

Original Paper

Diagnostics of the Life Deficiency of Life of the Population of Ukraine

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Abstract

The article is devoted to the determination of the lifespan deficiency of the population of Ukraine. The diagnostics is carried out on the basis of generalization of studies by domestic and foreign scientists in the context of lifespan. Calculations were made on the basis of official data of the State Statistics of Ukraine and the World Health Organization. In the article, by the lifespan deficiency of the population, it is suggested to mean actual shortage of a certain period of lifespan that has resulted from death coming from external and/or internal causes that prevent a person from living to the limits of his/her biological capabilities. The diagnostics is based on the methodology for constructing mortality tables of average expected lifespan for one year and five years old age groups. The results of the diagnostics made it possible to find that the real lifespan deficiency in Ukraine is 12.4 years. In addition, it was determined that the potential lifespan deficiency of the Ukrainians from so-called “diseases of behavior” is 2.47 years. It was substantiated that, in the context of overcoming mortality from such diseases as AIDS, active tuberculosis, alcoholism, and drug addiction by adjusting the behavior of the population in society, lifespan can increase by almost three years.

Keywords

health, health status, lifespan, healthy life duration, average expected lifespan, real lifespan deficiency, potential lifespan deficiency, lifespan diagnostics, premature mortality

1. Introduction

One of the most important indicators of the socio-economic development of society is average expected lifespan at birth (indicator of longevity), which is one of the indicators of the quality of life of the population. Singling out this component by the UN as one of the three components that characterize the welfare level of the population is due to the fact that the indicator of average expected lifespan depends on the conditions of human life.

The high mortality rate of the population of Ukraine, especially at the working age, affects the expected lifespan of the population and becomes one of the urgent problems of society. On this premise, modern studies of the structure and dynamics of the lifespan of the population, as well as the identification of the reasons influencing it, are of particular importance. Solving this problem requires careful scientific research and analysis.

1.1 Analysis of Recent Research and Publications

Health status and lifespan extension has been attracted, are attracting and will always attract attention both in scientific circles and in everyday life of ordinary citizens of the whole world. Thanks to works of such authors as: Human Development of the Regions of Ukraine: Analysis and Forecast Collective Monograph K.: Institute of Demography and Social Studies of the National Academy of Sciences of Ukraine, Health and life expectancy in Ukraine in the context of the prerequisites for an innovative employment. Demography and Social Economics, Demographic Consequences of Alcohol Abuse in Ukraine, Demography and Social Economy, Economic equivalent of losses due to premature mortality in Ukraine, Demography and social economy. Mortality of the Ukrainian population in working age, and others, modern Ukrainian science has a substantial number of works devoted to addressing problems of lifespan of the population.

Among the recent works focused on addressing issues of extending lifespan through overcoming illnesses, of interest are the works by Hall, Taylor, Barnes. Dependence of the achievement of the goals of the sustainable development of the Eastern Mediterranean on the improvement of public health was studied by Akbar, Hirani, Richter, and many other researchers, but this is not sufficient to solve problems of overcoming the lifespan deficiency of the population of Ukraine.

1.2 Purpose

The purpose of the article is to determine the expected lifespan deficiency at birth of the population of Ukraine.

1.3 Result and Discussion

According to the World Health Organization (data as of 2017), Ukraine ranked 104th in the world in terms of population lifespan. So, with regard to this indicator, Ukraine was left behind not only by countries that are classified as economically developed, but also by many developing or underdeveloped countries such as Nicaragua (75th place), Honduras (77th place), Venezuela (85th place), Azerbaijan (96th place), Libya (97th place), Belarus (98th place), Guatemala (101st place), Bangladesh (102nd place). The main reasons for such a situation are the low level and unfavorable conditions of

living and working of a large part of the population of Ukraine, low efficiency of the existing health care system, pollution of a large part of the territory by industrial waste, prevalence of bad habits, and neglect of healthy lifestyle standards.

The lag, with regard to the indicator of average expected lifespan at birth, of Ukraine from European countries leads to deterioration in the quality of life and to changes in the structure of the population. Thus, population lifespan in Ukraine in 2016 amounted to 71.38 years, including 66.37 years for men and 76.25 years for women. The difference in the lifespan of men and women in our country is almost 10 years, while in economically developed countries this indicator is 5-6 years.

2. Deficiency of Life Expectancy

It should be noted that by the lifespan deficiency of the population (from Latin *deficit*-it lacks) one means actual shortage of a certain period of lifespan that arose as a result of death coming from external and/or internal causes that do not allow a person to live to the limits of his/her natural abilities. By natural human abilities of a person, the authors mean the age which can potentially be reached by 80% of the representatives of the corresponding generation.

In theory and practice, real and potential lifespan deficiency is singled out. Real deficiency, according to the authors, can be considered as the number of years that Ukrainians fail to live to reach the maximum lifespan recorded in the world. It is clear that each year these indicators will vary depending on the statistics provided by the World Health Organization and the UN. Potential deficiency should be considered as a period of time by which lifespan is reduced depending on various causes that can potentially be eliminated, or whose effects can be reduced. Thus, in order to develop an effective mechanism for overcoming the lifespan deficiency of Ukrainians, it is advisable to differentiate the causes that cause it.

In previous studies, it was found that the formation of the value of average expected lifespan at birth is influenced by the following factors: man-made, physiological, and socio-economic ones (Figure 1).

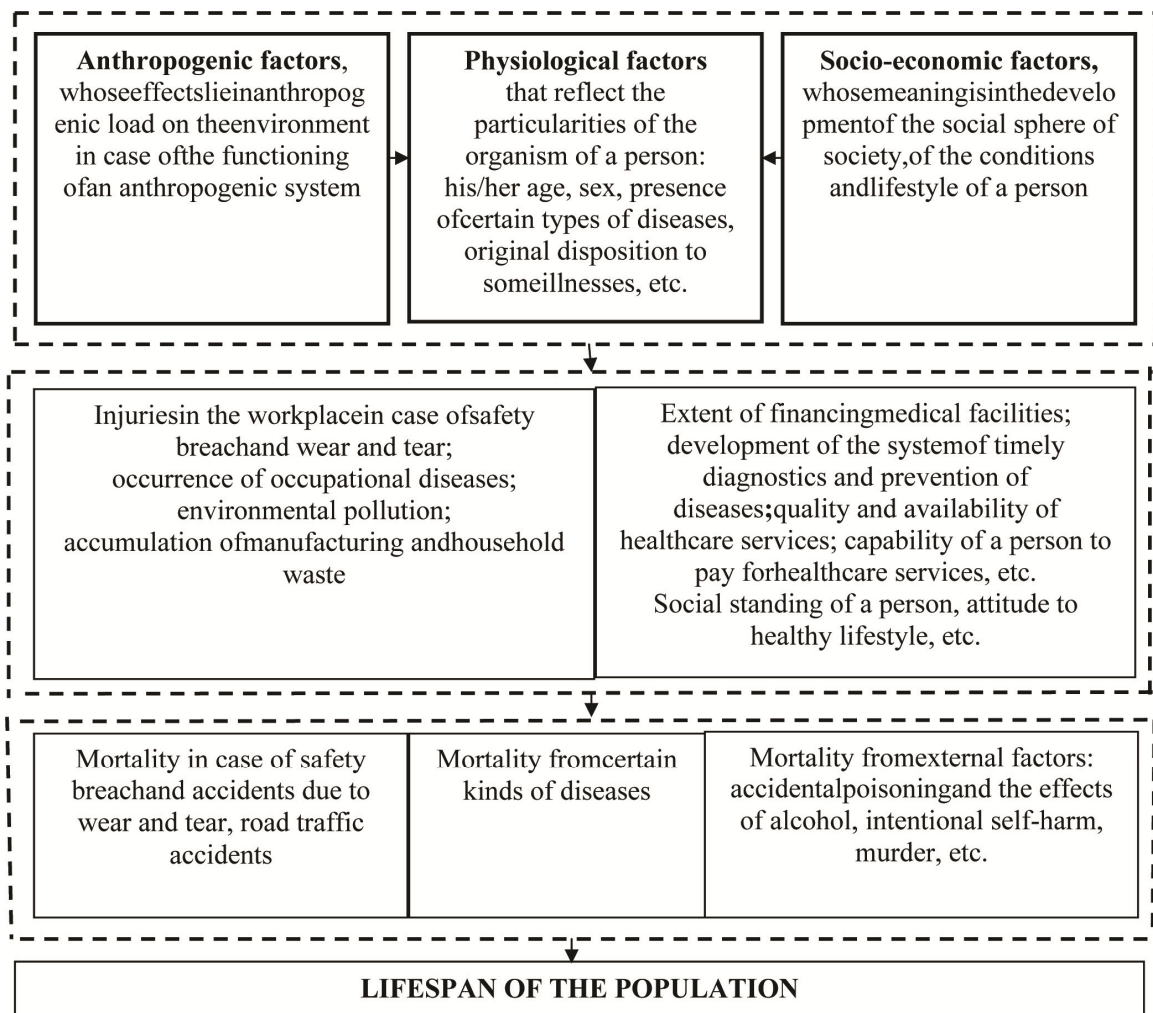


Figure 1. Factors Influencing the Formation of the Value of Average Expected Lifespan at Birth

Source: author's formulization according to previous research.

It is clear that the threat of the effects of the listed factors on a person will always be present. However, reducing the threat of the effects of some of them is possible through changes in social behavior, through raising the level of public responsibility and consciousness, etc.

It is found that the real lifespan deficiency of the Ukrainians is 12.4 years. This shows that the inhabitants of Ukraine do reach the possible hypothetical limit of the natural possibilities of the organism of a person.

Thus, if the socio-economic conditions of the reproduction of the population are changed, and the changes are aimed at improving their lives, one can count on an increase in the lifespan at birth by almost 12 years.

In this study, we give an example of the calculation of the potential average expected lifespan deficiency at birth caused by the causes of mortality from so-called “socially dangerous diseases”, that is, “diseases of behavior”, the dynamics of which is presented in Table 1.

Table 1. Dynamics of Socially Dangerous Diseases in Ukraine

Indicators	Years						Deviation	
	1995	2000	2005	2010	2015	2016	abs., pers. 1995-2016	rel., % 1995-2016
Living with HIV	1529	30692	62936	110503	126759	133117	131588	8606
per 100,000 of population	3.0	63.1	134.6	242.3	297.6	313.8	310.8	10360
AIDS, <i>persons</i>	54	917	5096	1402	34055	38779	38725	71712,9
per 100,000 of population	0.1	1.9	10.9	30.8	80.0	91.4	91.4	91300
Active tuberculosis, <i>persons</i>	99518	122904	103177	78635	36228	34966	-64552	-64.9
per 100,000 of population	194.8	250.6	220.7	172.5	85.1	82.4	-112.4	-57.7
Mental and behavioral disorders due to alcohol consumption, <i>persons</i>	736215	687716	650177	607461	475670	470196	-266019	-36.1
per 100,000 of population	1441.3	102.4	1390.8	1332.2	1116.8	1108.6	-332.7	-23.1
Mental and behavioral disorders due to the consumption of drugs and psychoactive sub-stances, <i>persons</i>	46515	76041	87883	80589	61715	62204	15689	33.7
per 100,000 of population	91.1	155.1	188.0	176.7	144.9	146.7	55.6	61.0

Source: calculated according to data of the State Statistics Service of Ukraine.

Mortality in Ukraine from the illness caused by the human immunodeficiency virus in 2016 amounted to 4036 cases (9.9 ‰). The number of people infected with HIV and AIDS who were registered at medical institutions of Ukraine in 2016 amounted to 133117 (313.8 ‰) and 38779 (91.4 ‰) persons respectively.

The dynamics of the spread of this infection over the last decade suggests that it is spreading at an exponential rate. And this is just official data. Back in 1995, the World Health Organization classified Ukraine as a country with a low prevalence of AIDS (HIV). However, we can assume that the real estimate of patients to some extent exceeds the official statistics.

The complex epidemiological situation in Ukraine with tuberculosis morbidity and mortality is causing concern. According to scientists, the current problem of the third millennium in the world has been the increase in the incidence of tuberculosis and the spread of the human immunodeficiency virus, with those illnesses belonging to the most dangerous and widespread diseases in the world as well as in Ukraine. It is also noted that these diseases have not been eliminated in any country in the world.

Despite the fact that the number of patients with active tuberculosis diagnosed for the first time in life has a stable tendency to decrease from 29753 in 2000 to 23292 in 2016 (it is more than 20%), the number of patients remains high enough. This trend can also be traced when calculating using 100000 of population: from 60.4 in 2000 to 54.8 in 2016. On average, over 20000 persons in Ukraine annually are found to have tuberculosis.

Most often, people of working and reproductive age are struck (Figure 2).

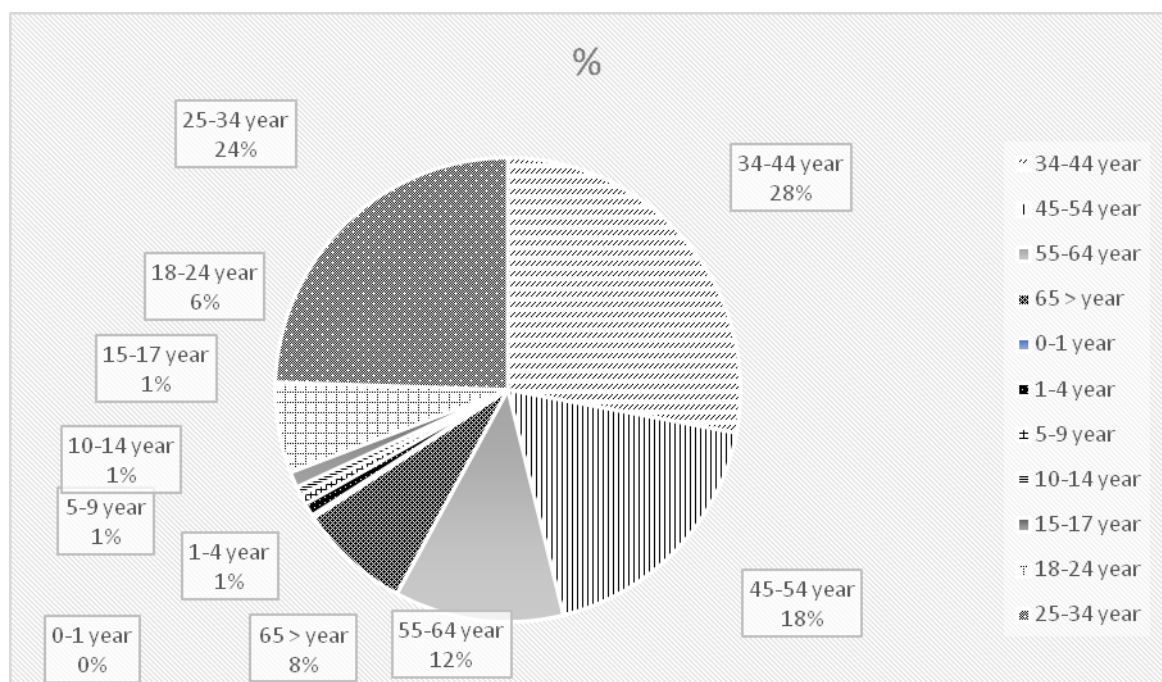


Figure 2. Age Structure of Persons Who Contracted Tuberculosis in Ukraine in 2016

Source: compiled by the author based on the works of Petrenko.

3. The Reasons for the Shortage of Life Expectancy Growth

Among the most common causes of the increased incidence of tuberculosis are the following. First and foremost, these are socio-economic problems of the development of society, the consequences of which are a decline in the standard of living of the general population, malnutrition and violation of nutrition regime, food of low quality, which further reduces the body's resistance to tuberculosis. The second reason is the lack of funding for anti-TB facilities. Other causes include: the existence of a significant number of patients (more than 10 thousand people) in detention facilities; social problems, namely

unemployment, alcoholism, drug addiction, stress, etc. The current dynamics of tuberculosis mortality tends to increase. Thus, since 1991, the mortality rate from this disease has increased from 8.1 per 100000 of population in 1991 to 10.2 in 2016. It is evident that the spread of social diseases such as AIDS and tuberculosis occurs in countries (regions) with serious socio-economic problems, which, in turn, leads to an increase in the number of deaths from this disease.

According to analysis of the consumption of alcoholic beverages in Ukraine, it has been found that there is a negative tendency to an increase in their consumption volumes. World Bank experts believe that in Ukraine, 40% of deaths of men and 22% of women of working age (from 20 to 64 years old) are the result of alcohol consumption. This is especially true for the consumption of strong alcoholic beverages, which is the most harmful to the health of the population and leads to negative social and economic consequences.

During the 90's of the twentieth century, the incidence of drug addiction and substance abuse has increased fourfold in Ukraine; also, the number of patients (per 100,000 people) who are registered for mental and behavioral disorders due to the consumption of drugs and other psychoactive substances more than tripled. Thus, the spread of drug addiction in Ukraine remains, along with alcoholism, one of the most important and most acute problems.

Given the fact that official statistics do not give a real picture of the consumption of drugs by the population, the extent of this problem is not determined. Drug consumption leads not only to the physical and social degradation of a person, but also to extremely negative consequences for society. Among them, one can mention the following ones:

- rise of the level of crime, increase in the number of grave and gravest crimes;
- spread of a wide range of concomitant diseases (hepatitis, tuberculosis, HIV, AIDS, which requires the state to increase the expenses for their prevention and treatment).

A significant impact on the lifespan of the population is made by the existing rate of mortality of the population from alcoholism and drug addiction. The consumption of alcoholic beverages amounts to 1.7% of the total household cash expenditures per month (for example, healthcare consumes about 2.1% of household expenditures). It should be borne in mind that there are no direct statistics of alcohol consumption in Ukraine; such an assessment can only be made on the basis of the volume of registered alcohol sales or according to relevant sociological surveys. The reliability of official statistical reporting is questionable, since it does not reflect the true capacity of the Ukrainian alcohol market, the size of which is much larger than the declared one. The corresponding expert estimates of alcohol consumption among Ukrainians are averagely hovering around 10-13 liters per capita.

It is worth remembering that, according to the WHO, alcohol consumption of more than 8 liters per year is dangerous and detrimental to health. Thus, an increase in average per capita consumption of alcohol by 1 liter adds 8 male and 1 female suicides per 100000 men and 100000 women. For alcoholics, the risk of suicide is 9 times higher than for the rest of the population.

The World Health Organization experts have found that each additional liter of pure alcohol above the specified limit causes a reduction in lifespan by 11 months for men and 4 months for women. Also, there is a close connection between the indicators of alcohol consumption, on the one hand, and the level of injury and mortality from accidents and the incidence of many chronic diseases, on the other one.

Among drug addicts, other diseases and viruses (HIV, hepatitis viruses, etc.) are also common, which significantly reduce the lifespan of a person. There is an assumption that the average lifespan of people who regularly take opioid drugs is 7-10 years since the beginning of narcotization.

Thus, it can be argued that the morbidity and mortality from AIDS, active tuberculosis, alcoholism, and drug addiction are an important indicator that influences the lifespan of the Ukrainians. As already noted, these diseases are considered “diseases of behavior”. That is, these diseases, as well as the consequences of mortality from them, can be avoided if adjusting the behavior of the population in society.

In order to calculate the expected lifespan of the population of Ukraine according to a hypothetical scenario, we will give the indicators of mortality from such diseases as AIDS, active tuberculosis, alcoholism, and drug addiction (Table 2).

Table 2. Structure of Mortality of the Population of Ukraine in 2016

Age interval, years	In all		For certain causes of mortality		
	Number of the dead	Mortality rate	Mortality rates from a disease caused by HIV (<i>per 100 000 of population</i>)	Mortality rates from tuberculosis (<i>per 100000 of population</i>)	Mortality rates from mental and behavioral disorders due to alcohol consumption
0–1	3318	722.2	1.3	0.3	0
1–4	662	37.2	0.1	0.4	0
5–9	419	18.0	0.1	0	0
10–14	454	21.9	0.1	0	0
15–19	1154	58.1	0.4	0.2	0.1
20–24	2437	89.7	1.5	1.6	0
25–29	4867	142.2	8.3	6.1	0.6
30–34	7875	225.5	21.2	10.2	1.1
35–39	11001	360.8	31.9	18.9	2.2
40–44	14108	489.9	28.6	19.9	2.6
45–49	17448	658.9	21.1	21.7	4.7
50–54	26564	913.1	12.4	22.0	4.3
55–59	37541	1296.6	6.3	18.0	4.4

60–64	49010	1981.8	2.6	13.6	4.0
65–69	53626	2822.1	1.1	6.1	2.5
70–74	59328	4285.1	0.3	6.0	1.4
75–79	108579	6785.0	0.2	5.2	0.9
80 and>	196405	19550.3	0.2	3.4	0.9
All population	594796	1477.1	10.0	1.2	1.9

Source: built according to data of the State Statistics Service of Ukraine, compiled by the author according to data of the State Statistics Service of Ukraine.

The next stage in diagnosing the lifespan deficiency of the population of Ukraine is the construction of mortality tables and the calculation of the average expected lifespan of the population. The calculations are made based on the “Methods for constructing mortality tables and average expected lifespan for one year and five year age groups”.

Firstly, estimates of the average expected lifespan of the population of Ukraine in 2016 under real conditions were made. The resultant value of lifespan at birth is 71.38 years.

Secondly, calculations of the hypothetical average expected lifespan of the population of Ukraine at birth in 2016 are made. That is, if the rate of mortality from a disease caused by human immunodeficiency virus, tuberculosis, alcoholism, and drug addiction were excluded, it is calculated that the lifespan would be 73.85 years.

Thus, it can be argued that the potential lifespan deficiency of the Ukrainians from so-called “diseases of behavior” is 2.47 years. Consequently, on the assumption of overcoming mortality from such diseases as AIDS, tuberculosis, alcoholism, and drug addiction by adjusting the behavior of the population in society, lifespan is increased by almost two and a half years.

A significant impact on the formation of the expected lifespan of the population at birth is made by deaths due to safety breaches in the workplace. A high degree of wear and tear against the backdrop of low investment activity in industry and the municipal sector remains a potential threat of accidents and incidents at hazardous industrial facilities, including those with fatal consequences. Physical and moral aging of production equipment is a problem that concerns all sectors of the economy and is characteristic of all regions of Ukraine.

According to conclusions of appropriate commissions, in 2016, in the event of failure to take necessary measures for safety and lack of personal protective equipment, 4429 accidents directly related to production occurred, of which 357 (8.1%) had fatal outcomes. Thus, the elimination of mortality due to safety breaches and accidents is a potential opportunity to increase the lifespan of the population of Ukraine.

It should also be noted that the potential for increasing the lifespan of the population includes the exclusion of mortality from transport accidents (in 2016, the number of victims was 4687 people) and intentional self-harm (the number of deaths is 6898 people). Consequently, the hypothetical elimination

of mortality due to these reasons will increase the expected lifespan at birth by about 1 year.

4. Conclusion and Recommendations

The authors' assessment of the lifespan deficiency in Ukraine has made it possible to draw the following conclusions. Firstly, the lifespan deficiency of the population is actual shortage of a certain period of lifespan that arose as a result of death coming from external and/or internal causes that do not allow a person to live to the limits of his/her natural abilities. By the natural abilities of a person we mean the age that can potentially be reached by 80% of the representatives of the corresponding generation.

Secondly, the lifespan deficiency of the population can be presented as real and potential. The real deficiency is considered as the number of years that Ukrainians do not live to reach the maximum lifespan recorded in the world. As for the potential deficiency, it is proposed to consider it as a period of time by which lifespan is reduced that is caused by a specific cause which can potentially be eliminated (or the consequences of which can be reduced).

Thirdly, the determination of the average expected lifespan deficiency at birth as a result of mortality from the main causes allows establishing a change in the value of this indicator, provided that the mortality from a particular cause is completely eliminated.

It is substantiated that an important indicator that influences the lifespan of the Ukrainians is the morbidity and, as a consequence, mortality from AIDS, active tuberculosis, alcoholism and drug addiction, transport accidents and intentional self-harm.

It is established that the real lifespan deficiency in Ukraine is 12.4 years; the potential lifespan deficiency of the Ukrainians caused by so-called "diseases of behavior" is 2.47 years. It is substantiated that in case of overcoming mortality from diseases such as AIDS, active tuberculosis, alcoholism and drug addiction, transport accidents and intentional self-harm by adjusting the behavior of the population in society, the lifespan may increase by almost 3.5 years.

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