

BRIEF REPORT

## Trends in Fatal Snakebites in Venezuela, 1995–2002

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**Objective.**—There have been few studies evaluating snakebite mortality in Venezuela and South America. In this study we evaluate trends in fatal snakebites occurring in Venezuela between 1995 and 2002.

**Methods.**—Epidemiological data for this study were retrieved from the records of the Ministry of Health of Venezuela. Using these data, we analyzed the impact of snakebites in Venezuela during the study period.

**Results.**—During the study period, there were 266 reports of death due to snakebite; 79.7% were males, and 20.3% were females ( $P < .01$ ). Annual mean deaths numbered 33 per year. Of total deaths, 24.1% occurred in victims 55–70 years old. Deaths in young children (<5 years old) accounted for 7.1% of the total. Mortality rate by age showed an age-dependent rate, with higher rates in older ages ( $P = .038$ ).

**Conclusion.**—Snake envenomations are an important cause of injury and deaths in Venezuela as in many American countries. Surveillance of envenomations is essential for establishing guidelines, planning therapeutic supplies, and training medical staff on snakebite treatment, as well as assessing risk zones for travelers.

*Key words:* snakebites, snake venoms, mortality, Venezuela, envenomations

### Introduction

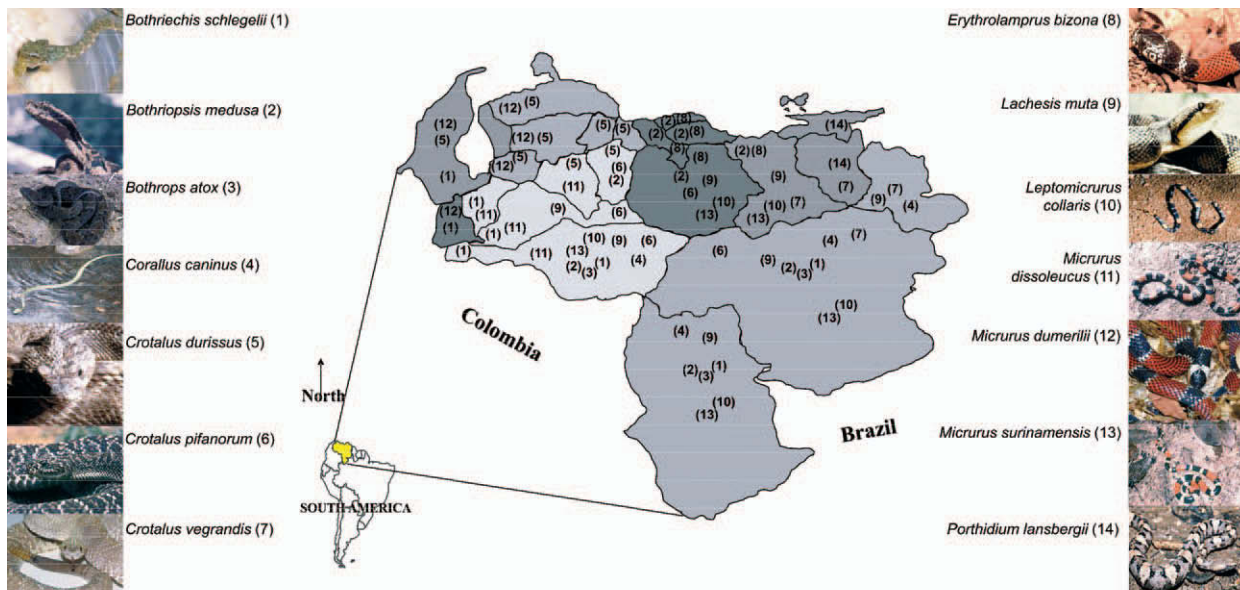
Venomous and poisonous animals are a significant cause of global morbidity and mortality.<sup>1</sup> In the case of venomous snakes, these are found throughout most of the world, including many oceans, and have evolved a variety of highly effective toxins and methods of delivery.<sup>1,2</sup> Their impact on humans is considerable, most current data suggesting they cause in excess of 3 million bites per year, with more than 150,000 deaths. Particularly in the rural tropics, snakebite morbidity and mortality is a significant human medical and economic bur-

den. The major groups of snakes causing bites are the vipers (family Viperidae), the elapids (Elapidae, eg, cobras), the sea snakes (Hydrophidae), the side-fanged vipers (Atractaspidae), and the back-fanged colubrids (Colubridae).<sup>1,2</sup> Although snakebites are rare in some countries, they present challenging and growing problems in many others. In Venezuela, as well as in other countries of South America, bites occur more commonly in jungle regions than in other ecological regions (Figure 1). Like many other tropical and wilderness traumatic illnesses, snakebites are reported more commonly in males living in risk areas, but the incidence in travelers has increased in recent years.<sup>3,4</sup>

In a recent study done in Goiás, Brazil, from 1998 to 2000, the authors reported 3261 accidents caused by venomous snakes, with a case fatality rate of 0.46%.<sup>5</sup> In a previous study in the same country, between 1989 and 1996, the authors found a total of 1576 accidents in the state of Amazonas, with a mortality of 1%.<sup>6</sup> In another Brazilian study in Rio Branco, Acre, based on an evaluation of 144 patients admitted with snakebites in the

This work was previously presented in part at the XVIth International Congress for Tropical Medicine and Malaria, the IVth European Congress on Tropical Medicine and International Health, and the VIIe Congrès International de la Société de Pathologie Exotique, September 11–15, 2005, Marseille, France (Oral presentation, O-042, pp 38).

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**Figure 1.** Relative position of Venezuela and a list of most important snake species distributed in the country.

year 2002, no deaths were recorded.<sup>7</sup> During 1999, 17 704 snakebites occurred in this country, corresponding to a rate of 10.4 cases per 100 000 population.<sup>5-7</sup>

In the setting of few studies about mortality due to snakebites in other countries of South America, the objective of this report was to evaluate the trends in fatal snakebites in Venezuela between 1995 and 2002.

## Methods

Epidemiological data for this study were retrieved from the records of the Ministry of Health of Venezuela. With these data, an analysis of snakebite impact in Venezuela during the study period was performed. Morbidity data were inadequate at the national level to perform further analyses beyond the primary analysis, and the objective of this report was to evaluate the trends in snakebite mortality in Venezuela between 1995 and 2002. We reviewed all mortality records from the Ministry of Health of Venezuela, using ICD-9 and ICD-10 codes to search for all deaths due to snakebites during the study period. Mortality records were compiled from the regional records of the whole country (24 states). Each of these records integrated information from the municipalities' health offices (the basic level of administrative health reporting). Each death due to snakebite was classified in the record according to the age and gender of the individual.

In Venezuela, snakebites are officially reportable, but, in practice, it is more of a voluntary registry, a cause

for underreporting of morbidity. Conversely, all cases of deaths are specifically and obligatorily reportable, and mortality information is more available and accurate.

Data were statistically processed to assess the importance, features, and trends of fatal snakebites in Venezuela, a country with considerable diversity of snake species (Figure 1). Chi-square and *F* tests were used for comparison of quantitative and qualitative variables, respectively, and *P* values less than .05 were regarded as significant.

## Results

For this period, 266 patients died from snakebites in Venezuela. The mean number of annual deaths was  $33.3 \pm 7.5$  per year. This figure did not vary significantly during the study period ( $r^2 = .1628$ ,  $F = 1.17$ ,  $P = .322$ ). The mortality rate ranged from 0.1 deaths per 100 000 population (in 1997) to 0.2 deaths per 100 000 population (in 2001) (Figure 2a).

The gender distribution was 79.7% males and 20.3% females ( $P < .01$ ). The age distribution showed that deaths occurred in 24.1% of the group of 55- to 70-year-olds, 19.5% of the group of 5- to 20-year-olds, and 18.8% of the group of 30- to 45-year-olds ( $P = .27$ ) (Figure 2b). Deaths in young children (<5 years old) were recorded in 7.1% (Figure 2b). Mortality rate by age showed an age-dependent tendency, with higher rates in older ages ( $r^2 = .2065$ ,  $F = 4.99$ ,  $P = .038$ ) (Figure 2c).

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