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Vulnerability to Ophidian Envenomation Deaths among Rural Populations at Bassila in North-Eastern Benin

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Abstract

Introduction: Snake bites and deaths caused by snake bites are a particularly significant public health issue in rural tropical areas. This study was initiated with the aim of raising awareness of the re-emergence and severity of ophidian envenomation (snake bites) in the municipality of Bassila in north-eastern Benin. The main objective was to study the incidence and factors associated with deaths from snake bites in the Bassila health zone in north-eastern Benin from 2020 to 2024. **Method:** This was a mixed cross-sectional analytical study of the 548 cases of ophidian envenomation recorded during the study period. It was conducted in the municipality of Bassila in Benin. All victims of snake bites admitted to the Bassila district hospital from 2020 to 2024 were included in the study. The data collected was entered using the Kobocollect platform and analysed using Stata18 statistical software. **Results:** The average age of the victims was 27.04 ± 1.91 years. Victims under the age of 18 accounted for 37.4% of cases, while those aged 18 - 30 accounted for 35.04%. The majority (59.7%) of victims had grade 0 or 1 snake envenomation, compared to 40.3% of patients with grade 2 or higher. The factors identified as being associated with deaths due to ophidian envenomation were the location of the bite, the place of origin, the grade of envenomation and the presence of haemorrhagic or cardiac disorders. **Conclusion:** It is therefore important to launch awareness campaigns targeting the most vulnerable populations, as well as to strengthen the capacity of healthcare personnel in regional hospitals to treat snake bites, including in children.

Keywords

Vulnerability, Snake Bite, Snake, Death, Sociocultural Beliefs, North-Eastern Benin

1. Introduction

Venomous snakes are found in a large number of countries around the world [1]. This makes ophidian envenomation (from snake bites) a neglected tropical disease that causes suffering, disability, and premature death. Worldwide, snake bites are a major public health problem, affecting approximately 1 million (421,000 - 1,841,000) [1] people per year, with half of them suffering from permanent sequelae such as physical disability due to injuries, amputations [2] [3] or psychological trauma [3]. In developed countries, snake bites generally occur during isolated recreation activities. However, in developing countries, they are more likely to occur among agricultural workers, mainly men, including young men and adolescents [4]. According to data from multiple studies, the highest number of envenomations was recorded in South Asia (121,000), followed by Southeast Asia (111,000) and East Sub-Saharan Africa (43,000) [5]. The highest number of deaths from snake bites was also recorded in South Asia (14,000), followed by West Sub-Saharan Africa (1500) and East Sub-Saharan Africa (1400) [5]. Globally, snake bites cause at least 20,000 deaths per year, with this number potentially reaching 94,000 [5]. Snake bites mainly affect poor rural communities in Asia and sub-Saharan Africa, where socio-economic status and agricultural and other practices contribute to increased interaction between snakes and humans [6]. Populations in these regions experience high morbidity and mortality rates due, among other things, to insufficient access to health services, which are mostly suboptimal. Thus, in Africa, snake bite envenomation is a public health problem that unfortunately remains poorly assessed. Envenomation and deaths from snake bites are a particularly significant public health problem in rural tropical areas. It is therefore rightly considered a neglected tropical disease. In June 2017, snake bite envenomation was classified as a Category A neglected tropical disease and was the subject of a resolution adopted by the World Health Assembly in May 2018 [7].

Most victims survive with permanent physical sequelae (due to local tissue necrosis) and even psychological sequelae. As the vast majority of these victims are young people [8], the economic impact of their disability and psychological damage is considerable. In developing countries such as Benin, young men are the most affected: they suffer between 50% and 75% of bites [9]. However, despite the scale of its impact on populations, snake bites have not received the attention they deserve from national health authorities. There is little reliable data available on the incidence in rural tropical areas where snake bites are most common. The available knowledge on the epidemiology of snake bites is very patchy. The true incidence of snake bite envenomation, its impact and characteristics in different regions of Benin remain largely unknown. However, this information is essential for assessing the scale of the problem, developing national guidelines for management, planning healthcare resources (particularly antivenom) and training medical staff in the treatment of snake bites. Thus, the main objective was to study the incidence and factors associated with deaths due to snake bites in the Bassila health zone (a commune located in north-eastern Benin) from 2020 to 2024. This is a

region with extensive tropical and savannah areas.

2. Method

Type of study

It was a cross-sectional analytical study conducted on cases of snake bites admitted to the district hospital in the municipality of Bassila in north-eastern Benin between 2020 and 2024.

Study populations and selection criteria

This study focused on 548 patients who were bitten by snakes and admitted to Bassila District Hospital between 2020 and 2024 for treatment. Our research was based solely on these patients' medical records.

The study included all records of patients who had been bitten by any type of snake and whose bite had been treated at the hospital. All records that met these criteria for the period from January 2020 to December 2024 were selected in accordance with the inclusion criteria. Incomplete files or those lacking key information such as age, location, treatment data and date of discharge (unusable files) were excluded after unsuccessful attempts to find the missing data. Thus, a total of 54 files were excluded in accordance with the previously defined exclusion criteria (leaving 548 files ultimately selected for analysis from overall 602 files found).

Sampling method

A comprehensive selection of patient records was made. All records of patients who were victims of snake bites and treated at the regional hospital between 2020 and 2024 were taken into account. The objective of the selection of study participants was to choose records that could be used. The sample size was equal to the total number of all patients admitted to the hospital between 2020 and 2024 as a result of snake bites.

Data collection

A data collection form was developed to gather data from the records. All records were reviewed to collect individual data from the selected patients. The data collection form used in this study was coded so that investigators could enter data directly into the Kobo Collect® mobile application to facilitate database creation and reduce collection bias. Care records (admission, care, hospitalisation) and death records were used to fill in the missing data in the records of some patients.

Study variables

- Demographic characteristics of snake bite victims, including age, occupation, gender, level of education, residential location, marital status, ethnicity, and treatment pathways.
- Factors related to the circumstances of the bite, such as: month of the bite, time of the bite (day or night), site of the bite, type of snake, and place where the bite occurred.
- Clinical factors such as symptoms and severity on admission, clinical signs and complications recorded during treatment.
- Factors related to the treatment of victims such as reception service, duration

of hospitalisation and type of antivenom received.

- Geographical accessibility assessed by the distance between the patients' location and the regional hospital.
- Time it took for patients to reach the regional hospital.

Many syndromes may coexist in the same patient due to different mechanisms of action of the toxins, making it difficult to assess the severity of envenomation on admission. However, predefined criteria (clinical syndromes, general signs, haemorrhagic signs and biological results) have made it possible to determine (on a scale of 0 - 3) the severity of envenomation in the patient [5].

Data analysis

Data cleansing procedures were applied to verify the completeness and consistency of the data collected. Data processing and analysis were performed using STATA18 software. Standard statistical measures were calculated. These included proportions for qualitative variables and means for quantitative variables. The univariate analysis was used to identify the association between the main variable and the other variables in the study at a significance level of 5% (p-value< 0.05). The associated variables were incorporated into a stepwise manual logistic regression model to determine the potential predictors of deaths from snake envenomation within the study population. However, the variables included in the initial model were those that were significant at the 20% threshold. Adjusted ORs were calculated at the 95% confidence interval, and appropriate goodness-of-fit tests were performed to verify the validity of the final model. Regression was performed on data from 548 selected patients (N = 548).

3. Results

The study involved 548 victims of snake bites, including 353 male patients (64.4%) and 195 female patients (35.6%). They were admitted to Bassila District Hospital for treatment. From 2020 to 2024, the annual number of snake bite cases admitted to Bassila District Hospital was 86 cases (15.7%) in 2020, 44 cases (8%) in 2021, 83 cases (15.1%) in 2022, 151 cases in 2023 (27.5%), and 184 cases in 2024 (33.6%). Over the entire study period, a total of 2,359,450 patients were admitted to the district hospital in the municipality of Bassila. The hospital incidence of snake bites was 0.023% (*i.e.*, 23 cases per 100,000 patients admitted). The Bassila district hospital is a referral centre located on the border between north-eastern Benin and north-western Togo. It receives patients from neighbouring localities, including those in Togo.

Socio-demographic characteristics

Age of snake bite victims

The average age of victims was 27.04 ± 1.91 years. The youngest victim was one (01) year old, while the oldest victim was 80 years old. **Figure 1** shows the breakdown of snake bite victims by age group. The vast majority (37.41%) of victims were minors (under 18 years of age). Among adults (victims over 18 years of age), the 18 - 30 age group was the most represented (35.04% of victims were aged 18 -

30, compared to 22.08% of adults aged 31 - 59). Victims aged 60 and over were very poorly represented.

Professional activities and vulnerable ethnic groups

Analysis of the data made it possible to determine the epidemiological profile of snakebite victims admitted to the Bassila district hospital. Table 1 shows the

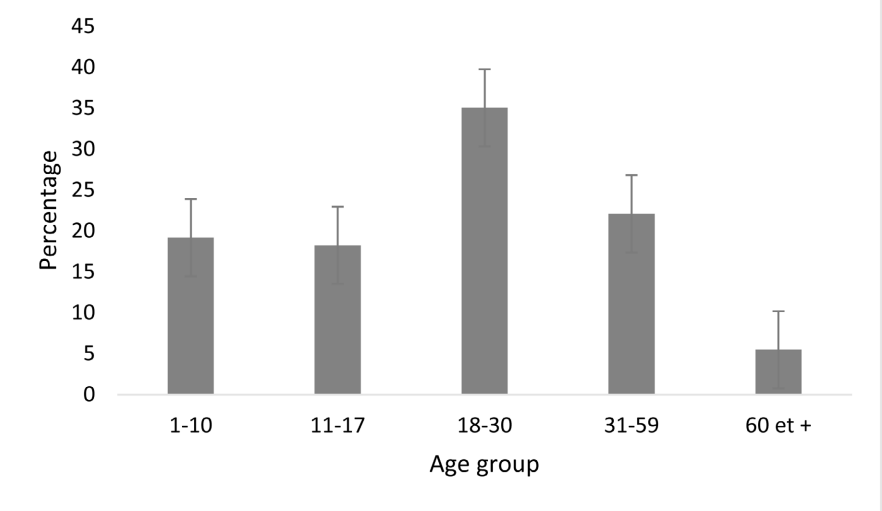

Figure 1. Distribution of victims by age group.

Table 1. Distribution of victims by occupation and ethnic group.

	n	%
Profession		
Childrendschoool/student/apprentice	225	41.1
Farmers/herders/hunters	168	30.7
Housewives	104	19
Craftsman/Shopkeeper/Civil servant/Employee	41	7.4
Other	10	1.8
Ethnic group		
Peulhs and related	118	21.5
Nagot and related	124	22.6
Kotokoli and related	84	15.3
Anii	73	13.3
Lokpa and related	55	10
Other	39	7.1
Otamari and related	23	4.2
Fon and related	14	2.6
Koura	12	2.2
Betammaribe	6	1.1

distribution of victims by profession and ethnic group. The most represented professional category (41.1% of all cases) was the group of schoolchildren, college students, university students and apprentices. This category includes a significant proportion of children and young people, despite sometimes irreversible consequences of snake bites on their overall development and ability to continue their education. Farmers, herders and hunters represented the second largest professional group (30.7% of victims). Housewives represented the third largest category (19% of cases recorded during the period) among the victims of snake bites treated at the hospital.

The municipality of Bassila is a multi-ethnic socio-cultural area. However, the ethnic groups most affected by snake bites were the Nagots (22.6%) and the Peulhs (21.5%). The Nagots and Peulhs in the Bassila region are communities reputed for producing essential agricultural products (notably yams and cassava) and raising cattle, respectively. These communities live in remote rural areas that are conducive to their main activities.

These results illustrate the social realities that can influence the vulnerability of victims to snake bites in the municipality of Bassila.

Occurrence of snake bites

Analysing monthly trends (Figure 2) in snake bite cases received at the hospital reveals that, starting in March, the number of snake bite cases increased (an average of 40 cases in March during the study period) and peaked in May-June (an average of 61 cases) before gradually declining throughout the year until October (an average of 43 cases). The period of increased cases in the region coincides with the start of the rainy season, during which snakes are more active and come out of their hiding places to search for food and mates in order to reproduce. It also corresponds to the planting season, when workers spend more time in the fields, thus increasing the risk of bites.

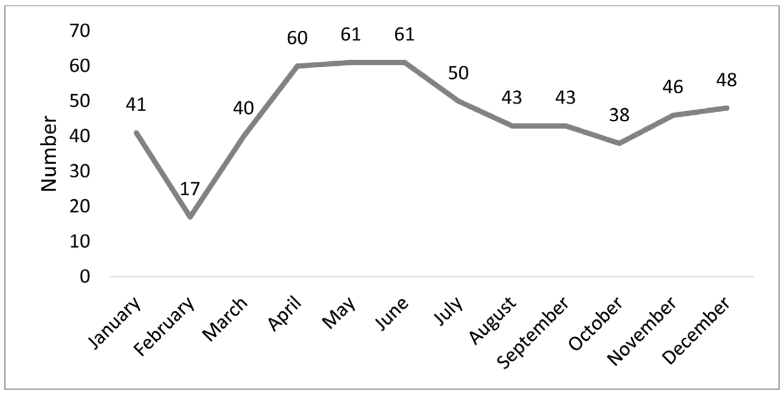

Figure 2. Average trend in snake bite incidents from 2020 to 2024.

The period covering the months of November and December, during which data analysis revealed a slight increase in cases (from a monthly average of 43 cases in November to 48 cases in December), corresponds to the harvest season, when workers move to the fields and are likely to come into contact with snakes of all

kinds.

Clinical profile upon admission

Most victims were bitten on their lower limbs (409 cases, or 74.6%) upon admission, with the foot and leg being the most commonly affected body parts. The upper limbs (hand and forearm), head, back and abdomen were the least affected (25.4%). The lower limbs are closer to the ground. They are therefore more likely to be the most affected part of the body in victims. Personal protective equipment (such as boots) is rarely used by people who are vulnerable to snake bites. Bites to the upper limbs could also be avoided if protective measures such as special gloves were used during activities with a high risk of snake bites.

Most of the victims admitted had grade 0 or 1 snake envenomation (59.7% of cases), while those admitted with grade 2 or higher envenomation accounted for 40.3% (15.1% and 25.2% of grade 3 and grade 2 cases, respectively). Grade 2 or higher envenomation can lead to severe complications such as tissue necrosis, secondary infections, haemorrhages and multiple organ failure. Their treatment involves additional costs due to the complications that may arise. The high cost of treatment and hospitalisation of variable duration required to manage severe envenomation exacerbates the situation for victims, most of whom have low economic livelihoods.

Symptoms and complications treated

Several disorders were recorded and treated among the victims of snake bite admitted to the hospital (Figure 3). The victims mainly presented symptoms of pain (83.03%) and bleeding (25.55%) at the bite site. Haemorrhagic disorders were the most common complications encountered by healthcare workers.

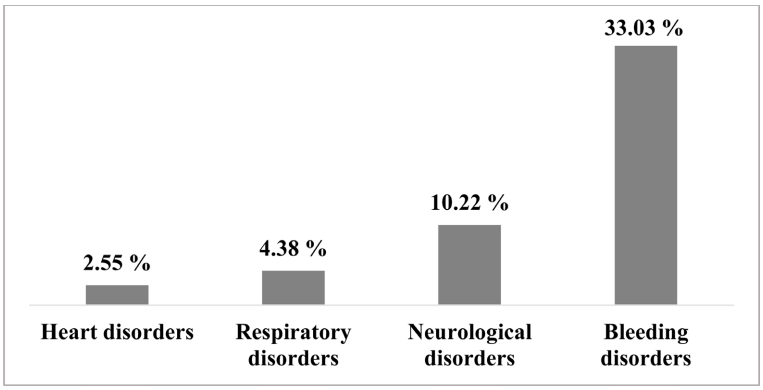

Figure 3. Disorders recorded in patients suffering from ophidian envenomation.

The vast majority of patients had haemostasis or coagulation disorders (31.39%). This was the main medical issue faced by healthcare workers when treating cases. Cases of angioedema (3.83%), myoclonus (3.65%), swallowing disorders (3.65%), pulmonary oedema (3.47%) and pharyngeal paralysis (3.28%) were also recorded. Cases of coma were very rare (0.36%).

A total of 44 patients died from envenomation (a death rate of 8.03%). There was no significant variation (p-value = 0.463) in the death rate from one year to

the next during the study period.

Factors associated with deaths caused by snake bites

Analysis of factors associated with death among victims (Table 2) revealed that patients bitten by snakes on their lower limbs were less likely to die than those bitten on their upper limbs (0.4058; 95% CI [0.2014 - 0.81774]; p-value = 0.012). Similarly, patients from rural areas (2.6275; 95% CI [1.0972 - 6.2924]; p-value = 0.030) were 2.6 times more likely to succumb to snake envenomation despite the care they received at the hospital.

Cases of grade 3 envenomation on admission were 3.6 times more likely (3.5725; 95% CI [1.4487 - 8.816]; p-value = 0.006) to succumb to ophidian envenomation despite treatment. Patients with haemorrhagic disorders (2.1307; 95% CI [1.1024 - 4.1184]; p-value = 0.024) or cardiac disorders (4.7690; 95% CI [1.4078 - 16.49]; p-value = 0.012] were 2.1 and 4.8 times more likely to succumb despite hospital care, respectively.

Table 2. Factors associated with death among victims of envenomation.

	N (%)	Univariate analysis		Multivariate analysis	
		ORa [IC 95%]	p-value	ORa [IC 95%]	p-value
Age (year)					
1 - 10	105 (19.2)	1			
11 - 17	100 (18.2)	0.17 [0.37 - 0.81]	0.026		
18 - 30	192 (35)	0.78 [0.35 - 1.74]	0.540		
31 - 59	121 (22.1)	1.02 [0.44 - 2.40]	0.948		
60 and +	30 (5.5)	0.61 [0.13 - 2.92]	0.536		
Sexe					
Masculin	353 (64.4)	1			
Female	195 (35.6)	0.83 [0.43 - 1.61]	0.587		
Profession					
Craftsman/Shopkeeper/Civil servant/Employee	41 (7.4)	1			
Farmers/herders/hunters	168 (30.7)	3.64 [0.46 - 28.48]	0.219		
Housewives	104 (19)	5.71 [0.72 - 45.18]	0.098		
Childrendschoool/student/apprentice	225 (41.1)	2.86 [0.37 - 22.24]	0.316		
Other	10 (1.8)	4.44 [0.25 - 77.96]	0.307		
Level of education					
Uneducated	428 (78.1)	1			
Primary	62 (11.3)	1.43 [0.61 - 3.37]	0.415		
Secondary/University	58 (10.6)	0.40 [0.09 - 1.71]	0.217		
Ethnic group					
Anii	73 (13.3)	-			

Continued

Fon and related	14 (2.6)	1.79 [0.17 - 18.62]	0.624		
Kotokoli and related	84 (15.3)	3.52 [0.94 - 13.14]	0.062		
Lokpa and related	55 (10)	1.35 [0.26 - 6.94]	0.722		
Nagot and related	124 (22.6)	2.27 [0.61 - 8.43]	0.220		
Otamari and related	23 (4.2)	2.22 [0.35 - 14.20]	0.399		
Peulhs and related	118 (21.5)	1.47 [0.37 - 5.88]	0.585		
Other	55 (10.4)	2.75 [0.66 - 11.50]	0.167		
Environment					
Rural	364 (66.4)	2.86 [1.25 - 6.55]	0.013	2.63 [1.10 - 6.29]	0.030
Urban	184 (34.6)	1		1	
Circumstances of the bite					
Domestic activity	191 (34.9)	1			
Agricultural activity	327 (59.7)	0.98 [0.52 - 1.88]	0.962		
Other	30 (5.5)	0.38 [0.05 - 2.95]	0.353		
Period of the bite					
Dry season	231 (42.1)	2.37 [0.60 - 6.92]	0.279		
Rainy season	317 (59.7)	1			
Time of bite					
Day	427 (77.9)	1			
Night	121 (22.1)	0.33 [0.12 - 0.94]	0.039		
Bite site					
Upper limb	127 (23.2)	1		1	
Lower limb	409 (74.6)	0.49 [0.26 - 0.94]	0.033	0.41 [0.20 - 0.82]	0.012
Other	12 (2.2)	0.63 [0.08 - 5.22]	0.669	0.37 [0.04 - 3.61]	0.391
Service					
Internal medicine	40 (7.3)	1			
Maternity	6 (1.1)	6.17 [0.78 - 48.64]	0.084		
Paediatrics	162 (29.6)	0.90 [0.24 - 3. 38]	0.874		
Emergency	340 (62)	1.11 [0.32 - 3.82]	0.878		
Time taken to seek care					
Same day	353 (64.4)	1			
1 - 3 days	71 (20)	1.08 [0.50 - 6.88]	0.538		
+3 days	124 (15.6)	1.73 [0.49 - 3.97]	0.345		
Grade					
Grade 0	180 (32.9)	1		1	

Continued

Grade 1	147 (26.8)	0.46 [0.15 - 1.55]	0.217	0.46 [0.14 - 1.50]	0.196
Grade 2	138 (25.2)	1.77 [0.75 - 4.16]	0.192	1.79 [0.74 - 4.31]	0.197
Grade 3	83 (15.1)	4.38 [1.91 - 10.05]	0.000	3.57 [1.45 - 8.81]	0.006
Type of AV (antivenom) used					
Monovalent	31 (5.7)	1			
Versatile	517 (94.3)	0.33 [0.13 - 0.85]	0.022		
Duration of hospital stay					
No hospitalisation	153 (28)	1			
1 - 7 days	366 (67)	0.22 [0.11 - 0.43]	0.000		
More than 7 days	29 (5)	0.82 [0.26 - 2.56]	0.732		
Bleeding disorders					
Yes	181 (33)	1.96 [1.06 - 3.65]	0.033	2.13 [1.10 - 4.12]	0.024
No	367 (67)	1		1	
Respiratory disorders					
Yes	24 (4.4)	3.27 [1.16 - 9.24]	0.025		
No	524 (95.6)	1			
Heart disorders					
Yes	14 (2.5)	9.79 [3.23 - 9.67]	0.000	4.77 [1.41 - 16.15]	0.012
No	534 (97.5)	1		1	
Neurological disorders					
Yes	56 (10.2)	2.93 [1.36 - 6.31]	0.006		
No	492 (89.8)	1			
Type of snake					
Viper	137 (25)	0.76 [0.36 - 1.63]	0.265		
Other species	8 (1.5)	1.55 [0.19 - 12.98]	0.686		
Unidentified species	403 (73.5)	1			

4. Discussion

This study has produced results describing the extent and severity of morbidity and mortality due to snake bites in the municipality of Bassila. A total of 602 cases of snake envenomation were recorded at the Bassila district hospital between 2020 and 2024. The results obtained by Cissé *et al.* in 2023 [10] revealed that the majority of victims resided in the savannah areas of the Atacora department (72.8%) and the Donga department (13.1%) located in northern Benin. This increase in cases of snake bite envenomation in these departments was explained by the fact that they are mainly rural and mountainous areas with a semi-arid tropical climate and rugged terrain conducive to the development of reptiles. These figures are much

lower than those obtained in other studies conducted in certain countries in the region. In Nigeria, 5367 people were treated for snake bite envenomation in two years (2009-2010) [11].

Age of victims

The average age of victims was 27.04 ± 1.91 years. Victims under the age of 18 accounted for 37.4% of cases recorded at Bassila Regional Hospital between 2020 and 2024. Victims aged 18 - 30 accounted for 35.04% of recorded cases. This high representation of young people could be explained by the fact that they are the main actors in manual labour, representing the most active social group. They are therefore the most exposed to snake bites. These results are consistent with those obtained by other authors who have conducted similar studies in Benin. For example, Chippaux *et al.* [12] noted in 2002 in Benin that subjects aged 21 to 50 were the most affected (60% of bites). Similarly, Cissé *et al.* in 2023 [10] in their study on the prevalence of snake bite envenomation among pregnant women according to their occupation in northern Benin from 2010 to 2021 noted an average age of 25 ± 5.72 years, with the most represented age group being 21 - 35 (63.0%). This reality is not unique to Benin. Several authors, including Coulibaly *et al.* [13] in Burkina Faso in 2015 and Békoin Abhe *et al.* [14] in Côte d'Ivoire in 2018, found an average age of 25.34 years and 24.1 ± 12.6 years, respectively, among snake bite victims. All these studies reveal the vulnerability of young people and children to snake bites.

Victims' occupational group

The group of farmers/ranchers/hunters (30.7%) was the most represented after that of schoolchildren/college students/university students/apprentices (41.1% of all cases). In line with these results, several authors, including Romaric *et al.* [15], Drabo *et al.* [16] and Nientao O. [17], have noted that most snake bites occur during farm work, when cutting and collecting wood or hunting. Furthermore, in our study, we note that housewives accounted for 19% of cases recorded during the period. However, the results obtained by Cissé *et al.* [10] revealed a higher proportion of 51% of uneducated pregnant women. This high proportion was due to the fact that their study population consisted only of pregnant women.

Bite location and severity

In terms of the site of the bite, the pelvic limbs were the most frequent site of bites. This is the part of the body most affected by snakebites. According to several studies carried out in Mali [18] and Gabon [19], 75% and 70% respectively of victims had been bitten on their pelvic limbs. These results testify to the vulnerability of the lower limbs. They are close to the ground where snakes move. Several other studies have found similar results (Coulibaly *et al.* (69%) [16] and Drabo *et al.* (70%) [16]), while other studies have found lower frequencies (Zarambaud in CAR (60%) [15]).

The majority (59.7% of cases) of victims included in our study presented with grade 0 or 1 ophidian envenomation. However, cases admitted to the emergency department of the local hospital remained significant, with 40.3% of patients pre-

senting with ophidian envenomation of grade 2 or higher. This proportion of serious cases observed remains lower than that reported by Yacouba Barré in 2021 [20], where 60.5% of patients presented with ophidian envenomation of grade 2 or higher. This variation could be linked to the different snake species involved.

Symptoms of envenomations

Patients admitted for ophidian envenomation presented mainly with pain at the bite site (83.03%), followed by bleeding at the bite site (25.55%) and localised oedema of the limb (22.26%). In other studies, the general signs are polymorphous, and dominated by digestive disorders, headaches and dizziness [21]. According to the study conducted by Tankpinou on the evaluation of the efficacy and safety of InoserpTM Pan-Africa in the treatment of snakebite envenomations, the victims mainly presented pain (100%) as a functional sign, oedema (88.4%) and haemorrhage (46.5%) as clinical signs [22]. These signs are non-specific. Oedema is a good indicator of ophid envenomation and is thought to be inflammatory in origin [23]. According to Zarambaud *et al.* [15] and Coulibaly [21], oedema is the dominant symptom. In most cases, oedema is the first sign after a snakebite. Combined with haematological disorders, it is a good indicator of envenomation and potential severity.

Factors associated with death due to envenomations

The death rate was 8.03% among snakebite victims treated at the Bassila zone hospital from 2020 to 2024. This rate is high compared with that obtained by Tankpinou, whose results showed a death rate of 3.7% [22]. In multivariate analysis, the factors associated with snakebite deaths due to envenomation were the site of the bite, the place of origin, the grade of envenomation and the presence of haemorrhagic or cardiac disorders. These results have been obtained by other authors such as Mohamed [24] whose study revealed that haemorrhage and pre-hospital delay of more than 24 h were associated with death in cases of ophidian envenomation.

Limits

The findings from this study cannot be generalised to the entire population of Bassila because the sample was not representative due to a selection bias that consisted of including only patients who received care in the services of the district hospital. This study had other limitations related to the absence of systematic biological testing. As well, some snakes responsible for bites were not found or formally identified. We also observe that victims of snake bites who were unable to go to hospital (those who preferred to seek treatment from traditional healers or at home until they were fully recovered, and those who died before reaching hospital) could not be included in the study.

5. Conclusion

This study has enabled us to identify the most vulnerable sections of the Bassila community. Snakebite envenomation is a worrying public health problem in this region. Juvenile and active adult populations are those who pay the highest price

for this deadly neglected tropical disease. It is a major cause of morbidity and mortality both outside human dwellings (in the fields in particular) and in homesteads, as shown by the significant proportion of bites that occur during domestic activities and at dusk. However, most snakebites occur in rural areas during agricultural activities. The factors identified in the study as being associated with the deaths of the victims include clinical and health factors. It would therefore be important, in the management of ophidian envenomations at the Bassila zone hospital, for the nursing staff to benefit from capacity building in the correct and early diagnosis of the type of ophidian envenomation, adjuvant resuscitation care and the development of an effective treatment protocol minimising the duration and cost of management.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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