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 c**entral 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)**

Source: IE