UDK 311.21:314.118“401”(476)
JEL Classification: C15, I15, J11
Doi: 10.31767/su.4(91)2020.04.08

A. G. Kulak,
PhD in Economics, Associate Professor,
Associate Professor of the Statistics Department,
Educational Institution “Belarus State Economic University”,
E-mail: alla_kulak@mail.ru
ORCID: https://orcid.org/0000-0002-4318-890X

A Statistical Assessment of Healthy Life Expectancy in the Regions of the Republic of Belarus

The cumulative potential of the sustainable innovation-driven development of the regions of the Republic of Belarus is proposed to be estimated by measuring individual sub-potentials (social, demographic, environmental-economic, investment) and subsequent modeling of the aggregate characteristics for each of the regions. It is argued that the health of the population is an important component of the social sub-potential and the necessary condition for the development of all other sub-potentials. Statistical assessment of health within the framework of the system of indicators of innovation-driven sustainable development of regions is proposed to be carried out using core indicators such as life potential and healthy life expectancy of the population. The article is devoted to a study of health in the regions of Belarus on the basis of healthy life expectancy (HLE), which reflects the average number of years lived by the population, taking into account their health status (as a rule, measured on the basis of representative surveys). That is, it is life expectancy estimated with account to the quality of the years lived. It allows to estimate the loss in life expectancy due to the deteriorating health.

The article provides a statistical assessment and analysis of HLE dynamics for the population of Belarus at birth (and for specific ages) for 2005-2018. HLE in Belarusian regions are analyzed using Sallivan’s method. The healthy life expectancy of Belarusians at birth in 2018 was 68.09 years and increased by more than 10% (or 6.49 years) compared to 2005, with an increase occurred in each of the studied ages. It was revealed that although Belarusian women lived longer, they tended to give a lower life quality assessment than men (due to “poor” health). The gap between HLEs of men and women in 2018 was 6.78 years: women’s healthy life expectancy was 71.38 years, men’s – 64.60 years. At the same time, the loss in life expectancy resulting from poor health was 4.64 years for men and 7.98 years for women. Brest region and Minsk were the leaders in terms of HLE (both in 2015 and in 2018), Vitebsk and Minsk regions were among the outsiders in 2015 and Mogilev and Minsk regions – in 2018. At the next phase, the estimated indicators, together with the indicator of life potential of the regions, will be used as the basis for assessing the population’s health as part of the social sub-potential of the country regions.

Key words: *social sub-potential, population health, regions, self-assessment of health, healthy life expectancy, Sustainable Development Goals.*

Introduction. In the era of economy digitalization, the social sub-potential, with its qualitative and quantitative characteristics, has a special significance in the structure of cumulative capacities for the sustainable innovation-driven development of a country and its regions. The social sub-potential (component) is one of the pillars for the sustainable development concept, reflected in many goals and objectives of the Sustainable Development Agenda – 2030. The social objectives that have to be achieved by 2030 are set out in the Sustainable Development Goals (SDGs) 1–6, 8, 10–11, 13, 16.

An important role is assigned to health as part of the social sub-potential for the sustainable innovation-driven development of regions, which is clearly defined in SDG 3 “Ensure healthy lives promote well-being for all at all ages”. Correlation between health and sustainable economic-environmental development is a research subject for many scientists. But health is not addressed by them as end in itself, but rather as one of the domestic economy growth imperatives. With the top position in SDG 3 of the Sustainable Development Agenda – 2030, health has direct or indirect effect for the achievement of each of the goals. The improvement of health due to the prolonged working capacity can increase available workforce and labor productivity, thus enhancing and stabilizing socio-economic indicators of a country and its regions.

The indicator of life expectancy at birth (LEB) is very often used as an integral indicator of the population’s health. Its estimate reflects the lifespan of a proxy generation, i. e. an average number of years to be lived by members of a studied population cohort in their later life given the stable levels of age-related

mortality existing at the moment of LEB assessment. In countries with developed economy LEB is equal to 80–84 years (78–81 years for men, 82–85 years for women). In Belarus, LEB made 74.5 years (69.3 years for men, and 79.4 years for women), according to data for 2019 [3]. With LEB for males 12–14 years lower, and for females 5–6 lower than in developed countries, Belarus lags behind almost all the countries of the world by this indicator [11, c. 40]. The peculiarity of Belarus (like neighboring Ukraine or Russian Federation) is in rather wide gender gap in LEB: most often is makes 10–11 years compared with 5–6 years in developed countries. The gap between LEB of Belorussian men and women made 9.3 years in 1990, and 10.2 years in 2018. In city areas women lived 9.7 years longer than men in 2018, and in rural areas they lived 11.4 years longer [4].This difference is mostly attributed to high mortality of men in the aged of 45 to 80 years; the probability of death occurrence in these ages is much higher with men than with women.

Both the Belorussian economy and society suffer losses caused by not only rather high mortality rates, but also by bad health condition that may result in full or partial loss of the population's working capacity [9]. Be believe that a more adequate idea of the real health condition of the population in its qualitative dimension can be provided by the indicators of healthy life expectancy (HLE). In European countries, where the mortality level decreases in the latest years along with the increasing share of old people, HLE acquires special significance. It allows for confronting the mortality characteristics with the subjective self-assessment of health by individuals, as it reflects the number of years to be lived by the population without limitations on the life activities due to deceases. Information about this subjective self-assessment of health is most commonly extracted from representative interviews of the population (sample surveys, results or monitoring etc.).

Global practices lead to the conclusion that health studies based on self-rated health are not only quite often used in analysis, but also allow to produce results compatible with data obtained from more reliable sources (medical surveys). A decreased self-assessment of health is rather good sign of the increased risk of death [2, p. 16].

There are two most common approaches to HLE estimation. The first one is used by World Health Organization (WHO) as part of Global Health Observatory program. The indicator known as Health-Adjusted Life Expectancy (HALE) is estimated for all the countries, but the estimation method depends on available data and represents a combination of statistical models and expert assessments. According to WHO definition, HLE is an average number of years that a man or a woman expects to live in perfect health, taking into account the years lived in less perfect health due to illness and/or injury [13]. The second approach is based on D. Sallivan's method using the shares of healthy persons, applied to the theoretical population of mortality tables (computations are made depending on age and gender). Such shares of healthy persons are determined on the basis of the sample survey on health status of the population or, much more often, on the basis of sample interviews of the population [12].

Issues of statistical assessment and modelling, comparative analysis of HLE have been in research focus of A. Aganbegyan [1], E. Andreyev, V. Shkolnikov, V. MakKi [2], E. Kiselyova [6], N. Levchuk [7], A. Ramonov [9], N. Ryngach [10], D. Sallivan [12] and others. However, scientific studies devoted to statistical analysis of health indicators on the basis of self-assessment by use of HLE cannot be easily found in the Republic of Belarus. This article is devoted to investigation of the population's health in Belorussian regions using the healthy life expectancy indicator.

Results of estimations and their analysis. The Republic of Belarus isn't among the countries where integral indicators lay the ground for monitoring of health. HLE is attractive due to its visibility, availability of data for estimation and insensibility to the population number or gender and age structure. It is intensively used by WHO and the organization on health studies in EU countries to monitor the situation with health, elaborate practical recommendations on improving its average status in a number of countries, and reduce differentiation caused by it [9, c. 502]. HLE allows to estimate the number of years to be expectedly lived by persons of certain age (in the Republic of Belarus estimations were made for 0, 16, 20, 30, 40, 50, 60 and 70 years) in a good health condition (i. e. without any serious problems with health, limiting the life activity of a person) given stable mortality and morbidity levels. For the statistical assessment of HLE in individual countries, Eurostat uses D. Sallivan's method created as early as in 1971 [12], allowing to integrate standard tools for statistical analysis of mortality tables and information on individuals' self-assessments of health. By Sallivan's virtue of, the term "disability free life expectancy" could gain a firm foothold in the scientific literature. By reliance on the Sallivan's method, numerous studies of the population's health status could be conducted in U.S. and European countries. By 2000s the notion of HLE had been well established in the WHO lexicon, which included this indicator in the European Health Expectancy Monitoring Unit (EHEMU).

The framework of Sallivan's methodology was used in estimating HLE for the population of the Republic of Belarus. As said earlier, there exist various approaches to determining the health status on the basis of respondent reports. For Belarus, the estimations were made on the basis of subjective assessments of the health status, obtained from the sample survey of households, devoted to the standard of living (with respondents attributing themselves to one of the health groups by

assessing own health as bad, satisfactory or good; for children aged 16, health assessments were given by their parents).

A review of the above survey conducted in 2015 and 2018 revealed that as the age increased people tended to assess their health as bad and satisfactory. Thus, in 2018 the health was assessed as good by 27.6% of all the respondents older than 16, as satisfactory by 63.1%, as bad by 9.3% of the respondents (to compare, in 2015 these reports were a little bit different: 27.0%, 63.1% and 9.9%, respectively). In older ages the picture was as follows: in 2018 the health was assessed as good by more than half of the respondents aged 20–29 (56.6%), but in the age of 30 years and older the self-assessment of health was significantly lower. As a result, the health was reported as good by 46.4% of the respondents aged 30–39, by 31.3% of the respondents aged 40–49, by 15.9% of the respondents aged 50–59, and by only 1.7% of the respondents aged 70 or older. As regards children and teenagers, most part of the parents tended to admit that their children younger than 16 had good health (this was reported by 60% of the respondents).

The respondents' self-assessment of health has notable gender-specific variations. Thus, men are prone to assess their health more optimistically than woman in an analogous age, and more than half of the responses was accounted for by the so called average category (satisfactory health). This pattern of response can be attributed to the fact that men tend to seek medical treatment less often than women and that due to the established social roles men (as "strong gender") are less inclined to complain about feeling unwell or inform about health problems [6, c. 96]. The health was assessed as good in 2018 by 32.8% of the men aged 16 and older, and by only 24.0% of the women (with bad assessments of health reported by 7.6% of the men and 10.5% of the women). In 2015, the health was reported as good by 32.1% of the men and 23.4% of the women, as bad – by 8.5% of the men and 11.0% of the women.

Because HLE indicators are constructed by Sallivan's method by use of dichotomous data on the health status, at the initial phase all the living population (the indicator of mortality and life expectancy tables ${}_nL_x$ in each studied age group: 0–15 years, 16–19 years, 20–29 years, 30–39 years, 40–49 years, 50–59 years, 60–69 years, 70 and more years) was divided into two parts: healthy ones, with no limitations specific to the health status (i. e. disability free), and unhealthy ones, with the above mentioned limitations. The share of people reporting about bad or too bad health in each age group from n to x years (${}_n\pi_x$), obtained from the sample survey of households on the standard of living, was chosen as a proxy for unhealthy ones in the subsequent estimations. This aspect, i. e. search for sound criteria for delineating health and illness, methods for their estimation and available sources of information, is the most challenging one in carrying out this kind of estimations and studies.

Subsequently, new tables were constructed for each year of the studied period and for each category of the population (the so called mortality and HLE tables), and HLE (e_x^h) of the persons reaching the age of x years was estimated by the formula [8]:

$$e_x^h = \frac{1}{l_x}\sum_{i=x}^{w}\left(1-{}_n\pi_i\right)\cdot {}_nL_i,$$

where l_x is the number of persons reaching the age of x years from mortality and HLE tables; w is the oldest age, assumed in estimations, years; ${}_n\pi_i$ is the share of the population reporting about bad or too bad health in the age interval from n to i years; $(1-{}_n\pi_i)$ is the share of the healthy population in the age interval from n to i years; ${}_nL_i$ is the table number of lived man-years in the age interval from n to i years.

HLE can be estimated for not only the age of 0 years (at birth), but for any age, e. g. how long will a person live healthy life when reaching 20, 40 or 60 years. Table 1 shows the results of HLE estimations for the population of the Republic of Belarus by age for 2005–2018. Here and below the estimations were made using data from mortality tables, provided by the National Statistical Committee of the Republic of Belarus (Belstat).

Table 1

HLE for the population of main ages, Republic of Belarus, 2005, 2010, 2015 and 2018

(years)

Age, years	Healthy life expectancy, e_x^h			
	2005	2010	2015	2018
0	61.60	66.74	67.57	68.09
16	46.74	51.42	52.16	52.61
20	43.01	47.60	48.30	48.84
30	33.95	38.33	38.88	39.35
40	25.41	29.55	29.85	30.25
50	17.51	21.42	21.61	21.78
60	10.96	14.44	14.27	14.21
70	5.68	8.52	8.20	7.84

The healthy life expectancy in the Republic of Belarus at birth made 61.60 years in 2005 and grew by 6.49 years till 2018 (to reach 68.09 years). The most intensive growth in HLE (nearly 80% of the total growth in 2005–2018) was recorded in the earliest five years of the studied period (2005–2010), with the increase making 5.14 years. As can be seen in Table 1, HLE could be increased in this period in nearly all the studied ages, and proved to be more significant in older ages. While for the persons who reached the age of 16 years HLE grew by 12.6%, or 5.87 years, in 2005–2018, for ones aged 20 it increased by more than 13.5%, and for ones aged 60 – by nearly 1/3 (29.7%). However, there was a decrease in HLE in the age of 60 years in 2015 compared with 2010, and in 2018 compared with 2015.

It is important to note that, according to the estimations of European statisticians, HLE for the Belarusian population at birth tends to exceed the average figure for the Commonwealth of Independent States, but it is 6 years less than the average figure for EU and about 3 years less than the average figure for the European region as a whole [5].

It is obvious that the life expectancy and the healthy life expectancy feature a close correlation over time: when the total lifespan significantly grows, the healthy lifespan will grow, too. Table 2 shows LEB, HLE, and their difference Δe_x^h caused by bad health, for Belarusians of all ages (for 2005 and 2018).

Table 2

LEB (e_x), HLE (e_x^h) and losses in the lifespan due to the deteriorating health (Δe_x^h), Republic of Belarus, 2005 and 2018

Age, years	2005				2018			
	e_x, years	e_x^h, years	Δe_x^h, years	Δe_x^h, %	e_x, years	e_x^h, years	Δe_x^h, years	Δe_x^h, %
0	68.83	61.60	7.23	10.51	74.46	68.09	6.37	8.56
16	53.58	46.74	6.84	12.76	58.79	52.61	6.18	10.52
20	49.73	43.01	6.72	13.51	54.87	48.84	6.03	10.98
30	40.54	33.95	6.59	16.25	45.19	39.35	5.84	12.92
40	31.90	25.41	6.49	20.36	35.92	30.25	5.67	15.77
50	23.91	17.51	6.40	26.76	27.30	21.78	5.52	20.22
60	17.05	10.96	6.09	35.71	19.51	14.21	5.30	27.14
70	11.29	5.68	5.61	49.72	12.88	7.84	5.04	39.12

The difference between LEB and HLE shows the average number of years to be lived by the studied generation with some kind of permanent life activity limitations caused by health problems. Hence, estimation of HLE allows to assess and compare not only the lifespan, but also the quality of life in various periods and various countries (regions). Besides that, HLE reflects the losses in the lifespan due to the deteriorating health.

As can be seen in Table 2, in spite of a close correlation between LEB and HLE, the latter does not grow proportionally to the former's growth: it is revealed that 8.2 percent growth (or 5.63 years in absolute figures) in LEB over the studied period (2005–2018) caused 10.54 percent growth in HLE (making 6.49 years).

In 2018, HLE of the Belarusian population made 68.09 years, from which it follows that average 8.56% of the lifespan was spent by the population in the unhealthy condition (10.51% in 2005 given 61.60 years of HLE). A positive tendency to the reduction of losses in the lifespan due to bad health is revealed. According to the estimation results, these losses reduced by more than 10 months in 2005–2018 (from 7.23 to 6.37 years). While in 2005 bad health took from 10.5% to 50.0% of the expected lifespan of the Belarusian population in various ages, in 2018 the losses in the lifespan due to bad health ranged from 8.5% to 40.0%. It would be interesting to note that as the age grows, the losses in the lifespan due to bad health and the share of these losses in the total lifespan grow as well. While in 2018 the lifespan reduction in the age of 40 years due to bad health made 5.67 years, or 5.77%, the losses in the age of 60 were higher than 27% (5.30 years in absolute figures).

Figure 1 shows LEB and HLE curves estimated for men and women in specific ages, residents of the Republic of Belarus in 2018. It is well known that women live longer than men, but the health-related losses in the expected lifespan for women prove to be more significant than for men (this pattern was revealed for all the estimated ages). While the total gap between LEB of men and women made 10.12 years in 2018, the gap between HLE was 6.78 (this proportion can also be noticed in Figure 1). The losses of LEB made 4.64 years for men and 7.98 years for women.

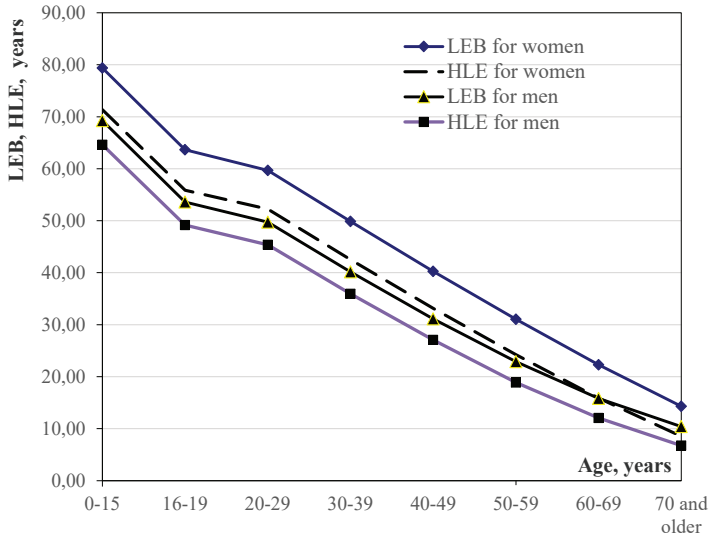

Figure 1. LEB and HLE for men and women, Republic of Belarus, 2018, years

In 2018, HLE made 64.60 years for men and 71.38 years for women. The difference between the span of healthy life of men and women is gradually narrowed by the age of 70 years, e. g. due to chronic deceases taking a large part of women's life as women are known to suffer from them stronger and longer than men [1, p. 145]. This can be partically attributed to a longer lifespan of womwn and specificities of women-related deceases. In the age of 70 years the difference between HLE of women and men made 1.76 years (i. e. the difference by gender practically disappears in the oldest ages).

The health status varies across the regions of the Republic of Belarus. The results of HLE estimation at birth for seven country regions (six regions and the city of Minsk) are given in Figure 2. HLE estimate at country level lays the basis for the subsequent normalization of HLEs for each region, in order to compute, at the next phase, aggregated indicators of the social sub-potential for 2015 and 2018.

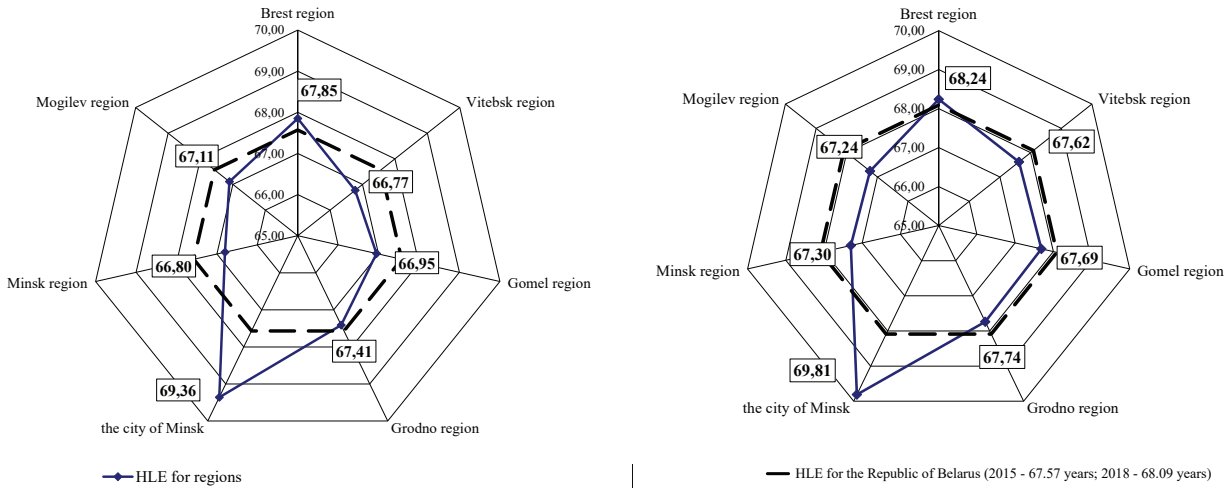

Figure 2. HLE of the population in the regions of the Republic of Belarus, 2015 and 2018, years

An analysis of the estimation results shown in Figure 2 reveals the following peculiarities. First, a growth in HLE in 2018 compared with 2015 is recorded at country level and in all the regions. The most successful regions are Vitebsk and Gomel ones, with HLE increased by 1.3% and 1.1%, respectively (given 1 percent growth at country level). The least extent of growth is recorded in Mogilev (with 100.2% growth rate), Grodno (100.5%) and Brest (100.6%) regions, and in the city of Minsk (100.6%). Second, the dispersion (the range of variation) of the highest and lowest HLE estimates (the best and the worst heath, respectively) made 2.57 to 2.59 years both in 2015 and 2018. Third, Brest region and the city of Minsk led the studied regions by the health status (estimated by HLE), with HLE exceeding the country

level (68.09 years) by 0.15 and 1.72 years in 2018, and by 0.28 and 1.79 years (compared with the country estimate of 67.57 years) in 2015. Fourth, HLEs in the other regions were lower than the country level. Of the group of lagging regions, the bottom positions were with Vitebsk region (with HLE lower than the country level by 1.2% or 0.80 years) and Minsk region (the difference in HLE is 1.1% or 0.77 years) in 2015, and with Minsk region (0.79 years) and Mogilev region (0.85 years) in 2018.

Table 3 shows the results of LEB and HLE comparison in 2018 for selected ages and regions of Belarus.

Table 3

LEB (e_x) and HLE (e_x^h) estimates, and the losses in the lifespan due to the deteriorating heath (Δe_x^h) in 0, 20, 40 and 60 years, regions of the Republic of Belarus, 2018

(years)

Region	0 years			20 years			40 years			60 years		
	e_x	e_x^h	Δe_x^h	e_x	e_x^h	Δe_x^h	e_x	e_x^h	Δe_x^h	e_x	e_x^h	Δe_x^h
Brest region	74.68	68.24	6.44	55.16	49.25	5.91	36.23	30.49	5.74	19.67	14.33	5.34
Vitebsk region	73.80	67.62	6.18	54.23	48.60	5.63	35.33	29.85	5.48	18.98	13.87	5.11
Gomel region	73.94	67.69	6.25	54.39	48.71	5.68	35.55	29.99	5.56	19.28	14.07	5.22
Grodno region	74.00	67.74	6.26	54.49	48.76	5.73	35.61	30.04	5.57	19.25	14.05	5.20
the city of Minsk	76.83	69.81	7.01	57.18	50.62	6.65	37.85	31.59	6.26	20.89	15.10	5.79
Minsk region	73.47	67.30	6.17	53.89	48.37	5.53	35.28	29.77	5.51	19.16	13.98	5.18
Mogilev region	73.32	67.24	6.08	53.72	48.25	5.48	34.99	29.60	5.39	18.86	13.79	5.07
Republic of Belarus	74.46	68.09	6.37	54.87	48.84	6.03	35.92	30.25	5.67	19.51	14.21	5.30

Traditionally, the city of Minsk (where the newborns were to live 76.83 years given the stability of gender and age mortality in the later life at the moment of estimations) and Brest region (74.68 years, respectively) were leaders by LEB. The significantly lower LEB estimate than the country average was recorded in Mogilev region and Minsk region in 2018 (73.2 and 73.47 years, respectively). The similar differentiation was found for HLEs (at birth and for specific ages). While a Minsk city resident aged 60 was to live in good health 15.10 years in 2018 (which comprised 72.3% of LEB), for a Minsk region resident aged 60 HLE was equal to 13.98 years (comprising 73.0% of LEB).

The estimate of losses Δe_x^h also varies across regions. As can be seen in Table 3, while Belarusians younger than 20 are to live healthy life in the later 48.25 to 50.52 years, or 88.5 to 90.0% of the later life (depending on a region), this estimate will be 29.60 to 31.59 years (83.5 to 84.6% of LEB) for the ones aged 40, and 13.79 to 15.10 years, or 72.3 to 73.1%, for the ones aged 60. As should be expected, the losses in the lifespan due to bad health have direct correlation with the population's age: while they were equal to 8.3–9.1% (being region-specific) for ones in the age of 0 years, and 10.0–11.5% for ones in the age of 20 years, for ones in the age of 40 years they grew up to 15.4–16.5%, and for ones in the age of 60 years they increased to 26.9–27.7%.

Conclusion. The modern society seeks for not only the longevity, but the fulfilling and high quality (healthy) life. Therefore, a health study, in addition to conventional medical and demographic indicators (mortality, life expectancy, morbidity ratios, disability rates etc.), should cover the indictors allowing for the lifespan analysis from the quality perspective. We believe that the most effective indicators for the assessment of social sub-potential of the sustainable innovation-driven development of regions are ones that are estimated through analysis and interpretation of mortality tables and used in potential demography (healthy life expectancy and life potential indicators).

By HLEs constructed and published by WHO, the Republic of Belarus is traditionally placed in the second hundred among more than 190 member countries. Belarusian HLEs for men tend to be lower than the global average, and for women they are slightly higher than the global average. Increasing the estimates to the level of developed countries, being a core objective of the national policy on health protection, requires long time and heavy effort aimed at the development of health protection and social services along with enhancing the standard of living and overcoming the social inequality. Prolongation of HLE is supposed to become a genuine efficiency criterion for social policy and health protection.

The statistical assessment and analysis of HLE for the population of the Republic of Belarus allowed to reveal the emerging tendencies in the HLE dynamics in 2005–2018, and to make a comparative analysis of its estimates in the Belarusian regions. Also, along with the estimates of life potential, the derived regional estimates of HLE lay the background for constructing aggregated indicators at the next phase

of the study for each of the four sub-potentials of the sustainable innovation-driven development (demographic, social, ecological-environmental, and investment), for each of the country regions. This will enable to derive the summary indicator for a multidimensional assessment of the cumulative potential for the sustainable innovation-driven development of Belarusian regions for 2015 and 2018.

The article is published as part of the research project "Develop statistical methods for the assessment and geo-spatial visualization of the potential for the sustainable innovation-driven development of the region", performed by the contract between the Belarus State Economic University and the Belarusian Republican Foundation for Basic Research No Г19-105 from 02.05.2019.

References

1. Aganbegyan, A. G. (2015). O prodolzhitelnosti zdorovoy zhizni i pensionnom vozraste [About healthy life expectancy and retirement age]. *Vserossiyskiy zhurnal "EKO" – ECO Journal, 9,* 144–157. Retrieved from https://cyberleninka.ru/article/n/o-prodolzhitelnosti-zdorovoy-zhizni-i-pensionnom-vozraste/viewer [in Russian].

2. Andreev, E. M., Shkolnikov, V. M., & MakKi, M. (2002). Prodolzhitelnost zdorovoy zhizni [Healthy life expectancy]. *Voprosy statistiki – Statistical issues, 11,* 16–21 [in Russian].

3. Belarus i strany mira. 2020: stat. sb. [Belarus and Countries of the World. 2020: *Statistical Yearbook]. (2020). National Statistical Committee of the Republic of Belarus.* Minsk. Retrieved from https://www.belstat.gov.by/upload/iblock/f64/f648db874ee3f872c7b7028f0d03a383.pdf [in Russian].

4. Demograficheskiy ezhegodnik. 2018: stat. sb. [Demographic Yearbook. 2018: Statistical Yearbook]. (2019). *National Statistical Committee of the Republic of Belarus.* Minsk [in Russian].

5. European Health Information Gateway. Health for all explorer. *gateway.euro.who.int.* Retrieved from https://gateway.euro.who.int/en/hfa-explorer.

6. Kiseleva, E. S. (2011). Prodolzhitelnost zhizni i zdorove naseleniya starshego vozrasta v Rossii [Life Expectancy and Health at Older Ages in Russia.]. *Vestnik Moskovskogo universiteta (Ekonomika) – Bulletin of the Moscow University (Economy), Vol. 6, Issue 2,* 93–100 [in Russian].

7. Levchuk N. M. (2017). Zdorovia i tryvalist zhyttia v Ukraini u konteksti formuvannia peredumov innovatsiinoi zainyatosti [Health and Life Expectancy in Ukraine in the Context of Innovative Employment]. *Demohrafiia ta sotsialna ekonomika – Demography and Social Economy, 1 (29),* 54–65. Retrieved from https://dse.org.ua/arhcive/29/4.pdf [in Ukrainian].

8. Metodika rascheta pokazatelia "Ozhidaemaia prodolzhitelnost zdorovoy zhizni (let)": utverzhdena prikazom Rosstata ot 25.02.2019 goda № 95 [Methodology for calculating the indicator "Healthy life expectancy (years)". Approved by Order of the Federal State Statistics Service of February 25, 2019 No. 95]. *docs.cntd.ru.* Retrieved from http://docs.cntd.ru/document/552499807 [in Russian].

9. Ramonov, A. V. (2011). Ozhidaemaya prodolzhitelnost zdorovoy zhizni kak integralnaya otsenka zdorovya rossiyan [Healthy life expectancy as an integral assessment of the health of Russians]. *Ekonomicheskiy zhurnal Vysshey shkoly ekonomiki – Economic Journal of the Higher School of Economics, Vol. 15, Issue 4,* 497–518. Retrieved from https://www.hse.ru/data/2012/03/25/1265526867/15_04_06.pdf [in Russian].

10. Ryngach, N. O. (2019). Peredchasna smertnist [Premature mortality]. *Population of Ukraine. Demographic dimension of life quality.* O. M. Gladun (Ed.); NAN Ukrainy, Instytut demohrafii ta sotsialnykh doslidzhen imeni M. V. Ptukhy. Kyiv [in Ukrainian].

11. Tihonova, L. E., & Fokeeva, L. V. (2015). *Demograficheskiy potentsial Respubliki Belarus: analiz i perspektivy razvitiya [Demographic potential of the Republic of Belarus: analysis and development prospects].* Minsk: Izdatelskiy thentr BGU. Retrieved from https://library.bntu.by/sites/default/files/novye-postupleniya/tihonova-l-e-demograficheskiy-potencial-respubliki-belarus-analiz-i-perspektivy-razvitiya.pdf [in Russian].

12. Sallivan, D. F. (1971). *A single index of mortality and morbidity.* HSMHA Health report. Vol. 86 (4). 347–354. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1937122/

13. WHO methods and data sources for life tables 1990–2016 (2018). WHO. Department of Information, Evidence and Research. Global Health Estimates Technical Paper WHO/HIS/IER/GHE/2018.2. Retrieved from https://www.who.int/healthinfo/statistics/LT_method.pdf

А. Г. Кулак,
кандидат економічних наук, доцент,
доцент кафедри статистики,
Заклад освіти
“Білоруський державний економічний університет”,
E-mail: alla_kulak@mail.ru
ORCID: https://orcid.org/0000-0002-4318-890X

Статистична оцінка очікуваної тривалості здорового життя в регіонах Республіки Білорусь

Оцінено сукупний потенціал сталого інноваційного розвитку регіонів Республіки Білорусь на основі вимірювання окремих субпотенціалів (соціального, демографічного, еколого-економічного, інвестиційного) та подальшого моделювання агрегованої характеристики за кожним із регіонів. Обґрунтовано, що важливим компонентом соціального субпотенціалу, а також основою і необхідною умовою розвитку всіх інших субпотенціалів є здоров’я населення. Статистичну оцінку здоров’я в рамках системи показників інноваційного сталого розвитку регіонів запропоновано здійснювати за допомогою таких базових індикаторів, як життєвий потенціал і очікувана тривалість здорового життя (далі – ОТЗЖ) населення. Стаття присвячена дослідженню здоров’я населення в регіонах Білорусі з використанням індикатора ОТЗЖ, який відображає середнє число років, що проживає особа, з урахуванням стану здоров’я (як правило, виміряного за даними репрезентативних опитувань). Тобто це очікувана тривалість життя, оцінена з огляду на якість прожитих років. Отже, величина ОТЗЖ дозволяє обчислити втрати в тривалості життя, пов’язані з погіршенням здоров’я.

У статті проведено статистичне оцінювання й аналіз динаміки ОТЗЖ населення Білорусі при народженні та для окремих вікових груп за 2005–2018 рр. З використанням методу Д. Саллівана вивчені рівні показника за регіонами Республіки Білорусь у 2015 і 2018 роках. Очікувана тривалість здорового життя білорусів при народженні в 2018 р склала 68,09 року і збільшилася порівняно з 2005 р. на понад 10%, або на 6,49 року; при цьому зростання характерне для кожної з вивчених вікових груп. Виявлено, що білоруські жінки живуть довше, проте порівняно з чоловіками вважають своє життя менш якісним (мають погане здоров’я). Розрив між показниками у 2018 р. склав 6,78 року: ОТЗЖ жінок дорівнювала 71,38 року, чоловіків – 64,60 року. При цьому втрати в тривалості життя через погіршення здоров’я склали 4,64 року (для чоловіків) і 7,98 року (для жінок). Лідерами за показником ОТЗЖ (як у 2015 р., так і в 2018 р.) є Брестська область та м. Мінськ, серед регіонів-аутсайдерів – Вітебська й Мінська області у 2015 р. і Могилевська та Мінська області в 2018 р. На наступному етапі досліджень розраховані показники разом із показником життєвого потенціалу регіонів стануть основою для оцінки здоров’я населення в рамках соціального субпотенціалу кожного з регіонів країни.

Ключові слова: *соціальний субпотенціал, здоров’я населення, регіони, самооцінка здоров’я, очікувана тривалість здорового життя, Цілі сталого розвитку.*

А. Г. Кулак,
кандидат экономических наук, доцент,
доцент кафедры статистики,
Учреждение образования
“Белорусский государственный экономический университет”,
E-mail: alla_kulak@mail.ru
ORCID: https://orcid.org/0000-0002-4318-890X

Статистическая оценка ожидаемой продолжительности здоровой жизни в регионах Республики Беларусь

Совокупный потенциал устойчивого инновационного развития регионов Республики Беларусь предлагается оценивать на основе измерения отдельных субпотенциалов (социального, демографического, эколого-экономического, инвестиционного) и последующего моделирования агрегированной характеристики по каждому из регионов. Обосновано, что важным компонентом социального субпотенциала, а также основой и необходимым условием развития всех остальных субпотенциалов является здоровье населения. Статистическую оценку здоровья в рамках системы показателей инновационного

устойчивого развития регионов предложено осуществлять с помощью таких базовых индикаторов, как жизненный потенциал и ожидаемая продолжительность здоровой жизни (далее – ОПЗЖ) населения. Статья посвящена исследованию здоровья населения в регионах Беларуси с использованием индикатора ОПЗЖ, который отражает среднее число лет, проживаемых человеком, с учетом состояния здоровья (как правило, оцененного по данным репрезентативных опросов). То есть это ожидаемая продолжительность жизни, оцененная с учетом качества проживаемых лет. Таким образом, величина ОПЗЖ позволяет вычислить потери в продолжительности жизни, связанные с ухудшением здоровья.

В статье проведено статистическое оценивание и анализ динамики ОПЗЖ населения Беларуси при рождении и для отдельных возрастов за 2005–2018 гг. С использованием метода Д. Салливана изучены уровни показателя в регионах Республики Беларусь в 2015 и 2018 гг. Ожидаемая продолжительность здоровой жизни белорусов при рождении в 2018 г. составила 68,09 года, увеличившись по сравнению с 2005 г. более чем на 10%, или на 6,49 года, при этом рост характерен для каждого из изученных возрастов. Выявлено, что белорусские женщины живут дольше, однако по сравнению с мужчинами считают свою жизнь менее качественной (имеют плохое здоровье). Разрыв между показателями в 2018 г. составил 6,78 года: ОПЗЖ женщин равнялась 71,38 лет, мужчин – 64,60 лет. При этом потери в продолжительности жизни из-за ухудшения здоровья составили 4,64 года (для мужчин) и 7,98 года (для женщин). Лидерами по показателю ОПЗЖ (как в 2015 г., так и в 2018 г.) являются Брестская область и г. Минск, среди регионов-аутсайдеров – Витебская и Минская области в 2015 г. и Могилевская и Минская области в 2018 г. На следующем этапе исследований рассчитанные показатели наряду с показателем жизненного потенциала регионов станут основой для оценки здоровья населения в рамках социального субпотенциала каждого из регионов страны.

Ключевые слова: *социальный субпотенциал, здоровье населения, регионы, самооценка здоровья, ожидаемая продолжительность здоровой жизни, Цели устойчивого развития.*

Bibliographic description for quoting:

Kulak, A. G. (2020). Statisticheskaya otsenka ozhidayemoi prodolzhitelnosti zdorovoi zhizni v regionakh Respubliki Belarus [Statistical Assessment of Healthy Life Expectancy in the Regions of the Republic of Belarus]. *Statystyka Ukrainy – Statistics of Ukraine, 4,* 72–80. Doi: 10.31767/su.4(91)2020.04.08.

Бібліографічний опис для цитування:

Кулак А. Г. Статистична оцінка очікуваної тривалості здорового життя в регіонах Республіки Білорусь (публікується англійською мовою). *Статистика України.* 2020. № 4. С. 72–80. Doi: 10.31767/su.4(91)2020.04.08.

Библиографическое описание для цитирования:

Кулак А. Г. Статистическая оценка ожидаемой продолжительности здоровой жизни в регионах Республики Беларусь (публикуется на английском языке). *Статистика України.* 2020. № 4. С. 72–80. Doi: 10.31767/su.4(91)2020.04.08.