

Territorial disparities of the Human Development Index in the North Development Region of the Republic of Moldova

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ABSTRACT: Human development is a component part of the development of socio-economic, natural-geographical systems. Currently, the need for comparative studies of human development appears increasingly imperative, in an attempt to track the level reached by states, regions or urban and rural human habitats within them, with the goal of evaluating the effectiveness of development policies applied by governments or regional and local administrations, beyond certain indicators or statistical series that attest to certain aspects of human development. Through this study, we proposed the calculation of the HDI at the level of human habitats of the North Development Region of the Republic of Moldova, with the disaggregated indicators taken into account, compared to the indicators taken into account by the United Nations Development Program (UNDP) in the calculation of the Human Development Index (HDI) of the states. This fact would allow a more accurate analysis of human development at the locality level. The purpose of this study is to estimate and determine the spatial differences of the HDI in the localities of the North Development Region (NDR) in the context of the implementation of the Regional Development Strategy of the Republic of Moldova and the intention of European integration of the country. The main results of the study consist in the creation of a valuable cartographic set with reference to the four dimensions of human development, as well as the map of the aggregate index of human development related to the human habitats of the region, a typology that can serve as a benchmark in the argumentation of territorial, administrative and financial decentralization which is to be implemented. The main methods used in the study: comparative, statistical, direct standardization, mathematical, the GIS system. The HDI study of the North Development Region includes 315 urban and rural localities within the region, through four dimensions that attest the level of human development and 12 indicators (values), these being related to the habitats of primary rank: communes and villages.

KEYWORDS: Human Development Index, Territorial disparities, Socio-territorial behavior, Standard of living, Republic of Moldova.

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1. INTRODUCTION

The research started from the idea that development is disproportionate and territorially discontinuous, and the expansion of the larger number of social, socio-demographic, economic and infrastructure indicators at the level of the primary administrative-territorial units of the region will reflect the state and situation of human habitats with a greater precision. The implementation of the policy in the field of regional development is relatively new for the Republic of Moldova, which is in the process of development and connection to the requirements of the regional development policy of the European Union. Within the mechanisms and tools of the Regional Development Strategy of the Republic of Moldova, for the years 2016-2020 and 2022-2028, it is provided that in the regional development planning process, the main economic and social problems will be explicitly identified and analysed, which

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hinder development in the regions and will prioritize the necessary measures to solve them (Law No. 239 of 13.10.2016, National Regional Development Strategy of the Republic of Moldova 2022–2028). In this sense, the assessment of the level of human development for each locality can be used as a tool to guide the interventions of the authorities, eliminate discrepancies in development and ensure decent living conditions throughout the country.

Starting from the basic purpose of the study, we proposed several objectives:

- to identify of the territorial disparities of the Human Development Index (HDI) at the level of the primary administrative-territorial units of the Northern Development Region;
- to identify the problems that prevent the development of human habitats based on the analysis of the set of indicators on the demographic, sanitary, economic and infrastructure dimensions, as well as the existing opportunities for the relaunch of the localities of the region;
- to elaborate a typology of HDI that could be used as a tool for local public authorities, in the context of attracting resources for development.

It was aimed to take into account several indexes/indicators that attest to human development in order to be able to follow the differentiation of human habitats in terms of the living standards they have reached on the socio-demographic, social, economic dimensions, as an expression of quality governance of human communities, as well as highlighting problems and trends in their evolution.

North Development Region occupies the north side of the Republic of Moldova. It is the second

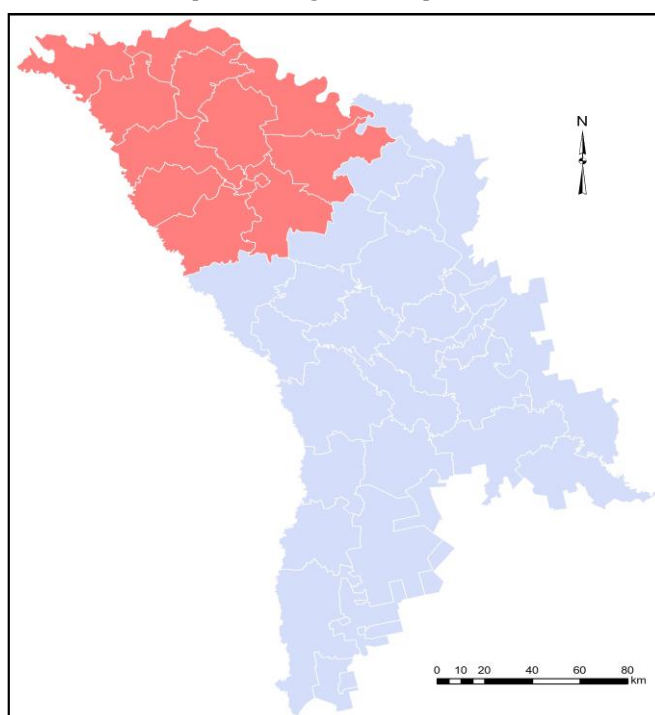


Figure 1. The North Development Region of the Republic of Moldova.

regarding in area and number of population among the six development regions (currently only 4 are functional) (Figure 1, Table 1).

The region includes 572 localities, of which: 244 villages, 295 communes, 17 cities and 3 municipalities. The number of localities in the region constitutes 34.0% of the total number of localities in the country, and the population of the region constitutes 27.6% of the total population of the Republic of Moldova (01.01.2023). The North Development Region was created in 2010, with the aim of contributing to the balanced socio-economic development in its 11 component districts and the municipality of Bălți. The activity of North Development Region was organized on the basis of Law No. 438 regarding regional development, GD no. 127 of 08.02.2008 and the Activity Regulation (Law No. 438 of 28.12.2006).

Table 1. Comparative characteristics of the Development Regions of the Republic of Moldova (01.01.2023).

Development Regions	The number of the population with usual residence (thousands of inhabitants) ¹	The share of population from total (%)	Population ratio vs. most populated region D.R. (R.D. Centre=100)	Surface (km ²)	Surface from the total (%)
1. North Development Region	718.7	27.6	98.2	10,014	33.4
2. Centre Development Region	731.4	28.1	100	10,636	35.5
3. South Development Region	354.4	13.6	48.4	7,379	24.6

¹ Calculated for the population with habitual residence on 01.01.2022, without the administrative-territorial unit on the left of the Dniester.

4. Chisinau municipality ²	677.5	26.0	92.2	123	0.4
5. Gagauzia Administrative-Territorial Unit	121.7	4.7	16.6	1,848	6.1
Total	2,603.7	100	-	30,000	

Source: National Bureau of Statistics (NBS, 2023a).

In the geographical area of the North Development Region there is a dense network of human settlements and a relatively high population density (97.3 inhabitants per km²). At the same time, North Development Region is characterized by the highest degree of fragmentation of localities at the level of the republic and the large number of small and very small localities (Hachi et al., 2021).

2. METHODS AND DATA

Human development is a complex phenomenon that includes various aspects of society's life. It started from the premise that the purpose of the existence of any society is development, and any evolutionary movement of a natural-geographic, social-economic, technological system falls within the term of development. From a socio-human aspect, development can be defined as a process of continuous improvement of the quality of life and living conditions of the population. In the given study, we included human development at the level of the primary territorial entities within the North Development Region, starting from the idea of evaluating development through the prism of quantitative and qualitative synthetic indicators related to territorial human communities. Starting from 1990, under the auspices of the United Nations Development Program (UNDP), a set of synthetic indicators was developed, which allow measuring the progress made by each country in areas related to human development. The main synthetic indicator, which expresses in a numerical form the level of human development, is the Human Development Index (HDI), which reflects this social phenomenon through the prism of three defining dimensions: a long and healthy life, the level of education and a decent standard of living life in terms of income.

In the last UNDP report published in the year 2021/2022, the HDI level of the Republic of Moldova was 0.767, occupying the 80th place out of 191 states of the world that were mentioned in the report (Hachi, Bunduc, Lozovanu & Răilean, 2020). Over time, the HDI value of the Republic of Moldova has fluctuated quite a lot. Despite the increase in the HDI level, the Republic of Moldova remains among the states with the lowest level of this index in the region. The transition period proceeded slowly, compared to other states in Central and South-Eastern Europe, with most states becoming members of the European Union (Hachi et al., 2021).

Increasing the number of indicators/values with reference to human development attributed to primary level territorial entities for the North Development Region of the Republic of Moldova, allows a better dimensioning of this indicator and reflects the situation of human development more precisely, the territorial discrepancies being quite accentuated, an expression of a legacies of the super-centralized system from the Soviet period (United Nations Development Programme, 2022).

The choice of indicators attesting to human development at the level of localities took into account their social, economic and scientific relevance, as well as the possibilities of current official statistics that provided us with the data requested at the level of primary administrative-territorial units (municipalities or even villages in the composition of the communes).

The methodological basis for the research of the health component with regional applicability on the North Development Region of the Republic of Moldova was carried out taking into account similar studies at the international and national level, but the results can only be achieved with a truthful and detailed basis at the regional level that allows the assessment of the state in fact, of the dynamics and distribution in territorial profile.

The direct standardization method is used when the age-specific morbidity rates in the populations compared to the standard population are known. These rates are applied to the standard population to calculate the expected number of illnesses in each age group if the age composition is the same as in the standard population. Based on this expected number of illnesses in the standard population, the morbidity index by age group is calculated.

$$\bar{x} = \frac{\sum_{i=1}^k x_i n_i}{n_j}$$

k = number of groups (intervals);

x_i = individual values of the characteristic;

² The municipality of Chisinau is to be implemented as a development region.

n_j = number of observed statistical units;

n_j = volume of component series j .

Calculation of the morbidity rate from malignant tumors:

$$\bar{x} = \frac{\sum_{i=1}^k x_i n_i}{n_j} = \frac{1959321}{100000} \approx 20 \text{ cases}$$

$$\text{Morbidity rate} = \frac{\text{No. cases}}{\text{No. pop. com.}^*} n_j = 294.9/100,000 \text{ loc.}$$

Based on the transformation of morbidity risk rates by (malignant tumors and active tuberculosis) and the level of accessibility of the population to emergency medical services into standardization coefficients, the Health Index in territorial profile was calculated.

Following the analysis of specialized literature in the field of assessing the economic component of the HDI and based on the availability of data, 3 basic pillars were established, which will characterize the economic activity in the North Development Region:

- Pillar 1. The economic situation of the population includes: 1) Salary income by region; 2) Remuneration of work on economic activities. The primary data for this pillar were collected from the National Bureau of Statistics (NBS) by districts;
- Pillar 2. The economic situation of the private sector includes: 1) The number of economic units by type of activity and size; 2) Revenues from sales of economic units by activities. Primary data for this pillar were also collected from the NBS by districts (National Bureau of Statistics [NBS], 2023d);
- Pillar 3. The economic situation of local public authorities refers to: 1) The ratio of own revenues to total expenses; 2) The ratio of own income in total income. The primary data for this pillar are collected from the Ministry of Finance by commune (North Regional Development Agency, 2010)

In order to compare the HDI aggregate indicator at the level of primary administrative-territorial units, the method of ranks was used, as in the analysis of the geodemographic situation. The intervals in which each locality is to be reached will be calculated according to the formula:

$$X = X_{\min} / (X_{\max} - X_{\min})$$

The following methods were used: statistics, mathematics, cartography, comparison, the GIS system. A large volume of information collected from specialized institutions in the country was systematized, such as: the National Bureau of Statistics, the Public Services Agency, the Regional Development Agencies, etc. Data from the 2004 and 2014 Population and Housing Censuses were also used.

3. RESULTS AND DISCUSSIONS

Development can be attributed to any evolutionary movement of a system. In socio-human aspect development can be defined as "a process of improving the quality of life of a group of people" (Vaculovschi, 2022). Social development is viewed from the perspective of orientation towards "achieving a desirable state, set as an objective to be achieved through a process planned over time, through a set of combined actions" (Zamfir & Stoica, 2006). Increasing the quality of life as the purpose of the existence of a social system is conceptually identified as human development. Human development is a broad concept that knows a permanent evolution. In the specialized literature, human development is analyzed from the perspective of capitalizing on human potential through the key dimensions of human development, addressed through the international instruments for measuring the quality of human capital, such as Human Capital Index, Human Development Index; Global Competitiveness Index, Quality of Life Index, etc. (Zamfir & Stoica, 2006; Hrușcirov, 2016; Buciuceanu-Vrabie, 2019; Gutium, 2021; Vaculovschi, 2022).

In the study carried out, we examined several dimensions of human development that are both directly and indirectly included in the concept of human development, these being related to the primary communities within the Northern Development Region of the Republic of Moldova. A first measurable aspect of human development is the socio-demographic dimension. Indices and indicators were taken into account, such as: the number of the population, population dynamics, demographic aging and the demographic dependency rate, each having a special significance within the socio-demographic component (Hachi & Cujbă, 2018).

Population size has both economic and social significance. As a rule, large and very large localities are less vulnerable to the socio-economic transformations that the Republic of Moldova has gone through. Large localities are characterized by greater vitality, also having a higher degree of stabilization. They are more attractive for investments, due to the presence of a greater number of jobs, as well as from the

perspective of greater opportunities for investments in social, economic, technical-building infrastructure, etc.

Within North Development Region we distinguish 6 categories of localities according to the number of inhabitants:

1. 7,001+ inhabitants – very large – 2 municipalities and 14 cities (5.1%);
2. 4,001-7,000 inhabitants – large – 21 municipalities and towns (6.6%);
3. 3,001-4,000 inhabitants – large averages – 42 communes and towns (13.3%);
4. 1,501-3,000 inhabitants – small averages – 142 localities (45.1%);
5. 1,001-1,500 – small – 61 localities (19.4%);
6. 453-1,000 – very small - 33 localities (10.5%) (NBS, 2023d).

Medium-sized, small and very small localities predominate - 75% of the total number of localities, these being the most vulnerable from the perspective of human development. The demographic situation is worsening in the context of the natural and mechanical decline that is currently taking place.

Another indicator taken into account referred to population dynamics. Even if the dynamic calculations were made over a longer period ((1989/1959 and 2014/1989, 1989/2004, 2004/2014), the dynamics of the last 10 years (2012-2021) were taken into account in the aggregate HDI.

The data obtained, as a result of the processing of the information regarding the entries and exits of the population, allowed us to identify the degree of stability or vulnerability of the population of the urban and rural localities of the region, as well as to create a typology of the demographic dynamics for the analyzed time interval.

Thus, out of the total number of localities, only 23 human habitats (two cities, district centers and one small town and 20 rural habitats) register an increase in the numerical population, which constitutes 7.3% of their total number. The region continued the human decline throughout the period of state independence, and in the analysed period 92.7% of the localities recorded a numerical setback (Figure 2).

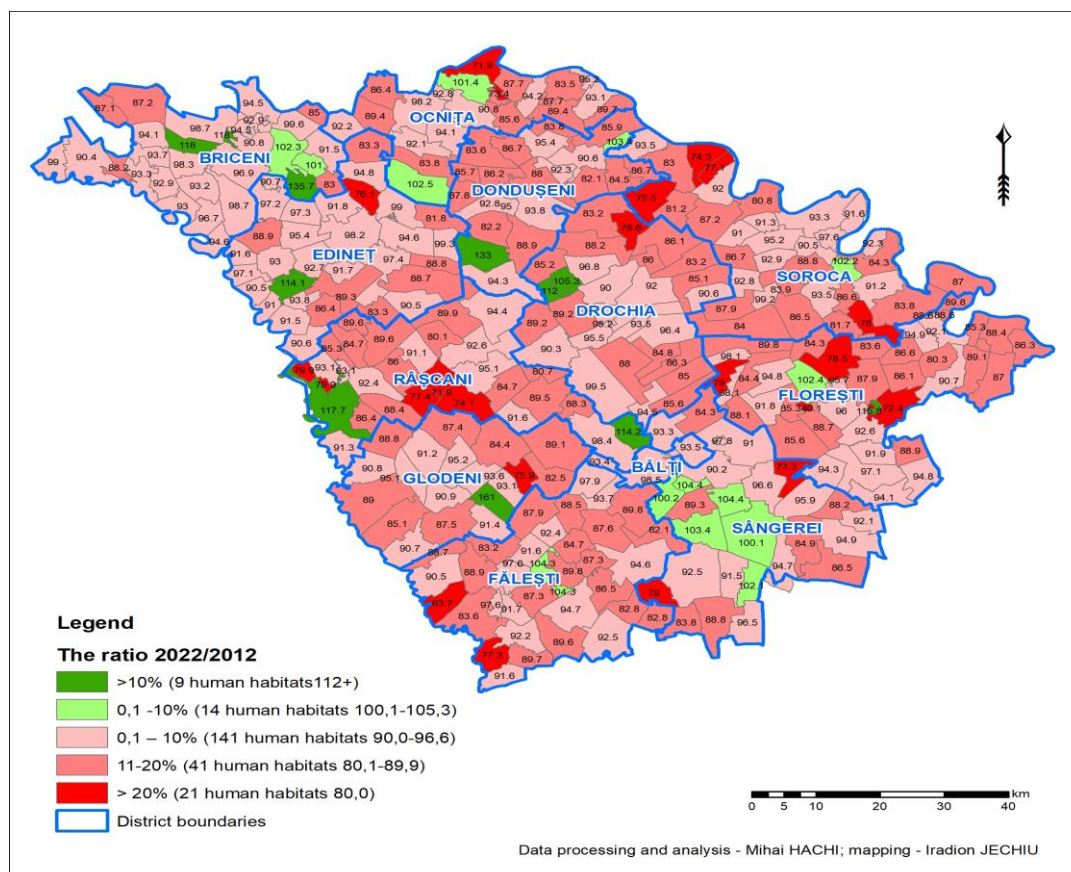


Figure 2. Dynamics of the population of the North Development Region of the Republic Moldova in the period 2012-2021 (%).

Source: based on data from the National Bureau of Statistics (NBS, 2023a).

Thus, the decline per locality was recorded at the following rates:

- 141 human habitats (47.8%) had an insignificant decrease, varying between 0.1 – 10%;

- 41 human habitats (13%) had a decline that oscillated between 10 and 20% of the numerical population;

- and 21 human habitats had a decline greater than 20%, which is very much and in most cases it is irreversible decline that can lead to the disappearance of human habitats in a future perspective.

The demographic situation at the level of human habitats in the North Development Region is more deplorable compared to other developing regions. The greatest degree of stability of the population from the point of view of its dynamics is the large and medium-sized localities, favorably positioned in relation to the city of Bălți or important regional centers such as: Sângerei, Edineț, Soroca, the vicinity of cities in Romania and Ukraine.

The third indicator taken into account was the degree of population aging has a double meaning. On the one hand, a high share of the aging population and a high life expectancy at birth can be interpreted as an expression of a high standard of living of the population, and on the other hand, a high share of the elderly population in the total population denotes increasing the economic burden and their maintenance expenses (NBS, 2022a; NBS, 2022b; NBS, 2023b).

The population aging indicator attests to the following trends and characteristics. All localities in the North Development Region have entered the phase of demographic aging, 100% exceeding the 12‰ level - considered the limit of demographic aging (Beaujeu-Garnier). The demographic transition towards narrow and simple reproductive behavior begins in the north of the republic, followed by other regions of the country. The administrative-territorial units with the oldest effective population are the districts of Edineț - 23% and Donduseni - 25.2%, and with the youngest population: the municipality of Bălți - 18.4% and the Administrative Territorial Unit (ATU), Sângerei - 17.8%, at an average demographic aging for the North Development Region of 22.9% (Figure 3).

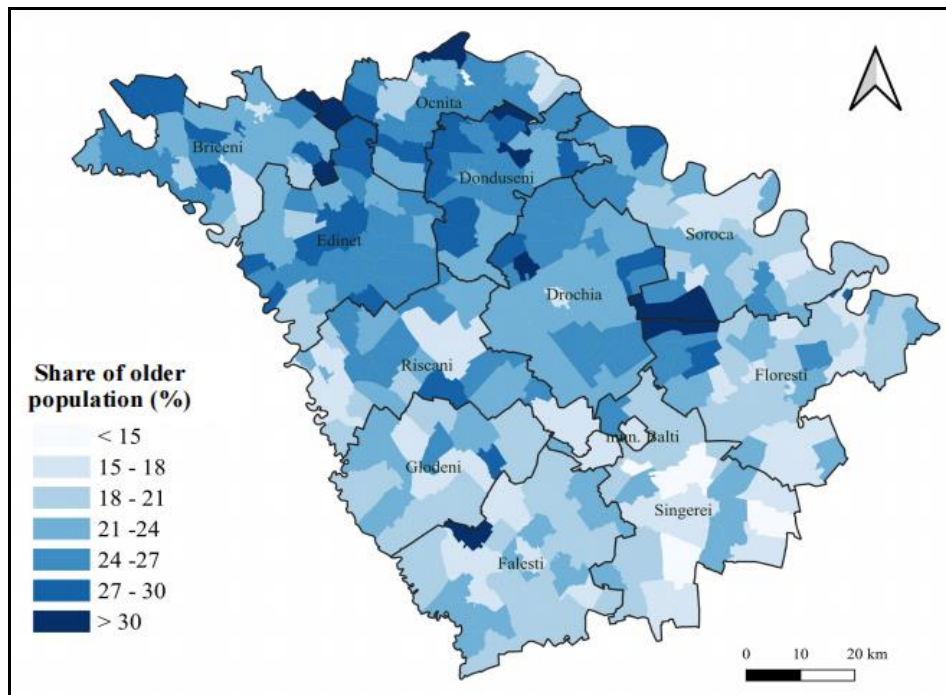


Figure 3. The degree of demographic aging at the primary ATU level, North Development Region, 01.01.2022.

Source: based on NBS (2022a).

The analysis of the data on the demographic aging of the North Development Region, compared to other regions, attests:

- the aging rate of the population of the North Development Region (22.9%) is higher compared to the other development regions;

- at the same time, the rates of aging in the North Development Region in the interval (2012-2021) are slower, compared to the other regions. If in the interval 2012-2021 the aging rate of the population of the Northern Republic increased by 116%, in the country as a whole - 128%. This fact proves that the demographic transition in the Northern Republic has ended and the stabilization process in the evolution of demographic phenomena has begun;

- the increase in the aging rate is characteristic for all regions of the country, but the rhythms are different (Table 2).

Table 2. The degree of aging of human habitats in the North Development Region (NDR) compared to those in the Central Development Region (CDR), 01.01.2022.

Rank	Share of the aging population (%)	Degree of aging of localities (%)	Number of localities in the CDR	% from total of CDR localities	Number of localities in the NDR	% from total of NDR localities
1	< 8	Young localities	18	2.9	-	-
2	8-10	Partially young loc.	25	4.1	-	-
3	10-12	Localities on the verge of aging	71	11.6	-	-
Aging localities above the 12% demographic aging threshold						
4	12-14	Localities in the early phase of aging	126	20.5	2	0.3
	14-16	Localities in the middle phase of aging	128	20.8	14	2.4
5	16-18	Localities in a high aging phase	111	18.1	40	7.0
	18+	The locality in a very high phase of aging	135	22.0	516	90.3
Total or average per region			614	14.4	572	100

Source: calculated and adapted based on NBS data (2022b).

The comparative analysis of human habitats in the two development regions within the Republic of Moldova attests to a much more pronounced degree of aging for the North Development Region, all localities in this region being in the aging phase, and over 90% in the very high aging phase.

The demographic dependency ratio (age dependency ratio) is the ratio between the number of people of "dependent" age (people under 15 and over 58/63+) and the population of working age (16/58/63+) expressed at 100 people (%). It is used as an indicator of the "economic burden" that the working population bears relative to the dependent population (children and the elderly).

The HDI typology was created on the geodemographic dimension. Only 9 rural habitats have a high geodemographic HDI: 0.630-0.760; 36 habitats with an average geodemographic HDI: 0.490-0.620; 136 habitats a small geodemographic HDI: 0.360-0.489 and 120 habitats a very small geodemographic HDI: 0.010-0.350 (Figure 4). The population of the North Development Region has the largest decline among the development regions, the geodemographic problem being very acute at the regional level and with large disparities at the intra-regional level. The demographic indicators and values taken into account attest to a sharp decrease in the geodemographic potential and, accordingly, the HDI on this dimension.

The population of the North Development Region has the largest decline among the development regions, the geodemographic problem being very acute at the regional level and with large disparities at the intra-regional level. The demographic indicators and values taken into account attest to a sharp decrease in the geodemographic potential and, accordingly, the HDI on this dimension. Large localities near cities/municipalities/growth poles/rational centers, with more opportunities for local development, are more attractive to young families of reproductive age and, accordingly, have a better demographic situation. Localities with a higher share of the population following neo-Protestant cults, but also Orthodox Christians, as well as isolated ones, with a higher degree of "conservation" from a demographic point of view, also have a better demographic situation. Small towns are the most vulnerable from a socio-demographic point of view. Territorial development policies require a differentiated approach by categories of human habitats that have common features in demographic behavior.

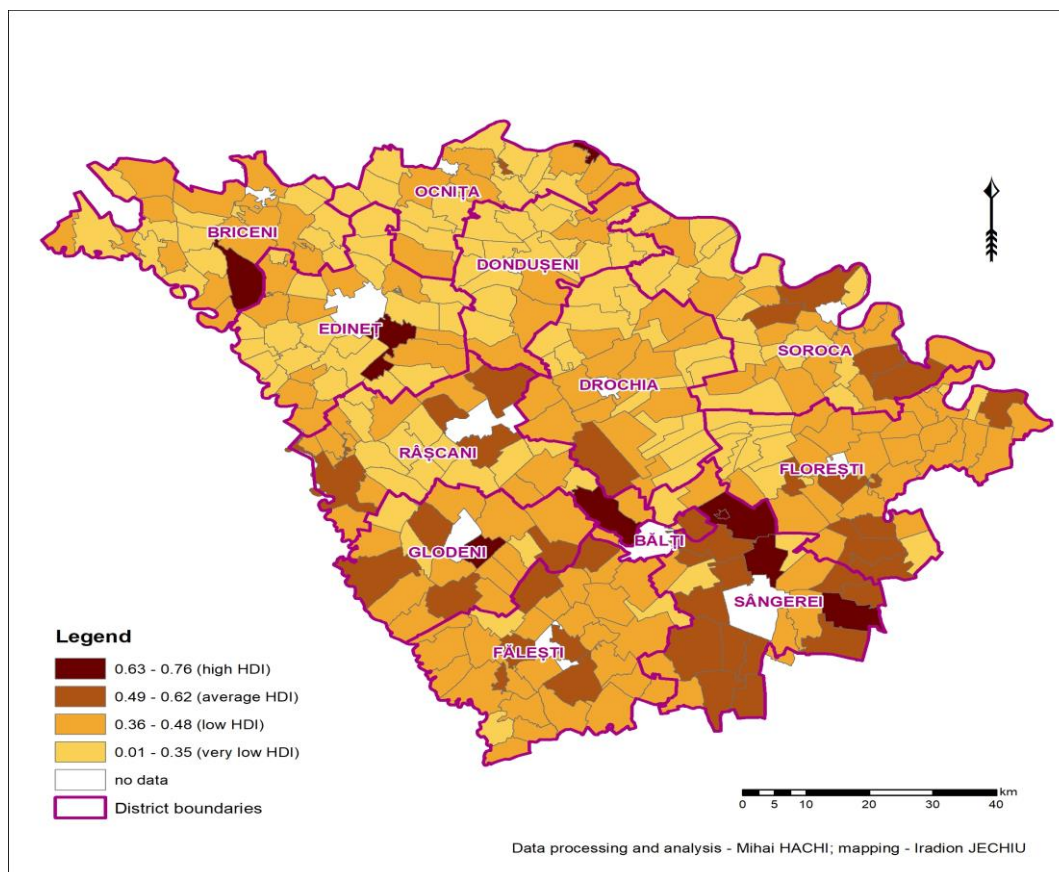


Figure 4. Human Development Index on the geodemographic dimension.
Source: based on NBS data (2023c).

The World Health Organization (1948) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Population health is affected by both intrinsic and extrinsic risk factors. Intrinsic factors include biological ones inherited through heredity and acquired lifestyle habits such as smoking, overeating, or other risk behaviors. Among the external factors that affect the individual's health are those of the person's environment, socio-economic and psychological (Tulchinsky & Varavikova, 2003). Modern epidemiology has focused its attention on risk assessment, using screenings to detect genetic, social factors, nutritional, ecological, professional, behavioral or other factors that contribute to the development of the disease.

In the North Development Region, the maximum values of the risk of disease with malignant tumors were recorded in the rural localities on the border of Soroca, Briceni and Ocnitza districts with rates between 437 - in the village of Oclanda (Soroca), 450 in Naslavcea (Ocnitza) and 458 per 100,000 inhabitants in the commune of Briceni (Dondușeni). The minimum rates of the risk of illness with malignant tumors in the Sângerei district are also supported by lower values of the population aging threshold compared to other districts. The minimum values were recorded in the communes of Sângerei Noi (212), Ciuciueni (214), Rădoaia (225) per 100,000 inhabitants.

A major problem that has reappeared in the attention of public health is tuberculosis, which preferentially manifests itself in population groups in the middle segment of the demographic pyramid. The degree of correlation between the population between 25-64 years and the risk of tuberculosis is very high ($R=0.858$).

As a rule, communities with a high rate of population aged 25-64 also have a high incidence of tuberculosis. The highest values of the risk of morbidity of the population due to tuberculosis were registered, predominantly, in the urban environment with a higher level of atmospheric air pollution, including in the cities of Frunză (50.4), Soroca (50.8), Ocnitza (52.0), Otaci (52.7) per 100,000 population, as well as in rural localities in the immediate vicinity of urban areas – Corlăteni (49.6), Zastâncă (49.7), Răuțel (49.8) per 100,000 inhabitants. The minimum values were recorded in a more concentrated form in the southern area of the Dondușeni district, and isolated in the rural localities in the districts neighboring the Bălți municipality (Figure 5).

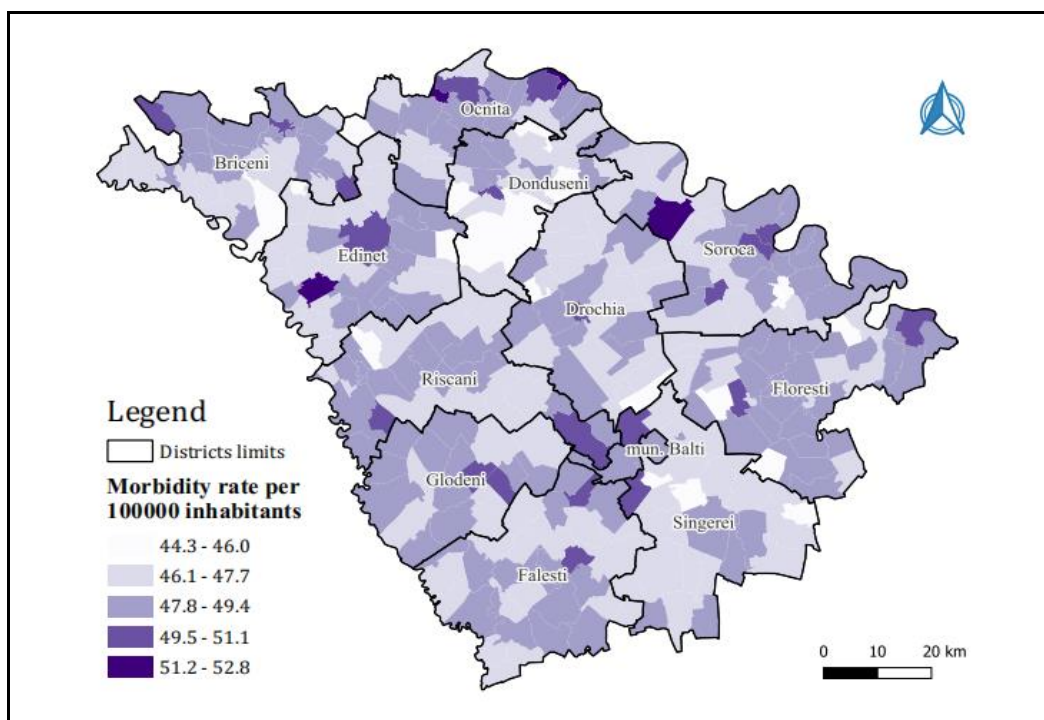


Figure 5. The risk of morbidity of the population through tuberculosis in the communes of the North Development Region (2020).
Source: National Agency for Public Health, 2022.

Thus, the mortality rates for the main classes of the causes of death identify the prevalence of diseases of the circulatory system, followed by malignant tumors, diseases of the digestive system, accidents, poisoning and trauma. A particular aspect is the increase in the incidence of respiratory diseases, caused by the Covid pandemic starting in 2020, which had a major impact on the health system and the structure of the morbidity of the population in the last two years.

The accessibility of the population to service centers is a key factor in public health. According to the results of the study, the majority of the population (87.6%) is at a distance of up to 1 km from the primary medical service centers (Figure 6).

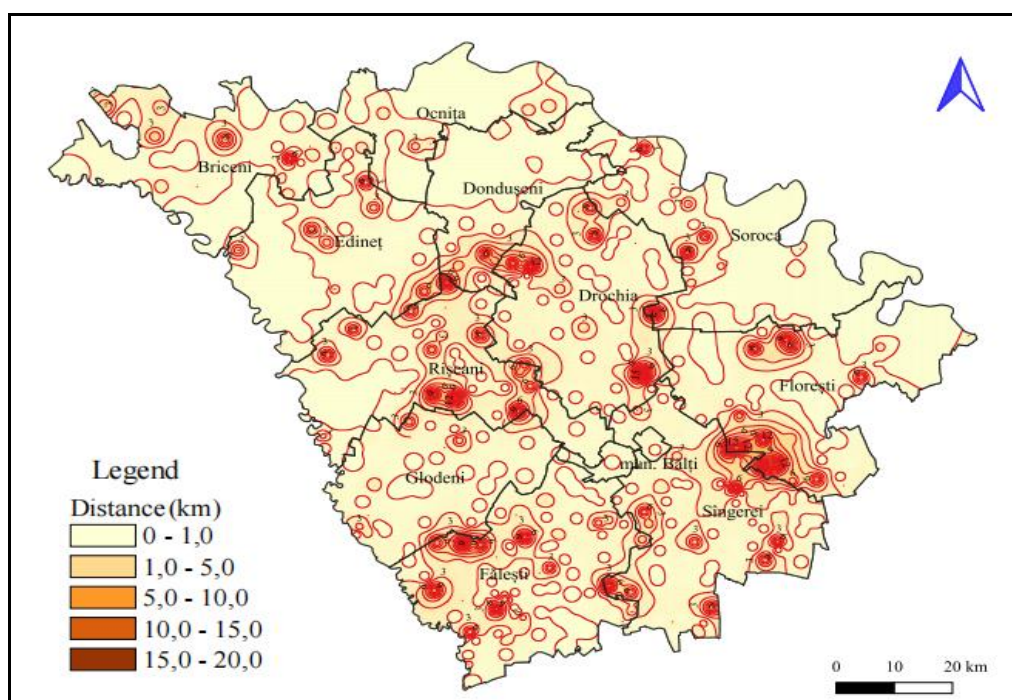


Figure 6. Accessibility of the population to primary healthcare.
Source: North Regional Development Agency. Index of Deprivation of Small Areas (IDAM), 2010.

However, the most marginalized are the localities (21 villages), located at a distance of more than 9 km from the medical point. Most of these localities are located in the districts of Râșcani (Slobozia-Recea, Malinovscoe, Ciubara, Lupăria), Fălești (Hâncești, Ilenuta, Moldoveanca, Musteață, Logofteni) and Florești (Dumitreți, Mihailovca, Antonovca, Nicolaevca), etc.

The access of the population of the Northern Development Region to emergency medical services can be evaluated based on the following findings (Figure 7):

- 86% of the number of households are located at a distance of up to 20 km from the nearest emergency medical institution;
- 11.5% of households are at a distance of more than 20 km from the emergency medical point;
- About 2% of households have limited access to emergency medical services due to distance and travel time. Most isolated households are located in the communes of Căinari Vechi, Dărcăuți, Schineni, Iarova and Tătărușa Veche (Soroca district), Calarașovca (Ocnița district), and Moara de Piatră (Drochia district).
- Only 29% of households benefit from emergency medical services in the commune.

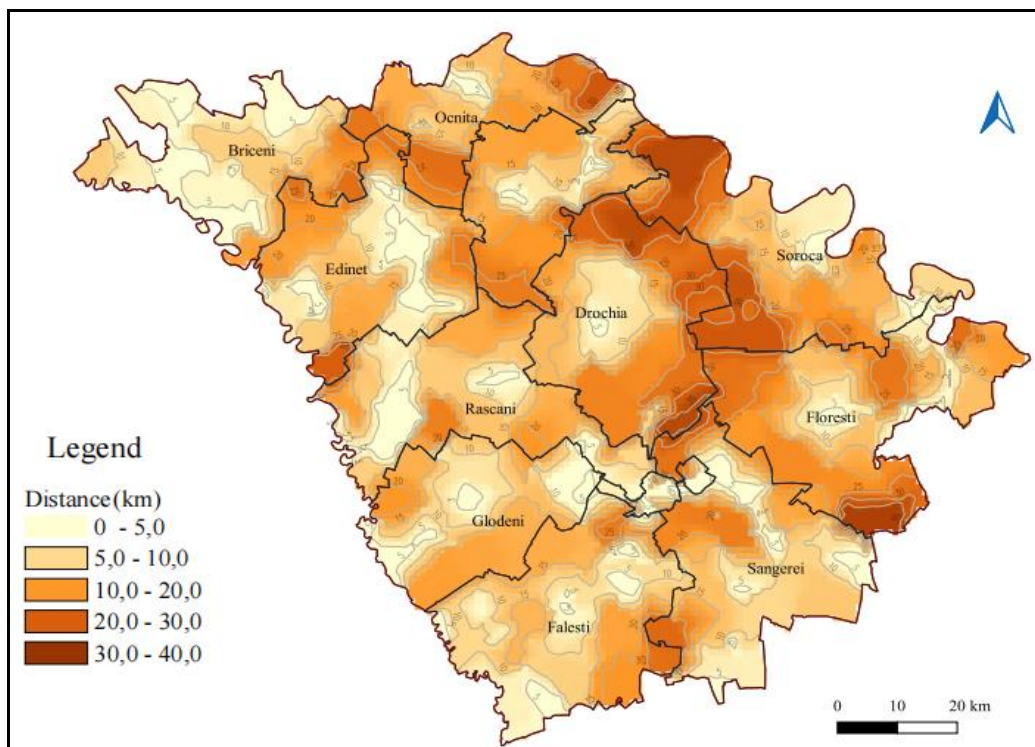


Figure 7. Accessibility of the population to emergency medical assistance.

Source: North Regional Development Agency. Index of Deprivation of Small Areas (IDAM), 2010.

Based on the transformation of morbidity risk rates by (malignant tumors and active tuberculosis) and the level of accessibility of the population to emergency medical services into standardization coefficients, the Health Index in territorial profile was calculated (Figure 8).

According to the indicators obtained, 5 classes of population health quality were established (figure 4.17). The value range is between the minimum of 0.073 recorded by Iarova commune (Soroca district) and the maximum of 0.545 in Rădoia commune (Sângerei district).

The state of health, infrastructure and medical services, as well as their evolution in chrono-spatial plan, have a special contribution to human development as a whole in relation to the researched region. The role of the indicators related to the health of the population conditions the morbidity and mortality indices, the provision of medical personnel, facilities and institutions in the territorial plan also determines the socio-economic development as a whole of the territorial units. The evolution of the majority of health indicators for the Northern Development Region of the Republic of Moldova shows a negative trend, of decrease and crisis of specialized personnel, also related to the general process of depopulation, aging of the population and destruction of the socio-economic system, especially in the rural environment, but and the urban one. For the analysis of the economic situation of the population, the wage income indicators of the population, by economic activities, from the study region were selected.

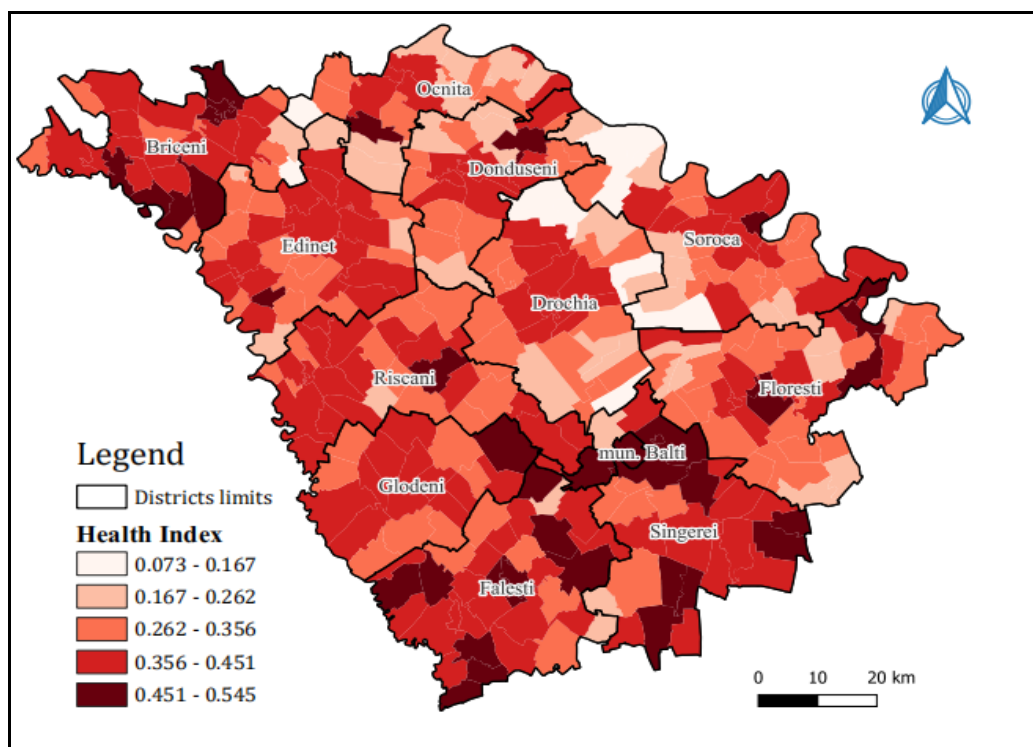


Figure 8. Population Health Index (2020).

Source: National Agency for Public Health, Statistical yearbook of the health system of the Republic of Moldova.

In the study region, the main share of population income comes from Services 37.2%, followed by Industry 33%, Agriculture and Commerce each 13.2% and Construction 4.3%.

Salary incomes from agriculture, forestry and fishing in 11 districts out of 12 exceed the average for the region, only in the municipality of Bălți they constitute 0.8% of the total salary incomes. In 4 out of 12 districts, salary income from trade exceeds the regional average, namely: Bălți municipality 15.8%, district Blood 15.5%, Fălești 14.2% and Briceni 13.7% (Table 3). In half of the districts, the regional average of salary income from construction activities is exceeded, Râșcani 7.7%, Briceni 7.2%, Sorocea 6.9%, Edineț 6.2%, Drochia 5.2% and you make 5%. From industrial activities, wage incomes exceed the regional average in 4 out of 12 districts: Sorocea 58.8%, Bălți municipality 41.2%, share 36.1% and Florești 33%. In most districts, the main share of salary income goes to the economic activities Services, where at 60% it exceeds the average for the region. This fact leads us to the conclusion that services are the main economic bringing wage incomes in the study region, with the exception of Bălți municipality.

Table 3. Structure of average wage incomes by economic activities, %.

ATU	Agriculture, forestry and fishing	Commercial	Construction	Industry	Services
Bălți	0,8	15,8	4,0	41,2	38,3
Briceni	25,9	10,8	0,4	4,2	58,6
Dondușeni	23,8	10,4	5,2	15,8	44,9
Drochia	19,9	11,9	6,2	24,4	37,6
Edineț	19,4	14,2	5,0	36,1	25,4
Fălești	15,8	8,3	1,2	33,0	41,7
Florești	48,0	9,8	3,8	9,1	29,3
Glodeni	36,3	12,2	1,2	10,7	39,7
Ocnita	33,2	11,2	7,7	15,6	32,2
Râșcani	28,7	15,5	1,5	15,2	39,2
Sângerei	13,9	8,8	6,9	58,8	22,8
Sorocea	13,2	13,2	4,3	33,0	37,2

Source: National Bureau of Statistics of the Republic of Moldova (2023a).

In the localities with the highest HDI for the economic component, a large number of economic agents per capita are active (Figure 9).

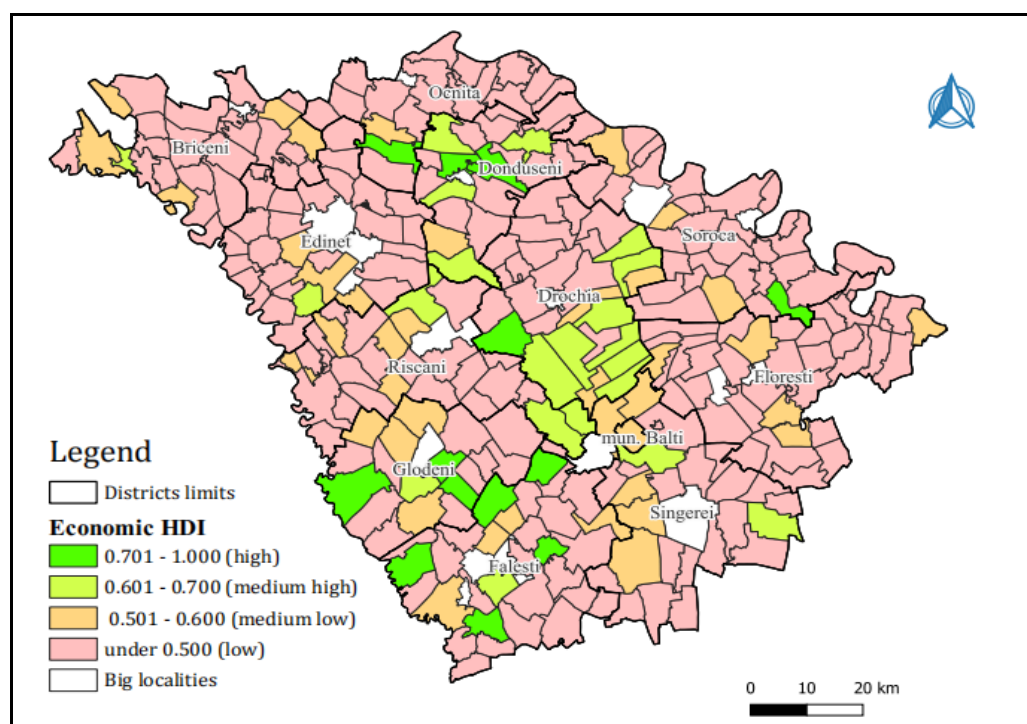


Figure 9. Spatial distribution of the economic component of the HDI for the communes of the North Development Region.

The 1st place is occupied by the village of Catranic from Fălești district with a present population of 1.1 thousand inhabitants (Table 4). Out of 30 economic agents, 23 are active, 11 of them are individual enterprises, 10 - commercial companies, 1 - agricultural cooperative and 1 - municipal enterprise Apă Canal. In the village of Balatina in Glodeni district, with a population of 4.9 thousand people, in addition to individual businesses, commercial companies and agricultural cooperatives, there are also 3 savings and loan associations. The town of Cupcini in Edineț district, with a present population of 7.1 thousand inhabitants, despite the fact that it has many economic agents, some of them are not active, and the active ones do not supply enough to the local budget to be able to cover the expenses incurred by the City Hall the city.

Table 4. Top 10 highest ranked rural localities in North Development Region according to the economic component of the HDI

Commune	District	HDI economic	Commune	District	HDI economic
Catranic	Fălești	1.000	Stoicani	Soroca	0.749
Balatina	Glodeni	0.960	Nicoreni	Drochia	0.727
Obreja Veche	Fălești	0.849	Plop	Donduseeni	0.714
Petrunea	Glodeni	0.807	Corbu	Donduseeni	0.704
Călinești	Fălești	0.797	Pîrlița	Fălești	0.697

Source: calculated by the authors

Table 5. Top 10 rural localities in the Northern Development Region with the lowest HDI by economic component

Commune	District	HDI economic	Commune	District	HDI economic
Constantinovca	Edineț	0.091	Grimăncăuți	Briceni	0,053
Tăura Veche	Sîngerei	0.080	Vasilcău	Soroca	0,036
Mîndic	Drochia	0.078	Bădiceni	Soroca	0,033
Cosăuți	Soroca	0.058	Albinețul Vechi	Fălești	0,012
Gura Căinarului	Florești	0.054	Lunga	Florești	0,000

Source: calculated by the authors

As for the infrastructure component, quantitative indicators were taken per locality: the degree of access to the public water supply system and the access of households to the public sewage system. In

North DR, 454 thousand people or 51% of the present population have access to public water supply systems, including 257 thousand (83%) in urban areas and only \approx 200 thousand (34%) in rural areas (National Bureau of Statistics of the Republic of Moldova, 2023c). Despite the higher degree of industrialization and urbanization compared to Center Development Region and South Development Region, North Development Region has the lowest level of access to public aqueducts, especially in rural areas. The population's maximum access to public aqueducts can be seen in the municipality of Bălți (84%), in the districts of Râșcani (74%), Sângerei (60%) and Florești (50%), and the minimum access - in the districts of Ocnîța (17%), Briceni (25%) and Dondușeni (32%), with small sizes and peripheral - position.

In the urban environment, the number of people connected to public aqueducts is directly proportional to the actual population. Thus, the maximum number of people connected to public aqueducts is registered in the cities of Bălți (104 thousand), Soroca (31.8 thousand), Fălești (15.7 thousand), Drochia (14.2 thousand) and Florești (12.5 thousand). Also, the highest access to public urban aqueducts is observed in the municipality of Bălți and in the districts of Florești, Fălești, Râșcani, Sângerei and Soroca, and the lowest access - in the districts of the northern end of the region: Ocnîța (47%) and Dondușeni (52%). At the commune level, the highest level of access (>95%) is recorded in the localities of Egoreni and Ocolina (Soroca district), Nihoreni, Pârjota and Vărativ (Râșcani district), Prodănești (Florești district), Fântânița (Drochia district), Criva (Briceni district) (Figure 10).

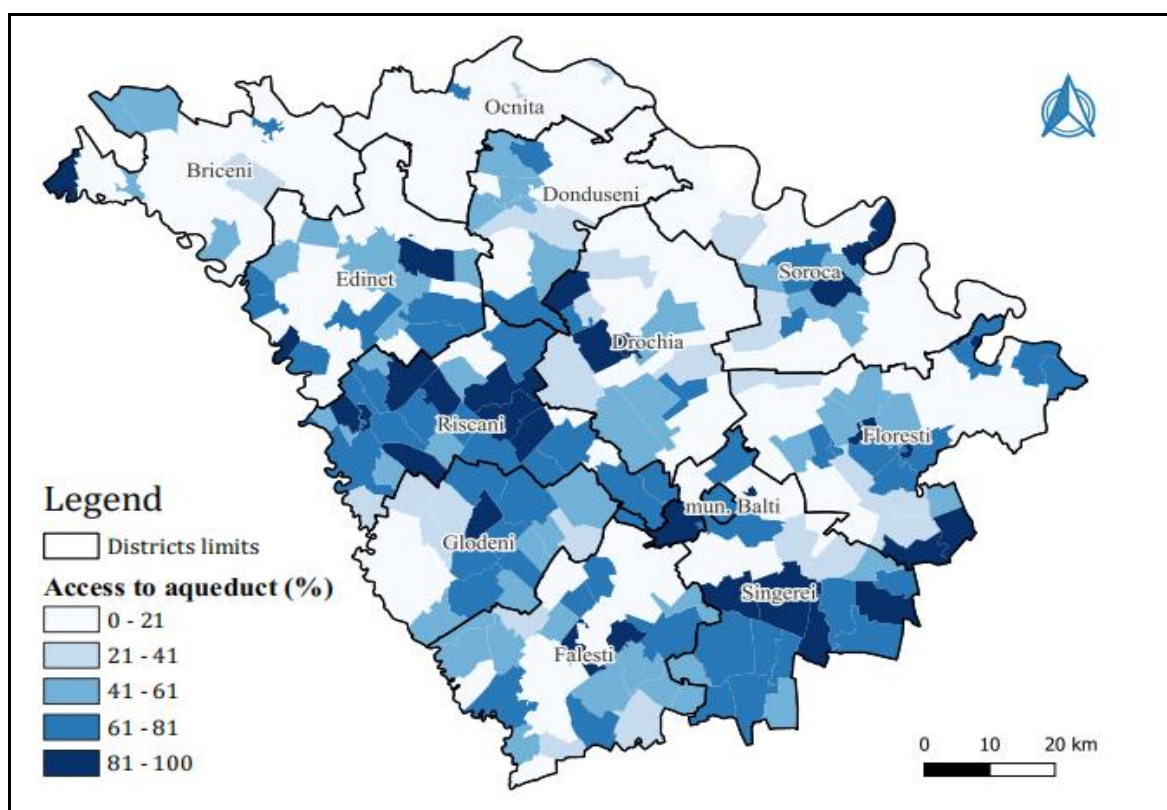


Figure 10. Access of the present population to aqueducts in the communes of the North Development Region (%).

Source: NBS (2023c).

About 172 thousand people or 19% of the population of the North Development Region have access to the centralized waste water disposal services (National Bureau of Statistics of the Republic of Moldova, 2023c), including \approx 2 thousand people (0.3%) - in the rural environment and 172 thousand people or 55% - in urban area. The maximum access is attested in the municipality of Bălți (63%) and in the districts of Soroca (21%), Dondușeni (14%). There are only 52 public sewage systems in the perimeter of the North Development Region, or \approx 6 times less than the public water supply systems (Figure 11). If the number of water supply systems registers a very rapid increase, by about 2.3 times, then the number of centralized sewage systems registers an oscillating evolution against the background of a general negative trend, and the negative dynamics is found in about $\frac{1}{2}$ of the districts of the region.

The lack of progress in the expansion of centralized sewerage systems is largely caused by the higher costs compared to water supply systems, and the majority of the population and LPA's (Local Public Authority's) do not consider this need to be a priority.

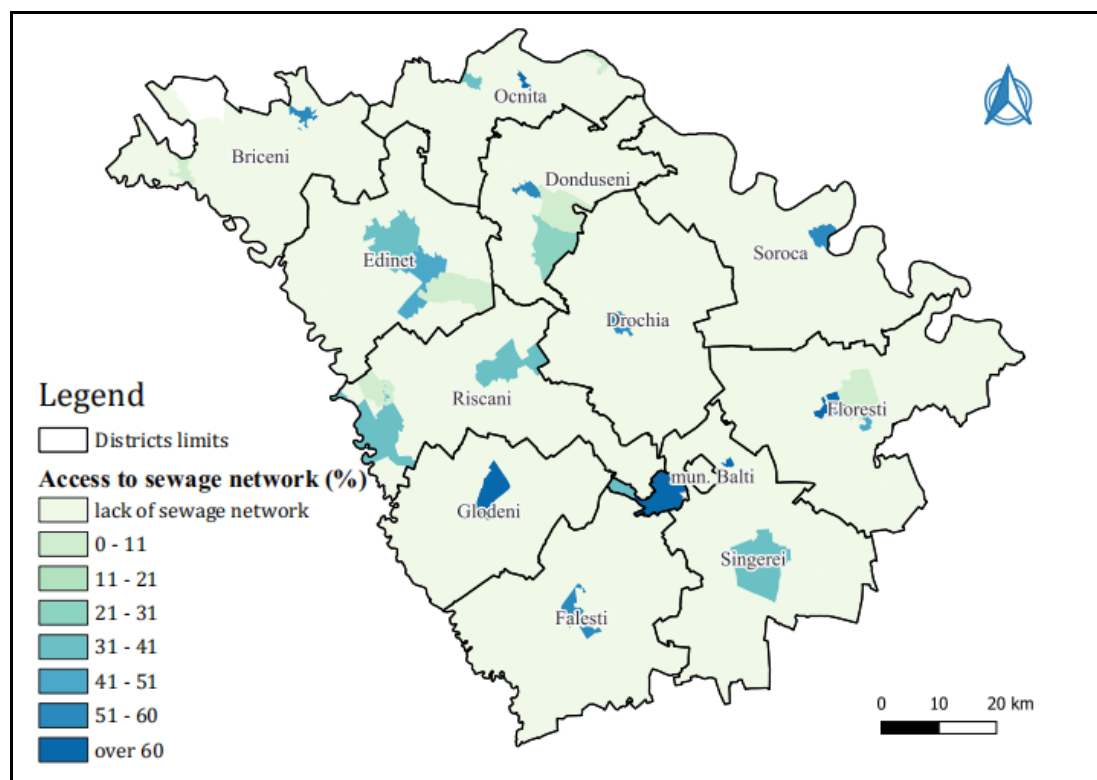


Figure 11. Access of the present population to public sewage systems.
Source: NBS (2023c).

The indicators were calculated, mapped and a typology of the aggregate HDI was made for all the localities of the North Development Region. Thus, 4 indicators were taken into account on the demographic dimension, 3 each on the health and infrastructure dimensions, and one each on the economy dimension. By calculating the weighted average for each individual indicator and arguing the significance of each one in the human development of rural and urban human habitats, a typology of the aggregate HDI was made. Thus, the differentiation of the aggregate HDI at the level of human habitats was found, which presents the following situation: high HDI (7 rural localities or 2.3% with values between 0.750-0.890), moderately high HDI (73 localities or 24.2%, values 0.600-0.750), medium average HDI (134 localities or 44.4%, values 0.460-0.600), low (79 localities or 26.2%, values 0.310-0.460) and very low HDI (9 localities or 3% of the total number of localities taken into account, values 0.170-0.310). The aggregate HDI map was drawn up, which broadly reflects the hypotheses launched regarding human development at the level of each primary ATU (Figures 12 and 13).

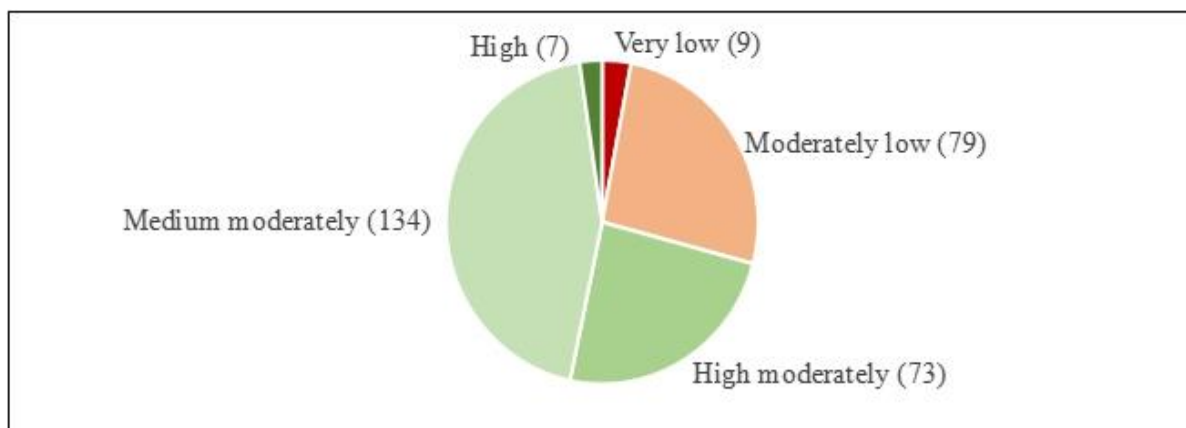


Figure 12. Aggregate HDI of human habitats in the North Development Region.

The aggregate HDI map was drawn up, which broadly reflects the hypotheses launched regarding human development at the level of the communes (Figure 13). The analysis of this indicator in a spatial and temporal aspect showed the trajectory and sustainability of human habitats in the North Development Region, constituting an important support for local public authorities in arguing the need for administrative-territorial decentralization, the eligibility of municipalities for the implementation of local projects.

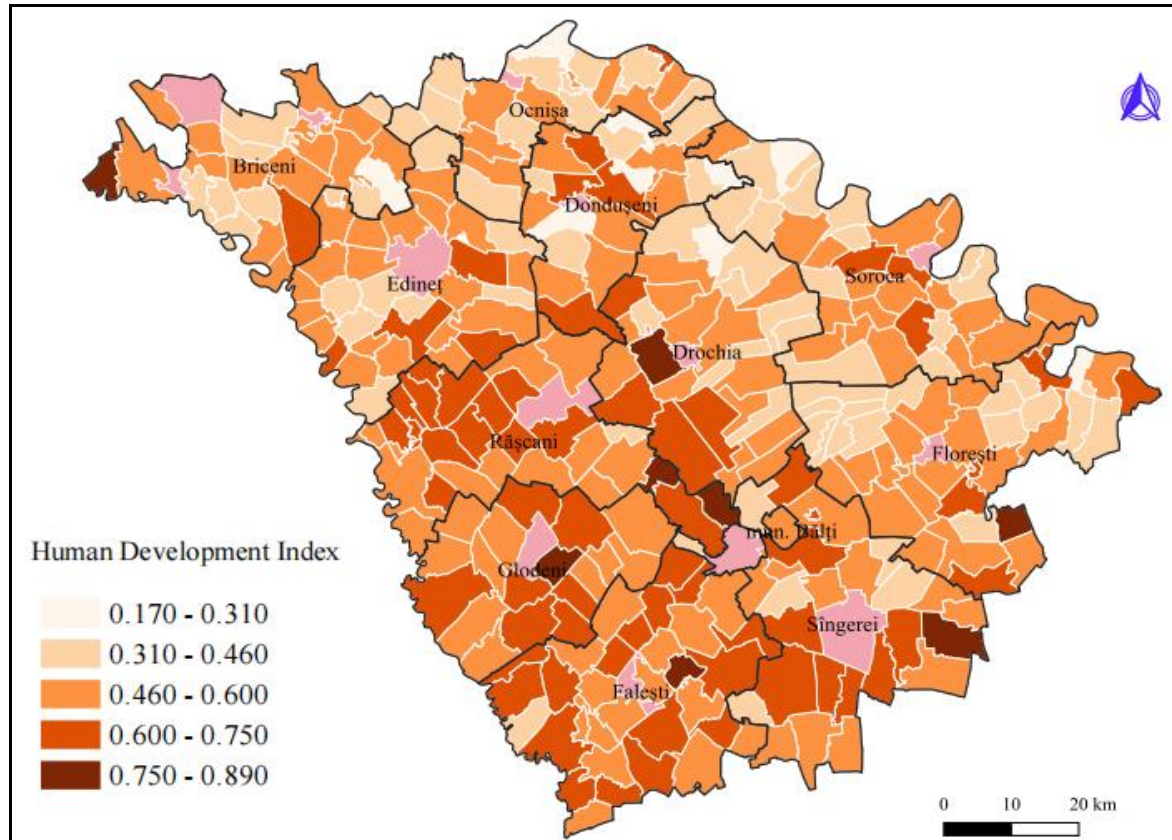


Figure 13. Aggregate HDI in the communes of the North Development Region.

The dynamic analysis and comparison of this indicator in a regional/spatial and temporal aspect showed the trajectory and sustainability of human habitats in the Northern Development Region, constituting an important support for local public authorities in arguing the need for territorial and administrative decentralization, the eligibility of habitats for the realization of local projects.

4. CONCLUSIONS

1. The socio-demographic dimension of human development has a special significance in calculating the HDI, given the role and place of the population in terms of quantity and quality. The comparative study of human development at the level of primary administrative-territorial units is necessary, by trying to track the level that human habitats have reached at the level of primary administrative-territorial units, aiming to evaluate the efficiency of the development policies applied by regional and local governments or administrations, beyond certain indicators or statistical series that attest to certain aspects of human development.
2. The systematization and analysis of socio-demographic indicators in the North Development Region highlighted the trends and problems generated by the evolution of the population in time and space in the 315 commune-residence villages and 20 cities. The assessment of the geodemographic situation of the population in the North Development Region shows a more pronounced decrease at the level of the region compared to other developing regions, confirming the hypothesis that the demographic transition in the Republic of Moldova began in this region.
3. An analysis of the HDI on the socio-demographic dimension shows a better situation for large and medium-sized localities, those located in the vicinity of Balti municipality, as well as localities with a population anchored in neo-Protestant cults.
4. Regarding health and education, in general, North Development Region is still at a satisfactory level, due to the existence of a developed and varied infrastructure of medical and educational institutions. At

the same time, the dynamics of quantitative and qualitative evolution of many components related to the field of health is a negative one, mostly related to the demographic problems of population reduction, migration, aging of the population, but also the socio-economic situation and insufficient funding.

5. Morbidity and implicit mortality caused by a series of chronic diseases is increasing, especially regarding respiratory diseases. The accessibility of the population to primary and emergency medical assistance presents difficulties for a number of rural localities in the North Development Region. The indicators related to the number and ratio of medical personnel, medical institutions, coverage with medical personnel are decreasing in the last decade, but compared to other countries, the Republic of Moldova is still in the class of values with a high HDI.

6. The economy component, next to the infrastructure component, is the most vulnerable in the structure of the HDI, as a result of the reduced number of economic units in the localities of the North Development Region and the increase in dependence on transfers from the state budget.

7. As a result of the expansion of the aqueduct network, more than half of the population of the region has access to public aqueducts, including 83% in the urban localities and only 34% in the rural area. In the districts of Briceni, Ocnîța, Dondușeni and Soroca is the lowest level of access throughout the Republic. The access of the North Development Region population to public sewage systems is only 19%, including 55% in cities and only 0.3% - in rural areas. In the villages of Ocnîța, Briceni, Fălești, Drochia and Soroca districts there are no public sewage systems, and in the rest of the districts - only in a few localities.

8. As a result of the calculations of the Integrated Human Development Index in the communes (villages and small towns) of the North Development Region, it was found that the high aggregate HDI is specific only for 7 communes, moderately high HDI - 73 localities or $\approx \frac{1}{4}$ (24%) of the number total, moderate HDI 134 localities or 44% of the total number, low average HDI - 79 localities (26%) and very low HDI - only 9 of them (3%).

9. Development policies applied in a spatial profile, as well as the allocation of financial and material resources, must take into account the current and prospective geodemographic situation, in order to better manage the human component.

10. The typology created allows the evaluation of the standards achieved by each individual locality and can serve as a benchmark for local public authorities, which can use the data in order to convince local or international investors about the eligibility of the investment in the social, economic, technical-building and environmental. Also, the results can be relevant as a reference point for local administrations with reference to the strengths and weaknesses of each locality, data necessary for the argumentation of local development policies and/or regional authorities for the argumentation of reforms/changes that are required in the territory according to needs local. Knowing the overall situation of human habitats allows the justification of the action plan for community development.

11. The social value of the study derives from the content of indicators and values taken into account on the social dimension that can serve as a benchmark in arguing the social component of regional development policies, family policies, demographic, migration, occupational policies, etc. whose finality is the population and which must take into account the local specifics. Ultimately, human development is the development of the people, for the people and by the people.

12. The scientific results could serve as a model for the HDI analysis of other development regions, as well as a didactic-scientific benchmark at higher education institutions.

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