

## 4. AN ANALYSIS OF AIR POLLUTION AND HUMAN HEALTH EFFECTS

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### ABSTRACT

Hazardous chemicals escape to the environment by a number of natural and/or anthropogenic activities and may cause adverse effects on human health and the environment. Increased combustion of fossil fuels in the last century is responsible for the progressive change in the atmospheric composition. Air pollutants, such as carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), ozone (O<sub>3</sub>), heavy metals, and respirable particulate matter, differ in their chemical composition, reaction properties, emission, time of disintegration and ability to diffuse in long or short distances. Air pollution has both acute and chronic effects on human health, affecting a number of different systems and organs. It ranges from minor upper respiratory irritation to chronic respiratory and heart disease, lung cancer, acute respiratory infections in children and chronic bronchitis in adults, aggravating pre-existing heart and lung disease, or asthmatic attacks. In addition, short- and long-term exposures have also been linked with premature mortality and reduced life expectancy. This paper discussed about effects of air pollutants on human health.

### KEYWORDS

Air pollutant; Human health; Environment.

### INTRODUCTION

Although a number of physical activities (volcanoes, fire, etc.) may release different pollutants in the environment, anthropogenic activities are the major cause of environmental air pollution. Hazardous chemicals can escape to the environment by accident, but a number of air pollutants are released from industrial facilities and other activities and may cause adverse effects on human health and the environment. By definition, an air pollutant is any substance which may harm humans, animals, vegetation or material. As far as humans are concerned an air pollutant may cause or contribute to an increase in mortality or serious illness or may pose a present or potential hazard to human health. The determination of whether or not a substance poses a health risk to humans is based on clinical, epidemiological, and/or animal studies which demonstrate that exposure to a substance is associated with health effects. In the context of human health, "risk" is the probability that a noxious health effects may occur.

### OBJECTIVES OF THE STUDY

1. To study the impact of air Pollution on Human health.
2. To Study the Air Quality of Indian scenario.
3. To obtain the knowledge and understanding necessary for developing preventive and corrective measures.

## REVIEW OF LITERATURE

The World Commission on Environment and Development (WCED) opines that "the future is to face ever increasing environmental decay, poverty, hardship and an even more polluted world".

**Aziz (1992)** observes that urban environmental issues are tending to assume an important dimension especially in developing countries since there is a rapid increase both in the number of cities and in the urban population.

**Nagdeve (2007)** argues that both population growth and un-sustainable development are a cause for concern in India. Population size and growth tend to expand and accelerate these human impacts on the environment. The biggest concern is that the increasing population will grow to such an extent in future that it will cause overall scarcity of resources.

According to **NEERI (2002)** the share of PM10 in the metropolitan city of Mumbai is as follows: Transport: 32 percent, 45 percent from industry, 18 percent from area sources, and 5 percent from building and road construction.

Air pollutants do not only restrict their impact to causing impaired health conditions, but they greatly influence the global problem of climate change caused due to the release of the Green House Gases (GHGs). Mumbai being a coastal city and most of its population living in the lowlying areas, people will be greatly affected by climate change. (MCGM, 2011)

## METHODOLOGY

This study based on secondary data. The data were collected from books, journals, magazines and published articles from leading journals.

### AIR

The air we breathe is heavy with toxins. Air pollution is responsible for half the cases of chronic coughing in urban children and facilitates the spread of

respiratory infection. In the poor and developing countries, air pollution in the form of soot and smoke has increased. More than one billion urban residents worldwide breathe air that does not meet WHO air quality standards (Sharma, 2001). In developing countries, indoor air pollution is largely attributed to smoking and the use of biomass for cooking (Rehfuess et al., 2006).

This indicator provides a measure of the state of the environment in terms of air quality and is an indirect measure of population exposure to air pollution. The air we breathe contains varying levels of pollutants such as particulate matter, sulfur dioxide, oxides of nitrogen, ozone, carbon monoxide and volatile organic compounds derived from motor vehicles, industry, housing and commercial sources. Despite efforts to reduce pollution levels, they continue to pose risks to human health. Epidemiological evidence shows that various health effects, including illness and death from respiratory and cardiovascular diseases, are associated with air pollutants. Exposure to air pollutants may lead to short-term effects such as reduced visibility, headaches, allergic reactions, irritation to the eyes, nose and throat, and longer term effects such as breathing difficulties, asthma and various chronic respiratory illnesses such as lung cancer and heart disease. Indoor air pollution is responsible for over 1.5 million deaths from Environment and Health Environmental Health Perspectives of a Panchayat in Idukki District of Western Ghats 15 respiratory infection per year and for 2.7 percent of the global burden of disease (WHO, 2006). In infants and young children, the effects can be far more (Smith et al., 2004). Children with asthma are believed to be particularly sensitive to air pollution. Air pollution may also act synergistically with other environmental factors to worsen asthma.

## HEALTH IMPACT OF SPECIFIC AIR POLLUTANTS

Some of these gases can seriously and adversely affect the health of the population and should be given due attention by the concerned authority. The gases mentioned below are mainly outdoor air pollutants but some of them can and do occur indoor depending on the source and the circumstances.

- **TOBACCO SMOKE**

Tobacco smoke generates a wide range of harmful chemicals and is a major cause of ill health, as it is known to cause cancer, not only to the smoker but affecting passive smokers too. It is well-known that smoking affects the passive smoker (the person who is in the vicinity of a smoker and is not himself/herself a smoker) ranging from burning sensation in the eyes or nose, and throat irritation, to cancer, bronchitis, severe asthma, and a decrease in lung function.

- **BIOLOGICAL POLLUTANTS**

These are mostly allergens that can cause asthma, hay fever, and other allergic diseases.

**LEAD:** Prolonged exposure can cause damage to the nervous system, digestive problems, and in some cases cause cancer. It is especially hazardous to small children.

**RADON:** A radioactive gas that can accumulate inside the house, it

originates from the rocks and soil under the house and its level is dominated by the outdoor air and also to some extent the other gases being emitted indoors. Exposure to this gas increases the risk of lung cancer.

**OZONE:** Exposure to this gas makes our eyes itch, burn, and water and it has also been associated with increase in respiratory disorders such as asthma. It lowers our resistance to colds and pneumonia.

**CARBON MONOXIDE:** CO(carbon monoxide) combines with haemoglobin to lessen the amount of oxygen that enters our blood through our lungs. The binding with other haeme proteins causes changes in the function of the affected organs such as the brain and the cardiovascular system, and also the developing foetus. It can impair our concentration, slow our reflexes, and make us confused and sleepy.

## AIR POLLUTION IMPACTS ON RESPIRATORY HEALTH

In 2012 alone, 7 million deaths in the world were attributable to the combined effects of ambient (3.7 million) and household (4.3 million) air pollution (WHO, 2015). Ischemic heart disease is at the forefront in this ranking of causes, and COPD, lower respiratory infections, lung cancer are also amongst the top five causes of deaths worldwide.

TABLE: 1

PERCENTAGE OF TOTAL GLOBAL DEATHS DUE TO CAUSES THAT ARE ATTRIBUTED TO AIR POLLUTION

Years	Chronic Obstructive Pulmonary Disease	Lower Respiratory Infections	Pneumoconiosis	Other Chronic Respiratory Diseases	Total
1990	6.7	7.3	0.4	0.6	15
1995	6.3	6.7	0.3	0.6	13.9
2000	5.7	6.1	0.3	0.5	12.6
2005	5.4	5.5	0.2	0.5	11.6
2010	5.5	5.3	0.2	0.6	11.6

Source: WHO 2015

Table 1 presents data for every five years from 1990 to 2010 for the percentage of total global deaths due to causes attributed to air pollution categorized under three main diseases. As per the data observations, it can be said that the total global deaths due to all the major respiratory diseases seem to be reducing systematically for the time period in consideration. This is also due to the improvements made over these years, 1990 to 2010, in the quality, accessibility and availability of health services and medicines, that are being provided to the geographical areas where treatment from the illnesses are required. There is insufficient data to be able to state that the percentage of total global deaths that are attributed to air pollution have reduced over these years due to improvements in global air quality.

### **INDIAN SCENARIO**

Deterioration of India's air quality has been accentuated by industrialization and urbanization. While India's gross domestic product has increased 2.5 times over the past two decades, vehicular pollution has increased eight times, while pollution from industries has quadrupled. Household energy consumption also cannot be ignored in this respect. Households are a major consumer of energy and contribute, to a large extent, to the total energy use of the nation. At present, the share of direct energy use of households in India is about 40% of the total direct commercial and non-commercial indigenous energy use (Pachauri and Spreng, 2002). If, in addition, one takes into account the indirect or embodied energy in all goods and services purchased by households, then about 70% of the total energy use of the economy can be related to the household sector, the remaining 30% comprise the energy requirements of government consumption, investments and net imports (Pachauri and Spreng,

2002). The distribution of population with regard to energy consumption also shows that over 60% have a per capita total household energy requirement of less than 0.5kw per year. In addition to the wide disparities in the quantities of energy used, there are large variations in the types of energy used and pattern of consumption among households.

A survey by Central Pollution Control Board India (CPCB, 2000) has identified 23 Indian cities to be critically polluted. 12 major metropolitan cities in India produce 352 tonnes of oxides of nitrogen, 1916 tonnes of carbon mono oxides from vehicular emission and 672 tonnes of hydrocarbon. The CO, SO<sub>2</sub> and NO<sub>x</sub> in the ambient air of India are above the WHO safe limit. WHO annual mean guidelines for air quality standards are 90 micrograms per cubic meter for total suspended particulates, and 50 for sulphur dioxide and nitrogen dioxide (World Development Indicators, 2000). The total urban air pollution of SO<sub>2</sub> and NO<sub>x</sub> from major cities in India are 300 micrograms per cubic meter and 250 microgram per cubic meter during 2004 (World Development Report, 2005). Deterioration of air quality is a problem. A majority of the 300 million urban Indians, about 30% of India's population is directly experiencing this (Gurjar et al., 2008). Recently an Environment and Forest Ministry Report, Government of India, released on September 14, 2007 has identified 51 cities that do not meet the prescribed Respirable Particulate Matter (RSPM) levels, specified under the National Ambient Air Quality Standards (NAAQS). In 2005, an Environmental Sustainability Index (ESI) placed India at 101st position among 146 countries (Environmental Pollution in India, 2008).

### **CONCLUSION**

Air pollution is a serious environmental concerns all around the globe. Over the last few decades, the intensified process

of industrialization and urbanization, coupled with rapid population growth has resulted in severe environmental degradation. In particular, harmful pollutants such as Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>), Total Suspended Particles Matter (TSPM) etc, are emitted and these pollutants even exceed air quality guidelines recommended by the World Health Organization (WHO, 2005). This brief review presents the adverse effects of a number of (air) pollutants in human health. As shown, major impairments of different organs can be observed. The main conclusion drawn is that, in view of increased exposure of humans to a diversity of pollutants, dietary interventions, rich in plant-derived foods, may protect or decrease their effects on different organs.

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