



Lingering Health Effects of Bhopal Gas Tragedy

For Prelims: [1984 Bhopal Gas Tragedy](#), [Neonatal mortality](#), [Methyl isocyanate](#), [Environment \(Protection\) Act, 1986](#), [Public Liability Insurance Act of 1991](#), [UN's International Labour Organization](#).

For Mains: Ways to Prevent Future Industrial Disasters.

Why in News?

The [1984 Bhopal Gas Tragedy](#), one of the world's worst industrial disasters, continues to cast a long shadow on the health of future generations, **even those who were not directly exposed to the toxic gas**.

- A recent study has shed light on the persistent health issues faced by **individuals, including disabilities and cancer, decades after the tragic event**.

What are the Major Findings of the Research?

- **About:** The study reveals that the repercussions of the Bhopal Gas Tragedy extend beyond immediate mortality and morbidity. It has been observed that the **impacts of the disaster are visible in a 100 km radius around Bhopal**, affecting a wider area than previously reported.
 - The findings highlight the social costs associated with the tragedy, which continue to afflict subsequent generations.
- **Health Issues Faced by Survivors:** The survivors of the Bhopal Gas Tragedy have experienced a range of health problems over the years. These include **respiratory, neurological, musculoskeletal, ophthalmic (related to eyes), and endocrine issues**.
 - Additionally, there has been a significant increase in **miscarriages, stillbirths, neonatal mortality, menstrual abnormalities**, and premature menopause among women exposed to the toxic gas.
- **Investigating Long-Term Health Effects:** Researchers from the **University of California (UC)** conducted a comprehensive analysis to assess the long-term health consequences and potential intergenerational effects of the Bhopal Gas Tragedy.
 - They gathered data from the [National Family Health Survey \(NFHS-4\) conducted between 2015 and 2016](#) and the [Integrated Public Use Microdata Series from India for the year 1999](#), including individuals ranging from ages six to 64 years and those in utero at the time of the disaster.
- **Disability among Women:** Women who were pregnant with male fetuses and resided within 100 km of Bhopal had a **one percentage point higher disability rate that affected their employment 15 years later**.
- **Decline in Male Births:** There was a decline in the **proportion of male births from 64% (1981-1984) to 60% (1985)** among mothers living within 100 km of Bhopal suggesting a higher vulnerability of male fetuses to external stress.
 - No significant change was observed beyond the 100 km radius.
- **Increased Cancer Risk:** Men born in 1985 within 100 km of Bhopal had an **eightfold higher risk of cancer compared to those born in the periods 1976-1984 and 1986-1990**.

- Furthermore, men born in 1985 who continued to reside within 100 km of Bhopal experienced a **27-fold higher risk of cancer in 2015** compared to their counterparts born in the reference periods and individuals living more than 100 km away.
- **Employment Disabilities:** Those who were in utero during the tragedy and lived within 100 km of Bhopal were **one percentage point more likely to report employment disability** compared to older individuals and those residing further from Bhopal.
 - The likelihood increased to two percentage points among those living within 50 km of the city.

What was the Bhopal Gas Tragedy?

- **About:**
 - The **Bhopal gas tragedy** was one of the **worst industrial accidents in history that occurred on the night of 2-3 December 1984** at the **Union Carbide India Limited (UCIL) pesticide plant in Bhopal, MP.**
 - It exposed people and animals to the highly toxic gas **methyl isocyanate (MIC)**, causing immediate and long-term health effects and deaths.
- **Causes of Gas Leak:**
 - The exact cause of the gas leak is still disputed between corporate negligence or employee sabotage. However, some of the factors that contributed to the disaster are:
 - The **UCIL plant was storing large quantities of MIC, a highly reactive and volatile chemical**, in poorly maintained tanks.
 - The plant was operating with **reduced staff and safety standards** due to financial losses and market competition.
 - The **plant was located in a densely populated area with no proper emergency plans** or warning systems for the nearby residents.
 - On the night of the disaster, **a large amount of water entered one of the MIC storage tanks (E610)**, either due to a faulty valve or a deliberate act of sabotage by a disgruntled worker.
 - This triggered an **exothermic reaction that increased the temperature and pressure inside the tank**, causing it to rupture and release a large cloud of MIC gas into the atmosphere.
- **Reactions:**
 - A 2019 report by the **UN's International Labour Organization (ILO)** said at least 30 tonnes of the poisonous gas affected more than 600,000 workers and nearby inhabitants.
 - It added the disaster was among the world's **"major industrial accidents after 1919"**.
 - **Laws Passed:**
 - **Bhopal Gas Leak Disaster (Processing of Claims) Act, 1985** - Gave the Central Govt the **"exclusive right" to represent, and act in place of every person connected with the claims.**
 - **Environment (Protection) Act, 1986**, - Authorised the **central govt to take relevant measures and regulate industrial activity** for environmental and public safety.
 - **Public Liability Insurance Act of 1991** - Provides public liability insurance for providing immediate relief to the persons affected by an accident occurring while handling any hazardous substance.
 - **Civil Liability for Nuclear Damage Act 2010**- India enacted the **CLNDA in 2010 to put in place a speedy compensation** mechanism for victims of a nuclear accident. It **provides for strict and no-fault liability** on the operator of the nuclear plant, where it will be held liable for damage regardless of any fault on its part.

How can Future Industrial Disasters be Prevented?

- **Risk Assessment Technologies:** There is a need to utilize advanced technologies such as **artificial intelligence, machine learning, and predictive analytics** to identify and assess potential risks in industrial processes.
 - These technologies can analyse vast amounts of data and provide early warnings for

potential hazards, enabling proactive safety measures.

- **Social and Environmental Impact Assessments:** There is a need to prioritise **social and environmental impact assessments for industries**, especially those dealing with hazardous materials.
 - Such assessments should **consider the potential risks to nearby communities, ecosystems, and natural resources**, and incorporate preventive measures into the planning and design of industrial processes.
- **Strict Enforcement:** It is crucial to ensure strict enforcement of safety regulations by government authorities.
 - **Regular inspections should be conducted to monitor compliance** with safety standards, and severe penalties should be imposed for violations.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q2. In India, why are some nuclear reactors kept under “IAEA safeguards” while others are not? (2020)

- (a) Some use uranium and others use thorium
- (b) Some use imported uranium and others use domestic supplies
- (c) Some are operated by foreign enterprises and others are operated by domestic enterprises
- (d) Some are State-owned and others are privately owned

Ans: (b)

Mains:

Q1. With growing energy needs should India keep on expanding its nuclear energy programme? Discuss the facts and fears associated with nuclear energy. (2018)

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