ТЕНДЕНЦИИ И ФАКТОРЫ ПРОСТРАНСТВЕННОГО РАЗВИТИЯ СТРАН И ТЕРРИТОРИЙ

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COMPARATIVE ASSESSMENT OF PUBLIC HEALTH INDEX IN THE COUNTRIES OF EURASIA

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Abstract

Aim. To analyse the level of health of the population on the basis of the public health index in countries of the world, to compare indicators at the country level using publicly available demographic indicators.

Methodology. As part of the study, a statistical database of demographic indicators was collected (life expectancy, infant mortality) on the Eurasian states. Three main periods of statistical accounting have been selected – 2010, 2015, 2019, all statistical data have been unified and brought into line with the territory and time period.

As a result, a demographic database for 96 Eurasian countries and 1264 first-order administrative-territorial units was created, adapted for work in GIS.

Results. Based on demographic indicators we calculated the integral indicator – The index of public health of the population (PHI) and we analyzed the quality of public health of the countries of Eurasia.
This paper provides a detailed analysis of the state of public health in the countries of Eurasia. The results of the study indicate that the growth of the public health index is a global trend. Taking into account the dynamics, the highest level of public health was observed in the first-order administrative-territorial units of European countries and some Asian countries (Israel, Qatar, Singapore, Turkey, South Korea and Japan).
The number of administrative-territorial units with a low level of health (PHI less than 0.55) has been decreasing over time. In 2010, territorial units of seven countries, mostly in Asia, had low health levels. In 2015 and 2019, the previous low health level persisted only in the administrative-territorial units of two countries (Afghanistan and Cambodia). The situation in Russia had its own peculiarities: the events of the 1990s had a negative impact on the level of public health and only since 2001 the growth of the public health level began to be noted.
Research implications. The level of public health in Eurasian countries is characterised by a high degree of differentiation in time and space. Cartographic visualisation allows us to effectively compare the situation in different countries, to identify the causes of changes in the level of public health. The materials of the study can be useful for making managerial decisions aimed at preserving the health of the population.

Keywords: geoinformation system, public health, infant mortality, life expectancy, Eurasian states

Original Research Article

СРАВНИТЕЛЬНАЯ ОЦЕНКА ИНДЕКСА ОБЩЕСТВЕННОГО ЗДОРОВЬЯ В СТРАНАХ ЕВРАЗИИ

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Аннотация

Цель. Проанализировать уровень здоровья населения на основе индекса общественного здоровья в странах мира, сравнить показатели на страновом уровне с использованием общедоступных демографических показателей.

Процедура и методы. В рамках исследования собрана статистическая база демографических показателей (ожидаемая продолжительность жизни, младенческая смертность) по государствам Евразии. Были выбраны 3 основных периода статистического учёта – 2010, 2015, 2019 гг., все статистические данные были унифицированы и приведены в соответствие с пространственным уровнем и временным периодом. В результате была создана база демографических данных для 96 стран Евразии и 1264 административно-территориальных единиц первого порядка, адаптированная для работы в ГИС. На следующем этапе проведена статистическая обработка данных и с использованием методов математического и картографического моделирования рассчитаны значения индекса общественного здоровья. На основе демографических показателей рассчитан интегральный показатель – индекс общественного здоровья населения (ИОЗН) и проанализировано качество общественного здоровья в странах Евразии.

Результаты. В данной работе проведён детальный анализ состояния общественного здоровья населения в странах Евразии. Результаты исследования свидетельствуют о том, что рост индекса общественного здоровья населения является общемировой тенденцией. С учётом динамики наиболее высокий уровень здоровья населения наблюдался в административно-территориальных единицах первого порядка европейских стран и некоторых стран Азии (Израиле, Катаре, Сингапуре, Турции, Южной Корее и Японии).

Количество регионов с низким уровнем здоровья (ИОЗН <0,55) с течением времени сокращалось. В 2010 г. низкий уровень здоровья населения был зарегистрирован в территориальных единицах семи стран, в основном в Азии. В 2015 и 2019 гг. прежний низкий уровень здоровья сохранялся только в регионах 2 стран (Афганистане и Камбодже). Ситуация в России имела свои особенности: события 1990-х гг. негативно повлияли на уровень здоровья населения, и только с 2001 г. стал отмечаться рост уровня общественного здоровья.

Теоретическая и/или практическая значимость. Уровень общественного здоровья населения в странах Евразии отличается высокой степенью дифференциации во времени и пространстве. Картографическая визуализация позволяет эффективно сравнивать ситуацию в разных странах, выявлять причины изменений уровня общественного здоровья. Материалы исследования могут быть полезны для принятия управленческих решений, направленных на сохранение здоровья населения

Ключевые слова: геоинформационная система, общественное здоровье, младенческая смертность, продолжительность жизни, евразийские государства.

Introduction

The most important component of the development of any society is the health of its citizens. In this regard, there is a need to develop objective criteria for measuring the level of health, while it is important to distinguish between individual human health and public health. Individual health is considered as a state of physical, psychological and social well-being of an individual. This definition is set out in the Preamble to the WHO Constitution and no changes have been made to it since 1948. There is no single universally recognized term "public health", scientific discussions continue [3; 4], but most researchers agree that there is a symbiotic relationship between the concepts of individual and public health, which determines the influence on each other [9]. In addition, individual health is the basis of population health. D. Izutkin [10] draws attention to the fact that public health, unlike individual health, is a qualitatively and quantitatively new integrative quantity that characterizes, on the one hand, the degree of opportunity for each person to achieve an optimal level of health and ability to creative work, and on the other hand, the viability of the whole society, the physical and moral health of its population and its opportunities for further socio-economic and spiritual development. According to WHO experts, public health should be considered as a national security resource, a means of enabling people to live a prosperous, productive and high-quality life [1]. If we integrate these concepts, then it is convenient to reflect the relationship of concepts in the form of a diagram (Fig. 1). This diagram shows the interrelationships of various levels of public health that are studied in different contexts, and on the other hand, it shows that biological, psychological and social factors affect each of these levels.

The methods of determining individual and group health are determined by the health system at the state level, and there is no single approach to characterize the level of public health at the global level. This is explained by significant differences in factors affecting the level of public health [2; 6].

When assessing health, demographic indicators, indicators of morbidity, disability, physical development, etc. are most often used. Let's consider some indicators that are used to assess the level of public health.

Morbidity according to the data of medical treatment is a fairly widely used indicator that gives a more objective picture when analyzing intraregional territorial differences. In the case of global comparisons, significant discrepancies are possible, due not only to the state of health, but also to the availability of medical care, since a patient can apply for one disease to several doctors in different medical institutions.

Mortality is also used as an indicator of public health, which reflects the vital potential of the population, its well-being. However, the overall mortality rate gives an approximate description of the phenomenon, since it is largely influenced by the age structure of the population.

The analysis of the structure of causes of death gives a good idea of the health status of the population, reflects the activities of health authorities, the quality of medical care. The complexity of use is related to differences in statistical data at the country level.

The use of the indicator "natural population growth" is not justified when characterizing the health of the population.

Infant mortality (mortality of children under 1 year per 1000 live births) is one of the most important criteria for the health status of the population, which reflects favorable or unfavorable socio-economic conditions of life in the region and the effectiveness of the pediatric service.

The life expectancy at birth of men and women demonstrates the health status of the population and the quality of its life. The value of this indicator not only determines the health status of the population, but also characterizes the level of socio-economic development of the country as a whole, the degree of medical literacy of the population, the level and quality of organization of medical care to the population. The method of calculating the indicator is universal, it allows to ensure its comparability regardless of the characteristics of the age structure of the compared population groups, territories and countries [5; 8]. All this ensures that data is collated at the global level.

It is the latter two indicators, according to the recommendations of the World Health Organization that are proposed to be used to assess public health[1]. These indicators are universal and are used in most countries in the world, including the World Health Organization However, statistical data can be difficult to compare and unavailable when there is a need for studying and spatial assessment of the level of health of citizens of different countries and (or) administrative-territorial units of countries. It is obviously that for a heterogeneous study area, it is advisable to use the most common indicators of public health – life expectancy for men and women, and infant mortality (mortality of children under the age of 1 year per 1000 newborns)[2].

Studies that have appeared in recent years using an integrated approach to assessing the state of public health of the population [7; 11; 12; 13] have shown their effectiveness.

One of the most well-known methods of comprehensive health assessment in different countries of the world is the DALY index (Disability Adjusted Life Years) – the number of years of healthy life lost), which was developed by the World Bank together with the World Health Organization. For each cause of death or morbidity, the DALY calculation includes the number of years of life lost, as well as the number of years lived under conditions of varying degrees of loss of health. The methodology for calculating the DALY (or global burden of disease) is to determine the state of health by counting the loss of years of life as a result of death or disability for each disease[3]. Many researchers point out that the definition of the DALY index is most suitable for assessing the economic losses of labor potential [8].

For comparative characteristics of the population's health at various territorial levels, the usability and effectiveness were demonstrated by a complex indicator – the public health index, integrating infant mortality rates and life expectancy of men

[1] Bulletin of the World Health Organization. In: Health status indicators, 2015, vol. 87, pp. 22–50.

[2] Atlas of Population Health in European Union Regions. Available at: https://www.researchgate.net/publication/321361767_Atlas_of_Population_Health_in_European_Union_Regions (accessed: 26.06.2024).

[3] WHO methods and data sources for country-level causes of death 2000–2019. Global Health Estimates Technical Paper WHO/DDI/DNA/GHE/2020.2. 2020. Available at: https://cdn.who.int/media/docs/default-source/gho-documents/global-health-estimates/ghe2019_daly-methods.pdf?sfvrsn=31b25009_7 (accessed: 28.06.2024).

and women. It was this indicator that we used for global comparisons. We use these indicators to calculate the integral indicator – The Public Health Index of the population (PHI)[1].

Another important aspect was the use of indicators of life expectancy and infant mortality to characterize the countries and administrative-territorial units of Russia [10] but this use is controversial at the level of small territorial entities (for example, municipalities or some administrative-territorial units), because of the statistics for this level is very variable from year to year, and these changes can be calculated in ordinal quantities. It should be noted that the choice of the level of detailing of the analyzed territorial units causes a certain interest, which is determined, first of all, by the purpose and objectives of the study.

Data and methods

At the global level, the main indicator characterizing the state of public health and quality of life, reflecting the success of actions in the field of protection and promotion of public health is the public health index. We have already justified the analytical merits of this indicator in the introduction.

As part of the study, a statistical database of demographic indicators was collected, which includes data on infant mortality and life expectancy in the Eurasian countries. The study was based on the official information of the statistical departments of the world organizations. In addition, the study has examined and includes data from the Organization for Economic Cooperation and Development[2], the World Bank[3], databases from the United Nations[4] and the European Union[5]. Three main periods of statistical accounting have been selected – 2010, 2015, 2019, all statistical data have been unified and brought into line with the territory and time period. To conduct research, we use relative (per 100 thousand people) indicators. In territorial terms, a region is defined as a unit of administrative-territorial division of a country at the level of a subject for Russia, or a state for India, etc.

Thus, indicators at the regional level of countries can be analyzed, compared and evaluated. The result was a database of demographic data for each region from 94 countries of Eurasia[6] and 2 countries with unclear legal status (Macau and Taiwan) and 1264 units of administrative-territorial division of a country of the first order, adapted for working in GIS. This database has the following characteristics:

– combines arrays of socio-economic data and modern methods and technologies of computer modeling of spatially distributed data, as a whole being a key element of the infrastructure of spatial socio-economic data of the territory, pro-

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[2] International Database. Organization for Economic Cooperation and Development (OECD). Available at: https://stats.oecd.org/Index.aspx?DataSetCode=MIG (accessed: 24.06.2024).

[3] Data World Bank Group. Available at: https://data.worldbank.org/indicator (accessed: 30.06.2024).

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[6] United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects: The 2019 Revision. Available at: https://population.un.org/wpp/definition-of-regions (accessed: 30.10.2023).

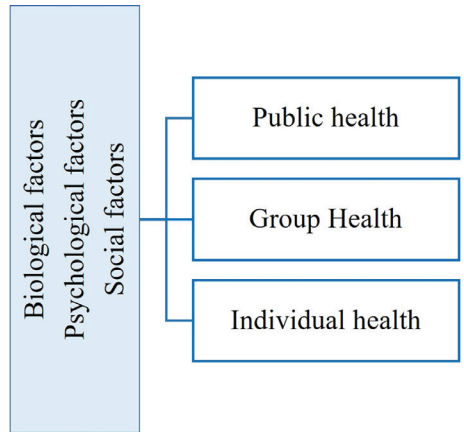

Fig. 1 / Рис. 1. The base of primary statistical parameters of public health / Основные показатели для оценки общественного здоровья

Source: elaborated by the authors

viding new knowledge about the levels of socio-economic development of the territory;

– the geoinformation model database is formed by integrating heterogeneous socio-economic data obtained from different statistical sources and using various methods and technologies containing integrated data;

– the database is formed on the basis of diversified sources of statistical data based on the use of official statistical sources at various levels (international, supranational, national).

In order to harmonize the statistical methodology of the Russian statistical system with international standards, work continues on providing statistical data to the OECD by filling out questionnaires, and work is also underway to organize information interaction between the OECD and Rosstat using the SDMX (Statistical Data and Meta data eXchange) software package.

It should be emphasized that the authors in this article chose the subjects of the Russian Federation as territorial units of the study for a more detailed interpretation of the situation in Russia.

The result of this action is a digital cartographic basis that displays the current state of settlements, the road network, administrative borders and a number of other general geographical objects of the mapped territory, typical within the framework of socio-economic cartography. Particular attention in the process of developing this framework should be paid to the territorial grid, administrative boundaries, which is the link between spatial data and a set of primary socio-economic indicators.

The problem of changing of the administrative-territorial division within the countries was considered. In some countries (Russia, France, Bulgaria, Finland, etc.), some administrative-territorial units were reorganized or abolished, and their territory and population were merged into new administrative-territorial entities. So, it was necessary to recalculate statistics for four former municipalities of Macedonia (Drugovo, Oslomej, Vraneshtitsa, Zajas), dissolved in 2013. In

2015 they were considered already as a part of the municipality of Kichevo. After the vote of the citizens of Norway in 2016, the administrative-territorial units of Sør-Trøndelag and Nord-Trøndelag, separated in 1804 by the King of Denmark-Norway, were merged into Trøndelag-Tröndelag in 2019. In 2010, the provinces of Finland were transformed into regional state administrative agencies; the changes affected, first of all, the provinces of Eastern Finland and Oulu. For example, the disputed status of belonging to some administrative-territorial units of the Island of Cyprus (Turkey or Greece) has led to the formation of the Republic of Northern Cyprus, recognized only by Turkey.

Alternative sources of statistical information were chosen to find up-to-date information and solve these problems. Thus, the data for Northern Cyprus, Democratic People's Republic of Korea was based on data from the Department of Economic and Social Affairs of the United Nations Population Division. We will note the peculiarities of the administrative-territorial units, which, due to the presence of a certain denomination, are not value for a number of indicators: Athos, the Vatican (there are no statistics on births or migrants and the only living population is the clergy).

Within the framework of the study, the author used the standards of the priority supranational statistical organization of the OSER. The territorial grids (TL2 and TL3) used in this database are officially established and relatively stable in all OECD member countries and are used by many as a basis for implementing regional policy.

Administrative-territorial units in 38 OECD countries are classified into two territorial levels reflecting the administrative organization of the countries. 391 large OECD administrative-territorial units (TL2) represent the first administrative level of sub national governance, 2,197 small OECD administrative-territorial units (TL3) are included in the TL2 region and represent the second administrative level.

As well as the NUTS 2021 classification, which is defined for European countries largely corresponds to the Eurostat classification, which contributes to greater comparability of geographical units at the same territorial level.

These two standards, officially established and relatively stable in all countries, are used as a basis for the implementation of regional policy in most countries.

For non-EU countries, only TL2 administrative-territorial units were defined for Colombia and the Russian Federation, whereas for Latvia and Lithuania TL3 were derived from the European NUTS 3 standard for Asian administrative-territorial units.

Thus, a unique basic cartographic framework is being formed that fully meets the possible tasks of both national and sub national regional analysis and territorial management

Next, a primary array of quantitative indicator data is formed for a more detailed description of the mapped socio-economic indicators and indices, this array is formed using data from international, supranational, national statistical agencies according to the hierarchy adopted and described above.

At the next stage, data selection is performed in accordance with the topic and purpose of socio-economic integral indices. And based on the selected set of indicators, by means of mathematical and

cartographic modeling, the index values are calculated.

Another relevant problem during the collection and organization of statistics is the lack of information in the public domain on the website of the statistical agency of the country (the lack of indicator values for a certain year or region of the country, the lack of data on the indicator as a whole, accounting and verification of these territories with unclear political status). The result was the following geoinformation model for the countries of Eurasia and their units of administrative-territorial division of a country of the first order.

For the PHI calculation, we used the evaluative algorithm developed by one of the authors [14].

After the process of normalising the data based on the principal component method, the selection of the classification type is carried out. Principal component analysis is one of the most commonly used dimensionality reduction methods. This method solves the problem of retrieval based on the existing system of attribute features. The method of principal components should be used to correct the original feature space distorted by mutual correlations, to reduce the volume of stored data without losing the essential part of information about operational territorial units (OTUs), to visualise OTUs in the feature space and to identify latent indicators reflecting the essence of a process or phenomenon. With respect to the analysed data, typological classification was used to identify stable types of OTUs without assessing their quality. The k-means method was chosen as the classification algorithm. This method allows to define groups by iteratively recalculating the centers of the classes, minimising the distances between OTUs within the group. This algorithm is the most justified for the data set under study [14]. The next step was to evaluate the quality of clustering based on intra-class and inter-class distances, followed by the stage of interpretation of the results. As a result of which we obtained the final geodata database. The generated data array is visualized, and as a result forms a group of thematic layers.

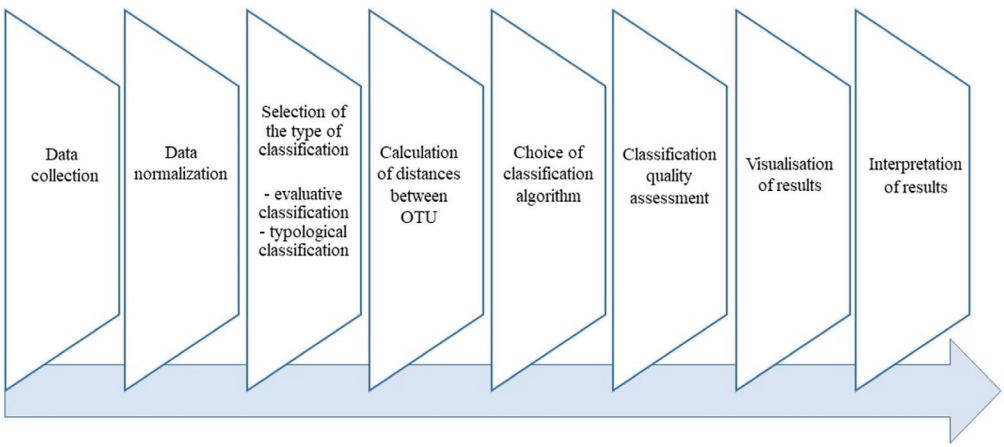

Fig. 2 / Рис. 2. Basic research design of geoinformation model / Дизайн исследования

Source: elaborated by the authors

Results and analysis

According to our calculations, there are no significant differences between the simplified and complete algorithms, which, among other things, have leveled out in the resulting maps with the step scale. Thus, Table 1 shows fragments of the calculation results, relating to the upper part of the PHI ranked series, the lowest part and the middle part, where the majority of administrative-territorial units occur. The maps of PHI for some countries and groups of administrative-territorial units are presented in Figure 2 and Figures 3–6, respectively.

Figure 4 shows a map of PHI of the world, the European Union and several countries. As can be seen from the map, growth of the index is the general trend for this territory. Dynamics of growth is much higher in developing countries. Russia stands out from the general trend. Events of 90s have affected the level of public health and sustainable growth observed only since 2001.

Detailed changes in the level of public health of the Russian Federation are shown in Figures 4–6. It was distinguished three groups: countries with low PHI, medium and high. Figure 4 shows that the regions-outsiders were most seriously affected after the Fall of the Soviet Union and only in recent years reached the same level that was before these events.

In the group of regions with an average PHI (Figure 5) general dynamics is clearly visible. The lowest level of public health in the group is marked in 1994, and then there is a slight increase. The economic crisis of 1998 leads to fall of the index. Sustained growth of public health in this group begins in 2003. Group with a high public health index is more resistant to changes in the economic and political situation in the country.

Turning to the analysis of the results obtained, it is worth outlining those key values that we accepted as the best and worst when calculating the desired index (Table 2–3).

As the best indicators of life expectancy at birth for women and men, we took the values of 83.67 years among men and 88.53 years in the San Marino region of Serravalle. The figures of 32.5 years among men and 35 years among women in Ratana Kiri, which is a province of Cambodia, were taken as the worst. Already at this stage, a huge difference in the values of the first two indicators is clearly

Table 1 / Таблица 1

Correlation of the PHI value and the characteristics of the public health index / Корреляция значения PHI и характеристик индекса общественного здравоохранения

PHI value	Characteristics of the public health index
0.8 and more	high level of health
0,70–0,80	average level of health
0,65–0,70	satisfactory level
0,55–0,65	reduced level of health
0.55 or less	low and very low level of health

Source: authors' calculations

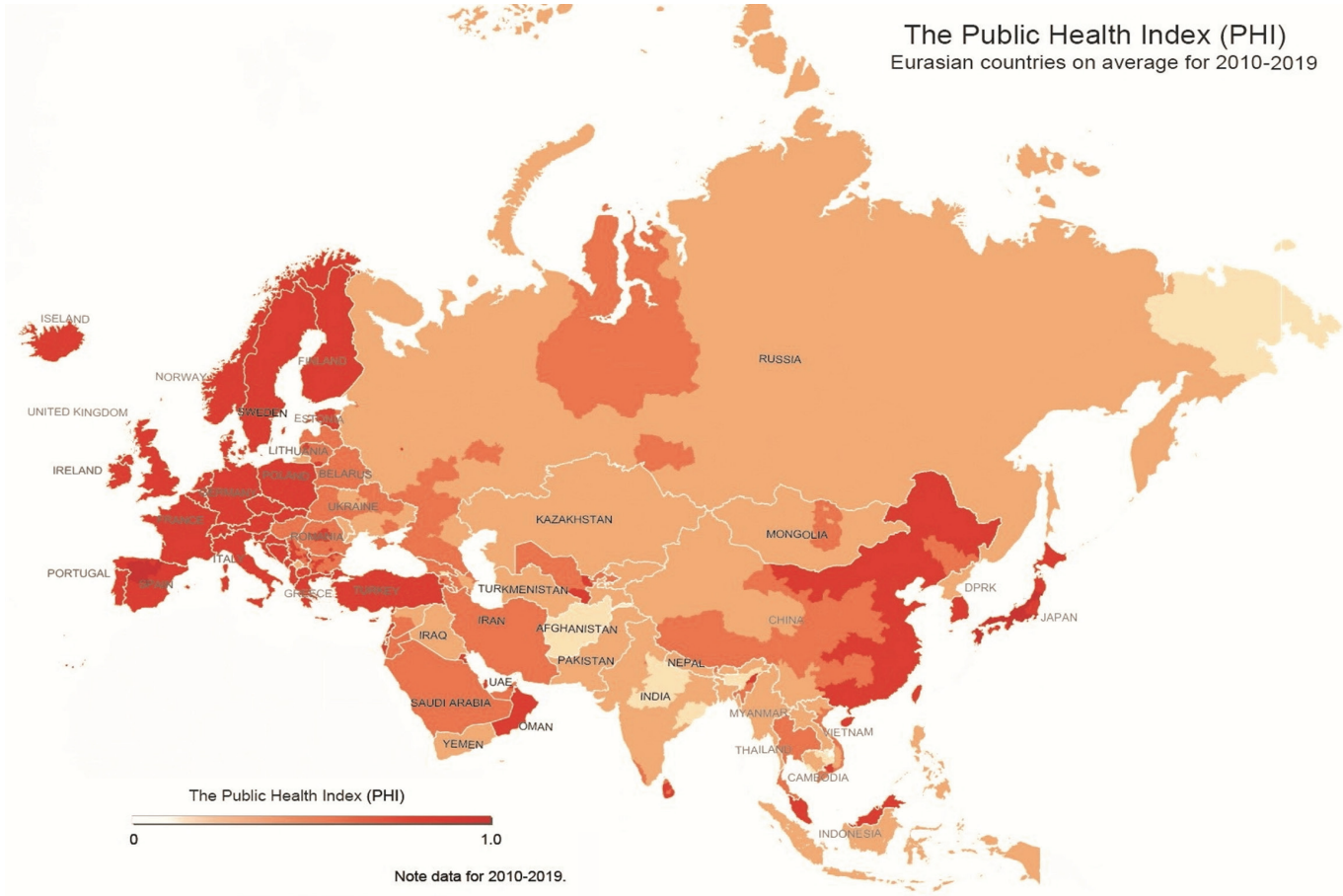

Fig. 3 / Рис. 3. Arithmetic mean value of the public health index for 2010–2019 / Среднеарифметическое значение индекса общественного здоровья в 2010–2019 гг.

Source: elaborated by the authors

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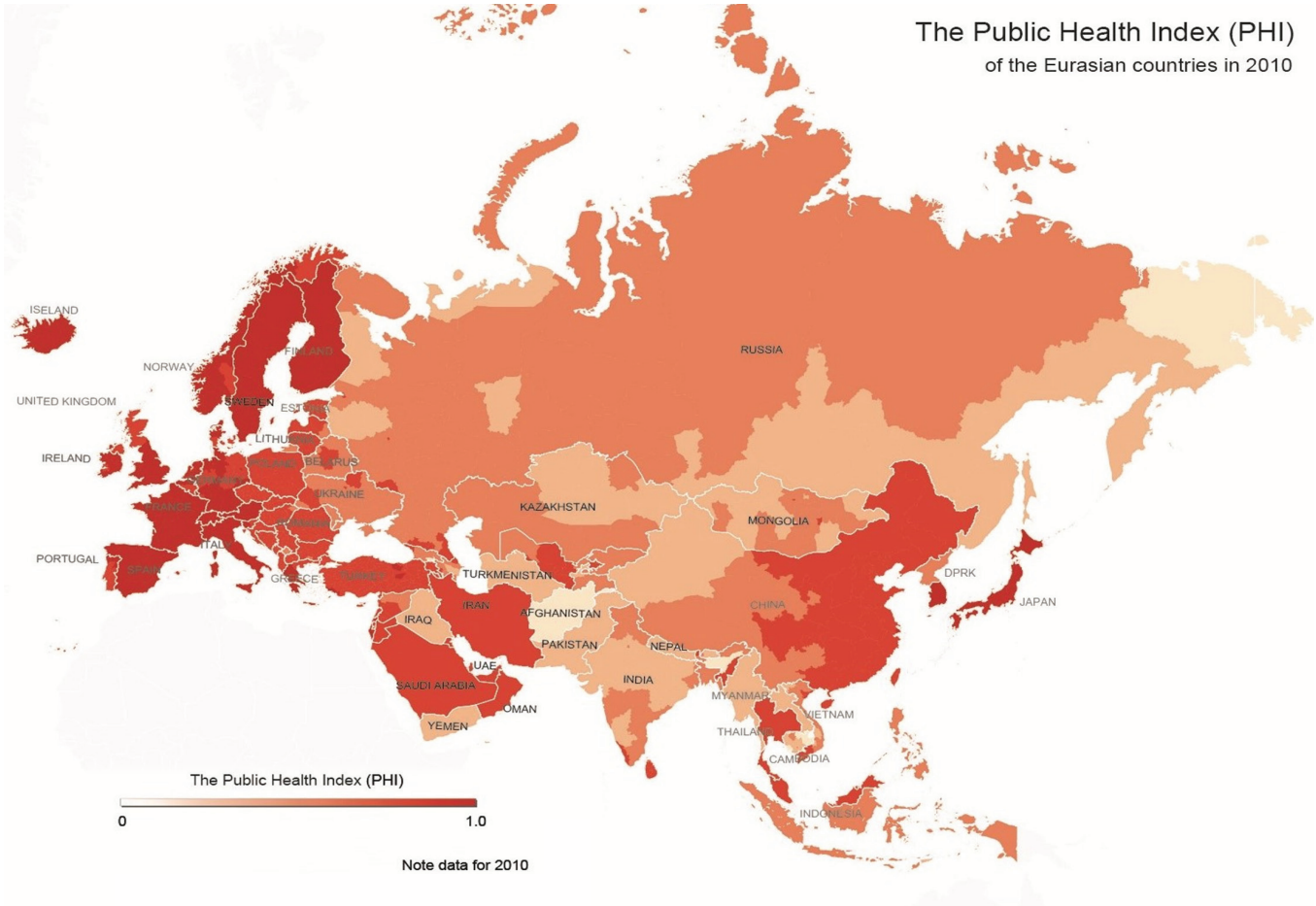

Fig. 4 / Рис. 4. The value of the public health index for 2010 / Значение индекса общественного здоровья в 2010 г.

Source: elaborated by the authors

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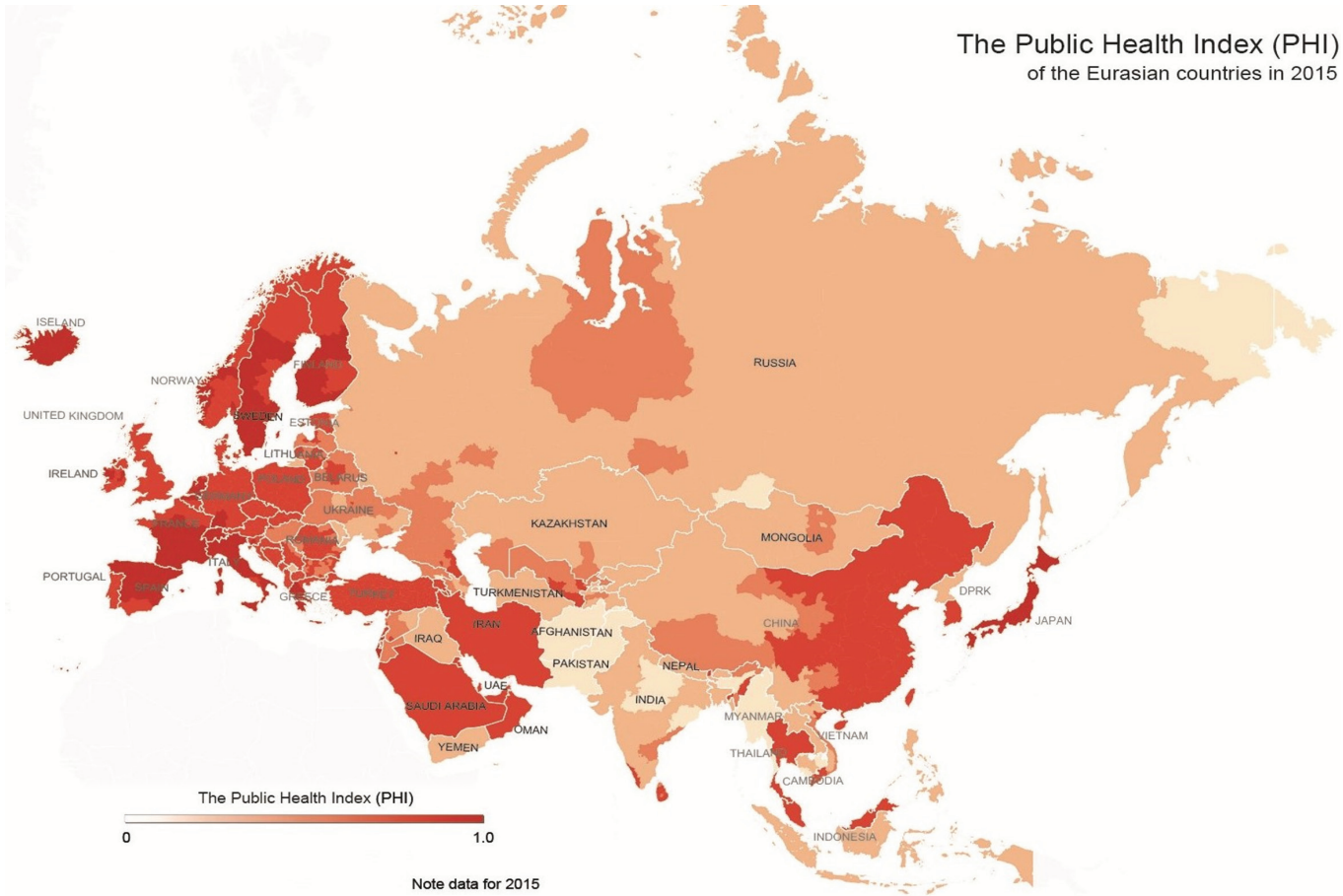

Fig. 5 / Рис. 5. The value of the public health index for 2015 / Значение индекса общественного здоровья в 2015 г.

Source: elaborated by the authors

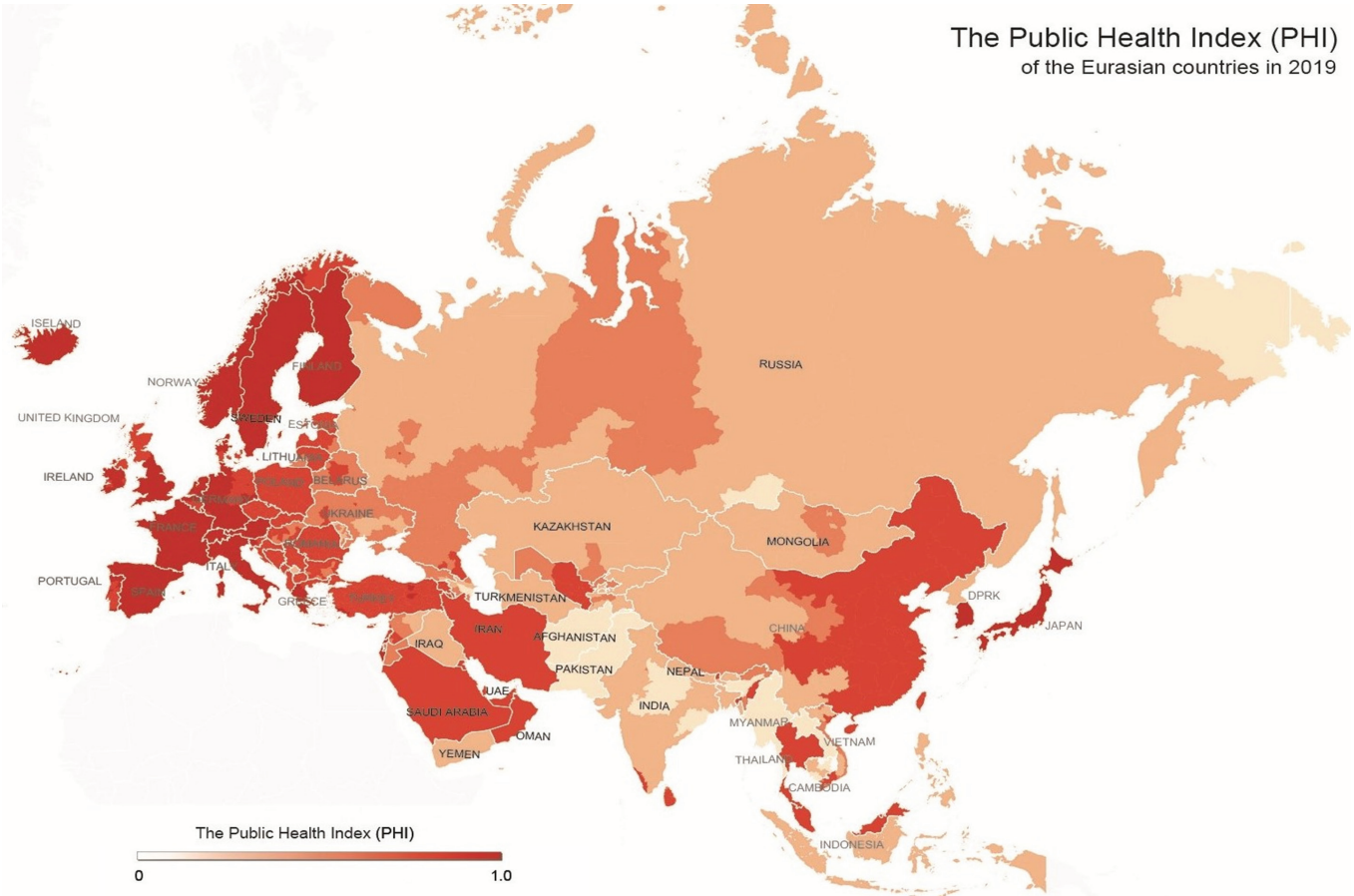

Fig. 6 / Рис. 6. The value of the public health index for 2019 / Значение индекса общественного здоровья в 2019 г.

Source: elaborated by the authors

Table 2 / Таблица 2

Top 10 regions with the worst values of PHI in 2010 / Топ-10 регионов с худшими значениями PHI в 2010 г.

NAME_Country	NAME_Region	TYPE_Region	PHI values
Cambodia	Ratana Kiri	Province	0,210971
Cambodia	Preah Vihear	Province	0,310779
Cambodia	Mondolkiri	Province	0,385621
Cambodia	Krong Preah Sihanouk	Municipality	0,45233
Cambodia	Stung Treng	Province	0,454888
Georgia	Kvemo Kartli	Region	0,466527
Cambodia	Soairieng	Province	0,507623
India	Meghalaya	State	0,527022
Cambodia	Kratie	Province	0,529967
Cambodia	Otdar Mean Chey	Province	0,533233
Cambodia	Koh Kong	Province	0,534566

Source: authors' calculations

Table 3 / Таблица 3

Top 10 regions with the best values of PHI in 2010 / Топ-10 регионов с лучшими значениями PHI в 2010 г.

NAME_Country	NAME_Region	TYPE_Region	PHI values
Turkmenistan	Turkmenistan	County	0,857845
Romania	Vrancea	County	0,874431
San Marino	Acquaviva	Municipality	0,874431
San Marino	Borgo Maggiore	Municipality	0,874431
San Marino	Chiesanuova	Municipality	0,874431
San Marino	Domagnano	Municipality	0,874431
San Marino	Faetano	Municipality	0,874431
San Marino	Fiorentino	Municipality	0,874431
San Marino	Montegiardino	Municipality	0,874431
San Marino	San Marino	Municipality	0,874431

Source: authors' calculations

evident. This indicates the presence of a pronounced territorial differentiation on the territory of the studied continent.

As the best indicators of infant mortality, we took its minimum value, due to the negative effect of this indicator, and the maximum values as the worst, respectively. As a result, we took the Ratana Kiri indicator equal to 109.7 ppm as the worst value. Such a coincidence of the worst values for all three indicators also indicates that it is this unit that will act as the worst and will have minimal PHI values as the best indicator of the Netherlands region Flevoland equal to 0.15 ppm.

Next, we will consider the general geography of each formed group in the framework of the study of public health.

The first group consists of territorial units with index values less than 0.55, which indicates a very low level of public health, the number of territories in this group is 14 units, which are represented by administrative-territorial units of Cambodia, single administrative-territorial units of Russia. In general, the analysis of this group makes it possible to constitute the tensest and unfavorable public health situation in Cambodia

The group with lowered index values with values from 0.56 to 0.65 will be represented by 108 territories or about 10% of the total territorial sample. This group includes the territories of Bhutan. India, Russia. Mongolia, East Timor and others

A group with a satisfactory level of public health is formed by 231 territories. This group includes the administrative-territorial units of the post-Soviet countries of Ukraine, Moldova, Tajikistan, Azerbaijan, Russia, a number of administrative-territorial units of China, Syria and others.

The group with an average level of public health is the majority of the considered territorial units, the number of which is 613; these territorial units are distributed throughout the continent. The agglomerates of the countries and administrative-territorial units of Eastern Europe, the Arabian Peninsula, as well as the eastern coast of China stand out vividly.

The group with the highest level of public health is formed by 298 territorial units, which are formed by the prefectures of Japan, Iran, Turkmenistan, and the administrative-territorial units of Western and northern Europe.

In 2015, the values of 86.5 years were taken as the best and worst when calculating the desired index within the life expectancy at birth of women and men, this indicator is observed among men in the Swiss canton of Nidwalden and 88.96 years among women in the San Marino region of Serravalle (Table 4–5).

The indicators of 37.63 years among men and 40 years among women in the Ratana Kiri region of Cambodia, which is still the source of the minimum values, were taken as the worst.

As a result, we took the Ratana Kiri indicator equal to 109.7 as the worst value

Table 4 / Таблица 4

Top 10 regions with the worst values of PHI in 2015 / Топ-10 регионов с худшими значениями PHI в 2015 г.

NAME_Country	NAME_Region	TYPE_Region	PHI values
Cambodia	Ratana Kiri	Province	0,270458
Cambodia	Preah Vihear	Province	0,274848
Cambodia	Mondolkiri	Province	0,347501
Cambodia	Krong Preah Sihanouk	Municipality	0,415344
Cambodia	Stung Treng	Province	0,417998
Georgia	Kvemo Kartli	Region	0,464487
Cambodia	Soairieng	Province	0,473009
India	Meghalaya	State	0,496361
Cambodia	Kratie	Province	0,496534
Cambodia	Otdar Mean Chey	Province	0,499993

Source: authors' calculations

Table 5 / Таблица 5

Top 10 regions with the best values of PHI in 2015 / Топ-10 регионов с лучшими значениями PHI в 2015 г.

NAME_Country	NAME_Region	TYPE_Region	PHI values
Turkmenistan	Turkmenistan	County	0,851822
Romania	Vrancea	County	0,870114
San Marino	Acquaviva	Municipality	0,870114
San Marino	Borgo Maggiore	Municipality	0,870114
San Marino	Chiesanuova	Municipality	0,870114
San Marino	Domagnano	Municipality	0,870114
San Marino	Faetano	Municipality	0,870114
San Marino	Fiorentino	Municipality	0,870114
San Marino	Montegiardino	Municipality	0,870114
San Marino	San Marino	Municipality	0,870114

Source: authors' calculations

of infant mortality, and the Flevoland indicator of the Netherlands region equal to 0.12 as the best. Thus, in this aspect, the territories of maximum and minimum values remained unchanged. As of 2010, there were 25 territorial units in the group with a low and very low level of public health. This group demonstrates very

As of 2010, there were 25 territorial units in the group with a low and very low level of public health. This group shows a very significant increase in territories compared to 2010. However, the geography of this group is still localized in Cambodia and a number of administrative-territorial units of Russia. At the same time, it is supplemented by some states of India.

The group with a reduced level of health also shows a significant increase, if in 2010 there were 108 territories in it, then in 2015 there were already 241. This increase is due to the transition of a large number of administrative-territorial units of Russia and Kazakhstan to this group. As well as countries such as Oman and Yemen, Pakistan, a number of states of India and aimags of Mongolia, as well as administrative-territorial units of European countries.

The group with a satisfactory level of public health, on the contrary, loses the number of territorial entities by 50 territorial units in 2015 compared to 2010. The result is a certain disorganization of the geography of clusters of territorial formations. The main agglomeration with these index values is formed by the administrative-territorial units of Ukraine and Belarus. At the same time, the main noticeable changes are taking place on the territory of the Russian Federation, a significant part of the administrative-territorial units of which are moving into the group with a reduced level of health.

The group with an average level of public health still makes up the majority of the territorial units under consideration, the number of which is and remains practically unchanged.

The group with the highest level of public health also loses almost a third of the territories. The geography of this group in general terms remains almost unchanged; however, there is a pronounced increase

in the territorial differentiation of the European part of the continent, which is clearly seen in the example of Germany. Considering the dynamics over the past 10 years, the highest level of health belonged to the administrative-territorial units of European countries and some countries in Asia, predictable.

In 2019, we took the values of 86.5 years among men as the best and worst when calculating the desired index within the life expectancy at birth of women and men, this indicator is observed among men in the Swiss canton of Nidwalden and 88.96 years among women in the San Marino region of Serravalle (Table 6–7).

Table 6 / Таблица 6

Top 10 regions with the worst values of PHI in 2019 / Топ-10 регионов с худшими значениями PHI в 2019 г.

NAME_Country	NAME_Region	TYPE_Region	PHI values
Cambodia	Ratana Kiri	Province	0,195087
Cambodia	Preah Vihear	Province	0,206675
Cambodia	Mondolkiri	Province	0,292108
Cambodia	Krong Preah Sihanouk	Municipality	0,382196
Cambodia	Stung Treng	Province	0,385338
Cambodia	Soairieng	Province	0,450601
India	Meghalaya	State	0,465056
Cambodia	Kratie	Province	0,478093
Russia	Yevrey	Autonomous Region	0,481669
Cambodia	Otdar Mean Chey	Province	0,482099

Source: authors' calculations

Table 7 / Таблица 7

Top 10 regions with the best values of PHI in 2019 / Топ-10 регионов с лучшими значениями PHI в 2019 г.

NAME_Country / Territory	NAME_Region	TYPE_Region	PHI values
Macau	Ilhas	District	0,868496
Romania	Vrancea	Country	0,887395
San Marino	Acquaviva	Municipality	0,887395
San Marino	Borgo Maggiore	Municipality	0,887395
San Marino	Chiesanuova	Municipality	0,887395
San Marino	Domagnano	Municipality	0,887395
San Marino	Faetano	Municipality	0,887395
San Marino	Fiorentino	Municipality	0,887395
San Marino	Montegiardino	Municipality	0,887395
San Marino	San Marino	Municipality	0,887395

Source: authors' calculations

The figures of 38.11 years among men and 41.24 years among women in the Ratana Kiri region of Cambodia, which is still the source of the minimum values, were taken as the worst.

As a result, we took the Ratana Kiri indicator equal to 69.4 ppm as the worst value of infant mortality, and the Flevoland indicator of the Netherlands region equal to 0.06 ppm as the best. Thus, in this aspect, the territories of maximum and minimum values remained unchanged for the entire period under review.

There were 31 territories in the group of values with the lowest level of public health in 2019. This indicates a trend towards a slight increase in the number of territorial units. These values are still recorded in the administrative-territorial units of Cambodia.

In the group with a reduced level of public health in 2019, there were 204 territorial units, which indicate a rather noticeable reduction in the number of territories which occurred on the territory of the administrative-territorial units of Russia, Ukraine, Belarus. However, the number of territories of this group has almost doubled over the past 8 years.

As of 2019, there are 166 territories in the group with a satisfactory level of public health, which also indicates a slight increase compared to 2015, mainly due to the administrative-territorial units of Russia.

The group with an average level of public health is losing almost 40 territorial units compared to 2015. Due to a pronounced change in the territorial differentiation of the administrative-territorial units of European countries.

The group with the highest level of public health demonstrates the best dynamics and reaches the 2010 indicator. The number of territorial units in 2019 in this group is 299. This change is due to the administrative-territorial units of European countries.

After conducting a brief analysis, the authors obtained a number of generalizing conclusions. In 2010, the highest PHI values (over 0.8) corresponded to San Marino, Monaco, Andorra, Switzerland (8 administrative-territorial units out of 26), Spain (5 administrative-territorial units out of 18) and Italy (2 administrative-territorial units out of 20). The territorial units of Japan (42 out of 47 administrative-territorial units) and Macau with similar index values should also be marked. In 2015, these territorial units retained their position, and France (3 administrative-territorial units out of 13), Liechtenstein (10 administrative-territorial units out of 11), the countries of northern Europe – Sweden (5 administrative-territorial units out of 21), Norway (2 administrative-territorial units from 19), and Iceland (6 administrative-territorial units out of 8) had the highest index values also. Singapore was among the Asian countries. Interestingly, three Indian administrative-territorial units have joined this group – the states of Nagaland, Manipur, Mizoram, small states in the east and northeast of the country. Similarly, in 2019, the PHI of 0.8 and higher corresponded to the administrative-territorial units of Belgium (1 region out of 3), Portugal (9 out of 20), Greece (1 out of 7) and Israel, and among Asian countries – South Korea. The number of territorial units with a PHI above 0.8 increased sequentially from 77 in 2010 to 167 in 2019.

The number of administrative-territorial units with low health levels (PHI below 0.55) has decreased over time. In 2010, poor population health was reg-

istered in the administrative-territorial units of seven countries – Myanmar, Pakistan, Afghanistan, Cambodia (11 administrative-territorial units out of 25), India (6 administrative-territorial units out of 36), Russia (2 administrative-territorial units out of 84) and Georgia (1 region out of 12). In 2015 and 2019 the same health level persisted only in Afghanistan and Cambodia. At the same time, the number of such administrative-territorial units in Cambodia was reduced to five.

Most of administrative-territorial units in Eurasia were rather unstable over time in terms of the population health. In 2010–2019 often, either the entire country, or half or most of it, has undergone fluctuations in PHI (from 0.70 to 0.75 or more). The level of health was unstable, but its values do not fell below 0.65 in the countries of Eastern Europe – Slovenia, Belarus, Ukraine, Romania, as well as in the Baltic countries and in the western administrative-territorial units of Russia. This means that many administrative-territorial units within the country have only a satisfactory level of health by expert assessment

Highlighting the Asian countries, we can observe the trend of prevalence of the high level of health to the western and eastern parts of Eurasia. The undoubted leaders in population health were in the eastern part, such territorial units as – Japan, Macau, Singapore, South Korea and Taiwan. In the western part there were Israel, Turkey, Qatar. All these territorial units remained a stable level of health; PHI did not fall below 0.75over the past decade. Interestingly, the same level of health prevailed in some administrative-territorial units in countries with significantly lower level of health – India and Sri Lanka. A typical example was Cambodia, where two administrative-territorial units – the capital Phnom Penh and the tourist Siem Reap, were distinguished by a high level of health and were in a significant "gap" in terms of PHI from the rest of the country.

Conclusions

On the basis of demographic indicators, the index of public health of the population within the countries and territories of Eurasia was determined for the first time. This indicator made it possible to analyse the quality of public health on a country level. The results of the study indicate an increase in the public health index over the observed period, which confirms global trends.

The analysis of the state of public health of countries and administrative-territorial units of Eurasia indicates that the growth of the public health index is a global trend. Taking into account the dynamics over the last 10 years, the highest level of public health was observed in the administrative-territorial units of European countries and some Asian countries (Afghanistan, Cambodia). The number of administrative-territorial units with low health levels (PHI below 0.55) has decreased over time. In 2010, poor population health was registered in the administrative-territorial units of seven countries – Myanmar, Pakistan, Afghanistan, Cambodia (11 administrative-territorial units out of 25), India (6 administrative-territorial units out of 36), Russia (2 administrative-territorial units out of 84) and Georgia (1 region out of 12). In 2015 and 2019 the same health level persisted only in Afghanistan and Cambodia. At the same time, the number of such administrative-territorial units in Cambodia was reduced to five.

The situation in Russia had its own peculiarities, as the events of the 1990s affected the level of public health and positive changes began to be observed only since 2001. Despite the significant natural and socio-economic differences that are characteristic of the study area, it is possible to identify common patterns.

Administrative-territorial units with a low level of health are characterized by difficult climatic conditions for development, as the Chukchi Autonomous District (Russia) or difficult economic (for example, Assam, Madhya-Pradesh, Uttar Pradesh, etc. administrative-territorial units of India) or political situation (the territory of Afghanistan, where as a result of the military actions of recent years, the average level of health of the population of the entire country remains extremely low).

In the future, the formed database of demographic indicators of the countries and administrative-territorial units of Eurasia can be used for regional studies of the population and settlement, the standard of living of the population, the dynamics of the natural movement of the population, etc.

It should be emphasized that the use of the public health index provides ample opportunities for the development of territorially differentiated health policy.

Further, we may expand the database spatially and temporally. For example, to reflect the patterns of demographic indicators earlier in time or taking into account the year of 2020, where due to recent events there will be a strong change in the values of demographic indicators of countries. Presenting statistics at a different territorial level, or considering the countries of other continents and their impact on the processes which take place in the countries of Eurasia, etc., will open up new analysis opportunities.

The authors will continue to work on this topic, expanding the database, which will further highlight deeper spatial and temporal patterns.

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ПРАВИЛЬНАЯ ССЫЛКА НА СТАТЬЮ

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