

# Socio-Demographic Profile of Patients of Snakebite in Eastern Odisha

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## ABSTRACT

**Background:** Snakebite, a global concern, causes sickness and death, especially among children and adults. The varying venom of species like Russell Vipers underscores geographic differences in therapeutic impact. These injuries demand urgent medical attention, often requiring hospitalization and skilled care. Recognizing their toll on health, the WHO has reclassified snakebite as a neglected tropical disease.

**Methods:** From January to December 2023, a hospital study at PGIMER and Capital Hospital, BBSR, Odisha, examined indoor and ICU patients of the General Medicine department. Demographic data like age, sex, residence, education, income, addiction, bite location, and occupation were collected via structured interviews. Statistical analysis was conducted using SPSS v26 to assess relevant parameters.

**Results:** Among 100 patients, those aged 16 to 29 constitute 27%, while 30 to 49 represent 45%, and 50 to 60 make up 28%. Of these patients, 66% are male and 34% are female. Six percent hail from urban areas, while 94% reside in rural settings. Regarding the bites, 16% occur at home and 84% outside, with 88% affecting lower limbs, 10% upper limbs, and 2% trunks. Furthermore, 82% of bites happen during the day, while 18% transpire at night. Lastly, 92% of victims exhibit neurotoxic symptoms, while 8% experience vascular toxicity.

**Conclusion:** The diverse demographics of snakebite victims underscore the need for targeted treatments tailored to specific groups and regions. Lowering snakebite morbidity and mortality hinges on better access to antivenom, heightened awareness, education, and enhanced healthcare infrastructure, particularly in rural and underserved areas.

**Key-words:** Biodiversity, Poisonous snake, Snakebite, Snakebite injuries, Vasculotoxic Neurotoxic

## INTRODUCTION

In some parts of the world, snakebites have been a major cause of sickness and mortality among children and adults. <sup>[1]</sup> South-East Asia has a rich and diverse poisonous snake biodiversity. It varies between the Nations as well as within them.

The venom composition of widely dispersed species, such as Russell Vipers is of crucial therapeutic importance, and Snakebite injuries <sup>[2]</sup> are a major medical emergency that frequently results in hospital admission and requires quick attention from well-trained medical professionals.

As a result, tens of thousands of young individuals, especially those working on farms and plantations, pass away or become permanently disabled. The precise amount of mortality and acute and chronic illness from snakebite is just now beginning to be known, based on comprehensive, meticulously organized community-based research. <sup>[3]</sup> The whole scope of suffering among people in the region is still unknown due to inadequate

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reporting in almost every place. It is highly recommended that all countries in the South-East Asia area define snakebite as a separate illness that requires reporting to rectify this deficiency. Snakebite is predominantly an agricultural problem with major consequences for rural areas as it is primarily an occupational illness of food producers such as farmers, plantation workers, ranchers, and collectors of snake skins. The economics and nutrition of the nations where it usually happens <sup>[4]</sup>.

In South-East Asia, the International Labour Organisation should officially recognize snakebite as a significant occupational ailment. In rural areas, snakebites are a workplace, environmental, and climatic hazard. Lower leg, ankle, and foot bites are common among agricultural labourers and their families. Between 4 and 18 million individuals are bitten by snakes worldwide every year, and between 20,000 and 94,000 of those people die, with the majority of those deaths occurring in South Asia, South-East Asia, and Africa. <sup>[5]</sup> These estimates have a lot of heterogeneity because there isn't much trustworthy population-based research on incidence and death <sup>[6]</sup>.

The substantial burden of death and morbidity brought on by snake bites has led the World Health Organisation to reclassify snakebite as one of the neglected tropical diseases. <sup>[7]</sup> India accounts for the bulk of snakebite fatalities and the ensuing mortality worldwide. An estimated 46,000 people in India die from snakebite each year. Six states, including Odisha, reported having the highest number of snakebite deaths annually. <sup>[8]</sup> One of the main subjects covered in most Indian published literature on snakebite patients is clinical care. The lack of knowledge on the causes and consequences of snakebites impedes the development of practical remedies for this public health concern. In some parts of the world, snakebites have been a major cause of sickness and mortality among children and adults. <sup>[1]</sup> South-East Asia has a rich and diverse poisonous snake biodiversity. It varies between the Nations as well as within them. The venom composition of widely dispersed species, such as Russell Vipers is of crucial therapeutic importance, and Snakebite injuries <sup>[2]</sup> are a major medical emergency that frequently results in hospital admission and require quick attention from well-trained medical professionals.

As a result, tens of thousands of young individuals, especially those working on farms and plantations, pass away or become permanently disabled. The precise amount of mortality and acute and chronic illness from snakebite is just now beginning to be known, based on comprehensive, meticulously organized community-based research. <sup>[3]</sup> The whole scope of suffering among people in the region is still unknown due to inadequate reporting in almost every place. It is highly recommended that all countries in the South-East Asia area define snakebite as a separate illness that requires reporting to rectify this deficiency. Snakebite is predominantly an agricultural problem with major consequences for rural areas as it is primarily an occupational illness of food producers such as farmers, plantation workers, ranchers, and collectors of snake skins. The economics and nutrition of the nations where it usually happens <sup>[4]</sup>.

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## MATERIALS AND METHODS

**Research Design-** This study employed a hospital-based cross-sectional design to investigate snakebite cases. The research was conducted within the Department of General Medicine at PGIMER and Capital Hospital, BBSR, Odisha, from January 2023 to December 2023.

### Inclusion Criteria

- ✓ Hospitalized adult patients diagnosed with snakebite.
- ✓ Patients with a confirmed history of snakebite.

### Exclusion Criteria

- ✓ Patients below the age of 16 years.
- ✓ Individuals with a doubtful history of snakebite.
- ✓ Patients who did not provide consent to participate in the study.

**Data Collection-** Demographic information such as age, sex, residence, education, family income, addiction, place of bite, and occupation of the selected cases was recorded using a pre-designed proforma. This data was gathered through structured personal interviews.

**Statistical Analysis-** Statistical analysis was conducted using SPSS v26 software. Relevant parameters were analyzed to understand the characteristics and patterns associated with snakebite cases.

**Ethical Approval-** Approval for this study was obtained from the relevant ethical committee/board, ensuring that all research procedures adhered to ethical standards and guidelines for protecting participants' rights and confidentiality.

## RESULTS

Table 1 shows the baseline characteristics of the patients included in the study sample. Regarding age distribution, the data indicates that the largest proportion of patients fell within the age range of 30-49 years, constituting 45% of the sample. This was followed by individuals aged 50-60, accounting for 28%, and those aged 16-29, making up 27% of the total. Regarding the sex distribution, males were significantly more represented in the sample, comprising 66%, whereas females accounted for 34%. Address-wise, most patients hailed from rural areas, making up 94% of the sample, with only 6% originating from urban regions. Occupation-wise, the largest

proportion of patients identified as farmers, representing 74% of the sample. Local vendors comprised 16%, construction workers 6%, and housewives 4%, while the remaining 6% fell under the "Others." This breakdown of demographic characteristics provides insights into the composition of the patient population under study, highlighting key demographic trends such as age, gender, urban-rural divide, and predominant occupations among those affected by snakebite.

**Table 1:** Baseline characteristics of the patients involved in this sample

Categories	Frequency (%)
Age Distribution	
16-29 years	27
30-49 years	45
50-60 years	28
Sex Distribution	
Male	66
Female	34
Address	
Urban	6
Rural	94
Occupation	
Farmer	74
Construction Worker	6
Housewife	4
Local Vendors	16

Table 2 presents findings related to the place, site of bite, time of bite, and type of snakebite among the study participants. Regarding the place of bite, most snakebite incidents occurred outdoors, constituting 84% of the cases, whereas only 16% occurred within the home environment. Regarding the bite site, the lower limb was the most commonly affected area, accounting for 88% of reported cases, followed by the upper limb at 10% and the trunk at 2%.

Regarding the time of the bite, the data indicates that most snakebite incidents occurred during the day, representing 82% of cases, while only 18% occurred at night. Lastly, the analysis of the type of snakebite venom reveals that most cases were vasculotoxic, accounting for 82% of the total. Neurotoxic bites constituted 18% of the cases, while there were no reported instances of myotoxic bites. These findings shed light on the circumstances surrounding snakebite incidents, including

where and when they commonly occur and the types of venom involved, which can inform prevention strategies and medical interventions.

**Table 2:** Findings related to place of bite, site of bite and type of snake bite

Category	Frequency (%)
Place of Bite	
Home	16
Outdoor	84
Site of Bite	
Lower Limb	88
Trunk	2
Upper Limb	10
Time of Bite	
Day	82
Night	18
Type of Snake Bite	
Vasculotoxic	82
Neurotoxic	18
Myotoxic	0

## DISCUSSION

One of the medical crises that is most frequently reported from emerging tropical nations is snakebite. It mostly impacts the younger generation of workers. The true pattern of morbidity and death is still largely unclear due to underreporting. Thus, continuous attempts have been made in the WHO's South East Asian Region (SEAR) to designate it as a notifiable illness. [9-11]

This study examined the sociodemographic and epidemiological characteristics of one hundred snakebite victims. The age range in this study with the highest number of cases was 16 to 29. The majority of instances clustered around the age group of 29 years, with very few cases found at the extremities of the age range. These findings were consistent with those of other studies in India and outside. [12] The research participants had a male-to-female ratio of 2.1:1. Analogous results have been documented from research carried out in SEAR and several regions of India. Thirteen research studies from Gujarat and Andhra Pradesh revealed a larger male-to-female ratio, whereas data from other areas of Karnataka revealed a lower ratio. [13,14] 74% of farmers were victims in our survey. This nation's region is mainly known for its agricultural industry, primarily involving outdoor activities. Because men are more likely

than women to work in agriculture-related fields, there are more male snakebite victims in the research than female ones.

According to our research, most snakebite instances happened between 6 p.m. and 12 a.m., which is consistent with other findings. [15-17] Twilight is when snakes emerge to hunt and become active as they become more visible. People may inadvertently tread on the snakes and get bitten because of their reduced vision at night and in the twilight hours. Lower extremities were the most often bitten areas. Seldom have individuals been bitten on the forearms and chest while sleeping on the ground by snakes that accidentally handle them when removing vegetation or when they invade human habitats in quest of prey. Most of the victims in this research were bitten in the lower leg, which agrees with the results of several other investigations.

This study reveals that, out of 100 patients, a vascular or neurotoxic snake had bitten 92%, and a neurotoxic snake had bitten 8%. Our observations align with research findings from Thailand and India. [18,19] Local discomfort was the most often reported symptom, followed by swelling, consistent with other research findings. Twenty Within [20] hours after being bitten by a snake, more than 3/4 of the patients were taken to a hospital. Following hospital admission, most patients (69.6%) got anti-snake venom. Other comparable studies have revealed a similar pattern of admission, which is consistent with our findings. [21] It has been highlighted that immobilization, early hospitalization, and immediate medical intervention in the form of anti-snake venom are essential in lowering the death rate related to snake bites. [22,23]

To address the issue of snakebite and its treatment, it is essential to draw attention to many factors, including a lack of knowledge about snakebite and their potential hazards, a delay in seeking prompt medical attention, difficulty identifying snakes, and a shortage of medical facilities in remote areas. Higher rates of reading and education, as well as more public knowledge of the problem of snakebite in our area, are responsible for the reduced case fatality. The decreased case fatality rates observed in this study may be primarily due to the abundance of private clinics and medical schools in the area, which offer top-notch healthcare services.

## CONCLUSIONS

The significance of focused treatments suited to certain demographics and geographic areas is shown by the socio-demographic profile of snakebite victims. Reducing the incidence of snakebite morbidity and death, especially in rural and marginalized populations, requires actions to strengthen the healthcare system, increase awareness, offer education, and improve access to antivenom. To address the complex issues of snakebite prevention and management, cooperation between healthcare professionals, legislators, community leaders, and non-governmental organizations is required. The study pointed out the demographic and venom patterns in snakebite victims but lacked an understanding of socioeconomic factors influencing outcomes. Further research should explore correlations between income, education, and healthcare access with snakebite severity.

Future efforts could focus on tailored management protocols, community education, and long-term outcome tracking to reduce snakebite burden and mortality. Collaboration between stakeholders is vital for effective interventions.

## CONTRIBUTION OF AUTHORS

**Research concept-** Premakanta Mohanty, Arjun Soren, Sachin

**Research design-** Susanta Kumar Bhuyan

**Supervision-** Susanta Kumar Bhuyan, Premakanta Mohanty

**Materials-** Arjun Soren, Sachin

**Data collection-** Arjun Soren, Sachin

**Data analysis and Interpretation-** Premakanta Mohanty

**Literature search-** Susanta Kumar Bhuyan, Arjun Soren, Sachin

**Writing article-** Arjun Soren, Sachin

**Critical review-** Susanta Kumar Bhuyan

**Article editing-** Arjun Soren, Sachin

**Final approval-** Susanta kumar Bhuyan, Namita Mohapatra, Premakanta Mohanty

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