Forever Chemicals (PFAS)

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In News: Analysis of human blood samples (2003–2021) shows an **86% decline in older PFAS levels**, mainly due to the **phasing out of their production by manufacturers**.

Forever Chemicals (PFAS)

What are PFAS?

- **PFAS (Per- and Polyfluoroalkyl Substances)** are a large group of **synthetic, highly persistent, toxic chemicals**.
- Known as **"Forever Chemicals"** because they **do not degrade easily** in the environment.

Why are they Persistent?

1. PFAS contain **strong carbon–fluorine (C–F) bonds**, one of the strongest chemical bonds.
2. This makes them **resistant to heat, water, and chemical breakdown**.

Common Uses

Household Products:

1. Non-stick cookware
2. Food packaging (microwave popcorn bags)
3. Textiles and stain-resistant fabrics
4. Cosmetics and personal care products
5. Floor and car polish

Industrial Uses:

1. Fire-fighting foams
2. Electronics and chemical manufacturing
3. Aerospace and defence applications

Environmental Pathways

1. PFAS **leach into soil, groundwater, rivers, and air** during production and disposal.
2. They **bioaccumulate** and **biomagnify** across food chains.
3. Once released, they remain in ecosystems **for decades or longer**.

Human Exposure

1. Drinking contaminated water
2. Consuming contaminated food (fish, dairy, crops)
3. Use of PFAS-containing consumer products

4. Inhalation of PFAS-laden dust or air

Because PFAS **do not break down easily**, repeated exposure leads to **accumulation in blood and tissues**.

Health Impacts

Scientific studies link PFAS exposure to:

1. Weakened immune response
2. Liver and thyroid disorders
3. Elevated cholesterol and blood pressure
4. Developmental issues in infants
5. Increased risk of kidney and testicular cancers

Regulation & Global Action

1. **Stockholm Convention on Persistent Organic Pollutants (POPs)**:

- Lists **PFOS** and **PFOA** for restriction/elimination

1. Many countries have **phased out older PFAS**, explaining declining blood levels.
2. Concern remains over **replacement PFAS**, which may also be persistent.