Indoor air pollution: can better design help protect our health?

Understanding Indoor Air Pollution

- **Indoor air pollution is often overlooked**, especially in urban India, where people spend **70–90%** of their time indoors.
- Unlike **well-insulated buildings** in developed countries, **Indian homes are more permeable**, leading to an infiltration of outdoor pollutants indoors.
- Indoor Air Quality (IAQ) is influenced by:
    - **Outdoor pollutants** entering through windows, doors, and poor insulation.
    - **Indoor sources**, such as cooking, smoking, use of mosquito coils, incense, chemical cleaners, and building materials (e.g., vapour from paint or plastering on walls).

Major Domestic Indoor Pollutants

- **Smoke from solid fuel use** (prevalent in rural areas).
- **Volatile Organic Compounds (VOCs)** from furnishings, paint, adhesives, etc.
- **Carbon dioxide build-up** in crowded, poorly ventilated spaces.
- **Biological contaminants** such as mould and mildew.
- **Particulate matter** and allergens from incense sticks, smoking, and cleaning agents.

Health Impacts of Indoor Air Pollution

- **Short-term effects**: Eye, nose, throat irritation, headaches, dizziness, and fatigue. Its Treatable
- **Long-term effects**: Chronic respiratory illnesses, cardiovascular diseases, cancer, and diabetes.
- Health symptoms may mimic viral illnesses, delaying diagnosis and treatment.
- Poor IAQ has been associated with **"Sick Building Syndrome"** and reduced productivity in offices.

Design-Related Causes & Solutions (Better building design)

- **Lack of proper ventilation** is a key design flaw in many urban buildings.
- Shutting windows and doors to block outdoor air traps indoor pollutants.
- Better design can incorporate:
    - Cross-ventilation and natural air flow.
    - **Green indoor spaces** for natural purification.
    - **Skylights and natural lighting** for reduced use of artificial lighting and improved mood.
    - Use of toxin-free building materials (e.g., low-formaldehyde products).

- HEPA filters and air purifiers to remove particulates.

Role of Architecture and Green Design, Healthy design

- **New construction**: Easier to integrate sustainable, healthy design features.
- **Retrofit possibilities:**
  - More complex but feasible with investments.
  - Priority in high-risk zones like hospitals or high-rise apartments.
- Green design is now **cost-effective** due to increased demand and tech accessibility.
- Post-COVID: Increased awareness of **filtered air systems** in healthcare and commercial buildings.
- **Separation of zones**, reduced crowding, and natural light can support both physical and mental health.

Climatic & Environmental Considerations

- India's coastal cities with high humidity and rising temperatures may worsen indoor air quality.
- **Buildings with air conditioning** must use high-quality filters and plan for:
  - Smooth occupant movement,
  - Proper waste management,
  - Easy-to-clean surfaces.

What do we do (In Policy and Public Health Perspective)

- Demand more attention on indoor air pollution in public health discussions
- Inclusion in urban planning policies.
- Awareness campaigns on indoor pollutant sources.
- Incentivizing green buildings and retrofitting programs.
- Where possible, a "**back to basics**" approach — ventilation and greenery — can be simple and effective.
- Better design is both preventive and remedial.
- Indoor air quality must become a mainstream public health priority, especially in urbanizing India.