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Air pollution - selected health effects in Poland

Zanieczyszczenie powietrza - wybrane skutki zdrowotne na terenie Polski

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Streszczenie

Jakość powietrza w Polsce od wielu lat jest jedną z najniższych na terenie Unii Europejskiej, natomiast poziom zanieczyszczeń wielokrotnie przekracza normy ustalone przez Światową Organizację Zdrowia (WHO). W konsekwencji negatywnie wpływa na organizm człowieka. Artykuł ukazuje problem zanieczyszczenia powietrza oraz skutki zdrowotne oddziaływania szkodliwych dla człowieka czynników emitowanych do atmosfery.

Summary

Air quality in Poland for many years is one of the lowest in the European Union, while the level of pollution is many times higher than the standards set by the World Health Organization (WHO). As a consequence, it has a negative effect on the human body. The article shows the problem of air pollution and the health effects of harmful factors emitted to the atmosphere.

Introduction

According to WHO reports, air pollution in Europe at the current level is responsible for a significant percentage of deaths and hospitalizations. In particular, this applies to cardio-respiratory diseases. The air we currently breathe is polluted mainly by: emissions from motor vehicles, heat sources, industry or tobacco smoke. [1]

The quality of air in Poland for many years is one of the lowest in the European Union, while the level of pollution exceeds the standards set by the WHO many times. As a consequence, they negatively affect the human body.

The topic of air pollution is a very current problem and widely commented, not only by the current time of the year - winter, during which the emission of harmful substances is much higher. Also by the UN climate summit in Katowice, hosted by Poland for the third time. [1, 2]

Health is one of the most important values in a person's life. Human activity has a significant impact on the surrounding environment, leading to numerous pollutants. The visible and widely commented in recent years negative effect of these actions is smog. Observed in recent years - cyclically recurring in each winter season - smog episodes in our country constitute an important public health problem and are the object of a keen interest of an anxious community in each of its regions. [3]

The air content is confirmed by the content of the substance in it, it concerns the chemical composition of the air at a height of about 2 m above sea level, and precisely the content of chemical compounds harmful to health of both humans, animals and plants. Levels of pollution concentrations is the result of low emissions from individual heat sources in combination with adverse weather conditions, such as high humidity or lack of wind. [4]

Pursuant to the ordinance of the Minister of the Environment of August 24, 2012 (Journal of Laws of 2012, item 1031, as amended) regarding the levels of certain substances in the air, the permissible levels of airborne contamination have been defined. [5**]**

In Poland, as in other EU countries, acceptable levels of substances result from the relevant EU directives. In the period covered by the audit, 11 substances emitted into the air were subject to monitoring, monitoring and evaluation, including:

1. B (a) P, benzo (a) pyrene - highly carcinogenic, polycyclic aromatic hydrocarbon (PAH),
2. PM 2,5 - are dust particles of aerodynamic diameter up to 2.5 μm that can reach the lungs and upper respiratory tract, and the smallest of them can penetrate through the walls of blood vessels,
3. PM10 - dust particles with aerodynamic diameter up to 10 μm that can reach the upper respiratory tract and lungs,
4. sulfur dioxide (SO2) - a colorless gas with a choking and sharp odor that is poisonous for both animals and plants,
5. nitrogen dioxide (NO2) - gas in brown color and suffocating odor,

6. heavy metals (including lead, mercury, chromium, cadmium or manganese) - extremely harmful to human health, animals and plants,
7. dioxins - poisonous chemicals with carcinogenic nature. [6]

According to the National Center for Emissions Management and Balancing (KOBiZE), the main source of the aforementioned pollution is low emission, i.e. pollution from sources located at a height of up to 40 m, it is associated with non-industrial combustion processes, i.e. combustion of wood, coal, and also low fuels quality (eg coal sludge) and municipal waste in domestic furnaces, chimneys and boilers.[7]

Among the European Union countries, Poland is still one of the countries with the worst air quality.

Maximum average annual concentrations of suspended dust were almost twice as high as acceptable. According to the Supreme Audit Office (NIK), actions appropriate by the ministries as well as voivodeship and municipal governments were far from sufficient. [6,7].

In 2016, the WHO report was published, which shows the 50 most polluted cities in the European Union. The list includes 33 Polish cities, including Żywiec, Pszczyna, Rybnik and Wodzisław Śląski. [1]

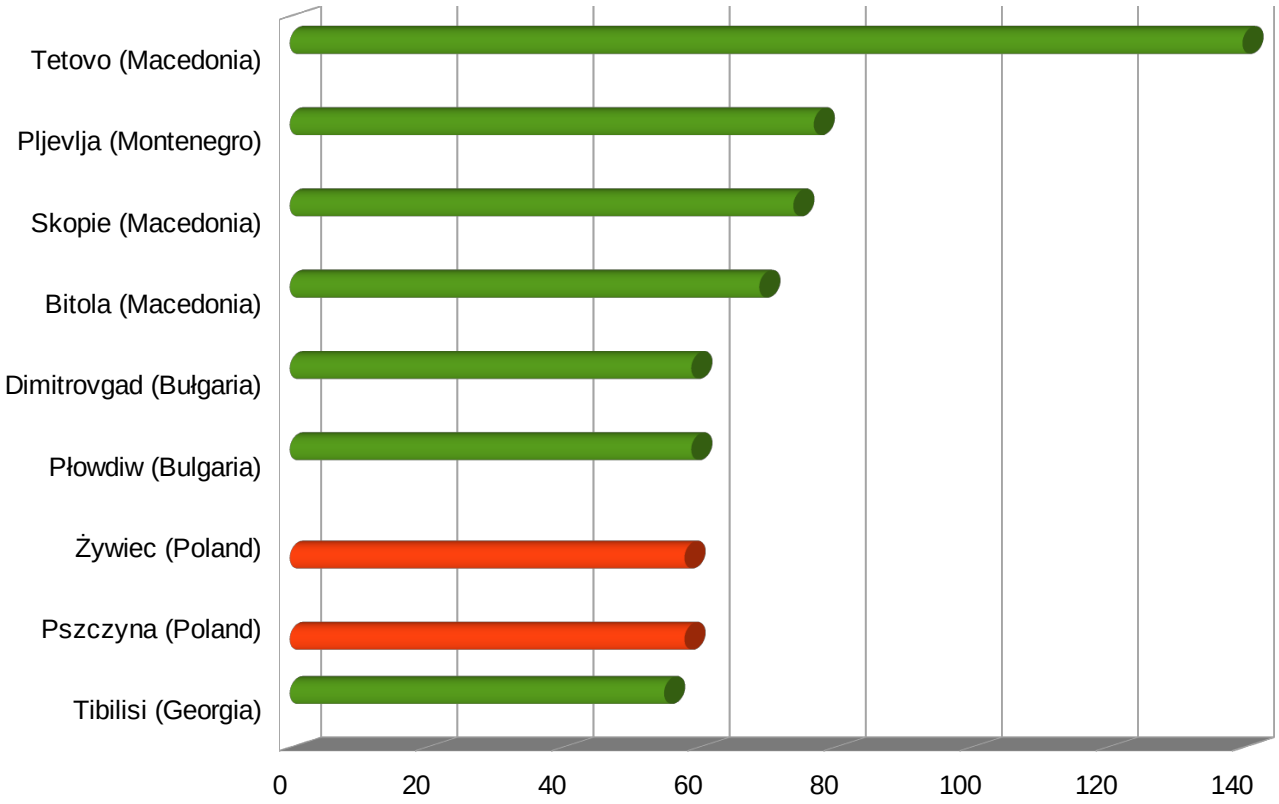

Chart 1. Classification of European cities at the PM10 annual concentrations. [6]

Data from the European Environment Agency show that over 46 thousand people die each year due to poisoned air (due to PM2,5). people. According to the NIK report, achieving the required levels of dust emission reduction and benzo(a)pyrene from the municipal and housing sector, at the current rate of action, may take on a scale of individual provinces covered by the control from 24 to almost 100 years. [6]

From the perspective of health impact, particles with a diameter smaller than 10 μm are important, i.e. exactly those that get into the air as a result of low emission sources located at a height of up to 40 m, it is associated with non-industrial combustion processes, i.e. burning wood, coal, as well as low-quality fuels (eg coal sludge) and municipal waste in domestic furnaces, chimneys and boilers. These particles, mostly retained in the nose, but smaller ones can reach the throat and trachea. They can then penetrate into the bronchi and bronchioles. The smallest of them, so-called submicron dust particles with a diameter smaller than 1 μm reach the alveoli, from where they can enter the bloodstream. [8]

The negative effect on the human body refers not only to the respiratory system, but also leads to diseases of the nervous system, blood vessels. It also increases the risk of pregnancy pathology and cancer.

Air pollution affects the increase in asthma, chronic obstructive pulmonary disease, or COPD. They also lead to recurrent infections of the upper respiratory tract, including the formation of inflammation. Research conducted at the Warsaw University of Technology confirmed the correlation between the exposure to dust pollution and the occurrence of COPD. Depending on the place of residence, the percentage of people affected by the obstruction ranged from 5.1% to 12.3%. In the case of the control group, it ranged from 2.0% to 2.6%. [10]

In the Śląskie Voivodeship, studies conducted on the effects of PM2,5 fine particulate concentrations in atmospheric air during a smog episode with diurnal exacerbations of respiratory tract diseases showed an increase in the number of outpatient consultations registered due to bronchitis and exacerbation of asthma. The dependence was visible from the first days of the smog episode and continued. However, hospitalization in the case of acute respiratory diseases of registered events increased with a two-day delay. [9,11]

Another example of the negative effects of air pollution, including particulate matter, is the impact on the development of the airways in infants born to mothers exposed to them during pregnancy. Studies conducted in Krakow showed that the lungs of these children show significantly lower values of total expiratory volume by as much as 100 ml, and are also much more likely to be exposed to respiratory infections than in the control group. Exposure to air pollutants in the prenatal period may lead to disturbances of concentration and attention as well as increased attention deficit hyperactivity disorder (ADHD). The results of foreign studies were confirmed in Krakow, where it was shown that the children of more exposed mothers (concentration of polycyclic aromatic hydrocarbons above 18ng / m3) showed in the tests the intelligence quotient lower by 3.8 points. IQ from children of mothers less exposed. [12]

There are many activities at the moment to improve air quality, but in order to effectively fight this problem, the problem should be addressed comprehensively. The strategy of combating smog should be logically based and the space of related activities.

At the turn of October and November 2018. Geneva hosted the first global WHO conference on air and health pollution, which was aimed at make commitments regarding the development of local clean air solutions. [13-15]

Conclusion

In summary, education is important in the fight against air pollution, currently there are more and more opportunities to learn about it, thanks to social campaigns, press or mobile applications such as Air quality in Poland (presents current data on air quality). Another point is the limitation of car traffic or transport with the municipal and living sector, which is the main source of pollution. It is also important to limit heat loss during heating. One of the last points is the comprehensive approach, that is acting on several levels, starting from local activities at the lowest level. Do not forget about the flora, which should be an inseparable point of every metropolis.

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