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# Study of Ecological and Epidemiological Factors Affecting the Health of the Population in Ecologically Unfavorable Industrial Areas

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**Abstract** When incinerating waste, it should be dry, fresh, not rotten, with a moisture content of no more than 45 percent, and the ash content should be about 45 percent. Currently, there are few and at the same time a large number of waste incineration plants in our republic. There are also special plants in central cities that burn up to 600-700 tons of waste per day. It is advisable to build such plants 300-500 meters away from residential areas. In furnaces of plants equipped with modern equipment, waste is burned at 1000℃ - 1300℃.

**Keywords** Hypothermia, Chemicals, Radiation, Climate, Climatic, Edaphic, Orographic, Hydrographic, Chemical, Lymphoid tissue, Container

## 1. Introduction

A group of organs that have a common origin, a single structure plan, and perform a common function is called an organ system. Five of the ten organ systems are regulatory (controlling): nervous, circulatory, endocrine, lymphatic, and immune. Let us clarify that the lymphatic organs and lymph nodes, of which there are about 600, are functionally part of the immune system, and the lymphatic system itself includes an extensive network of vessels that passes through almost all of our tissues, ensuring the movement of a fluid called lymph.

**Research objective**. To identify factors affecting the health of the population in environmentally unfavorable production areas, to assess their ecological and epidemiological characteristics and to develop scientifically based preventive measures against them.

## 2. Research Materials and Methods

The health of the population living in industrialized areas was selected as the object of research, and harmful factors of the surrounding environment (chemical, physical, biological) and their epidemiological impact were studied. During the research, geoecological assessment, epidemiological analysis, risk assessment based on bioindicators, correlation and regression analysis methods were used.

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## 3. The Results Obtained and Their Discussion

The results of the study serve as a basis for decision-making in the activities of sanitary-epidemiological services and local authorities. Industrial and environmental monitoring activities allow the creation of regional risk maps. It created a scientific basis for the development of comprehensive preventive measures to protect public health.

Bone marrow is a reservoir of stem cells, which form blood cells. Depending on the situation, stem cells are transformed into immune B-lymphocytes. If necessary, a certain portion of B-lymphocytes are transformed into plasma cells, which are capable of producing antibodies.

Peripheral organs include the spleen, tonsils, and lymph nodes, which contain areas of immune cell maturation. The tonsils, which got their name because of their external resemblance to almonds, are a cluster of lymphoid tissue in the upper part of the nasopharynx. A person has six tonsils: two palatine, two thoracic, and one nasopharyngeal and one lingual [1,3].

The spleen is the largest lymphoid organ. In addition, it can accumulate some amount of blood. In emergency situations, the spleen is able to send its reserves into the general bloodstream. This improves the quality and speed of the body's immune reactions. The spleen cleanses the blood of bacteria and processes all kinds of harmful substances. Endotoxins are completely destroyed in it, as well as the remains of dead cells from burns, injuries or other tissue

damage. People who are left without a spleen for some reason have a weakened immune system [2,5].

Innate (species) immunity is a hereditarily fixed system of protection of the human body from pathogenic and non-pathogenic microorganisms, as well as tissue decay products. Innate immune cells recognize a pathogen by its specific molecular markers – the so-called "pathogenicity patterns". These markers do not allow one to accurately determine the pathogen's belonging to a particular species, but only signal that the immune system has encountered troublemakers: a stranger or one of its own, but one that has become a traitor to the body.

Macrophages and dendritic cells are located in the skin and mucous membranes. They are mobile and are carried by the blood and lymph. They absorb (phagocytize) the pathogen and dissolve it inside themselves with the help of the contents of the vacuoles. Dendritic cells branch like a tree. Thanks to their antennae-branches, they act as liaisons between the innate and acquired types of immunity.

Neutrophils are the most numerous immune cells in human blood. They circulate in the blood for only 8-10 hours and spend most of their lives traveling through the tissues of the body. When they encounter a pathogen, they capture and digest it, after which they usually die. Granules containing antibiotic substances are released from destroyed neutrophils. Granules of eosinophils and basophils provide chemical protection of the body from large pathogens, such as parasitic worms, fungi, and extracellular bacteria. However, if they are overly active, they can also participate in the development of an allergic reaction; Natural killer cells or NK cells are a type of cytotoxic lymphocytes that participate in the functioning of innate immunity. They destroy cells infected with bacteria and viruses, as well as tumor cells, at high speed [3,5].

The complement system is a multicomponent self-assembling system of more than 20 serum proteins that are normally in an inactive state. After activation, the biological effects of complement appear: the formation of a membrane-attack complex for the lysis of pathogens, the release of inflammatory mediators to attract phagocytes and enhance their absorption capacity. Cytokines are a system of low-molecular proteins in the body, synthesized mainly by active cells of the immune and hematopoietic systems, regulating intercellular interactions, a "universal" language for all cells.

Environmental health issues have become a topic of constant attention of the United Nations. According to WHO, the state of public health depends on the level of socio-economic development by 50-60 percent, on solving environmental problems by 20-30 percent, and on the development of the health system by 15-20 percent. In environmental protection, the fight against air pollution, which threatens the health and well-being of society, occupies a special place [2,6].

The collection and disposal of household waste is decided individually depending on the conditions of the settlement. A plan is drawn up at the beginning of the year, and this plan is used for the present and future. When drawing up the plan, the equipment of communal services, the improvement of settlements, the determination of the distances between settlements and places where waste is taken out, etc. are taken into account. Currently, containers and a special garbage collection system are used for these purposes. All heavy work performed in the container system is performed using mechanisms. Containers with garbage are loaded onto special container-carrying vehicles with lifting cranes, and the garbage is unloaded one by one, tilting the vehicle platform to one side. If the volume of solid waste is 0.12-0.25 t/m3, the volume of the containers should be 0.75 m3. For 0.6 t/m3 of food waste, a container of 0.55 m3 is required. Such a system is used for multi-storey buildings [1,3].

In sparsely populated areas, garbage is collected in tanks on streets that garbage trucks cannot reach and loaded onto special trucks. In medium-sized, small, and low-traffic cities, garbage is loaded directly onto trucks. In such a system, garbage from households is loaded onto trucks at regular times according to a schedule. In this case, garbage is collected in containers in the household. This is a much more convenient method for residents. However, as a result of numerous observations, garbage trucks often do not arrive on time, resulting in garbage being left on the streets for weeks. This is due, on the one hand, to the lack of responsibility of municipal employees, and, on the other hand, to the irresponsibility of employees of the sanitary and epidemiological station in their work [2,4].

Currently, there are modern M-9, M-30 container trucks, M-50, K0-40, M-585, M-93 garbage trucks, and street sweepers. If the places where waste is to be neutralized are far away, then the garbage is collected at the interregional garbage collection point and loaded onto large garbage trucks and transported to these interregional decontamination facilities. In recent years, closed pipelines have been developed in many cities that transport the collected garbage over long distances using air. This method does not require much manual labor from workers, and loading and unloading of garbage is automated. With the help of such a system, 500 thousand m3 of garbage is removed per year. Such a system can be used in microdistricts. This is a convenient system from an epidemiological and sanitary point of view [2,5].

In one day, garbage can be discharged through vacuum pipes to a place designated for garbage collection and compaction 3-4 times. In the future, such systems are expected to be widely used.

Scientists have proven that garbage can be easily neutralized in greenhouses. After cleaning the garbage from stones, iron, rags, and broken glass, it is placed in greenhouses in February-March. The high temperature generated as a result of the exothermic biochemical processes in the garbage heats the greenhouse, which can be used effectively to plant various early-ripening crops. The humus obtained from garbage is a good feed for plants. This method can be used only in spring and winter. Improved landfills [1,4].

It is known that garbage collected from residential areas is not always used in agriculture. Therefore, in order to render excess garbage harmless, improved landfills are built 1000 meters away from the city. A layer of soil 0.25-0.5 meters thick is laid over the garbage buried in the landfill. This

protects the garbage from flies and the environment from unpleasant odors. Biochemical processes occur in the garbage buried in the soil. These processes proceed depending on the temperature increase. The temperature rises to 60-70℃, organic matter turns into humus, pathogenic microbes and worm eggs are destroyed. After the improved landfills are filled, soil is poured over them, leveled, and then trees are planted [2,6].

In recent years, special plants have been built for the mechanical processing of waste. For example, a 65,000-ton waste processing plant has been built in St. Petersburg. The plant produces nitrogen fertilizers for agriculture. They have departments for receiving and separating waste. After the waste brought to the plant is cleaned of iron, stones and other objects, it is placed in bio-drums (4 meters in diameter, 60 meters long). In the bio-drums, the waste is ventilated for 1-3 days, then, after providing a certain level of moisture, the bio-drum rotates and mixes it. As a result of rotation, the waste heats up and its temperature rises to 50-60℃. This occurs as a result of the combined biochemical processes of thermophilic microbes and organic matter. When the temperature is raised to 50-60℃, pathogenic microflora and helminth eggs begin to die. In this way, the garbage turns into compost, almost completely neutralized humus. Of course, the total number of microbes decreases, the coli-titer decreases to 0.1-0.01, and the perfringens titer also increases. However, the degree of garbage neutralization in this method is not high. Therefore, such composts are neutralized and matured in piles on additional collective farm land [1,3].

Waste disposal by incineration. The advantage of this method over others is that such decontaminated waste does not pose an epidemiological or hygienic hazard. At the same time, transportation costs for transporting waste over long distances are saved, and this method quickly and completely decontaminates waste.

Heat, slag and steam generated by waste combustion can be used in the national economy. The construction of waste incineration plants is recommended in the following cases:

1) when the amount of garbage in large cities is very large, it is difficult to separate the land plots, and when the garbage dumps are located far from the city;
2) in order to quickly eliminate the waste of cities where holiday homes are built;
3) in areas where industrial enterprises are located, where coal is used, the waste generated contains a large amount of unburned coal waste;
4) it is recommended to incinerate the waste of hospitals, sanatoriums, veterinary institutions, etc. that pose an epidemiological risk. When incinerating waste, they should be dry, fresh, not rotten, with a moisture content of no more than 45 percent, and the ash produced should be about 45 percent.

Currently, there are few and at the same time a large number of waste incineration plants in our republic. There are also special plants in central cities that burn up to 600-700 tons of waste per day. It is advisable to build such plants 300-500 meters away from residential areas. In furnaces of plants equipped with modern equipment, waste is burned at 1000℃ - 1300℃. When burning waste at such temperatures, smoke does not appear, and ash is separated using special ash traps. The heat generated by the combustion of waste can be used to heat bathrooms, laundries or to generate electricity. 0.5-1.0 kg of steam is produced from 1 kg of waste.

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