



A member of the Irula tribe holding a cobra. The tribe members catch snakes to extract and sell the snake venom.

Photo: Yves Soulabaille/LookatSciences/laif

Snakebite brings social and financial burden among Indian farmers

Snakebites are a crucial, yet underreported issue in many South Asian countries. In India, they kill some 50,000 people every year. However, the government has neglected the issue. Now, it's time to seriously address this all but forgotten public health problem, our author maintains.

TN Muthusamy sits on a stack of rice sacks at his home in Thayirpalayam, a village near Erode town in the Indian state of Tamil Nadu. The sacks that he is sitting on are, however, not produced from his own farm. "I was growing paddy, corn and sesame on my farm for 15-20 years, until I was bitten by a poisonous snake in 2012. After the bite, I could no longer work in the fields," Muthusamy says.

According to the Million Deaths Study (MDS), headed by the Registrar General and the Centre for Global Health Research, snakebites claim the lives of 45,000–50,000 people in India every year. However, this figure

is debatable as most snakebites are unreported, with no official records. Sakthivel Vaiyapuri, a scientist at the Institute for Cardiovascular and Metabolic Research, University of Reading, United Kingdom, who published a paper titled 'Snakebite and its Socio-Economic Impact on the Rural Population of Tamil Nadu, India', believes that these numbers could be higher. "No one knows the actual data," Vaiyapuri maintains. "The MDS is a representative study, and that will not work in India because snakebites range across states, which is not considered here."

Vaiyapuri's study estimates 10,000 deaths and 100,000 bites from snakes yearly just in the state of Tamil Nadu. "If we use these as indicative numbers, total deaths from snakebites in India would be 200,000, and total bites would be two million. Further, these numbers double in the monsoon, when there is higher bite incidence,"

he says. "The primary healthcare centres need to send snakebite records to medical and rural health services departments." Many fishermen lacking access to treatment also die from poisonous sea snakes in Tamil Nadu and Kerala.

Snakebite is a critical issue across South Asia, and India is considered to have the highest incidence of bites and associated deaths in the world. The most vulnerable people are the poor farmers. Living in remote villages, they are cut off from access to medical facilities. "The snakebite happened at about eight in the evening," Muthusamy recalls. "I became unconscious, and was rushed to the government hospital. I was given antivenom and sent to a private hospital for dialysis (kidney treatment)." Muthusamy was bitten by a Russell's viper. This snake's venom affects the kidneys directly. Although antivenom is given

Sharada Balasubramanian
Journalist
Coimbatore, India
sharadawrites@gmail.com

for free at the government hospital, the victims are often left with no choice but to visit private hospitals to save their vital organs, as there is no facility for dialysis at public hospitals.

■ Heavy social and financial burden

Muthusamy spent a month in a private hospital, with two weeks in the intensive care unit. Not only did he lose his livelihood as a farmer, but he spent almost Rs 400,000 on healthcare in the hospital. "I sold jewellery, and my relatives loaned me some money. I am still paying my dues and interest," the farmer explains. "Additionally, I had to pay labourers working on my farm and spend money to hire tractors."

Since snakebites are unforeseen incidents, the affected farmers face sudden financial pressures. Vaiyapuri's paper reveals that over 40 per cent of victims took out loans to pay for treatment, and to repay the same, they were forced to sell their land. The nationalised banks do not provide medical loans for snakebites. "This is largely an agricultural problem. There is no medical insurance, and farmers sell everything to survive, which turns their life upside down," Vaiyapuri states. Almost 18 per cent of victims surveyed sold their stored crops (valued from Rs 1,000 to 20,000), 14 per cent sold valuable items (valued from Rs 10,000 to 100,000), more than 9 per cent sold cattle (valued from Rs 5,000 to Rs 30,000) and over 5 per cent sold vehicles such as bicycles (valued from Rs 1,000 to 2,000) and motorcycles (valued from Rs 5,000 to 20,000). Some farmers also sold family land or property (valued from Rs 50,000 to 400,000), while others were forced to stop sending their children to school.

Selvaraj Palanisamy is one among them. He recalls: "It's been over three years since I was bitten by a cobra. I am still paying my loans, after spending almost Rs 1,000,000 on treatment in a private hospital. I have three children, and I am unable to pay their school fees. I cannot practice agri-

culture either." If a farmer dies from snakebite, there is compensation of Rs 20,000-25,000 by the state for his family. For, injury, there is no compensation.

Robin Bernard, a snakebite survivor, founded the National Snakebite Initiative in 2011 at Erode in Tamil Nadu, with an aim to protect the lives of both the farmers and the snakes. "Snakebite is a neglected issue, a poor man's disease, and not many people are willing to work on it. The local people here even hesitate to speak or do anything about it," Bernard says. The NGO uses flashcards to raise awareness among villagers on snakebites and safety measures. "The first thing we tell them is not to kill snakes as they play an important role in agriculture," he explains. Snakes are natural rodent controllers in farms, protecting crops and harvests and preventing serious diseases from being spread e.g. by rats.

Bernard says, "We culturally and environmentally linked the importance of snakes, and slowly expanded the outreach programme." In 2013, the NGO won UN recognition for its rural snake safety campaign. It ran an epidemiological survey which gives details on bite, and also on what victims do when they return home from hospital. "Sometimes, superstition causes victims to change homes, names and phone numbers after the bite due to superstition. Following a victim in the village is a challenge," Bernhard says. The NGO also ran activities on rural snake safety for the villagers. In the youth and development programmes, they worked on a historical envenomation survey, where details on snake-



Selvaraj Palanisamy was bitten by a cobra.
Photo: Sharada Balasubramanian

bite were collected from the victims. A snake safety and skill development training programme was organised for the fire service, the forest department and the police.

Relocation of snakes and record keeping are issues the NGO faces even today. Equipment such as safety gear like tongs and hooks was designed and promoted at lower cost, and the forest officers were trained to use them. Now the forest department officials are able to identify the snakes.

■ Raising awareness – easier said than done

Awareness of the snakebite problem among farmers in India is minimal. "The farmers don't know that they should not lie down when the leg gets bitten. They immediately tie the wound tightly. When they reach the hospital and the tied wound is opened, the venom spreads fast and impacts vital organs," says Shyamala Robin of the National Snakebite Initiative. Bernard recalls an incident when a victim consumed alcohol on his way to the hospital. He could not be given anti-venom and died within three hours. Another patient sat in front of the television after the bite instead of rushing to the hospital. "In the past, the farmers were more aware of the problem. For example, they knew that snakes always move in corners. So they painted broad white lines on the corners of the houses, which made it easier for them to spot the snakes," Bernard explains. "Also, people wore rubber slippers that were noisy and used to carry sticks, tapping them while going to the field. This would alert the snakes, and they moved away." "The farmers can wear shoes, or at least carry a torch to minimise the impact," says Vaiyapuri. Farmers have to be taught to distinguish poisonous from non-poisonous snakes, and know where medicine will be available.

■ Lacking medical treatment

"According to government rules, every primary health care centre must

have antivenom. None of the centres I visited in Tamil Nadu during my study stocked antivenom. We are using polyvalent venom which can be applied to all bites," says Vaiyapuri. This antivenom works against bites of the "Big Four" – the cobra, the saw-scaled viper, the common krait and Russell's viper. But it may not be effective against bites from snakes such as the hump-nosed pit viper and the Levantine viper. Antivenom given after a non-venomous bite could trigger potentially dangerous reactions. So it is vital to improve diagnosis of snakebite and develop new treatment methods with reduced side effects that are also effective against snakes other than the Big Four.

"There are about 20 to 25 proteins in snake venom. We are working on a universal antidote, a mixture of chemical compounds that can block or neutralise venom proteins to prevent them from spreading in the victim's body," Vaiyapuri explains. The medicine in the form of tablet, injection or nasal spray will have 10 to 15 chemicals. The nasal spray will go to the lungs and spread faster.

This medicine will cost less as these chemicals are already available. "They have no expiry date, do not need cold storage and farmers can carry them to fields," Vaiyapuri says. "Further, patients need not visit hospital, and the medicine can be used for any snakebite. These chemical compounds can

be altered to neutralise the impact of bite. In vipers, 80 per cent of the neurotoxin can be neutralised."

Vaiyapuri has also screened 30 plants which were used by traditional healers to cure snakebites. "We found that twelve plants show an effect on bite," he explains. "We are doing a parallel study on how chemical compounds from plants can be used."

■ What needs to be done

WHO's guidelines on snakebite management in South East Asia recognise that community education is the most effective preventive measure. The clinical staff in the primary health care centres and local people should be trained in first aid measures. This first aid kit and antivenom should be available in the centre to take immediate action. If it is not available in health centres, there should be vehicle services to take victims to hospitals in time. Both Bernard and Vaiyapuri stress the need for envenomation experts in India. "Who tells the doctor that the kidney failure is due to snakebites? They treat patients like any other poison victim," says Bernard. There should be a separate envenomation unit in hospitals. The village leaders should take the initiative in training local people. The victims and the scientists believe that the treatment should be made free even in private hospitals.

The impact of the bite depends on the health of the individual, how fast the victim reaches the hospital, and how much venom has been injected into the body. For villagers living far away from city hospitals, an emergency ambulance service could be of help. The local government should play an important role in spreading awareness. Short videos could be produced on snake safety. Further, awareness and training programmes could be run in rural health centres. Here, both farmers and health staff could learn the most important practices in handling snakebites – that the patient should not walk after a bite on the leg, that first aid should be given in 2 to 3 hours – which is indeed a challenge in rural areas – and that, if bandage is tied half a foot away from the bite area, 70 per cent of venom mixing will be blocked. Using a pressure bandage will slow down the venom spread, giving the victim more time to reach hospital. Vaiyapuri stresses that medical staff at health centres have to grasp how important swift action is and stop sending victims to city hospitals without doing anything themselves.

Research funding for snakebites is very poor globally. No medical advancement has happened in the last 125 years. "The Indian government could fund this research because it will benefit Indians, who are after all the most affected people," says Vaiyapuri. "The Indian government has banned sending snakes to other countries. Hence, it is difficult to research in our labs. The central government should take steps to promote research in this field."

Vaiyapuri's team is now working on a diagnostic kit. "There is a strong need for this in India because this kit will confirm if there is a snakebite, which snake has bitten, and the quantity of venom circulating in the blood," he explains. Further, there is a need to get information on snakebite incidents, especially in the rural areas where snakebites are most common. It is important that the public, researchers and the clinical community come together to work on this issue.



TN Muthusamy (left) chatting with Robin Bernard of the National Snakebite Initiative. Bernard advises farmers to have tongs in the house to catch snakes.

Photo: Sharada Balasubramanian