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Journal homepage: wwwhttps://fezzanu.edu.ly/

The Risks of Some Air Pollutants on Public Health

*Mohamed F. Abdalsadegh and Hamed Babai and Tawfiq M. Almsatar and Abdulnasir S. Alqazoun[1]
[1]Environmental Science Department, Azzaytuna University, Tarhuna, Libya.

A B S T R A C T

Air pollutants surround us from everywhere, which is the biggest environmental threat to public health in all parts of the world, so they are exposed to it in their workplaces while travelling and in their homes. Particulate matter polluting the air inside and outside homes causes nearly 7 million premature deaths, according to the estimation of the World Health Organization.

The United Nations Environment Program estimates that more than 2.7 billion people worldwide depend on biofuels. The bulk of the effects of air pollution is concentrated in parts of Asia and sub-Saharan Africa, where burning biomass for cooking food is common. That was involved in the health risks of cardiovascular diseases, and respiratory diseases.

In Europe, air pollutants caused 790,000 additional deaths in 2015, and between 40-80% are due to cardiovascular diseases, such as heart attacks and strokes. In addition, more than 80% of the diseases that humanity was exposed to are due to characteristics of the environmental regime. Since the environmental situation plays a major role in the spread of diseases.

Where in Africa, air pollution, impacted health, the economy, and human capital resources.

Therefore, this research will discuss three main topics :

.1The toxins of air pollutants in the internal and external environment

.2The health risks of air pollutants.

3. Dangers of air pollutants in the countries of the world

Keywords: Air pollutants, Toxins, Fine particles.

مخاطر بعض ملوثات الهواء الجوي على الصحة العامة

*محمد فرج عبدالصادق، حامد باباي و توفيق المسطر و عبدالناصر القزون[1]
[1]قسم العلوم البيئية – جامعة الزيتونة – ليبيا.

الملخص

يعد تلوث الهواء الخطر البيئي الأضخم على الصحة العامة في جميع أنحاء العالم، و أن الملوثات الهوائية تحاصرنا من كل مكان. فيتعرضون له في أماكن عملهم، وفي منازلهم، وأثناء تنقلهم وسفرهم، فتتسبب

*Corresponding author:
E-mail addresses: khlwafaa321@gmail.com Received 30 July 2022 - Received in revised form 20 August 2022 - Accepted 2 September 2022

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Journal homepage: wwwhttps://fezzanu.edu.ly/

الجسيمات الدقيقة الملوثة للهواء بالمنازل وخارجها إلى ما يناهز على 7 ملايين حالة وفاة مبكرة، وفق تقديرات منظمة الصحة العالمية. ويقدر برنامج الأمم المتحدة للبيئة عدد المعتمدين على أنواع الوقود الحيوي بأكثر من 2.7 مليار نسمة حول العالم. أما جُل أثار تلوث الهواء متركزة في أجزاء من آسيا وأفريقيا جنوب الصحراء ، حيث يشيع حرق الكتلة الحيوية لطهي الطعام، والتي تشارك في المخاطر الصحية لأمراض القلب والأوعية الدموية، وأمراض الجهاز التنفسي.

وفي أوروبا تسببت الملوثات الهوائية في ما يقدر بنحو 790.000 حالة وفاة إضافية في عام 2015، وما بين 40–80% بسبب أمراض القلب والأوعية الدموية، مثل النوبات القلبية والسكتات الدماغية. بينما تؤثر الملوثات الهوائية في أفريقيا على الصحة العامة، وعلى الاقتصاد، وعلى رأس المال البشري. وأن أكثر من 80% من الأمراض التي تتعرض لها البشرية ترجع لأسباب بيئية وليست وراثية كما يعتقد، فالبيئة تلعب دور كبير في انتشار الأمراض ولهذا سيناقش هذا البحث ثلاث مباحث أساسية:

المبحث الأول: سموم الملوثات الهوائية بالبيئة الداخلية والخارجية.

المبحث الثاني: المخاطر الصحية للملوثات الهوائية.

المبحث الثالث: مخاطر الملوثات الهوائية بدول العالم.

الكلمات المفتاحية:

الملوثات الهوائية، السموم، الجسيمات الدقيقة.

1.Introduction:

In the twenty-first century, the world has been witnessing huge pollution in all aspects of the ecosystem, as a result of man's immoral work with the environment. Man-made is one the of main causes of environmental pollution, destroying the ecological balance, losing the importance of ecosystems, and polluting water, air, and agricultural resources. The air becomes polluted if any change occurs in its natural composition or unusual elements of gases, particles, or microbes are introduced into it during a short or long period of time to cause harm to human life, animal, plant, or economic property. [1]

Unfortunately, today, air pollution surrounds us from all sides. As most of the world's population lives in areas with high levels of pollution. According to several studies, air pollution is related to many diseases, reducing the quality of life, negatively affects the economy, and has serious effects on human communities. Air pollutants have both spatially and temporally significant impacts on the ecosystem. It affects not only public health, but also the climate, the atmospheric water cycle, the

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energy cycle, and food productivity. [1,2] The World Health Organization has classified more than 80% of the diseases that humankind is exposed to due to environmental, not genetic reasons. That is why the World Health Organization also classified air pollution as a carcinogen. There is a strong relationship between air pollution and climate change, as many of the gases polluting the environment come from several sources (either fixed sources, such as factories, or mobile sources such as transportation), and many of these pollutants are considered harmful to human health, and strong climatic factors. , which affects the livelihoods of human beings at present, and weakens the elements of security for their future over generations . [3]

However, the concentrations of air pollutants outdoors (the outdoor environment) may obscure another fact, which is that the highest levels of exposure to air pollution are found inside homes (the indoor environment). The studies and research of the US Environmental Protection Agency (EPA) concluded that the concentrations of some air pollutants inside homes may reach two to five times the levels found in open spaces. This does not mean that some pollutants in the outside air may seep into homes as well. Some of the most dangerous types of pollutants, such as nitrogen oxide and nanoparticles (measured in nanometers in diameter), are too small that they not only penetrate lung walls and enter the bloodstream, but also slip through closed-door openings and pollute indoor air. [4,5]

Therefore, outdoor air pollution is a major contributor to the disease burden worldwide, and most of the world's population resides in places where air pollution levels have become severe, due to emissions from industry, power generation, transportation, and household burning. Based on healthy air quality guidelines issued by the World Health Organization, outdoor air pollution poses an urgent public health challenge worldwide because it is ubiquitous and has many serious adverse effects on human health, including cancer. [6]

The environments threatened by the risks of air pollutants are either indoor or outdoor air pollutants. The indoor sources (such as inside buildings, meeting rooms, schools, and others) emit carbon, nitrogen, and other gases, as well as organic compounds, such as hydrocarbons. Because people spend more than 90% of their time indoors. As well as air pollutants in the external environment, the source of which is factories, transportation, and weather conditions have an increasingly large impact on human societies at risk, especially the world's poor. Both indoor and outdoor pollution still cause many cancers and deaths. [7] The air pollutants in the indoor environment in most cases take the form of particles of different sizes (PM2.5, PM10), which is more toxic to public health. According to the estimates of the US Environmental Protection Agency, the concentrations of air pollutants inside are much higher than outside places, due to, people spending most of their time in the indoor environment. Therefore, human exposure to pollutants indoors is much greater than the exposure that occurs outdoors (the outdoor environment). Studies on the brain health start from the internal environment in which a person lives, and from the residential neighborhood in which he lives. There are many sources of pollutants in the indoor environment, including air conditioners, cooking gases, combustion of living mass, blankets, pillows, and furniture.

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Air quality is a global concern, requires a good understanding of the choice of materials used, and these emissions are impacted humidity, temperature, weather conditions, airspeed, air exchange rate, and building structure. Further, Indoor air quality is closely related to our health, and the three sources of pollution such as building, decoration, building materials, and furniture contain more than 300 types of volatile compounds. Among them, a few are very important, for instance, formaldehyde, volatile organic compounds, ammonia, and radon,.[8] Table 1. shows some sources of air pollutants in the indoor environment.

Table 1. air pollutants in the indoor environment

Pollutants	Its Resources
Radon	Building materials (concrete, stone) and groundwater
Asbestos, minerals, synthetic fibers, and hydrocarbons	Fire insulators, electrical or thermal materials.
Biological pollutants	Infection, dust, animal dander, allergens.

Source: World Health Organization.

This paper aims to study and evaluate the main topics as mentioned above:

1. The toxins of air pollutants in the internal and external environment
2. The health risks of air pollutants.
3. Dangers of air pollutants in the countries of the world.

2. The toxins of air pollutants in the indoor and outdoor environment are divided into :

2.1. **Biological contaminants:** include bacteria, molds, viruses, animal dander, cat saliva, dust mites, cockroaches, and pollen. These biological pollutants are associated with some serious health effects, as some biological pollutants, such as measles, chickenpox, and influenza, are transmitted through the air, however, the first two types can now beprevented using vaccines. The transmission of the influenza virus, despite the evolution development of vaccines, remains a concern in crowded indoor conditions and can be affected by ventilation levels in the home, like the Coronavirus [9].

The most Common pollutants, such as pollen, originate from plants and can cause symptoms such as sneezing, watery eyes, coughing, shortness of breath, dizziness, fever, and digestive problems. Allergic reactions are the result of repeated exposure and immune sensitivity to biological allergens. Although pollen allergies are annoying, asthmatic responses to pollutants can be life-threatening. Asthma is more common in children than in adults, with 1 in 13 school-aged children suffering from asthma. Low-income African Americans and some Hispanic populations suffer disproportionately from it, with urban inner cities experiencing particularly severe problems. Asthma, is a third of all pediatric emergency room visits, and the fourth most common reason for doctor's office visits. In addition, some studies has shown that it is the main cause of truancy (losing 14 million school days each year) from chronic diseases.

1.2. Chemical pollutants:

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These include carbon monoxide, lead, asbestos, pesticides, and ozone. It also includes volatile organic compounds: organic substances that evaporate and turn into gases at normal room temperature. Examples of common items that can release VOCs are paints, varnishes, and waxes, as well as in many cleaning and sanitizing products, cosmetics, degreasing, and hobby products. Levels of approximately a dozen common VOCs can be two to five times higher indoors, as opposed to outside, whether in high industrial or rural areas.[10]

1.2.1. Toxins of air pollutants in the external environment:

Ambient air pollution is one of the most common environmental risks, affecting up to 100% of the population living in urban areas from womb to death. Several studies have described the negative impact of air pollutants on human health, which serve as risk factors for cardiovascular
and respiratory diseases. The International Agency for Research on Cancer (IARC) and the World Health Organization (WHO) have classified outdoor air pollution as carcinogenic to humans.[11]

Air pollution has been a major problem in recent decades and has a serious toxic effect on human health and the environment. It was proven that brain health starts in the residential areas, and the standard of living of the place where individuals live, negatively affects the safety of their brains and leads to the development of diseases. The sources of pollution are varied, starting from a small unit of cigarettes and natural sources such as volcanic activities to a large volume of emissions from vehicle engines and industrial activities. Means of transportation, cement factory dust, oil and gas industry, waste incineration in solid waste landfills, as well as many other air pollutants, such as dust, fumes, smog, smoke, and gaseous pollutants, are all multiple sources of external environmental pollutants. And that more than 98% of urban air pollutants are gases or compounds, such as carbon monoxide and non-methane hydrocarbons.[10]

Ambient air pollution alone caused 4.2 million deaths in 2016, and more than 90% of air pollution-related deaths occur in low, and middle-income countries, particularly in Asia and Africa, followed by low- and middle-income countries in the Eastern Mediterranean region, Europe, and the Americas.

1.2.2. The risks of air pollutants in the indoor environment:

The adaptive devices prevent the body from getting rid of the toxins inside it. They (i.e. the adaptive devices) hinder sweating, which helps the body to get rid of harmful substances through the pores of the body. Sweating is one of the natural ways that God made for His servants to rid their bodies of toxins. It also increases the incidence of respiratory diseases, and heart and digestive disorders. It is the main cause of allergic diseases, such as skin rashes, runny nose, and coughing. The accumulated toxins are the cause of all diseases associated with a defect in the human immune system.[10]

According to the reports of the World Health Organization, annually 3.8 million people die prematurely due to exposure to indoor air pollutants, through the ineffective use of solid fuels and kerosene for cooking and heating, including 27% of

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pneumonia , and 18% of cardiac arrest 27% due to heart diseases and vertebrates 20% of chronic obstructive pulmonary disease 8% of lung cancer.[12]

2. The risks of air pollutants in the countries of the world:

2.2. The risks of air pollutants on Africa:

In the last twenty years, Africa's growth has been accelerating. Life expectancy is increasing and deaths from communicable diseases are declining.

However, rapid urbanization and industrialization bring new challenges. Ambient air pollution driven by the burning of fossil fuels is already contributing to premature deaths, including pneumonia, heart disease, stroke, diabetes, chronic lung disease, and lung cancer. In 2019, ambient air pollution was responsible for an estimated 383-419 deaths across Africa. Meanwhile, though household air pollution is declining, it still accounts for 60% of all air pollution-related deaths (1.1 million) in Africa, where polluting fuels such as charcoal and kerosene are prevalent.[13]

2.3. The risks of air pollutants in Europe:

According to the studies of the European Environment Agency (EEA): the main environmental threat to the health of urban dwellers in Europe remains air pollutants. And that air pollution caused 400,000 premature deaths in 2011, and that heart disease and strokes were the most common premature death, as a result of air pollution, attributable to air pollution, followed by lung diseases and lung cancer.

In addition, the main sources of air pollution are vehicle fumes such as cars, buses, factories, and fuel-burning operations, and leads to respiratory complications such as coughing and chest pain. Toxic air is a "silent global public health emergency" according to the World Health Organization (WHO) Director-General.

2.4. The risks of air pollutants in Asia:

Cancer incidence in Asia, including India and China, increased by 80 % during the past 30 years, due to air, water, and soil pollution with dangerous chemicals, especially in industrial sites. The Chinese Ministry of Environment said in a report that there are cancerous villages due to industrial waste and smog. Chinese experts in malignant diseases confirmed that cancer has overtaken cardiovascular disease to become the country's number one killer. Statistics from the Ministry of Health have shown that cancer deaths have increased by 80% over the past 30 years. Figures reported by the National Cancer Registry showed an alarmingly higher rate than the World Health Organization. Every minute, six

Chinese are diagnosed with cancer, or about three million every year. while in India, every year, approximately 5.8 million Indians die from heart and lung disease, stroke, cancer, and diabetes. Chronic respiratory diseases affect young people and the younger population, and the premature loss of millions of productive individuals to noncommunicable diseases seriously undermines social and economic development, according to WHO studies for East Asia.[14,15]

Conclusion:

It is complicated and challenging to control air pollution. Microscopic pollutants in the air can infiltrate our body's defenses, penetrating deep into the respiratory and circulatory systems, and damaging the lungs, heart, and brain. There are no measurements of air pollutants in some developing countries such as Libya. Air

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pollutants, even if they are in small proportions, are a result of their accumulation in the body, which makes them a source of great danger to public health.

- **Recommendations to combating air pollutants:**
- Planting trees and planting plants.
- Combating smoking and contributing to educating people about its harmful effects.
- Do not burn rubbish, waste and tires near residential neighborhoods.
- Staying away from crowded places and encouraging living in a clean rural atmosphere.
- Maintaining cars, trucks and heaters periodically and rationalizing their use.
- Ventilate classrooms in schools and homes. • Banning trucks from traveling inside cities. Requiring factories and laboratories to install special devices that purify the smoke emitted from them and encourage preventive measures in some industries (the use of protective masks).
- Building factories away from residential neighborhoods. • Spraying streets and roads with water, especially in the summer, to reduce the flow of dirt and dust and to contribute to cleaning them.

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