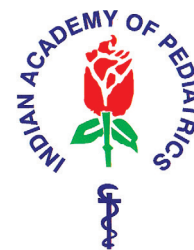


Indian Academy of Pediatrics (IAP)



GUIDELINES FOR PARENTS

Environmental Pollution



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10 FAQs on ENVIRONMENTAL POLLUTION

1. What is the meaning of environmental pollution? What causes it?
2. What are the types of environmental pollution?
3. Is environmental pollution a significant problem in the place I stay?
4. How does environmental air pollution affect my child?
5. As a parent, how can I safeguard my child from the bad effects of environmental air pollution?
6. How can we help to increase awareness and reduce ill effects of environmental pollution?
7. What are the adverse effects of noise pollution? Are there any restrictions for use of loudspeakers?
8. My kids go to school in the school bus (diesel vehicle). Should I worry about it?
9. What is the expected impact of coronavirus disease 2019 (COVID-19) waste (mask, sanitizer, and bottles) on environmental pollution?
10. What are the procedures that can be adopted to decrease the effects of cleaning, sanitizing, and disinfecting products on indoor air quality?

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Environmental Pollution

Q1

What is the meaning of environmental pollution? What causes it?

- *Environment*: Incorporates air, land, and water along with the inter-relationship of them that subsists among human beings, living creatures, air, land and water, plants, microorganism, and property.
- *Environmental pollutant*: Any liquid, gaseous or solid body existing in such deliberation as may be, or likely to be detrimental to environment.
- *Environmental pollution*: Existence of any pollutant in environment.

Air pollution is a mixture of many gases, particles, moisture, and some inert materials and the main source are industries, agriculture, and transport. Primary contaminants are air pollutants that release unswervingly from a resource. The secondary-derived contaminants are generated when other pollutants interact chemically in the environment. Major secondary pollutants areas follows:

- Ozone, which is produced when hydrocarbons (HC) and nitrogen oxides (NO_x) coalesce in the occurrence of bright sunlight from emissions of fossil fuel.
- NO₂ too is a major secondary pollutant which is shaped when NO mingles with oxygen in air.
- Acid rain is produced when sulfur dioxide or nitrogen oxides counter with water.

Causes

- | | |
|--|------------------------------------|
| ○ Combustion of fossil fuels | ○ Agricultural activities |
| ○ Carbon emissions | ○ Construction activities |
| ○ Improper waste disposal | ○ Urbanization (population growth) |
| ○ Disposal of chemical waste from industries | ○ Human and animal breathing |

Q2

What are the types of environmental pollution?

Natural pollution: It is caused by natural calamities such as earthquakes, floods, forest fires, volcanic eruptions, etc.

Man-made pollution: Caused by human activities such as burning of fossil fuel, deforestation, industrialization, overpopulation, and intense animal agriculture.

Sources of pollution:

- Air contamination
- Land and soil effluence
- Light contamination
- Noise contamination
- Radioactive contamination
- Thermal contamination
- Water pollution

Indoor pollution: Internal air contamination is caused by the dilapidation of internal air eminence by damaging substances. Latent pollutants, for example, burning of coal wood, dung cakes, kerosene for cooking purposes and use of mosquito repellents, and incense sticks/dhoop with closed windows and doors. Additionally, dust mites, cockroach, fungi and animal danders also contribute to air pollution indoors.

Outdoor pollution: Outdoor contamination is primarily caused by ignition of fossil fuels by engineering plants and vehicles. This emits carbon monoxide, sulfur dioxide, hydrocarbons, particulate matter, and other contaminants.

Q3

Is environmental pollution a significant problem in the place I stay?
Water-related Infections are the Primary Public Concern.
Water-borne diseases

- Cholera
- Poliomyelitis
- Diarrheal diseases
- Roundworm
- *Enteric fevers:* Typhoid
- Whipworm
- Hepatitis A
- *Cryptosporidium*
- Giardia

Water-based diseases

- Schistosomiasis
- Dracunculiasis (guinea-worm)
- Leptospirosis

Water-washed diseases

- Scabies
- Typhus
- Trachoma
- Louse infestation

Diseases transmitted by water-related insect vectors

- Malaria
- Onchocerciasis
- Yellow fever
- Dengue
- Filariasis
- African trypanosomiasis
- Leishmaniasis
- Chikungunya

Air Pollution

In this era of technology, there are several mobile applications that may help to check the air quality by yourself. The level of air pollution is measured by checking the air quality at a particular place.

Air quality index (AQI) measures air quality. It operates like a thermometer which runs from 0 to 500° presentation alterations in the quantity of pollutants in the air. It converts multifaceted air eminence statistics of a range of pollutants into a single number and color.

The extent of air excellence is founded on eight pollutants (**Figs. 1 and 2**). They include:

1. Ammonia (NH₃)
2. Carbon monoxide (CO)
3. Nitrogen dioxide (NO₂)
4. Ozone (O₃)
5. Particulate matter (size <10 μm) or (PM-10)
6. Particulate matter (size <2.5 μm) or (PM-2.5)
7. Sulfur dioxide
8. Lead

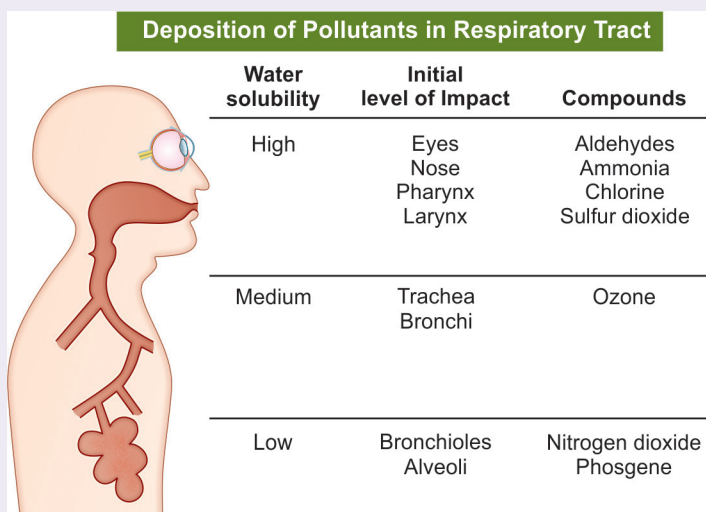


Fig. 1: Deposition of pollutants in respiratory tract.
Source: Centers for Disease Control and Prevention.

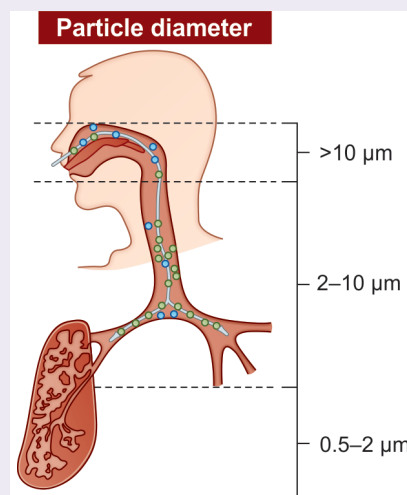


Fig. 2: Particle diameter.

The AQI value and their associated health impacts are mentioned in **Table 1**.

TABLE 1: Air quality index (AQI) value and their associated health impacts.			
Remark	Quality	AQI	Possible health impacts
Good	Good	0–50	Minimal impact
Satisfactory	Satisfactory	51–100	Minor breathing discomfort to sensitive people
Moderate	Moderate	101–200	Breathing discomfort to the people with lungs, asthma, and heart diseases
Poor	Poor	201–300	Breathing discomfort to most people on prolonged exposure
Very Poor	Very Poor	301–400	Respiratory illness on prolonged exposure
Severe	Severe	401–500	

Source: World Health Organization. Air Quality Guidelines. Geneva, World Health Organization, Department of Protection of the Human Environment, 1999.

Who monitors pollution?

The Central Pollution Control Board, New Delhi, is the top establishment in the nation in the area of pollution management, as a Scientific Wing of the Ministry of Environment, Forest, and Climate Change. Each state has its own State Pollution Control Board.

Is there any variation with a particular time of the day or a particular season when it comes to the level of pollutants?

In a day, early morning and late evenings have poor air quality, especially in the Metros—New Delhi, Mumbai, Bengaluru, and Chennai.

Metro	Best air quality	Worst air quality
Delhi	4 pm	7 am
Mumbai	5 pm	8 am
Bengaluru	Midnight	7 am
Chennai	3 pm	7 am

- The standard diurnal dissimilarity of PM-2.5 and PM-10 exhibits a bimodal allocation with two pinnacles monitored in the morning and evening at the locations in all the areas.
- The zenith in the morning (~08:00–10:00 hours) is because of the fumigation consequence and traffic releases while the evening and the night augment is connected with domestic discharge.
- The least level of PM was experienced through the late post noon hours (~15:00–16:00 hours) in all surroundings. Though, observing sites in the south demonstrate the smallest amount value after midnight.
- *Seasonal variation:* Worst in winter, generally. Local factors do influence, as in our country, pollution worsens during the post-Diwali time.

Q4

How does environmental air pollution affect my child?

Diseases Linked to Air pollution	
New onset asthma	Allergic rhinosinusitis
Bronchitis	Chronic migraine-type headache
Deficits of lung growth	BP and cardiovascular disease
Respiratory infections	Stroke
Eczema	Lung cancer
Behavioral disorders	Obesity

Lung is the worst affected organ.

Adolescents are more vulnerable to air pollution because of the outdoor activities. Children are more prone for damages caused by air pollution because of following:

- Immature immune system and antioxidant defense system is in developing stage
- Continuing development of lungs postnatal period
- Involvement in vigorous, outdoor activities
- Faster rate of breathing than adults taking in more air pollutants with each breath.

Can the Adverse Effect on Lungs be Reversed?

- The changes can be reversed to some extent. Improvement in air pollution leads to improvement in lung function level, and airway inflammation can also be reversed.
- Carbon monoxide (CO) is an odorless, colorless, and tasteless gas. Carbon monoxide poisoning is caused when CO builds up in the blood stream, preventing the body from using oxygen.
- Carbon monoxide can cause severe damage to your several organs, and possibly silent death from lack of release of oxygen. Because you cannot see, taste, or smell it, people often do not realize that they are breathing CO. Sources include:
 - Furnaces, gas water heaters
 - Fireplaces, exhaust stoves
 - Automobile exhaust fumes in closed environment
 - Fire accidents

A good ventilated house is always better to live in.

Q5

As a parent, how can I safeguard my child from the bad effects of environmental air pollution?

At Home

- Household should be kept clean and tidy.
- Dust and smoke can trigger asthma attacks and allergies.
- Improved indoor air quality—clean fuel, solar, electricity, avoid incense stick, and mosquito repellents, mop instead of dusting the house.
- Optimize ventilation during construction and renovation of house. Use “vaastu” in construction (our traditional way of architecture based on “vedic” mathematics).
- Use indoor plants and expose to sunlight and remove tray of water once a week.
- Use high-efficiency particulate air (HEPA)-fitted air purifiers [no obstruction from furnishings and wall should have a high clean air delivery rate (CADR)].



How to Protect from Outdoor Air Pollution?

- Limit outdoor activity on poor air quality days.
- Wear mask based on poor air quality.
- Avoid heavy traffic and major intersections.
- Asthmatic should use inhaler prescribed by their physician 15 minutes before venture out.

Others

- *Safe water*: Filtration and disinfection of water
- High levels of sanitation
- Ensuring no exposure to hazardous substances
- Mosquito-borne diseases due to poor water management and storage, deforestation, and loss of biodiversity.

Community-level Measures

- Public transportation
- Use of bicycles
- Carpools
- Walking
- Limit motor vehicle idling
- Avoid open burning
- Better storage and safe use of chemicals
- Vigilance against all forms of pollution
- Increased lobbying to make environmental pollution, forest conservation an election issue!

Q6

How can we help to increase awareness and reduce ill effects of environmental pollution?

Here are some suggestions:

- Avoiding personal vehicles and using public transports.
- Turning off the lights when not in use.
- Not using plastic bags.
- Lessening of forest fire and smoke.
- Build houses with good ventilation.
- Using filters for chimneys.
- Avoiding usage of crackers.
- Execute a forestation.
- Use indoor plants and expose to sunlight and remove tray of water once a week.
- Grow one tree for a family of four in front of your house and maintain it.

Source: AQI India

Improving Water Quality

- Mending seep of water sources as soon as they are exposed and put in squat flush toilets in community amenities.
- Using water cautiously where watering is essential and water at night or in the early morning.
- Shunning away from overapplying fertilizers and insect repellents as surplus amount can seep into ground or surface water.

Waste Minimization

- Use fewer materials.
- Use a dissimilar skill, process, or merchandize that creates fewer squander or employs a smaller amount of power.
- Reuse wastes.
- Recycle wastes that cannot be reused.

Q7

**What are the adverse effects of noise pollution?
Are there any restrictions for use of loudspeakers?**

Adverse Effects of Noise Pollution

- High frequency deafness in newborn
 - Prematurity
 - Intrauterine growth retardation
 - Sleep disturbance
 - Annoyance, headache, decrease work efficiency, and poor school performance
- A loudspeaker shall not be used apart from getting written consent from the authority and shall not be used at night (between 10.00 pm and 6.00 pm). Also, agencies have been fixed to implement the principles for management and adjust noise contamination.
- Noise limit has been agreed for automobiles, domestic appliances, and building equipment at the industrialized stage.
 - Paradigms have been developed and informed for the producer, firecrackers, and coal mines.
 - Proper education of religious leaders regarding the ill effects of noise pollution. Using modern technique to remind the communities without noise.
 - Proper quality education in society on ill effects of noise pollution as Indian cities rank high on noise pollution.

Q8

My kids go to school in the school bus (diesel vehicle). Should I worry about it?

Diesel exhaust contains small particles, toxic pollutants—1,400 times more than petrol. Diesel particles coated pollens are 50 times more allergenic.

- Low sulfur diesel should be used, but can be changed to electric buses if possible.
- Turn off engine in loading/unloading areas.
- *Bus driver education:* Keep doors/windows closed when in traffic, smart driving practices (avoid rapid acceleration and maintain steady speed).
- Cleaner vehicle standards, regular inspections, and maintenance.
- *Promote active school travel:* Walking or biking to school.

Q9

What is the expected impact of coronavirus disease 2019 (COVID-19) waste (mask, sanitizer, and bottles) on environmental pollution?

Plastic

- Increased wastes due to increase in the use of disposable single use plastics [masks, personal protective equipment (PPE), gloves], sanitizer, disinfectants and the plastic bottles.
- Reduction of recycling during the pandemic
- Economic fallout may reduce investments in green energy.
 - Plastic pollution before the pandemic was already increasingly harming our environment.
 - N95 masks are made up of plastics.

The discarding of such substances in open areas will undergo the “never-ending-story” of “plastics in the environment” (soil and aquatic ecosystem).

- In aquatic surroundings, it provides breeding ground for mosquitoes.
- Major source of water pollution and is ingested by aquatic animals.
- Plastic additives and/or absorbed contaminants leach out and decrease soil and water quality.



Disinfectants

- Mopping with a bleach-and-water produces hypochlorous acid gas, a skin irritant, and nitrogen trichloride gas causes respiratory problems.
- Disinfectant sprays release volatile organic compounds that can cause respiratory problems.
- Studies showing increased use of disinfectants associated chronic obstructive pulmonary disease (COPD) among healthcare workers and asthma in household settings.



Immediate Concerns

- Accidental ingestion leading to alcohol poisoning, especially by children
- Accidental contact to eyes of children causes damage to the eyes, when they step on foot-stand sprays
- Burns due to inadequate period of waiting before starting activities that may involve heat or sparks.
- Indoor pollution with use of sanitizer and disinfectants.



Q10

What are the procedures that can be adopted to decrease the effects of cleaning, sanitizing, and disinfecting products on indoor air quality?

- The best way to preserve the excellence of your indoor air is to decrease foundation of pollution indoors.
- Do not use machines that clean the air, or air “purifiers”, that produce ozone. Ozone is a gas that can damage human health.
- Keep away from the use of perfumed or aromatic goods in your service particularly air fresheners.
- Never mix cleaning products.
- Rinse surfaces well with water after cleaning.
- Sterilize only when and where required.
- Ventilation is an imperative part of recuperating indoor air quality.