake?						
Yes	23 (41.8)	30 (49.2)	17.6	67 (40.6)	42 (42.9)	5.5
No	32 (58.2)	31 (50.8)	-12.6	98 (59.4)	56 (57.1)	-3.8
What has done to the snake?						
Got killed	6 (10.9)	7 (11.5)	5.2	9 (5.4)	11 (11.2)	105.9
Did nothing	49 (89.0)	54 (88.5)	-0.6	156 (94.5)	87 (88.8)	-6.1

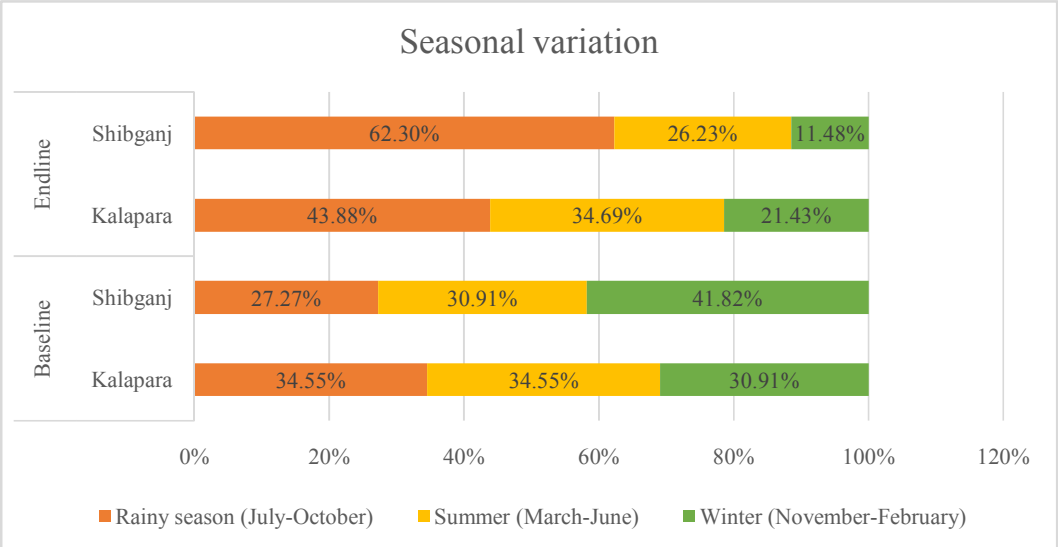


Figure 12: Percentage of victims by seasonal variation in two upazila

In both Shibganj and Kalapara, the proportion of victims receiving first aid increased notably at endline, with Shibganj showing a significant rise from 70.9% to 95.1%, while Kalapara saw a slight decline from 90.3% to 83.6%. Traditional or faith healers remained the most common first referral, with a 31.1% increase in Shibganj, but a 21.9% decrease in Kalapara. However, referrals to health care facilities in Kalapara more than doubled, rising by 154.3% from baseline to endline. Despite these shifts, the majority of victims reported improvement after the first treatment, with Shibganj remaining steady at around 58%, and Kalapara showing a slight improvement from 77.9% to 82.2%. Cases of referral slightly increased in Shibganj but declined in Kalapara. **(Table 13)**

Qualitative

Many people in our study community said, as a FGD participants, that they did not know how to treat snakebites, especially young people and male workers. However, many housewives and older adults had learned about first aid and were sharing this knowledge with others.

"Even though I'm a young man working in the fields, I know the importance of first aid for snakebites. I've learned these skills from my father, who has always emphasized the need for preparedness" ***– (Respondent from a male attended FGD)***

Many participants expressed a strong preference for traditional healing methods, such as ojhas or kobiraj, over modern medical care. They believed that only ojhas or kobirajs could treat snakebite patients, and there was no need to go to a hospital. As much as they could remember, their ancestors also went to ojhas or kobirajs, so they tried to follow what their predecessors had done during snakebite incidents. Additionally, community members were reluctant to attend court yard meeting (Uthan Boithok) without receiving money or gifts. Sometimes the health volunteers of the snakebite support group (SBSG) also had to face irrational questions from the community. Therefore, to ensure community engagement, it was necessary to increase the number of court yard meetings and encourage greater participation.

"Still, lots of people go to the traditional healers for snakebite and dog bite treatment, because they use to do this. It is very challenging for us to understand people like this new health education."-**(FGD with female member at Kalapara)**

The people who lived closest to the upazila sadar or hospital preferred going to the hospital. On the other hand, those who lived in remote areas still prefer to go to the ojha or kobiraj. Overall, people were gradually shifting from ojhas and kobirajs to hospitals because they received better treatment at no cost. However, some people in remote areas did not appreciate hospital treatment at all. They believed that seeking snakebite treatment at the hospital was troublesome and

required too much time. Many of them were unaware of modern treatment methods. These individuals also visited local pharmacies or village doctors for snakebite medication. According to the community in Bablatola Union, Kalapara pharmacists or local doctors gave them a type of anti-venom in exchange for money. They found this convenient, even though they had to pay for the treatment.

"In our village market, every pharmacy has snakebite's injection. When people are bitten by snake then go the pharmacy and take injection. People also purchase and keep the injection in their home at the same time." **- (FGD with female member at Kalapara)**

In this FGD one of the snakebite victims was a participant at Kalapara answered

"If I have money, I can take medication in my way from pharmacy. On the other hand, if I go to the hospital for snakebite treatment, the doctors treat as they desire. Besides, we don't get injection all the time in hospital. But if we go to the pharmacy, we will get injection definitely." **- (FGD with male member at Kalapara)**

A participant from health service provision said that Kolapara Upazila, being a seashore area, had a high rate of snake infestation. Currently, awareness about snakebite medication could be observed among the community. Previously, people did not know anything about anti-venom. However, most community members now knew that snakebite treatment was available at the hospital. As a result, people came to the hospital immediately after a snakebite. Although some people living in remote areas were still unwilling to go to the hospital, those living closer to the upazila hospital came directly without delay.

"Snakebite patients still now go to traditional healers who live far away from upozila health complex. At first, they go to the traditional healer then they also come to hospital with taking some first aid. As opposed to, the people who live close to the Upozila Sador, come to hospital immediately." **- [Said by a SECMO]**

Table 13: Treatment-seeking behavior of the snakebite victims, Shibganj and Kalapara

Variables	Shibganj			Kalapara		
	Baseline	**Endline**	**% Change (Baseline vs Endline)**	**Baseline**	**Endline**	**% Change (Baseline vs Endline)**
Any first aid has been taken for the victim?	**55**	**61**		**165**	**98**	
Yes	39 (70.9)	58 (95.1)	34.1	149 (90.3)	82 (83.6)	-7.3
After first aid, where did victim take (1st referral)	**39**	**58**		**149**	**82**	
No treatment	6 (15.4)	4 (6.9)	-55.1	10 (6.7)	7 (8.5)	27.3
Traditional/faith healers	20 (51.3)	39 (67.2)	31.1	121 (81.2)	52 (63.4)	-21.9
Health care facility	10 (25.6)	14 (24.1)	-5.8	15 (10.1)	21 (25.6)	154.3
Others (pharmacy/relative)	3 (7.7)	1 (1.7)	-77.6	3 (2.0)	2 (2.4)	21.4
Outcome of first treatment (Traditional healer/hospital)	**30**	**53**		**136**	**73**	
Referred	12 (40)	22 (41.5)	3.8	28 (20.5)	13 (17.8)	-13.5
Improved	18 (60)	31 (58.5)	-2.5	106 (77.9)	60 (82.2)	5.4
Disabled	0 (0)	0 (0)	.	2 (1.4)	0 (0)	-100.0

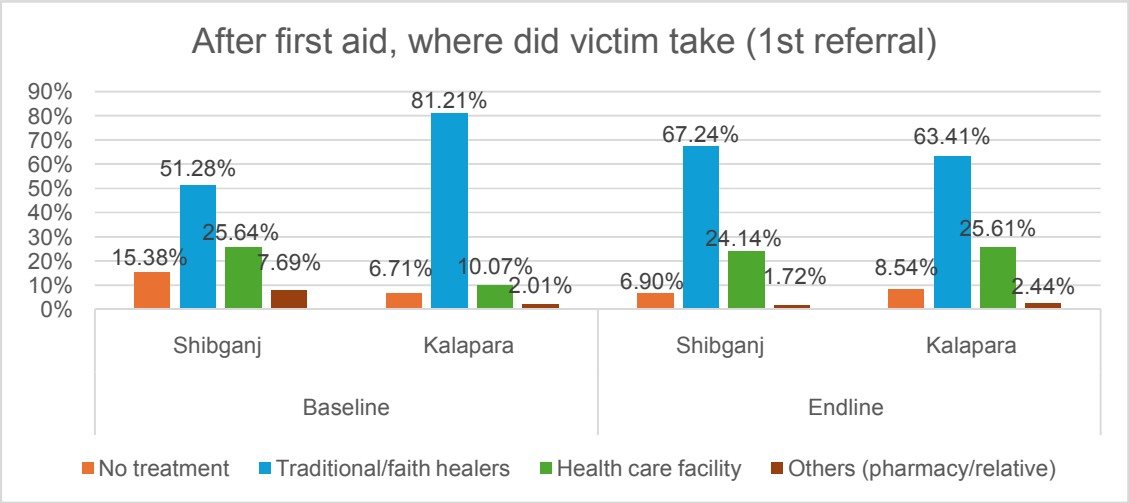


Figure13: Positive trend towards treatment seeking behavior

The number of victims visiting traditional healers in Kalapara dropped significantly by 57%, from 121 at baseline to 52 at endline, suggesting a shift toward alternative scientific care. Importantly, the number of victims referred by traditional healers for further treatment increased by 4.2%, reflecting a slight positive change in recognizing the limits of traditional healing. Kalapara saw a reduction in the belief that traditional healers are the best option for snakebite treatment, with a 13.5% increase in victims recognizing the availability of health facilities. This reflects greater awareness of alternative treatment options. There was a 90.3% reduction in the perception that access to health centers is time-consuming, highlighting improvements in healthcare infrastructure or perception of its accessibility. In terms of outcomes, while the proportion of victims who improved after visiting a traditional healer slightly decreased by 8.9%, the percentage of those not going anywhere after visiting a healer remained sTable, with a minor increase of 0.8%. Meanwhile, the average time victims spent with traditional healers increased from 51.9 minutes to 97.11 minutes, suggesting a deeper engagement, though the median stayed relatively Table. The median time from snakebite to visiting both traditional healers and hospitals in Kalapara showed some positive trends, with a 2.8% increase in victims arriving at hospitals within two hours, and a significant 48.6% drop in those taking more than four hours. This shift highlights a gradual improvement in emergency care awareness and access compared to Shibganj. **(Table 14)**

Qualitative

The participants in this study expressed great confidence in the ability of traditional healers to treat snakebites effectively. They also mentioned the convenience of having these healers easily accessible within their communities.

"It's so convenient to have a traditional healer just a few steps away from our homes" - ***(IDI with a snakebite victim)***

Another respondent also answered in this same query

> *"When it comes to snakebites, I've always relied on our local healer. They've never failed me"* - ***(IDI with a snakebite victim)***

Table 14: Distribution of victims by study site who sought treatment from the traditional healers

Variable	Shibganj			Kalapara		
	Baseline n=20	Endline n=39	% Change (Baseline vs Endline)	Baseline n=121	Endline n=52	% Change (Baseline vs Endline)
If taken to traditional healer outcome						
Improved	4 (20)	13 (33.3)	66.6	23 (19.0)	9 (17.3)	-8.9
Referred	16 (80)	26 (66.7)	-16.7	96 (79.3)	43 (82.7)	4.2
Disabled	0 (0)	0 (0)	.	2 (1.6)	0 (0)	-100.0
Reasons behind visiting Traditional healer						
Traditional healer is believed to provide successful treatment for snake bites	20 (100)	20 (51.3)	-48.7	41 (33.8)	20 (38.5)	13.5
Traditional healer is easily available in this area or can be found in easy walking distance	0 (0)	19 (48.7)	.	56 (46.3)	31 (59.6)	28.8
Access to health centers or health workers is time consuming and located at remote locations	0 (0)	0 (0)	.	24 (19.8)	1 (1.9)	-90.3

Variable	Shibganj			Kalapara		
	Baseline n=20	Endline n=39	% Change (Baseline vs Endline)	Baseline n=121	Endline n=52	% Change (Baseline vs Endline)
Inadequacy of snakebite treatment at health centers	0 (0)	0 (0)	.	0 (0)	0 (0)	.
Minutes of staying at traditional healer house first time						
Mean (sd)	40.2 (24.0)	20.25(23.6)		51.9 (81.0)	97.11 (201.0)	
Median (iqr)	31 (20-60)	15 (0-30)		40 (30-50)	47.5 (30-90)	
Those who visited Trad healer, where did they go for the second time?						
Did not go anywhere	13 (65)	25 (64.1)	-1.4	90 (74.4)	39 (75)	0.8
Traditional healer	2 (10)	2 (5.1)	-48.7	11 (9.09)	4 (7.7)	-15.4
Health care facility	5 (25)	11 (28.2)	12.8	18 (14.9)	7 (13.5)	-9.5
Others (Pharmacy)	0 (0)	1 (2.6)	.	2 (1.6)	2 (3.8)	133.3
Time for visiting one traditional healer to another traditional healer	2	2		11	4	
Mean (sd)	55 (49.5)	127 (159.1)		205.9 (273.7)	41 (22.5)	-87.3
Median (iqr)	55 (20-90)	127.5 (15-240)		80 (60-180)	45 (22.5-60)	-100.0
Time from bite to visiting traditional healer to hospital	5	11		18	7	
Less two hours	1 (20)	10 (90.9)	354.5	10 (55.6)	4 (57.1)	2.8
2-4hours	4 (80)	1 (9.1)	-88.6	3 (16.7)	2 (28.6)	71.4
>4hours	0 (0)	0 (0)	.	5 (27.8)	1 (14.3)	-48.6

In Kalapara, data from the endline survey shows significant positive improvements in treatment outcomes and access to health facilities compared to Shibganj. The average time to reach a hospital directly in Kalapara decreased by 14.8%, from 58.6 minutes at baseline to 43.8 minutes at endline, demonstrating quicker access to medical care. In contrast, Shibganj showed a slight increase of 2.2%. Although the proportion of victims reaching the hospital in less than an hour slightly declined in Kalapara by 9.1%, there was a 24.9% increase in victims reaching the hospital within 1-2 hours, indicating better response times. Kalapara saw a 10.4% improvement in patient recovery at the hospital (from 73.3% at baseline to 80.9% at endline), while Shibganj experienced a 28.6% decline in recovery rates. Referrals in Kalapara also decreased by 28.6%, suggesting that fewer patients needed additional medical transfers compared to Shibganj, where referrals increased by 28.6%. Notably, Kalapara saw a 42.7% increase in patients seeking a second round of treatment at health facilities, indicating improved follow-up care, whereas Shibganj showed a more modest 78.6% increase. These improvements in Kalapara highlight faster treatment, better outcomes, and greater healthcare utilization compared to Shibganj. **(Table 15)**

Qualitative

Many participants reported difficulty retaining information from training due to limited focus and time for providing health education. While some teachers and community health care providers successfully applied their knowledge, others struggled to recall key concepts. Despite these challenges, they strived to share their understanding of the first aid following snakebite first aid. However, traditional healers like Ojha/kobiraj remained popular, and outdated harmful practices like using tourniquets persisted. Those with accurate knowledge did their best to follow recommended first aid guidelines.

> *"During snakebite at first people used to do tourniquet, after that they go to the Ojha/kobiraj. Right now, they go to the hospital as soon as possible"*
> ***- [IDI from a female member]***

A participant from hospital services said that some patients came to the hospital immediately if they did not go to Ojha/Kobiraj following snakebite for advice. Besides, some of them also lived nearest to the hospital as well as had knowledge of anti-venom. On the other hand, the people who went to Ojha/Kobiraj took a long time for coming to the hospital, approximately 5 to 8 hours. At first, they went to the nearest Ojha/Kobiraj or called them to their house for medication. Sometimes Ojha/Kobiraj could not ensure proper treatment, so they referred patients to the hospital. Moreover, snakebite patients and their families could not be satisfied with Ojha/Kobiraj. Therefore, they also came to the hospital after a long time. In addition, the people who lived in remote areas from Upozila Sador took a long time coming to the hospital because of transportation problems and fear.

> *"Still people go to the Ojha/ kobiraj initially, after that they come to hospital. They say that snake has bitten in the morning but they come to hospital in the afternoon. Perhaps they live far away from hospital otherwise come from Ojha/kobiraj taking wrong treatment."*
>
> ***- [Said by a Nurse]***

Table15: Distribution of victims by study site (Shibganj and Kalapara) who sought treatment from the health facility

Variable	Shibganj			Kalapara		
	Baseline	**Endline**	**% Change (Baseline vs Endline)**	**Baseline**	**Endline**	**% Change (Baseline vs Endline)**
Time to visiting hospital directly (Mean)	49.6	51.8	2.2	58.6	43.8	-14.8
Time to visiting hospital directly	10	14		15	21	
Less than 1 hour	9 (90)	9 (64.3)	-28.6	11 (73.3)	14 (66.7)	-9.1
1-2 hours	1 (10)	5 (35.7)	257.1	4 (26.7)	7 (33.3)	24.9
Outcome first time to hospital	10	14		15	21	
Referred	5 (50)	9 (64.3)	28.6	4 (26.7)	4 (19.0)	-28.6
Improved	5 (50)	5 (35.7)	-28.6	11 (73.3)	17 (80.9)	10.4

Variable	Shibganj			Kalapara		
	Baseline	**Endline**	**% Change (Baseline vs Endline)**	**Baseline**	**Endline**	**% Change (Baseline vs Endline)**
If taken hospital directly, where was taken 2nd time	10	14		15	21	
No treatment	5 (50)	3 (21.4)	-57.1	11 (73.3)	15 (71.4)	-2.6
Traditional healer	1 (10)	1 (7.1)	-28.6	3 (20)	4 (19.0)	-4.7
Health facility	4 (40)	10 (71.4)	78.6	1 (6.7)	2 (9.5)	42.7
Others	0 (0)	0 (0)	.	0 (0)	0 (0)	.
Minutes of staying at hospital first time	10	14		15	21	
Mean (sd)	42.3 (31.6)	51.8 (35.9)		59.3 (85)	43.8 (20.3)	
Median (iqr)	30 (20-60)	45 (20-60)		40 (30-60)	40 (30-60)	
Time for seeking 2nd time treatment (trad healer/hospital)	5	11		4	6	
Mean (sd)	93.1 (98.5)	94.6 (47.3)		192.63 (229.3)	210 (368.8)	
Median (iqr)	40 (35-105)	120 (48-120)		90 (60-180)	55 (40-120)	
Overall time for seeking treatment (trad healer/hospital)	10	14		15	21	
Mean (sd)	44.7 (85.0)	84.3 (50.1)		64.9 (158.3)	92.8 (61.6)	

The Table presents a comparison of baseline and endline data on transport methods and first-aid practices for snakebite patients in Shibganj (control area) and Kalapara (intervention area). In Shibganj, the use of ambulances increased slightly by 11.1%, while motorized vehicle use saw a significant rise of 200%, and non-motorized transport decreased by 66.6%. The use of alternative forms of transport, such as walking, was completely eliminated. In Kalapara, ambulance use declined by 28.6%, but motorized vehicle use increased by 85.7%, indicating improved access to faster transportation after the intervention. Non-motorized transport also saw a decrease of 28.6%, and other transport methods like walking were completely phased out.

Notably, no patients in either area applied immobilization above the bite site at baseline or endline, indicating a gap in first-aid practices. Regarding tourniquet use, Shibganj experienced a 17.4% increase, reaching 91.8% by the endline, suggesting a continued reliance on harmful practices. In contrast, Kalapara showed a slight reduction in tourniquet use by 4.9%, but it remained high, at 88.8%, highlighting the need for further education on safe snakebite management practices. **(Table 16)**

Qualitative

People still believed in ancient medication methods of snakebite first aid. Most of the community people opposed taking modern treatment, particularly about tourniquets. They thought that tourniquets were the most important first aid for snakebites. Besides, people liked to use them as soon as possible. After a snakebite, most of the people preferred to go to the Ojha/kobiraj. However, some people had become aware of first aid as a result of health education. Although, it would take time to make all the community people aware.

"We tourniquet as soon as possible after snakebite so that poison can't rise into the patient's head. It is very important to tourniquet during snakebite, otherwise snake venom will rise instantly and patient will die" ***- [Sahadat, FGD 11]***

Table 16: Distribution of area-wise victims in terms of carriage media, treatment pattern

Variable	Shibganj			Kalapara		
	Baseline	**Endline**	**% Change (Baseline vs Endline)**	**Baseline**	**Endline**	**% Change (Baseline vs Endline)**
Types of transport carried the patient	10	14		15	21	
Ambulance	3 (30)	5 (33.3)	11.1	1 (6.7)	1 (4.8)	-28.6
Motorized vehicle	2 (20)	9 (60)	200	5 (33.3)	13 (61.9)	85.7
Without motor (rickshaw, van, boat, cart)	2 (20)	1 (6.7)	-66.6	5 (33.3)	5 (23.8)	-28.6
Ferry/launch/troller	0 (0)	0 (0)	.	2 (13.3)	2 (9.5)	-28.6
Others (walking, at home, don't know)	3 (30)	0 (0)	-100	2 (13.3)	0 (0)	-100

Immobilization above the bite site	55	61		165	98	
Yes	0 (0)	0 (0)	.	0 (0)	0 (0)	.
Ligature/tourniquet	55	61		165	98	
Yes	43 (78.2)	56 (91.8)	17.4	154 (93.3)	87 (88.8)	-4.9

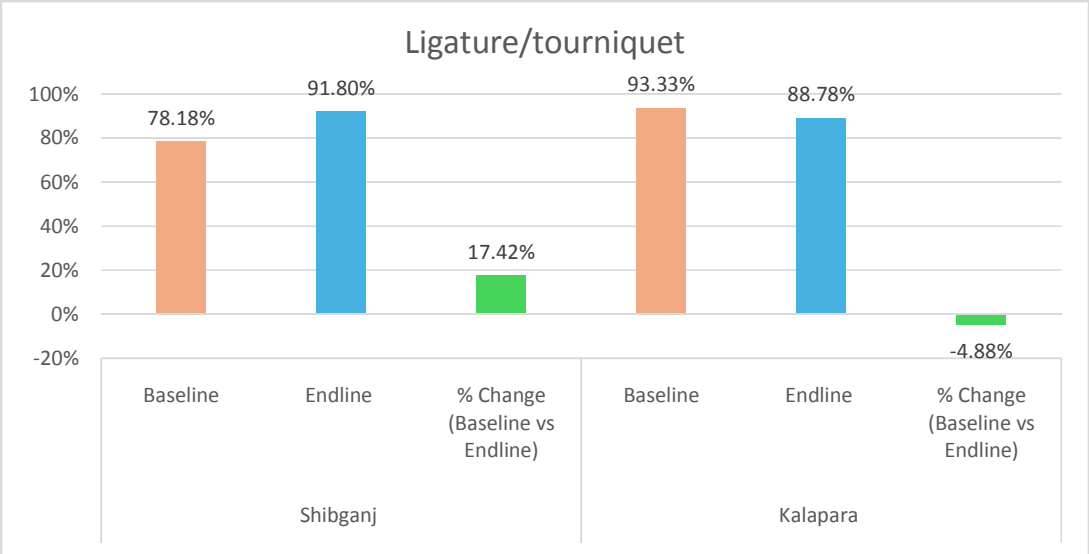


Figure 14: Changes in use of ligature/torniquet

Section 4 - Knowledge and Practices Related to Snakebite

Table 17 showed that the comparison between Shibganj (control area) and Kalapara (intervention area) revealed noTable differences in changes in knowledge about snakebite prevention and safety over time. In Shibganj, the belief that snakebites were prevenTable increased marginally by 5.05% from baseline to endline, while Kalapara saw a more substantial rise of 14.2% in the same period, reflecting the positive impact of interventions. Similarly, the perception that it was possible to stay safe from snakebites improved significantly in both areas, but the increase was more pronounced in Shibganj (62.52%). The results showed that while both areas saw improvements in knowledge, Kalapara's targeted interventions resulted in more substantial and consistent increases in awareness and confidence in snakebite prevention and safety measures.

Qualitative

The community was now more aware of snakebite first aid and treatment, particularly women who had learned through court yard meetings (Uthan Baithok) and volunteers. They understood the need for proper first aid and hospital care and were aware of initiatives to prevent snakebites. However, many men and older community members lacked sufficient knowledge, with some men not recalling any health education activities. Women and adolescents, who were more restricted to the home, had attended court yard meetings but missed folk song ('Boyathi') events. Although they had gained valuable knowledge, they requested more frequent court yard meetings. Students also showed some awareness, mostly from flip charts.

In conformity with community people, they always found an easier way of medication for any disease. So, they searched for the nearest treatment system, such as Ojha/kobiraj and village doctors. Moreover, people also believed in their ancestors and what they used to do. The most important problem was that people were not willing to go to the hospital. They considered that taking medication from the hospital was a complicated process. Besides, most of the people believed in what their ancestors did during snakebites.

"Our ancestor used to do many things while snakebite, such as tourniquet, bleeding (Door), using herbal medicine. But now, doctors suggest that we shouldn't do this but our ancestors were able to survive" ***- (IDI from a male snakebite victim)***

On a different KII session with a doctor at Kalapara UZHC, Potuakhali, these issues were discussed elaborately. According to the doctor, by taking some steps people could protect themselves from snakebites. For instance, using a torch light while going out at night, keeping clean around the house, and using gumboots while working in the farmland. Besides, using a mosquito net before going to bed at night, and not keeping food and domesticated birds in the bedroom. However, if people were aware, they would not be bitten by snakes. There was no substitute for awareness.

"Snake is not dangerous insect; it is an important part of our ecosystems. If we do not disturb snake, then it will not harm us. We should always be aware during walking and working."

[Said by a doctor]

Table 17: Changes in knowledge of preventive measures and first aid method at Shibganj and Kalapara

Variable	Shibganj				Kalapara			
	Baseline n=1460	**Midline n=750**	**Endline n=1515**	**% Change (Baseline vs Endline)**	**Baseline n=1494**	**Midline n=756**	**Endline n=1479**	**% Change (Baseline vs Endline)**
Knowledge regarding the preventability of snakebite	764 (52.3)	526 (70.1)	829 (54.9)	5.05	1118 (74.8)	602 (79.6)	1263 (85.4)	14.2
Knowledge regarding the self-protection for snakebite	515 (35.3)	444 (59.2)	864 (57.3)	62.52	667 (44.7)	460 (60.9)	1020 (69.1)	54.5

Table18 illustrated the changes in knowledge of preventive measures at Shibganj and Kalapara, showing the percentage change from baseline to endline. At Shibganj, there was a notable decline in knowledge about using mosquito nets while sleeping on the floor (-36.6%), guarding/sleeping in crop fields at night (-86.3%), using boots while working in the field (-71.0%), and storing crops in bedrooms (-51.0%). Conversely, Kalapara, which was the intervention area, experienced increases in knowledge about these practices due to targeted interventions. For instance, knowledge about using mosquito nets while sleeping on the floor rose by 17.7%, and there was a notable decrease in negative behaviors such as guarding/sleeping in crop fields at night (-71.8%). Both areas showed improvements in cleaning surroundings, but Shibganj had a slightly higher increase (58.1%) compared to Kalapara (54.8%). Kalapara demonstrated a more significant improvement in using torches while moving at night (85.5%) compared to Shibganj (54.9%), and a greater rise in awareness about being cautious with stacked firewood/haystacks (57.3%) versus Shibganj (-42.4%). Conversely, Shibganj saw an increase in making sound with a stick while walking (33.3%), while Kalapara's knowledge in this area decreased (-17.5%). The knowledge about not putting hands inside holes and using mosquito nets while sleeping on beds showed less change, with Shibganj experiencing minimal improvement (-4.2% and -63.5%, respectively) compared to Kalapara's gains (15.8% and 27.3%, respectively).

Table 18: Changes in knowledge of preventive measures at Shibganj and Kalapara

Variable	Shibganj				Kalapara			
	Baseline n=1460	**Midline n=750**	**Endline n=1515**	**% Change (Baseline vs Endline)**	**Baseline n=1494**	**Midline n=756**	**Endline n=1479**	**% Change (Baseline vs Endline)**
Using mosquito net while sleeping on floor	339 (23.2)	293 (39)	224 (14.7)	-36.6	297 (19.8)	271 (35.4)	345 (23.3)	17.7
Guarding/sleeping in crop field at night	204 (13.9)	38 (5)	30 (1.9)	-86.3	118 (7.8)	96 (12.6)	34 (2.2)	-71.8
Cleaning the surroundings	471 (32.2)	401 (53.4)	772 (50.9)	58.1	609 (40.7)	419 (55.4)	933 (63)	54.8
Using boots while working at field	112 (7.6)	30 (4)	34 (2.2)	-71.0	109 (7.2)	95 (12.5)	23 (1.5)	-79.2
Be cautious while handling stacked firewood/haystack	252 (17.2)	39 (5.2)	150 (9.9)	-42.4	186 (12.4)	78 (10.3)	289 (19.5)	57.3
Using torch while movement at night	383 (26.2)	268 (35.7)	616 (40.6)	54.9	434 (29)	317 (41.9)	797 (53.8)	85.5
Don't store crops at bedroom	216 (14.7)	92 (12.2)	110 (7.2)	-51.0	136 (9.1)	66 (8.7)	36 (2.4)	-73.6
Making sound with stick while walking	124 (8.4)	138 (18.4)	171 (11.2)	33.3	154 (10.3)	119 (15.7)	126 (8.5)	-17.5
Don't put hand inside the hole	420 (28.7)	336 (44.8)	417 (27.5)	-4.2	350 (23.4)	276 (36.5)	402 (27.1)	15.8
Using mosquito net while sleeping on bed	233 (15.9)	99 (13.2)	88 (5.8)	-63.5	132 (8.8)	134 (17.7)	167 (11.2)	27.3

Table 19 illustrated the changes in knowledge of first aid methods at Shibganj and Kalapara, showing the percentage change from baseline to endline. In Shibganj, there was a significant decline in knowledge about immobilizing the bitten part/limb, which decreased by 62.84%. Conversely, Kalapara saw a smaller decrease of 20.51% in the same practice. Immediate referral to a hospital increased by 12.95% in Shibganj, while Kalapara experienced a substantial rise of 59.79%. The practice of sucking out blood from the bite site saw a notable decrease in Shibganj by 61.97%, while Kalapara's decrease was slightly less at 71.43%. The use of tourniquets above the bite site improved by 49.06% in Shibganj and 32.37% in Kalapara, indicating increased knowledge in both areas. Incision at the bite site showed a minor decrease of 8.77% in Shibganj, compared to a larger decrease of 24.24% in Kalapara. The use of chicken shit/layering soil dropped by 77.39% in Shibganj and 77.27% in Kalapara, reflecting a reduction in traditional practices. Knowledge about visiting traditional healers decreased by 2.82% in Shibganj, while Kalapara saw a significant reduction of 42.60%. Chanting mantras showed an increase of 30.75% in Shibganj and 52.11% in Kalapara. Knowledge about adding lime/onion juice was only available for Kalapara, where it showed a 13.2% increase. Knowledge about the correct place to seek treatment after a snakebite increased by 11.93% in Shibganj and 58.29% in Kalapara, highlighting a shift towards hospital-based care. Conversely, the knowledge about visiting traditional healers decreased by 32.96% in Shibganj and 69.59% in Kalapara, reflecting a positive shift towards evidence-based practices in both areas.

Table 19: Changes in knowledge of first aid method at Shibganj and Kalapara

Variable	Shibganj				Kalapara			
	Baseline n=1460	**Midline n=750**	**Endline n=1515**	**% Change (Baseline vs Endline)**	**Baseline n=1494**	**Midline n=756**	**Endline n=1479**	**% Change (Baseline vs Endline)**
First aid knowledge								
Immediate referral to hospital	767 (52.5)	447 (59.6)	899 (59.3)	12.95	581 (38.8)	303 (40)	918 (62)	59.79
Suck out the blood from bite site	104 (7.1)	8 (1.06)	42 (2.7)	-61.97	42 (2.8)	20 (2.6)	13 (0.8)	-71.43
Using tourniquet above the bite site	852 (58.3)	545 (72.6)	1318 (86.9)	49.06	827 (55.3)	361 (47.7)	1084 (73.2)	32.37

Variable	Shibganj				Kalapara			
	Baseline n=1460	**Midline n=750**	**Endline n=1515**	**% Change (Baseline vs Endline)**	**Baseline n=1494**	**Midline n=756**	**Endline n=1479**	**% Change (Baseline vs Endline)**
Incision at the bite site	84 (5.7)	38 (5.06)	90 (5.2)	-8.77	50 (3.3)	17 (2.2)	37 (2.5)	-24.24
Using chicken shit/layering soil	35 (2.3)	.	8 (0.52)	-77.39	33 (2.2)	0 (0)	7 (0.5)	-77.27
Visiting Traditional healer	312 (21.3)	306 (40.8)	332 (21.9)	2.82	667 (44.6)	215 (28.4)	379 (25.6)	-42.60
Add lime/onion juice	.	-	200 (13.2)	.	.	.	24 (1.7)	.
Treatment sources after first aid								
Hospital	1072 (73.4)	560 (76.3)	1245 (82.2)	11.93	813 (54.4)	474 (63.0)	1274 (86.1)	58.29
Traditional healer	388 (26.6)	174 (23.7)	270 (17.8)	-32.96	681 (45.6)	278 (36.9)	205 (13.9)	-69.59

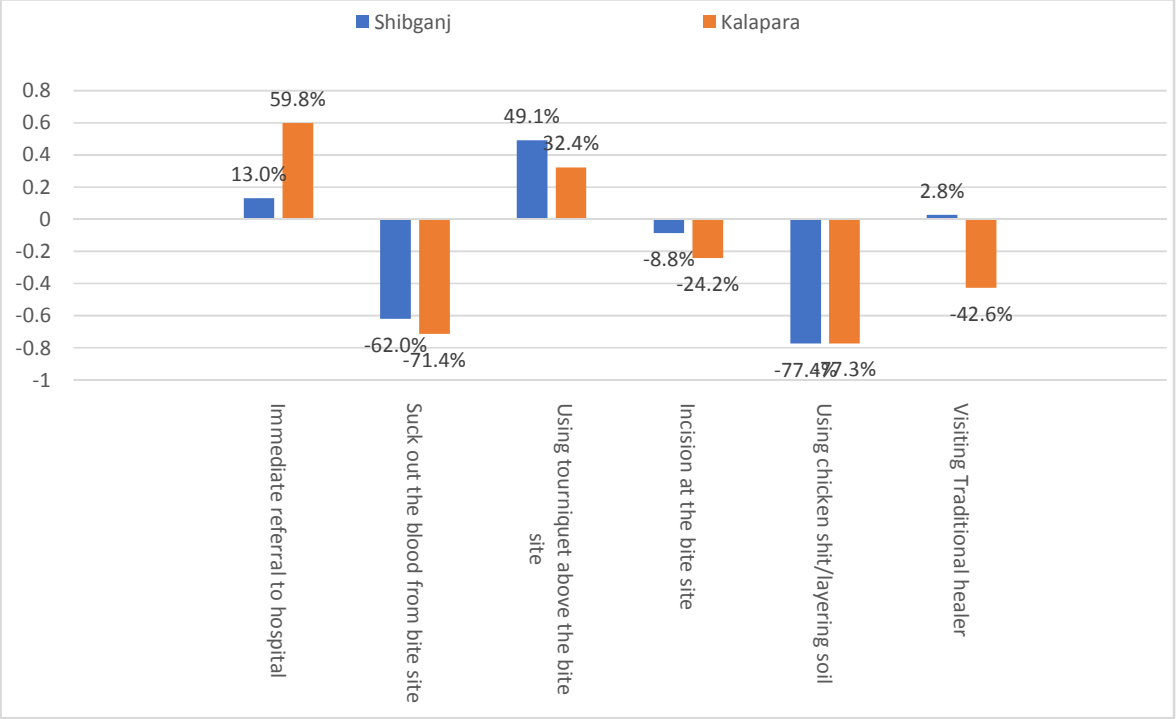


Figure 15: Percentage change comparison in knowledge about first aid measures

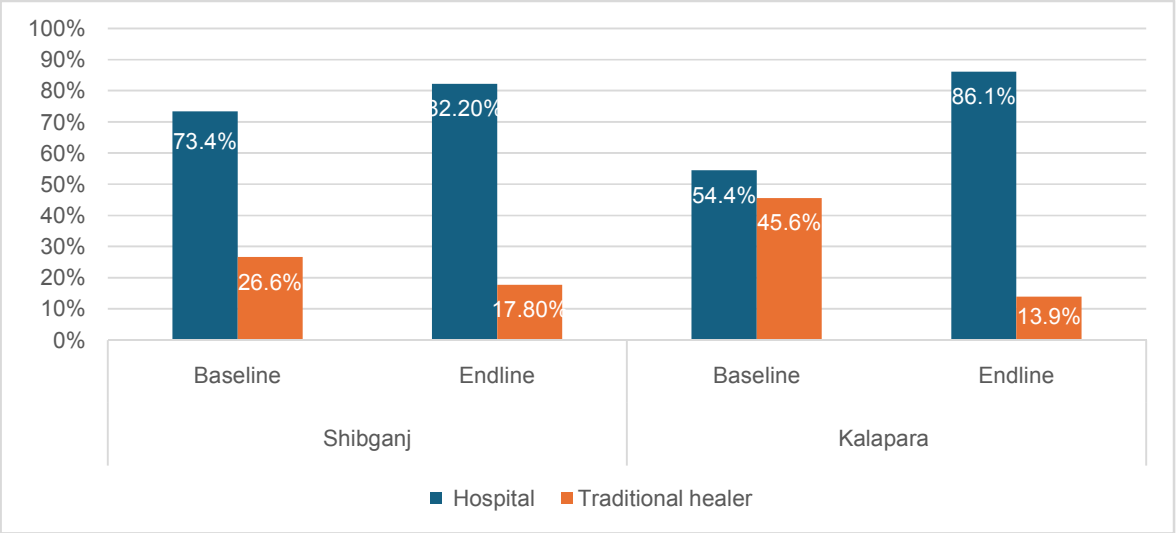


Figure 16: Percentage comparison of knowledge about where to take the patient after a snake bite by upazila

Table20 displayed the practice of preventive measures for snakebite at Shibganj and Kalapara, showing the percentage change from baseline to endline. At Shibganj, the practice of using mosquito nets while sleeping declined by 27% from baseline to endline, while Kalapara experienced a smaller decrease of 12%. The practice of being cautious while guarding or sleeping in crop fields at night fell significantly by 85% in Shibganj, compared to a 42%

decrease in Kalapara. Keeping the surroundings clean saw a decrease of 34% in Shibganj, whereas Kalapara showed an increase of 8%.

The use of boots while working in the field decreased by 82% in Shibganj, while it fell by 77% in Kalapara. Awareness about being cautious with stacked firewood or haystacks increased by 71% in Kalapara but decreased by 15% in Shibganj. The percentage of people being cautious while catching fish or putting their hands inside fish nets dropped dramatically by 93% in Shibganj and by 30% in Kalapara.

Using a torch while moving at night decreased slightly by 3% in Shibganj, while Kalapara saw a notable increase of 46%. The practice of tapping the floor with a stick while walking fell by 67% in Shibganj but increased by 19% in Kalapara. The practice of not storing crops in the bedroom decreased by 60% in Shibganj and by 31% in Kalapara. Awareness about not keeping chickens or ducks inside the bedroom fell by 35% in Shibganj, while it remained relatively Table in Kalapara with only a 3% decrease. The practice of not putting hands inside holes decreased by 40% in

Shibganj but increased by 40% in Kalapara. Finally, the practice of following other preventive measures dropped drastically by 99% in Shibganj and 89% in Kalapara. Overall, the Table illustrated varying trends in the practice of preventive measures for snakebite between Shibganj and Kalapara, with Kalapara generally showing more positive changes in certain practices.

Qualitative

The participants in the qualitative study described a range of strategies to mitigate the risk of snakebites. These included maintaining a clean environment to discourage snakes from seeking shelter, employing protective measures such as using sticks to probe the ground and wearing sturdy footwear, and preventing snakes from entering their living spaces by avoiding storing food in bedrooms. Additionally, participants emphasized the importance of exercising caution during nighttime activities, as snakes were more likely to be active in low-light conditions. They also highlighted the need to keep poultry away from sleeping areas, as these animals could attract snakes. Multiple statements were provided by the participants.

"We never keep our chickens inside the house. We know that snakes are attracted to them, so we keep them in a separate coop outside "- ***(FGD with female member snakebite victim)***

"We use a flashlight whenever we're walking around at night. It helps us see potential hiding places for snakes "- ***(FGD with male member snakebite victim)***

"Sleeping under a mosquito net every night has been a lifesaver. I used to get bitten so often, but now I can sleep peacefully"- ***(FGD with female member snakebite victim)***

"I always make sure to tap the ground with a stick before stepping anywhere, especially in the fields. It's a simple precaution that can make a big difference" - ***(FGD with male member snakebite victim)***

"I always wear boots when I'm working in the fields. It's a small extra step, but it can help protect my feet from snakebites "- ***(FGD with male member snakebite victim)***

Table 20: Practice of Preventive Measures of Snakebite at Shibganj and Kalapara

Variable	Shibganj			Kalapara		
	Baseline n=1460	Endline n=1515	% Change (Baseline vs Endline)	Baseline n=1494	Endline n=1479	% Change (Baseline vs Endline)
Using mosquito net while sleeping	629 (43.1)	477 (31.4)	-27	796 (53.3)	693 (46.8)	-12
Being cautious while guarding or sleeping at crop field at night	283 (19.4)	44 (2.9)	-85	135 (9.0)	78 (5.2)	-42
Keeping the surroundings clean	943 (64.6)	643 (42.4)	-34	1150 (77.0)	1234 (83.4)	8

Variable	Shibganj			Kalapara		
	Baseline n=1460	Endline n=1515	% Change (Baseline vs Endline)	Baseline n=1494	Endline n=1479	% Change (Baseline vs Endline)
Using boot while working at field	169 (11.6)	33 (2.1)	-82	179 (12.0)	42 (2.8)	-77
Be cautious while handling stacked firewood/haystack	346 (23.7)	305 (20.1)	-15	435 (29.1)	738 (49.8)	71
Be cautious while catching fish/putting hand inside fish net	368 (25.2)	27 (1.7)	-93	321 (21.5)	222 (15.01)	-30
Using torch while movement at night	619 (42.4)	626 (41.3)	-3	834 (55.8)	1201 (81.2)	46
Tapping floor with stick while walking	169 (11.6)	58 (3.8)	-67	231 (15.5)	274 (18.5)	19
Don't store crops at bedroom	358 (24.5)	151 (9.9)	-60	254 (17.0)	176 (11.8)	-31
Don't keep chicken/duck inside the bedroom	359 (24.6)	244 (16.1)	-35	322 (21.6)	311 (21.02)	-3
Don't put hand inside the hole	610 (41.8)	382 (25.2)	-40	632 (42.3)	877 (59.2)	40

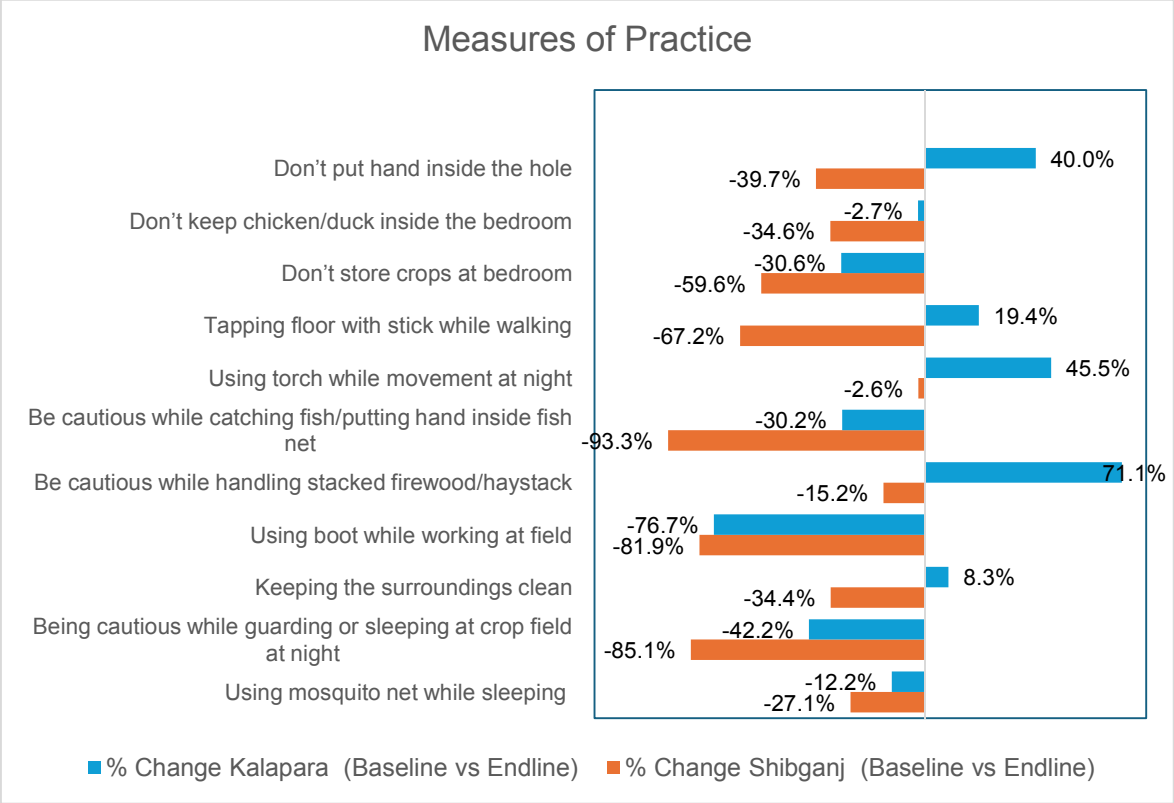


Figure 17: Percentage change comparison of snakebite preventive practices by upazila

Section 5- Surveillance of Snakebite

Community surveillance

We made an arrangement for community surveillance for snakebite, to record all the cases of snakebite in humans and domesticated animals (e.g., poultry, cattle, goat, pig [if any], dog, cat) happening in the community through a structured questionnaire in a register. Any case of snakebite occurring in the community was requested to notify to the community health care provider (CHCP) of the community clinic by all including the snakebite support group (SBSG), and community health workers (for example health assistant, HA) for monthly onward transfer of snakebite data to Upazila Health Complex (UZHC) covering the locality of bite.

Table21 shows the data of snakebite gathered through the community surveillance. During the period covering 2023 and 2024 (until August) 30 events of snakebite were reported by the 15 CHCPs, 23 in the year 2023 and 07 in 2024. Among the cases 19 male and 11 were female. No cases of snakebite was reported from 15 CHCPs (CCs). No case of snakebite in the animals was reported.

Table 21: Distribution of cases of snakebite at Kalapara from community clinic through surveillance

Sl. no.	Name of community clinic	Year 2023	Year 2024 (up to August)	Total
1.	Chungapasha CC2, Chakamaiya, Kalapara	01	-	01
2.	Mithaganj CC13, Mithaganj, Kalapara	-	01	01
3.	Anantapara CC24, Dhulashar, Kalapara	02	-	02
4.	MaddhaTiakhali CC9, Tiakhali, Kalapara	03	-	03
5.	PurbaModhukhali CC26, Baliatali, Kalapara	-	01	01
6.	Kumirmara CC16, Nilganj, Kalapara	01	-	01
7.	DighorBaliatali CC27, Baliatali, Kalapara	01	-	01
8.	Sudhirpur CC5, Mohipur, Kalapara	01	-	01
9.	Kacchapkhali CC11, Latachapli, Kalapara	-	-	-
10.	Dalbuganj CC28, Dalbuganj, Kalapara	01	01	02
11.	Doulatpur CC17, Nilganj, Kalapara	-	-	
12.	Gamorbunia CC1, Chakamaiya, Kalapara	-	-	-
13.	Aliganj CC14, Mithaganj, Kalapara	-	-	-
14.	Usufpur CC4, Mohipur, Kalapara	-	-	-
15.	Badurtali CC7, Tiakhali, Kalapara	-	02	02
16.	Anipara CC3, Chakamaiya, Kalapara	01	-	01
17.	Serajpur CC6, Mohipur, Kalapara	-	-	
18.	Rojopara CC8, Tiakhali, Kalapara	01	02	03
19.	Dankupara CC10, Latachapli, Kalapara	-	-	-
20.	Fashipara CC12, Latachapli, Kalapara	-	-	-
21.	Tegachiya CC15, Mithaganj, Kalapara	-	-	-
22.	Hajipur CC18, Nilganj, Kalapara	02	-	02
23.	Majherhawla CC19, Lalua, Kalapara	02	-	02
24.	Boro 5 no. CC20, Lalua, Kalapara	02	-	02
25.	Chandupara CC21, Lalua, Kalapara	02	-	02
26.	Dhulashar CC22, Dhulashar, Kalapara	-	-	-
27.	Notunpara CC23, Dhulashar, Kalapara	-	-	-

Sl. no.	Name of community clinic	Year 2023	Year 2024 (up to August)	Total
28.	Amtolipara CC25, Baliatali, Kalapara	02	-	02
29.	Fulbunia CC29, Dalbuganj, Kalapara	-	-	-
30.	Monosatoli CC30, Dalbuganj, Kalapara	01	-	01
	Total	23	07	30

Three surveys were conducted at base line (before interventions), after one year and after two years by a house-to-house search in a defined method.

Hospital Surveillance

We have arranged recording of all the human cases of snakebite attending the UZHC both at Kalapara, Patuakhali and at Shibganj, Chapainawabganj keeping a 'snakebite register', and also for snakebite cases in domesticated animals seen at the veterinary hospital of the upazila, Kalapara, Patuakhali and gathered the data from the district veterinary hospital.

All patients of snakebite attending the UZHC from the intervention areas of Kalapara was reimbursed for availing the quick motorized transport arranged by the SBSG at the community level.

During the pre-study year 2022, from the hospital register we gathered the information of snakebite. Sixty-three cases arrived at Kalapara UZHC and 27 cases at Shibganj UZHC.

The snakebite patients attending the two UZHC in 2023 and 2024 is being provided in the Table 5.2.

During January 2023 to August 2024, 258 cases attended Kalapara UZHC and 119 cases at Shibganj UZHC. Only in July 2024, 25 cases of snakebite attended Shibganj UZHC. There was a big media hype about Russell's viper bite in this region in July 2024.

Table22:Total patient attended UZHC, (Kalapara & Shibganj): 2022 -2024

Years	Kalapara	Shibganj
2022	63 (02.01.2022 to 12.12.2022) (Pre intervention)	27 (09.03.2022 to 04.12.2022)
2023	129 (10.01.2023 to 30.12.2023) (Post intervention)	63 (08.01.2023 to 29.12.2023)
2024 (up to August)	129 (02.01.2024 to 30.08.2024) (Post intervention)	56 (03.01.2024 to 30.08.2024)

Years	Kalapara	Shibganj
2022	63 (02.01.2022 to 12.12.2022)	27 (09.03.2022 to 04.12.2022)
2023	129 (10.01.2023 to 30.12.2023)	63 (08.01.2023 to 29.12.2023)
2024 (January to June)	74 (02.01.2024 to 30.06.2024)	21 (03.01.2024 to 30.06.2024)
2024 (July to August)	55 (01.07.2024 to 30.08.2024)	35 (01.07.2024 to 30.08.2024)

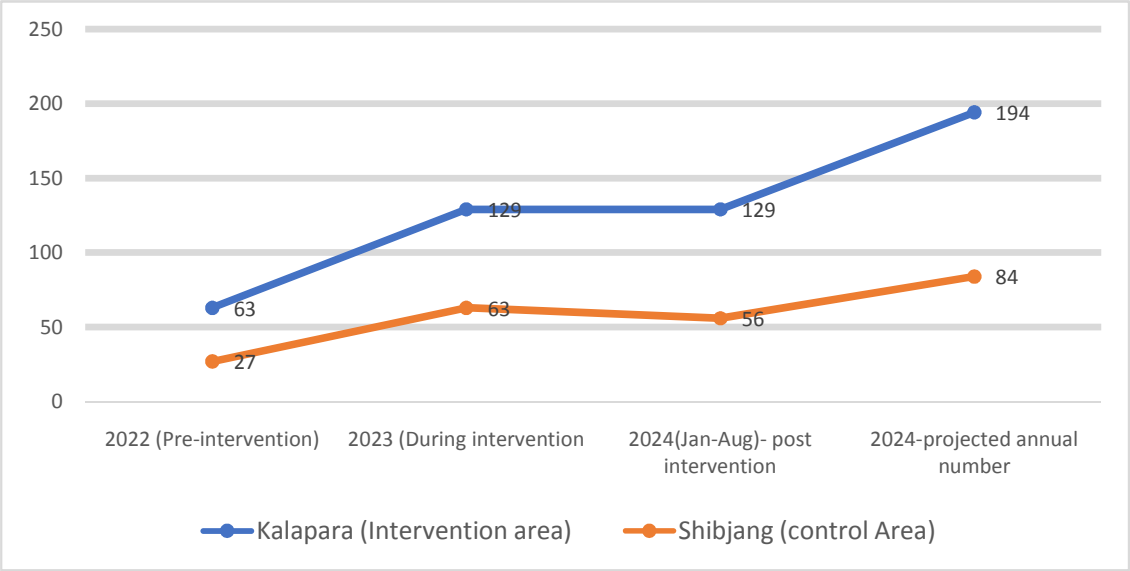


Figure 18: Number of snakebite cases attended in hospital (Upazial Health Complex) by different phases of intervention

Case on venomous bite managed in Kalapara, the intervention area.

A 22-year-old woman, was gathering wood for cooking at her home at Kalapara upazila, district Patuakhali between 7:30 and 8:00 am 09th August in 2024. The wood was stored some distance from the kitchen. While carrying the sticks, she was bitten by a snake that had been hiding between them. The snake bit her on the left hand, just below the thumb. With fear, she dropped the sticks and the snake and screamed for help. Her husband, who was nearby brushing his teeth, quickly came to her aid and killed the snake. (was there any photo of the snake or the killed snake was taken to the UZHC?)

After the bite, they rushed her to the Kalapara Upazila Health Complex with their own motorbike, arriving to UZHC around 9:00 a.m., after a 45-minute journey from their home. Upon arrival, she was found to have swelling at the bite site with bleeding and having positive 20 WBCT, immediately the hospital team administered a dose of antivenom (10 vials) with pre medication with subcutaneous adrenaline. Once the antivenom was administered and completed, she was transferred to Patuakhali Sadar Hospital.

She reached Patuakhali district Hospital at approximately 11:30 a.m. and remained there from Thursday morning until 1:00 p.m. on Friday. During this time, she received some treatment, including the painkiller Ketorolac. However, the swelling in her hand worsened, and the pain intensified, leading the doctors to refer her to Barisal Sher-E-Bangla Medical College Hospital, Barishal or Dhaka Medical College Hospital (DMCH), Dhaka for further treatment. Despite this advice, her family decided to return home instead of going to either hospital, arriving home later that evening.

The next day, as the swelling and pain in her hand had worsened overnight, they visited a 20-bed hospital in Kuakata, Kalapara. The doctor on duty, upon examining her condition, immediately advised them to go to DMCH, Dhaka, as surgery might be necessary due to the severe swelling.

They left Patuakhali by bus at 11:00 p.m. and reached DMCH at 5:00 a.m., where she was admitted. Upon admission, she was given antibiotics and Low molecular weight Heparin (Enoxaparin). Later that morning, at 10:00 a.m., a professor examined her and recommended administering another dose of antivenom.

During her admission, laboratory tests revealed a hemoglobin level of 13.6 g/dl, a total leukocyte count of 11.7/mm³ with a normal differential count, and a platelet count of 395/mm³. Her serum creatinine was 0.88 mg/dl. Additionally, her D-dimer level was 2.42 µg/ml, CPK was 1854 u/l, INR was 1.0, APTT was 32.0, and PT was 12.1. Her serum sodium level was 137 mmol/l, and potassium was 3.3 mmol/l.

She received a total of two doses of antivenom along with other standard care. After four days of hospitalization, she was discharged with no residual disabilities. She had a follow at Kalapara UZHC and also regularly follows up over the telephone by the team at Kalapara from experts of Toxicology Society of Bangladesh and receives necessary advice as needed.

Outcome of the patient: The patient survived with no residual disabilities and continues to receive regular follow-up care.

Identification of the snake: After being bitten by a Russell's viper snake, the patient's relatives killed the snake and later brought a mobile phone picture and the snake was identified as russell’s viper by looking at the mobile phone picture.

Snakebite in domestic animals

Data from the Veterinary Hospital, Kalapara recorded one case of animal bite in cattle. The animal bite happened in the village Londha, Union Dhankhali, upazila Kalapara on 27 July 2024 at 16.00 hours. It was not a rainy day, the bite happened in a grazing field, and affected body part was leg, diagnosed as a 'probable' case of snakebite. Initial treatment was given in a 'pharamacy' and subsequently at the veterinary hospital, antivenom was not required. To mention here that antivenom for animals is not available at veterinary hospital. Tak 2000 was required for the treatment of this bite which was managed from savings of the family.

Arrangement was made for keeping the brought killed snake specimen if brought any by the victims or their attendants and for appropriately labeling and preserving them in the facility using ethanol or formalin. Training was given and logistics were provided for keeping the specimen. No killed or live snake specimen was brought by the victims or attendants.

Chapter 5

Discussion and Limitations

Discussion

The findings from this study highlight substantial improvements in healthcare-seeking behavior and access to timely medical care in the intervention area of Kalapara compared to the control area of Shibganj. The interventions, which included awareness campaigns, community engagement, and improved access to modern healthcare, led to significant behavioral changes, particularly in Kalapara. Between Baseline and Endline, the data shows contrasting trends in the two areas. In Shibganj, the incidence rate increased by 10.6%, rising from 91.7 to 101.5 per 100,000 people, indicating a modest rise in incidence. In contrast, Kalapara experienced a significant -43.4% reduction in incidence rate, dropping from 294.4 to 166.5 per 100,000, reflecting the effectiveness of the interventions. This comparison suggests that the interventions in Kalapara had a strong positive impact, while Shibganj saw a slight increase in incidence. However, the incidence of snakebite in both the intervention and control area were found to be below the national average found in the previous survey(1,39).

Community education using snakebite dedicated poster was used in an early study in Bangladesh but no impact assessment on prevention of snakebite was assessed(48) In several countries IEC materials on snakebite were developed, and utilized for community intervention but in few of them impact on prevention and change in treatment seeking behaviour of the community was assessed(49–52). It is encouraging that in this community-based cluster randomized trial the IEC materials were developed, utilized in providing health education during implementation and assessment of the change in behaviour of the community revealed important findings.

The most noteworthy outcome is the dramatic reduction in snakebite incidence among females in the intervention area, where the rate decreased by an impressive 61.5%. This decline indicates that the targeted interventions had a significant positive impact on this demographic, likely due to enhanced community awareness and increased access to healthcare services. In contrast, Shibganj, the control area, saw a notable increase in snakebite incidence among males, with rates more than doubling, rising by 107.1%. However, female incidence in Shibganj dropped by 52.4%, suggesting that while there was some improvement in women's outcomes, men were particularly vulnerable to snakebites, possibly due to their differing roles in agricultural work, which exposed them to snakes more frequently.
These contrasting trends between the two areas suggest that the interventions in Kalapara—particularly the awareness campaigns and community engagement effortswere highly effective in reducing snakebite risk, especially among women. The increased education and outreach likely addressed gender-specific needs and behavior patterns, enabling women to adopt safer practices and avoid risky situations. In contrast, the lack of targeted interventions in Shibganj

left both men and women more vulnerable to snakebites, with men experiencing a particularly sharp rise in incidence.

A significant shift in healthcare-seeking behavior was observed in Kalapara, where the proportion of snakebite victims seeking treatment from traditional healers decreased notably. Initially, 81.2% of victims in Kalapara sought help from traditional healers, reflecting the dominant role of traditional beliefs and customs in rural healthcare. By the endline, this figure had dropped to 63.4%, a 22% decline. This reduction indicates that the community-based interventions effectively encouraged victims to seek modern medical care rather than relying on traditional healers, who often provide ineffective or harmful treatments. Increased awareness of the importance of timely medical attention, along with improved access to health facilities, likely contributed to this positive shift.

In contrast, the control area of Shibganj experienced a troubling trend, with the proportion of snakebite victims relying on traditional healers increasing by over 31%. This rise indicates that, in the absence of targeted interventions, communities continued to trust traditional healers. This underscores the need for comprehensive and sustained educational programs in rural areas like Shibganj, where deeply ingrained traditional practices may impede the adoption of modern, evidence-based medical care. The stark difference between Kalapara and Shibganj highlights the effectiveness of awareness campaigns and educational initiatives in shifting healthcare-seeking behavior from harmful practices to formal medical care.

The most striking improvement in healthcare-seeking behavior in Kalapara was the dramatic increase in the percentage of snakebite victims who sought medical attention from hospitals after receiving first aid. Initially, the proportion of victims going to hospitals was relatively low, but by the endline, it surged by an impressive 154.3%. This significant change suggests that the interventions in Kalapara were effective in educating the community about the risks of relying on traditional healers and the importance of prompt professional medical care. In contrast, Shibganj saw only a modest 5.8% increase in hospital visits following snakebites, highlighting the marked difference between the intervention and control areas. These results are consistent with other studies, which have shown that targeted awareness campaigns and education programs can reduce reliance on traditional healers and increase the use of formal healthcare services(53,54).

In both Shibganj (control area) and Kalapara (intervention area), the practice of immobilizing the limb above the bite site was zero at both baseline and endline, indicating that immobilization was not commonly practiced in either region. But this practice is very much crucial to manage snakebite consequences. Thus, long term and effective intervention for affected limb immobilization should be planned and executed. This will help to make this practice happen in the community. The data also revealed a high prevalence of harmful practices, such as the use of ligatures or tourniquets, suggesting ongoing reliance on traditional first aid measures. To note that the first aid following snakebite, some of them not ideal were taught in the school curriculum for long period (55).Given the persistent use of ligatures, there is a clear need for targeted education on proper first aid techniques. Enhancing knowledge and focusing on harm reduction strategies will be essential for improving snakebite outcomes in these communities.

Timely access to medical care is a critical factor in improving outcomes for snakebite victims, as delays in receiving appropriate treatment can lead to severe complications and even death. In Kalapara, the average time to reach a hospital after a snakebite decreased significantly, by

14.8%, from 58.6 minutes at baseline to 43.8 minutes at endline. According to WHO guideline 2nd edition This reduction in time to reach medical care is a promising development, as quicker access to treatment is crucial for preventing complications associated with snakebites, such as envenomation and systemic effects(56). The improved infrastructure, increased availability of transport, and heightened community awareness about the importance of immediate medical attention likely contributed to this reduction in time. In contrast, the control area of Shibganj saw a slight increase of 2.2% in the time to reach the hospital, suggesting that without interventions aimed at improving transportation and healthcare access, the situation may worsen, leading to delays in treatment and poorer outcomes for snakebite victims.

The means of transport used to reach healthcare facilities also showed improvements in both Kalapara and Shibganj, though Kalapara exhibited more significant gains. In both areas, there was an increase in the use of motorized vehicles to transport snakebite victims to hospitals, but Kalapara showed more increase in motorized vehicle use than Shibganj. This is a positive development as motorized transport tends to be faster and more reliable than non-motorized alternatives such as rickshaws or carts. In Kalapara, the number of motorized vehicle users increased from 15 to 21between baseline and endline. The change of percentage in between these two phases is 85.7. This shift indicates improved community awareness about the need for faster transportation in emergency situations, which is critical in ensuring timely access to healthcare. Other studies have highlighted the importance of motorized transport in rural areas, where the use of faster vehicles can lead to quicker access to healthcare and improved outcomes for patients (57)(58).

The data reveal a marked improvement in snakebite prevention knowledge among participants in Kalapara, the intervention area, compared to Shibganj, the control area. In Kalapara, the percentage of participants who recognized snakebites as preventable increased from 74.8% at baseline to 85.4% at endline, while those aware of how to prevent snakebites rose from 44.7% to 69.1%. Conversely, Shibganj showed minimal progress in these areas, with the recognition of preventability changing from 52.3% to 54.9% and knowledge of preventive measures slightly increasing from 35.3% to 57.3%. These findings underscore the success of the community-based interventions in Kalapara in enhancing snakebite knowledge and suggest that similar strategies could be beneficial for improving awareness and practices in Shibganj.

The comparison of changes in snakebite prevention knowledge between Kalapara (intervention area) and Shibganj (control area) reveals that Kalapara experienced more notable improvements. Knowledge about using torches at night increased significantly by 85.5% in Kalapara, compared to 54.9% in Shibganj, while awareness of cleaning surroundings to prevent snakebites rose by 54.8% in Kalapara and 58.1% in Shibganj. These findings suggest that the interventions in Kalapara contributed to a better adoption of preventive measures. However, both areas saw declines in certain practices; knowledge about guarding or sleeping in crop fields at night dropped by 71.8% in Kalapara and by 86.3% in Shibganj. These declines may be due to changing perceptions of risk or the reduced relevance of these specific preventive actions.

The analysis of changes in first aid knowledge highlights significant improvements in Kalapara, the intervention area, compared to Shibganj, the control area. Notably, the percentage of individuals in Kalapara who recognized the importance of immediate referral to hospitals after a snakebite increased by 59.79%, whereas Shibganj only saw a 12.95% rise. Similarly, awareness of hospitals as the appropriate treatment location for snakebites increased by 58.29% in

Kalapara and 11.93% in Shibganj. These substantial gains in Kalapara demonstrate the effectiveness of the community-based interventions in promoting correct first aid practices. Furthermore, harmful practices like sucking blood from the bite site and using traditional remedies (such as chicken feces or soil) decreased sharply in Kalapara by 71.43% and 77.27%, respectively. These reductions further emphasize the success of the intervention in replacing dangerous practices with appropriate, life-saving knowledge.

effectiveness of the interventions. In Kalapara, there were notable improvements in specific preventive measures. For example, awareness about cleaning surroundings increased by 8% in Kalapara, whereas Shibganj saw a considerable decline of 34%. Additionally, the use of a torch while moving at night rose by 46% in Kalapara, compared to a slight 3% decrease in Shibganj. Furthermore, the practice of avoiding putting hands inside holes improved by 40% in Kalapara, while it decreased by 40% in Shibganj.

Nevertheless, both areas experienced declines in certain practices. The use of mosquito nets while sleeping decreased by 12% in Kalapara and 27% in Shibganj, and the practice of wearing boots while working in the fields dropped significantly in both areas—by 82% in Shibganj and 77% in Kalapara. Despite these setbacks, Kalapara demonstrated better retention and improvement in key preventive behaviors, such as handling stacked firewood and tapping the floor with a stick while walking. This suggests that the intervention efforts in Kalapara have been effective in promoting safer practices and improving overall preventive measures.

Overall, the findings from this study indicate that interventions aimed at increasing awareness, improving access to health facilities, and reducing reliance on traditional healers can significantly improve healthcare-seeking behavior and outcomes in snakebite cases. The reductions in snakebite incidence, the shift away from traditional healers, and the increase in hospital visits following snakebites in Kalapara demonstrate the effectiveness of these interventions in reducing the burden of snakebites in vulnerable areas. However, the control area of Shibganj, where no targeted interventions were implemented, saw a worrying rise in snakebite incidence among men and a growing reliance on traditional healers, underscoring the need for such interventions in areas that remain underserved.

Despite huge burden of snakebite found by national survey in Bangladesh there was no periodic assessment and there was no dedicated snakebite control program either (1,39) In this community-based trial the impact of the interventions assessed after 20 months found to be encouraging. That the interventions are feasible to implement using the existing public health system of Bangladesh. Although the period was short to detect major impact as behaviour change usually takes time.

The findings support the continued need for community-based interventions, including education and outreach efforts, to improve healthcare-seeking behavior and outcomes in snakebite cases. These interventions should include training healthcare workers, raising awareness about the importance of timely medical care, and improving infrastructure to facilitate quicker access to hospitals. Addressing traditional beliefs about snakebite treatment and promoting the use of modern, evidence-based medical care is critical in rural and underserved communities where access to healthcare is often limited. Ongoing efforts to reduce the burden of snakebites should focus on scaling up these interventions and expanding their reach to more communities at risk.

Most of the cases of snakebite attending UzHCs were non-venomous which was also found in early study in Bangladesh (3). Early use of antivenom once there is indication is an important step in improving management of snakebite in our case first contact rural hospital is Upazila Health Complex (UZHC) (56). In the UZHC of Bangladesh until recently antivenom was not used even if indicated rather the medical doctors preferred to refer the cases to higher hospital(33,59). resulting in delay of appropriate care resulting in death or prolongation of hospital stay. With appropriate training to a team of health care professionals, orientation of the team of health at UZHC and by a supportive supervision we could see the improvement of situation, exemplified by use of antivenom in at least 06 cases at intervention Kalapara upazila HC and 03 cases at control UZHC, Shibganj.

Bangladesh do not produce antivenom, it was recurring phenomenon to have a stock out or expiry of limited antivenom procured from Indian source. The NCDC program of DGHS arranged a regular supply of a certain amount of antivenom available at different tiers of hospital, UZHC (one-two dosage), Civil Surgeon's office (05 dosage), at district hospital 5 dosage and at medical college hospital 10 dosage. For maintenance of procurement, supply and availability of antivenom an evidence-based approach is needed in Bangladesh which is missing now(3,48–52,58,60,61). A coordinated continued supply of antivenom and other logistics ensured in the study and control upazila was found to be effective in managing the envenomed cases at UZHC which can be expanded in other upazillas of Bangladesh.

The successful use of antivenom in the upazila health complex of both the intervention and control upazila for initiation of management of venomous bite is encouraging as well.

Limitations

This study faced several limitations that impacted the overall effectiveness of its interventions. One significant issue was the inability to measure the impact of individual interventions, as multiple strategies were implemented simultaneously, making it difficult to determine which contributed most to the observed outcomes. Additionally, the use of radio messaging was limited by both geographic constraints and the declining popularity of radio as a communication medium in the study villages, reducing its potential impact. Another challenge arose when the initially planned traditional song 'Gambira' was replaced with 'Boyathi' after discovering it was more popular in the region, which may have influenced how the intervention was received. Moreover, the community surveillance system for capturing real-time snakebite data proved ineffective, likely due to insufficient training or engagement with the process, which impacted the accuracy of snakebite incidence reporting. Future research should address these limitations by evaluating interventions separately, using more widely accepted communication channels, conducting thorough cultural assessments, and improving data collection through enhanced surveillance methods and technology.

Chapter 6

Conclusions and Recommendations

Conclusions

In conclusion, the community-based intervention that centered on engaging local communities and utilizing the existing healthcare system was successfully implemented to address snakebite prevention and first aid in rural Bangladesh. The study found a notable variation in snakebite incidence between the intervention area in Kalapara and the control area in Shibganj, highlighting the regional differences in snakebite occurrence. Strong community engagement, particularly at the local healthcare level, proved effective in reducing snakebite incidence. However, despite influencing health-seeking behaviors, the intervention did not lead to significant improvements in essential first aid practices, such as immobilizing the affected limb. Hospital surveillance indicated an encouraging trend, with more individuals seeking hospital care for snakebites. Yet, the intervention had limited impact on enhancing community knowledge about snakebite prevention. Although hospital-based passive surveillance for snakebites is feasible even at the Upazila Health Complex level, community-based surveillance through community clinics was not successful, pointing to the need for further refinement of surveillance strategies in rural settings.

Recommendations

Given its positive impact, the program has the potential for nationwide expansion. Strategic planning and partnerships can facilitate the scaling-up process while maintaining program quality and effectiveness. Implementation research can be structured to explore the challenges and opportunities encountered during large-scale scaling.
The recommendations that can be derived from this study are:

1. Information, Education and Communication materials developed in Bengali for prevention of snakebite and providing first aid through community engagement like formation of snakebite support group should be used across the country.
2. Positive impact of multiple interventions on prevention, first aid and rapid transport to hospital and lessons learned from conducting courtyard meeting (UthanBaithok) using flip chart, periodic health education sessions at the community clinic and upazila health complex, displaying posters on prevention, first aid and ‘what not to do’ , holding community meetings, performing educational institution based sessions, performing traditional songs, using social media can be used in different locations of the country.
3. More works are needed to transfer the knowledge into practice related to providing first aid following snakebite like ‘not to use tourniquet’, to practice pressure immobilization.
4. Method of training provided to the community to be tested/developed on prevention of snakebite highlighting for example use of ‘cot-and net’, not to share bedroom with

livestock and food grains, using boot, stick, torch, safe handling of fire wood, stay, bricks and fishing safety.

5. Anthropological study should be undertaken related to continued treatment seeking from the traditional healers, 'Ohza' to address the change of the behavior of the community.
6. Treatment of snakebite particularly initiation of treatment by antivenom in envenomation at the first contact hospital, Upazila Health Complex has found to be feasible in resource limitations by providing SOP based training to a team of health professionals including doctors, nurse and sub-assistant community medical officer (SACMO).
7. Continued availability of logistics like antivenom, and relevant drugs and logistics like availability of competent health professionals skilled in the delivery of antivenom and initiation of respiratory support by intubation and using Ambo bag will build trust of the community on UZHC. Skills acquired in managing snakebite, a common rural community emergency can be used by the health care professionals in addressing other acute medical emergencies.
8. Successful supportive supervision 24/7 from Medical Colleges through 'WhatsApp Group' to the medical doctors working at Upazila Health Complex for managing envenomation should be replicated in different regions of the country.
9. For the development of a community surveillance of snakebite in human and animal more work is needed.
10. Snakebite register should be maintained in upazilas of the country for developing an evidence base of snakebite data.

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Biography of the principal investigator

Brief Curriculum Vitae of Professor (Dr.) Mohammad Abul Faiz

Born on 28 October 1953, Anwara, Chittagong, Bangladesh.

Educated:

Chittagong College, Chittagong (Higher Secondary) 1972
MBBS, Chittagong Medical College, Bangladesh 1978
Fellowship in Internal Medicine from BCPS (FCPS), 1982
Ph D, University of Newcastle upon Tyne, UK, 1993
(Fellow of the World Health Organization for doing research leading to Ph D from University of Newcastle upon Tyne, UK, 1990 – 1993).
FRCP-2001

Previous Job:

Thirty two years' service under the Ministry of Health Bangladesh in different capacities: Assistant Surgeon, Chittagong Medical College Hospital 1978 – 1979 and Successively Consultant Medicine, Cox's Bazar District Hospital and Chittagong Medical College Hospital 1982 – 1988; Assistant Professor Medicine, Institute of Post Graduate Medicine and Research Dhaka 1988 – 1993; Associate Professor and Professor of Medicine, Chittagong Medical College 1993 – 2003. Professor and Head of Medicine, Principal, Dhaka Medical College and Dean, Faculty of Medicine, University of Dhaka, Director General of Health Services (DGHS, Govt. of Bangladesh) – 07.01.2008 – 18.01.2009, Professor and Head of Medicine, Sir Salimullah Medical College & Mitford Hospital- 19.01.2009 – 27.10.2010.

Currently:

- Professor of Medicine,(Retired on 27.10.2011 from Sir Salimullah Medical College, Mitford, Dhaka).

Previous major responsibility:

- Co-Chair, WHO Snakebite Envenoming Group (SBE-WG)
- Member, Guidelines for the Management of Snakebites, WHO, SEARO Region (2010, 2016).
- Advocacy for establishing snakebite as a Neglected Tropical Disease by WHO in 2018.
- Board Member, The Global Fund (SEA Constituency) from 1st June 2018 to May 2020
- Senior National Consultant, WHO for development of National Snakebite Strategy from10th September to 10th December 2021
- Member of Joint Coordination Board, Tropical Disease Research (TDR)
- Member, Guidelines for the Treatment of Malaria, WHO, Geneva
- Member, DNDi Board of Directors
- President, Bangladesh Association for Advancement of Tropical Medicine (BAATM)
- Consultant, Programme Implementation Plan, 4th Health, Population, and Nutrition Sector Programme and for revision of the Operation Plan in 2020
- To provide teaching, career/training support for the under graduate and post-graduate students in Bangladesh, examiner in under Graduate &Post Graduate Courses
- To provide patient care
- To provide training to doctors
- Guiding dissertations and thesis
- Administrative Chief of the largest and oldest Medical College of Bangladesh which provides both Undergraduate and Postgraduate Medical Education
- Technical Chief of Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh: Director General, Directorate General of Health Service

- The Dean of the Faculty of Medicine, University of Dhaka, Bangladesh
- Associated with policy planning for medical education, research and patient care in Bangladesh
- Editor-in-Chief, Journal of BCPS
- Editor-in-Chief, BMRC Bulletin

Current major responsibility:

- Chairman Editorial Board, Journal of Bangladesh College of Physicians & Surgeons (BCPS)
- Vice Chair, Bangladesh Country Coordinating Mechanism (BCCM)
- Chairman, Research Committee, BMRC
- Co-chair, WHO Snakebite Envenoming Group (SBE-WG)
- Provides teaching, career/training support for the under graduate and post-graduate students in Bangladesh, examiner in under graduate & post graduate courses.
- Provides patient care
- Provides training to doctors.
- Guiding dissertations and thesis
- Member, Bangladesh Country Coordinating Mechanism Oversight Committee as an expert
- Chairman, Clinical Protocol Development Committee, Bangladesh
- Chairman Editorial Board, Journal of Bangladesh College of Physicians & Surgeons
- Associated with a non government non-profit organization, Dev Care Foundation
- President, Toxicological Society of Bangladesh (TSB)

Current Member of Important Bodies:

- Member, Steering Committee, COVID-19 Clinical Research Coalition
- Member, Regional Technical Advisory Group Malaria, SEARO, WHO
- Member, Regional Technical Advisory Group Antimicrobial Resistance, SEARO, WHO
- Member, Asia Pacific Association of Medical Toxicology
- Member, Technical Committee, Malaria, Bangladesh
- Member National Steering Committee for Elimination of Kala Azar
- International Advisory Board of Davidson's Principles and Practice of Medicine
- Member, Guidelines for the Management of Snakebites, WHO, SEARO Region (2010, 2016)
- Member, Editorial Board, Neurology Asia.
- Member, Editorial Board- Journal of Bangladesh Society of Medicine, Journal of Association of Physicians, Bangladesh.
- Member Editorial Board, Clinical Toxicology in Asia Pacific and Africa, Springer
- Member 'Healthy Bangladesh' Initiative, Member 'Think Tank for Health', Bangladesh

Research interests in Tropical Medicine since 1978: Malaria, Organophosphorus Compound Poisoning, Snake Bite, Nipah Infection, Kala Azar, Tuberculosis. Total number of publications 338 including 136 articles on malaria.

- Currently involved in a number of Collaborative Research.
- Principal Investigator, Saving Brains: The artesunate suppository severe malaria cohort (SBASSMC); Bangladesh site of Tracking Artemisinin Resistance (TRAC), Tracking Artemisinin Resistance II.
- Principal Investigator of Malaria Research Group (MRG) and Multi center study on Community Based Rectal Artesunate Study, Bangladesh (Study 13 TDR/WHO).
- Completed and published Multi center study on effect of Quinine and Artesunate in severe malaria (SEAQUAMAT).
- Completed and published Multi center study on Pre-referral rectal artesunate to prevent death and disability in severe malaria: a placebo-controlled trial (Lancet Feb 2009), which received the BMJ Award on March 10, 2010, as the research paper of the year 2009.

Other key achievements:

- Received Gold Medal of Bangladesh Academy of Sciences, 2002
- Awarded the "ChikitshokPodok" (wPwKrmKc`K) in the field of Medical Research by PLATFORM of Medical & Dental Society in association with Bangladesh Medical Teachers' Welfare Trust, 2021
- One of the Snakebite Champions from Asia in 2021 Campaign: 'Why I Chose Snakebite' in the 4th Annual International Snakebite Awareness Day
- Included in the directory of experts on Malaria& Snakebite.
- Collaborator Scientist, Mahidol-Oxford Research Unit (MORU), Bangkok, Thailand.
- Visiting Professor and Collaborator Scientist, Faculty of Medicine, Institute of Occupational Medicine; Social Medicine and Environmental Medicine; Organisation Goethe University Frankfurt, Germany.
- Contribution in 'Banglapedia'.
- Contributed as a consultant, chairman, member, or as a resource person in policy development and development of documents of Government of Bangladesh for example, Strategic plan for Surveillance and prevention of Non Communicable Diseases in Bangladesh 2011-2015; Strategic Plan for Health Sector Investment 2016-2021 (SIP), MOHFW, GOB; National Strategic Plan for Malaria Elimination Programme (2021-2025); Clinical protocol; Hospital Standard; Evidence Based Medicine; Communication skills in Medicine; National Guidelines on- Dengue, Snakebite, Malaria, Kala azar, Poisoning, COVID-19,Climate Change and Health.

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Appendices

Appendix A: Ethical Clearance for SPACE project

Appendix B: Consent paper of the respondents in Bangla

কমিউনিটিকে সম্পৃক্ত করে বাংলাদেশে সর্পদংশন প্রতিরোধ ও প্রাথমিক চিকিৎসা প্রদান

(Snakebite Prevention and First Aid through Community Engagement in Bangladesh)

সম্মতিপত্র (Informed Consent)

(অনুগ্রহ পূর্বক সাক্ষাৎকার শুরু করার আগে উত্তর দাতাকে পড়ে শোনান এবং সাক্ষাৎকার গ্রহণের অনুমতি নিন)

আসসালামু আলাইকুম/আদাব,

গবেষণার উদ্দেশ্যঃ আমি ---------- টক্সিকোলজি সোসাইটি অব বাংলাদেশ ও সেন্টার ফর ইনজুরি প্রিভেনশন অ্যান্ড রিসার্চ, বাংলাদেশ (সিআইপিআরবি) এর তথ্য সংগ্রহকারী হিসেবে কাজ করছি। এই গবেষণায় কমিউনিটির সম্পৃক্ততা ও সচেতনতা সৃষ্টির মাধ্যমে বাংলাদেশে সর্পদংশন প্রতিরোধ এবং কার্যকর প্রাথমিক চিকিৎসা পদ্ধতি কে কিভাবে প্রভাবিত করে তা নির্ণয় করা হবে।

পদ্ধতিঃ আপনাকে এই গবেষণার অংশগ্রহণকারী হিসেবে দৈবচয়ন বেছে নেয়া হয়েছে। তথ্য সমূহ সংগ্রহ করতে আনুমানিক ৩০-৪৫ মিনিট সময়ের প্রয়োজন হবে। সাক্ষাৎকার গ্রহণ করার জন্য একটি প্রশ্নপত্র ব্যবহার করা হবে।

ঝুঁকি এবং সুবিধাদিঃ এই সাক্ষাৎকার প্রদানে আপনি কোন ঝুঁকির সম্মুখীন হবেন না যদিও এখানে কিছু ব্যক্তিগত বিষয়ের উপর প্রশ্ন করা হবে। এই গবেষণায় অংশগ্রহণের জন্য কোন সরাসরি সুবিধা আপনি পাবেন না।

গোপনীয়তাঃ আপনার উত্তর গুলোর গোপনীয়তা সম্পূর্ণভাবে রক্ষা করা হবে। আমি আপনাকে নিশ্চিত করে বলতে পারি যে, আপনার দেয়া তথ্য গোপন রাখা হবে এবং শুধুমাত্র গবেষণার কাজে ব্যবহার করা হবে। আপনি যে তথ্য গুলো দিবেন তা অন্যদের তথ্যের সাথে একত্র করে একটি রিপোর্ট আকারে প্রকাশ করা হবে। এই প্রতিবেদনে কোথাও আপনার নাম, ঠিকানা থাকবে না। আমার কাছে আপনার কোন প্রশ্ন আছে কি? (না থাকলে অগ্রসর হোন) আমি কি এখন আপনার সাথে এ বিষয়ে কিছু সময় কথা বলতে পারি?

স্বেচ্ছায় অংশ অংশগ্রহণঃ আপনার অংশগ্রহণ সম্পন্ন স্বেচ্ছা প্রণোদিত। সাক্ষাৎকার অথবা যে কোন প্রশ্নের উত্তর দানে বিরত থাকতে পারেন বা যে কোন সময় এই সাক্ষাৎকার প্রদান বন্ধ করতে পারেন।

অংশগ্রহণকারীর অধিকারঃ এই গবেষণা সর্ম্পকে যদি আরো কোন প্রশ্ন থাকে তাহলে আমাকে বা গবেষক অধ্যাপক মোঃ আবুল ফয়েজ (ফোন- ০১৬১৩-০০৮৮৫৭) বা অধ্যাপক এ কে এম ফজলুর রহমান, (ফোন- ০১৭১৫-০৮০৬৪৫) এর সাথে যোগাযোগ করতে পারেন।

আপনার কি আর কোন প্রশ্ন আছে ? |____| (১= হ্যাঁ, ২= না),

আপনি/আপনার সন্তান কি সাক্ষাৎকার দিতে রাজি আছেন? |____| (১= হ্যাঁ, ২= না)

অংশগ্রণকারীর ইউনিক নাম্বারঃ.....

সাক্ষাৎকার চলাকালীন যে তথ্যাবলী আমাকে দেয়া হয়েছে, আমি তা অবশ্যই গোপন রাখব।

সাক্ষাৎকার গ্রহনকারীর নামঃ....., মোবাইল নংঃ.....

স্বাক্ষরঃ....., তারিখঃ...../...../২০২৪

উত্তর দাতার নামঃ....., মোবাইল নংঃ.....,

স্বাক্ষরঃ....., তারিখঃ...../...../২০২৪

Appendix C: Consent paper of the respondents in English

ANNEXURE - D

'Snakebite prevention and First Aid through community engagement in Bangladesh'

INFORMED CONSENT FORM (English)

Assalamualaikum/Adab,

Purpose of Research: I ……. am working as a data collector of Toxicology Society of Bangladesh (TSB) and Centre for Injury Prevention and Research Bangladesh (CIPRB). Inthis study we willdetermine how community involvement and awareness affect snakebite prevention and effective first aid procedures after snakebite in Bangladesh.

Method: As a participant of this research, you are selected randomly. To complete the questionnaire, it will take around 30-45 minutes. We shall use a questionnaire in this study.

Risk and Benefits: Your participation in this research is not associated with any risk although some confidential questions will be asked. It will not bring any direct profit to you in any aspect.

Confidentiality: Full confidentiality will be maintained to your response. We would like to assure that information will be kept confidential and will be used only for reaserch purpose.The information you have given will only be used for publication as a report collating with other's information.Your identity such as name or address shall not be revealed anywhere Do you have any question to me (If No, please proceed).

Voluntary Participation: Your participation in this research is entirely voluntary. Even after you agreed to the "Consent form" you have the right to withdraw from this study anytime or refuse to answer any questions.

Right as a participant: If you have any question you can ask me or communicate with the Investigators Professor Md. Abul Faiz (Phone 01713008858) or Professor A K M Fazlur Rahman (01715080645).

Do you have any question? **|____|,** (1= Yes, 2=No)

Do you/your child agree to participate in this study? **|____|,** (1= Yes, 2=No)

Unique ID:_____

I shall keep the information of the interview as confidential.

Interview taken by:....., Mobile number:.....
Signature:....., Date:...../...../2022

Name of the respondent: ……..….....….…., Mobile number:....., Signature:....., Date:...../...../2022

Appendix D: Questionnaire in English

Data Collection Tool

"Snakebite prevention and first aid through community engagement in Bangladesh"

Implemented by:

Toxicology Society of Bangladesh

Module 1: Screening form

(This module is for everyone)

Section 1A:Face Sheet

	Name	
Name of division	01. Rajshahi 02. Barisal	☐
District	01. Patuakhali 02. Chapainawabganj	☐☐
Upazila	01. Kalapara 02. Shibganj	☐☐
PSU		☐☐☐
Household No		☐☐
Respondent number		
Data collector name and signature		
Date of interview		|_____|_____| |_____|_____|
Starting time of interview		|_____|_____| : |_____|_____|
Finishing time of interview		|_____|_____| : |_____|_____|
Supervisor name and signature		

Section 1B: Informations about family members of that household

Family members serial no	Name	Age in years (completed years)	Sex 1. Male 2. Female 3. Third Gender	Occupation (Please mention from the below mentioned code)	Years of schooling (In years)	Monthly family income

Occupational code: 01= Farming, 2 = Fisherman, 3= Homemaker, 04 = Transport driver, 05= Student, 06= Laborer, 07 = Retired, 08 = Teacher, 09 = others, 99 = Not applicable

Section 2: Snakebite related information

No.	Questions	Coding Categories		Skip/Direction
Snake bite related information in humans				
1.	In last 12 months, is there any incidence of snake bite/symptoms of snake bite/death from snake biteoccurred among any of your family members?	Yes	1	If the ans is yes go to question 2 and then go to module 2A
		No	2	
2.	How many people in your family were bitten by a snake?	## _____		Ifvictim number is more than one,then respective number of forms should be filled.
3.	In last 12 months, is there any of family your members died while sleeping?	Yes	1	If Ans yes, go to 2B Section of module 2 if no finish here.
		No	2	
Do you currently have any livestock/ poultry or have had within the last 1 year?				
4.	Do you currently have any livestock/ poultry or have had within the last 1 year?	Cow	1	If No finish interview here.
		Sheep	2	
		Buffalo	3	
		Bull	4	
		Goat	5	
		Chicken/duck/pigeon/quail bird	6	
		Others	7	
		No	8	
5.	In last 12 months, is there any incidence of snake bite/symptoms of snake bite death from snake bite occurred among any domestic animals?	Yes	1	If yes go to module 3, if no finish the interview here.
		No	2	

Module 2: Snakebite victim's information

Section 2A: Snake bite victim's information				
No.	**Questions**	**Coding Categories**		**Skip/directon**
1.	Name of the snake bite victim			
2.	Serial No of victim from the HH serial id			
3.	Sex of the victim	Male	1	
		Female	2	
		Third gender	3	
4.	When did the incident happen?	D D/MM/YYYY		
5.	How was the weather around the time of bite incident?	Sunny day	1	
		Cloudy	2	
		Raining	3	
		Flood	4	
		Others (please mention)	5	
6.	Could you identify the offending snake?	Yes	1	
		No	2	
7.	What had done with the offending snake?	The snake was caught	1	
		It was killed	2	
		The snake was brought to the hospital	3	
		Nothing was done to/with the snake	4	
8.	Did the snake was carried to the hospital?	Yes	1	
		No	2	
9.	Time of bite (in 24hours format)	HH/MM		
10.	What was the victim doing while the ite incident took place?	Sleeping on the floor without mosquito net	1	
		Sleeping on the floor with mosquito net	2	
		Sleeping on the bed without mosquito net	3	
		Sleeping on the bed with mosquito net	4	
		Was working on field	5	
		Catching fish	6	
		Was swimming	7	

		While catching snake	8	
		While Playing with snake	9	
		Walking	10	
		Others	11	
11.	What was the location, where the bite incident occurred?	Bedroom	1	
		kitchen	2	
		Toilet	3	
		Veranda	4	
		Cattle house	5	
		Fuel/ wooden storage room	6	
		Courtyard	7	
		Paddy field/farmhouse	8	
		Bush next to the house	9	
		Haystack	10	
		On the street	11	
		Dirt Road	12	
		Aisle of land	13	
		Pond	14	
		Playing ground	15	
		Industry/factory/workshop ground	16	
		Under construction area	17	
		Others	18	
		Don’t know	19	

Section 2A: Snake bite victim's information				
	Questions	**Coding categories**		
12.	Did the victim receive any first aid treatment after the incident?	Yes	1	
		No	2	
		Don't know	3	
13.	If yes, who has given him/her treatment?	By him/herself	1	
		Parents	2	
		Siblings	3	
		Spouse	4	
		Pharmacy	5	
		Other service providrs	6	
		Friend	7	
		Neighbours	8	
		Fieldhealthworker	9	
		Volunteers	10	
		Doctors	11	
		Traditional healers	12	
		Others(pleasemention)	13	
14.	Where the victim did was taken for treatment?	Traditional healers	1	
		Health worker	2	
		Others(pleasemention)	3	
15.	If the above answer is traditional healer, then the reason to visit him? (There may be more than one answer)	Traditional healer is believed to provide successful treatment for snake bites	1	
		Traditional healer is easily available in this area or cn be found in easy walking distance	2	
		Access to health centers or health workers is time consuming and located at remote locations	3	
		Inadequacy of snakebite treatment at health centers	4	
		Others(pleasemention)	5	
16.	What was the outcome from taking treatment from the traditional healer? (There may be more than one answer)	Survived	1	
		Got disabled	2	
		Died	3	
17.	Was the snakebite site immobilized with something to prevent it from moving??	Yes	1	
		No	2	

18.	Was the snake bite site tied by something above the bite site?	Yes	1	
		No	2	
19.	Did the snake bite injured person receive any treatment?	Yes	1	
		No	2	
20.	Is the snake bitten person was admitted to the health center?	Yes	1	
		No	2	
21.	(If the answer is yes) If the snake bitten person is admitted to a hospital/health center/clinic then what kind of hospital?	Specialized hospital(medical college hospital, orthopaedic hospital, P.G hospital	1	
		District hospital	2	
		Upazilla health complex	3	
		Private clinic	4	
		NGO Clinic	5	
		Others(pleasemention)	6	
22.	How the snakebitten person was taken to the hospital/medicalprovider	Ambulance	1	
		Other motorized vehicle(bus, zeep, car and three wheelers	2	
		Non-motorized vehicle (rickshaw, van, boat)	3	
		Ferry/launch/steamer	4	
		Others(pleasemention)	5	
		Don't know	6	
23.	If taken to hospital, what was the time taken from bite time to hospital arrival?	HH_MM		
24.	What was the travel time from home to hospital?	HH_MM		
25.	The time gap betweenadmission to hospital and deathincidence(in caseofdeath)	---------- days		
26.	Outcome from hospital treatment?	Fully recovered	1	
		Not recovered	2	
		Got disabled	3	
		Discharged from hospital	4	
		Died	5	

Section 2B: Information of dead person from snake bite				
	More detailed information			
1.	Please mention the name and timing of death.	HH/MM		
2.	Did he die at the incident site?	Yes	1	
		No	2	
3.	Wherewas the incident takeplace?	Hospital	1	
		At his own home	2	
		On Road	3	
		On the way to home	4	
		On the way to hospital	5	
		Others (please mention)	6	

Module 3: Snake bite related information in domestic animal

Section 3(A): Snake bite related detailed information in case of domestic animal				
1.	**What was the location, where the bite incident occurred?**	Cattle house	1	
		Farm Field	2	
		Around the river/ pond	3	
		Others	4	
2.	**What was the time of bite?**	Day time	1	
		Nighttime	2	
3.	**Can you please mention which species of snake was it?**			
4.	**What type of snake was it?**	Venmous	1	
		Nonvenomous	2	
		Don't know	3	
5.	**How was the weather around the time of bite incident?**	Sunny day	1	
		Cloudy	2	
		Raining	3	
		Flood (water was clogged inside and around the house)	4	
		Others (please mention)	5	
6.	**Could you identify the offending snake?**	Yes	1	
		No	2	
7.	**Did the animal undergo any treatment for snakebite?**	Yes	1	
		No	2	
8.	**Where the victim did was taken for treatment?**	Animal hospital	1	
		Traditional healer	2	
		Pharmacy	3	
		Others	4	
9.	**What was the treatment outcome?**	Fully recovered	1	
		Died	2	
		Sold it to butcher	3	
		Disabled	4	
		Got slaughterd	5	
		Others (Please specify)	6	

Module 4: Snakebite prevention and first aid management knowledge and practice related information

(This module is only for subpopulation)

NO.	Questions and Filters	Coding categories	Code	Skip
KNOWLEDGE RELATED TO SNAKE BITE PREVENTION				
1	Do you know how you can prevent yourself from snake bite?	Yes	1	**Go to question 2**
		No	0	
2	If above mentioned question answer is yes, what preventive measures can be taken to prevent snake bite? (There may be more than one answer)			
3	Could you recognize a poisonous and non-poisonous snake when you see a snake?	Yes	1	
		No	0	
4	If the answer is yes, could you please mention some snake's name.			
KNOWLWDGE RELATED TO SNAKE BITE FIRST AID				
5	Do you know what to do immediately if someone is bitten by a snake?	Yes	1	
		No	0	
6	If above mentioned question answer is yes, what measures can be taken immediately? (There can be multipleans)	**Positive practice**		
		Immobilize the bite site	1	
		Immediate referral to nearest hospital	2	
		Negative practice		
		Suck out blood from the bite site	3	
		Using tourniquet at the bite site	4	
		Incision at bite site	5	
		Applying ashes,chicken wastage at bite site	6	
		Visiting traditional healer	7	
		Casting mantras by traditional healers	8	
		Others (please mention)	99	

7	Where the snake bite victim should be taken after being bitten?	In a hospital	1	
		To the traditional healer	2	
8	How will carry the patient while transferring him/her to the hospital?	By rickshaw	1	
		By foot	2	
		Carrying in a bed	3	
		By boat	4	
		By three-wheeler	5	
		By bike	6	
		By Motorcycle/scooter	7	
Practice related to snakebite prevention				
9	To prevent urself from snake bite, what measures are you taking? (ans can be multiple)	Using mosquito net	1	
		Being cautious while guarding the crop fields and sleeing at night	2	
		Keeping the surrounding clean	3	
		Using boots while working at fields	4	
		Be Cautious while handling stacked materials	5	
		Look into the water cautiously while fishing	6	
		Using Torch	7	
		Tapping the fllor with stick while walking	8	
		Do not store grains/crops in the bedroom	9	
		Not Keeping chickens, pigeons and ducks in the bedroom	10	
		Donot put hand inside any hole	11	
		Others (please mention)	99	

Appendix E: Questionnaire in Bangla

Data Collection Tool (বাংলা)

কমিউনিটিকে সম্পৃক্ত করে বাংলাদেশে সর্পদংশন প্রতিরোধ ও প্রাথমিক চিকিৎসা প্রদান

“Snakebite prevention and first aid through community engagement in Bangladesh”

Supported by:

Ministry of Health and Family Welfare

Implemented by:

Toxicology Society of Bangladesh

মডিউল ১: স্ক্রিনিংফর্ম

(এই মডিউল সবার জন্য প্রযোজ্য)

সেকশন ১:ফেইস শীট

	নাম	
ডিভিশনের নাম	১. রাজশাহী ২. বরিশাল	☐
জেলা	১. পটুয়াখালী ২. চাপাইনবাবগঞ্জ	☐☐
উপজেলা	১. কলাপাড়া ২. শিবগঞ্জ	☐☐
পিএসউ		☐☐☐
খানার নম্বর		☐☐
ব্যক্তিনম্বর		☐☐
ডাটা কালেক্টর এর নাম এবং স্বাক্ষর		
সাক্ষাৎকার গ্রহনের তারিখ		|_____|_____| |_____|_____| |_____|_____|
সাক্ষাৎকার শুরু হবার সময়		|_____|_____| : |_____|_____|
সাক্ষাৎকার শেষ করার সময়		|_____|_____| : |_____|_____|
সুপারভাইজারের নাম এবং স্বাক্ষর		

সেকশন ১(এ): খানার জীবিত সদস্যদের তথ্য

পারিবারিক ক্রমিক নম্বর	নাম	বয়স (বছরে)	লিঙ্গ ১. পুরুষ, ২. মহিলা, ৩. তৃতীয় লিঙ্গ	প্রধান পেশা (নিচে প্রদত্ত কোড লিখুন)	সর্বমোট কত বছর পড়াশোনা করেছেন	পারিবারিক মাসিক আয়

পেশার কোড: ১= কৃষিকাজ, ২ = জেলে, ৩ = গৃহিণী, ৪ = গাড়িচালক, ৫ =ছাত্র-ছাত্রী, ৬ = শ্রমিক, ৭=অবসরপ্রাপ্ত,, ৮ = শিক্ষক, ৯ =অন্যান্য, ৯৯ = প্রযোজ্য নয়।

সেকশন ২: সর্পদংশন সম্পর্কিত তথ্য

No.	Questions	Coding Categories		Skip
	সর্পদংশন মানুষের ক্ষেত্রে			
১	গত ১২ মাসের (১ বৎসর) মধ্যে আপানার পরিবারের কাউকে সর্পদংশন করেছিল কিনা বা সর্পদংশনের লক্ষণ প্রকাশ পেয়েছিল অথবা কেউ সর্পদংশনে মারা গিয়েছিল কিনা?	হাঁ	১	যদি হ্যাঁ হয় ২ নম্বর প্রশ্নে যাবেন এবং এর পর মডিউল ২ (এ) তেযাবেন।
		না	২	
২	আপানার পরিবারের মধ্যে কতজন কে সর্পদংশন করেছিল?	## _____		একের অধিক ব্যক্তি হলে একাধিক ফর্ম হবে।
৩	গত ১২ মাস (১ বৎসর) এর মধ্যে আপানার পরিবারে কেউ রাতে ঘুমন্ত অবস্থায় মৃত্যু বরন করেছিল কিনা?	হাঁ	১	যদি হ্যা হয় মডিউল ২ এর সেকশন ২ (বি) তে যাবেন।
		না	২	এই খানে সাক্ষাতকার শেষ করবেন।
	সর্পদংশন গবাদী পশুর ক্ষেত্রে			
৪	বর্তমানে আপনার কোন গবাদি পশু/পাখি আছে বা বিগত ১ বৎসরের মধ্যে ছিল। (একের অধিক উত্তর হতে পারে)	গরু	১	উত্তর না হলে সাক্ষাতকার এখানে শেষ করুন।
		ভেড়া	২	
		মহিষ	৩	
		ষাড়	৪	
		ছাগল	৫	
		হাঁস-মুরগী/কবুতর/কোয়েলপাখি	৬	
		অন্যান্য	৭	
		না	৮	
৫	গত এক বছরের (১২ মাস) মধ্যে আপনার কোন গবাদিপশু বা পাখিকে সর্পদংশনের কোন ঘটনা/মৃত্যু ঘটেছে কি?	হ্যাঁ	১	উত্তর হ্যা হলে মডিউল ৩ এ যান।
		না	২	

মডিউল ২ : সর্পদংশনে আহত ব্যক্তির তথ্য

সেকশন ২(এ): সর্পদংশনে আহত ব্যক্তির তথ্যঃ				
No.	**Questions**	**Coding Categories**		**Skip and directions**
১.	সর্পদংশনে আহত ব্যক্তির নাম			
২.	সর্পদংশনে আহত ব্যক্তির ক্রমিক নম্বর (খানার আইডি থেকে)			
৩.	সর্পদংশনে আহত ব্যক্তির লিঙ্গ	পুরুষ	১	
		মহিলা	২	
		তৃতীয় লিঙ্গ	৩	
৪.	কত তারিখে সর্পদংশন করেছিল?	D D/MM/YYYY		
৫.	সর্পদংশনের সময় আবহাওয়ার অবস্থা কেমন ছিল?	রোদ ছিল (স্বাভাবিক আবহাওয়া)	১	
		মেঘলা আকাশ ছিল	২	
		বৃষ্টি পড়ছিল	৩	
		বন্যা (ঘরে বা ঘরের বাহিরে বন্যার পানি ছিল)	৪	
		অন্যান্য (উল্লেখ করুণ)_____	৫	
৬.	যে জাতের সাপদংশন করেছিল তা আপনি চিনেছিলেন কি?	হাঁ	১	
		না	২	
৭.	সর্পদংশনের পর সাপটির সাথে কি করা হয়েছিল। (একের অধিক উত্তর হতে পারে)	সাপটি ধরা হয়েছিল	১	
		সাপটি মেরে ফেলা হয়েছিল	২	
		সাপটি হাসপাতালে নিয়ে আসা হয়েছিল	৩	
		সাপটির সাথে কিছুই করা হয়নি/যায়নি	৪	
৮.	সাপটি কি রোগীর সাথে হাসপাতালে নিয়ে যাওয়া হয়ে ছিল?	হাঁ	১	
		না	২	
৯.	কখন সর্পদংশন হয়েছিল? (২৪ ঘন্টায় লিখুন)	HH/MM		
১০.	দংশনের মুর্হূতে কি করছিলেন?	মাটিতে ঘুমিয়ে ছিলেন (মশারি ছাড়া)	১	
		মাটিতে ঘুমিয়ে ছিলেন (মশারিসহ)	২	
		বিছানায় ঘুমিয়ে–ছিল (মশারি ছাড়া)	৩	
		বিছানায় ঘুমিয়ে ছিলেন (মশারিসহ)	৪	
		মাঠে কাজ করতে ছিলেন	৫	
		মাছ ধরতে ছিলেন	৬	
		সাতার কাটতে ছিলেন	৭	
		সাপ ধরার সময়দংশন	৮	
		সাপ নিয়ে খেলা করার সময় দংশন	৯	
		হাঁটি ছিলেন	১০	
		অন্যান্য	১১	
১১.	সাপে কাটার স্থান	শোয়ার/বসার ঘর	১	
		রান্না ঘর	২	
		গোসল খানা/টয়লেট	৩	

সেকশন ২(এ): সর্পদংশনে আহত ব্যক্তির তথ্যঃ				
No.	**Questions**	**Coding Categories**		**Skip and directions**
		বারান্দা	৪	
		গোয়াল ঘর	৫	
		লাকড়ির স্তুপ/ঘর	৬	
		বাড়ীর উঠান	৭	
		কৃষিক্ষেত্র/খামারবাড়ী/চাতাল	৮	
		জঙ্গল/বাড়িরপাশেরঝোপ	৯	
		খড়েরগাদা	১০	
		হাঁস মুরগির খোঁয়াড়	১১	
		রাস্তায় /মহাসড়কে	১২	
		কাচা রাস্তা	১৩	
		জমির আইল	১৪	
		জলাশয়	১৫	
		খেলার মাঠ	১৬	
		শিল্প/কলকারখানা/ওয়ার্কশপ	১৭	
		নির্মাণ এলাকা	১৮	
		অন্যান্য (উল্লেখ করুন)	১৯	
		জানা নেই	২০	

১২.	সর্পদংশিত ব্যক্তিটি কি প্রাথমিক চিকিৎসা পেয়ে ছিল?	হাঁ	১	
		না	২	
		জানা নেই	৩	
১৩.	উত্তর হ্যাঁ হলে, কে প্রাথমিক চিকিৎসা দিয়েছিল ?	নিজ	১	
		মা/বাবা	২	
		ভাই/ বোন	৩	
		স্বামী/ স্ত্রী	৪	
		ফার্মেসি/পল্লী চিকিৎসক	৫	
		অন্য সেবাপ্রদানকারী	৬	
		বন্ধু/ সমবয়সী শিশু	৭	
		প্রতিবেশী	৮	
		মাঠ পর্যায়ের স্বাস্থ্যকর্মী	৯	
		কমিউনিটির স্বেচ্ছাসেবক	১০	
		ডাক্তার	১১	
		ওঝা	১২	
		অন্যান্য (উল্লেখ করুণ) _____	১৩	
১৪.	সর্পদংশনের পর রোগী চিকিৎসার জন্য সর্ব প্রথম কার শরণাপন্ন হয়েছিলেন?	ওঝা	১	
		স্বাস্থ্যকর্মী/ স্বাস্থ্য কেন্দ্র	২	

১৫.		অন্যান্য _____	৩	
১৬.	যদি উপরের উত্তর ওঝা হয়ে থাকে তাহলে ওঝার নিকট শরণাপন্ন হবার কারণ? (একের অধিক উত্তর হতে পারে)	ওঝাই সর্পদংশনের সফল চিকিৎসা প্রদান করেন বলে মনে করেন	১	
		ওঝাসহ জলভ্য এই এলাকায় পাওয়া যায় বা ওঝার নিকট সহজে গমন করা যায়	২	
		স্বাস্থ্য কেন্দ্র বা স্বাস্থ্যকর্মীর কাছে যাওয়া অনেক সময় অনেক সাপেক্ষ ও দূরবর্তীস্থানে অবস্থিত	৩	
		স্বাস্থ্য কেন্দ্রে সর্পদংশনের চিকিৎসার অপ্রতুলতা	৪	
		অন্যান্য _____	৫	
১৭.	ওঝার নিকট চিকিৎসার ফলাফল (একের অধিক উত্তর হতে পারে)	বেঁচে গিয়েছিল	১	
		পঙ্গু হয়ে গিয়েছিল	২	
		মারা গিয়েছিল	৩	
১৮.	সর্পদংশনের স্থান যাতে নড়াচড়া না করে সেজন্য কি শক্ত কিছু দিয়ে বেধে দেয়া হয়েছিল।	হাঁ	১	
		না	২	
১৯.	সর্পদংশনের স্থান থেকে উপরের দিকে কিছু দিয়ে বাধা হয়েছিল।	হাঁ	১	
		না	২	
২০.	সর্পদংশনে আহত ব্যাক্তি কি কোন চিকিৎসা গ্রহন করেছিল?	হাঁ	১	
		না	২	
২১.	সর্পদংশিত ব্যক্তি হাসপাতালে/ স্বাস্থ্য কেন্দ্রে ভর্তি হয়ে ছিল কি?	হাঁ	১	
		না	২	
২২.	(উত্তর হাঁ হলে) সাপে কাটা ব্যক্তিকে যদি হাসপাতাল/স্বাস্থ্য কেন্দ্র /ক্লিনিকে ভর্তি করা হয়ে থাকে তা হলে কোন ধরনের হাসপাতাল ?	বিশেষায়িত হাসপাতাল (মেডিকেল কলেজ হাসপাতাল, পঙ্গু হাসপাতাল, পি. জি. হাসপাতাল ইত্যাদি)	১	
		জেলা হাসপাতাল	২	
		উপজেলা স্বাস্থ্য কমপ্লেক্স	৩	
		প্রাইভেট ক্লিনিক	৪	
		এন.জি.ও ক্লিনিক	৫	
		অন্যান্য (উল্লেখ করুন)	৬	
২৩.	সর্পদংশিত ব্যক্তিটিকে হাসপাতালে/চিকিৎসা প্রদানকারীর নিকট কিভাবে নিয়ে যাওয়া হয়েছিল?	এ্যাম্বুলেন্স	১	
		অন্য কোন মোটরচালিত গাড়িতে (বাস, জীপ, কার এবং তিন চাকা বিশিষ্ট গাড়ি)	২	
		মোটরবিহীন যানবাহন (রিক্সা, রিক্সা ভ্যান, ঠেলাগাড়ি) নৌকা	৩	
		ফেরী /লঞ্চ /স্টীমার	৪	
		অন্যান্য (উল্লেখকরুন)	৫	
		জানানেই	৬	
২৪.	সর্পদংশন ও হাসপাতালে পৌঁছানোর মধ্যবর্তী সময় কাল।	HH_MM		
২৫.	হাসপাতালে/সেবাদানকারীর নিকট পৌঁছাতে যাতায়াত সময় (ঘন্টায় লিখুন) [যদি এক ঘন্টার কম হয় তবে ০০০ লিখুন]	HH_MM		
	হাসপাতালে ভর্তি ও মৃত্যুর মধ্যে সময় কালের বাবধান। (মৃত্যুর ক্ষেত্রে)	---------- দিন		

২৬.	হাসপাতালে চিকিৎসার ফলাফল?	সম্পূর্ণ সুস্থ হয়ে গিয়েছে (শারিরিক/ মানসিক)	১	
		সুস্থহয় নাই	২	
		পঙ্গু হয়ে গিয়েছিল	৩	
		হাসপাতাল থেকে ডিসচার্জ নিয়ে চলে গেছে	৪	
		রেফার করা হয়েছিল?	৫	
		মারা গিয়েছিল	৬	

সেকশন ২(বি): সর্পদংশনে মৃত ব্যক্তির তথ্য				
	মৃত্যুর ক্ষেত্রে অতিরিক্ত তথ্য			
১.	ব্যক্তিটির (নাম উল্লেখ করুন) কখন মৃত্যু হয়েছিল? (২৪ ঘন্টায় লিখুন)	HH/MM		
২.	ব্যক্তিটির (নাম উল্লেখ করুন) কি ঘটনা স্থলেই মৃত্যু হয়েছিল?	হাঁ	১	
		না	২	
৩.	কোন জায়গায় মৃত্যু হয়েছিল?	হাসপাতালে	১	
		নিজ বাড়ীতে	২	
		রাস্তায়	৩	
		বাড়ীতে নেওয়ার পথে	৪	
		হাসপাতালে নেওয়ার পথে	৫	
		অন্যান্য (উল্লেখ করুন)	৬	

মডিউল ৩: প্রাণীদের (গবাদীপশু/পাখি) সর্পদংশন

সেকশন ৩(এ): সর্পদংশনসম্পর্কিতবিস্তারিততথ্যাদিগবাদীপশুরক্ষেত্রে:				
	Questions	Coding categories	Codes	Skip/ direction
১.	প্রাণীটির কোন স্থানে সর্পদংশন করেছিল?	বাড়ি/গোয়াল ঘরের আশেপাশে		
		খামারে/মাঠে		
		নদী/পুকুর/অন্যান্য জলাশয়ের আশেপাশে		
		অন্যান্য		
২.	কখন সাপে কেটেছিল?	দিনের বেলায়		
		রাতে		
৩.	কোনজাতেরসাপদংশনকরেছিল?			
৪.	সাপের বৈশিষ্ট কি ছিল?	বিষধর সাপ		
		বিষহীন সাপ		
		জানি না		
৫.	সর্পদংশনের সময় আবহাওয়া কেমন ছিল?	রোদ ছিল (স্বাভাবিক আবহাওয়া)		
		মেঘলা আকাশ ছিল		
		বৃষ্টি পড়ছিল		
		বন্যা (ঘরে বা ঘরের বাহিরে বন্যার পানি ছিল) অন্যান্য (উল্লেখ করুণ) _____		
৬.	সাপটিকে কি চিনতে পেরেছিলেন?	হ্যাঁ		
		না		

৭.	প্রাণটিকেসর্পদংশনেরজন্যকোনচিকিৎসাকরিয়েছিলেন?	হ্যাঁ		
		না		
৮.	হ্যাঁহলে, কোথাথেকেচিকিৎসানিয়েছিলেন? (একাধিকউত্তরহতেপারে)	পশুহাসপাতাল		
		ফার্মেসী		
		ওঝা		
		অন্যান্য (উল্লেখকরুন)		
৯.	চিকিৎসারফলাফলকিহয়েছিল?	পুরোপুরিসুস্থহয়েছিল		
		মারাগিয়েছিল		
		কসাইয়েরকাছেবিক্রিকরেছিলাম		
		পঙ্গুহয়েগিয়েছিল		
		জবাইকরেছিলাম		
		অন্যান্য		

মডিউল ৪: সর্পদংশন প্রতিরোধ এবং প্রাথমিক চিকিৎসার আচরণ সম্পর্কিত তথ্য

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	CODE	SKIP
সর্পদংশন প্রতিরোধ বিষয়ক জ্ঞান সম্পর্কিত প্রশ্ন				
১.	সাপের কামড় থেকে কিভাবে নিজেকে বাঁচানো যায় আপনি কী জানেন?	হ্যা	1	
		না	0	
২.	যদি উত্তর হ্যা হয়, কি কি ব্যবস্থা নেওয়া যায় সাপের কামড় প্রতিরোধের জন্য? (একের অধিক উত্তর হতে পারে)			
৩.	আপনি কি সাপ দেখলে বিষধর অবিষধর সাপ চিনতে পারবেন?	হ্যা	1	
		না	0	
৪.	যদি উওর হ্যা হয়, কিছু সাপের প্রজাতির নাম কি বলুন।			
সর্পদংশন এ প্রাথমিক চিকিৎসা বিষয়ক আচরণ সম্পর্কিত প্রশ্ন				
৫.	কাউকে সাপে কামড় দিলে আপনি কি জানেন তাৎক্ষনিক ভাবে কি কি ব্যবস্থা নেওয়া উচিত?	হ্যা	১	
		না	০	
৬.	যদি উওর হ্যা হয়, তাহলে কি কি ব্যবস্থা নিবেন? (একের অধিক উত্তর হতে পারে)	উচিত		
		সাপে কাটা স্থান অচল করে দেওয়া	১	
		তাৎক্ষণিক হাসপাতালে স্থানান্তর	২	
		অনুচিত		
		সাপেকাটা স্থান হতে রক্ত চুষে বের করা	৩	
		সাপে কাটা স্থানে গিট দেওয়া	৪	
		সাপে কাটা স্থানে কাটাছেড়া করা	৫	
		মুরগীর বিষ্ঠার প্রলেপ	৬	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	CODE	SKIP
		ওঝার কাছে নিয়ে যাওয়া	৭	
		ঝাড় ফুক করানো	৮	
		অন্যান্য (নির্দিষ্ট করুন)	৯৯	
৭.	সাপে কাটার পর কোথায় নেওয়া উচিত?	হাসপাতালে	১	
		ওঝারকাছে	২	
৮.	জরুরী অবস্থায় কিভাবে হাসপাতালে নিবেন?	রিক্সায়	১	
		পায়ে হেটে	২	
		খাটিয়াতে	৩	
		নৌকায়	৪	
		থ্রিহুইলারে	৫	
		বাইসাইকেল	৬	
		মোটর সাইকেল/স্কুটার	৭	
সর্পদংশন প্রতিরোধ বিষয়ক আচরণ সম্পর্কিত প্রশ্ন				
৯.	সাপের কামড় থেকে কিভাবে নিজেকে বাঁচানো যায় আপনি কীকী ব্যবস্থা নিচ্ছেন? (একের অধিক উত্তর হতে পারে)	শোবার সময় মশারী ব্যবহার করা	১	
		শস্য ক্ষেত (ফল ও সবজি) পাহাড়া দেওয়ার সময় এবং ঘুমানোর সময় সাবধানতা অবলম্বন করা	২	
		বাড়ির চারপাশ পরিষ্কার পরিচ্ছন্ন রাখা	৩	
		মাঠের কাজের সময় বুট ব্যবহার করা	৪	
		স্তুপাকৃত সামগ্রীর ব্যবহারের সময় সাবধানতা	৫	
		মাছ ধরা সময় পানিতে ভাল করে দেখে নামা	৬	
		টর্চ ব্যবহার করা	৭	
		চলাফেরার সময় লাঠি দিয়ে মাটিতে শব্দ করা	৮	
		শোবার ঘরে শস্য জমা রাখা না রাখা	৯	
		শোবার ঘরে হাস, মুরগী, কবুতর না রাখা	১০	
		গর্তের মধ্যে হাত না দেওয়া	১১	
		অন্যান্য (নির্দিষ্ট করুন)	৯৯	

Four posters had been developed. The contents of the posters were as follows:



সর্পদংশন প্রতিরোধ ও জরুরী প্রাথমিক চিকিৎসা

সর্পদংশনের প্রাথমিক চিকিৎসা, যা করবেন

- মোটর যানে রোগীকে দ্রুত হাসপাতালে নিন
- দংশিত অঙ্গ স্থিরাম বা অচল করে রাখুন/স্প্লিন্ট ব্যবহার করুন

সর্পদংশনের প্রাথমিক চিকিৎসায় যা করবেন না



সাপে কাটলে ভয় পাবেন না

সাপে কাটলে বমি করাবেন না
কথা বলতে অসুবিধা হলে খেতে দিবেন না





সাপে কাটা স্থানের উপরে গিঁট দিবেন না

সাপে কাটা স্থানে কাটা-ছেঁড়া করবেন না





'ওঝা'/বৈদ্যের চিকিৎসা নিবেন না

- বিষধর সর্পদংশনের ঔষধ এন্টিভেনম ও অন্যান্য বৈজ্ঞানিক চিকিৎসা উপজেলা হাসপাতালে পাওয়া যায়
- সর্পদংশন প্রতিরোধ করুন, নিকটস্থ হাসপাতালে দ্রুত চিকিৎসা নিন, জীবন বাঁচান

জনস্বার্থে: বাংলাদেশ সরকারের 'ইন্টিগ্রেটেড রোগ: সার্ভেল হিসার অ্যান্ড রেসপন্সেবেট প্রজ'
'SPACE' পাবলিক উপজেলায় বাস্তবায়নের জন্য: যোগাযোগ: info@tbsb.org.bd

সর্পদংশন প্রতিরোধ ও জরুরী প্রাথমিক চিকিৎসা

- বিষধর সর্পদংশনের ঔষধ এন্টিভেনম ও অন্যান্য বৈজ্ঞানিক চিকিৎসা উপজেলা হাসপাতালে পাওয়া যায়
- সর্পদংশন প্রতিরোধ করুন, নিকটস্থ হাসপাতালে দ্রুত চিকিৎসা নিন, জীবন বাঁচান

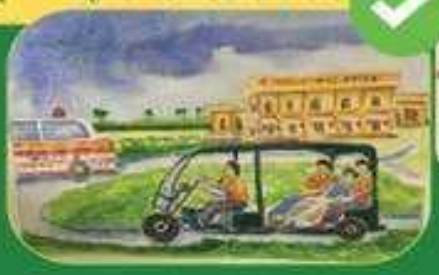
সর্পদংশনের প্রাথমিক চিকিৎসায় যা করবেন





সাপে কাটলে দংশিত অঙ্গ বিশ্রাম বা অচল করে রাখুন

সাপে কামড়ালে মোটর যানে রোগীকে দ্রুত হাসপাতালে নিন





অর্থায়নে: বাংলাদেশ সরকারের 'ইন্টিগ্রেটেড ডেভেলপমেন্ট সাপোর্ট টু রিসার্চ অ্যান্ড ডেভেলপমেন্ট খাত'
'SPACE' গবেষণা উপজেলায় ব্যবহারের জন্য। যোগাযোগ: info@issb.org.bd

সর্পদংশন প্রতিরোধ ও জরুরী প্রাথমিক চিকিৎসা

- বিষধর সর্পদংশনের ঔষধ এন্টিভেনম ও অন্যান্য বৈজ্ঞানিক চিকিৎসা উপজেলা হাসপাতালে পাওয়া যায়
- সর্পদংশন প্রতিরোধ করুন, নিকটস্থ হাসপাতালে দ্রুত চিকিৎসা নিন, জীবন বাঁচান

সর্পদংশন এড়ানোর উপায়



রাতে সাবধানে হাঁটা ও
আলো, লাঠি, বুট ব্যবহার





রাতে ঘুমানোর সময় চৌকি-মশারী ব্যবহার

সাপের কামড় থেকে বাঁচতে শোবার ঘর
প্রাণী ও শস্য সামগ্রী মুক্ত রাখা





বাড়ীর চারপাশ পরিস্কার রাখুন
সাপের কামড় থেকে বাঁচুন

আয়োজনে: বাংলাদেশ সরকারের 'ইন্সটিটিউট ফেলপ্ স্যাকেল ডিসিজ অ্যান্ড ডেভেলপমেন্ট ব্যাঙ'
'SPACE' গবেষণা উপজেলায় ব্যবহারের জন্য; যোগাযোগ: info@ieb.org.bd

WE Developed the flip chart on 'Prevention of Snakebite and Emergency First Aid'



১. বিষধর সর্পদংশনের গুরুত্বপূর্ণ উপসর্গ



১. দংশিত স্থানে ফোলা



২. রক্তক্ষরণ



৩. চোখের উপরের পাতা বুজে আসা



৪. কম ও কালো প্রস্রাব

১ ক. বিষধর সর্পদংশনের গুরুত্বপূর্ণ উপসর্গ

১. দংশিত স্থান দ্রুত (তাড়াতাড়ি) ফুলে যাওয়া।

২. সর্পদংশনের প্রাথমিক চিকিৎসা: যা করবেন



১. সাপে কাটলে দংশিত অঙ্গ বিশ্রাম বা নিশ্চল করে রাখুন



২. সাপে কামড়ালে মোটর যানে রোগীকে দ্রুত হাসপাতালে নিন



৩. দংশিত সাপ সনাক্তকরণ

২ ক. সর্পদংশনের প্রাথমিক চিকিৎসা: যা করবেন

আশ্বস্তকরণ- শান্ত থাকুন

১. দংশিত অঙ্গ নড়াচড়া করা যাবে না
(বিশ্রাম/অচল করা, স্প্লিন্ট দিয়ে)

৩. সর্পদংশনের প্রাথমিক চিকিৎসায় যা করবেন না

ক. 

সাপে কাটলে ভয় পাবেন না

সাপে কাটলে বমি করাবেন না
কথা বলতে অসুবিধা হলে খেতে দিবেন না



খ.

গ. 

সাপে কাটা স্থানের উপরে গিঁট দিবেন না

সাপে কাটা স্থানে কাটা-ছেঁড়া করবেন না



ঘ.

ঙ. 

'ওঝা'/বৈদ্যের চিকিৎসা নিবেন না

৩ ক. সর্পদংশনের প্রাথমিক চিকিৎসায় যা করবেন না

ক. ভয় পাবেন না, সর্পদংশনের চিকিৎসা আছে।

খ. বমি করানোর চেষ্টা করবেন না। কথা বলতে অসুবিধা হলে খেতে দিবেন না।

৪. কিভাবে সর্পদংশন এড়ানো যায়



রাতে সাবধানে হাঁটা ও আলো, লাঠি, বুট ব্যবহার





রাতে ঘুমানোর সময় চৌকি-মশারী ব্যবহার

সাপের কামড় থেকে বাঁচতে শোবার ঘর
প্রাণী ও শস্য সামগ্রী মুক্ত রাখা





বাড়ীর চারপাশ পরিস্কার রাখুন
সাপের কামড় থেকে বাঁচুন

৪ ক. কিভাবে সর্পদংশন এড়ানো যায়

১. সাবধানে হাঁটা: আলো-লাঠি, বুট। ঘাসের মধ্যে কিংবা ঝোপ-ঝাড়ের ভিতর আপনাকে যদি হাঁটতে হয় তাহলে খুব সাবধানে হাঁটুন ও লম্বা জুতা কিংবা বুট জুতা পরুন। গর্তের মধ্যে হাত-পা ঢুকাবেন না।

২. চৌকি-মশারী: ঘুমের সময় বিশেষ সাবধানতা অবলম্বন করুন-খাটের উপর ঘুমাবেন, মশারী ব্যবহার করুন, মেঝেতে ঘুমাবেন না। মশারী তোশকের নিচে ভালো করে গুঁজে দিন।

৩. বসতবাড়ী: প্রাণী ও শস্য সামগ্রী মুক্ত, শোয়ার ঘরে মুরগী/শস্য রাখবেন না। শোয়ার ঘরের সাথে খাবার যেমন-ধান-চাল, হাঁস-মুরগী, কবুতর রাখবেন না। এসব ইঁদুরকে আকর্ষণ করে যার খোঁজে সাপ ঢুকতে পারে।

৪. বাড়ীর চারপাশ পরিষ্কার: আঙ্গিনা ময়লা-আর্বজনা মুক্ত রাখুন। বাড়ী ও চাষ করার জমির মধ্যে দূরত্ব রাখুন।

৫. শস্য পাহারা-সাবধানতা: রাতের বেলায় শস্য, ফলের বাগান কিংবা মাছ পাহারা দেওয়ার সময় মাটিতে কিংবা মাচায় ঘুমানোর বা শোয়ার ব্যাপারে বিশেষ সাবধানতা অবলম্বন করুন।

৬. মাছ ধরার সাবধানতা: মাছ ধরার সময় 'চাঁই' বা জালের মধ্যে হাত দেওয়ার আগে সাপ আছে কিনা দেখে নিন।

৭. স্তূপাকৃত/জমাকৃত সামগ্রী সাবধানে নাড়াচাড়া করুন। পতিত গাছ, লগ, জ্বালানী লাকড়ি, খড়, ইট, উইয়ের ঢিপি সরানোর সময় বিশেষ সাবধানতা অবলম্বন করুন।

৮. গর্তে হাত না দেয়া। সাপ বসত বাড়ীর গর্তে বা ফাটলে লুকিয়ে থাকতে পারে কাজেই এগুলো যত দ্রুত সম্ভব মেরামত করুন।

৫. বাংলাদেশের কিছু বিষধর সাপ



গোখরা/কোবরা



চন্দ্রবোড়া/রাসেলস্ ভাইপার



শঙ্খিনী/শাঁকিনী



সবুজবোড়া বা বাশবোড়া

৫ ক. বাংলাদেশের কিছু গুরুত্বপূর্ণ বিষধর সাপ

১. গোখরা বা কোবরা- ফণা তোলে এবং ফোস ফোস শব্দ করে। ইঁদুর খেতে বাড়ি-ঘরের আশে পাশে আসে।

২. চন্দ্রবোড়া/উলুবোড়া (রাসেলস্ ভাইপার)- শরীরে গোল গোল চাক বা শিকলের মতো ছাপ থাকে। চাষের জমি বা বাড়ী-ঘরের আশে পাশের জঙ্গলে থাকতে পারে।

৩. শঙ্খিনী বা শাঁকিনী গায়ে হলুদ ও কালো ডোরা কাটা থাকে। লাকড়ির স্তূপ ও ছোট জঙ্গলে থাকতে পারে, খাবারের খোঁজে রাতে বসত ঘরে ঢুকতে পারে।

৪. সবুজবোড়া, বাঁশবোড়া/গাল টাউয়া- গায়ের রং সবুজ ও মাথা তিন কোনাচ্চা। সাধারণত গাছে ঝোপ-ঝাড়ে থাকে।

৬. বিষধর সর্পদংশনের সফল চিকিৎসা আছে

চিকিৎসার আগে



চিকিৎসার পরে



সর্পদংশন প্রতিরোধ করুন, নিকটস্থ হাসপাতালে দ্রুত চিকিৎসা নিন, জীবন বাঁচান।
উপজেলা হাসপাতালে বিষধর সর্পদংশনের ঔষধ এন্টিভেনম ও অন্যান্য বৈজ্ঞানিক চিকিৎসা আছে।

৬ ক. বিষধর সর্পদংশনের সফল চিকিৎসা আছে

১. চিকিৎসার আগে- মারাত্মক অসুস্থ, প্যারালাইসিস

২. চিকিৎসার পরে- সম্পূর্ণ সুস্থ (হাসি মুখ)

সর্পদংশন প্রতিরোধ করুন, নিকটস্থ হাসপাতালে দ্রুত চিকিৎসা নিন, জীবন বাঁচান।
উপজেলা হাসপাতালে বিষধর সর্পদংশনের ঔষধ এন্টিভেনম ও অন্যান্য বৈজ্ঞানিক চিকিৎসা আছে।

অন্যকে জানান



আপনাদের সবাইকে আন্তরিক ধন্যবাদ।

We Developed the leaflet on 'Prevention of Snakebite and Emergency First Aid'



বাংলাদেশের কিছু বিষধর সাপ



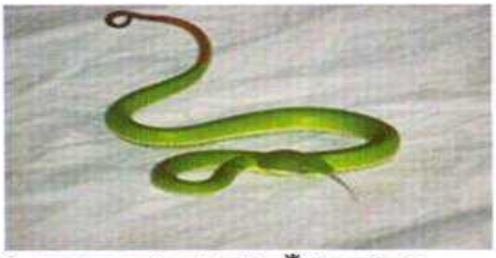
১. গোখরা বা কোবরা



২. চন্দ্রবোড়া বা রাসেলস্ ভাইপার



৩. শঙ্খিনী বা শাঁকিনী



৪.সবুজবোড়া বা বাঁশবোড়া

বাংলাদেশের কিছু গুরুত্বপূর্ণ বিষধর সাপ

১. গোখরা বা কোবরা- ফণা তোলে এবং ফোস ফোস শব্দ করে। ইঁদুর খেতে বাড়ি-ঘরের আশে পাশে আসে।

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৩. শঙ্খিনী বা শাঁকিনী গায়ে হলুদ ও কালো ডোরা কাটা থাকে। লাকড়ির স্তুপ ও ছোট জঙ্গলে থাকতে পারে, খাবারের খোঁজে রাতে বসত ঘরে ঢুকতে পারে।

৪. সবুজবোড়া, বাঁশবোড়া/গাল টাউয়া- গায়ের রং সবুজ ও মাথা তিন কোনা চ্চা। সাধারণত গাছে ঝোপ-ঝাড়ে থাকে।

Here is some Snakebite Victim's Case Summary

Snakebite Victim Case Summary-1

(Antivenom was administered) (within the study area)

Patient Name: "SA, Age: 32 years, Village: Rojopara, Union: Tiakhali, Upazila: Kalapara, District: Patuakhali. Patient Mobile No: 01719914110, Date and Time of Snakebite: 21.06.2024, 06.45 PM.

"SA", was bitten by a snake on her fingers on June 21, 2024, at 06.45 pm while working on the cow fence near the wooden house. The sky was cloudy at the time, and she couldn't identify the snake. Immediately after the bite, her mother-in-law provided first aid by applying three ligatures above the bite site. She was then taken to Kalapara Upazila Health Complex (UZHC) in a battery-operated auto, reaching the hospital 30 minutes later. Upon arrival, she experienced swelling at the bite site, drowsiness, and dizziness. The duty doctor administered 10 vials of antivenom. After initial treatment, she was referred to Patuakhali District Hospital for further care. The transfer from Kalapara UZHC to Patuakhali District Hospital took an hour. At the district hospital, she received the same treatment and, after staying there for 11 hours, recovered and was discharged. The total cost of her treatment was approximately 5000 TK.

The patient credited her quick recovery to the timely hospital treatment and her prior awareness about snakebite care, which she gained from an awareness poster, a community meeting (UthanBaitokh), and information provided by her son's school teacher. This knowledge led her to seek immediate medical help rather than consulting a traditional healer (Ojha). Thanks to the proper and timely treatment, she made a full recovery and is now living a healthy life.

Snakebite Victim Case summary-2

(Antivenom was administered) (within the study area)

Patient Name: "SA", Age: 25, Village: Pachbunia, Union: Lalua, Upazila: Kalapara, District: Patuakhali. Patient Mobile No: 01317820659, Date and Time of Snakebite: 26.06.2024, 10.00 AM.

"SA" experienced a snakebite on her left hand while gathering wood in the woodshed on June 26, 2024, at 10:00 AM. The sky was overcast at the time of the incident, and the victim was unable to identify the snake. Following the bite, she received immediate first aid from her husband, who applied two ligatures above the bite site. After that, she was transported by motorbike to the Kalapara Upazila Health Complex (UZHC) for further treatment. The journey from her home to the hospital took about 30 minutes.

Upon arrival at the UZHC, "SA" exhibited mild swelling at the bite site, along with drowsiness and dizziness. In response to these symptoms, the attending physician administered 10 vials of antivenom. After initial treatment, she was referred to Patuakhali District Hospital for additional care. "SA" spent 40 minutes at the Kalapara UZHC before being transported to Patuakhali District Hospital by ambulance, which took approximately one hour.

At Patuakhali District Hospital, she received the same treatment as before and remained there for 24 hours before making a full recovery and returning home. The total cost of her treatment was estimated at 13,000 Tk. Currently, "SA" is living a healthy life.

"SA" mentioned that she had not encountered any awareness posters regarding snakebites, nor had she participated in courtyard meetings, public events, or health education programs at the community clinic. However, with the assistance of the Chairman of Lalua Union, she learned about the availability of proper snakebite treatment at the hospital. This knowledge led her to bypass traditional healers and go directly to the hospital for prompt treatment. Thanks to the timely and effective care she received, "SA" made a swift recovery and returned home.

Snakebite Case summary-3

(Antivenom given) (within study area)

Patient Name: "K", Age: 48, Village: Pakhipara, Union: Baliatali, Upazila: Kalapara, District: Patuakhali. Patient Mobile No: 01771882538, Date and Time of Snakebite: 03.07.2024, 05.00 PM.

On July 3, 2024, at 5:00 PM, "K" was bitten by a snake on her leg while wading through the water in a wetland (beel). The sky was cloudy at the time, and she was unable to identify the snake. After the bite, she immediately administered first aid by tying two knots above the bite area herself. She was then transported by motorbike to the Kalapara Upazila Health Complex for further treatment, arriving at the hospital 30 minutes after the incident. Upon arrival, the bite area was swollen, and the attending doctor administered 10 vials of antivenom.

After receiving initial treatment, she was referred to Patuakhali District Hospital for further care. She remained at the Kalapara Health Complex for 30 minutes before being transferred by ambulance to Patuakhali District Hospital, which took an hour to reach. At Patuakhali District Hospital, she received the same treatment and stayed there for three days, after which she recovered and was discharged. The total cost of her treatment was approximately 10,000 Tk. Upon discharge, the doctor prescribed "Fluclox" to be taken every six hours for seven days. Currently, she is living a healthy life.

"K" mentioned that she had no prior exposure to awareness posters about snakebites, nor did she attend yard meetings, public events, or health education programs at community clinics. However, she knew from her neighbors that hospitals provide snakebite treatment, so she did not seek help from a traditional healer (Ojha). Instead, she promptly went to the hospital by motorized vehicle and received timely and proper treatment, which led to her quick recovery and return home.

Snakebite Victim Case Summary-4

(Antivenom given) (outside study area)

Patient Name: "CB", Age: 50, Village: Islampur, Upazila: Amtali, District: Barguna. Patient Mobile No: 01760-777709, Date and Time of Snake Bite: 22.06.2024, 08.00 PM.

On June 22, 2024, at 8:00 PM, "CB" was bitten on her leg by a snake while walking in the courtyard of her home. The weather conditions were normal at the time of the incident. "CB" identified the snake as a "JatiSaap," the local term for Cobra. Following the snakebite, she received prompt first aid from a neighbor, who applied two bandages to the bite area. Afterward, "CB" was rushed to the Kalapara Upazila Health Complex (UZHC) by motorcycle, a journey that took about 30 minutes from her home.

Upon her arrival at the hospital, "CB" presented with swelling at the bite site, drowsiness, and dizziness. The attending physician promptly administered 10 vials of antivenom in response to her condition. Although she was advised to go to the Patuakhali District Hospital for further treatment, "CB" felt sufficiently well to return home instead of visiting the district facility. She spent a total of 90 minutes at Kalapara UZHC, during which her treatment costs were approximately 500 TK.

"CB" also mentioned that living outside the study area limited her access to snakebite awareness programs. However, she learned about the possibility of snakebite treatments in hospitals through mobile social media, which prompted her to go directly to the hospital rather than seek help from traditional healers (Ozha). Thanks to the timely medical care she received, "CB" made a quick recovery and was able to return home.

Snakebite Victim Case summary-5

(Antivenom was administrated) (within the study area)

Patient Name: "US", Age: 21, Village: Char Dhulasar, Union: Dhulasar, Upazila: Kalapara, District: Patuakhali. Patient Mobile No: 01712966425, Date and Time of Snakebite: 08.08.2024, 07.30 AM.

On August 8, 2024, at 7:30 AM, "US" was bitten by a snake on her hand while gathering wood for cooking in the kitchen. It was raining at the time, and she recognized the snake as a "guiapora" (Russell's viper). Immediately after the snakebite, her father-in-law administered first aid by applying three tourniquets above the bite area. She was then taken to Kalapara Upazila Health Complex (UZHC) on a motorcycle, which took 60 minutes from her residence.

Upon arrival at the hospital, "US" presented with the symptoms of drowsiness and significant swelling around the bite area. The attending doctor, noting these symptoms, administered 10 vials of antivenom. After initial treatment, she was referred to Patuakhali District Hospital for further care. She stayed at Kalapara UZHC for 30 minutes before being transferred by ambulance to Patuakhali District Hospital, a journey that took 1 hour. After a one-day stay at Patuakhali District Hospital, during which she received the same treatment, "US" was advised to go to Dhaka for further care. However, she chose to return home instead. The total cost of her treatment was approximately 20,000 Tk.

Currently, "US" is living a relatively healthy life. She mentioned that she was not aware of snakebite awareness posters, courtyard meetings, public events, or health education programs at community clinics. However, she learned through social media on her mobile phone that proper snakebite treatment is available at the hospital. As a result, she did not consult a traditional healer (Ojha) and promptly went to the hospital in a motor vehicle. Thanks to timely and appropriate treatment, she recovered quickly and returned home.

Snakebite Victim Case summary-6

(antivenom given) (within study area)

Patient Name: "F", Age: 45, Village: Tiakhali, Union: Tiakhali, Upazila: Kalapara, District: Patuakhali. Patient Mobile No: 01741377855, Date and Time of Snakebite: 16.07.2024, 08.00 am.

On the morning of July 16, 2024, at 8:00 AM, "F" was bitten by a snake on his leg while going to the toilet. The sky was cloudy at the time, and he was unable to identify the snake. Immediately after the bite, his son administered first aid by applying two ligatures (knots) above the bite site. "F" was then transported to Kalapara Upazila Health Complex (UZHC) in a battery-operated auto. It took 30 minutes to reach the hospital from his residence.

Upon arrival, "F" exhibited symptoms such as nausea and dizziness. Based on the symptoms, the duty on doctor was required to administer 10 vials of antivenom. After receiving initial treatment, "F" was referred to Patuakhali District Hospital for further care. He stayed at Kalapara UZHC for 15 minutes before being transferred by ambulance to Patuakhali District Hospital, a journey that took 1 hour. At Patuakhali District Hospital, he received continued treatment and was discharged after two days, having fully recovered. The total cost of his treatment was approximately 10,000 Tk. "F" is currently living a healthy life.

"F" mentioned that he had no prior opportunity to view snakebite awareness posters, attend courtyard meetings, public events, or health education programs at community clinics. However, he had heard from another snakebite survivor in his area who had successfully received hospital treatment. Knowing that hospitals provided effective snakebite treatment, he decided not to consult a traditional healer (Ojha) and instead went directly to the hospital by motor vehicle. His quick recovery was due to the timely and appropriate treatment he received at the hospital.

Snakebite Victim Case summary-7

(antivenom given) (within study area)

Case 7: SB, a 35-year-old male businessman presented to Upazilla Health Complex (UZHC), Kalapara, district Patuakhali (Dhaka Medical College Hospital) ? 3 hours after bite by Russell's viper while walking in a paddy field. The bite occurred at approximately 6.40 pm and resulted in a clear fang mark and bleeding from his leg. Then, he was quickly taken to a traditional healer ('Ohza') who applied a tight round band around his right great toe and attempted bleeding using thorn of flower plant for expulsion of venom toxin.Due to the absence of any noticeable improvement over time, the patient was taken to the UZHC within a few hours.

Throughout this duration, the swelling in the leg of the patient persisted,and was accompanied by continuous pain. At the UZHC, the attending doctors conducted a thorough examination, administered tetanus toxoid, performed 20 WBCT which was found positive and referred the patient to the district hospital for further treatment. After an approximate 8-hour journey, the patient arrived at Patuakhali District Hospital where the initial dose of 10 vials of polyvalent anti-venom (prepared against venoms of binocellate cobra, common krait, Russell's viper, and saw scaled viper of South India) was administered with pre-medication with 0,25 ml adrenaline sub cutaneously and the antivenom was completed without any untoward reaction. Concurrently, wound care and third-generation cephalosporin were initiated.

Upon examination, the attending doctors noted the patient's agitation, icteric appearance, and progressively increasing extensive swelling in the bitten leg, extending up to the mid-thigh. Since there was no significant improvement observed in the overall condition of the patient, a second dose of anti-venom treatment was administered. Considering the lack of progress/improvement, the medical team at the district hospital recommended admission to Dhaka Medical College Hospital (DMCH), Dhaka. Upon admission, the patient received symptomatic management, and a third dose of anti-venom was administered. There was limited capacity of investigations at UZHC and DH and there was no facility for intensive care.

During admission at DMCH, the patient was icteric, semiconscious, and had very low urine output. The laboratory investigations showed a hemoglobin level of 12.7 g/dl, a total leukocyte count of 33,300/mm3 with a normal differential count, and a platelet count of 6000/mm3. Both serum creatinine and urea were high, at 6.09 mg/dl and 160 mg/dl, respectively. In addition, fibrinogen was 257 mg/dl, procalcitonin was >200, D-dimer level was 17.38, FDP was 109.48 and serum CPK was 3999 U/L. His troponin level was 0.12 ng/dl, INR was 1.2, APTT was 30.9 and PT was 14.0. Serum bilirubin was found to be 9.30 mg/dl, with the predominant indirect bilirubin measuring 6.4 mg/dl, LDH 518 U/L and serum alkaline phosphate 46.7 U/L. level of serum albumin was 2.7 g/dl..

Due to the rapid development of coagulopathy, decline in renal function, and multiorgan involvement, the patient was shifted to the ICU and started on dialysis. Initially, improvement was very slow, and at 08 days after the bite, the patient developed hematuria and pancytopenia with respiratory distress, and endotracheal intubation was performed based on immediate action along with other standard care.

He received a total of four doses of antivenom and underwent seven sessions of dialysis, 6 units of fresh frozen plasma, 5 units of platelet transfusions and 3 units of whole blood transfusion. After seven days of mechanical ventilation and aggressive treatment, the patient's laboratory reports returned to normal, and he became clinically stable. After 26 days of hospitalization, he was discharged with advice to home with no residual disabilities.

Outcome of the patient: The patient survived with no residual disabilities. He was on periodic regularly follow up with the taem at the UZHC Kalapara and with specialists over the telephone and take necessary advice on regular fashion.

Identification of the snake: Russell viper snake is also known as the 'Guiyaporaa snake' in the local language at Kalapara. The snake was not killed and allowed to escape. The patient and their companion accurately identified the snake. After admission, a different snake sample was presented to them, and it was correctly recognized, thus confirming the presence of a Russell's viper.

List of SOPs Snakebite:

Field SOPs- Bengali:

১. সর্পদংশনের প্রাথমিক চিকিৎসা, প্রতিরোধ ব্যবস্থা, দ্রুত হাসপাতালে প্রেরণ বিষয়ক কমিউনিটি ক্লিনিক ভিত্তিক স্টেকহোল্ডার সভা।

২. সর্পদংশনের প্রাথমিক চিকিৎসা, প্রতিরোধ ব্যবস্থা, দ্রুত হাসপাতালে প্রেরণ বিষয়ক কমিউনিটিতে 'উঠান বৈঠক' অনুষ্ঠান।

৩. মটর বাইক/মটর যানবাহন ফোন সরবরাহ ('উঠান বৈঠকসহ সব জায়গায়)।

৪. স্কুল/কলেজ ভিত্তিক সর্পদংশন প্রতিরোধ, প্রাথমিক চিকিৎসা ও দ্রুত হাসপাতালে নেওয়া বিষয়ক স্কুল ক্লাস/সেমিনার/ সিম্পোজিয়াম।

৫. সিএইচসিপি কর্তৃক প্রতি ২ সপ্তাহে কমিউনিটি ক্লিনিকে স্বাস্থ্য শিক্ষা।

৬. পরিবহন চালক কে রোগীর যাতায়াত ভাড়া প্রদান, উপজেলা কলাপাড়া।

৭. সর্পদংশন রেজিষ্টার ও ফরম পুরণ উপজেলা কলাপাড়া/শিবগঞ্জ।

৮. স্কুল সেমিনার/ক্লাস (কমপক্ষে ৩টি)।

৯. শিক্ষা প্রতিষ্ঠান প্রধান ও শিক্ষকদের সাথে সেমিনার।

১০. সর্পদংশন প্রতরিোধ, প্রাথমিক চিকিৎসা ও দ্রুত হাসপাতালে নেওয়া বিষয়ক বয়াতি গান ও নাটিকা

List of SOPs: Snakebite (Clinical):

1. How to quickly assess the patient of snakebite
2.Blood pressure measurement
3. Respiratory Rate Measurement
4. Weight Measurement
5. Tympanic Temperature Measurement
6. How to detect ptosis
7. How to detect external ophthalmoplegia
8. How to detect paralysis
9. How to detect 'broken neck sign'
10. How to perform 20 MWBCT
11. How to identify the indication of giving antivenom
12. How to give antivenom
13. Subcutaneous adrenaline as a prophylactic
14. How to identify early AV reaction Anaphylaxis
15. How to treat anaphylaxis
16. How to diagnose pyrogenic reaction
17. How to treat pyrogenic reaction
18. Neostigmine and atropine in neurotoxic
19. Patient of snakebite is brought dead
20. How to identify that the patient is dead
21. How to declare that the patient is dead
22. Respiratory support- intubation and Ambo bag
23. Transfer the patient to higher centre with respiratory support.