

# The impact of transportation on the natural environment and human health

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## ABSTRACT

**Environmental air pollution poses serious challenges to human health, the effects which are mostly seen as the respiratory diseases, cardiovascular diseases and cancers. Our health is closely related to our environment. The aim of this study was to identify the air pollutants that are of health importance to humans and to find their negative impacts on human health, conduct retrospective studies to find out if there is a correlation between exposure to environmental air pollutants and hospital visits due to symptoms of respiratory diseases and to see if exposure to environmental air pollution has significant effects on hospital visits due to the symptoms of respiratory diseases. The findings justify that exposure to air pollution has serious effects on human health especially in causing symptoms and diseases.**

**Keywords: air Pollution, air pollutants, human health, exposure, toxic environment, diseases, retrospective studies, respiratory and infectious.**

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## INTRODUCTION

Transportation decisions that take place upstream affect our lives downstream. We all use various ways to get to work or school, to access healthy foods and to do countless other things every day. Yet poor transportation decisions can harm health and are not always fair across all communities. For example, communities near a highway or major roadway are often low-income and communities of color. Living near a highway or major roadway increases a person's exposure to traffic-related air pollution. Traffic-related air pollution is linked to respiratory conditions like wheezing and decreased lung functioning and also cardiovascular disease. Long-term exposure to traffic-related air pollution is linked to childhood asthma.

Since the industrial revolution, the rate of pollution of our environment has increased tremendously with the negative impact threatening our existence in terms of climate change, global warming and flooding. Environmental air pollution poses serious risk to our existence as human, the effects which are underestimated and reported. Several scientists, researchers, international organizations, governmental and non-governmental agencies are relentlessly studying the impacts of environmental pollution on our health. The emerging data from the recent research on the health consequences of environmental air pollution are astonishing and scary. Recently, diabetic diseases have been linked to environmental air pollution; Infertility and pregnancy loss have also been attributed to air pollution.

In 2014, World Health Organization announced the classification of air pollution as class I human carcinogen due to cumulative evidence by the researchers across the world that air pollution is a predisposing factor to nasopharyngeal, lung, head and neck cancer (Wong IC, 2014) According to the latest report and data released by WHO on 25th March, 2014, about 7 million deaths in 2012 were attributed to air pollution exposure, the data which doubled the previous estimation. This data made WHO to term air pollution as the largest single environmental health risk. The evidences of involvement of pollutant gases in development of allergic reactions are emerging. Li J and associates from Peking University, Beijing in their recent research found that over 400 unique bacterial species including opportunistic pathogens and those that are capable of eliciting allergic reaction were found in abundance in the dust samples collected from filter of automobile air conditioning (AC) within 5 minutes of powering.

### Objectives of the study

The effect of environmental air pollution on human health is a well-known topic and of research interest in the field of environmental and public health studies and research. There have been many publications by different health agencies, environmental agencies, and researchers in the field of environmental, public and global health across the globe. The most common studies involve studies of ambient air pollution exposure and their effects on cardiopulmonary diseases (Phung D, 2016), on hospital emergency room visit (Liu P, 2016) and hospital admission of young children for acute lower respiratory infection (Le TG, 2012). Most of these studies focused on indoor or outdoor air pollutant as well as

ambient air pollution with little studies on long term exposure to these pollutants. However, none of these studies have tried to study exposure to toxic environmental air pollutants at workplace in addition to exposure to ambient air in relation to hospital visit.

The uniqueness of this studies lies in the fact that it is non biased retrospective epidemiological studies which identified all the major and established diseases (that were presented at the respiratory and infectious disease hospital Dr Victor Babes, Timisoara) associated with environmental air pollution. The identified diseases were analyzed and their presentation were compared among those that were considered to be exposed to considerable long term effects of environmental air pollutants and those considered to be non-exposed (but do not include ambient air pollution).

### **IMPACT ON NATURAL ENVIRONMENT**

Man is found constantly interacting with his environment in which his health cannot be separated from his immediate environmental qualities. The air we breathe in, the work we do and the physicochemical and biological factors of the environment has a tremendous effect on our health (Environment Nature and Energy Department, 2014). According to Business dictionary, Environment is defined as the sum total of all the surroundings of a living organism including, natural forces and other living things which provides living conditions for development and growth as well as of danger and damages. (S.balanarayanan & K.vetrivel, 2012). In relation to health, the world Health Organization (WHO) defined environment as all physical, chemical and biological factors external to person and all related behavior. It is imperative to maintain a healthy environment in order to have a good health.

According to WHO and the most commonly quoted definition, health is “a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity”. Our health is closely related to our environment (Environment Nature and Energy Department, 2014) such that a healthy environment brings healthy living and vice versa. Our health can be traced to our microclimate, the home we live: the type of fencing; roofing, wall colour and landscape orientation. The public health practitioners are at the forefront of preventing diseases and promoting health of the people (Gabriel N. Stover, 2003), increasing quality of life and years of healthy living (Oregon Public health authority, 2014).

Building associated illness could be specific if it could be proved that the symptoms and illnesses are associated with specific noxious substances in the building for instance Legionnaires’ disease, occupational asthma, hypersensitivity pneumonitis, Inhalation fever and humidifier fever. It could be nonspecific if it is difficult to establish the link between building related exposure and illnesses. Such symptoms includes :- Itchy, irritated, dry, or watery eyes, runny nose or nasal congestion, throat soreness or tightness, dry itchy skin or unexplained rashes, headache, lethargy, or difficulty in concentrating. It has been established that environmental factors are responsible for about 25% of total diseases burden globally and one third among children.

### **Environmental Air Pollution**

Ever since primitive Homo sapiens sat crouched by the warmth of a smoky fire in his Paleolithic cave, human have been undoubtedly been coping with a certain amount of polluted air. Since the industrial revolution, the rate of pollution of our environment has increased tremendously with the negative impact threatening our existence in terms of climate change, global warming and flooding. The rapid population growth demands that the technology must meet the demand globalization and subsequently, increase in combustion of fossil fuel. Historically, environmental air pollution could be traced back to city of London which was known for coal mining and exportation.

The city was well known for ‘big smoke’, fog and smog. In 1873, over 700 people died as a result of smog and in December 1952, approximately 4000 during Great London Smog (Oosthoek, Jan, 2014). The same trends which made London headquarter of polluters were seen in United State during 19th and 20th century. However, today, one needs not to travel to either London or United State to feel the environmental and health impact of air pollution as a result of industrialization. Nowadays, the problem of air pollution is felt mostly in the urban area due to increase in consumption of products which gives bye products as air pollutants. Inadequate pollution control, lack of regulations and proper law enforcements, unregulated vehicular emissions and increasing desertification among others are seen as factors promoting environmental air pollution.

### **Definition of Air Pollution**

World Health Organization in 1999 defines air pollution as ‘substances put in by the activities of mankind in concentration sufficient to cause harmful effects to health, properties, crop yield, or to interfere with the enjoyment of property’ (Amitava Mukherjee, 2002). The substances either natural or artificial which pollute the environment is termed pollutant. For air pollution to have effect, the pollutant is first released to the atmosphere and undergoes some

mixing or chemical transformation and thereafter, exact its effect on receptors. Receptor as used in this context is referred to human, animals, plant or materials.

**Secondary pollutants** are formed in the atmosphere as a result of chemical reaction of primary pollutants. Example includes: - Tetraoxosulphate (IV) acid, nitrous acids which causes acidic rain, Smog.

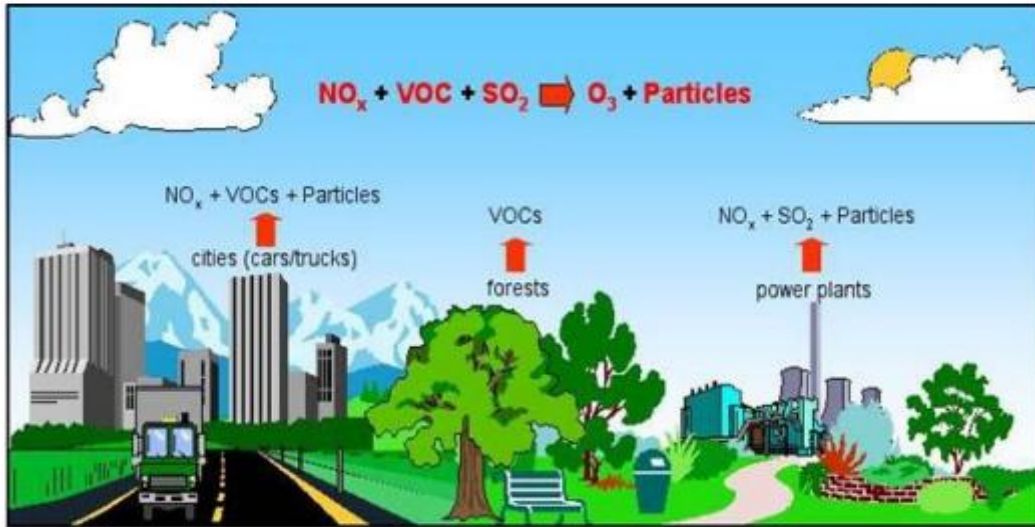


Figure 1: air pollutants caused by vehicles

### MAJOR ENVIRONMENTAL POLLUTANTS AND THEIR HEALTH EFFECTS

There are many air pollutants which are of public health importance. They have pronounced consequences on human health ranging from causing asthma, respiratory diseases, infections and risk factors for cancer. Depending on the dosage of exposure and accumulation of these pollutants in the body overtime, a serious health threat and death can ensue. These pollutants include: - carbon monoxide, oxides of sulphur and nitrogen, heavy metals and particulate matter.

#### Carbon Monoxide

It is a colorless, odorless, tasteless and very poisonous gas. Its occurrence is naturally in volcanoes, natural gas emission and seed germination. Artificially, it is formed as a product of incomplete combustion processes of carbon based energy sources such as burning of fuels. People in urban area are constantly exposed to this harmful gas. Furnaces and heater also emit this gas especially when they are not properly maintained.

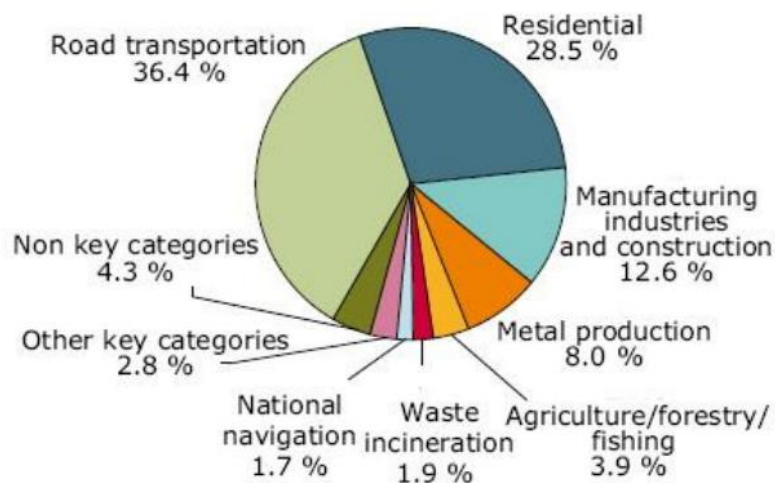


Figure 2: carbon monoxide and contribution of various sectors to the emission.

#### Health effects of NOx

It has been documented that nitrogen oxides are toxic to animals and human being due to its ability to form nitric acid. In the atmosphere, it is involved in acid rain formation together with other gases such as SO<sub>2</sub>. In human, it forms nitric acid with water in lung, mucus membrane and skin (New Zealand Ministry of Environment, 2014). Low level exposure to nitrogen dioxide can lead to increased bronchial reactivity, increase in response to allergen in asthma patients and aggravation of chronic respiratory diseases (Hong Kong Center of health protection, 2014).

Long term exposure to nitrogen oxides make human susceptible to respiratory infections, lung irritation and damage in asthmatic patients (New Zealand Ministry of Environment, 2014).

### **IMPACT OF TRANSPORTATION ON HUMAN HEALTH**

Several researchers in the field of public health, environmental health, international health and also, international organisation and agency have done tremendous works in the studying and publishing effects of transportation on environment and human health in several scientific journals. Asides from the respiratory symptoms and allergic reactions that may be associated with the air pollution, some unexpected diseases also manifest which may difficult to trace to air pollution as a causative agent. Some of the diseases can be attributed to transportation are as follows.

#### **Respiratory diseases**

Respiratory diseases are common manifestation of air pollution. The lesser symptoms include runny nose, sore throat, cough and allergy. Serious condition includes asthma, pulmonary emphysema, pneumonia, chronic bronchitis. Chronic obstructive pulmonary disease (COPD), Pulmonary emphysema, pulmonary fibrosis. At early stage of life, air pollution could predispose children to development of childhood asthma. Since the industrial revolution, the rate of pollution of our environment has increased tremendously with the negative impact threatening our existence in terms of climate changes, global warming, flooding. Aside from active and passive smoking, predisposing factors to lung cancer are includes:- exposure to NO<sub>x</sub>, coal fumes exposure to household radon (Milner J1, 201), particulate matter and ozone.

#### **Cardiovascular diseases**

Several research conducted from the last two decades have proved beyond reasonable doubt that air pollution can trigger irregular heart rhythms, strokes, heart attack especially in the people at risk of these conditions. Researchers have also attributed both short and long time increase in level of the following Pollutants to increase in hospitalisation for cardiac diseases 'PM<sub>10</sub>', 'PM<sub>2</sub>, Ozone O<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>. Recent studies by evaluated possible effects of occupational exposure to air pollutants among taxi drivers and they found that exposure to polycyclic Aromatic hydrocarbon (PAH) is an important factors that leads to atherosclerosis among the studied groups.

#### **Diabetics**

Diabetics are of two types, type 1 which is insulin dependent diabetics and it is associated with childhood onset. Type 2 diabetic type 2 in contrast is associated with adult onset. Longitudinal studies in human shows that increased in ozone exposure may be contributory factors to increase in incidence of diabetics type 1 and PM<sub>10</sub> may be a specific contributory factor to development of type 1 diabetics before the age of 5. Follow up studies of his research in 2006 conformed to his earlier result but ruled out the possibilities of SO<sub>2</sub>, NO<sub>2</sub> and PM<sub>10</sub> as a contributory factor to childhood asthma. However, researcher in Chile published their findings in 2013 that exposure to PM<sub>2.5</sub> could be related to peak of diabetics type 1 incidence. In these studies researchers measured the exposure of air pollutant from birth until diagnosis. Moreover, researchers have also shown in series of experiment the relationship between road traffic pollutants to development of type diabetics. Predisposing factors to diabetic type 2 are: - PM<sub>2.5</sub> (Chen H, 2013), PM<sub>10</sub>, NO<sub>2</sub>.

#### **Cancer**

Recently, World Health Organization announced the classification of air pollution as class I human carcinogen due to cumulative evidence by the researchers across the world that air pollution is a predisposing factor to nasopharyngeal, lung, head and neck cancer. On 17th October 2013, The specialized Cancer Agency for Research on cancer (IARC) monograph programmer reported that outdoor pollution is the leading environmental cause of cancer death (United Nation News centre, 2014). CNN news reported that on the same day that WHO reported that 223,000 people worldwide died of lung cancer alone (CNN news, 2013).

### **CONCLUSION**

Promoting healthy and sustainable transport options to prevent the negative effects of transport systems on human health is an important goal of modern policy development. This means ensuring that health issues are considered when transport policies are being formulated and creating the conditions to develop integrated assessments, monitor progress,

account fully for social and environmental costs and identify the strategies with the greatest net benefits. Integration initially requires combining scientific knowledge, methods and results into one long list. Further, integration comprises selecting the procedures and practices that contribute most to the overall objective of a healthy and sustainable transport system.

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