Snake bite: An unrecognized burden of human suffering

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Neglected NTDs?

Diseases covered by NTD Department:
- Buruli Ulcer
- Chagas disease (American trypanosomiasis)
- Cysticercosis
- Dengue/dengue haemorrhagic fever
- Dracunculiasis (guinea-worm disease)
- Echinococcosis
- Fascioliasis
- Human African trypanosomiasis
- Leishmaniasis
- Leprosy
- Lymphatic filariasis
- Onchocerciasis
- Rabies
- Schistosomiasis
- Soil transmitted helminthiasis
- Trachoma
- Yaws

Other 'neglected' conditions:
- Podoconiosis
- Snake bite
- Strongyloidiasis
Neglected NTDs?

The plight of millions of victims of snake bites deserves...
Neglected NTDs?

The plight of millions of victims of snake bites deserves

- to be covered by WHO’s NTD department
- to be prioritised among NTDs

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Making the case for snake bite at an important NTD

• Any claim that a disease is unjustly neglected must be built on reliable quantitative evidence that it causes substantial mortality and/or morbidity
Making the case for snake bite at an important NTD

- Any claim that a disease is unjustly neglected must be built on reliable quantitative evidence that it causes substantial mortality and/or morbidity
- In the case of snake bite, these data were not available....until recently
Community-based studies in Africa
Snake bite deaths

Bandafassi, Senegal
14/100,000/year

Nigeria, Malumfashi
4/100,000/year

Muri, Nigeria
8/100,000/year

Kilifi, Kenya
7 adults /100,000/year
Community-based studies in Asia
Snake bite deaths

Eastern Terai, Nepal
162/100,000/year

Bardhaman, West Bengal
16/100,000/year
Snake bite deaths in India and Bangladesh
Joseph Fayrer (Indian Medical Service) (1873):
“The destruction of life in India by snake-bites is so great, that, ..... it probably destroys over 20,000 human beings annually” (also affects domestic animals)
How many people are being killed by snake bite in 21\textsuperscript{st} century India?

- Official Government of India website 2003-2008: average \textbf{2,183 snake bite deaths/year}
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~11,000 deaths/year

National snake bite data: Registrar General of India’s “Million Deaths Study”

- Attempts to assign causes of all deaths in 6,671 randomly chosen sample areas (average population ~1,000 each) throughout the whole country, using **verbal autopsy**
- Independent of hospital underreporting
- Nationally representative

Million deaths study:
statewise distribution of snake bite deaths

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statewise distribution of snake bite deaths


Highest numbers of deaths
Uttar Pradesh 8,700
Andhra Pradesh 5,200
Madhya Pradesh 4,500

Death rate / 100,000
- 3.0 – 3.5
- 3.5 – 5.0
- 5.0 – 6.5
- Data not shown
Million deaths study: statewise distribution of snake bite deaths

Highest numbers of deaths
- Uttar Pradesh 8,700
- Andhra Pradesh 5,200
- Madhya Pradesh 4,500

Highest death rates
- Andhra Pradesh 6.2
- Madhya Pradesh 5.9
- Orissa 5.6

Snake bite deaths in India in 2005:
National totals

- Deaths attributable to snake bite:
  46,000 (99% CI 41,000-51,000)
  1 snake bite death for every 2 HIV/AIDS deaths
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  5-14 yr   3%
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  5-14 yr 3%
- Proportion of victims dying in rural area: 97%
- Proportion of victims dying in health facility: 23%
Bangladesh

- 9,000 people in nearly 4,000 randomly selected households throughout the country provided information about snake bites/deaths

- **National annual totals:**
  ~600,000 bites, ~6,000 deaths
  calculated by extrapolating to the total population of rural Bangladesh.

Estimated Global snake bite mortality

- Americas: 4,000 deaths
- Europe: <50 deaths
- Africa: >20,000 deaths
- Asia: >75,000 deaths
- New Guinea: 300 deaths

Global annual total: >100,000 deaths
Why have we been misled about incidence of snake bite?

- Snake bite victims usually consult local traditional healers
- Consequently, most snake bite victims suffer and die outside medical facilities
- As a result, hospital returns under report the snake bite in the community
Traditional treatment of snake bite

Bangladesh

Ecuador

Thailand

Sri Lanka
How might snake bites be prevented?
Snake bite: epidemiology

High risk populations:
- Impoverished rural communities in tropical developing countries
- Farmers, herdsmen, plantation workers (occupational disease)
- Children
- Indigenous hunter-gatherers
Snake bite: epidemiology

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Snake bite: epidemiology

- Vulnerability to krait and spitting cobra bites: sleeping on the ground
- Krait bite “early morning paralysis”
Snake bite is a rainy season (monsoon) disease

Reducing the risk of bites by community education for behavioural change

Identify the most dangerous
- Environments
- Times of year
- Times of day

Promote
- Awareness
- Footwear
- Torch, flashlight or lantern after dark
- Safer sleeping
Safer walking

- Protect lower legs and feet

Fang poof boot®DMR


- Carry a light at night
Safer sleeping

- Sleep off the ground (bed or hammock)
- Or under well tucked-in mosquito net
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Reducing the risk of debilitating or fatal envenoming

- Promote appropriate first-aid methods (pressure-pad, pressure-immobilisation....)


- Rapid transport to medical care

  Sharma SK et al (in preparation)

- Discourage ineffective, time-wasting and often dangerous traditional treatments
Transport to medical care
Transport to medical care
Effects of envenoming preventable or reversible by antivenom

Morbidity

• Necrosis of bitten part complicated by infection and malignancy (amputations)
• Neurological sequelae of strokes, chronic renal failure and chronic panhypopituitarism
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Mortality
- Shock
- Respiratory muscle paralysis
- Bleeding and thrombosis
- Acute kidney injury
Guidelines: Prevention and Clinical Management of Snakebite in Africa

Black Mamba
05-05 Dendroaspis polylepis Zam
© David A. Warrell

WORLD HEALTH ORGANIZATION
Regional Office for Africa
Brazzaville ● 2010
Coordination with other tropical disease control programmes

Community education integrated with control programmes for other diseases: provision and Promotion of

- Footware: podoconiosis, soil-transmitted helminths, Buruli ulcer...
- Bed nets: malaria, leishmaniasis etc.
Snake bite: combined programmes

- Occupational/agricultural/veterinary diseases
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Who will stimulate and coordinate action against snake bite?

The Global Snakebite Initiative (GSI) Established in Melbourne in 2008 to:

• Advance knowledge of snake bite epidemiology
• Improve access to effective antivenoms
• Train medical personnel in their clinical use
• Promote community education for the prevention of snake bites
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Conclusion: Reasons for prioritising snake bite among WHO’s NTDs

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- Preventive methods can be coordinated with other disease control programmes
- Effective antidote for envenoming (antivenom) (“tool-ready NTD”)
- On the steep part of the “investment-response curve”: relatively modest investment could yield a disproportionately large benefit to snake bite victims
Snake bite: an unrecognized burden of human suffering
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For too long, neglected, rejected and forgotten as a serious public health issue
Waorani deaths from snake bite (Ecuador)

Fig. 2
Causes of Waorani deaths.

Based upon data extending to five generations of genealogies, excluding post-European contact data (Dgr.: J.A. Yost).

Savages
Joe Kane
Long term complications of snake bite
Long term complications of snake bite
Long term complications of snake bite
Long term complications of snake bite
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Neglected *Bothrops atrox* bite Peru
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• Snake bite is rarely seen in many hospitals in tropical developing countries; it always seems to happen somewhere else, not here
• In Western countries, it is often a self-inflicted injury
• The medical literature is unconvincing and antivenom is rarely available so why encourage snake bite victims to come to the hospital?
• Snake bite will disappear with urban spread and environmental destruction
Judaeo-Christian tradition: Genesis 3.6

Lucas Cranach The Elder “Adam and Eve in the Garden of Eden” 1510 (Warsaw)
Judaeo-Christian tradition: Genesis 3.6

Lucas Cranach The Elder “Adam and Eve in the Garden of Eden”
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National snake bite data: Bangladesh
Primordial fear and denial

An almost universal fear and loathing of snakes!