

The Global Snake Bite Initiative: an antidote for snake bite

David Williams, José María Gutiérrez, Robert Harrison, David A Warrell, Julian White, Kenneth D Winkel, Ponnampalam Gopalakrishnakone, on behalf of the Global Snake Bite Initiative Working Group and International Society on Toxinology

Clinicians have for a long time witnessed the tragedy of injury, disability, and death from snake bite that is a daily occurrence in many parts of Africa, Asia, and Latin America. To many people living in these regions, including some of the world's poorest communities, snake bite is an ever present occupational risk and environmental hazard, an additional penalty of poverty. Like malaria, dengue, tuberculosis, and parasitic diseases, the risk of snake bite is always present. Unlike many of these other public health risks, however, the burden of human suffering caused by snake bite remains unrecognised, invisible, and unheard by the global public health community, forgotten by development agencies and governments alike. The problem is so underrated that it was only added to WHO's list of neglected tropical diseases in April, 2009.

Yet an estimated 5·4–5·5 million people are bitten by snakes each year,^{1,2} resulting in about 400 000 amputations,³ and between 20 000 and 125 000 deaths.^{1,2} We recognise that snake bite does not have the epidemic potential of infectious and vector-borne parasitic diseases, but we should emphasise that the yearly mortality caused by snake bite is much greater than that attributed to several presently recognised neglected tropical diseases, including dengue haemorrhagic fever, cholera, leishmaniasis, schistosomiasis, Japanese encephalitis, and Chagas' disease (table).⁴ The reason might be that recognition of these important diseases as neglected problems has encouraged efforts to combat them. In 1986–87, a massive epidemic of yellow fever occurred in Nigeria, killing an estimated 20 000 to 30 000 people.^{6,7} Since then, the hundreds of millions of US dollars rightly invested by the global community in immunisation of susceptible populations against yellow fever seem to have succeeded in the prevention of such epidemic catastrophes. This outcome is supported by accounts of 114 reported cases resulting in 58 deaths in seven African and four south American countries in 2006,⁸ and 2058 cases resulting in

106 deaths in 16 African countries, and 117 cases with 52 deaths in five south American countries in 2005.⁹ Globally, 177 963 new cases of cholera and 4031 deaths in 2007 (36% reduction since 2006)² are much fewer than even the most conservative data for snake bite. Dengue causes an estimated 500 000 new infections each year, including about 73 000 severe cases, 19 000 of which are fatal, whereas snake bite, a newly recognised neglected tropical disease, can kill up to six times more people.¹⁰

So what is the reason that snake bite, which causes enormous suffering, and maims or kills hundreds of thousands of men, women, and children each year (figure), has not previously registered on the global health agenda? No other disease of similar importance is so closely associated with impoverished rural environments, and agricultural occupations. Do the communities at greatest risk of snake bite simply lack a collective political voice, and the three essential components of successful public health intervention—ie, consistent advocacy, comprehensive community engagement, and compliance?

Within communities, causes of illness and death are rarely forgotten. They are familiar to local medical fraternities, to those who study and record their effects, and, most of all, to the bereaved families of the victims and the communities in which they live and die. Diseases are forgotten, neglected, and abandoned by governments, public health organisations, and development agencies when their effects are not identified and clearly articulated. Besides the need for concerted advocacy, timely, accurate information and appropriate policy settings are crucial to improve the perceptions of funding providers especially when public health budgets are entirely inadequate and priorities are too focused.

The first attempt to review the worldwide epidemiology of snake bite was reported in 1954.¹¹ However, many governments and public health organisations did not formally recognise the actual burden of snake bite, which caused under-reporting and made improvement in the quality and authority of the estimation of the burden of global snake bite difficult. The few reported estimates of global snake bite urgently need to be substantiated with country by country data for the burden of disease. Substantial investments of time and effort are needed to establish acceptable methods to gather and analyse the data for snake bites, while avoiding the situation whereby funding partners demand the data before funding the data gathering.

Compliance with appropriate regulatory standards in the production of therapeutic interventions is another fundamental public health requirement, allowing global partners to act on the basis of information that addresses

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Australian Venom Research Unit, Department of Pharmacology, University of Melbourne, Parkville, VIC, Australia (D Williams BSc, Prof D A Warrell FMedSci, K D Winkel PhD); Nossal Institute for Global Health, University of Melbourne, Parkville, VIC, Australia (D Williams); Instituto Clodomiro Picado, Universidad de Costa Rica, San José, Costa Rica (J M Gutiérrez PhD); Alistair Reid Venom Research Unit, Liverpool School of Tropical Medicine, Liverpool, UK (R Harrison PhD); Nuffield Department of Clinical Medicine, University of Oxford, John Radcliffe Hospital, Oxford, UK (Prof D A Warrell); Toxinology Department, Women's and Children's Hospital, North Adelaide, SA, Australia (J White MD); and Y L L School of Medicine, National University of Singapore, Lower Kent Ridge Road, Singapore, Singapore (Prof P Gopalakrishnakone DSc)

Correspondence to:

Mr David Williams, University of Melbourne, Australian Venom Research Unit, Grattan Street, Parkville, VIC 3010, Australia d.williams4@pgrad.unimelb.edu.au

For more on the [Global Snake Bite Initiative](#) see <http://www.snakebiteinitiative.org>

	Incidence	Deaths
Chagas' disease ⁴	217 000	14 000
Cholera ⁵	178 000	4000
Dengue haemorrhagic fever ⁴	73 000	19 000
Leishmaniasis ⁴	1 691 000	51 000
Japanese encephalitis ⁴	44 000	14 000
Schistosomiasis ⁴	5 733 000	15 000
Snake bite envenoming ^{1,2}	420 000–2 682 000	20 000–125 000
Yellow fever ^{6,7}	100–2100	60–100

Table: Comparison of snake bite incidence and mortality rates with some other formally recognised WHO neglected tropical diseases

For WHO's list of neglected tropical diseases see http://www.who.int/neglected_diseases/diseases/en/

For the Global Alliance for Vaccination and Immunization see <http://www.gavialliance.org>

not just the issue of burden, but also the costs, risks, and benefits of interventions. As long as product safety and efficacy remain untested and unproven, cost effectiveness and market sizes are unquantified, and regulatory frameworks remain fragile, the demand for antivenom in countries around the world will continue to be insufficient and organisations such as the Global Alliance for Vaccination and Immunization will be reluctant to become actively involved in the issue.

Philanthropists, health economists, and civil society organisations that recognise health as an investment in the alleviation of poverty have renewed interest in addressing public health challenges in the tropical world. This interest provides encouragement for the development of a new strategy to address the neglected problem of snake bite. The positive efforts of WHO to develop standard guidelines for the production, regulation, and control of snake antivenoms,¹² drawing attention to the problem in a report by WHO/UNICEF,¹³ and support from WHO's Department of Neglected Tropical Diseases² are important and commendable improvements. However, further research is needed with implementation of existing knowledge. To be most effective, this strategy requires global policy initiatives and advocacy campaigns, and also the development of sustainable local solutions. Within countries and regions, specific issues need to be addressed with the collective experience and skills of toxinologists, clinicians, epidemiologists, zoologists, health economists, health promoters, policy makers, philanthropists, governments, community-based groups (particularly those groups working with people who have disabilities), and other stakeholders. A new model is available for those working in the specialty of neglected

Panel: Key initiatives

- Community education about improved prevention and preclinical care on the basis of the specific needs of different regions, consistent advocacy, and comprehensive community engagement
- Improved injury surveillance, and advocacy for making snake bite a notifiable disease so that reporting becomes mandatory at local, national, and regional levels
- Further clinical and basic research with focus on an improved understanding of injury mechanisms and optimisation of interventions
- Systematic approaches to improve medical management, education, and training of medical and paramedical personnel, focusing on the specific needs of different regions (teaching materials should be developed by those with first-hand experience of treating snake bites)
- Functional support for the prequalification of antivenoms (the only specific antidote for envenoming), research to improve their safety and clinical effectiveness, and storage conditions and hence shelf life
- Promotion of rehabilitation and prevention of disability through engagement with established stakeholders in this field so that the physical, economic, and psychological handicaps resulting from snake bite are kept to a minimum
- Build effective public health policy and governance frameworks, and create innovative financing bridges to enable programmes to be put into practice

tropical diseases.¹⁴ Snake bite is a neglected condition that, rather than competing for resources, can benefit from integration with programmes funded to address HIV/AIDS, tuberculosis, and malaria, and contribute to the achievement of Millennium Development Goals.

The collective efforts of the world toxinology community and individuals working in the specialties of injury, disability, and health economics led to the launch of a global snake bite initiative at the inaugural conference in Melbourne, VIC, Australia, in November, 2008.¹⁵ An interdisciplinary working group was formed to develop practicable solutions to the problems associated with snake bites. The project was immediately endorsed by the International Society on Toxinology. In partnership with public health agencies, academia, governments, industry, and other professional and civil society stakeholders, we are formulating a new approach to global snake bite reduction. Efforts to reduce the burden of suffering and deaths should, in addition to focusing on the traditional treatment with antivenoms, include the seven key initiatives shown in the panel.

The lessons that we can learn from other public health initiatives (eg, those for malaria and HIV) are obvious and imperative. The establishment of networks between governments and relevant stakeholders, such as the producers of antivenom, researchers, local organisations, and funding bodies, is the best way to provide the



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Figure: African girl with scars and contractures from her encounter with a black-necked spitting cobra (*Naja nigricollis*)

financial stimulus needed, not only to make vital antivenoms safe, and improve their efficacy and affordability, but also to encourage coordination between ancillary programmes that provide rural workforces with protective clothing and footwear; communities with effective first aid strategies; rural doctors and health workers with much needed education and training; health centres with improved infrastructure, basic drugs, and equipment packages; rehabilitation for people with disabilities; and access to prosthetic services for amputees.

With powerful, passionate advocacy, and at the same time, greatly improved information about the burden of human suffering attributable to snake bite, and compliance with the requirements of organisations with the capacity to mobilise resources, we can give snake bite global public health recognition so that it is no longer an obscure, denied, and neglected condition. In so doing, we can protect, save, and repair millions of lives, relieve an enormous personal and collective economic burden, and provide sustainable contributions to improving health in some of the world's poorest regions.

To quote Bill Gates: “humanity’s greatest advances are not in its discoveries—but in how those discoveries are applied to reduce inequity”.¹⁶

Contributors

All authors participated in writing the Viewpoint, and have seen and approved the final version.

Conflicts of interest

JW’s hospital department provides a consultant clinical toxinology service for doctors treating envenomation that is supported by Commonwealth Serum Laboratories (CSL), Melbourne, VIC, Australia; JW does not own shares in CSL. CSL provides some support to the Australian Venom Research Unit for KW. All the other authors declare that they have no conflicts of interest.

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