



केन्द्रीय प्रदूषण नियंत्रण बोर्ड  
CENTRAL POLLUTION CONTROL BOARD  
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार  
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

Speed Post

No.A-14011/1/2018-WQM-1

26-06-2018

To,

Member Secretary,  
West Bengal Pollution Control Board,  
Paribesh Bhavan Building, No.10-A,  
Block -LA, Sector 3, Salt Lake City,  
Kolkata – 700098

**Sub: News item in 'The Hindu' regarding rising concern on the deaths due to arsenic-laden groundwater in nine districts of West Bengal**

This has reference to the communication, dated 11.06.2018, File No. Q-15015/02/2018-CPW, received from Sh. M.R. Chandwara, Section Officer, CP Division, Ministry of Environment, Forest and Climate Change forwarding the O.M. from Rajya Sabha Secretariat, regarding rising concern on the deaths due to arsenic-laden groundwater in nine districts of West Bengal.

It is, therefore, requested to investigate the matter and submit action taken report to CPCB for timely submission of comments to MOEF & CC.

Yours faithfully

(R.M. Bhardwaj)  
Sc 'E' & In-Charge WQM-I Div.

Encl: As above

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032

Parivesh Bhawan, East Arjun Nagar, Delhi-110032

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File No. Q-15015/02/2018 - CPW  
Government of India  
Ministry of Environment, Forest and Climate Change  
CP Division

*S. Tuls M/S  
W.B.M.-J*

Prithvi 2<sup>nd</sup> Floor, Indira Paryavaran Bhawan  
Jor Bagh Road, New Delhi – 110 003

Dated 11<sup>th</sup> June, 2018

To

1. The Member Secretary  
Central Pollution Control Board  
Parivesh Bhawan  
East Arjun Nagar, Shahdara  
Delhi 110 032

2. The Member Secretary  
West Bengal Pollution Control Board  
Paribesh Bhavan,  
10A, Block-L.A., Sector III, Salt Lake  
City, Calcutta - 700 106

3. The Member Secretary  
Central Ground Water Board  
West Block-II,  
Wing-3 (Ground Floor),  
Sector-1, R.K. Puram,  
New Delhi-110066.

**Subject: News items in 'The Hindu' rising concerns on the death due to arsenic – laden groundwater in nine district of West Bengal-regarding**

Sir,

Undersigned is directed to enclose an Office Memorandum received from Rajya Sabha Secretariat regarding news items published in 'The Hindu' about rising concerns on the death due to arsenic –laden groundwater in nine district of West Bengal. A copy of OM received from Rajya Sabha Secretariat is enclosed for reference.

It is requested to provide comments on the matter to this Ministry by 14<sup>th</sup> June 2018.

Encl: As above

Yours faithfully,

*M.R. Chandwara*  
(M.R. Chandwara)  
Section Officer – CPW  
Tele - 24695299

*68653/D.S*  
*12/06/18*

*68653/M  
M/ob*

*SD (ECS)*

*Ramly J.  
15/6/2018*

*We may seek a ATR from  
on the captioned subject PL*

*WB PCB*

*SDS (M.S. PI)*

*Lunish  
18/6/2018*

*Dr. Deepika*

*15/6/18*



**भारतीय संसद**  
**PARLIAMENT OF INDIA**  
**राज्य सभा सचिवालय**  
**RAJYA SABHA SECRETARIAT**

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वेबसाईट : <http://rajyasabhbahindi.nic.in>

Parliament House/Annexe,  
New Delhi-110001  
Website : <http://rajyasabha.nic.in>

No. RS.17/1/2018-S&T

Dated the 6<sup>th</sup> June, 2018

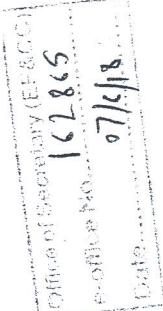
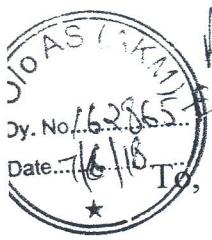
## **OFFICE MEMORANDUM**

The undersigned is directed to forward herewith a news item published in 'The Hindu' on 19<sup>th</sup> May, 2018 raising concerns on the deaths due to arsenic-laden groundwater in nine districts of West Bengal.

2. The Ministry of Environment, Forest and Climate Change is, therefore, requested to kindly furnish its comments on the issues raised in the said news-item latest by 15<sup>th</sup> June, 2018 for the consideration of the Committee.
  3. Receipt of this O.M. may kindly be acknowledged.

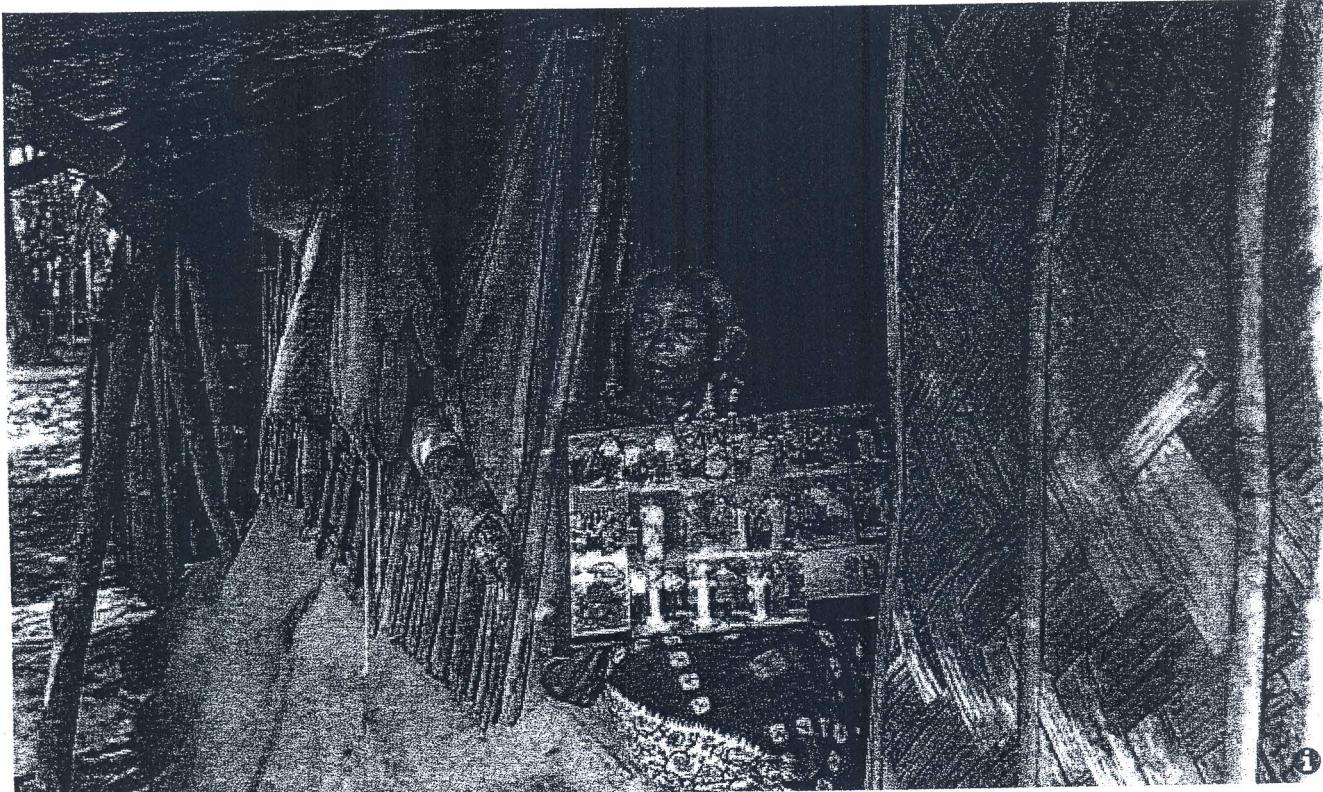
  
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The Ministry of Environment, Forest & Climate Change  
**(Shri C. K. Mishra, Secretary),**  
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Aliganj, Jorbagh Road,  
New Delhi – 110003.



GROUND ZERO | HEALTH

## Death by slow poisoning



Priyanka Pulla

MAY 19, 2018 00:15 IST

UPDATED: MAY 18, 2018 23:41 IST

An estimated 10 million people in nine districts of West Bengal drink arsenic-laden groundwater. Priyanka Pulla finds that despite alarms having been sounded over decades, the State government has moved at a glacial pace to tackle the crisis, while people struggle to cope with the symptoms

**O**n a Thursday morning at the government primary school in Madhusudankati, a village in West Bengal's North 24 Parganas district, a gaggle of five-year-olds chatter animatedly in a classroom. A teacher walks in. They stand up and chant "Good morning, teacher" in a high-pitched sing-song. There is momentary quiet, and the rustle of textbooks being opened, but the giggling and chattering return soon. It's a school scene that is as ordinary as it gets, but behind its normalcy lies a disturbing fact: the bodies of these children contain alarming

levels of arsenic – a poisonous metalloid that sickens and kills with chronic exposure. Unlike the adults in Madhusudankati though, the children don't show any symptoms yet.

Madhusudankati is a lush green agricultural village about 14 km from the border with Bangladesh and deep inside India's arsenic territory. About 15 years ago, scientists discovered that the shallow groundwater here had high levels of the mineral: up to 1,000 micrograms (mcg) per litre in places. The World Health Organisation's (WHO) prescribed safe level is 10 mcg per litre. When such water is consumed for years, either directly or through the food chain, the mineral damages organs like the skin, kidneys and lungs.

The most visible symptom in early years is a classic blotchy pattern on the skin, a condition called raindrop pigmentation. If people showing such pigmentation don't switch to safer water, they develop hyperkeratosis – dark crusts on their palms and soles, which can get infected and make it painful to work. Eventually, the skin can turn cancerous. Simultaneously, arsenic can destroy the kidneys and liver tissue, cause conjunctivitis and affect the lungs, just as heavy smoking does. There are few organs that arsenic spares.

## Mass poisoning

Today, an estimated 10 million people in nine districts in West Bengal drink arsenic-laden groundwater. It is the worst worldwide case of mass poisoning alongside Bangladesh, which has 40 million people at risk. When West Bengal's problem first attracted international attention in 1995, a researcher from the University of Colorado compared its scale with the Chernobyl disaster. Today, we know it is worse. But despite the grave warnings from international bodies like the WHO, the West Bengal government has moved excruciatingly slowly to tackle the crisis. A critical shortcoming in its efforts was the delay in realising that mitigation is a sociological challenge, not just a technological one. This is why, even though multiple technologies to filter arsenic from groundwater are there, awareness of arsenic's ill-effects remains low. So, people continue drinking toxic water, even when alternatives exist.

Madhusudankati is an example of this. In 2013, a farmer's cooperative society, the Madhusudankati Samabay Krishi Unnayan Samity (MSKUS), installed a water treatment plant in the village with help from the Sulabh International Social Service Organisation. Today, the plant supplies treated water from a local pond to 500 families and the primary school. However, studies show that despite the

availability of MSKUS water, several people continue drinking contaminated groundwater.

In August 2017, a team led by Tarit Roychowdhury, an Associate Professor at the School of Environmental Studies (SOES) in Kolkata's Jadavpur University, collected urine, nail and hair samples from the children in Madhusudankati's primary school. By then, the school had stopped using water from its contaminated tube well for drinking and cooking midday meals, switching to MSKUS water instead. Several village families had done the same.



Students of class one in Madhusudankati's primary school | Photo Credit: K.R. Deepak

Yet, Roychowdhury's team found between 20 and 200 mcg per litre of arsenic in the children's urine, a sign that they were still consuming the poison. "This means the children are still drinking polluted water at their homes or somewhere else," says Roychowdhury.

Outwardly, the children seem symptom-free. Arsenic is a silent killer; it takes years for keratosis to show in adults and even longer in children. But there is extensive evidence that children are not immune to internal damage – their lungs, kidneys and other organs are slowly being ravaged. Studies also show that arsenic-exposed children have lower IQ compared to control groups. “If they continue drinking this water, they will definitely develop keratosis,” says Roychowdhury.

## Years of neglect

In 1983, a doctor called Kshitij Chandra Saha from the **West Bengal** Health Services began examining a cluster of patients with skin lesions in the formerly undivided 24 Parganas district. Saha diagnosed them with arsenicosis, the first record of the illness in the Indian subcontinent. In the following years, Saha and epidemiologist Dipankar Chakraborti, the founder of SOES, surveyed more villages. It dawned upon them that they were uncovering a massive epidemic. By 1988, six arsenic-affected districts had been identified along the eastern border of West Bengal. The source of the toxin seemed to be the thousands of shallow tube wells that dotted the region. But there was confusion about why the arsenic was there – some suggested that the metal strainers in the tube wells were leaching the mineral, some thought pesticides were the culprit, and some others thought arsenic-treated electric poles were at fault.

The researchers sounded the alarm. They warned the government that people would grow sicker unless they switched immediately to safe water. But the government's first reaction was denial, Chakraborti noted in a paper published in the journal *Talanta* in 2002. It was a theme that continued for years. The government did appoint committees in 1983, '88, '92 and '93 to examine the problem, but the findings didn't trigger substantial action. Presciently, a member of the '93 committee even resigned, saying schoolchildren were continuing to drink contaminated water because the government wasn't digging alternative tube wells. Over a decade later, researchers are still reporting the consumption of contaminated water by schoolchildren in districts like Malda.

After denial in the initial years came some questionable decisions by the government. Even though the State had tested 1,32,267 tube wells for contamination by 2007, the polluted wells weren't marked. Instead, the government dug alternative tube wells in some spots and installed filters in some others. Several experts, and the United Nations Children's Fund (UNICEF),

dvocated that unsafe tube wells immediately be painted red, so that people would avoid them. But there was strong resistance to the idea from the government, says Kumar Jyoti Nath, the chairman of West Bengal's Arsenic Task Force, an advisory body. "We told them again and again that the scientific truth must be shared with the public. But they said it would create panic," Nath says.

UNICEF consultants, SOES, and Nath were also of the opinion that public outreach ought to be the foundation of the government's mitigation strategy. This would mean not just painting wells, but also holding door-to-door campaigns, conducting street plays and distributing flyers about the danger of using contaminated tube wells. Unless this happened, patients would not go to government-run arsenic clinics or switch to safe tube wells. But this did not happen on a large enough scale.

Such outreach campaigns would have needed dedicated communication experts, which the government did not have. The West Bengal Public **Health** Engineering Department (PHED), which is at the helm of the State's mitigation efforts today, is manned by engineers. "There was no one to advise them on the communication strategy; on how to ensure people's participation," says Nath. "So, the department has always been hardware-oriented. The software has been neglected."

## Impact on hardware

This neglect impacted the hardware too. Over the years, countless arsenic-filtration technologies were developed by institutions like the SOES and the Central Glass and Ceramic Research Institute. Some, like SOES's filter, were for household use. This device had two components. This first was a tablet made of an iron salt, an oxidising agent and activated charcoal which reacted with arsenic in water to turn it into a filtrable floc. The second component, a fly-ash filter, would filter out the floc, which would then have to be disposed of safely. But even though the SOES filter and others like it worked flawlessly in the lab, they failed frequently in the field. Several people couldn't figure out how to use them. During an evaluation, Roychowdhury's team found that villagers would use multiple tablets in the filter instead of one, or expose the tablets to sunlight, or let the filter run dry. Such problems plagued community filters too, which were designed for several households. Toxic arsenic sludge was sometimes disposed of unsafely, sent back into the environment, instead of being treated as per protocol. Meanwhile, materials used in the filter, such as bleaching powder, weren't stored properly, causing them to lose efficacy. "At some point, you realise that the investments in

hardware are not yielding returns, because you have not invested in awareness," says Nath.

In 2016, a study in North 24 Parganas district, jointly conducted by UNICEF and PHED, found that merely marking tube wells as safe or unsafe and conducting awareness campaigns brought about large behavioural changes. "Even if we don't provide alternative safe water sources, just marking tube wells can go a long way in mitigation," says Shyamnarayan Dave, who was a UNICEF consultant to the West Bengal government till 2015. But the State government realised this truth rather late. Almost after a decade of advocacy for awareness campaigns, it officially began painting tube wells two years ago.

## A geological curse

Even as the government struggles to implement technological solutions to arsenic contamination, there is good news on another front. Scientists today broadly agree on the source of arsenic in the Ganga delta, a consensus that didn't exist earlier. John McArthur, a geochemist at the University College of London, explains the science in simple terms. The process is thought to have begun between 18,000 and 6,000 years ago, when small Himalayan rock particles, coated with iron oxide, entered the Ganga river delta. Along the way, these particles absorbed the tiny amounts of arsenic in the river water, like a sponge soaking liquid. These particles were then deposited in layers of sediment, over thousands of years, in what is now West Bengal and Bangladesh.

Here, the rocks stayed in a more or less stable state until another actor entered the scene: decaying organic matter, or peat, says McArthur. The Ganga delta was also home to swampy wetlands some 5,000 years ago. The organic matter from these wetlands is now decaying slowly, alongside the arsenic. When the bacteria responsible for this decay come in contact with the iron oxide in the arsenic-bearing rocks, they use the oxygen from the iron oxide for their own metabolism, setting both arsenic and iron free. This is why the groundwater in West Bengal and Bangladesh are rich in both minerals.

The free arsenic, buried under the soil, did not pose a human threat until three decades ago. Till then, most Bengali and Bangladeshi homes depended on lakes and rivers for their domestic needs. But some time in the '70s, families switched en masse to tube wells, because the surface water was growing increasingly contaminated, spreading diseases like cholera. "In this region, you can get groundwater at depth of a few meters. So, everyone began digging tube wells in

their own backyards," says Roychowdhury. This unleashed the underground arsenic.

There is uncertainty today on how the geological mechanism of arsenic release impacts policy. Researchers agree that shallow tube wells, less than 150 meters deep, are the worst affected, because they contain arsenic-rich sediments from the Holocene era, when the arsenic arrived in the delta. Conversely, deep aquifers, more than 150 meters underground, are unaffected because they tap into the older Pleistocene sediments. According to McArthur, such deep tube wells can potentially be used for a long time without fear of contamination, as they have been in Bangladesh. "The smart money is on the deep aquifer remaining viable for many decades, if not forever," he says.

But Roychowdhury argues that even deep aquifers can become tainted with the overuse of groundwater. Such overuse is disturbing the clay separating the deep and shallow aquifers, allowing the arsenic to enter previously pristine waters, he says. His research seems to bear this out. In a study in North 24 Parganas, deep tube wells which were uncontaminated initially saw arsenic levels rise in about five years. If this phenomenon is typical across West Bengal, the government's initial strategy of digging deeper tube wells to replace shallow ones may not even be a good stopgap. "Until we stop using groundwater, and focus on watershed management, this problem will remain," he says.

## Piped dream

The endgame for the West Bengal government is to replace all groundwater for domestic use with water from the river Hooghly, using pipelines. But there are technical and financial challenges in laying such long pipelines. A senior official from the PHED, who wished to remain anonymous, said that the total cost of providing river water to all villages was an estimated ₹100,000 crore, money the government currently doesn't have.

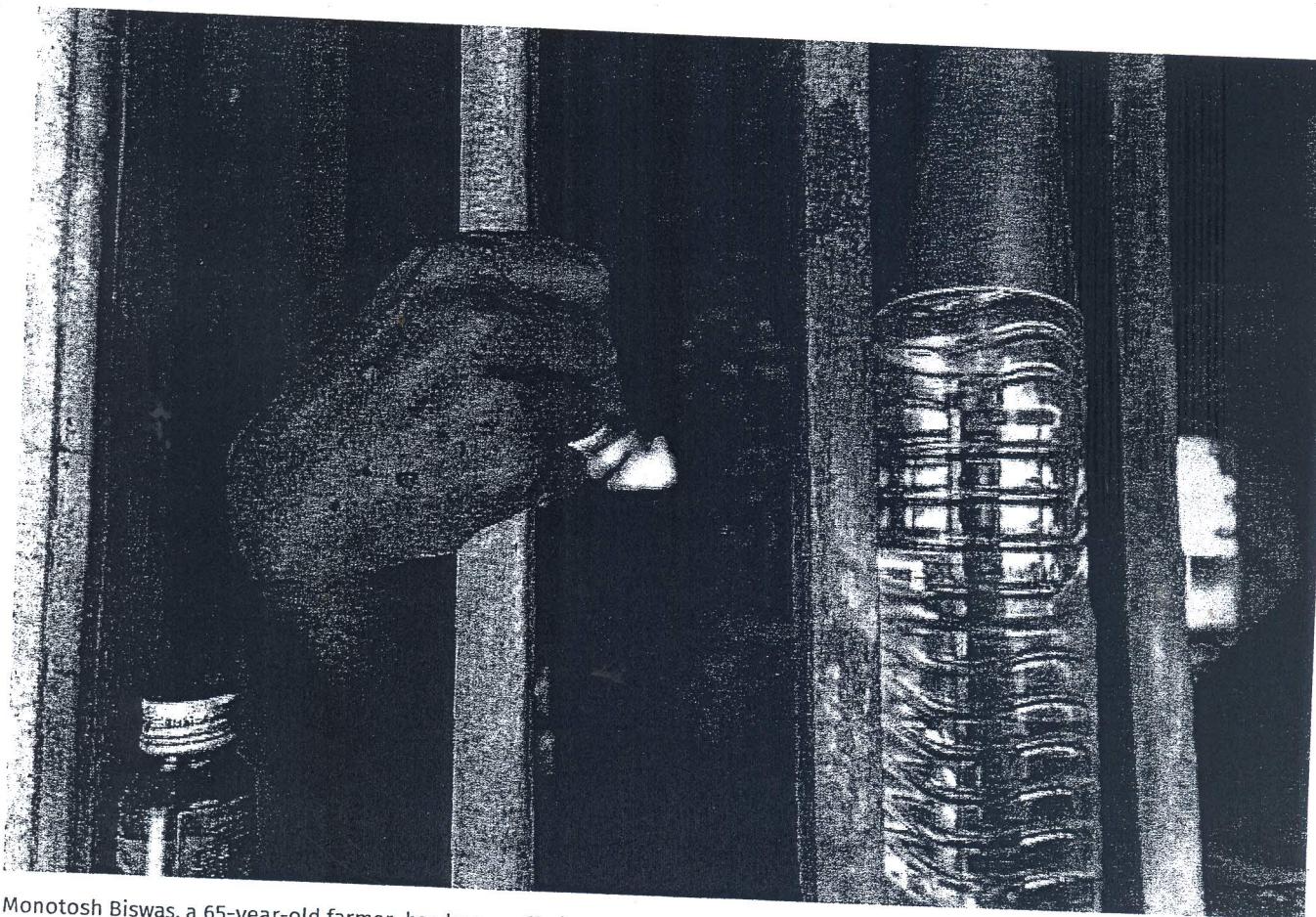
This is why the State's short-term strategy is to provide Hooghly water to about half the arsenic-affected villages. The other half are to be served by community arsenic-treatment plants. The first part of this strategy has been easy to execute, because West Bengal has years of experience in sanitising surface water. Even though this water is heavily contaminated with bacteria, technologies to remove these bacteria have been tried and tested. "For bacteriological quality improvement, we have experience for over 150 years," says Nath. "The first water

treatment plant in Kolkatta was 175 years old." The problem lies with arsenic-removal technologies, which are still emerging.

About 170 such community arsenic treatment plants are to be installed across the State before the end of 2018. This deadline could be tough to meet, given that only 60 plants have been commissioned so far. Moreover, many of the commissioned plants are still operating at low efficiency because of maintenance issues.

### A socially isolating illness

Until West Bengal is able to get safe water for all the 10 million at risk, its villages will remain dotted with tragedy. In Madhusudankati, a few km from the primary school lives a farmer, Monotosh Biswas. About 25 years ago, he began showing symptoms of toxicity. Today, his torso, palms and feet are dotted with lesions. A few years back, he developed Bowen's Carcinoma, a skin cancer, on his hip. He went to Kolkata to get the lesion removed, spending ₹12,000 on medicines. While Bowen's Carcinoma is treatable, others in the village have died of more lethal cancers.



Monotosh Biswas, a 65-year-old farmer, has been suffering from arsenicosis for over two decades | Photo Credit: K.R. Deepak

Between shallow breaths, a sign of arsenic-induced bronchitis, Biswas says his illness has also affected his farm work. The impact of arsenicosis on one's

livelihood and the social stigma attached to it extracts a high cost from sufferers, says Kunal Kanti Majumdar, a doctor at Kolkata's KPC Medical College, who has worked in arsenic-affected areas for about two decades now. "Wherever I went, I found depression, social isolation and suicidal thoughts. It is not just a health problem, but also a social problem," he says.

As researchers fret about tackling the crisis, the schoolchildren in Madhusudankati are untroubled. It will be lunchtime soon. Roychowdhury's team collects food samples from the kitchen, which will be tested. Even though the school water is now safe, the rice and vegetables being used could have been grown in soil containing arsenic. Understanding the impact of this on the children is the team's next goal. "So far, we have only tested water and biological samples. Now, we have to test the food," says Roychowdhury. "Maybe it will have arsenic. Maybe it won't. Let us see."

Printable version | May 29, 2018 2:42:19 PM | <http://www.thehindu.com/sci-tech/health/death-by-slow-poisoning/article23930645.ece>

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