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Hazardous Factories in India: Safer and Sustainable Industrial Growth

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1.Abstract
The presence of hazardous factories in India plays a pivotal role in the nation's industrial and economic landscape. These factories, spanning sectors such as chemicals, petrochemicals, pharmaceuticals, and heavy manufacturing, pose significant risks to workers, public safety, and the environment. This article provides a comprehensive analysis of the hazardous factory scenario in India, examining key industrial sectors, regulatory frameworks, and recent accident trends. Using data from 2018–2022, collected by the Directorate General Factory Advice Service & Labour Institutes (DGFASLI), the article evaluates trends in factory numbers, employment patterns, and safety inspections. The article highlights gaps in safety compliance and inspection rates, emphasizing the need for stronger regulatory oversight. With reference to international safety protocols, such as the Sendai Framework and the UN's conventions on hazardous substances, this article advocates for improved industrial safety policies, increased inspections, and the adoption of advanced safety technologies to mitigate occupational hazards and enhance worker well-being.

2.Keywords: Occupational Safety & Health, Registered Factories, Hazardous Factories, Fatal Injuries, Non-fatal Injuries, Industrial Safety

3.Introduction
This article aims to present a comprehensive overview of the hazardous factories scenario in India, highlighting the vital role of these industries in the country's industrial and economic landscape. India's hazardous factories, which include sectors such as chemicals, petrochemicals, pharmaceuticals, and heavy manufacturing, contribute significantly to the nation's progress. With the regulatory frameworks provided by the Factories Act, 1948, and various environmental laws, substantial efforts have been made to ensure the safety of workers, the public, and the environment.
While the country has seen remarkable strides in industrial safety and compliance, the management of hazardous processes remains an area of continued focus for both the government and the industries involved. This article explores the regulatory environment, the key sectors operating hazardous factories, and the proactive measures being taken to mitigate risks. It also highlights the advancements in safety technologies, ongoing improvements in compliance, and the collaborative efforts of industry, government, and civil society in fostering safer and more sustainable industrial growth.

4.Hazardous factories
Hazardous factories, as defined under **Section 2(cb) of the Factories Act, 1948**, involve processes that expose workers and the environment to chemical, physical, or biological risks. These processes often involve the production, handling, and storage of hazardous substances, such as toxic chemicals, flammable gases, explosives, or carcinogenic materials. Industries such as **chemical manufacturing, pharmaceuticals, mining, petroleum refining, and metallurgy** fall under this category, as they handle materials that can pose significant dangers to both employees and the public if not properly managed. Simply put, a hazardous factory is any premise where a manufacturing process is carried out that poses

significant risks to health and safety; and this can include operations involving hazardous substances or processes that can lead to accidents or health issues.

The **Manufacture, Storage, and Import of Hazardous Chemicals Rules, 1989**, further classify hazardous substances based on their properties, aiming to regulate their safe storage, transportation, and disposal. However, the key challenge lies not just in identifying hazardous factories but ensuring their compliance with safety regulations.

Industries notable for their hazardous operations and are typically classified as hazardous include:

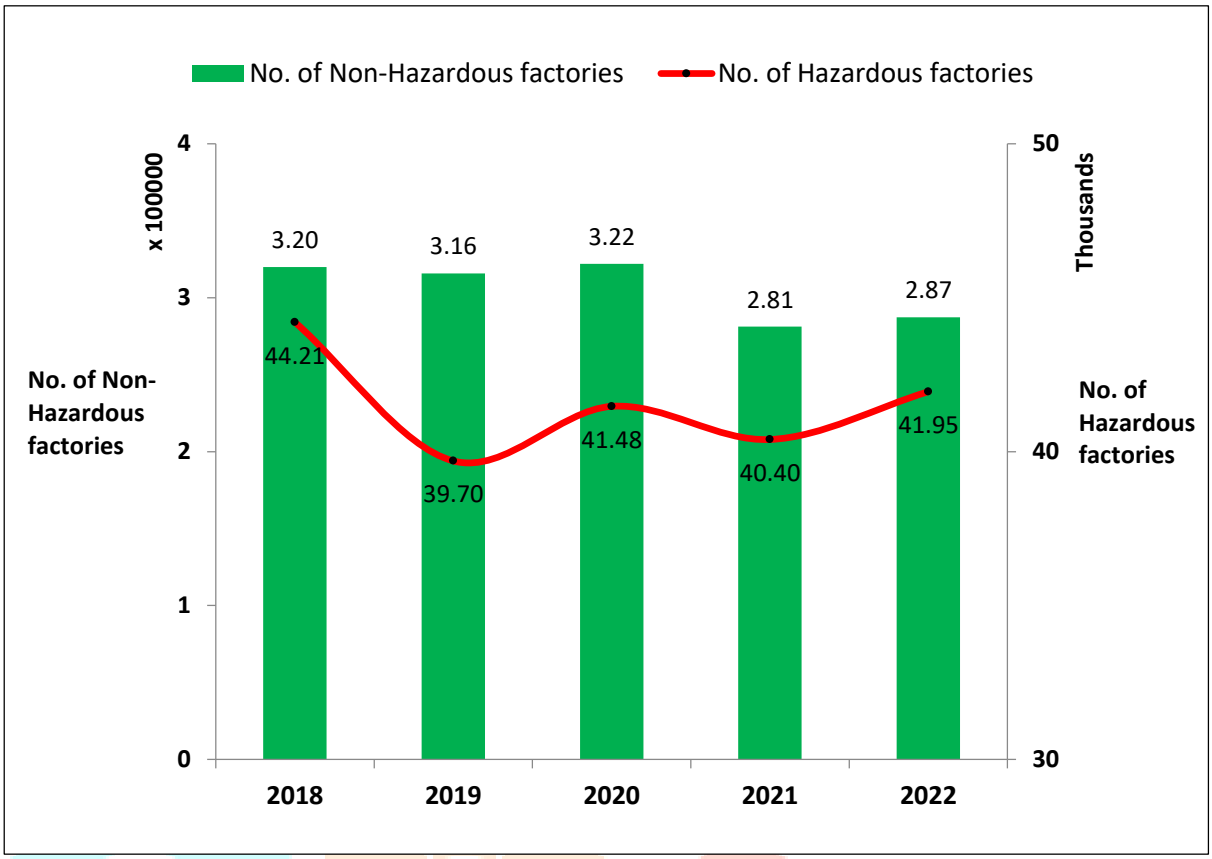
- **Chemicals**: Includes manufacturing processes that involve toxic substances.
- **Petrochemicals**: Refineries that process crude oil into fuels pose significant risks.
- **Pharmaceuticals**: Production processes that utilize hazardous chemicals require strict adherence to safety protocols.
- **Heavy Manufacturing**: Industries such as steel production involve dangerous materials and processes.
- **Mining**: Industries such as coal mining, other mining industries etc.

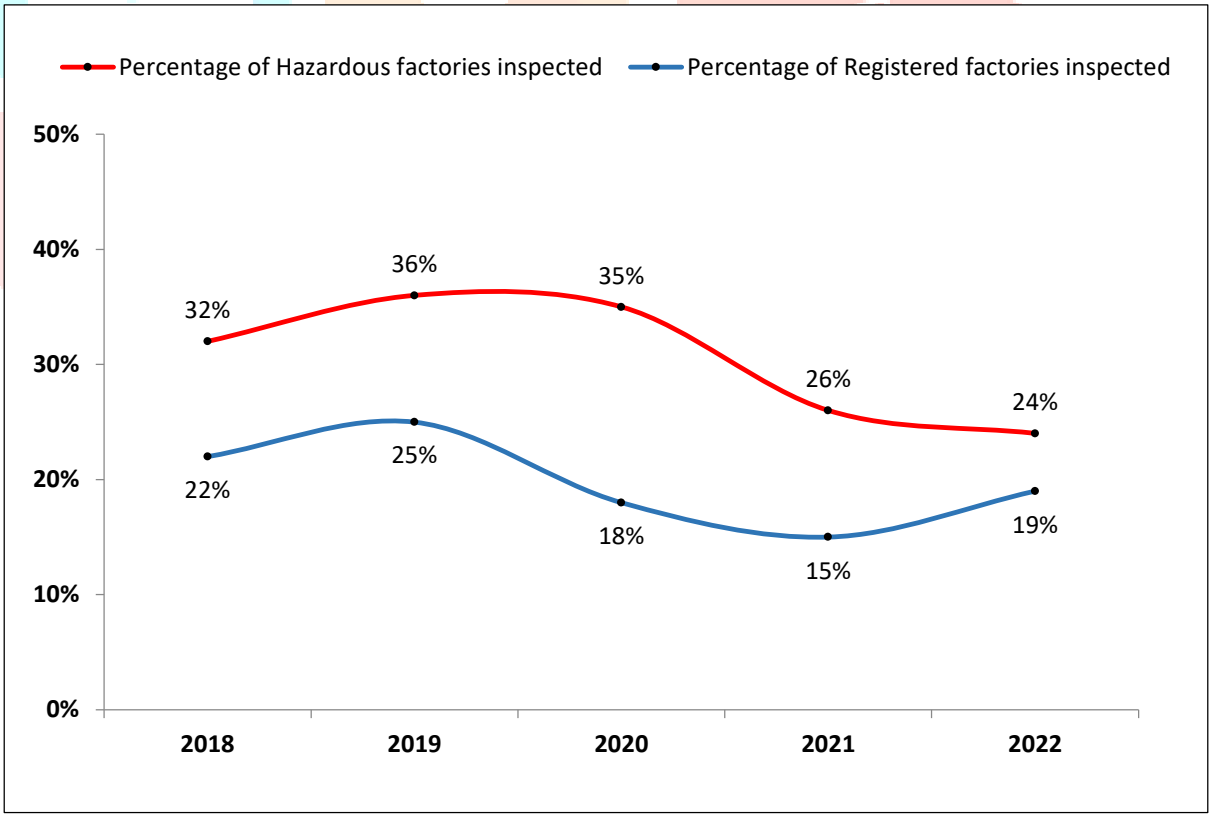
OSH Data on Hazardous Factories in India (2018-2022)

Year	No. of Hazardous factories	Workers employed in Hazardous factories	Workers employed per Hazardous factory	No. of Hazardous factories inspected	Percentage of Hazardous factories inspected
2018	44207	3796503	86	14229	32 %
2019	39700	3863890	97	14269	36 %
2020	41475	4143240	100	14460	35 %
2021	40398	3838506	95	10513	26 %
2022	41953	4632574	65	17467	24 %

Year	No. of Registered factories	Workers employed in registered factories	Employment per registered factory	No. of registered factories inspected	Percentage of registered factories inspected
2018	364268	18724733	51	80650	22 %
2019	355478	18552909	52	87771	25 %
2020	363442	20298387	56	66063	18 %
2021	321578	17414912	54	47125	15 %
2022	329317	17767088	54	64176	19 %

N. B.: Data collected by DGFASLI through correspondence with Chief Inspector of Factories (CIF) of States/UTs. The data in the table for the following years does not include data from the States/UTs mentioned against them, as they did not provide data to DGFASLI during that year: 2022- Daman and Diu & Dadra and Nagar Haveli, Himachal Pradesh, Mizoram, Punjab, Uttar Pradesh and West Bengal, 2021 - Daman and Diu & Dadra and Nagar Haveli, Punjab, Uttar Pradesh and West Bengal, 2020 West Bengal, 2019 - West Bengal.





5.Data Analysis

The data reveals significant trends in the hazardous factory landscape in India over the past five years. The number of hazardous factories experienced a gradual decline from 44,207 in 2018 to 41,953 in 2022, indicating a reduction in hazardous industrial activities. Conversely, the total number of workers employed in these factories showed a notable increase from 3,796,503 in 2018 to 4,632,574 in 2022,

reflecting a shift toward increased labor demand despite the reduction in the number of operational factories. While the employment per hazardous factory rose from 86 in 2018 to 100 in 2020, it subsequently declined to 65 by 2022, suggesting a trend towards consolidating labor in fewer operational units or a possible shift to more automated processes.

The data on inspections reveals that the number of hazardous factories inspected peaked in 2022 at 17,467, a significant increase from 14,228 in 2018. However, the percentage of hazardous factories inspected has fluctuated, peaking at 25% in 2019 but falling to 15% in 2021 before slightly recovering to 19% in 2022.

The inspection rate for Hazardous factories increased from 32% in 2018 to a peak of 36% in 2019 before declining to 24% in 2022, indicating a significant drop in oversight. In comparison, the percentage of registered factories inspected also showed an initial rise to 25% in 2019, but it has since decreased to 19% in 2022.

The percentage of hazardous factories inspected has consistently been higher than that of registered factories each year from 2018 to 2022. This consistent pattern indicates that hazardous factories have been subject to more inspections than registered factories throughout the analyzed period.

6.Current Scenario of Hazardous Factories in India

India is home to thousands of factories classified as hazardous due to the nature of their operations and the substances they handle. Key industrial states like **Gujarat, Maharashtra, Tamil Nadu, Karnataka, and Odisha** house large clusters of such factories, contributing significantly to the economy but also increasing safety risks.

According to the website of the Ministry of Environment, Forest and Climate Change; and the National Disaster Management Authority of India data, “There are about 1861 Major Accident Hazard (MAH) units, spread across 301 districts and 25 states & 3 Union Territories, in all zones of country. Besides, there are thousands of registered and hazardous factories (below MAH criteria) and un-organized sectors dealing with numerous range of hazardous material posing serious and complex levels of disaster risks.”[12]

7.Accidents and Disasters in Hazardous Factories

India has witnessed several industrial accidents over the decades, the most notable being the **Bhopal Gas Tragedy (1984)**, which resulted in over 3,000 immediate deaths and long-term health impacts on thousands more due to exposure to methyl isocyanate gas. This incident marked a turning point in India’s approach to industrial safety, leading to the introduction of stricter laws. Some recent accidents are:

- **Vizag Gas Leak (2020)**: A gas leak from an LG Polymers plant in Andhra Pradesh exposed thousands to styrene gas, killing several and causing widespread health issues.
- **Tarapur Chemical Explosion (2016)**: An explosion in a chemical factory in Maharashtra resulted in multiple fatalities and injuries, raising questions about the safety protocols in place.
- **Dahej Chemical Plant Fire (2020)**: A fire at a chemical plant in Gujarat left several workers dead, pointing to the lack of fire safety preparedness.
- **Thane boilers explosion (2024)**: On 23 May 2024, a fire broke out following the explosion of four boilers at a chemical factory in Dombivili, a suburb of Thane, Maharashtra. Ten people were killed and more than 64 were injured.

[1] https://moef.gov.in/hazardous-substances-management-hsm
[2] https://ndma.gov.in/Man-made-Hazards/Chemical

8.Relevant Laws and Regulations

Several laws and regulatory frameworks have been enacted to ensure safety in hazardous industries. The primary legislations include:

- **Factories Act, 1948**: This act lays down provisions for the safety, health, and welfare of workers. **Chapter IVA** focuses specifically on the handling of hazardous processes, requiring employers to identify risks and implement safety measures to mitigate them.
- **Environment (Protection) Act, 1986**: Passed in the aftermath of the Bhopal disaster, this act aims to safeguard the environment from industrial pollutants and hazards.
- **Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016**: These rules govern the handling and disposal of hazardous wastes, ensuring that industries responsibly manage their hazardous by-products.
- **National Policy on Safety, Health, and Environment at Workplace (2009)**: This policy sets guidelines for workplace safety, especially in industries involving hazardous processes.
- The **National Disaster Management Authority (NDMA)** has issued specific guidelines on Chemical Disaster Management. These guidelines provide direction to various authorities for preparing detailed disaster management plans.

International Legal Safeguards against Chemical/Industrial Disasters

- **Sendai Framework for Disaster Risk Reduction 2015-2030**: is a global agreement that aims to reduce disaster risk and enhance resilience by promoting a comprehensive approach to disaster risk management, focusing on prevention, preparedness, response, and recovery.
- **UN Convention on the Transboundary Effects of Industrial Accident (1992)**: It provides a legal framework for international cooperation on preventing and responding to industrial accidents. Parties share information, plan emergencies, and help each other during disasters. This reduces risk of widespread accidents.
- **Flexible Framework for Accident Prevention and Preparedness (CAPP) (2006) of UNEP**: It adopts a flexible approach to help countries, especially developing ones, build programs to prevent and prepare for chemical accidents. It also offers guidance on creating these programs considering a country's specific needs.
- **OECD Programme on Chemical Accidents (1990)**: It focuses on preventing accidents through information sharing and best practices in chemical safety.

United Nations' conventions to address hazardous substances

The United Nations has established several conventions and treaties to address hazardous substances and their impacts on human health and the environment. Here are some key conventions related to hazardous substances:

- **Stockholm Convention on Persistent Organic Pollutants (POPs) (2001):** Aims to eliminate or restrict the production and use of persistent organic pollutants, which are toxic chemicals that remain in the environment for long periods and can accumulate in living organisms.
- **Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998):** Facilitates the exchange of information about hazardous chemicals and provides a framework for the international trade of certain hazardous substances by requiring exporting countries to obtain consent from importing countries.
- **Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1989):** Aims to reduce the movement of hazardous waste between nations, especially from developed to developing countries, and to ensure that hazardous waste is managed in an environmentally sound manner.

- **Minamata Convention on Mercury (2013):** Focuses on protecting human health and the environment from the adverse effects of mercury, including its use in mining, industrial processes, and consumer products.
- **Convention on the Prohibition of Chemical Weapons (CWC) (1992):** Prohibits the development, production, stockpiling, and use of chemical weapons and their precursors, promoting the destruction of existing chemical weapon stockpiles.
- **Hague Declaration on the Prevention of the Use of Chemical Weapons (1974):** Aims to ensure the prohibition of the use of chemical weapons in warfare and emphasizes the importance of international cooperation in chemical safety.
- **Vienna Convention for the Protection of the Ozone Layer (1985) and Montreal Protocol on Substances that Deplete the Ozone Layer (1987):** Aims to protect the ozone layer by phasing out the production and consumption of substances that contribute to ozone depletion.

9.Conclusion

The landscape of hazardous factories in India is complex but essential for economic growth. While significant progress has been made in ensuring safety through regulatory frameworks and technological advancements, ongoing vigilance is necessary. Future efforts should focus on enhancing compliance, improving emergency preparedness, and fostering collaboration among all stakeholders involved in industrial activities.

References:

1. Website https://dgfasli.gov.in
2. Factories Act 1948 (OSH&WC Code 2020) and State Factories Rules framed thereunder.
3. Standard Reference Note, Directorate General Occupational Safety & Health (Formerly known as DGFASLI) Mumbai, Ministry of Labour and Employment, Govt. of India
4. Manufacture, Storage and Import of Hazardous Chemical Rules 1989
5. THE CHEMICAL ACCIDENTS (EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE) RULES, 1996
6. Reports of Periodic Labour Force Survey (PLFS) of Ministry of Labour and Employment, Govt. of India
7. Documents on UN conventions.
8. Loss Prevention in the process industries, Frank P. Lees, third edition, Volume 1, Texas, USA
9. Manufactures, Storage and Import of Hazardous Chemical Rules 1989
10. Hazardous Waste Management Rules, 2016
11. Chemical Weapon Convention, 1992
12. Disaster Management Act, 2005.