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Air And Noise Pollution are Major Pollutants in Big Cities

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ABSTRACT

Road traffic along with extreme urbanization rates are the major sources of urban pollution in big cities of the world. In Europe, for example road traffic Is estimated to generate almost 40% of nitrogen oxide emissions. Traffic is also a significant source of PM10 and PM2,5 particles and lead emissions. The energy consumed by residential, commercial and government buildings generate a large volume of suspended particular matter, rising to almost 60% in the case of PM2,5 particles. They are also a major source of Carbon Monoxide (CO) and black carbon emissions. Most big cities in the world are surrounded by industrial areas occupied by polluting businesses that also contribute to the deterioration of air quality in urban areas. In addition to the gasses generated by fossil fuel burning industry they are responsible for releasing heavy metals, such as nickel and arsenic. Tackling noise and air pollution requires stronger collaboration across all levels of governmental, municipal, scientific and technical organizations. Our task should be the movement towards healthier, quieter and more livable cities.

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Introduction

In the middle decades of the 20th century when the problem of air pollution has already become evident in big cities of the world people paid little attention to noise pollution. It was nearly ignored. But little by little, especially along with increasing number of light vehicles and high urbanization tempos, they began to pay more attention to it and today noise pollution along with air pollution is considered as a deadly pair of pollutants in big cities of the world. At the same time air pollution is still remains as the leading one as it adversely affects not only on people, but on animals and plants too. There are investigations that leaves of the plants growing in the overcrowded and polluted city conditions are growing worse and their leaves already dry up and twist in the second half of summer. Air pollution is the greatest environment health problem and cause of main death and disease globally. Children are the most vulnerable to polluted air, carrying risk for lifelong consequences. Poor air quality is a leading risk factor for major chronic diseases in adults too, including heart and lung disease as well as cancer.

Air Pollution

The air pollution is still considered the leading environmental cause of premature death in the world, linked to cardiovascular and respiratory diseases as well as cancer. Certain pollutants, such as arsenic (Ar), Cadmium (Cd), mercury (Hg), Nickel (Ni) and polycyclic aromatic hydrocarbons (PAHs), are human genotoxic carcinogens, capable of causing cancer by directly altering the genetic material of target cells. Air pollution also negatively affects water and soil quality, and damages ecosystems. For example, through eutrophication (the increase in concentration of phosphorus, nitrogen and other plant nutrients in a body of water), resulting in excessive plant and algal growth and acid rain. Agriculture and forests, as well as buildings and goods, therefore are affected too. Air pollution has many sources, but mainly stems from industry, transport, domestic heating, energy production and agriculture [1].

Carbon Monoxide

Carbon Monoxide (CO) is a colorless, highly poisonous, odorless, flammable gas that is slightly less dense than air. The most common source of carbon monoxide is the partial combustion of carbon containing compounds, when sufficient oxygen or heat is present to produce carbon dioxide. It is important in production of many compounds, including drugs, fragrances and fuels. Upon emission into the atmosphere, carbon monoxide affects several processes that contribute to climate change. Several thousand people go to hospital emergency rooms every year to be treated for carbon monoxide poisoning [1]. It is known that carbon monoxide had been used for genocide during the Holocaust at some extermination camps in Germany during World War ii [2,3].

Carbon Dioxide

Carbon Dioxide (CO_2) in the air is transparent to visible light but absorbs infrared radiation, acting as greenhouse gas [2,4,5]. Burning fossil fuels are the primary cause of increased CO_2 concentrations and global warming and climate change. About half of excess CO_2 emissions to the atmosphere are absorbed by land and ocean. Carbon dioxide content in fresh air varies between 0.036% and 0.041% depending on the location [6-8]. There are few studies of the health effects of long-term continuous CO_2 exposure on humans and animals at levels below 1%. Poor ventilation is one of the main causes of excessive Co_2 concentrations in

closed spaces. Carbon dioxide is natural and harmless in small quantities, but as levels rise, it can affect productivity and sleep. High levels are directly correlated to low productivity and high sick leave making this a crucial concern in offices, schools and home environments. It is revealed in restlessness, drowsiness, increased heart rate and blood pressure, sweating and headache.

Nitrogen Oxides (NOx)

Nitrogen is one of the elements contained in fossil fuel. Their presence in the atmosphere is directly related to the burning of fossil fuels, such as in road vehicles. Long exposure to high concentrations of NOx can lead to lung problems and inflammation of the airways. Furthermore, NOx is also contributes to the formation of tropospheric ozone [1,2,6,9].

Sulfur Dioxide (SO_2) is a gaseous air pollutant composed of sulfur and oxygen. SO_2 is formed when sulfur-containing fuel such as coal, oil, or diesel is burned. Sulfur dioxide causes a range of harmful effects on lungs, as the EPAs, besides it causes wheezing, shortness of breath and chest tightness, especially during exercise or physical activity [10]. Continued exposure at high levels, increases respiratory symptoms and reduces ability of lungs to function. Short exposure makes it difficult for people with asthma to breathe when they are active outdoors. Rapid breathing during exercise through the mouth increase risk of hospital admissions or emergency room visits, especially among children, older adults and people with asthma [11-12].

Particular Matters (PM10 and PM2,5): PM10 is particulate matter of 10 micrometers or less in diameter. PM2.5 is particulate matter of 2.5 micrometers or less in diameter. Synonyms of particular matters are: dust, inhalable particles, respirable particles, smoke and mist. PM are important constituents of the atmosphere [13]. The sources of PM can be natural or man-made sources. There are a number of natural sources that inject million tons of PM into the atmosphere. They include volcanic eruptions, wind, volcanic and dust storms, forest fires, salt spray, debris, reactions between gaseous emissions and soil erosion. Man-made activities such as fuel combustion, industrial processes, steel industry, petroleum foundries, cement, glass manufacturing industry, mining operations. All these substances contribute to PM in the atmosphere.

Soot (BC): Soot (BC) is an impure carbon particle resulting from the combustion of hydrocarbons [14]. Soot as an airborne contaminant has many different sources like coal burning, internal-combustion engines, power-plant boilers, ship boilers, central steam-heat boilers, fireplaces. Soot, particularly diesel exhaust pollution accounts for one quarter of total hazardous pollution in the air. Among these diesel emission components, a particular matter has been a serious concern for human health due to its direct and broad impact on the respiratory organs. It is associated with lung cancer, influenza, asthma and increased mortality rate.

Ammonia (NH3): Ammonia is a compound of nitrogen and hydrogen with chemical formula NH3. It is a colorless gas with distinct pungent smell. Ammonia even at dilute concentrations is highly toxic to aquatic animals and for this reason it is classified as dangerous for the environment. Atmospheric ammonia plays key role in the formation of fine particulate matter. Ammonia is a constituent of tobacco smoke. In humans, inhaling ammonia in high concentrations can be fatal. Exposure to ammonia can cause headaches, impaired memory [15].

Ozone(O_3)

Tropospheric ozone can cause serious damage to plant life. But it is also harmful to human health. Ozone is a secondary pollutant. It is formed as a result of a photochemical reaction between nitrogen oxides (NOx) and volatile compounds (VOC), which is triggered by sunlight. In other words, pollutants from cars or industry are released into the atmosphere and as they circulate through the air, transformed into other substances, such as ozone. Ozone causes smog and can cause breathing difficulties [15].

Volatile Organic Compounds (YOCs)

VOCs are another pollutant that is released when fossil fuels are burned. Two of the main sources of VOCs are solvents and paints and the companies that manufacture these products are significant contributors to this form of pollution. For people they can cause a range of problems from breathing difficulties to dizziness, or lack of concentration [16,17].

Noise pollution

The problem of noise pollution has always been ignored until recently in the world [18-20]. But due to the accelerated rates of automobilization noise problems made scientists and city municipalities to pay due attention to these problems. Many people may not even be aware of adverse impact on their health. Noise pollution is a major problem both for human health and animals. Long-term exposure to noise pollution can induce a variety of adverse health impacts like increasing sleep disturbance, negative effects on cardiovascular and metabolic system, as well as cognitive impairment in children. It estimated that school children suffer reading impairment as a result of aircraft noise, living in the neighborhood of big airports [21]. Despite the fact that noise pollution is one of the major public health problems, there continue tendency to underestimate it making major accent on air pollution.

European Court of Auditors (ECA) report on air and noise pollution that they sauce 12,000 premature deaths and 48,000 new cases of ischemic heart diseases, contributing to learning disabilities in children, causes sleep deprivation and costs Europeans an estimated 40 billion euro per year. It is estimated that school children suffer reading impairment as a result of aircraft noise living in the neighborhood of big airports [22-23].

In most European countries more than 50% of people living in urban areas are exposed to road noise levels of 55 decibels or higher during the day-evening-night period. Long-term exposure to this level can have negative health mental health and wellbeing, impaired cognitive function in children and negative effects on the cardiovascular and metabolic system. During nights environmental noise starting at levels below 40 decibels can cause negative effects on sleep such as body movements, awakenings, self-reported sleep disturbance, as well as effects on the cardiovascular system that becomes apparent above 55 decibels. The WHO (World Health Organization) established a night-time outdoor noise guideline value for night-40 decibels aiming protecting public, including vulnerable groups, such as children, the chronically ill and the elder people [1,2].

Environmental noise exposure can lead to annoyance, stress reactions, sleep disturbance, poor mental health and wellbeing, impaired cognitive function in children and negative effects on the cardiovascular and metabolic system. During nights environmental noise starting at levels below 40 decibels can cause negative effects on sleep such as body movements, awakenings, self-reported sleep disturbance, as well as effects on the cardiovascular system that becomes apparent above 55 decibels.

Different measures to reduce noise exposure currently are being taken by countries including road and rail noise barriers, optimizing aircraft movements around airports as well as using urban planning new, more convenient models. However, it is more effective to reduce noise at the source of origin, for example by reducing the number of vehicles on the roads, introducing new type of quieter tires for vehicles and quieter road surfaces.

It is unlikely that noise pollution will decrease significantly in near future. As to the longer period electric cars and zero emission busses, refuse collection trucks, municipal vans and installment of required infrastructure will be in priorities. These zero-emission vehicles and improved city road infrastructure along with cycling and walking facilities will reduce noise and air pollution levels in cities.

Conclusion

Accelerated urbanization generate a lot of problems for city dwellers and municipal workers to solve. The desire of people to live in cities is understandable by reasons, like finding a job, giving their children good education and other amenities. But on the other hand, raises many problems for native dwellers living there before. Cities are getting dangerously overcrowded with traffic and people. This process is the most evidently observed in countries of south-east Asia and Latin America, where in some cities live 20 million people and more with suburbs. The big cities are overcrowded with people and transport. There are insanitary condition and slums around them full of trash and substances which are the souse of bacterium and infectious diseases that spread in the world. It is enough to see the downstream of the river Nile which is extremely dirty and people including children bathe there. What can be done in this situation? Unfortunately, scientists don't have sufficient suggestions to stop urbanization and its adverse consequences. Our recommendations are: to decrease exaggerated housing construction; to increase city greenery instead of it, like big and small parks, vertical greenery on buildings and roofs; implant trees, bushes and half-bushes along the streets. These measures will help to increase the total space of city greenery and mitigate adverse effects from air and noise pollution. It will help citizens to breathe additional fresh air and defend themselves from extra noise pollution. From technical means: it is necessary to regulate city traffic especially on crossroads to avoid traffic jams; to choose the most optimal traffic routs; facilitate such type of transport as scooters and bicycles; to ban in city areas big motorcycles producing terrible noise and exhausting great amount of the most toxic gases; decrease transport speed in the central, over-crowded parts of the city to 30 km/h; to use zero emission buses; to develop infrastructure for safe cycling and available public bike fleet; gradual transition from internal-combustion vehicles working on fossil fuel to electric cars.

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