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NOSOGEOGRAPHIC RESEARCH ASPECTS OF ENVIRONMENTAL PROBLEMS IN CITIES

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In the modern world we live in, many environmental problems have arisen, and studying their scope and the negative consequences arising from them is of great importance. Environmental problems have a significant impact on various processes, people's lifestyle, health, etc. Taking these aspects into account, as a result of the impact of environmental problems, changes occur in the territorial structure of population diseases. Currently, like many other fields of science, medical geography, including nosogeography, is experiencing its own innovations. These innovations are directly related to the use of modern technologies and innovative methods. As a result, issues such as the use of digital cartography and the use of geographic information systems in nosogeographical research are gaining relevance. In addition, determining the impact of environmental problems and urbanization on the territorial structure of population morbidity, identifying ecological hazard zones, and carrying out work to eliminate problems associated with man-made pollution of the environment are also one of the main issues today.

From a nosogeographical point of view, the ecological state of the natural environment is the main one in the characteristics of the places of residence of the population (Meade M.S., 2010). Along with social and economic characteristics, the ecological factor also determines the place of residence of the population, the occurrence of certain diseases among the population. For example, malignant tumor diseases are formed under the influence of carcinogens, some viruses and nuclides, as well as technogenic influences on the functioning of epithelial tissues. As a result of the increase in technogenic influences on the environment, the number of precisely these types of diseases increases as a result of changes in ecological conditions and the emergence of various ecological problems. In areas where there is a shortage of clean drinking water, water contaminated with various harmful compounds reaches the population for consumption, and this area can become an epidemiological hotbed. When carrying out an assessment based on these criteria, it is necessary to identify the main causes of epidemic and endemic diseases, morbidity and mortality. Only then can an appropriate conclusion be drawn. One of the factors that greatly affects these criteria

is the environmental problems that are emerging in the world. Therefore, it is important to study and analyze the types of these problems, diseases of the population and their significant impact on the territorial composition. According to WHO, 24% of all diseases and 23% of deaths recorded in the world are associated with environmental problems. Many diseases that are currently spreading and increasing in the world are caused by environmental problems occurring at a global and local level.

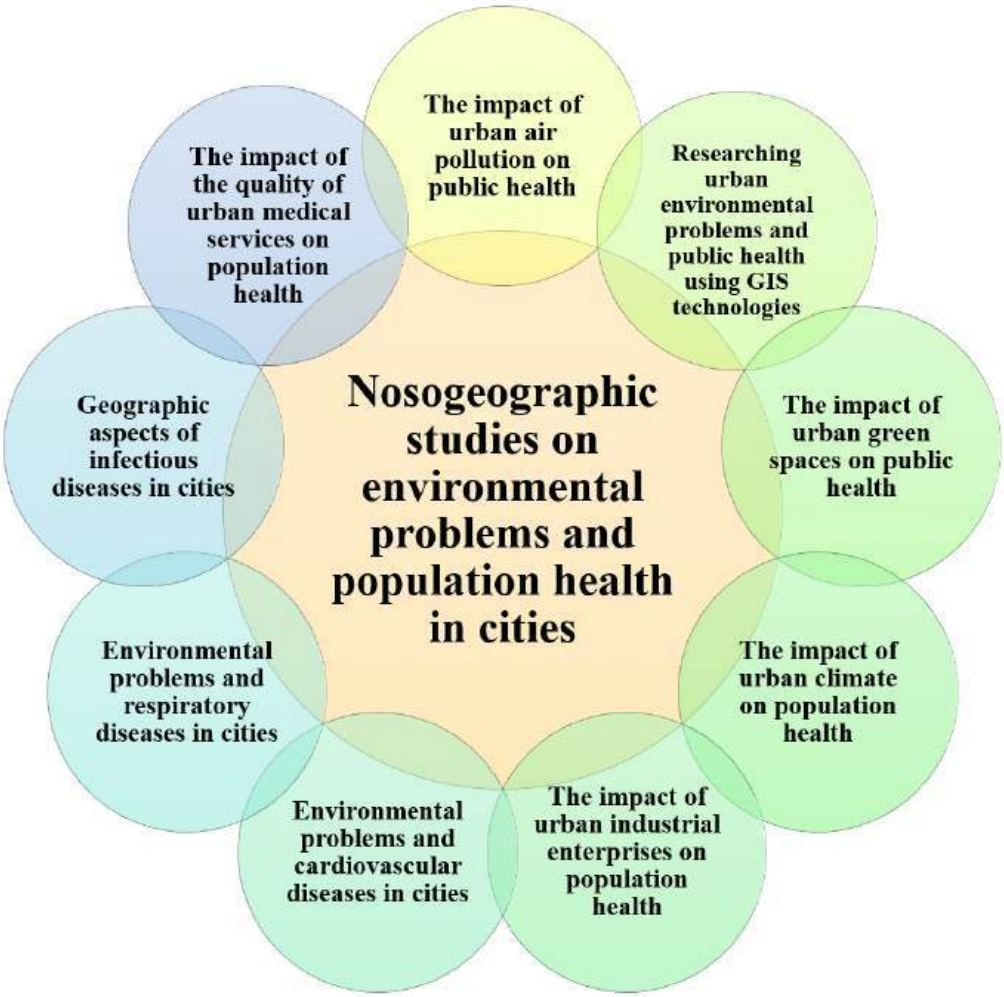

Figure 1. Trends in nosogeographic research on environmental problems and population health in cities around the world

Many nosogeographic studies are being conducted worldwide on environmental problems and public health (Fig.1). In particular, studies by Lucas, Repacholi, and McMichaels in 2006 (McMichael A.J., 2006) and Thomas, Swaminnathan, and Lucas in 2012 have highlighted the negative impact of ultraviolet radiation on the development of natural immunity against infections. According to the results of these studies, ultraviolet radiation can lead to an increase in infectious diseases. Because the immune system that fights viral diseases is damaged by ultraviolet radiation.

McMichael and colleagues (McMichael A.J., 2004) developed a five-step checklist for researchers studying the impacts of climate change:

1) Explore the basic relationships between weather and health;
2) Demonstrate evidence of early climate change impacts;
3) Develop predictive models;

4) Assess adaptation options;

5) Calculate benefits and costs.

This five-step study may be of great help to many researchers.

Goodman, Dockery, and Clancy conducted a study in Dublin, Ireland, assessing the impact of climate and temperature changes on public health. They found that temperature changes increased the number of deaths from cardiovascular disease, while deaths from respiratory diseases were observed later. A 2009 study by Subbarao and colleagues found that respiratory disease incidence rates had increased fourfold over the period of the study compared to 10 years earlier. A year later, Cecchi and other researchers found that respiratory diseases were increasing in proportion to air pollution and that the number of cases was increasing. According to data provided by WHO expert Maria Neira (Neira M., 2023), nine out of ten people worldwide, especially those living in cities, breathe polluted air. Air pollution directly causes diseases such as chronic obstructive pulmonary disease, lung cancer, and pneumonia. But in addition, toxic substances enter our lungs when we breathe and from there pass into the bloodstream, affecting the cardiovascular system. This causes ischemic heart disease, neurological diseases, stroke, and neurological problems. Maria Neira also noted that diseases such as COVID-19 affect people differently if they live in environments with very high levels of air pollution. This is because breathing polluted air affects the immune system and makes people more susceptible to all kinds of respiratory diseases. Since COVID-19 is also a respiratory disease, people living in areas with polluted air experience these and similar diseases more severely.

A study by Victora and colleagues in southern Brazil found that factors associated with increased risk of death from diarrhea include inadequate water supply and lack of toilets. Households without piped water had a 4.8-fold higher risk of infant death from diarrhea than households with piped water. Pakistani researcher Khan and colleagues conducted a 2013 study on water pollution and public health in their country. The study found that some water sources were contaminated with coliform bacteria. Improper disposal of sewage and solid waste, excessive use of pesticides and fertilizers, and deteriorating pipe networks are the main causes of drinking water contamination. This creates the basis for the occurrence of water-borne diseases such as gastroenteritis, dysentery, diarrhea, and viral hepatitis. The hydrological state of these regions, that is, the composition of their waters, plays an important role in the occurrence of not only infectious diseases, but also some non-infectious diseases (a number of urological diseases are also closely related to drinking water). For example, the occurrence of endemic goiter can be cited as an example of this. In its formation, the human body is greatly influenced by microelements received from the external environment. It is known from the studies of A.P. Vinogradov that the human body must receive 120 grams of iodine per day, only then the normal physiological need of the body will be satisfied. Of these, 70 grams are obtained from plants and 40 grams from animal products. Therefore, the human body receives the main part of iodine from plants. Plants receive iodine from the soil through water (Ermakov V., 2017). According to A.P. Vinogradov's theory, iodine deficiency is prevalent in mountainous and gray soil regions, and therefore it is necessary to conduct necessary research in such regions.

We can take a look at a study conducted by a local scientist in Hong Kong, Cheung. According to his research, people who swim in Hong Kong's beach waters are more likely to suffer from skin diseases than the rest of the population. A study conducted by researcher Kazi in 2009 found that skin diseases in arsenic-affected villages in the southern Sindh province of Pakistan were caused by excessive water pollution. It was found that the level of arsenic in drinking water directly affects the health of the local population and that skin diseases are the most common clinical complication of arsenic poisoning. Analysis of hair and blood of patients with skin diseases proved that there is a relationship between arsenic concentration and consumption of arsenic-contaminated drinking water. Studies conducted in Hebei Province, China, showed that the presence of nitrogen compounds in well water is closely related to the use of nitrogen fertilizers in agriculture, and that high levels of three nitrogen compounds in well water are associated with mortality from esophageal cancer (Zhang et al., 2003). Another environmental problem affecting public health is soil pollution. A 2019 study by German researcher Rinklebe found that tertiary arsenic, a major risk factor for overall health in soils around the Middle Elbe River, was the main contributor to the overall health risk, with chromium in second place, vanadium in third place, and lead in fourth place.

Table 1.Scientists who conducted nosogeographic studies on environmental problems and population health in cities

	Scientists	Research area	State
1	Theocracy Latue	Geographic aspects of infectious diseases in cities	Indonesia
2	Philia S Laue	Researching the nosogeographic situation of cities using GIS technologies	Indonesia
3	Anne Maitre	The impact of urban air pollution on cardiovascular disease	France
4	Mats Rosenlund	Long-term effects of urban air pollution and myocardial infarction	Sweden
5	Haiyan Shao	Research on the quality of medical care in cities	China
6	Jin Chen	Urban green spaces, research on the quality of medical care	China
7	Michelle S. Kondo	Urban green space and its impact on human health	USA
8	Patrick Lot Kinney	The impact of urban climate on population health	USA
9	Sotiris Vardoulakis	The impact of urban air pollution and climate on public health	Australia
10	Joshua Newell	Urban green spaces, urban sustainability and public health issues	USA

It is known that 57% of the world's population lives in cities. Cities are developing day by day, and environmental problems specific to cities are emerging in urban areas. This indicates that nosogeographic studies at the city level are effective. For this reason, many scientists around the world are currently conducting nosogeographic studies and scientific research on environmental problems and public health in cities. (Tab 1.) Indonesian Theochrasiya Latue studied the geographical aspects of infectious

diseases in cities, the transformation of green areas in urban areas into residential, commercial and industrial zones, the urban heat island, air and water pollution, and the impact of these aspects on public health. Her colleague Philia S Latue also conducted nosogeographic studies related to infectious diseases in cities and studied the nosogeographic situation of cities using GIS technologies. French researcher Anne Maitre studied the impact of urban air pollution on cardiovascular diseases, as well as the increase in a number of diseases among the population due to urban air pollution. Similar studies were conducted by Swedish scientist Mats Rosenlund, whose research is devoted to the increase in myocardial infarction due to urban air pollution. Chinese Haiyan Shao studied the quality of medical services in cities, and Jin Chen studied the quality of urban green spaces and medical services.

Studies on the stability, dynamics and impact of urban green spaces on human health were conducted by American scientists such as Michel S. Kondo and Joshua Newell. Another American researcher, Patrick Lot Kinney, studied the impact of urban climate on public health. In this direction, Australian researcher Sotiris Vardoulakis has also conducted scientific research, and his research is devoted to the impact of urban air pollution and climate on public health. At the same time, nosogeographic studies were conducted by Adipandang Yudono, Firman Afrianto, Annisa Dira Hariyanto in Makassar, Indonesia, by Peters A, Breitner S. in Erfurt, Germany, by Ho Hyun Kim in Daeson, South Korea, by Ju Hyun Sung in Ulsan, South Korea, and by Frederica Perera in New York, USA.

Nosogeographic studies conducted at the urban scale cover several areas. Particular attention is paid to the impact of urban air quality and urban green spaces on population health.

At the same time, issues such as the climate of cities, the impact of industrial enterprises, and what diseases can spread among the population as a result of this impact are also becoming relevant. Studies on the geographical aspects of infectious diseases in cities are also becoming popular. Researchers are also studying the interrelationships between cardiovascular diseases, respiratory diseases, and urban environmental problems. Effective nosogeographic studies have been conducted in cities around the world to assess the impact of industrial enterprises in cities on population health and to study the quality of medical services.

References

1. Ermakov, V. (2017). A.P. Vinogradov's concept of biogeochemical provinces and its development. Geochemistry International, 55(10), 872–886.
2. McMichael, A. J., McKee, M., Shkolnikov, V., & Valkonen, T. (2004). Mortality trends and setbacks: Global convergence or divergence? The Lancet, 363(9415), 1155–1159.
3. McMichael, A. J., Woodruff, R. E., & Hales, S. (2006). Climate change and human health: Present and future risks. The Lancet, 367(9513), 859–869.
4. Meade, M. S., & Emch, M. (2010). Medical Geography (3rd ed.). The Guilford Press.
5. Neira, M. (2023). Dr. Maria Neira: Director, Department of Public Health, Environmental and Social Determinants of Health (PHE). United Nations Climate

Change. https://unfccc.int/climate-action/momentum-for-change/advisory-panel-members/maria-neira
6. Zhang, J., Niu, C., Ye, L., Huang, H., He, X., Tong, W. G., Ross, J., Haug, J., Johnson, T., Feng, J. Q., Harris, S., Wiedemann, L. M., Mishina, Y., & Li, L. (2003). Identification of the haematopoietic stem cell niche and control of the niche size. Nature, 425(6960), 836–841. https://doi.org/10.1038/nature02041

RECREATIONAL AND GEOGRAPHICAL ANALYSIS OF CLIMATIC CONDITIONS IN THE UKRAINIAN CARPATHIANS

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Abstract. The article explores the meteorological factors determining the recreational potential of the Carpathian region. The influence of vertical zonation on the duration of comfortable recreation periods is analyzed. The role of intermontane basins as centers for climatotherapy is identified.

Key words: recreational potential, vertical zonation, bioclimatic conditions, Ukrainian Carpathians, climatotherapy.

Introduction. The Carpathian region of Ukraine represents a unique geosystem where a moderate continental climate, combined with the advection of marine air masses from the Atlantic, creates favorable conditions for year-round recreation [3]. The Transcarpathian region is of particular importance, as its climate is among the most favorable in the country due to the orographic protection provided by mountain ranges against northern cold air masses.

Research Results. Relief is the primary factor in climate differentiation within the region. The vertical temperature gradient averages 0.4–0.7°C per 100 meters of elevation [1]. This determines the variation in the duration of recreational periods: in the Transcarpathian lowlands, the summer season lasts up to 6 months, while in the high-altitude areas, it is limited to approximately 3 months.

The region is characterized by significant moisture levels. The maximum precipitation (up to 1400 mm) is recorded in the highlands, whereas lowland territories (such as the Chop and Berehovo districts) receive less rainfall. More than 60% of the annual precipitation occurs during the summer period, necessitating the consideration of storm activity when planning active tourism and hiking routes [3].