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Epidemiology of Envenomings in Zimbabwe 2022 to 2025

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ABSTRACT

Snake bites are a neglected public health problem in low to middle income countries yet most majority of the cases are reported from these countries. Globally more than five million cases are recorded annually and thousands of deaths. This study was conducted in an effort to raise awareness of the problem and also come up with prevention strategies as well advocate policy makers and programmers to prioritise medicines for snake bites. A retrospective secondary data analysis was conducted using DHIS2. Some of the recommendations from the study were cutting grass around the home, wearing snake bite prevention boots, avoiding walking at night, health education of communities, and ensuring availability of ant venom.

Keywords

Envenoming, Snakebite, Antivenom, Epidemiology.

Introduction

A snake bite occurs when a snake's fangs pierce the skin, potentially injecting venom. Venomous snake bites can cause severe symptoms, including pain, swelling, tissue damage, and systemic effects like difficulty breathing or blood clotting issues. Non-venomous bites, while less dangerous, can still lead to infections or allergic reactions [1,2].

The World Health Organisation declared snake bites a neglected tropical diseases. An estimated **5.4 million people** worldwide are bitten by snakes each year. Around 81 410 to 137 880 people die each year because of snake bites, and around three times as many amputations and other permanent disabilities are caused by snakebites annually [3]. The vast majority of venomous snake species are viperids (eg, rattlesnakes, Gaboon vipers) or elapids (eg, cobras, taipans). Although most snakes in the Colubridae family are nonvenomous, some (eg, boomslang) are venomous and responsible for significant morbidity and mortality [3]. Most of these occur in Africa, Asia and Latin America. In Asia up to 2 million people are envenomed by snakes each year, while in Africa there are an estimated 435 000 to 580 000 snake bites annually that need treatment. Envenoming affects women, children and farmers in poor rural communities in low- and middle-income countries. The highest burden occurs in countries where health systems are weakest and medical resources sparse [5].

Most snake bites occur on the **hands, feet, and ankles**. This is primarily because these are the body parts most likely to come into contact with snakes, either intentionally (handling) or accidentally (walking or climbing) [4]. Most snakebites happen in tropical and sub-tropical parts of Africa, the Americas, Asia, the Middle East and Oceania. People in poor agricultural areas are most affected with children, adolescents and young adults at particular risk.

Effects of Snake Poisoning in the Body

Snake venom is produced in the back of the snake's head in the salivary glands. Salivary glands are the parts of the head where saliva is made. To deliver venom, snakes have hollow fangs that act like hypodermic needles. When a snake bites, muscles in its head squeeze the venom glands. This pushes the liquid through its fangs muscles in its head squeeze the venom glands. This pushes

the liquid through its fangs and into the flesh of its prey. Toxins vary from one species to the next. Sometimes, snakes of the same species that live in different locations can have slightly different venom compositions.

Once the toxins are injected, they can work in several ways depending on the type of snake. Some toxins target the nervous system. These are called neurotoxins. Neurotoxins prevent neurons in the brain from transmitting signals. This causes paralysis. Other toxins harm the circulatory system. These are called haemotoxins. Haemotoxins can cause red blood cells to burst, cause blood to clot, or severely lower blood pressure. Others toxins harm the muscular system. These are called mycotoxins. Mycotoxins cause tissue death in muscles and prevent muscle contraction. Another word for tissue death is necrosis [6].

Management of Snake Bites

The World Health Organisation published snake bite management guidelines that must be followed after snake bite [7]. These are shown below.

Prompt medical attention is the key. Main steps of care include:

- immediate and complete immobilization of the affected body part and prompt transportation to the closest medical facility;
- cleanse wounds to decrease infection risk;
- avoid tourniquets and cutting wounds;
- treatment with appropriate antivenom suited for snakes endemic to the region;
- supportive therapy: airway support; and
- administration of tetanus vaccine if the person has not been adequately vaccinated.

Prevention of Snake Bites

Prevention of snake bites involves informing communities about snake bite risks and prevention techniques including wearing protective shoes/boots as shown in annex 1; keep storage areas clear of rodents; raise beds above floor level; and tucking mosquito nets securely under sleeping mats.

Healthcare providers should be educated on snake-bite management. Public health authorities and policymakers should ensure appropriate supplies of safe and effective anti-venoms to communities.

Methods

A secondary data analysis was conducted of cases between 2022 and 2025 first quarter was done. The data source was DHIS2.

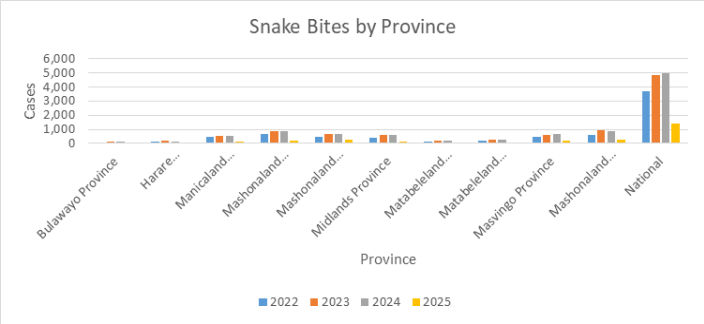
Results

Snake Bites Cases by province 2022-2025

Year	Bulawayo Province	Harare Metropolitan Province	Manicaland Province	Mashonaland Central Province	Mashonaland East Province	Midlands Province	Matabeleland North Province	Matabeleland South Province	Masvingo Province	Mashonaland West Province	National
2022	86	129	488	680	488	428	156	170	445	635	3,705
2023	110	190	532	843	647	602	208	232	603	909	4,876
2024	105	141	554	874	687	605	187	271	683	880	4,987
2025	22	44	159	227	258	133	52	86	190	236	1,407

The above table shows cases of snake bites by province during the period under review. Highest cases in 2022 were recorded in Mashonaland Central 688 (18%) followed by Mashonaland West (17%), least cases were in Bulawayo (2.3%). In 2023 Highest cases were recorded in Mashonaland West 909 cases (18,6%) followed by Mashonaland Central 843 (17.3%) the least cases were reported in Bulawayo Province 110 (2.3%). There was an increase in snake bites in every province in 2023 in terms of absolute numbers.

In the year 2024 Mashonaland West had the highest snake bites 880 (17.6%) followed by Mashonaland Central 874 (16.9%) the lease cases were reported in Bulawayo province 105 (2.1%). In 2025 only first quarter cases were compared and they showed similar trend highest cases in Mashonaland West 236(16.8%) followed by Mashonaland Central 227 (16.1%) and the least was Bulawayo with 22 (1.6%). From 2022 to 2024 the annual cases of snake bites at national level increased each year as shown above.



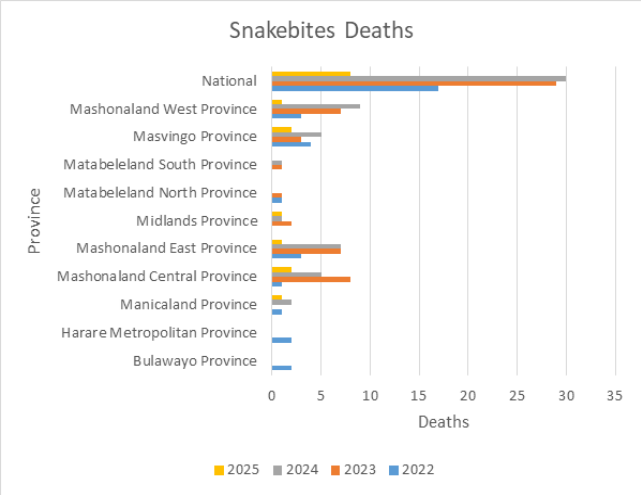
The above graph shows the trend analysis of snake bites in Zimbabwe from 2022 to 2025.

Snake Bites Deaths by Province 2022-2025

Year	Bulawayo Province	Harare Metropolitan Province	Manicaland Province	Mashonaland Central Province	Mashonaland East Province	Midlands Province	Matabeleland North Province	Matabeleland South Province	Masvingo Province	Mashonaland West Province	National
2022	2	2	1	1	3		1	0	4	3	17
2023			0	8	7	2	1	1	3	7	29
2024			2	5	7	1	0	1	5	9	30
2025		0	1	2	1	1			2	1	8

Table above shows deaths due to snake bites. In 2022 seventeen deaths were reported nationally, Masvingo reported the highest deaths 4 followed by Mashonaland West and East both at 3 deaths Bulawayo 2. Mashonaland Central 1. In 2023 twenty-nine deaths were reported nationally, Mashonaland Central had the highest deaths 8, followed by Mashonaland East and West with 7 each, Manicaland had zero deaths other provinces didn't report deaths. In 2024 30 deaths were reported nationally, highest cases were in Mashonaland West 9 (30%), followed by Mashonaland East 7 (23%) the least was Matabeleland North with zero. In 2025 highest deaths were reported in Masvingo and Mashonaland West with two deaths each. Nationally number of deaths due snake bites increased between 2022 and 2024 from 17 to 30 deaths.

The annual national percentage deaths in 2022 was 0.5%, in 2023 it was 0.6% 2024 it was 0.6%.



Graph above shows deaths due to envenomings by province

Discussion

The study revealed that snake bite cases are relatively high in Zimbabwe with over three thousand cases annually. The provinces with bigger population such as Mashonaland Central, Mashonaland East, Mashonaland West, Manicaland, Midlands, and Masvingo generally had higher cases, the cases were consistently high in Mashonaland West, Mashonaland East and central this could be due to high rain falls which leads to tall grass thick vegetation. These provinces predominantly practice agriculture and mining as survival means and this puts them in direct contact with snakes hence the bites. It had been reported by various scholars that human snake encounters are due to humans expanding fields and also the snakes hunting rats and eggs in the yards [4,6]. Some bites happen during the night when people are walking in the dark. It is therefore encouraged to have lighting devices like torches when travelling at in the dark. In addition it's best to avoid walking in the dark. Other prevention strategies include snake repellents, clearing grass around homes, removing clutter, wearing snake boots as shown in the annex. Health education on snake bites remain the most cost effective public health prevention strategy for snake bites. Health facilities must ensure that anti snake venom is always available for the victims of snake bites and also ensure it's affordable.

Case fatalities if snake bites were relatively low for all the provinces and also for the country. This may be due to proper snake bite management and high quality of care by health workers. The other reason maybe that the type of biting snake will be having less fatal venom and hence chances of survival will be high. Snakes with very toxic venom such as the mambas family can kill and grown up man in less than an hour and hence survival chances will be less. Some villager manage snake bites with traditional herbs before visiting the hospital this may increase their survival chances.

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Annex 1

Snake bite prevention boot