

# Territorial Analysis of the Nosoecological Situation and the Health of the Population of the Syrdarya Region

Nilufar Komilova<sup>1,\*</sup>, Lolakhon Karshibaeva<sup>2</sup>, Umriniso Egamberdiyeva<sup>1</sup>, Khusniddin Egamkulov<sup>2</sup>

<sup>1</sup>Department of Economic and Social Geography, National University of Uzbekistan named after Mirzo Ulugbek, Republic of Uzbekistan

<sup>2</sup>Department of Ecology and Geography, Gulistan State University, Republic of Uzbekistan

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**Abstract** This article discusses the nosoecological situation in the Syrdarya region and territorial aspects of public health. Natural conditions, economic-social and historical-geographical aspects of the territory were analyzed from a nosoecological point of view. The geographical position of the region, natural conditions, population, economy, and indicators of morbidity of the population are highlighted. The incidence rates of certain species and groups of the population in the Syrdarya region were identified by districts. The study provides a brief overview of the function of medical demography, and its role in the system of sciences. The main attention is paid to the medical and demographic state of the Syrdarya region. Separate demographic processes of the population of the republic and the Syrdarya region, including maternal and infant mortality, and general mortality rates, are considered. In this regard, in particular, scientific research is important to identify and analyze the relationship between the morbidity of the population of the Syrdarya region and the ecological situation on the territory. Monitoring the water and soil composition, as well as identifying the influence of winds blowing on its territory on certain types and groups of diseases of certain areas (Khavast, Bayaut), developing a prognosis, improving health becomes important.

**Keywords** Nosoecological Situation, Types and Groups of Diseases, Medical Demography, General Mortality Rate, Maternal Mortality Rate, Infant Mortality Rate

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## 1. Introduction

In recent years, a number of environmental changes have been taking place on the Earth due to human activity: the climate and weather in all regions of the globe are changing significantly, the composition of water and soils is becoming more polluted, and species of flora and fauna are declining. And this, in turn, dramatically affects the health of all people living on earth.

The World Health Organization notes that currently about 80 percent of all diseases are the result of environmental problems. Thus, the prevention of such environmental hazards puts a number of issues at stake not only for environmentalists, but also for the public, including medical geographers. A number of reforms are being carried out in Republic of Uzbekistan to improve the health of the population, reduce morbidity, and optimize the ecological state of the regions, and significant positive results are being achieved. In particular, for the purposes of Decree of the President of the Republic of Uzbekistan No. PF-60 "On the new development strategy of Uzbekistan for 2022-2026" [1], "elimination of existing environmental problems that harm the health of the population and the gene pool; improvement of mechanisms for assessing the level of environmental pollution, environmental monitoring, forecasting the level of its pollution, constant

information support of state environmental supervision, monitoring of the state and environmental impact of pollution sources” are important tasks that have been identified.

It is known that nosoecology (ecology of diseases) studies diseases that occur in the population, and their natural foci, patterns of their occurrence and spread. The object of this science, unlike the object of epidemiology, includes not only zoonoses, anthroponoses, and endemic diseases, but also oncological, cardiac, vascular and other pathologies.

In this research, the concept of a nosoecological situation was applied. Nosogeographic situation is characterized primarily by the mortality rate of the population, average life expectancy, general morbidity, and the presence of foci or areas of diseases in a given place or territory. As an extremely thin, impressive territorial system, it becomes extremely volatile due to its dependence on various natural and socio-economic factors. The nosogeographic situation is also influenced by the ecological and demographic situation of places. This is due to the fact that among the population, there are such types and groups of diseases that are primarily directly related to the oncological condition of a particular area. The rapid development of science and technology, the steady increase in human influence on nature, and due to this, a number of negative changes occurring in the natural environment, have a significant impact on human health. Health ecology (sanitary ecology) – identifies patterns associated with the influence of environmental factors on the level of public health [2]. In addition, the concept of human ecology should also be taken into account. In some sources, the terms “Human ecology” and “medical geography” are used in the same meaning. But although these areas are very close to each other, there is also a mutual difference between them. Medical geography studies living beings in general and the diseases they encounter, the causes and patterns of their spread, as well as their state of health. Thus, medical geography is a different, broader concept than Human Ecology and even its interpretation in a broader sense.

Studies conducted to examine the level of health of the population also show that in recent years, diseases associated, in particular, with the cardiovascular, digestive and respiratory systems, occupy leading positions in the world. Separately, it should be noted that most of the diseases that are common all over the world mainly affect economically backward countries, both developing and lagging behind in development.

Scientists D.H. Meadows [3], E. Schaal and M. Taschereau-Dumouchel [4] took part in the development of scientific research related to nosoecology, human ecology, as well as its medical geography and medical cartography, today, there are such scientists as B.B. Prokhorov [3], E. Keller and D. DeVecchio [5], S. Malkhazova, D. Orlov, N. Shartova, S. Starikov and T. Puzanova [6], who contributed to the development of this field. In the

geographical study of issues related to nosoecology, especially with the geography of diseases and mortality of the population in Uzbekistan, the role of such scientists as N. Komilova [8], I.R. Turdymambetov, N.Zh. Embergenov and G.T. Naurzybayeva [7] are great. A series of monographs, textbooks and manuals written by these scientists mention a number of data on nosoecology.

## 2. Materials and Methods

In preparing the article, the data of the State Statistics Committee of the Republic of Uzbekistan and the Department of Statistics of the Syrdarya region, as well as the opinions of leading experts based on a sociological survey and direct observational work of the authors in the studied areas were used.

The method of analysis played a central role in the study, allowing us to delve into both theoretical and practical aspects of the nosocomial situation. This method was used to define the basic meaning and essence of the concept, and to explore different approaches to its assessment and factors that influence it. This analytical approach contributed to the systematic study of the components of the concept, which allowed us to comprehensively understand its content.

The analysis method was used to study the unique characteristics of the Syr Darya region. The study covered geographical features, historical foundations of development, and consideration of the regional units that make up the region. This approach allowed us to obtain a holistic view of the dynamics of the region's development and the factors influencing its nosoecological situation.

In addition, this method was applied to study the peculiarities of the Syrdarya region. In this case, its geographical properties are subject to discussion, as well as the historical foundations of development. Based on this, the regional units included in it were considered.

The synthesis method involved the collaboration of findings derived from our analysis. This approach facilitated a systematic evaluation of both external and internal factors that shape the daily lives of the population within the specified territorial environment.

The comparison method was used to assess various factors that affect the state of health of citizens in the region. Based on it, statistical indicators were studied and tables were compiled. In particular, the population density within the defined territorial unit was investigated and this indicator was compared in different years. In addition, mortality is compared, which is an important factor in the analysis of the nosoecological situation. The peculiarities of the reduction of maternal mortality were also revealed. The change in indicators, according to different environmental conditions, is compared.

The deduction method helped us determine the overall infant mortality rate. Based on this data, the authors were able to identify the factors responsible for the decline or

increase in infant mortality. This transition led from broad statistical data to a detailed analysis of specific categories of diseases common among children.

The generalization method was used to evaluate the results obtained during the research. It made it possible to describe the factors affecting the nosoecological situation in the Syrdarya region. Based on this, a personal assessment of the current indicators characteristic of this territorial environment was established.

### 3. Results

It is known that the Syrdarya region is the smallest administrative unit of Uzbekistan in terms of area and population. It was founded in 1963 and has an area of 4.28 thousand sq. m. km, or 0.95% of the territory of the republic. In this regard, it occupies the last place in the Republic of Uzbekistan. The population as of 2022 is 878.6 thousand people. This is 2.5% of the total population of Uzbekistan, 39.0% of the Mirzachul economic district. The province also ranks last in terms of population [8].

In the territorial division of labor, the Republic of Uzbekistan specializes primarily in agricultural products, including the cultivation of cotton, melons, grain and other products. The economy as a whole has the form of a territorial agro-industrial complex. In addition, the main purpose of the creation of this province was also the development of cotton growing on the basis of the development of new lands, namely Mirzachul. The development of this steppe began in the early 20th century by Tsarist Russia, and at the same time the Syrdarya region was formed, which occupied a huge territory. By the end of 2020, the Syrdarya region accounts for 2.1% of Uzbekistan's GDP, its share in industrial production is 2.2% [9]. Administratively, the Syrdarya region consists of 8 rural districts, 5 cities, 3 cities of district subordination and 2 cities of regional subordination, including the city of Shirin of republican subordination and 25 settlements. There are 69 rural assemblies of citizens, which unite a total of 257 rural settlements. As can be seen from the data in table 1, some rural areas existed even before the formation of the province. For example, the Syrdarya region was allocated in 1939, Gulistan – in 1952, Bayaut – in 1961. The last district was created in 1988 (Mirzaabad). The area of the region is small, and its districts, respectively, are small, on average 0.54 thousand square kilometers. For each rural district see correctly. The ratio between the largest district and the smallest district in the province (Mirzaabad and Gulistan districts) is 1.83 times [10, 11].

The Syrdarya region occupies a relatively favorable economic and geographical position. The region within

Republic of Uzbekistan borders in the West and Southwest with the Jizzakh region, in the East and Northeast with the Tashkent region. The geopolitical situation is also peculiar: the Syrdarya region is adjacent to the South Kazakhstan region of the Republic of Kazakhstan in the North, and to the Sughd region of the Republic of Tajikistan in the South. The highways crossed by the province also testify to the convenience of its geographical location, having a transit character [12].

The Syrdarya region is not as rich in minerals as its surface. Excluding the raw materials for the production of bricks, which are used only in building materials (Bayaut and others), almost no other riches have been found. Most of its territory is a plain, unlike the Jizzakh region, which creates good conditions for irrigation agriculture. However, the total land fund is considered relatively small not only economically, but also in the republic [13, 14].

The growing season in the region is long, reaching 210-228 days. The hot climate and the duration of the growing season are favorable for growing heat-loving crops. The main water resources include the Syrdarya River, which serves for irrigation of the district's lands. The largest gas-fired Syrdarya thermal power plant in the republic has been built in the city of Shirin region. The presence of specific natural, economic, and geographical factors in the Syrdarya region has led to the development of irrigation agriculture and on this basis some branches of the economy. Thus, the natural conditions of the region, in particular the weakness of the mineral resource potential, have an impact on its socio-economic development [15]. The ground structure of the region has both positive and somewhat negative values. Its height does not exceed 310-320 meters above sea level. Such a plain is favorable for housing construction, development of transport infrastructure and settlement of the population. The demographic potential of the region is small. However, the population density is much higher. This figure in 2022 averages 205 people [10], which is 257 more people than in Bayaut district; the above-average level is also observed in the Syrdarya region (Table 1).

**Table 1.** Districts and villages of Syrdarya region

No.	Districts	Year of foundation	Administrative center	Area, thousand sq. km	Population, thousand people (2022)	Density of population, 1 sq. m per person
1	Bayaut	05.04.1961	Bayaut	0.52	134.1	257.8
2	Gulistan	16.04.1952	Dehkanabad	0.35	76.0	217.1
3	Mirzaabad	02.09.1988	Navruz	0.64	77.1	120.4
4	Akaltyn	31.08.1971	Sardoba	0.55	54.0	98.1
5	Saykhuabad	07.12.1970	Saykhun	0.45	80.1	178.0
6	Sardoba	30.04.1964	Pakhtaabad	0.52	68.3	131.3
7	Syrdarya	10.02.1939	Syrdarya	0.55	132.3	240.5
8	Khavast	25.08.1966	Khavast	0.62	99.0	159.6
	By region	16.02.1963	Gulistan	4.28	878.6	205.2

Source: [17].

The population growth of the region is somewhat slower than in some areas of the republic. In the period from 2010 to 2022, it increased by an average of 13.6 thousand people. This means that the average annual increase is 1.20 percent. Nevertheless, the population of the Republic of Uzbekistan has increased by about 1.60 percent in recent years.

Most of the districts of the region were formed in the 1960s. The total fertility rate varies from 24.1 ppm in Mirzaabad district to 20.3 ppm in Syrdarya region. Even in 2021, such territorial differences were not so great: in Khavastsky district – 29.9%, in Okoltinsky – 17.4%. Mortality is quite low; in 2021 it will vary from 3.1 (in Sardoba) to 7.7 ppm (in Syrdarya region) within the districts, while in the province it will be 4.7 ppm. The highest rate was recorded in the city of Gulistan [11, 17]. Natural population growth has territorial peculiarities in terms of fertility. In a year, it is 17.1 ppm, if taken as a percentage – 1.71%. While the real population growth rate of the province is just over 1.0 percent. Consequently, such a demographic situation arose due to external migration of the population. It should be particularly noted here that the Syrdarya region is the only region in the Republic of Uzbekistan whose population was formed mainly under the influence of migration.

Professor A.S. Soliev [10] noted that in the 1960s, the implementation of the program of integrated development of the Mirzachul steppe began. It was for this purpose that a separate province was created, and the city of Yangier was built as the capital. Its construction began in 1956 according to the project of architect A. Zotov. However, he failed to achieve his intended goal, and this was caused by Khavast or Ursatev winds. As a result, the city of Gulistan (formerly Mirzachul) became the administrative center of the Syrdarya region.

For the development of Mirzachul, residents from other regions of the republic, mainly from densely populated areas, were resettled. Most peasants from Andijan and Ferghana regions moved here. At the later stages of the desert development process, migration from the Samarkand region also took place [11]. Along with natural and geographical factors, the specialization of the regional economy occupies an important place in the formation of the nosoecological situation of the region.

As you know, the mortality rate of the population is expressed by the level of socio-economic development of any country, the material conditions of the population, and the state of medical care. Mortality and its dynamics change in close connection with the health status of the population, the general birth rate, and the age composition of the population. In fact, in addition to the above demographic factors, the disproportion of population density and national composition is also the cause of fluctuations in mortality rates [12].

One of the greatest achievements achieved in recent years in the healthcare system of the Republic of Uzbekistan is the reduction of mortality. However, in some regions and districts of Uzbekistan, this process is still in a somewhat negative state. There are certain differences in this depending on the socio-economic development, demographic situation and ecological state of the regions.

Today, in the Syrdarya region, the mortality rate of the population in 2021 was 4.8 per 1000 people (Table 2).

Environmental degradation is also observed in Gulistan, Shirin and some other large cities and industrial centers of the region. Unfavorable living conditions of the population, insufficient supply of necessary food and clean drinking water also to some extent lead to an increase in mortality [11, 12].

**Table 2.** General mortality

	Cities and districts	For each 1000 people					Index of changes
		2005	2010	2015	2020	2021	
Cities							
1	Gulistan	6.2	5.0	5.7	5.5	6.3	1.01
2	Yangiyer	7.3	7.4	5.8	5.0	5.6	0.76
3	Shirin	5.4	5.1	5.2	4.1	6.1	1.12
Districts							
4	Akaltyn	3.6	3.4	4.0	4.6	4.3	4.3
5	Bayaut	4.4	4.6	4.3	4.3	4.3	0.97
6	Gulistan	5.2	5.3	5.0	5.0	4.7	0.90
7	Mirzaabad	4.5	3.7	4.4	4.2	4.1	0.91
8	Saykhunabad	4.7	4.0	4.5	4.2	4.6	0.97
9	Syrdarya	6.2	6.0	6.2	5.2	5.2	0.83
10	Sardoba	4.2	3.7	4.1	4.1	4.0	0.95
11	Khavast	5.0	4.4	4.6	4.3	4.4	0.88
	By region	5.1	4.8	5.0	4.6	4.8	0.94

Source: [12].

**Table 3.** Dynamics of maternal mortality

Regions	per 100,000 live births								Index of changes
	1992	1995	2000	2005	2010	2015	2020	2021	
Republic of Uzbekistan	51.0	32.2	33.1	29.2	21.0	18.9	18.5	14.4	0.27
Republic of Karakalpakstan	98.6	50.5	38.8	15.4	26.4	29.0	30.5	24.8	0.25
Andizhan	42.3	32.0	20.2	21.0	18.3	12.9	14.7	10.6	0.25
Bukhara	47.8	27.3	49.0	29.9	23.1	7.6	9.6	20.8	0.43
Jizzakh	69.2	30.0	29.4	24.8	27.0	25.1	13.1	12.1	0.17
Kashkadarya	51.1	28.3	39.9	24.4	14.1	15.3	10.0	11.3	0.22
Navoi	52.1	25.2	91.6	49.3	27.2	24.7	33.6	15.1	0.28
Namangan	32.4	18.9	27.0	30.7	21.7	8.1	5.4	5.0	0.15
Samarkand	35.8	38.4	26.4	17.4	16.0	21.4	9.9	4.5	0.12
Surkhandarya	67.3	39.8	24.6	23.9	13.7	18.6	36.2	23.5	0.34
Syrdarya	50.6	29.7	21.0	34.8	12.3	5.6	38.0	21.5	0.42
Tashkent	31.0	46.9	27.5	43.2	32.8	44.3	288	20.6	0.66
Fergana	38.6	11.7	22.5	31.7	17.0	12.6	23.7	17.1	0.44
Khorezm	44.3	25.4	24.9	41.5	30.6	15.2	11.9	18.8	0.42
Tashkent city	94.7	55.6	63.9	44.6	25.4	25.7	20.0	14.3	0.15

Source: [17].

The analysis shows that one of the significant achievements achieved by the Republic over the three decades from 1992 (51.0) to 2021 (14.4) is a slight reduction in maternal mortality. In the Syrdarya region under study, the indicators also fell from 50.6 to 21.5 people, the index was 0.27 (Table 3).

However, studies show that in the city of Gulistan (42), as well as in the districts of Saykhunabad (52), Khavast (44), the maternal mortality rate per 100,000 live births is

slightly higher than the national level. The analysis showed that the indicators of maternal and infant mortality, morbidity of certain groups of diseases (malignant tumors, cardiac, vascular, nervous, mental disorders, respiratory diseases), especially in the industrial centers of the region, were several times higher than in the republic [8]. This leads to an increase in mortality. For this reason, it is necessary to radically improve the urban-ecological situation in the above-mentioned cities,

and pay serious attention to the correct territorial organization of industrial enterprises, transport and other infrastructure systems.

Another important achievement achieved by the demographic situation of the Republic of Uzbekistan in recent years is a slight decrease in infant mortality. In almost all regions of Uzbekistan, there is a decrease in indicators from year to year (Table 4).

If only in 1995 in Tashkent [16], for every 1,000 live births, this indicator was 31.3 people, then in 2021 this

indicator decreased to 11.5. According to the results of 2021, infant mortality in the Republic of Uzbekistan decreased compared to the early period of independence (12.3), but in Tashkent, Andijan and Khorezm region it is significantly higher than the republican level.

In the Syrdarya region, where the study is being conducted, the indicators also fell from 23.1 to 12.6. This case is determined primarily by the state of medical care in the republic (Table 5).

**Table 4.** Infant mortality in Uzbekistan

Regions	per 100,000 live births							Index of changes
	1995	2000	2005	2010	2015	2020	2021	
Republic of Uzbekistan	26.0	18.9	14.9	11.0	11.4	9.3	12.3	0.47
Republic of Karakalpakstan	31.5	20.5	17.4	11.8	11.6	11.8	13.4	0.42
Andizhan	23.5	15.2	12.3	9.4	14.2	12.8	16.0	0.68
Bukhara	21.0	19.0	12.0	11.3	10.0	7.4	10.8	0.51
Jizzakh	25.1	16.2	12.3	8.8	9.9	8.6	11.6	0.46
Navoi	28.1	18.4	10.9	6.6	9.8	7.4	11.0	0.39
Namangan	26.8	18.8	15.1	12.5	12.2	10.6	12.0	0.44
Samarkand	24.2	16.0	12.7	9.4	10.1	6.5	11.3	0.46
Surkhandarya	29.5	20.7	11.6	7.8	9.9	8.6	13.1	0.44
Syrdarya	23.1	20.4	16.7	10.2	12.9	9.6	12.6	0.54
Tashkent	24.6	19.6	15.4	11.0	10.9	10.7	17.0	0.69
Fergana	27.3	19.3	19.3	14.1	9.1	6.6	7.2	0.26
Khorezm	25.9	24.6	16.3	12.0	14.2	12.6	19.4	0.74
Kashkadarya	24.0	19.0	13.8	10.1	8.6	7.8	12.5	0.52
Tashkent city	31.3	19.5	22.3	17.1	19.9	12.7	11.5	0.36

Source: [12].

**Table 5.** Infant mortality

	Cities and districts	per 1000 live births				
		2005	2010	2015	2020	2021
Cities						
1	Gulistan	10.6	12.0	16.9	8.7	12.1
2	Yangiyer	17.3	10.4	11.3	6.4	17.2
3	Shirin	8.4	5.1	11.0	12.7	13.0
Districts						
4	Akaltyn	11.3	15.6	5.9	19.9	10.8
5	Bayaut	12.3	12.0	11.4	16.7	11.9
6	Gulistan	14.5	11.0	15.3	15.9	11.2
7	Mirzaabad	13.4	10.0	16.3	13.2	8.6
8	Saykhunabad	11.5	10.8	11.1	4.7	6.9
9	Syrdarya	12.8	4.8	7.8	3.5	6.3
10	Sardoba	10.6	8.0	10.3	10.1	13.5
11	Khavast	11.5	8.6	10.6	11.9	14.1
	By region	19.0	14.9	17.2	14.0	11.4

Source: [12].

**Table 6.** The number of cases in the Syrdarya region in 2016-2020 (per each 10.000 people)

	Groups and types of diseases	2016	2017	2018	2019	2020
1	Total cases	6568.6	6419.0	6787.3	6807.5	6678.2
2	Some infectious and parasitic diseases	150.3	151.0	466.5	284.2	278.7
3	Total neoplasms	58.7	58.8	40.7	46.0	45.1
4	Endocrine glands, nutritional and metabolic	415.4	417.1	275.8	295.4	289.7
5	Including thyroid gland disease	216.1	217.1	127.2	102.3	100.3
6	Diseases diabetes mellitus, total	75.9	76.2	78.2	101.3	99.4
7	Diseases of the nervous system	267.5	268.6	263.0	260.4	21.5
8	Including: infantile cerebral paralysis	4.3	4.3	4.3	4.1	255.3
9	Alzheimer's disease	4.5	4.5	4.5	5.9	24.7
10	Diseases of the eye and its appendages	160.6	161.3	367.5	272.7	267.4
11	Including: glaucoma	8.5	8.6	42.6	10.0	9.8
12	Cataract	8.9	8.9	44.3	11.3	11.0
13	Diseases of the circulatory system	482.2	307.4	49.8	487.1	414.4
14	Including: diseases accompanied by high blood pressure	189.3	190.1	321.3	245.1	208.4
15	Acute myocardial infarction	1.4	1.3	4.6	3.2	5.5
16	Respiratory diseases	2095.4	2104.1	2060.3	2196.1	2153.9
17	Diseases of the digestive system	624.2	626.7	613.7	626.7	614.6
18	Including: gallstone disease	9.0	9.0	8.8	8.2	8.0
19	Diseases of the genitourinary system	577.5	579.9	568.7	582.7	571.4
20	Including: glomerular, tubulointerstitial kidney diseases, other diseases of the kidneys and urinary tract	125.1	448.9	439.6	293.6	287.9
21	Pregnancy, childbirth and the postpartum period	55.0	55.3	54.1	56.0	54.9
22	Diseases of the musculoskeletal system and connective tissue	166.6	167.3	163.8	172.5	169.1
23	Including: rheumatoid arthritis	13.5	13.5	13.3	15.1	14.8
24	Gout	3.9	3.9	3.8	4.7	4.6
25	Connective tissue system	3.5	3.5	3.4	3.9	3.8
26	Congenital anomalies	17.6	17.6	17.3	16.8	16.5
27	Complications related to injuries, poisoning and some external causes	172.1	172.8	163.1	333.4	327.0

Source: [17].

The analysis of infant mortality in the Syrdarya region shows a slight decrease in the indicators associated with these cases (Table 6).

The indicators are slightly higher in Khavast districts, Yangiyer and Shirin cities of the Syrdarya region. It is known that congenital anomalies (malformations), deformities, chromosomal changes and the occurrence of disability occupy an important place in the growth of infant mortality. When studying the components of infant mortality, special attention is paid to perinatal, neonatal and post-neonatal mortality. These periods differ from each other and cover a certain period of time [8].

Comparing this region with others that have undergone similar economic changes and share a comparable

environmental context is a viable option. This comparative analysis could involve examining regions with analogous mortality rates and comparable environmental influences on public health. Such a comparison can aid in recognizing both commonalities and disparities in the strategies employed to address these issues.

In terms of policy conclusions and recommendations, we can note the need to pay more attention to the environmental situation in regional development programs and strategies, in particular, taking into account the specifics of each region. Attention should also be focused on improving the quality of medical care and preventive measures in areas with high mortality rates. It

is important to consider opportunities to reduce the impact of harmful factors on public health and to introduce appropriate environmental standards and regulations. Regular monitoring and assessment of the situation in the region, as well as additional research, are necessary to ensure effective measures to improve the environmental and health situation. It is important to take into account the demographic characteristics of the region when developing strategies and programs to reduce mortality and improve public health.

#### 4. Discussion

During the study, the main attention was paid to certain diseases occurring among the population. The analysis shows that the overall incidence of the population in the province has decreased slightly over the past five years (6,678.2 versus 6,568.6 per 10,000 inhabitants). However, there were cases of a significant increase in certain groups of diseases in which they were included [14]. These include, for example, some infectious and parasitic diseases, diseases of the eyes and their appendages (glaucoma, cataracts), respiratory diseases, diseases of the musculoskeletal system and connective tissue, complications associated with injuries, poisoning and some external causes (Table 2). Here it should be noted that in the world, as well as in the Republic of Uzbekistan, most of the morbidity of the population is due to diseases of the circulatory system. Although the incidence of this group of diseases in the province has decreased significantly in recent years, some types of diseases included in its composition have been slightly increased [16].

Any issue of territorial analysis of the nosoecological situation in a specific region is not common in scientific doctrine. This is explained by its punctuality, which narrows the circle of the target audience for which such a study will be characterized by practical significance. The scientific community holds somewhat differing positions on this matter, emphasizing the need for an in-depth examination of each perspective. K. L. Ebi et al. [17], as exemplified in study, have delved into the categorization of diseases associated with natural environments, taking into account the specific nosoecological conditions of a hypothetical region, let's call it the "Syrdarya region" for illustration purposes. Research is centered around assessing how the external environment impacts public health and broader societal indicators in this particular region.

They argue that when analyzing the nosoecological situation in the Syrdarya region, it is crucial to investigate various key parameters. These parameters encompass factors such as the concentration of harmful chemical elements in the atmosphere, the levels of macro and microelements found in soil and vegetation, the chemical composition of drinking water, the accessibility of

medical services for residents, and the factors that influence the duration and conditions of people's habitation in this region. These indicators collectively contribute to a comprehensive evaluation of the nosoecological conditions specific to the Syrdarya region. To conduct a more precise and targeted analysis, it is advisable to select one of these parameters and conduct a more extensive investigation. By doing so, it becomes possible to exert a more effective influence on the nosoecological conditions in the Syrdarya region.

Unlike the previous researchers, L. Moorman et al. [18] believe that the analysis of the nosoecological situation in a specific territory should be based on the knowledge and approaches of medical geography. They claim that the territorial environment, as well as its system elements, must be studied in connection with the characteristics of the health of the society that lives in it. Thus, the position of the researchers is based on the fact that each natural system consists of a number of medical and geographic indicators. The latter is determined by specific properties, such as climate, topography, natural waters, and soils. All the listed biotic components of the landscape clearly affect people's health. The above opinion is reasonable, however, it is advisable to further classify these elements into 3 categories, in particular, pathogenic (causing diseases); ethological (related to geophysical, geochemical factors); sanogenic (on the basis of sanatorium-resort and recreational resources) [19, 20]. Environmental and hygienic ones should be singled out separately, which have recently become particularly relevant. These properties are determined by a complex of physical-geographic, geochemical and biotic indicators, which express the level of efficiency of self-cleaning of the regional environment under the negative influence of external factors.

Significant emphasis should be placed on the scientific contributions of G. L. Wong et al. [21]. Their research encompasses both theoretical and practical dimensions concerning the analysis of the nosoecological situation within a specific region. According to their perspective, the objective of such research is to establish and illustrate the correlation between regional variations and factors influencing community health development. In this context, the territorial community of residents serves as the focal point for evaluating the medical and geographical characteristics of the environment. Consequently, their study involves an examination of a range of metrics associated with the overall health and well-being of the region's population. These metrics encompass various aspects, including the total number of medical service requests, mortality rates, life expectancy, and the ratio between healthy individuals and those with chronic illnesses [22].

The disclosed position echoes the results obtained in the recent research. Because the latter also believes that in order to assess the state of health of the community, it is necessary to deeply study the conditions and dynamics of



the spread of diseases, as well as the level of morbidity of people. At the same time, distribution, as an indicator, is an important element, as it allows detecting the distribution of a specific nosological form in the environment [23].

On the contrasting end of the spectrum, as suggested by M. Wang et al. [24], conducting a comprehensive analysis of the health status of the population and an overarching assessment of the nosoecological conditions within their residential areas, let's continue to use the "Syrdarya region" for illustration, requires a systematic consideration of various influencing factors. They posit that it is imperative to carry out a holistic assessment at both the regional level and within smaller territorial subdivisions within the Syrdarya region. The primary emphasis should be on the thorough examination and characterization of the health status of the population, with distinctions made between children, youth, and adults. Employing mathematical and statistical methods becomes pivotal in determining the degree of interdependence among various components, including influencing factors and societal functions.

This approach is geared towards revealing the nature and extent of the influence exerted by contemporary conditions in which regional development and population growth unfold. Thus, it is pertinent to demonstrate that a set of mathematical techniques should be employed to scrutinize the statistical relationships between environmental characteristics and the health status of citizens within the Syrdarya region. This may involve a specific focus on assessing the systemic impact of environmental indicators through mathematical modeling, thereby shifting the approach to a more abstract and logical perspective.

A similar position is held by R. E. Roth [25] and M. N. Kamel Boulos and E. M. Geraghty [26]. They claim that the results obtained during the assessment of the noso-ecological situation in the specified territory make it possible to establish not only the current conditions of existence of citizens, but also to take into account the state of their health in case of expected changes in the environment. In addition, their goal is the development and implementation of mapping of medical and geographic phenomena. This will make it possible to logically combine the features of the landscape base of the region with mathematical and statistical indicators of the state of health of its population. It is important to be able to analyze the spread of diseases in the future due to external factors specific to a specific area. The ideas of these researchers seem promising for further development. This is expressed in the possibility of their creation of a set of medical-geographical maps, developed taking into account geographical factors. As a result, it will be possible to reveal the dynamics of development and distribution of nosoforms, both among individual territories and entire regions.

The discussion shows that the analysis of the

nosoeological situation in the region allows the reveal of the system of indicators affecting the development of society. One of these is the state of poverty of the population. Undoubtedly, the revealed ideas diverge, but their essence is common, which consists in the possibility of conducting a qualitative study of factors that affect the state of the environment and the life of citizens in different territories.

Possible limitations of the study may include data Limitations. The quality and availability of data on population health, environmental factors, and economic indicators can vary between regions. The study's conclusions heavily rely on the accuracy and comprehensiveness of available data, which could be limited or subject to bias. The study appears to rely on data up to the year 2022. Economic, environmental, and health conditions can change over time, and the study may not capture recent developments or trends beyond that year.

By concentrating solely on the Syrdarya region, the study might not consider the broader national policies and strategies that could impact regional health and environmental outcomes. The study highlights certain diseases and their incidence but may not provide a comprehensive overview of all health issues affecting the population, potentially missing other important health concerns.

Future research could involve a more extensive and diverse set of regions for comparative analysis, a deeper exploration of the reasons behind migration patterns, updated data, and a broader examination of health issues and their causes. Additionally, it is beneficial to assess the socio-economic and political context to understand how these factors interact with environmental and health outcomes.

## 5. Conclusions

Summing up, it can be said that the morbidity of the population and the increase in the number of certain types of diseases among them are directly related, firstly, to the influence of the natural, as well as the economic and social environment. Today, in most cases, the morbidity rates of the population are higher, which is due to a healthy lifestyle, hereditary factors, the socio-economic status of the regions, the quality of medical care, as well as the attitude towards a person in the family and society, synchronized with the professional factor. It is worth noting that in the economy of the Syrdarya region, mortality rates from malignant tumors, blood and hematopoietic organs are slightly higher due to the activities of certain industries, including thermal power plants. If in the Republic of Uzbekistan in 1991 there were 53.0 deaths associated with malignant tumors for every 100 thousand inhabitants, then in the province this figure shows 63.7. Although the figures have slightly

decreased in 2021, the number of such deaths is still close to the level of the country. Thermal power plants can be a source of emissions of various harmful substances, including toxic compounds and heavy metals. These substances can be released into the atmosphere and enter residential areas, affecting air quality. Exposure to such pollution can increase the risk of developing cancer and blood diseases. The direct interaction of pollutants with the body's cells can trigger some mechanisms that contribute to the growth of malignant tumors and changes in hematopoietic organs. If a thermal power plant is located in close proximity to populated areas, its impact on the health of residents can be much more significant.

The existing nosoecological situation in the Syrdarya region is also directly related to the natural and economic situation, the geo-ecological situation of the territory, the winds blowing in certain areas (especially in the Bayaut, Khavast, districts and Yangiyer), industrial enterprises located in some administrative-territorial units, and their influence. While the Tashkent region surrounding the Syrdarya region is the leader in the republic mainly in the incidence of civilization, the neighboring Jizzakh region is distinguished by the geo-ecological position of individual districts. In this research paper, the nosogeographic situation in the Syrdarya region is analyzed. The region differs from the neighboring Jizzakh and Tashkent regions, as well as from other administrative-territorial systems of the republic in socio-economic, demographic, environmental and other aspects. In the medical and demographic study of the region, taking into account the impact of the socio-ecological situation on the health of the population, it is advisable to take into account the problems in the health system. In particular, the region should pay special attention to weight loss of diseases associated with respiratory, cardiac, cardiovascular, visual, and musculoskeletal systems.

## Ethical Approval

Not applicable.

## Conflicts of Interest

The authors have no conflicts of interest to disclose.

## Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

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Not applicable

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## REFERENCES

- [1] Decree of the President of the Republic of Uzbekistan No. PF-60 "On the new development strategy of Uzbekistan for 2022-2026", 2022, Online available from <http://lex.uz/docs/5841063>.
- [2] B. B. Prokhorov. Applied anthropoecology, MNPU Publishing House, Moscow, 1998.
- [3] D. H. Meadows. Thinking in Systems: A Primer, Chelsea Green Publishing Company, White River Junction, 2008.
- [4] E. Shaal, M. Taschereau-Dumouchel. Optimal Redistributive Policy in a Labor Market with Search and Private Information. CREI, Online available from [https://crei.cat/wp-content/uploads/2016/09/optimal\\_labor\\_market\\_policy-1.pdf](https://crei.cat/wp-content/uploads/2016/09/optimal_labor_market_policy-1.pdf).
- [5] E. A. A., Keller, D. E. DeVecchio, Natural Hazards. Earth's Processes as Hazards, Disasters, and Catastrophes, Routledge, London, 2019.
- [6] S. Malkhazova, D. Orlov, N. Shartova, S. Starikov, T. Puzanova, Mud Springs (Peloids). In: Healing Springs of Russia (pp. 71-80), Springer, Cham, 2022.
- [7] I. R. Turdymambetov, N. Zh. Embergenov, G. T. Nauryzbayev. Scientific-theoretical foundations of medical geography and the concept of nosoecology, Notice of the Geographical Society of Uzbekistan, Vol.50, pp. 111-115, 2017.
- [8] N. K. Komilova. Development of Specialized Maps Based on the Analysis of the Medical Geographical Situation of Uzbekistan (on the Example of Jizzakh and Syrdarya Regions), Biomedical Journal of Scientific & Technical Research, Vol.43, No. 1, 34140-34143, 2022. DOI: 10.26717/BJSTR.2022.43.006832
- [9] Statistics Department of the Syrdarya region, Online available from <https://www.goldenpages.uz/company/?Id=102415>.
- [10] A. Soliev. Economic and social geography of Uzbekistan, Universitet, Tashkent, 2014.
- [11] Ruziev, K. Abirkulov. Economic Geography of Uzbekistan, Sharq, Tashkent, 2001.
- [12] E. Erdanaev, M. Kappas, A. Pulatov, M. Klinge. Short Review of Climate and Land Use Change Impact on Land Degradation in Tashkent Province, International Journal of Geoinformatics, Vol.11, No.4, pp. 39-48, 2015.
- [13] State Statistics Committee of the Republic of Uzbekistan, Online available from <https://stat.uz/ru/>.
- [14] National Encyclopedia of Uzbekistan, State National Publishing House, Tashkent, 2005, Online available from <https://web.archive.org/web/20130505031656/http://www.ensiklopediya.uz/>.
- [15] N. K. Komilova, N. N. Ermatova, T. L. K. Rakhimova, Karshibaeva, M. O. Hamroyev. Urboekological situation and regional analysis of population health in Uzbekistan, International Journal of Agricultural Extension, Vol. 9, No.

- 4, pp. 65-69, 2021. DOI: 10.33687/ijae.009.00.3722
- [16] A. Wismadi, M. Brussel. M. Zuidgeest, M. van Maarseveen. Equitable distribution of growth for utilitarian and non-utilitarian infrastructure planning, *Infrastructure Complexity*, Vol.2, 8, 2015. DOI: 10.1186/s40551-015-0011-x.
- [17] K. L. Ebi, J. Vanos, J. W. Baldwin, J. E. Bell, D. M. Hondula, N. A. Errett, P. Berry. Extreme weather and climate change: population health and health system implications, *Annual Review of Public Health*, Vol. 42, pp. 293-315, 2021. DOI: 10.1146/annurev-publhealth-012420-105026.
- [18] L. Moorman, J. Evanovitch, T. Muliaina. Envisioning indigenized geography: a two-eyed seeing approach, *Journal of Geography in Higher Education*, Vol.45, No.3, pp. 1-20, 2021. DOI: 10.1080/03098265.2021.1872060
- [19] Fedoniuk, L., Hlyvka, N., & Stravskyy, Ya., Organizational and methodological principles of teaching the elective discipline “Modern Aspects of Medical Parasitology” for students of the Educational and Research Institute of Nursing. *Bulletin of Medical and Biological Research*, Vol. 5, No. 3, pp. 25-32, 2023. <https://doi.org/10.61751/bmbr.2706-6290.2023.3.25>
- [20] Orel, M., & Martynyuk, L., Endothelial dysfunction correction in patients with hypertension, dyslipidaemia, and decreased thyroid function. *International Journal of Medicine and Medical Research*, Vol. 9, No. 1, pp. 24-31, 2023. <https://doi.org/10.61751/ijmmr.2413-6077.2023.1.24>
- [21] G. L. H. Wong, V. W. S. Wong, B. W. Y. Yuen, Y. K. Tse, H. W. S. Luk, T. C. F. Yip, H. L. Y. Chan. An aging population of chronic hepatitis B with increasing comorbidities: a territory-wide study from 2000 to 2017, *Hepatology*, Vol.71, No.2, pp. 444-455, 2020. DOI: 10.1002/hep.30833.
- [22] Melnychenko, I., & Andreychyn, S., Biological therapy of severe bronchial asthma. *Bulletin of Medical and Biological Research*, Vol. 5, No. 2, pp. 86-92, 2023. <https://doi.org/10.61751/bmbr.2706-6290.2023.2.86>
- [23] Salyha, N., Regulation of oxidative stress and lipid peroxidation induced by epinephrine: The corrective role of L-Glutamic acid. *International Journal of Medicine and Medical Research*, Vol. 9, No. 1, pp. 32-38, 2023. <https://doi.org/10.61751/ijmmr.2413-6077.2023.1.32>
- [24] M. Wang, P. Liu, R. Zhang, Z. Li, X. Li. A scientometric analysis of global health research, *International Journal of Environmental Research and Public Health*, Vol.17, No.8, 2963, 2020. DOI: 10.3390/ijerph17082963
- [25] R. E. Roth. Cartographic design as visual storytelling: synthesis and review of map-based narratives, genres, and tropes, *The Cartographic Journal*, Vol.58, No.1, pp. 83-114, 2021. DOI: 10.1080/00087041.2019.1633103
- [26] M. N. Kamel Boulos, E. M. Geraghty. Geographical tracking and mapping of coronavirus disease COVID-19/severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic and associated events around the world: how 21st century GIS technologies are supporting the global fight against outbreaks and epidemics, *International Journal of Health Geographics*, Vol.19, No.1, pp. 1-12, 2020. DOI: 10.1186/s12942-020-00202-8