



REPORT

SNAKEBITE IN KENYA: EVIDENCE FROM THE FIELD

Research data from 2019 – 2020

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1 BACKGROUND

Globally, it is estimated that 138,000 people die annually and more than 400,000 become disabled by snakebite envenoming.¹ In sub-Saharan Africa, up to 32,000 snakebite deaths and 6,000 amputations are reported every year. However, these numbers are believed to highly underestimate the actual burden.^{2,3}

Snakebite can have a considerable impact on peoples' lives – it can lead to death, disability and psychological distress.³ It mostly affects people living in rural regions, who often work in the agricultural sector as farmers or herders.^{2,3,4}

The economic burden from snakebite envenoming in sub-Saharan Africa is under-researched and largely unknown. However, a socio-economic analysis of snakebite in Sri Lanka found that, annually, snakebite costs the government over \$10 million—and victims \$4 million—despite free healthcare in the country.⁵ This can push families into a downward spiral, when the breadwinner of the family is deceased or permanently disabled after the snakebite, and when high treatment costs force families into debt.^{3,6,7}

Despite the high burden, effective treatment of snakebite envenoming is generally scarce in sub-Saharan Africa. Antivenoms are hardly available or are ineffective despite being the only proven effective medical treatment for snakebite envenoming. It is estimated that only about 2% of snakebite victims in sub-Saharan Africa receive the antivenom they need.^{3,6,8} The lack of antivenom—in combination with traditional beliefs—leads to the consultation of traditional healers, even though they provide ineffective or adverse treatment, which can worsen the effects of snakebites on the patient's health.^{2,3}

To improve the situation for snakebite patients, research on the availability of affordable, effective and safe antivenoms, training of healthcare workers, and awareness among communities is needed. As part of its Snakebite Programme, Health Action International (HAI) is developing an evidence base on snakebite in Kenya. Our research findings will inform HAI's capacity-building efforts in communities and provide county-level and national health authorities with reliable up-to-date evidence to intensify resources and policy reforms.

This report provides the results of the research conducted in Kenya in 2019 and 2020, and will be shared with county and national level policy makers and snakebite experts, as well as community leaders and community members through various engagement sessions for dissemination and education. We aim for the findings to inform evidence-based advocacy and decision making through the adoption of our recommendations to support policy implementation, as well as to contribute to behaviour change among communities, so they take effective prevention, first aid, and treatment-seeking measures in the event of a snakebite.

2 METHODS

HAI has surveyed multiple levels of the Kenyan healthcare system to create a clearer picture of community beliefs on snakes and snakebites, snakebite incidents, snakebite patient profiles, health-seeking behaviour, availability and affordability of snakebite treatment commodities, and healthcare worker knowledge on snakebite management. Data was collected through three different studies.

Snakebite Household Survey

Data on community beliefs and perceptions surrounding snakes and snakebites, snakebite prevalence, and health-seeking behaviour after a snakebite was collected through a household survey. The household survey was conducted among 399 households in Kajiado (100), Kilifi (101), Kwale (98), and Taita Taveta (100) counties. Data was collected between February 2020 and August 2020.

Snakebite Focus Group Interviews

Three focus group interviews each were held with community members in Kajiado and Kilifi counties to gain in-depth insights through into their beliefs and perceptions on snakebites, as well as their health-seeking behaviour and the impact of snakebites through their personal experiences. The focus group interviews were held in November 2019.

Snakebite Healthcare Worker Survey

A survey was conducted among healthcare workers working in public, private and mission sector health facilities. Information collected included healthcare workers' experiences and views on snakebite patients' profiles, most common activities performed at time of the snakebites, the number of snakebite cases over the previous twelve months, availability and stock-outs of antivenoms, and the treatment regimen for snakebite patients.

Healthcare workers were surveyed from 145 facilities in six counties: Kajiado, Kilifi, Kirinyaga, Kwale, Nyandarua, and Taita Taveta. Participants worked in the public (104), private (23) and mission (18) sectors, from both urban (25) and rural (119) areas. The survey was conducted between March and November 2019.



One of the surveyed healthcare workers.

Snakebite Commodities: Measuring Prices, Availability and Affordability

HAI adapted the HAI-WHO methodology, Measuring Medicine Prices, Availability, Affordability and Price Components⁹ to generate reliable information on the availability, affordability and stock-outs of selected commodities important for the treatment of snakebite. A total of 49 commodities were included in the tool. Commodities included were antivenoms, antibiotics, analgesics, antihistamines, fluids and medical devices.

The research was conducted in July and August 2020, and included 133 health facilities from the public (85), private (36) and mission (12) sectors, from both urban (42) and rural (91) areas. The same six counties were surveyed in the commodities research as for the healthcare worker survey.

3 RESULTS

KEY TAKEAWAYS

Our research found:

1. a high number of snakebites in surveyed communities with no system in place for cases to be collected and recorded;
2. that snakebite patients are predominantly bitten in the lower limb;
3. that snakebite patients were often at a young working age, and were often either walking or farming at the time of the incident;
4. that half of those bitten lost their jobs as a direct result of a snakebite, while some also experienced economic consequences, such as debt;
5. that communities often sought multiple types of treatment for snakebite;
6. that traditional healers are commonly consulted;
7. that supportive treatment was most commonly provided by healthcare workers, consisting of pain management and anti-inflammatories;
8. that trust is high in the effectiveness of medicines, including antivenoms;
9. that antivenom was available at one-third of surveyed facilities;
10. that antivenom in the private and mission sectors was unaffordable;
11. that stock-outs of commodities were relatively common, especially in the public sector;
12. that the majority of healthcare workers have not been trained in snakebite management;
13. that the majority of healthcare workers believed their health facility did not have the necessary equipment and medicines to treat and manage snakebites.

IN THE COMMUNITY

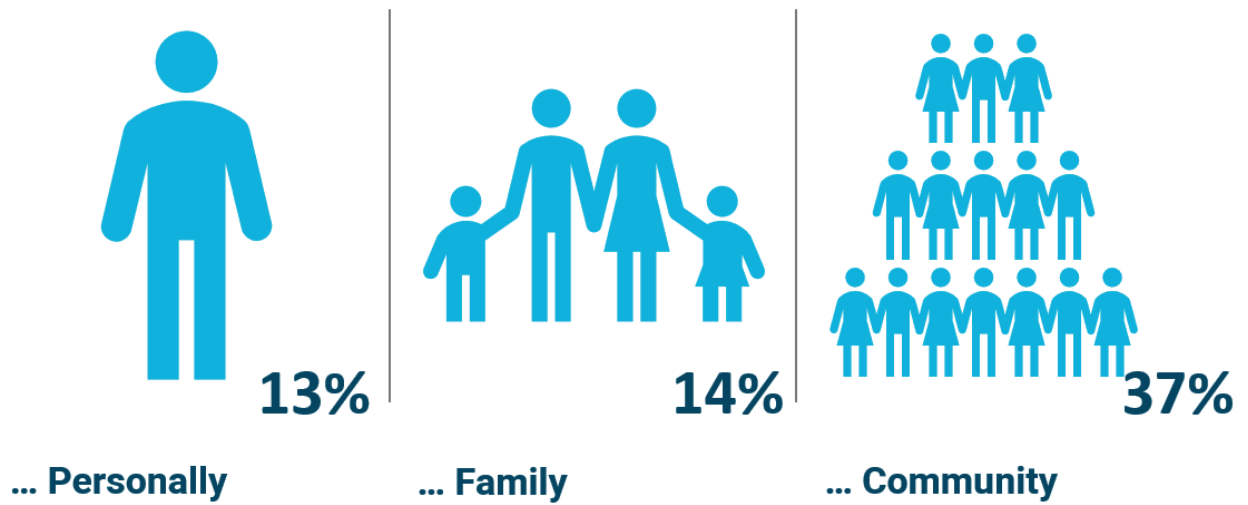
BACKGROUND INFORMATION

| COMMUNITY SURVEY | FOCUS GROUP INTERVIEWS |
|--|---|
| <p>399 people surveyed Average of 4.0 children in household Occupation: Farmer (39%), unemployed (21%), shop keeper/service worker (12%), herder (6%), business owner (6%), other (16%). Average household income/mth: 14342.1 KSH (130.9 USD). Average household living expenses/mth: 8372.8 KSH (76.4 USD) Average household health expenditure/mth: 1964.6 KSH (17.9 USD)</p> | <p>50 people interviewed. Three focus groups in Kajiado, three focus groups in Kilifi. 13 personally bitten, 36 knew someone who had been bitten.</p> |

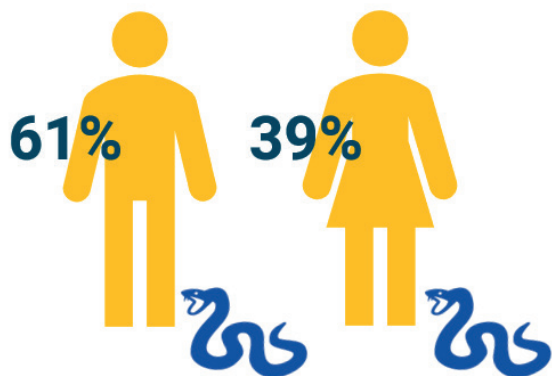
Of the 339 surveyed respondents, 51 (13%) had personally been bitten by a snake, while 55 (14%) knew a family member and 145 (37%) knew a community member who had ever been bitten by a snake. Of the 51 respondents bitten themselves,

61% were male and 30% were bitten when aged 31–40 years. The majority of respondents who were personally bitten were bitten in the foot (47%) or leg (37%) and were most often walking (40%) or farming (26%) when the bite occurred.

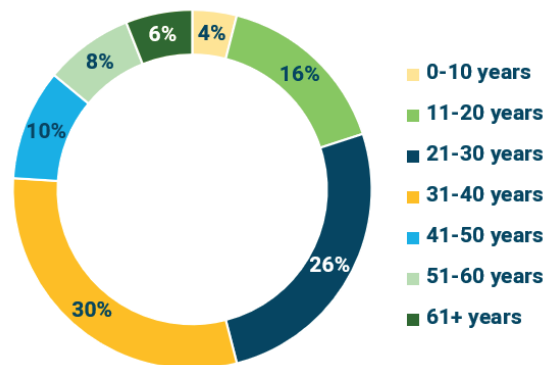
Bitten by a Snake...



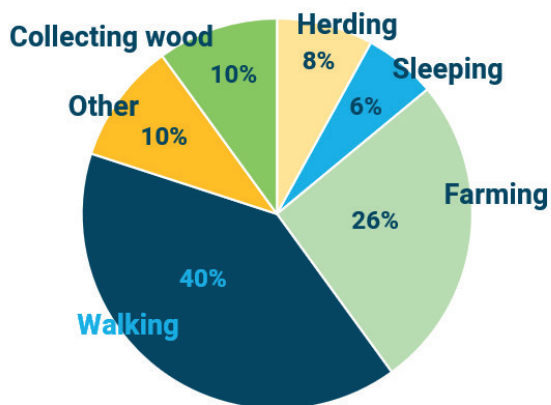
Sex of Patient



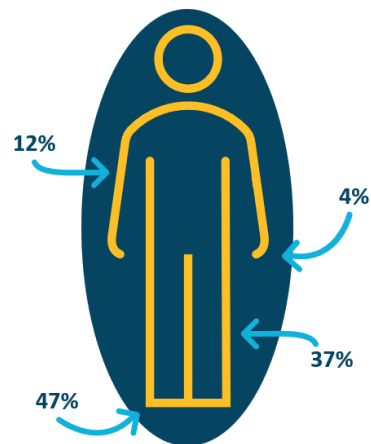
Age when Bitten



Activity at Time of the Bite



Body Part Bitten



Health Seeking Behaviour and Health Outcomes

Fifteen of the 51 (29%) who personally experienced a snakebite went to a traditional healer, 30 (59%) went to a health facility, and six (12%) went to both. When treated by a traditional healer, the methods used were:

- Black stone and healing plants (57%)
- Sucking the venom from the bite (43%)
- Cutting the wound (24%)

All these methods are ineffective in treating snakebite.

“As first aid we tied above the bitten part to prevent flow of poison, and cut the area and placed the black stone. The stone (...) helped a lot by sucking the poison. Later he was taken to hospital, but the first aid was so helpful. The stone fell off after 40 minutes and had sucked all the poison and he felt okay.”

– Focus Group Participant, Kajiado

Reasons given about why the traditional healer was visited were because it was conveniently close-by and the health facility was far away, and because it was cheaper to go to a traditional healer.

Antivenom (44%), antibiotics (38%), painkillers (29%), and tetanus toxoid (24%) were the medicines most often provided to patients at health facilities. 18% of patients were referred to other facilities.

“I took my wife and brought her to the local dispensary on a motorbike. The doctors said that there was no medicine to treat her but did first aid on her, then an ambulance took us to the district hospital. We arrived at around 16.15 and were again told that there is no medicine to treat her. As we were inquiring where we would get the medicine, at around 17.00, she passed away.”

– Focus Group Participant, Kilifi

Of the 51 snakebite patients, 96% made a full recovery. Respondents who had a family member with a snakebite indicated that 82% made a full recovery, 4% have a permanent disability, and 14% died. When asked about the most common health

outcome of community members that had been bitten, 83% indicated a full recovery, 7% indicated they were often left with a permanent disability, and 8% indicated that death was often the most common outcome.

Economic and Social Consequences

Of the 51 respondents who had been bitten by a snake:

- 39% lost income due to the snakebite.
- 59% were unable to do the same job as before the snakebite.
- 22% went into debt because of the snakebite.
- 53% were unable to pay the hospital bills for the treatment.
- 6% felt they were looked at differently or socially excluded in the community because of the snakebite.

“It has affected my life as I cannot walk for long distances. It affected my sewing business too as I only use one leg when sewing.”

– Focus Group Participant, Kajiado

Community Perceptions and Beliefs

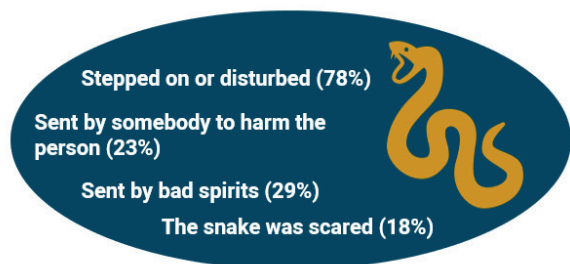
All respondents were asked about their perceptions and beliefs on snakes and snakebites. They shared their beliefs on why snakebites happen, how to prevent a snakebite, and what to do after a snakebite.

They believed that snakebites happen because the snake was stepped on or disturbed, it was scared, it was sent by somebody to harm the person or because it was sent by bad spirits. They believed wearing shoes, carrying a light in the dark, ensuring no snakes can enter the house, and not hurting or touching a snake when you see it are ways to prevent snakes from biting. They also—wrongly—believed that killing a snake when you see it is a preventative measure.

“We believe in Masai that it does not just bite you. There must be a reason. This could be due to differences in the community, for example quarrels with an elder, neighbour, etc. Because at times we stay with them, yet they don't bite us. At times they just pass on without biting.”

– Focus Group Participant, Kajiado

Community Beliefs on why Snakebites Happen



“I have witnessed a situation where the witch doctor was involved. He cut the victim’s skin and then told the people to cover the victim, he would return but he delayed, and the victim died. He was a very trusted witch doctor so from then on if anyone is bitten, the person will go to the hospital.”

– Focus Group Participant, Kilifi

The community members indicated that if they got bitten by a snake, **52%** would use traditional first aid methods, **18%** would visit a community health worker, and **85%** would go to a health facility. Traditional healing would be sought by **6%** of the respondents.

When asked to specify the type of traditional first aid they would use, **79%** of the community members would use a tight bandage, **47%** would make use of a black stone, **24%** would make cuts around the bite, and **9%** would wash the wound.

Community Beliefs on how to Prevent a Snakebite



Wear shoes if you go out (50%)



Carry a light if you go out in the dark (45%)



Make sure snakes cannot enter the house (25%)



If you see a snake, do not hurt or touch it (23%)



If you see a snake, try to kill it (21%)

All these methods are ineffective in treating snakebites, and might even be potentially harmful.

Almost all community members (**91%**) believed that medicines are an effective treatment for snakebite, while **10%** of the communities also believed in traditional treatment. When asked about which medicines specifically would work for the treatment of snakebite, **60%** mentioned antivenom, **39%** mentioned antibiotics, and **32%** mentioned pain killers.

IN THE HEALTH FACILITY

| BACKGROUND INFORMATION | |
|--|--|
| HEALTHCARE WORKER SURVEY | COMMODITIES RESEARCH |
| <ul style="list-style-type: none"> • 144 healthcare workers surveyed • 103 public-, 23 private-, 18 mission sector • Urban (25) and rural (119) facilities • Dispensary (67), health centre (52), (sub-) county hospital (24), and referral hospital (1) • Kajiado (23), Kilifi (24), Kirinyaga (25), Kwale (24), Nyandarua (24), Taita Taveta (24) | <ul style="list-style-type: none"> • 133 health facilities surveyed • 85 public-, 36 private-, 12 mission sector • Urban (42) and rural (91) facilities. • Dispensary (22), health centre (76), (sub-)county hospital (16), and referral hospital (19) • Kajiado (22), Kilifi (24), Kirinyaga (21), Kwale (24), Nyandarua (20), Taita Taveta (22) |

Of the 145 health facilities, 108 kept track of snakebites in records. Of these facilities, 69 had recorded at least one snakebite in the previous 12 months. In total, 801 snakebites were recorded, with the highest number of snakebites recorded in one facility being 76.

Snakebites per County*

KAJIADO: 191 snakebites in 23 facilities.

KILIFI: 99 snakebites in 12 facilities.

KIRINYAGA: 53 snakebites in 15 facilities.

KWALE: 392 snakebites in 20 facilities.

NYANDARUA: 12 snakebites in 24 facilities

TAITA TAVETA: 54 snakebites in 14 facilities.

*Snakebites recorded in a 12-month period.

Patient Profiles and Health Outcomes

Healthcare workers, in their experiences with snakebite patients, reported a similar patient profile as was observed when looking at the actual experience of snakebite patients: healthcare workers believed that the most common age of snakebite patients was 19-30 years (56%), and that farming (55%), herding (32%), collecting firewood (28%) and walking (26%) were the most common activities undertaken by people when bitten by a snake. The most common complications seen by healthcare workers were:

- Swelling (32%)
- Pain at the site of the bite (19%)
- Cellulitis (13%)

Knowledge and Health Facility Treatment Capacity

The majority of healthcare workers indicated that there was no healthcare worker at the facility who had been trained in snakebite management, and that they did not have the equipment and medicines available to properly treat snakebite patients. Supportive care was offered by 61% of facilities, this care commonly consisted of pain management, anti-inflammatories and antibiotics. Antivenom was used in 32% of facilities according to the healthcare workers, while 44% also indicated they refer snakebite patients to other facilities at times, which was on average 22km away.



86% of facilities did not have a healthcare worker who had been trained in snakebite management.



77% of healthcare workers believed they did not have the equipment and medicines available to properly treat snakebites.

Antivenom was available in 27% of facilities at the time of the healthcare worker survey, with 37% of the healthcare workers indicating antivenom was stocked out at that particular moment; 36% indicated antivenom was generally not stocked at the facility. The Snake Venom Antiserum (African) produced by VINS Bioproducts Ltd was the antivenom brand most commonly available (86%), followed by SAIMR Polyvalent Snake Antivenom by South African Vaccine Producers Ltd (11%) and Inoserp PANAFRICAIN by INOSAN Biopharma (6%). Two out of three healthcare workers believed antivenom was unaffordable for patients.

Stockouts and Affordability of Healthcare Commodities

Availability, stock-outs and affordability of commodities used for the treatment of snakebite was studied to gain insights into the treatment capacity of public, private and mission sector facilities. The specific use of the medicines surveyed can be found in Annex A.

Availability

The commodities research showed that antivenom was found in 44% of the surveyed facilities; availability in the private and mission sector facilities was lower compared to the public sector (see Table 1).

| ANTIVENOM AVAILABILITY PER COUNTY* | | | |
|------------------------------------|---------------|----------------|----------------|
| | Public Sector | Private Sector | Mission Sector |
| KAJIADO | 78% | 30% | 33% |
| KILIFI | 53% | 0% | 0% |
| KIRINYAGA | 40% | 13% | 33% |
| KWALE | 31% | 14% | 0% |
| NYANDARUA | 12% | 0% | 0% |
| TAITA TAVETA | 61% | 50% | Not surveyed |

*The analysis takes into account at which facility level antivenom commodities ought to be available at, based on the Kenya Essential Medicines List.¹⁰













Tetanus toxoid, used as a precautionary measure to prevent tetanus, was available in half of public facilities, and two-thirds of private and mission facilities. Epinephrine (adrenalin), used to treat anaphylaxis, which can occur as an acute reaction to the administration of antivenom, did not have a very high availability, especially in the public sector.

Chlorpheniramine and hydrocortisone are used in parallel to treat serum sickness, and while hydrocortisone had a relatively high availability (80% public sector), chlorpheniramine had a very low availability (10% public sector).

The availability of pain killers also differed per type, with morphine having a low availability and paracetamol having a high availability across the sectors. One of the antibiotics studied (amoxicillin + clavulanic acid) was available in 51% of public facilities.

Health facilities were also surveyed about the availability of whole blood, since blood transfusions may sometimes be deemed necessary: availability was low, ranging from 9% to 20% across the sectors. Instruments also showed a wide range in availability, with some (IV administration set, syringes and needles, bandages) having a high availability, and others (oral airway, ventilator, laryngoscope) having a low availability.

Table 1. Availability of a selection of snakebite commodities.*

| | Antivenom | Tetanus toxoid | Epinephrine | Hydrocortisone | Chlorpheniramine | Prednisolone |
|---|----------------|--------------------------|--------------|---------------------|-----------------------|-------------------------------------|
|  Public | 44% | 49% | 44% | 80% | 10% | 58% |
|  Private | 19% | 67% | 61% | 78% | 38% | 91% |
|  Mission | 17% | 67% | 58% | 83% | 30% | 100% |
| | Paracetamol | Dihydrocodeine phosphate | Morphine | Lidocaine | Sodium chloride | Amoxicillin + clavulanic acid |
|  Public | 88% | 4% | 16% | 75% | 81% | 51% |
|  Private | 97% | 3% | 18% | 75% | 64% | 38% |
|  Mission | 100% | 10% | 0% | 67% | 50% | 40% |
| | Whole blood | Oral airway | Catheter | Syringe + needle | IV administration set | Bandage |
|  Public | 16% | 18% | 68% | 96% | 82% | 80% |
|  Private | 9% | 38% | 56% | 97% | 78% | 78% |
|  Mission | 20% | 10% | 75% | 92% | 67% | 58% |
| | Urine dipstick | Oxygen cylinder | Laryngoscope | Manual resuscitator | Ventilator | 20-minute whole blood clotting test |
|  Public | 58% | 50% | 2% | 69% | 6% | 4% |
|  Private | 58% | 55% | 14% | 44% | 10% | 17% |
|  Mission | 58% | 40% | 8% | 42% | 20% | 8% |

*The analysis takes into account at which facility level the commodities ought to be available at, based on the Kenya Essential Medicines List.¹⁰

Stockouts

Of the 133 surveyed health facilities, 121 kept track of their stock using stock cards or a stock-taking database. Stockouts occurred often in the public sector, with any one of the snakebite commodities being stocked out on average at least once over a six-month timeframe at 14% of facilities. Antivenom, for instance, was stocked out at least once during a six-month period in 20% of public facilities.

In the public sector, chlorpheniramine was most often stocked out. It was out-of-stock at least once during a six-month timeframe at 52% of the facilities, with morphine, dihydrocodeine phosphate and prednisolone also often facing stockouts. Stockouts of disposable instruments such as oral airways, catheters, syringes and needles, bandages, IV administration sets, and urine dipsticks did not occur in any of the facilities.

Affordability

Affordability was calculated using the average prices of the commodities, the standard treatment regimens (see Annex B), and the daily wage of a lowest-paid government worker (LPGW) (452.4 KSH in 2020). A commodity is unaffordable if it costs more than a day's wage.

One vial of antivenom was unaffordable in all three sectors: in the public sector it costs an LPGW 2.3 days, in the private sector 16.9 days, and in the mission sector 7.7 days. What should be noted is that this is the price of only one vial, and it is likely that multiple vials may need to be administered to a patient.

In the public sector, many commodities were for free (e.g., tetanus toxoid, epinephrine, hydrocortisone, chlorpheniramine, prednisolone, paracetamol, dihydrocodeine phosphate and lidocaine). Two others were not free, but still affordable (amoxicillin + clavulanic acid and morphine), while sodium chloride costed 1.5 days' wages.

In the private sector, morphine (1.1 days), sodium chloride (1.2 days) and amoxicillin + clavulanic acid (11.7 days) were unaffordable. Again, important to note for morphine is that this is a starting dose, and it can be expected that more doses are needed if the patient is in a lot of pain.

Table 2. Facilities reporting a stockout of a selection of snakebite commodities in a six-month period.







| | | Antivenom | Tetanus toxoid | Epinephrine | Hydrocortisone | Chlorpheniramine |
|---|---------|------------------|-------------------------------|--------------------------|----------------|------------------|
|  | Public | 20% | 15% | 18% | 10% | 52% |
| | Private | 0% | 17% | 5% | 8% | 8% |
| | Mission | 0% | 0% | 0% | 14% | 0% |
| | | Prednisolone | Paracetamol | Dihydrocodeine phosphate | Morphine | Lidocaine |
|  | Public | 27% | 2% | 38% | 38% | 7% |
| | Private | 4% | 4% | 0% | 0% | 10% |
| | Mission | 0% | 0% | 50% | - | 0% |
| | | Sodium chloride | Amoxicillin + clavulanic acid | Oxygen cylinder | Oral airway | Catheter |
|  | Public | 2% | 17% | 11% | 0% | 0% |
| | Private | 0% | 0% | 0% | 0% | 0% |
| | Mission | 0% | 0% | 0% | 0% | 0% |
| | | Syringe + needle | IV administration set | Bandage | Urine dipstick | |
|  | Public | 0% | 0% | 0% | 5% | |
| | Private | 0% | 0% | 0% | 0% | |
| | Mission | 0% | 0% | 0% | 0% | |

Table 3. Affordability of snakebite commodities.

| | | Antivenom | Tetanus toxoid | Epinephrine | Hydrocortisone | Chlorpheniramine | Prednisolone |
|---|---------|-------------|--------------------------|-------------|----------------|------------------|-------------------------------|
|  | Public | 2.3 days | 0.0 days | 0.0 days | 0.0 days | 0.0 days | 0.0 days |
| | Private | 16.9 days | 0.2 days | 0.2 days | 0.2 days | 0.1 days | 0.0 days |
| | Mission | 7.7 days | 0.1 days | 0.2 days | 0.2 days | 0.0 days | 0.0 days |
| | | Paracetamol | Dihydrocodeine phosphate | Morphine | Lidocaine | Sodium chloride | Amoxicillin + clavulanic acid |
|  | Public | 0.0 days | 0.0 days | 0.2 days | 0.0 days | 1.5 days | 0.5 days |
| | Private | 0.0 days | - | 1.1 days | 0.4 days | 1.2 days | 11.7 days |
| | Mission | 0.0 days | 0.1 days | - | 0.0 days | 0.4 days | 1.5 days |

4 RECOMMENDATIONS

Snakebite Case Reporting

We found a high number of snakebite cases in surveyed communities, with no system in place for cases to be collected and recorded.

County authorities should collect, report, and evaluate snakebite cases at both community and health facility levels, supplemented with more complete data at the national level:

- Implement mandatory reporting throughout the health system, including communities, using existing surveillance systems and capture cases seeking treatment and referral pathways.
- Work with CSOs and communities to undertake routine community-based surveys in high incidence areas to capture a variety of qualitative and quantitative data, including on the prevalence, behaviour, gender, responses, and the uptake of health services.

Patient Profile

Our research shows that snakebite victims are predominantly bitten in the lower limb, are often at a young working age, and were often either walking or working at the time of the incident.

Support community-based initiatives and provide communities with education tools which contain evidence-based guidance on awareness, prevention, first aid and treatment:

- Work with CSOs and communities to provide new and existing educational materials to snakebite-affected areas tailored to high-risk groups in order to increase awareness and behavioural change.
- Work with wildlife authorities, conservation groups and NGOs to provide education on human-snake conflict mitigation to promote people to live safely among snake habitats.
- Incorporate snakebite messaging alongside existing community disease programmes to support the uptake of effective prevention measures such as using malaria bed nets and wearing shoes.

Health-Seeking Behaviour

We found that communities often sought multiple types of treatment for snakebite, that traditional healers are commonly used, and trust is high in the effectiveness of medicines, including antivenoms.

Increase community confidence in health systems by providing reliable, affordable and reachable services, and recruit local community actors to provide an evidence-based first response:

- Improve essential, affordable health services to remote health facilities in high-incidence areas by providing effective, affordable treatments and care, including antivenom.
- Work with CSOs and partners to train and sensitise community leaders, community health staff and traditional healers on prevention, first aid, case management and referral pathways to improve timely health facility attendance and to reduce complications from envenomings.

Healthcare Worker Knowledge

Our findings show that most healthcare workers had not received any training in snakebite management and felt they lacked the knowledge necessary to properly treat and manage cases.

Provide healthcare workers in high prevalence areas with adequate resources to properly diagnose and manage snakebites at all levels of the health system:

- Adequately train relevant healthcare workers in the skills necessary to provide effective diagnosis, referral, treatment, and management.
- Adopt and adapt the Ministry of Health's national guidelines for snakebite envenoming to the local context to improve and standardize patient care.

Availability and Affordability of Snakebite Treatment

We found that the availability of snakebite commodities, including antivenom was suboptimal. Stockouts were particularly common in the public sector, and affordability is a problem for those seeking care in the private and mission sectors.

Champion efforts to ensure that every Kenyan has access to effective, affordable, and safe treatment and protect all patients from out-of-pocket payments across the entire health system.

- Work with communities, CSO's and the national authorities to ensure the performance of all antivenom products in relation to patient outcomes is frequently recorded and reported.
- Put mechanisms in place to frequently monitor and report stockouts for all essential commodities required for the management of snakebite.
- Refine financing strategies to ensure that snakebite patients are exempt from any out-of-pocket in relation to their care and treatment in the public, private and mission sector.

Socio-Economic Consequences and Disabilities

Our research found that half of those reportedly bitten lost their jobs as a direct result of a snakebite, while some experienced social and economic consequences such as debt and exclusion.

Provide rehabilitation for snakebite victims and address social and economic barriers:

- Incorporate snakebite-related injuries and impairments within established clinical rehabilitation services.
- Provide regular community awareness-raising sessions which aim to reduce stigma and negative attitudes associated with snakebites and snakebite victims.
- Take the necessary steps in health financing to ensure that snakebite victims are exempt from any out-of-pocket payments and expenses.
- Together with CSOs and communities undertake further qualitative research to capture the broader societal and economic impacts on snakebite victims and its consequences through people's own stories and experiences.

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6 APPENDICES

APPENDIX A – MEDICINES AND THEIR USE IN SNAKEBITE TREATMENT

| Medicine | Use |
|--|---|
| Antivenom | Specific antibody treatment for envenomings. |
| Tetanus toxoid | Used to prevent tetanus. |
| Epinephrine | Also known as adrenaline. Used to treat anaphylaxis. |
| Hydrocortisone | Used to treat anaphylaxis. |
| Chlorpheniramine | Used to treat serum sickness. |
| Prednisolone | Used to treat serum sickness. |
| Paracetamol | Used to reduce fever and to manage mild to moderate pain. |
| Dihydrocodeine phosphate | Similar to codeine. Used to manage moderate to severe pain. |
| Morphine | Used to manage severe pain. |
| Lidocaine | Local anesthetic. |
| Sodium chloride | Intravenous fluid. |
| Amoxicillin + clavulanic acid | Antibiotic. |
| Whole blood | Used for blood transfusions. |
| Oral airway | Used to maintain or open a patient's airway. |
| Catheter | Soft hollow tube. Passed into the bladder to drain urine. |
| Syringe + needle | Used to inject substances or extract fluids from the body. |
| IV administration set | Used to administered fluids and medications to patients. |
| Bandage | Used to bind up a wound or a part of the body. |
| Urine dipstick | Thin, plastic stick with strips of chemicals on it. Used to test for blood or haemoglobin or myoglobin. |
| Oxygen cylinder | Used to provide oxygen to patients. |
| Laryngoscope | Used to examine the throat or for inserting a tube into it. |
| Manual resuscitator | Used to provide manual ventilation to patients who are not breathing (adequately). |
| Ventilator | Used to assist the function of the lungs of a patient. |
| 20-minute whole blood clotting test | Used to determine if envenomation has occurred. |

APPENDIX B – MEDICINES AND THEIR TREATMENT REGIMENS

| Medicine | Number of Treatment Units (Per Day) | Number of Days |
|---|--|---------------------------------|
| Antivenom | Start dose | - |
| Tetanus toxoid | 1 | Repeat after 1, 6 and 12 months |
| Benzylopenicillin (powder 600mg) | 4 | 5 |
| Epinephrine (1mg/ml) | Start dose | - |
| Hydrocortisone (100mg) | Start dose | - |
| Chlorpheniramine (10mg/1ml) | Start dose | - |
| Prednisolone (5mg) | 3 | - |
| Paracetamol | 3 | 3 |
| Dihydrocodeine phosphate (30mg) | 3 | More if necessary |
| Morphine (10mg/ml) | Start dose | - |
| Lidocaine (2%, 30ml) | Start dose | - |
| Sodium chloride | 2 to 3 litres | - |
| Amoxicillin + clavulanic acid | 3 | 5 |