

Air pollution sources in Ahvaz city from Iran

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ABSTRACT:

Human needs clean and healthy air. Clean air is more important than food and water. Industries and industrial activities produce a lot of gases and particles that pollute the air. Air pollution, as one of the concerns of the present age, in addition to environmental degradation and economic damage, poses serious risks to human health. Continuous monitoring of air quality to identify pollutants and identify sources of their emissions is also one of the basic strategies for controlling air pollution. Unhealthy air quality causes a lot of damage to humans and the environment and various health effects. Air pollution is a major environmental threat to human health in many developed or developing cities around the world. The level of air pollution is usually determined by the concentration of air pollutants such as dioxide hydrogen, sulfur dioxide, carbon monoxide, ozone and suspended particles. In recent years, air quality has been a major factor in the emergence of quality of life in urban areas, especially in densely populated and industrial areas. Air pollution with a wide range of suspended particles has effects on human health, including the respiratory and cardiovascular systems, as well as mortality. In this article, the effects of air pollution on the environment and sources and the source of pollution in Ahvaz city are introduced.

Review

Air pollution is a major environmental threat to human health in many developed or developing cities around the world. The level of air pollution is usually determined by the concentration of air pollutants such as carbon dioxide, sulfur dioxide, carbon monoxide, ozone and suspended particles [1]. During the past decade, many attempts to examine the relationship between air pollution and meteorological parameters were conducted and several statistical methods have been proposed.

Population growth and industrial development, including the factors that play a role in the development and air pollution in large cities, leading to the idea of prevention and control of pollution in major cities around the world. Air pollution has negative effects on various biological, physical, chemical and economic systems. In recent years, air quality has been considered as the main factor in the emergence of quality of life in urban areas, especially in densely populated and industrial areas [2, 3].

The atmosphere is the dynamic and complex natural gas system on which life on planet earth depends. Ozone depletion due to air pollution has long been known to pose a threat to human health as well as to Earth's ecosystems [4, 5]. Air pollution is considered to be one of the concerns of the present age, which in addition to environmental degradation and economic damage, poses serious risks to human health. Continuous monitoring of air quality to determine pollutants and identify sources of their emissions is also one of the basic strategies for controlling air pollution. Poor air quality caused great damage to human health and the environment and the effects will be different [6]. In previous years, coal produced a lot of sulfur dioxide gas in the industry, but today, due to the low sulfur content in coal, its fuel does not cause less problems, but cars produce nitrogenous compounds. Nitrogen dioxide gas makes the air brown, and this is a situation that many Iranian cities, such as the city of Ahvaz, face in the summer. The particulate matter produced by fuel for gasoline engines and road dust, smoke from fires and plant pollutants are the main causes of air pollution [7, 8]. In general, air pollution involves an increase in the amount of vapors and toxic gases and particulate matter that threaten human health. In standard and healthy air, there should be no chemical contaminants such as carbon monoxide, nitrogen oxides and carbon dioxide and they should be above the allowable limit.

Air pollution sources

The most important sources of air pollution are vehicles, industrial plants, smoke from fires such as forest and rangeland fires, plant pollutants, quicksand's, and dust and smoke from volcanic

activity. They are. The most important air pollutants are:

1. Solid particles: These particles pass through the body's natural defense barrier and penetrate deep into the lungs, exacerbating asthma and lung dysfunction.
2. Ozone: This gas is produced by chemical reactions in the atmosphere under the influence of sunlight and is a powerful stimulant of the respiratory system.
3. Dioxide
4. Carbon monoxide
5. Lead
6. Sulfur dioxide
7. Sulfates and hydrogen sulfide
8. Acrolein: One of the compounds that is formed during the heating of oils and vegetable fats is acrolein, which has various toxic effects on the body.
9. Dioxin: Dioxin exacerbates the disorder in fetal development and increases the risk of cancer [9, 10].

Effects of air pollution on human health

Air pollution with a wide range of suspended particles has effects on human health, including the respiratory and cardiovascular systems, as well as mortality. Long-term air pollution can be fatal to humans. In a bitter experience, during a week of air pollution in December 1952, about 4,700 people died in London, most of them suffering from heart and lung disease and the elderly. Air pollution irritates the airways and exacerbates asthma, and the higher the ozone level, the more people get asthma. Long-term exposure to air pollution can damage lung tissue. Air pollution with various gases causes lung cancer. Air pollution also kills

animals and is harmful to plants. Air pollution also increases respiratory infections in humans. Air pollution has irreversible effects on antiquities, buildings and cultural heritage. Human quality of life is affected by air quality. With declining air quality and noticeable changes, so can human lifestyles. Air pollution is one of the consequences of the development of industry and urban development, which destroys the environment and seriously threatens human health. Air pollution causes acute and chronic health effects from minor physiological disorders to death [9, 10].

Pollution in closed environments such as homes, offices and schools should also be considered. Some of these pollutants are caused by activities such as smoking and cooking. Many people spend 80 to 90% of their lives indoors, and exposure to harmful pollutants can endanger people's health. That's why it's important to pay attention to indoor and outdoor air pollution. Air pollution can have long-term and detrimental effects on human health in a variety of ways. The effect of air pollution on different people is different. Some people are much more vulnerable to air pollution than others. Young children and the elderly suffer more from air pollution than others. Some conditions, such as asthma, heart disease, and lung disease, are exacerbated by air pollution. The extent of the damage usually depends on the amount of exposure to the harmful chemicals, the duration of contact with the contaminants and the concentration of the chemicals. Short-term effects of air pollution include sensitivity of the eyes, nose and throat, and upper respiratory tract infections such as bronchitis and pneumonia. Headaches, nausea, and allergic reactions are other short-term side effects of this environmental problem. Short-term air pollution can exacerbate asthma. Long-

term effects of air pollution can include chronic respiratory disease, lung cancer, heart disease, and even brain, nerve, liver, and kidney damage. Continuous contact with contaminants affects the lungs of children and exacerbates the disease in the elderly. Fertility due to decreased sperm count in men is known to be a complication of air pollution. Air pollution not only contributes to the exacerbation of asthma but is the biggest risk factor for developing the disease. Air pollution is one of the most common causes of acne. This is a deadly problem for diabetics. Air pollution interferes with the process of controlling blood flow in diabetes. Research has shown that air pollution plays a role in obesity and has been shown to cause premature death in polluted areas of cities [11, 12].

Effects of air pollution on children

Children are at higher risk for air pollution for the following reasons than adults:

1. Children and infants breathe faster and this increases the contact with air pollutants.
2. Children often have oral respiration, so the nasal filter, which takes part of the air pollution, cannot work effectively.
3. Children spend more time outdoors than adults, especially in hot, summer seasons when the level of infection is higher.
4. The immune system and related organs in children are still immature and more susceptible to contamination, such as lead, which builds up in the growing bones.

Air pollution stimulates airway obstruction and exacerbates asthma, affects the development of the nervous, respiratory, immune, and endocrine systems, and can increase the risk of cancer in later life [9, 10].

Effect of air pollution on animals

Air pollution increases the normal pressure on the cell to such an extent that it disrupts its activity and eventually causes cell death. All living things, including humans, animals, plants, and microorganisms, need air. When the air is polluted, along with cellular respiration, several other harmful gases are inhaled. Experts have also shown that the particles that animals inhale for a long time can accumulate in their tissues in the long run and damage their organs. In addition to inhaling harmful pollutants directly, animals may be exposed to these pollutants through the food they eat or by absorbing their skin [9,10].

Ahvaz City

According to the 2016 census, the population of Khuzestan province is 4,710,000. The city of Ahvaz with an area of 64019 square kilometers is considered as one of the largest cities in Iran. The population of this city is about 1303,000 people, which is considered as the seventh most populous city in Iran. In terms of industrial and industrial activities, the city of Ahvaz is considered as one of the major industrial cities in Khuzestan province, and it includes large food factories and industrial, mining, metals and large and small chemical workshops. The high population of this city has caused various agricultural activities in the fertile lands around it. A variety of other industrial products such as steel, iron, pipes, wood profiles, industrial parts, synthetic leather, pressure tanks and heat and refrigeration converters are also produced in the industrial towns of this city. Hygiene and detergents, food products, agricultural products such as wheat, barley, barley, dates and fishery products are the most important exports of this region to other provinces or abroad. There

are critical industrial centers such as the National Iranian Drilling company, the Steel Complex, the National Steel Industrial Group, Piping company, and the oil and gas companies in Ahvaz. There is also traffic on the city's highways. Sand mines and rich oil and gas resources are also exploited in the area, and there are many exploitation units in the city. The National company for Southern Oilfields is the largest oil producer in Iran and the National Iranian Drilling company is the largest drilling company in Ahvaz. It is also home to one of the largest steel mills in the city [13,14].

Air pollution in Iran

Air pollution is a major health hazard in several major Iranian cities. Transportation, widespread use of fossil fuels such as gasoline and worn-out and old-fashioned vehicles, industrial resources within and near city limits, and local dust are the most important causes of air pollution. Air quality control and monitoring shows that the ambient air is healthy in most cities of Iran, but air pollution in most days of the year in major cities of Iran such as Tehran, Karaj, Mashhad, Arak, Ahvaz, Tabriz, Shiraz and Azfahan indicates dangerous air condition [15]. In many cities of Iran, including Tehran, Mashhad, Isfahan, Tabriz, Shiraz, Karaj, Arak and Ahvaz, it has reached a dangerous level and some days of winter are highly polluted. Among the various sectors, transportation and industry are the most important causes of air pollution, respectively, so that the transport sector alone accounted for 64.3% of total nitrogen oxide emissions, 3.29% sulfur dioxide, 27.5% carbon dioxide, 98.6% produces. Carbon monoxide and particulate matter have the highest emissions among other energy sectors in the country. [7].

Air pollution in Ahvaz

Ahvaz, with all its resources for development, today, for various reasons, the most important of which is the lack of a cohesive and interconnected culture of ethnic groups and in constructive interaction with its environment, is facing an environmental pollution crisis that has increased dramatically in recent decades. Ahvaz has been named the most polluted city in the world in the international media last year [8, 16]. Major industries, including the steel industry, the National Steel Group, the oil company's facilities, drilling and oil extraction activities, and the burning of sugarcane fields are among the most important air pollutants in Ahvaz. In addition to industry, motor vehicles can be considered as other sources of pollution. The results of a research have shown that the pollution load index in industrial and high-traffic areas of Ahvaz city is higher than other areas and in these areas the *Conoacarpus erectus* tree can be used as a reliable bio-tracer in studying air and soil pollution. Lead was less than allowed [17, 18].

In the study, the concentration of environmental suspended particles in the city of Ahvaz was examined, and the results showed that dust storm was observed at the meteorological station of Ahvaz region. In order to study the sources of dust storms in Ahvaz, Iran, in the hot and cold seasons of 2017, the method of lagging satellite images and weather conditions were used. Comparing satellite imagery with the HYSPLIT model is a useful tool for validating and increasing understanding of the processes involved in the propagation, transportation, sedimentation and geographical distribution of dust. Analysis of the particle return path showed that there is a direct relationship between PM, which originates from domestic and foreign

sources in the southwestern region of Iran. The highest probability of dust storms in the whole season was colder (from November to February) and the lowest in the warmer seasons (March to October). Accordingly, the results of this study showed that dust storms are the main source of pollution in Ahvaz particles [19]. Pollution in Ahvaz is caused by the consumption of fuel energy and oil and petrochemical industries [20], but the most important factors in air pollution in Ahvaz are suspended particles of less than 10 μm and ozone gas, and carbon monoxide gas has played the least role in air pollution in Ahvaz [21].

Conclusion

According to studies and research, despite the activities carried out to reduce air pollution, including technical inspection of vehicles, construction of low-consumption vehicles with injector engines, non-use of diesel vehicles, proper aerodynamic design of vehicles, increase combustion efficiency and improve combustion system. Engine, development of public transportation infrastructure and change of consumption pattern, air quality is still critical in most cities of Iran. Air pollution in metropolitan areas is very high and dangerous and plays an important role in the mortality of people in the community. Therefore, in order to control air pollution, officials and experts should pay more attention. Suggestions for reducing pollution can include the implementation of appropriate management programs, including the evaluation and continuous monitoring of air quality, the implementation of air quality management programs in each region and the technical inspection of vehicles. Also increase public transportation while using clean technology.

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Competing interests

The authors declare that there are no competing interests.

Ethical considerations

Ethical issues have been completely observed by the authors.

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