# Pharmaceutical Pollution

**For Prelims:** Pharmaceutical Pollution, Wastewater, Bioaccumulation, Multi-Drug Resistance, National Action Plan for Antimicrobial Resistance 2017.

**For Mains:** Pharmaceutical Pollution, Associated Concerns, Potential Solutions and Related Initiatives.

## Why in News?

According to a research paper, Pharmaceutical Pollution **is an overlooked but urgent issue** that needs coordinated action from across the pharmaceutical, healthcare and environmental sectors.

- **Almost half, or 43% of the world's rivers are contaminated** with active pharmaceutical ingredients in concentrations that can have disastrous ramifications on health.

## What is Pharmaceutical Pollution?

- **About:**
  - Pharmaceutical **plants** are often **incapable of filtering out all the chemical compounds used in their manufacturing process** and as such, the chemicals will **seep into the surrounding freshwater systems** and eventually into the oceans, lakes, streams, and rivers.
  - **Wastewater** from pharmaceutical manufacturers is also sometimes **discharged into open fields and nearby water bodies,** thereby increasing the pharmaceutical waste or their **by-product load in the environment, landfills, or dumping areas**. All this is basically known as **pharmaceutical pollution.**
- **Effects:**
  - **Effects on Fish and Aquatic Life:**
    - A number of studies have indicated that **estrogen found in birth control pills** and postmenopausal hormone treatments, have a **feminizing effect on male fish and can alter female-to-male ratios.**
  - **Disruption of Sewage Treatment Process:**
    - **Antibiotics** present in the sewage treatment systems can, therefore, **inhibit the activities of the sewage bacteria,** and therefore seriously **affect the organic matter decomposition.**
  - **Effect on Drinking Water:**
    - The chemicals present in these pharmaceuticals**, find a way into waterways, after being excreted** from the body or after being flushed down the toilet.
    - Most municipal sewage **treatment facilities can't remove these** pharmaceutical compounds from drinking water and people end up **consuming the same compounds.**
    - **Chronic exposure** to these compounds could result in **serious health issues.**
  - **Long-term Effects on the Environment:**
    - Some pharmaceutical compounds can **persist for long in the environment and in water supplies.**

        - These bioaccumulate**, enter a cell and move up food chains**, becoming **more concentrated** in the process. This can have disastrous effects on life and environment, in the long run.
- **Solutions:**
    - **Investment in public education** on the **proper disposal of drugs** should be done as part of the drug take-back programs
    - **Tougher Regulations** to limit large-scale medicine flushing in hospitals, nursing homes and other healthcare institutions.
    - **Additional research** is desperately required to **assess the potential human effects** of pharmaceutical pollution.
    - **Limiting bulk purchases** will ensure only the required amount is supplied and therefore,b
    - **Proper trashing must be preferred over flushing** as it leads to them being incinerated or buried in landfills.

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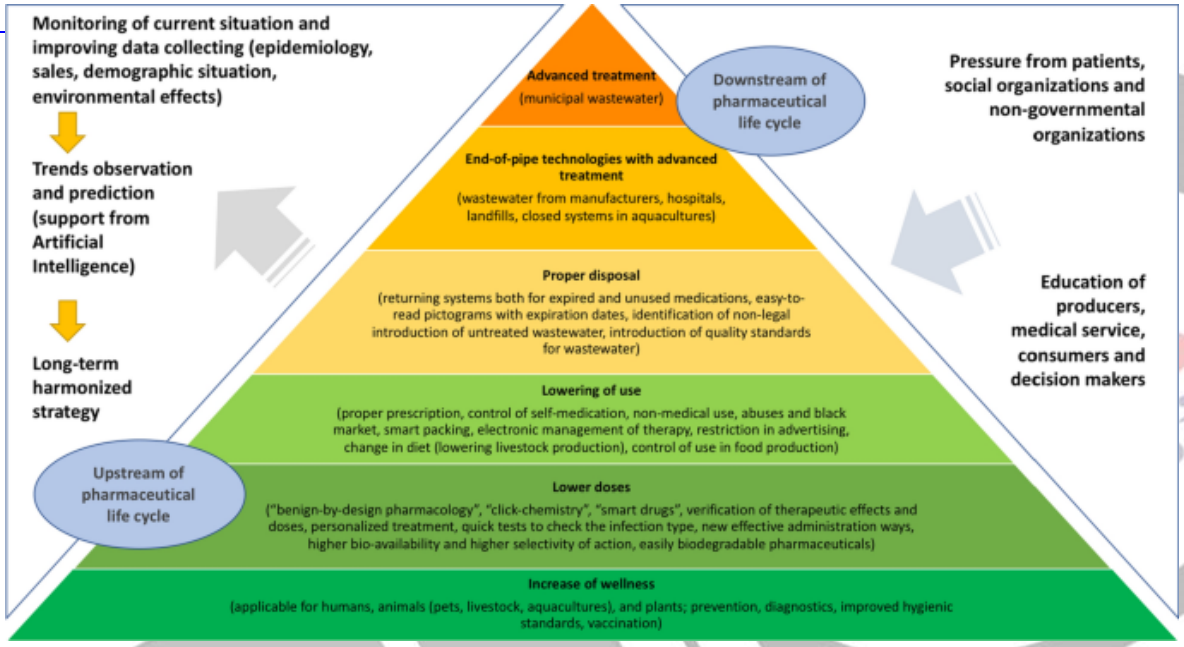


## What is the Status of Pharmaceutical Pollution in India?

- **World's Third-Largest Producer:**
    - India is the world's third-largest producer of pharmaceuticals, in which about **3000 drug companies and about 10500 manufacturing units are involved.**
        - Pharmaceuticals production has been considered **one of the most polluting industries in various parts of India.**
- **Bulk Drug Capital of India:**
    - In India, the dominant pharma industries are located in the **city of Hyderabad (known as the 'Bulk Drug Capital of India").**
    - It accounts for **more than about 800 pharma/biotech units.**
        - According to the survey, local people argue that the **groundwater is highly contaminated in the regions where industries are situated.**
- **Multi-Drug Resistance Infections:**
    - It has been estimated that about **60000 newborns die annually in India because of** multidrug-resistance **infections,** where pharmaceutical water pollution with antimicrobial drugs is responsible for that.

## What are the Related Government Initiatives?

- **National Action Plan for Antimicrobial Resistance 2017:** It was proposed to tackle the problem related to limits on antibiotics in industrial waste.
- **Zero Liquid Discharge Policy: Central Pollution Control Board (CPCB)** has introduced

**guidelines to various pharma industries** to achieve zero liquid discharge.
    - Around **86 of the 220 bulk drug makers in Hyderabad have zero liquid discharge facilities,** which showed that they could recycle almost all the liquid effluent.
- **Continuous Monitoring of Effluents:** The **Ministry of Environment, Forest, and Climate Change (MoEFCC) has also announced** that industries must **install devices to monitor** the effluent continuously.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### ***Prelims***

**Q. Which of the following are the reasons for the occurrence of multi-drug resistance in microbial pathogens in India? (2019)**

1. Genetic predisposition of some people
2. Taking incorrect doses of antibiotics to cure diseases
3. Using antibiotics in livestock farming
4. Multiple chronic diseases in some people

**Select the correct answer using the code given below.**

**(a)** 1 and 2
**(b)** 2 and 3 only
**(c)** 1, 3 and 4
**(d)** 2, 3 and 4

**Ans: (b)**

**Exp:**

- Antimicrobial Resistance (AMR) is the ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotic, antiviral and antimalarial) from working against it. As a result, standard treatments become ineffective, infections persist and may spread to others.
- A genetic predisposition (sometimes also called genetic susceptibility) is an increased likelihood of developing a particular disease based on a person's genetic makeup. A genetic predisposition results from specific genetic variations that are often inherited from a parent. It has no direct relation with Antimicrobial Resistance. Hence, 1 is not correct.
- AMR occurs naturally over time. In many places, antibiotics are overused and misused in people and animals, and are often given without professional oversight. Examples of misuse include when they are taken by people with viral infections like cold and flu, and when they are given as growth promoters in animals or used to prevent diseases in healthy animals. Hence, 2 and 3 are correct.
- Multiple chronic diseases are two or more chronic diseases that affect a person at the same time. For example, either a person with arthritis and hypertension or a person with heart disease and depression, both have multiple chronic diseases. So it is not necessary that a person with Multiple chronic disease will have an antimicrobial resistance, because a chronic disease can be of type where administering antibiotics is not required. Hence, 4 is not correct.
- Therefore, option (b) is the correct answer.

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### ***Mains***

**Q.** Can overuse and free availability of antibiotics without Doctor's prescription, be contributors to the emergence of drug-resistant diseasesin India? What are the available mechanismsfor monitoring and control? Critically discuss the various issues involved. **(2014)**

**Source: DTE**