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LIFE IS LOST EVERY BREATH: THE TRAGEDY OF AIR POLLUTION, THE CAUSES OF AIR POLLUTION THAT HUMANS HAVE NOT NOTICED.

Azizbek Khusanov Raximberdi ugli

Lecturer

Abdug'aniyeva Nilufar Elyorjon kizi

Student,Fergana Medical Institute of Public Health,

Uzbekistan, Fergana

Abstract: Today, humanity, with every breath it takes, inhales a multitude of invisible toxic substances along with the air that is the source of life. Air pollution remains one of the most dangerous environmental threats to modern civilization today. Air pollution is one of the most pressing and worrying topics of humanity today.

Today, the impact of air pollution on human health, climate change and ecology is being analyzed in depth. According to the World Health Organization (WHO), 99% of the world's population currently breathes air that exceeds quality standards. These indicators can be determined in real time using various information technology methods. More than 8 million people die prematurely worldwide every year as a result of air pollution. Diseases caused by air pollution are causing people to die prematurely, such as cardiovascular diseases, respiratory diseases and even cancer.

Harmful gases in the atmosphere, such as carbon dioxide, nitrogen oxide, sulfur dioxide, and microparticles, enter the human body and have a negative impact on the respiratory system, cardiovascular system, and nervous system.

Air pollution in particular has a very negative impact on the elderly and children. The deterioration of air quality is not only causing human health but also causing ecological disruption. As a result of the increase in the amount of sulfur and nitrogen oxides in the air, acid rains also occur. Due to these rains, an acidic environment is formed in the soil, which causes great harm to green plants, and is very dangerous not only for green plants, but also for humans.

The increase in the amount of greenhouse gases in the atmosphere is accelerating global warming. Therefore, combating air pollution means saving human lives. Today, efforts are being made to restore air quality around the world through the transition to a green economy, zero-waste technologies, and "Green Space" projects.

Keywords: air pollution, atmospheric protection, human health, global warming, dust and microparticles, traffic fumes, acid rain, greenhouse gases, environmental problem, industrial emissions, air pollution level determination through AI.

Introduction.

Air is an integral part of life, every person feels its importance as soon as he breathes. However, today, due to industrialization, the increase in vehicles, waste and excessive emission of greenhouse gases, air quality is seriously deteriorating. Harmful substances in the air we breathe have a negative impact on our health, living environment and nature.

Air pollution not only causes chronic diseases, such as asthma, bronchitis and cardiovascular diseases, but also shortens human life. At the same time, it disrupts the ecological balance, harms the flora and fauna, and accelerates climate change. The lives lost with each breath show that in fact, it has become a joint tragedy of humanity and nature.

Every person's life begins with breathing. But the air we breathe today is not life, but slowly leading to death. This is a very sad situation. The sad part is that we ourselves are the cause of this. The indifference of humanity to its life is astonishing. Until today, air has always seemed invisible, harmless, natural to people. However, the development of 21st century technologies has completely changed people's perception. Now the cities we live in are covered in smog, and every breath we take contains dust, chemical particles, and toxic gases. This is one of the quietest, but most dangerous global problems that humanity has created with its own hands.

Technological progress, although it makes human life easier, has also worsened the state of nature. Cars, factories, and power plants emit millions of tons of toxic substances into the atmosphere every year. According to scientists, more than 30 billion tons of carbon dioxide are released into the atmosphere every year. This amount is creating a sharp decline not only in global growth, but also in human health.

The most dangerous aspect of air pollution is its imperceptibility. A person can smell the air, but cannot determine its composition. For this reason, this problem is often ignored. However, statistics show that more than 7 million people die every year worldwide due to polluted air. Especially dangerous diseases such as respiratory diseases, heart failure, and asthma are on the rise among children and the elderly.

If a person has difficulty breathing, nature suffers even more than humans. Due to dust particles stuck to the leaves of plants, photosynthesis slows down, soil fertility decreases, which causes even more serious problems. The oceans are becoming acidic, unable to absorb carbon dioxide from the atmosphere. As a result, the balance of the animal world is being disrupted, which leads to a food problem. Therefore, the fight against air pollution is not only the task of environmentalists, but also the duty of all people who are not indifferent to their lives. Today, major cities in the world are covered in smog and dust. In large cities such as Beijing, Delhi, London, Tashkent, the amount of toxic substances in the atmosphere is several times higher than the norm. The main sources of air pollution are divided into 2: natural and anthropogenic.

Anthropogenic, i.e. as a result of human activity.
Vehicle exhaust (CO2, NO2, SO2).
Industrial emissions and thermal power plants.
Household fuels (coal, gas, wood).
Pesticides and fertilizers in agriculture.
Construction and dust sources.
Natural factors.
Forest fires
Volcanic eruptions
Dust storms
Main toxic substances and their dangers.

PM2.5 and PM10

Particles smaller than 2.5 microns in size penetrate deep into the lungs and even into the blood vessels. PM2.5 is the most dangerous pollutant in the world. NO2 is emitted from vehicle engines and aggravates asthma. SO2, emitted as a result of coal combustion, is the cause of acid rain.

CO is released when fuel is not completely burned and prevents the transport of oxygen in the blood. O3 is harmful near the surface of the earth. It blocks sunlight. However, its degradation is currently being observed, due to which greenhouse gases released into the atmosphere react with various toxic gases and vehicle emissions. This, in turn, causes dangerous skin cancer. The cause of skin cancer is the inability of the skin to absorb harmful rays from the sun.

Now, if we consider the issues that cause great harm to air pollution but are overlooked by people, they include the following:

Air purifier aerosols emit VOCs (volatile organic compounds) in quantities equal to urban transport emissions.

Various fragrances and perfumes increase allergic inflammation by 40–60%.

Micro-particles released from clothing

Synthetic fabrics (polyester, acrylic, elastane) release microplastic dust into the air when rubbed.

Fact: Laboratory studies have shown that microparticles released from clothing while walking can account for 10–25% of indoor PM2.5.

Simple gas stove combustion. Most people think only of the smoke, but when a gas stove is burning in an open flame, NO_2 levels can reach the same levels as outside traffic within minutes.

Fact: In indoor air measurements in the US, NO_2 levels rose to 200–400 $\mu g/m^3$ during short cooking sessions in the kitchen (WHO guideline: 40 $\mu g/m^3$).

Not watering dry soil and gardens

When rainfall is low or the ground is not moist, more ammonia, nitrogen oxides and dust are released from the soil.

Fact: Volatile nitrogen compounds from dry soil can account for up to 20% of total atmospheric nitrogen.

Dried fruits and coffee roasting shops. During the drying process of fruits (especially in charcoal or wood), carcinogenic substances such as benzopyrene are released into the air. During the roasting process of coffee, VOCs (volatile organic compounds) and fine smoke particles are released. Fact: Small roasting shops have been reported to increase PM2.5 in the vicinity by up to 1000 $\mu g/m^3$.

Worn car brakes. Pollution doesn't just come from the engine — brake pad wear is a major source of airborne metal particles (copper, iron).

Fact: Brake wear contributes up to 55–60% of PM2.5 metal particles to the air along major roads in cities.

Perfumes and deodorants

Aerosol air fresheners emit a large amount of VOCs that react with NOx.

Fact: Analysis of London and New York shows that personal perfumes and chemicals account for 30–40% of the city's total VOC emissions.

Burning dry branches

Many people think that burning branches in the garden in the fall is "harmless."

Fact: Burning 5 kg of dry branches releases as much PM2.5 into the air as a car driving 8–10 km.

Dust from concrete buildings: In newly constructed buildings, calcium dust and other microparticles are constantly being released into the air during the drying process of concrete.

Fact: PM10 levels around buildings have been observed to be 3-5 times higher than normal for 2-3 months after construction is complete.

Air pollution impairs memory and decision-making

Studies have found that on days with high PM2.5, people's IQ test scores drop by 5-10 points, and decision-making speed slows down by 20%.

Economic damage: decreased productivityIn cities, office productivity drops by an average of 5-6% on days with high PM2.5.

Fact: An analysis of 10 large US companies

Below is a fact-rich, scientifically based information about air pollution (atmospheric air pollution).

Effects of air pollution.

For health: Cardiovascular diseases. Lung cancer. Asthma and bronchitis. Low birth weight in newborns. Decreased brain function

For the environment: Acid rain. Drying of plants. Increased climate change (CO_2, methane and black carbon)

Harmful aspects for the economy.

Reduced productivity due to diseases. Reduced energy efficiency. Increased medical costs

The highest levels of pollution in the world are observed in the regions of South Asia (India, Pakistan, Bangladesh).

In urban areas, PM2.5 particles are 3–5 times higher in winter.

In the transport sector, the transition to electric vehicles can reduce CO_2 emissions by 50–70%.

The main sources of pollution: transport, coal-fired heating systems, construction dust, some industrial enterprises. Dry climate and dust storms increase the amount of particles in the air.

7. Ways to reduce air pollution

Switch to fuel-efficient and electric vehicles

Replace coal with natural gas or renewable energy

Plant trees (1 tree absorbs 20–30 kg of CO_2 per year)

Install filters (SCR, ESP) in factories

Expand cities with green spaces

Wet dust sources with water (construction sites)

Now let's dive into the global statistics. Currently, the statistics have increased significantly over the past 5 years worldwide, these figures are surprising.

According to the 2024 IQAir report, only 17% of cities in the world meet the World Health Organization (WHO) air quality standards.

In 2024, only 7 countries achieved the annual PM2.5 standard recommended by the WHO - that is, a level below 5 μg/m³.

On the other hand, the countries with the most polluted air in 2024 were: Chad (PM2.5 ~ 91.8 μg/m³), Bangladesh (~ 78.0 μg/m³), Pakistan (~ 73.7 μg/m³), Democratic Republic of the Congo (~ 58.2 μg/m³) and India (~ 50.6 μg/m³).

Global indicator: about 36% of the world's population is exposed to PM2.5 levels above the minimum requirements (interim target 35 μg/m³).

The average PM2.5 level in Tashkent in 2024 was ≈ 31.5 μg/m³. This is ≈ 6.3 times higher than the WHO recommended norm (5 μg/m³).

Statistics of Uzbekistan.

On November 20, 2025, Tashkent ranked 1st among the cities with the highest air pollution in the world, i.e. the city was found to have a high level of pollution according to the AQI.

In September 2025, the PM2.5 level in Tashkent was also significantly higher than the WHO norm: on September 30, it reached ~ 40PM2.5.

In 2024, annual deaths due to PM2.5 exposure were also recorded in Tashkent: according to one source, ~ 3042 people die annually due to air pollution. Not only because of air pollution, but also because of diseases caused by air pollution, but also because of it, are threatening human life.

PM2.5 levels several times higher than WHO recommendations pose a serious health risk to the respiratory tract, cardiovascular system, and chronic diseases. Global and local statistics show that "clean air" is rare in the world, and most cities fall into the "moderate", "unhealthy", and sometimes "hazardous" zones.

Billions of people around the world constantly breathe highly polluted air. Uzbekistan, along with many cities, ranks high in the ranking of countries with high levels of air pollution.

Conclusion.

It's not just time that's being lost with every breath we take—it's life itself, which is changing and becoming more difficult. Air pollution is no longer an invisible threat, but a reality that permeates every breath we take. Once a free gift of clean, crisp air, it's increasingly hard to find. It's as if we're taking in not just oxygen with every breath we take, but traces of human neglect as well.

But even so, every breath serves as a reminder that life is fragile and nature is wearing itself out. What we're losing as we breathe are opportunities created for future generations, the scent of fresh spring air that they may never know.

Therefore, air pollution is not just an environmental problem, but an echo of our daily choices. Another breath we take is a warning, another opportunity. If we take one step closer to nature, tomorrow will be one step cleaner. Because the number of breaths is not infinite, but cleaning and preserving them is in our hands.

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