

THE INFLUENCE OF THE ECOLOGICAL SITUATION IN UKRAINE ON THE LIFE EXPECTANCY AND HEALTH OF THE POPULATION

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Abstract

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The article is devoted to the interdependence between the environment and the health of the population of Ukraine. The processes of destructive changes in the ecosystem of the regions of Ukraine, the use of human capital, and the dependence of public health on the environment have become the object of study and constitute the main goals of this study. To achieve the goals, general scientific and special methods of analysis and techniques were used: economic analysis and comparison – to assess the health status of the population, correlation–regression method – to build a system of equations and identify the dependence of the mortality rate on the impact of environmental factors, the grouping method – to analyze indicators of population morbidity by regions of Ukraine, induction and deduction. With the help of these techniques, the cause-and-effect relationships of the population's morbidity and the influence of environmental factors on their dynamics were studied. To characterize the qualitative state of the environment in Ukraine, laboratory methods were used – the method of threshold limit value (TLV) of water, air, soil pollution, etc. To assess the quality of the living environment, an index method was used (the suitability index is a synthetic indicator of the quality of the living environment). Statistical data for the analysis were taken from the information bulletins of the State Sanitary Epidemiological Service for 2021–2022, the statistical yearbook of Ukraine for 2019–2021, and the Center for Health Statistics of the Ministry of Health of Ukraine. It was determined that the prospects of the national economy will depend on the one hand, on the ability to quickly and effectively adapt to the new, modern requirements of globalization processes and on the other hand, on the consciousness of the population and the rational use of natural resources. It has been proven that the solution of medical and environmental problems directly depends on the professionalism of personnel and the motivation to preserve the environment for future generations. The quality of the living environment of the population depends on a safe environment and rational nature management.

Key words: public health, medicine, sanitary condition, habitat, human capital, state of the ecological situation.

Introduction

The problem of interaction between man and nature has always existed, but it became especially acute at the end of the 20th century. Studies of the relationship between economic development, environmental safety, and human development have become especially relevant today, since the priorities of independent Ukraine are high quality of life, its spiritual flourishing, satisfaction of reasonable human needs, and environmentally healthy and environmentally safe lifestyle of present and future generations. The Ukrainian state, like most European states of the world, has declared attempts to build sustainable development. One of its components is the development of man and preservation of the environment. These components become challenges not only for Ukraine, but also for the countries of the civilizational world.

The processes of destructive changes in the ecosystem of the regions of Ukraine, the use of human capital, and the dependence of public health on the environment have become the object of the study and constitute its main goals. Many foreign and Ukrainian scientists are studying the impact of the environmental situation in the country on the life expectancy of the population. In particular, Qi et al. (2023) investigated how the association between univariate health and socioeconomic status (SES) changes when health-related personality capital, economic capital, social capital, cultural capital, and attractiveness as well as personality capital are included. Yang (2022) proposed increasing investment in public health in underdeveloped regions and striving to promote the balanced development of public health services to further consolidate and expand gains in poverty eradication. Bieloborodova and Bessonova (2023) studied the correlation between the level of metallurgical enterprises' en-

environmental responsibility and the incidence of respiratory diseases in the regions where they are present. Carter (2022) argues through regression analysis that social capital influences health care, including personal resilience, ability to cope with uncertainty, perceptions of societal solidarity, and adherence to public health measures. Shao (2022) considers the notion of «environmental inequality» that lays down health, education, labor productivity, and property prices. Based on these concepts, he identifies the causes of environmental inequality and their impact on the health of the population: ethnic differences, economic status, human capital, and household registration systems. Bezuhla et al. (2023) studied the impact of heavy metals that accumulate in urban park and recreation areas on the population. The green areas in urban conditions and their impact on the population of a certain territory were also studied by Bihuňová et al. (2021). The authors underlined that the level of positive effects of green spaces depends on their area, distribution within the city, and the proportion of trees. Ways of ecological land management were considered by Makarova et al. (2023). The authors propose a methodology for calculating the integrated coefficient of ecological land destruction. It is substantiated that the application of the integrated coefficient of ecological destruction has a significant corrective value in the context of determining the market price of land.

Therefore, Boyce (2016) looks at environmental inequalities through three questions: 1) to what extent are environmental inequalities sensitive to spatial scale and population health? 2) how does sensitivity to different segments of the overall distribution affect the ratings for these indicators? 3) how do the indicators of vertical and horizontal inequalities in the life of the population relate to each other? Scientists conclude that none of the listed questions gives a generalized answer to the questions of environmental inequality and its impact on the quality and health of the population. Ways of measuring the readiness of the population to strengthen environmental requirements at the consumer level were studied by Bieloborodova et al. (2021). The authors proposed the use of the environmental Kuznets curve as an indicator of the population's readiness to accept more ecological forms of recreation. Ai (2020) investigated the impact of environment on enterprise performance as a decisive factor in the duration of the enterprise. The authors propose to innovate and improve the efficiency of distribution of production factors to achieve the goal of stepwise control of environmental pollution, increasing life expectancy. Popadinets (2021) argued in their work that the main incentive for motivating staff at all levels of an enterprise is an integrated systematic approach to motivating the work of management.

Scientists from China (Azimi et al., 2019) examined health inequalities (represented by perinatal and tuberculosis mortality) caused by inequalities in air pollution (represented by NO_x emissions) in 31 provinces in China between 2006 and 2015 using the generalized method of moments (GMM) and quantile regression (QR). The GMM results showed a strong positive relationship between NO_x emission inequality and tuberculosis mortality inequality. Banzhaf (2019) researches between pollution, race, and poverty in his work. But the author concludes that all these indicators are interconnected. Agyeman (2012) argues that a sustainable society must be just. Environmental degradation is almost always linked to issues of human equality

and the quality of life. The author conducted research between environmental quality and human equality, as well as between sustainability and environmental justice. It was concluded that these concepts are inseparable. Wu (2022) investigated whether education spending and technological innovation affect population morbidity in emerging economies. Research shows that education and technological innovation significantly reduce the incidence of disease. Effective government policy, research and development, and human capital negatively affect the incidence of the population. Wei (2022) analyzes various economic, non-economic, managerial, and environmental indicators of human health for seven developing countries. The results show that economic growth, public health spending, and human capital significantly reduce health disasters. Goenka (2020) and Popadinets (2020) found that poor countries have significantly higher population morbidity rates and significantly lower levels of intellectual capital. Acemoglu (2007) proposed using projected mortality as a tool and found that a 1% increase in life expectancy results in a population growth of 1.7–2%. Puro (2022) argues that social capital is a critical factor in partnerships between hospitals and community organizations, and hospitals may seek partnerships with organizations that enable them to address community health issues beyond their own experience, as such partnerships and common efforts can help address social determinants of health (SDOH) and manage public health. Kinash (2019) considers “health economic regulation,” by which the author understands the components that combine financial, material, and human resources.

Valerko et al. (2022) proposed Gis-based assessment of risk for drinking water contamination to children's health, which is considered to be a basis of human potential. The danger to children's health was evaluated by using the hazard quotient and following the methodology recommended by the US Environmental Protection Agency.

Zelinska (2021a,b) and Shmygol (2021) proposed a model for ensuring the human and sustainable development of Ukraine. They note that the main directions of development should be the use of innovative approaches to environmental, demographic, educational, and social components through the implementation of targeted programs for regional development, outsourcing, insurance medicine, public-private partnerships, international online educational environment, and international environmental projects. Simkiv (2022) and Andrusiv (2022) prove that structural changes in the Ukrainian economy (in particular, in the health-care sector) are rather slow and are characterized by significant inter-regional differentiation.

Based on the above, the analysis of the impact of the ecological situation in Ukraine on the life expectancy and health of the population is an extremely relevant topic today.

The purpose of the article is to study the relationship between environmental indicators and the state of morbidity of the population in Ukraine (through correlation-regression analysis and analysis of the quality of the residential environment, taking the example of the Ivano-Frankivsk region).

Methods and limitations

To achieve the goals, general scientific and special methods of analysis and techniques were used: economic analysis and com-

parison – to assess the health status of the population, correlation–regression method – to build a system of equations and identify the dependence of mortality rate on the impact of environmental factors, the grouping method – to analyze the indicators of population morbidity by regions of Ukraine, induction and deduction. With the help of these techniques, the cause-and-effect relationships of the population's morbidity and the influence of environmental factors on their dynamics were studied. To characterize the qualitative state of the environment in Ukraine, laboratory methods were used – the method of threshold limit value (TLV) of water, air, soil pollution, etc. To assess the quality of the living environment, an index method was used (the suitability index is a synthetic indicator of the quality of the living environment). Statistical data for the analysis were taken from the information bulletins of the State Sanitary Epidemiological Service for 2021–2022, the statistical yearbook of Ukraine for 2019–2021, and the Center for Health Statistics of the Ministry of Health of Ukraine.

Results

An analysis of the ecological state of Ukraine shows that the main reason for the unfavorable environmental situation is the hypertrophied development of resource-intensive, low-waste industries focused mainly on raw materials and materials and is caused by the following factors: pollution from transboundary sulfur transfers from Central and Eastern Europe, regional pollution from their large enterprises, and local pollution (Andrusiv, 2021). According to the International Union for the Conservation of Nature, sulfate sulfur, ammonium nitrogen, etc. are annually supplied to Ukraine. The consequence of the Chernobyl disaster was the appearance of spots of radionuclides in the Zhytomyr and Rivne regions, and in the Ivano-Frankivsk region, lands contaminated with nuclides and cesium-137 are still recorded (Adamenko, 2000). On the territory of the Zhytomyr, Ivano-Frankivsk, Rivne, and Volyn regions, etc. spots of contamination of soils, surface and ground waters, and vegetation are found. Thermal power plants, oil refineries, enterprises of the chemical and leather goods industries in Vinnytsia, Kherson, Rivne, Khmelnytskyi regions, etc. lead to environmental pollution. Local pollution is quite widespread from the activities of individual enterprises in the territories of the regional section. This list can also include the active development of oil and gas fields, underground salt mining, laying oil and gas pipelines through the territory of Ukraine – from Kharkiv and Luhansk regions to the Carpathian region (Kostetska, 2020). All these factors led to the crisis state of natural resources and the deterioration of people's health, which is expressed as an increase in morbidity and mortality among both the adult and child populations of the country. According to medical statistics over the past decade, a growing trend of diseases of the endocrine and circulatory systems, tuberculosis, neoplasms, an increase in the proportion of congenital anomalies, morbidity of the musculoskeletal system, etc. have been recorded.

The main air pollutants are enterprises of the chemical, mining, and processing industries of the regional level. As for toxic wastes, wastes of I and IV hazard classes pose a particular threat. As a result of the use of water resources, there is a clear trend toward their pollution. According to the official statistics of Ukraine for 2000–2021, it can be argued that the average life expectancy of

rural residents in both articles is less than that of urban residents. This is largely due to the increased morbidity of rural residents as a result of pollution of the natural environment by chemicals used in agriculture and the consumption of contaminated drinking water from wells with nitrates. Insufficient number and capacity of treatment facilities has a negative impact on the health of city dwellers. In the role of “leaders,” there were territories that were once considered ecologically clean. We are talking about the unique territories of the Carpathian region.

Of particular concern is the high contamination of soils with mineral fertilizers and pesticides, the increased dosage of which has led to the accumulation of nitrates and pesticides in the ground. The disposal, recycling, and processing of industrial waste (used mercury lamps, galvanic slags, acids, and solvents) has become an urgent and unresolved environmental problem. All this creates the danger of fires in forests and leads to irreversible consequences not only in the health of the population, but also of the state of demographic situation in the country. Factors that negatively affect the quality of human life safety include sources of pollution formed as a result of the storage of clay-salt sludge on the surface of the earth, etc.

Consequently, air pollution, a decrease in the volume of clean water, and deterioration of the quality of sewage with various kinds of waste are sources of morbidity, which definitely affects the life expectancy of the population.

Medical and social extremes of morbidity and mortality of the population, along with other factors, can be recognized as benchmarks of the intense influence of a complex of environmental factors. In particular, the number of children born under 1 year of age in 2021 compared to 2000 in Ukraine decreased in urban areas by 42% and in rural areas by 30%, and the number of deaths of children in the first year of life increased by an average of 35%. A particularly high level of morbidity and mortality was observed in the areas of radioactive contamination in the city of Kyiv as well as in Kyiv, Ivano-Frankivsk, Rivne, Zhytomyr, and Volyn regions. Since most of the enterprises have curtailed their activities or closed in recent years, road transport and woodworking enterprises remain the main air pollutants. The greatest number of diseases among the population was recorded as neoplasms and diseases of the blood and blood-forming organs among the other diseases. The results of laboratory studies of atmospheric air, for example, in the Ivano-Frankivsk region, for the period 2000–2021 showed an increase in the percentage of non-standard samples, which amounted to 20.9% in 2021 against 8.8% of the average regional level. An analysis of the biochemical indicators of water annually records excess of the maximum permissible concentrations in it (according to the materials of the sanitary and epidemiological service in 2020–2021 in the Ivano-Frankivsk region).

One of the most sensitive indicators reflecting the state of the environment and social well-being is the health of children. As the results of the analysis show, twice as many children under 16 suffered from diseases of the endocrine system and disorders in 2021 than in the period of 2000, and the rate of childhood disability has increased. The main reasons for increase in the incidence of diseases in children are unbalanced nutrition, lack of iodine in water, which was the result of radiation pollution, and social unhappiness in families. Outbreaks of morbidity in children with contact dermatitis, diseases of the blood and respiratory organs, anemia, and poisoning were recorded during the study period in all regions of Ukraine, which became an echo of the Chernobyl accident.

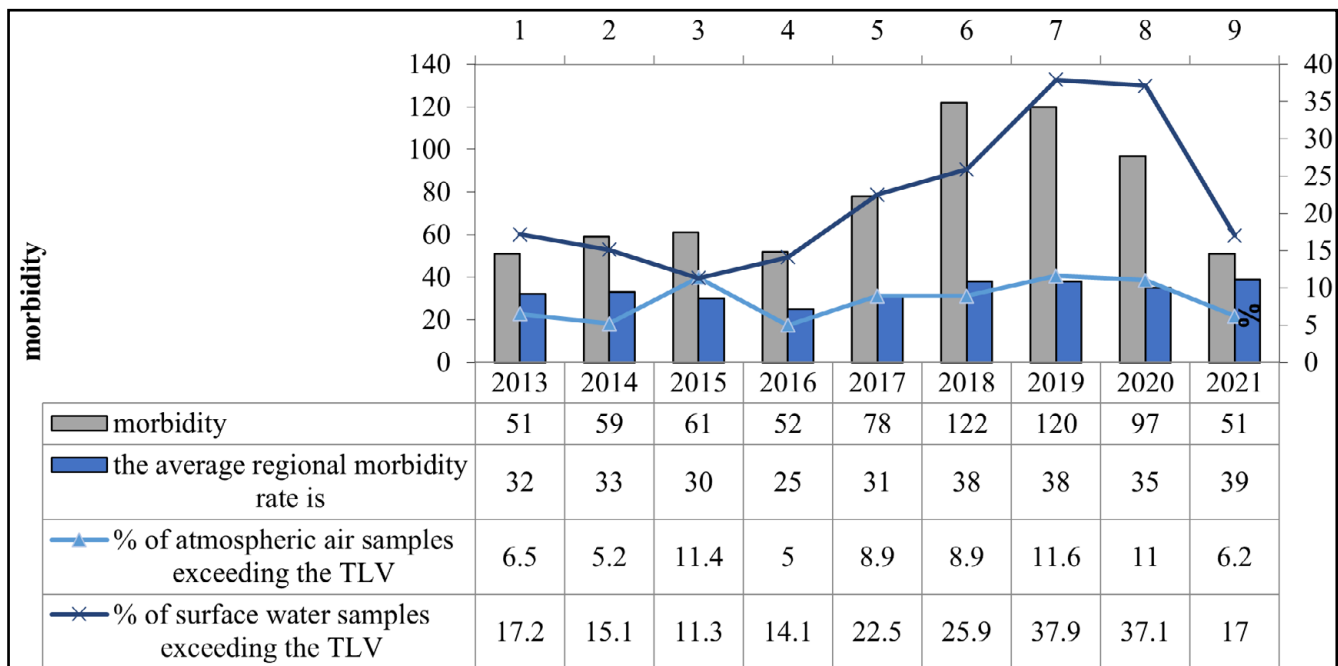


Fig. 1. Dynamics of morbidity in the Ivano-Frankivsk region for 2013–2021.

Note: formed by authors.

It is known that the state of health of the child largely depends on the factor of heredity and the state of health of the parents, especially the mother. Illnesses of parents often become the causes of various pathologies in newborns and the death of babies. It was revealed that the occurrence and spread of diseases is determined by the adaptive type. The growth and intensity of diseases are associated with risk factors common for a particular region and specific for the climatic and geographic zone. Thus, an analysis of the results of preventive examinations of 6-year-old children in the regional context, conducted in 2020, shows that 30% of them are not functionally ready for education. This is five times more than the number recorded in 1974. The number of children with disharmonious development increased by 1.7 times, and the number of children with a lag of biological age from the calendar one increased by 2.6 times (from 12.2 to 31.2%) (based on the materials of the conference of the Ministry of Health of Ukraine dated November 4–6, 2022). One of the reasons for this situation is the mutagenic changes in the development of the child's body, aggravated by an unhealthy environment, impoverishment of households, and socioeconomic and political turmoil in the state. The latter is confirmed by the noncompliance of the material and technical base of general education schools and vocational schools with the necessary sanitary standards. According to the results of surveys of workplaces for the period 2019–2021 in schools and vocational schools, in particular Ivano-Frankivsk, Kirovohrad, and Lviv regions, more deviations from the norms (nonstandard workplaces) were revealed, which is expressed as excess of dust, gas contamination, noise load from TLV (based on the materials of the Sanitary and Epidemiological Service of 2021–2022 in the relevant areas). All this leads to deviations in the activity of body systems, chronic development of disease, and physical, intellectual, and reproductive limitations in human life. Based on the foregoing, we conclude that there are potential risks caused by environmental pollution

for the formation and use of human resources in the future. As an example, let us consider the Ivano-Frankivsk region in terms of the morbidity of respiratory and blood organs (Fig. 1).

As we know, human health largely depends on nutrition. On comparing data on food consumption in Ukraine over the past 5 years, we see that the level of consumption of primarily valuable food products – vegetables, fruit, meat, butter, fish – is declining. Deviations from scientifically based norms and other products are observed, which negatively affects the state of people's health, reducing their overall level of vital activity and leading to a decrease in labor productivity and a reduction in life expectancy. Deficiency of proteins and vitamins in food causes improper metabolism in the body of people, especially children, which causes various pathologies.

Financial difficulties of households and insufficient provision of pensions increase social problems in the state. As an example, we can talk about a sharp outbreak of tuberculosis in certain regions (Ivano-Frankivsk, Lviv, Chernivtsi, Odesa, Kirovohrad, Zakarpattia) during 2000–2021, which threatens even greater depopulation. Today, tuberculosis and coronavirus disease (COVID) are considered one of the most serious threats to human health on a global scale and as a problem of an emergency nature. The highest rates of tuberculosis in Ukraine among children under the age of 14 were recorded in 2021 in the Volyn, Dnipropetrovsk, Zaporizhzhia, Ivano-Frankivsk, Zakarpattia, Kirovohrad, and Cherkasy regions. The “leaders” in terms of morbidity among children under the age of 14 per 10,000 people in 2021 compared to 2017 were Zaporizhzhia (26.6%) and Cherkasy (15.4%) regions. In Ukraine as a whole, the tuberculosis incidence rate for 2017–2021 decreased from 51.9 to 35.5 per 10,000 people, although in some regions, it remains quite high (Statistical yearbook of Ukraine for 2019–2021). Undoubtedly, the level of consumption has a significant impact on the wages of workers, which remains low in Ukraine today, despite the law adopted by the government on rais-

ing the minimum wage (01.10. 22 6700 UAH – Law of Ukraine “On the State Budget of Ukraine for 2022”). Low wages lead to low purchasing power of the population and indicate an extremely low price of human capital. It does not stimulate highly productive work, and it leads to irrational use of the existing economically active population and creates tension in the national labor market.

An important factor influencing the value of the average life expectancy is the mortality of the population. For 5 years in a row, chronic noncommunicable diseases have dominated the structure of mortality in Ukraine. The first place is occupied by diseases of the circulatory system, which caused 61.4% of all deaths in Ukraine in 2021. Over the past 5 years, the mortality rate from diseases of the circulatory system has increased by 11.4% and amounts to 758.3 per 100,000 population (680.9 in 2017). Mortality from myocardial infarction increased by 14.1% and in 2021, it was 41.5 per 100,000 of the population against 36.4 per 100,000 of the population in 2017. The death rate from stroke increased by 0.3% in 2021 and amounted to 86.4 per 100,000 of the population against 86.1 in 2017, but compared to 2019, it decreased by 0.3%. Mortality from cancer ranks second in the causes of death. In 2021, the proportion of deaths from malignant neoplasms among all deaths was 15.5%. The death rate from malignant neoplasms increased by 3.1% compared to 2019 (Ukrainska baza medyko-statystychnoi informatsii).

To establish the relationship between individual environmental indicators and the mortality rate of the population, as an indicator of the health of the population of Ukraine, we used a correlation-regression analysis for the Ivano-Frankivsk region, which

allowed us to obtain a multiple regression equation describing the dependence of a function on a set of factors. The relevance of such an analysis lies in the possibility of conducting monitoring studies on the state of the environment and the incidence of the population in certain regions of Ukraine, which will become an action plan for the development of the medical industry. The calculation was performed in MS Excel 2000 program. The study period is 2017–2021. Statistical data on the pollution of the territory were taken as independent variables (X), and the death rate of the population was taken as the function (Y). The calculations carried out indicate a close relationship between environmental factors and the mortality rate of the population. The significance of the obtained results confirms the high level of the correlation coefficient. The proposed model and the corresponding calculations made it possible to assert that the most significant impact on the mortality rate of the population is exerted by emissions of harmful substances into the atmospheric air from stationary and mobile sources of pollution and the volume of discharged wastewater (polluted). As independent variables, we have chosen emissions of harmful substances into the atmospheric air from stationary sources of pollution, emissions of harmful substances into the atmospheric air from mobile sources of pollution, volume of discharged wastewater (contaminated), capacity of treatment facilities, the number of man-days of incapacity for work due to injuries at work per victim, and volume of toxic waste in general.

$$Y = 3.4922 + 0.0093 \cdot X_1 - 0.0028 \cdot X_2 + 0.14 \cdot X_3 + 0.0034 \cdot X_4 + 0.0065 \cdot X_5 + 0.0013 \cdot X_6$$

Table 1. Point assessment of factors of the quality of the living environment.

Factor number in evaluation	Factor name	Factor value	Points
1	Percentage of recurrence of inversions, wind speeds 0–1 m/s, zone	III	2
2	Percentage of apartments equipped with internet per 100 families, %	38	3
3	Noise load in the daytime, dB	68	2
4	Usable area per person, m ²	14	2
5	Percentage of apartments equipped with security systems per 1000 population, %	16.5	3
6	Percentage of apartments equipped with baths, %	92.8	3
7	Percentage of apartments connected to the water supply network, %	95.6	3
8	Percentage of apartments equipped with gas, %	91.2	3
9	Percentage of apartments connected to the heating network, %	85.8	3
10	Percentage of apartments connected to the sewer, %	96.5	3
11	Time spent on a trip through the city in one direction, h	1.25	2
12	Air pollution with dust, TLV particles	1.2	1
13	Air pollution with nitrogen oxide, TLV particles	1.3	1
14	Air pollution with carbon monoxide, TLV particles	1.2	1
15	Capacity of urban wastewater treatment plants, m ³ /s	1.84	2
16	The rate of accumulation of municipal solid waste for the year, m ³ /person	1.68	2
17	The method of liquidation of municipal solid waste	Special places for tanks, pickup two times a week	2
18	Area of green spaces per inhabitant, m ² /person	52	3
19	Percentage of green spaces in good, intact condition, %	47	2
20	Population density, persons/km ²	6420.1	1

Note: formed by the authors based on (Mikolash, Pitterman, 1993).

Thus, it was found that environmental degradation affects not only indirectly, but also directly the health indicators of the population, worsens the indicators of its demographic reproduction, and has a significant impact on the growth of disability, which means that we can talk about a direct connection between environmental factors and the life expectancy of the population and use of human resources in the economy of Ukraine.

The analysis of the state of the ecological situation in Ukraine showed that in most regions, the main share of pollution is accounted for by emissions from vehicles. In this regard, we analyzed the assessment of the quality of the living environment using the example of the city of Ivano-Frankivsk based on regional data by the State Statistics Service of Ukraine (2022).

To assess the quality of the living environment, we have focused on this urban agglomeration, since over the past 5 years,

Ivano-Frankivsk has been one of the top three cities in Ukraine in terms of living comfort. The system of indicators selected for analysis is shown in Table 1.

To characterize the living environment, a three-stage point scale was chosen and a synthetic indicator of the quality of the environment was calculated using the Fuller's triangle (Tables 2, 3).

Apparently, a synthetic indicator of the quality of the living environment $U = 374.5$; $U_{\min} = 190.1 = 190$; $U_{\max} = 190.3 = 570$; and the normalized synthetic indicator of the quality of the environment

$$\bar{U}_{(\%)} = \frac{374.5 \cdot 100}{570} = 65.7\%$$

Using the classification by environment categories, we see that:

- category 1 characterizes a favorable habitat for which the nor-

Table 2. Fuller's triangle for hierarchization of living environment quality factors.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
			5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
				6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
					6	6	6	6	6	6	6	6	6	6	6	6	6	6
					7	8	9	10	11	12	13	14	15	16	17	18	19	20
						7	7	7	7	7	7	7	7	7	7	7	7	7
						8	9	10	11	12	13	14	15	16	17	18	19	20
							8	8	8	8	8	8	8	8	8	8	8	8
							9	10	11	12	13	14	15	16	17	18	19	20
								9	9	9	9	9	9	9	9	9	9	9
								10	11	12	13	14	15	16	17	18	19	20
									10	10	10	10	10	10	10	10	10	10
									11	12	13	14	15	16	17	18	19	20
										11	11	11	11	11	11	11	11	11
										12	13	14	15	16	17	18	19	20
											12	12	12	12	12	12	12	12
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Note: formed by the authors.

- malized quality indicator is within $66.7\% < \bar{U} \leq 100\%$;
- category 2 is a conditionally favorable environment – $33.3\% < \bar{U} \leq 66.7\%$;
- category 3 is an unfavorable environment – $\bar{U} \leq 33.3\%$.

Thus, the living environment of Ivano-Frankivsk, chosen for the study, is conditionally favorable, and according to the above table, it is confirmed by calculations that the most significant impact on the health of the population and life expectancy is exerted by emissions of harmful substances from vehicles into the atmospheric air.

Conclusion

Thus, according to the results of the study, it can be stated that:

- The health of the population in the regions of Ukraine largely depends on the environmental and sanitary factor and the quality of the habitat. The intensity of the incidence of the population in Ukraine is characterized by significant variations, which is especially pronounced in the sub-regional context.
- Currently, the crisis phenomena in the state economy have led to a partial reduction in the environmental burden on the health of the population. Given this, it can be argued that harmful environmental factors have a cumulative and prolonged effect on the human body.
- A purely medical aspect is not the main one among the variety of influences on human health. Ninety percent of the health of the population depends on many factors. These are
- socioeconomic (the level of well-being of citizens, life safety, etc.), environmental (quality of air, drinking water, food, waste management, etc.), infrastructural factors (land management, transport, accessibility of services, places of recreation, etc.), and the conditions and lifestyle of each individual person (the city where a person lives; the place where he lives; and the scope of his activities and lifestyle, determining his own priority in relation to himself, his health, and the health of others). The state of the health-care system determines, on average, about 10% of the total complex of such influences. Therefore, taking into account the above, the provision of quality services to the population in all areas of activity that would meet the individual needs of each person should have an integrated approach due to the consolidated efforts of all stakeholders in the direction of maintaining and strengthening the health of the population and requires the effective and targeted use of all available resources (financial, material, social, personnel, and others). In addition, the prevention of premature mortality from external causes should be based on the development and adoption of effective organizational and managerial measures aimed at providing the population with affordable and high-quality medical care, including emergency, and conducting training for adults and children on methods of first aid and emergency care.
- The prospects of the national economy will depend on the one hand, on the ability to quickly and effectively adapt to the new, modern requirements of globalization processes and on the other hand, on the consciousness of the population and

Table 3. Hierarchization of factors and calculation of a synthetic indicator of the quality of the living environment in the city of Ivano-Frankivsk.

Factor number	Factor weight	Order of factors	Factor value in points	Synthetic indicator of environmental quality, product of (2) × (4)
1	11	9	2	22
2	9	11	3	27
3	0.5	20	3	1.5
4	8	12	2	16
5	2	18	2	4
6	3	17	3	9
7	5.5	13	3	16.5
8	5.5	14	3	16.5
9	5.5	15	3	16.5
10	5.5	16	3	16.5
11	0.5	19	2	1
12	15.5	3	1	15.5
13	15.5	4	1	15.5
14	15.5	5	1	15.5
15	15.5	6	2	31
16	12	7	2	24
17	12	8	2	24
18	18.5	1	3	55.5
19	18.5	2	2	37
20	10	10	1	10
Tot				374.5

Note: formed by the authors based on State Statistic Service of Ukraine (2022).

the rational use of natural resources.

5. To improve the state of the ecological situation in the regions of Ukraine and to reduce the morbidity of the population from the impact of destructive human changes on the environment, it is advisable to propose the following steps: ensure a well-thought-out environmental policy aimed at reducing the negative anthropogenic impact on the environment; increase the level of social protection of employees; attraction of investments in the environment; disease prevention, development of insurance medicine, etc.

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