



Review on Air Pollution on Health and Its Prevention

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Air pollution is the major environmental pollution that contains different types of gases, dust particles, small molecules, etc. Smoke and other hazardous gases, such as carbon, sulfur, and nitrogen oxides, are the primary causes of air pollution. Otherwise, air pollution is the contaminated air that poisonous effect on people's health. Most air pollution is affected by auto-rickshaw drivers. Auto drivers doing very stressful works which have been associated with environmental interaction factors. So the auto drivers are working within the environment, auto drivers are exposed to climate changes and poor road conditions. So the drivers are exposed to air pollution, dust, droplets, job insecurity, noise and vibration, business demands, damage to equipment, an excessive number of stops, schedule-related pressure, among others. Drivers' social role is also reflected in the responsibility of passengers and pedestrians 'lives and other vehicles.

Keywords: Assess; knowledge; effects; air pollution; health; prevention; auto-rickshaw drivers.

1. INTRODUCTION

Air pollution is a combination of various small particles and gases which may accumulate to

toxic levels of both outdoors and indoors particles. Its consequences can range from increased illness risks to increasing temperatures [1]. Air pollution is a well-known

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environmental health issue. Air pollution is based on a combination of toxic substances emitted by both person and naturally occurring substances. The major causes of man-made air pollution include vehicle emissions, fuel oils and natural gas used to heat houses, byproducts of manufacturing and electricity generation, notably coal-fueled power plants, and odors from chemical manufacture [2].

Air is the most important and very valuable resource in the environment. It is a part of Earth's atmosphere and one of its most important natural resources. Human beings need a continual supply of air is essential for human survival [3].

If the air is polluted then its major effect on a human being. Air pollution means changes in atmospheric physical, chemical, or biological state. Air pollution affects on human health in both the short and long term, affecting a number of systems and organs. Acute respiratory infections in children and adults, worsening of pre-existing heart and lung conditions, and asthmatic episodes are all possible side effects. Moreover, both short- and long-term infections

have been associated to early death and decreased life expectancy [4].

The air is contaminated with harmful gasses, particles of dust, and molecules, which severely impact plants, animals, and humans, and nature as a whole. In the atmosphere is various types of gases [5]. There it may increase the amount of pollution and it's harmful to our survival. If there is a change in the gaseous composition that gets increased the earth's temperature which is known as global warming [6].

2. DEFINITION

Air pollution is defined as occurring when introducing harmful or excessive quantities of substances into the Earth's atmosphere. Air pollution sources include gases, particulates, and molecules of biology [7].

Air pollution is the content of various dust particles that affect human health and there are various respiratory problems which include asthma, bronchitis cough, and chronic obstructive pulmonary diseases [8].

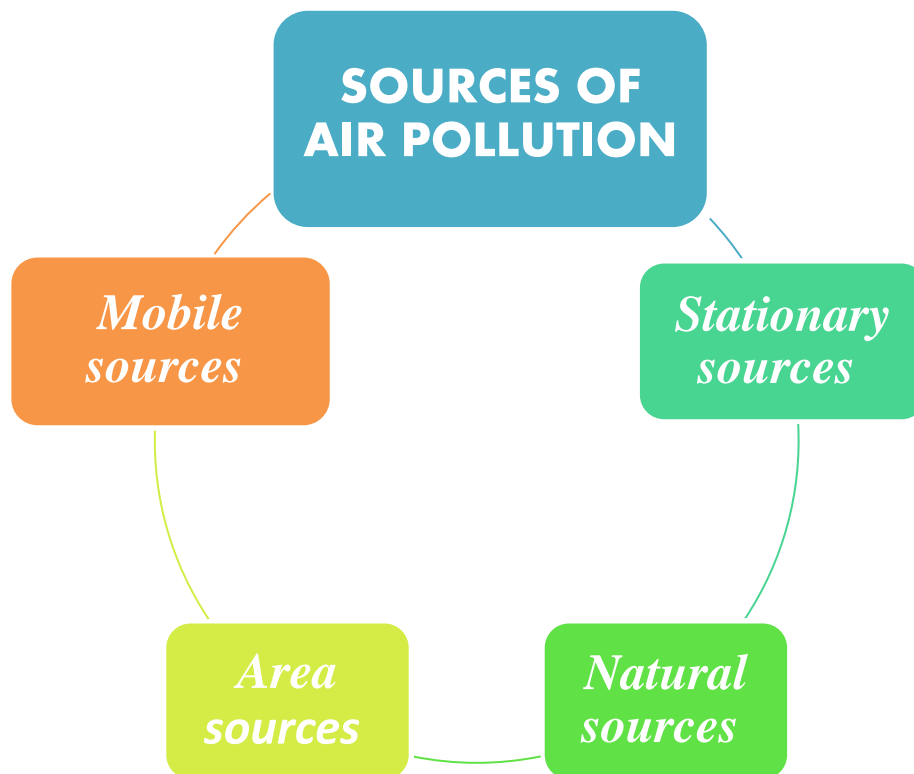


Fig. 1. Sources of air pollution

3. SOURCES OF AIR POLLUTION

3.1 Mobile Sources

Carbon monoxide, volatile organic compounds (VOCs), and nitrogen oxides (NO_x) are among the air pollutants that are mostly produced by vehicles. Mobile sources can be categorized as mobile on-road sources (such as trucks, buses, passenger vehicles, and engines) or mobile non-road sources (e.g. locomotives, marine vessels, construction equipment, lawn, garden and snow equipment, personal recreation equipment, etc.) [9].

3.2 Stationary Sources

A spectrum of air pollutants are emitted by stationary sources of air pollution such as plants, refineries, boilers and power stations [10]. Furthermore, stationary sources are separated into two main subsections: point and area sources [11]. Many distinct emission sites may consist of stationary sources. The precise location or device from which a pollutant is issued is an emissions point. Smokestacks, storage tanks, machine leaks, sewage processing/treatment zones, loading and unloading activities are commonly released by air pollution [12].

3.3 Area Sources

Area sources are the pollution sources which are emitted from a specific area by a substance or radiation [13]. The area sources includes the burning of stationary fuels, service stations, painting, solvent uses, trash and light industrial applications (cloakrooms, dry cleaners and self-selling stores). A wide range of citizen activities, including lawn maintenance, solvent based painting uses, grills with gas and charcoal and home heating, are also included in the area sources. Area sources of air pollution can contribute similar health and environmental risks that point and transportation sources contribute [14].

3.4 Natural Sources

Natural sources of air pollution include organic plant chemicals, sea salt, saturated soils and dusts [15]. Although human pollution, through the burning of fossil fuels, has contributed to acid deposition, rainwater is naturally acidic as a result of carbon dioxide in the air dissolving in the

water. natural sources of sulphur and nitrogen emissions can contribute further to the acidity of rainwater. Natural sources of nitrogen oxides include volcanoes, oceans, biological decay and lightning strikes [15].

4. EFFECTS OF AIR POLLUTION ON HEALTH

Because air pollution can cause harmful respiratory consequences, the media has informed the general public, especially those with upper or lower respiratory problems. In order to properly counsel their patients, allergists must be up-to-date on the possible health impacts of air pollution. Specifically, the allergist-clinical immunologist should be keenly aware that both gaseous and particulate outdoor pollutants might aggravate or enhance the underlying pathophysiology both the upper and lower airways.

Healthy persons might face health consequences from polluted air like respiratory discomfort or breathing problems during exercise or outdoor activities. Real risk of harmful consequences depends on the present health state, the pollutant kind and concentration, and the length of exposure to the contaminated air.

High air pollution levels can cause immediate health problems including:

- Cardiovascular and breathing conditions may worsened
- Added stress to heart and lungs, which must work harder to supply the body with oxygen
- Damaged cells in the respiratory system

Long-term exposure to polluted air can have irreversible impacts on health, for example:

- Accelerated aging of the lungs
- Loss of lung capacity and decreased lung function
- Development of diseases such as asthma, bronchitis, emphysema, and possibly cancer.
- Shortened life span [16].

5. PREVENTION OF AIR POLLUTION

Some important measures that can be adopted by individuals to contribute towards the prevention of air pollution.

5.1 Usage of public transport and carpooling

– By lowering the quantity of fuel produced from the combustion for an individual's transportation requirements, he or she can reduce the amount of pollutants emitted into the atmosphere and create less air pollution. Furthermore, these alternative solutions are cost-effective and can help save money.

5.2 Switching off the lights when they're not in use

– The most of our electricity is generated by the burning of fossil fuels, which contribute significantly to air pollution. As a result, saving power is an efficient method of reducing air pollution.

5.3 Reusing and recycling products

– By reusing things (that may be reused), the amount of energy needed to manufacture another one of those products is saved. Furthermore, recycling items uses less energy than manufacturing new ones.

5.4 Avoiding the burning of garbage and smoking

– Avoiding rubbish burning and smoking - garbage burning contributes significantly to air pollution. Cigarette smoking is another source of air pollution. Avoiding these behaviors and raising awareness about their harmful implications can go a long way toward preventing air pollution.

5.5 Avoiding the use of firecrackers

– Firecrackers are commonly used to mark special events. They are, however, known to create significant air pollution and are hence very detrimental to the environment. Personally avoiding the use of firecrackers and promoting knowledge about their harmful impacts is an efficient technique to contribute to the prevention of air pollution [17].

5.6 Minimize air pollution from cars:

Road traffic is a major source of nitrogen oxides. Nitrogen oxides are highly monitored air contaminants that have a negative impact on healthy lung development and overall life expectancy.

The problem of hazardous emissions from automobiles is most noticeable in congested areas. In such cases, personal diesel vehicles and smaller vans top the list of the worst pollutants.

5.7 Walk, bike or use public transportation to reduce air pollution:

When you have the option, take public transportation to get to work. Many cities have already invested in a good public transportation network and by choosing public transportation (even just one or two days a week) you are helping to reduce the number of cars on the road.

Many cities also provide excellent incentives to encourage people to take public transit. Some often used benefits are low-cost long-term fares, quicker travel times to your destination, shorter waiting times, timeliness, and free fares during specific hours, on weekends, or for seniors and students.

5.8 Walking or riding a bike to work

has several advantages for the health. One can choose less traveled roads and backstreets to get to work faster and less irritated than unless you were trapped in traffic. Both of these activities help to maintain an active lifestyle while also increasing self-confidence and health.

5.9 Take a good care of your wood stove or fireplace-

If you own a wood burning stove or a fireplace, be sure to keep it well-maintained. When burning fire-wood in wood stoves, incomplete combustion often releases particulate matter of a very small size (less than 2.5 micrometer). These tiny particles are the most harmful to our respiratory tracts because they can easily get deep into our lungs, and for their small size may even enter our bloodstream.

5.10 Recycle and Buy Recycled Products-

All the complicated procedures required to generate new products from scratch. To begin, the mine for raw minerals. Mined resources must subsequently be transported, cleansed of contaminants, processed, and treated before being converted into desired goods.

5.11 Plant Trees

Trees in the house and community can considerably reduce air pollution. The capacity of trees to filter particle contaminants from the air was tested by researchers from the University of Southampton. Every year, trees remove between 850 and 2,000 tons of hazardous particles from metropolitan air.

Trees placed beside highways or on property's boundaries also help to keep dirty air from being blown far by the wind. Consider it a protective barrier produced by the forest canopy. As a result, trees help to limit the spread of air pollution across long distances. The pollutants is then progressively filtered at the site, with little possibility of polluting surrounding regions [18].

6. PREVENTION AND CONTROL OF AIR POLLUTION

The management of air pollution due to 'gaseous pollutants' is based on different approaches, and this is caused by 'particular pollutants.'

Methods of controlling gaseous pollutants:

The air pollution generated by gas pollution emissions such as hydrocarbon, sulfur, ammonia and carbon monoxide etc. may be managed by three ways - Combustion, Absorption and Adsorption.

6.1 Combustion

The scientific term for burning is combustion. A material interacts with oxygen from the air in a combustion process, transferring energy to the surroundings in the form of light and heat. Oxides are the byproducts of a combustion process [19].

This method is used when the particles are organic gases or vapors. When organic air pollutants are transformed to less hazardous products, they are subjected to 'flame combustion or catalytic combustion.' carbon dioxide and non-harmful product water [20].

6.2 Absorption

Absorption in the context of air pollution control refers to the transfer of a harmful gas pollutant from the air into a contacting liquid, such as water. The liquid must be able to either function as a solvent for the pollutant or capture it through a chemical process [20].

Controlling emissions from industrial sources is essential to maintaining air quality. This might be accomplished by switching fuel sources, updating or changing raw materials, employing different manufacturing methods, or installing add-on control systems. Even though these the emissions can come in the form of particle

matter, gases, or vapors, the focus of this study will be on reducing gaseous air pollutants.

In this process the contaminated air containing gaseous pollutants is routed through a scrubber containing a suitable liquid absorbent. The liquid absorbs the dangerous gaseous contaminants in the air.

6.3 Adsorption

Adsorption is the removal of gaseous pollutants from an airstream by transferring the contaminants to the solid surface of an adsorbent. Although zeolites, polymers, and other adsorbents may be employed, activated carbon is the most widely used adsorbent.

The adsorption process can be either physical or chemical. In physical adsorption, the adsorbate molecules (the contamination) attach to the adsorbent materials by a physical bonding force known as "van der Waals forces." A chemical adsorption is formed between the adsorbate and adsorbent. This connection is referred to as "chemisorption." Chemisorption generally happens at high temperatures when energy is required to break chemical bonds. Chemisorption is basically the same as catalytic oxidation [20].

The contaminated air is passed through porous solid adsorbents maintained in appropriate containers in this approach. The gaseous contaminants are absorbed at the porous solid's surface, and clean air flows through.

7. METHODS OF CONTROLLING PARTICULATE EMISSIONS

Particles such as dirt, soot, ash etc. can regulate pollution from air by the use of fabric filters, wet scrubbers, precipitators and specific mechanical equipment.

1. Mechanical devices

It works on the principle of:

- Gravity: The particle sinks down and is eliminated via the action of gravitational force in this procedure.
- Sudden change in airflow direction: based on increased momentum, it causes particle separation.

2. Fabric Filters:

- The particulate matter is passed through a porous medium made of woven or filled fabrics.
- The particulate present in the polluted air is filtered and gets collected in the fabric filters, while the gases are discharged.
- The process of controlling air pollution by using fabric filters is called 'bag filtration'.

3. Wet Scrubbers: SO₂, NH₃ and fumes are trapped by fumes through the water.

4. Electrostatic Precipitators:

- When contaminated air containing particulate pollutants is pumped through a precipitator, the particles are electrically charged and aerosol particles are subsequently precipitated into the electrodes [21].

7. CONCLUSION

Air pollution is vigorously affected by human health and due to the air pollution the human which get affected by various diseases like asthma, bronchitis, emphysema, and other various serious problems within the respiratory system. For that taking various precautions to prevent the disease related to air pollution. This review focuses on what is air pollution and what are the health effects on respiratory mortality, morbidity, and quality of life.

CONSENT

It is not applicable.

ETHICAL CLEARANCE

As per international standard or university standard written ethical approval (Ref no: DMIMS(DU)/IEC/Dec-2019/8648) has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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