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GLOBAL ENVIRONMENTAL PROBLEMS CAUSING POTENTIAL CHANGES IN THE HUMAN BODY.

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Abstract. This scientific article examines the causes of global environmental problems in the Fergana region, as well as their consequences and approaches to solving them. Based on these, a research study was conducted based on a systems analysis using flue gas analyzers for industry, which revealed elevated levels of air pollution. The morbidity rate of children and the adult population was compared with the morbidity rates of the city of Fergana, the Fergana region, and the Republic as a whole for the most typical nosological groups.

Keywords. Maximum permissible concentrations, nitrogen dioxide, carbon monoxide, sulfur dioxide, silicon dioxide, anthropogenic emissions, dust collection equipment.

Annotatsiya. Ilmiy maqolada Farg‘ona viloyatidagi global ekologik muammolarning kelib chiqish sabablari, shuningdek, ushbu muammolarni hal qilishning oqibatlari va yondashuvlari ko‘rib chiqilgan. Shundan kelib chiqib, sanoat uchun tutun gazlari analizatorlari yordamida tizimli tahlil asosida tadqiqot ishlari olib borildi va havoning ifloslanish darajasi oshganligi hamda ishlab chiqarish oqava suvlarining ifloslanganligi aniqlandi. Bolalar va katta yoshdagi aholining kasallanishi Farg‘ona shahri, Farg‘ona viloyati va umuman Respublika bo‘yicha eng xarakterli nozologik guruhlar bo‘yicha kasallanish darajasi ko‘rsatkichlari bilan taqqoslab o‘rganildi.

Kalit so‘zlar. Ruxsat etilgan chegaraviy konsentratsiyalar, azot dioksidi, uglerod oksidi, sulfit angidrid, kremniy dioksidi, antropogen chiqindilar, chang tutish uskunalari.

Аннотация. В статье рассматриваются причины глобальных экологических проблем Ферганской области, а также последствия и подходы к решению этих проблем. Проведена исследовательская работа на основе системного анализа с помощью анализаторов выхлопных газов для промышленности и выявлено повышенный уровень загрязнения воздуха а также загрязнения производственных сточных вод. Изучена заболеваемость детей и взрослого населения в сравнении с показателями уровня заболеваемости города Ферганы, Ферганской области и Республики в целом по самым характерным нозологическим группам.

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Ключевые слова. Предельно допустимые концентрации (ПДК), диоксид азота, окись углерода, сернистый ангидрид, двуокись кремния, антропогенные выбросы, пылеулавливающее оборудование.

INTRODUCTION.

Currently, many factors impact human health. Human health is determined by the interaction of hereditary factors and the environment. Exposure conditions, depending on the extent to which a substance reaches the body, can alter the body's response to this exposure. The study of these mechanisms is the field of toxicology, the science of the etiology and pathogenesis of toxic damage. The toxicity of a substance can be defined as its ability to cause harm to a living organism, as well as the extent of damage. Objective: To identify the impact of air pollution on human health.

RESEARCH METHODS. Negative effects of long-term exposure to air pollutants were demonstrated in animal experiments and through morbidity and mortality data. These data led to the conclusion that there is a link between low-level air pollution and a number of chronic diseases.

Chemicals to which humans are exposed in their residential or workplace environments can cause illness if their concentrations exceed the maximum permissible concentration (MPC), which reduces the body's ability to withstand their effects [1, 2].

These substances include hydrocarbons, dust, nitrogen dioxide, carbon monoxide, and many others. The list is constantly growing. Hydrocarbons, which are gaseous, have a maximum permissible concentration (MPC) of 5 mg/m3, and are classified as Class 4 in terms of their impact on the human body. They are carcinogenic, which can cause various cancers [1].

Nitrogen dioxide in low concentrations irritates the respiratory epithelium, leading to bronchitis and mild pneumosclerosis. The release of cellular breakdown products into the bloodstream has a general toxic effect (damaging the central nervous system and hematopoiesis). At higher concentrations, severe poisoning occurs, leading to pulmonary edema, and can even be fatal in individuals sensitive to NO2. These individuals primarily suffer from lung diseases. Long-term exposure to low concentrations of nitrogen dioxide reduces the immune system's ability to fight respiratory infections.

Carbon monoxide. A colorless gas. It has reducing properties. Formed during incomplete combustion of fuel. Found in automobile and locomotive exhaust, coal dust, and during burning paint and film. Toxicity: It displaces oxygen from oxyhemoglobin in the blood. This causes suffocation, headache, dizziness, nausea, irritability, and drowsiness. Increases in air temperature increase the

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toxicity of CO. When CO and NOx are present in the air simultaneously, the toxicity of CO increases by 1.5 times, and NOx by 3 times. Stimulation and slight enhancement of CO toxicity have been observed in the presence of H_2S.

Carbon dioxide. A colorless gas. Formed as a result of fermentation, putrefaction, and fuel combustion. Used in the production of ammonia soda and lead white, in the sugar industry, in metallurgy, and as a refrigerant. Toxicity: irritates the mucous membranes of the respiratory tract, causing coughing, eye irritation, headaches, increased blood pressure, palpitations, and mental agitation (narcotic). High CO_2 levels are usually associated with low O_2 levels in the air.

Sulfur dioxide. A colorless gas with a strong odor. It is produced in copper smelters, sulfuric acid production, battery manufacturing, forges, foundries, boiler houses, and rolling mills, in steam locomotives, in automobile exhaust gases, in gelatin and sugar production, during oil production, in the dyeing industry, in oil refineries, in ceramics production, and in superphosphate plants. Toxicity: irritation of mucous membranes, disrupts metabolism. Affects the hematopoietic organs (bone marrow, spleen), destroying bones. Under unfavorable weather conditions (fog and high humidity), the irritating effect of SO_2 is much stronger due to the formation of SO_2 as an aerosol. Toxicity increases sharply with simultaneous exposure to SO_2 and CO, as well as SO_2 and fine dust with SiO_2, Cu, Fe, Pb and As, SO_2 and phenol, SO_2 and SO_3.

Silicon dioxide. Occurs in crystalline and amorphous forms. Used as a filler in varnishes, plastics, rubber, and in the production of various alloys. Toxicity: silicosis, shortness of breath, chest pain, cough, increased ESR, tuberculosis. Discussion results. The state of the atmospheric air depends on the amount of harmful emissions and their chemical composition, the altitude at which the emissions occur, and climatic conditions that determine the transport, dispersion, and transformation of the emitted substances. Sources of harmful emissions into the atmosphere can be both natural and anthropogenic. Natural emissions enter the atmosphere as a result of volcanic activity, weathering of soil and rocks, forest fires, plant mortality, sea waves (accompanied by the formation of spray), and the combustion of meteorites [3].

Emissions of anthropogenic origin are formed primarily during the combustion of fossil fuels (in internal combustion engines, thermal power plants, and heating systems), as well as during the incineration of industrial and household waste, nuclear explosions, etc. The greatest dust emissions come from coal-fired plants. For example, a power plant that annually burns 1 million tons of coal with an ash content of 20%, even with a dust collection equipment efficiency of 94-98%, emits 4,000-12,000 tons of fine dust particles into the atmosphere [4].

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The combustion of fuel oil produces two orders of magnitude fewer particulate matter than the combustion of coal. Fuel oil ash contains 6-12% V, 3-4% Ni, and the concentrations of other elements are similar to those in coal ash. Particulate matter emissions from domestic fuel oil-fired power plants are not captured. Burning natural gas produces 10 times less particulate matter than burning fuel oil.

One of the main sources of air pollution in urban areas is transportation. Of all modes of transport, automobiles contribute the most to urban air pollution, while other modes—rail, water, and air—contribute significantly less. In the Republic of Uzbekistan, vehicle emissions account for over 60% of total emissions, and in the cities of Tashkent, Andijan, Fergana, Namangan, Bukhara, Gulistan, Samarkand, and others, they account for over 80%. In Fergana, environmental monitoring is carried out by the Fergana Hydrometeorological Department [5].

Table 1.

Values of background concentrations of pollutants in Fergana

No	Pollutant Name	MPC of pollutant (mg/m3)	Background Concentrations by Wind Direction (mg/m3)			
			(0-23) ÷by the direction of wind			
			Northe rrn, м/s	Easter nrn, м/s	Southe rn, м/s	Weste rn, м/s
1.	Inorganic Dus	0,6	1,50	1,50	1,50	1,50
2.	Cotton Dus	0,5	0,35	0,35	0,35	0,35
3	Sulfur Dioxide	0,5	0,50	0,50	0,50	0,50
4.	Carbon Monoxide	5	8,00	8,00	8,00	8,00
5.	Nitrogen Dioxide	0,085	0,23	0,23	0,23	0,23
6.	Nitrogen oxide	0,6	0,25	0,25	0,25	0,25
7.	Gasoline Vapors	5	3,00	3,00	3,00	3,00

According to long-term observations carried out by the regional hydrometeorology department, there is an increased level of air pollution in the city of Fergana in general with dust, nitrogen dioxide and carbon monoxide. With continuous operation of enterprises at full capacity, the average annual concentrations of inorganic dust exceeded the maximum permissible concentration by 2 - 2.2 times, nitrogen dioxide - by 2 times, carbon monoxide - by 1.7 times. Moreover, the main contribution is made by high hot springs and vehicles to the total emissions in the city, which is estimated on average at 41.6%. However, at present the situation is more favorable, because there is strict control on the part of the Fergana Regional Department of Ecology and Environmental Protection on the

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one hand, and the development of measures by enterprises to prevent adverse impacts on the environment on the other hand [6].

This trend will continue to be observed in the future, since enterprises currently have QUOTAS for emissions of pollutants into the atmosphere and payments are made for emissions of harmful substances into the atmosphere.

Despite increased efforts to improve the environmental situation in Fergana, pollutants emitted by industrial enterprises impact the health of the city and region's population. A public health assessment was conducted based on data provided by the Fergana Regional Health Department. Child and adult morbidity rates were compared with those in Fergana City, the Fergana Region, and the Republic as a whole for the most common disease groups. An analysis of statistical data for the adult population for recent years (Table 2) shows that respiratory diseases are the leading cause of illness in Fergana, accounting for over 38% of all adult morbidity.

Next in descending order are diseases of the nervous system and respiratory organs, diseases of the skin and subcutaneous tissue, diseases of the genitourinary system, the circulatory system, and neoplasms. The high percentage of respiratory diseases is noteworthy, both among children (50%) and among adults (38%), while in the Republic this figure for children is 31.5%, and for adults, just over 24%. The identied increased incidence of respiratory diseases may be a consequence of environmental pollution by combustion products from high-temperature sources of hot emissions.

Table 2.

Morbidity rates of the adult population in the city of Fergana

o	Nosological Groups	○ Disorder indicators		
		Fergana City	Fergana Region	Republic of Uzbekistan
	Neoplasms	94	49	11,3
.	Diseases of the nervous system and sense organs	550	629	836.4
.	Diseases of the circulatory system	403	289	257,9
.	Respiratory diseases	2224	1904	1904,2
.	Diseases of the genitourinary system	239	306	376,7
.	Diseases of the skin and subcutaneous fat	235	388	441

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CONCLUSIONS. Analysis of morbidity data revealed that, on average, 200 cases of morbidity occur per year out of the total number of workers, with respiratory diseases (ARI, etc.) predominating among them. The identified increased frequency of respiratory diseases may be a consequence of chemical pollutants in the environment, which is consistent with data for the city of Fergana.

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