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FEATURES OF PRIMARY DISABILITY INDICATORS IN DISEASES OF THE CIRCULATORY SYSTEM IN UKRAINE

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Summary. Throughout the world, cardiovascular diseases (CVD) are one of the most pressing medical and social problems. The paper analyzed approaches to the assessment of primary disability indicators due to diseases of the circulatory system. Statistical information on the state of disability in Ukraine was obtained from the "Report on the causes of disability, indications for medical, professional and social rehabilitation" (f. №. 14). The leading elements of information technology for the analysis of disability dynamics were computing technologies for assessing levels and forecasting primary disability based on methods of cluster analysis and adaptive methods of short-term forecasting. In 2023, there was a 59.6% increase in primary disability due to diseases of the circulatory system among the adult population – from 11.4 to 18.2 cases per 10,000 adults compared to 2022, and by 28.4% – among the population of working age. The increase in disability due to diseases of the circulatory system during 2022-2023 occurred in all nosological units, except for acute rheumatic fever and chronic rheumatic heart diseases. In 2023, compared to 2022, the negative trend of increasing the disability rates of the adult and able-bodied population with hypertension continued by 20% and 33.3%; as a result of CHD – by 69.4% and 26.3%, respectively. The development, definition, and calculation of new indicators of morbidity/disability will provide an opportunity for a more in-depth analysis of trends in their changes, will create the basis for improving management measures in the health care system to prevent possible negative trends.

Keywords: primary, "hidden", predicted disability, diseases of the circulatory system, information technology, adaptive forecasting methods.

Relevance of the issue. The health of the population is the greatest public and personal value; a factor influencing the economic, social, and cultural development of the country; the basis of demographic and national security; and a social criterion of state well-being [1].

According to V. M. Kovalenko and V. M. Kornatskyi, cardiovascular diseases (CVD) are one of the most urgent medical and social problems and the main cause of morbidity, disability, and mortality in the world population [1]. According to the WHO, CVD has been the leading cause of death worldwide for the last ten years [2]. Between 2019 and 2021, worldwide indicators of life expectancy at birth decreased by 1.8 years to 71.4 years and healthy life at birth decreased by 1.5 years to 61. 9 years, respectively (2012 level) [1].

In Ukraine, over the past ten years, the incidence of diseases of the circulatory system (HCS) has almost doubled, and its contribution to the formation of the disease burden index (DALY) has reached 27% in men and 33% in women. Indicators of morbidity, disability, and mortality are integral indicators of assessing the economic, social, and cultural state of society and its development prospects, and this is not only a health care problem, but also a social and state one [1; 3; 4].

Analysis of recent research and publications. As of January 1, 2021, there were 2.7 million people with disabilities in Ukraine, of which: 222.3 thousand people with disabilities of the 1st group, 900.8 thousand – the 2nd group, and 1.4 million – the 3rd group. According to the State Statistics Service, there were 163,900 children among persons with disabilities [5].

Beginning on February 24, 2022, Russia's full-scale invasion of Ukraine triggered a significant humanitarian crisis in the country. Thus, according to the calculations of the International Organization for Migration, 6.2 million citizens have become internally displaced persons, and 4.2 million Ukrainians are refugees and have left the territory of Ukraine, about 23% of whom are persons with disabilities (23% calculated from 38% from 6 .2 million who agreed to mention the existing disability) [6].

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People with disabilities are at significant risk during war. They have difficulty accessing resources and services such as shelter, food and health care. The risk of discrimination and stigmatization, threats to life, physical and mental health, and harsh treatment is especially high. All this prompts the need to ensure the protection of the rights of persons with disabilities in order to guarantee respect for their human dignity even in the conditions of martial law [6].

In addition, as a result of Russia's full-scale invasion of Ukraine, the number of people with disabilities is rapidly increasing – both among combatants and among civilians who suffer from shelling, bombing and other injuries caused by military actions. In the short term, the number of people with disabilities who will require outpatient and inpatient treatment will also increase [1; 6].

Victims of hostilities have many risk factors for cardiovascular disease, timely diagnosis and prevention of which can become effective tools for preventing cardiovascular diseases. The socio-economic consequences of underestimating these conditions lead to an increase in cardiovascular disease among people of working age [1].

The goal is to analyze approaches to the assessment of indicators of primary disability due to diseases of the circulatory system, as characteristics of the public health of the population.

Research materials and methods. In Ukraine, the analysis of the incidence and prevalence of CHD is given according to the manual "Stress and diseases of the circulatory system", published by the National Scientific Center "Institute of Cardiology named after Acad. M. D. Strazheska" National Academy of Sciences of Ukraine [1; 7].

Extended statistical information on the state of disability in Ukraine is contained in the "Report on the causes of disability, indications for medical, professional and social rehabilitation" (f. no. 14). The analysis of the report data was used by the State Institution "Ukrainian State Research Institute of Medical and Social Disability Problems of the Ministry of Health of Ukraine" for the publication of an analytical and informational guide "Main indicators of disability and activity of medical and social expert commissions of Ukraine for 2015" [8].

In our previous works, we considered in detail the development of information technology for the analysis of disability dynamics [9]. According to the results of the analysis of the functioning of disability monitoring in Ukraine, it was found that forecasting should be carried out based on short series of dynamics. With this in mind, adaptive short-term forecasting methods were chosen among the variety of methods for the development of computing technology for disability forecasting [10-13]. The complex application of several adaptive models and the selection of the best model in three ways, including on the basis of decision-making theory methods, were envisaged.

Research results. In our previous works, the organization and functioning of disability monitoring systems in various European countries were analyzed in detail, information technology for analyzing the dynamics of disability was proposed, and the effectiveness of its creation with the formation of a high-quality information fund was shown [9]. In the manual "Information technology for the analysis of the dynamics of disability" we describe the computing core of this technology. Its leading elements were computational technologies for assessing levels and forecasting primary disability based on methods of cluster analysis and adaptive methods of short-term forecasting. With the use of this information technology, different levels of primary disability were characterized and an analysis of dynamics, risk assessment and prognosis of primary disability due to the main disabling pathologies was carried out [9]. In a number of works, employees of the State Institution "Ukrainian State Research Institute of Medical and Social Disability Problems

of the Ministry of Health of Ukraine" for the first time began to use the terms low, medium and high "levels" of primary disability, proposed the definition of the term and calculation of "hidden" disability [14]. The fact of disability is recognized only after its legal registration, and therefore the number of people with persistent health impairment, which leads to a complete loss or restriction of life, according to estimated data, may be much higher than according to official data. This made it possible to talk about the presence of a so-called "hidden" disability. By this term it should be understood that the actual level of disability of the population of Ukraine is much higher than official data. A. V. Ipatov and his co-authors proposed a definition of the level of "hidden" disability as the difference between estimated prognostic data and the actual value for a certain period [14]. The presence of "hidden" disability is associated with demographic trends (population aging and migration); socio-economic problems in today's Ukraine (the possibility of job loss in the presence of temporary or permanent incapacity); with the presence of additional factors affecting the level of disability of the population (hope for social support of the disabled, regional specifics of the evaluation of the criteria for the definition and preparation of the clinical and expert diagnosis). The population, and this primarily concerns the population of working age, do not legally register disability due to fear of job loss and lack of means of livelihood. A part of the able-bodied population works without legally establishing employment relations and therefore does not apply for the establishment of permanent disability. As for old-age pensioners, now the registration of disability gives almost no benefits (with the exception of disability due to the musculoskeletal system and organs of vision), and therefore this contingent of the population does not legally register disability [14]. Today, in connection with the war launched by Russia against Ukraine, a significant number of socio-economic problems in our country have changed, which has led to the official recognition of "hidden" disability and a significant increase in the legally recognized fact of disability. During 2022-2023, as in recent decades, diseases of the circulatory system (CHD) continue to play a leading role in the formation of the general contingent of disabled people in Ukraine. In the presence of a military conflict, which is directly associated with an increased risk of coronary heart disease (CHD), heart injuries, heart rhythm disorders, arterial hypertension (AH), the specific weight of CHD among people of working age will increase.

According to various data, only 17-25% of the adult population of Ukraine have neither CHD nor risk factors for the development of CVD. The rest of the population needs primary or secondary prevention. However, the work of services for the prevention and treatment of non-communicable diseases after the start of the COVID-19 pandemic, then the war, was seriously disrupted in many regions of Ukraine.

If we take into account the data of 2021-2022, then we can notice a negative growth trend of 20 and 11.2% in the number of initially recognized persons with disabilities (from 9.5 to 11.4 per 10,000 adult population) and (from 9, 8 to 10.9 per 10,000 working-age population). In 2023, this trend continued: 55,407 people were initially recognized as disabled due to diseases of the circulatory system (30,144 people of working age), while in 2022 this figure was 37,790 people (23,310 of working age).

In the structure of primary disability of the adult and able-bodied population by forms of diseases in 2023, the specific weight of diseases of the circulatory system among both the adult and able-bodied population remains the highest and amounted to 24.0% and 19.3%, respectively.

In the structure of diseases of the circulatory system, primary disability due to cerebrovascular pathology continues to prevail: in 2023 – 11.5% among the adult population (in 2022 – 11.2%) and 8.5% – among the able-bodied (in 2022 – 8.8%) and coronary heart disease – 8.0% (in 2022 – 7.6%) among the adult population and 6.6% (7.4% – in 2022) – among the able-bodied.

In 2023, there was a 59.6% increase in primary disability due to diseases of the circulatory system among the adult population – from 11.4 to 18.2 cases per 10,000 adults compared to 2022, and by 28.4% – among the population of working age.

The increase in disability due to diseases of the circulatory system over the last year occurred in all nosological units, except for acute rheumatic fever and chronic rheumatic heart diseases. The negative trend continues in recent years in the increase of disability rates due to hypertension by 20% compared to 2022 among the adult population and by 33.3% among the able-bodied population. Primary disability due to coronary artery disease increased by 69.4% among the adult population, and by 26.3% among the able-bodied population.

If we consider the levels of primary disability of the adult population during 2015-2022, it can be seen that the presence of "hidden" disability led to a significant increase in the rate of primary disability already in 2022 in Zhytomyr from 7.3 to 13.3 per 10,000 adults population, Odesa – from 9.3 to 20.2; Poltava – from 10.6 to 16.3; Chernivtsi – from 10.9 to 17.7; in the Chernihiv region – from 10.0 to 10.9, and in Ukraine as a whole – from 8.8 to 11.4, respectively (Table 1).

Table 1 – Indicators of primary disability of the adult population in Ukraine during 2015-2022

Administrative territory	Primary disability due to diseases of the circulatory system per 10,000 adults				
	2015 year			2016 year	2022 year
	actually	forecast	"hidden"	forecast	actually
Vinnytsia	12,9	10,3	*	11,8	15,4
Volynsk	9,2	9,2	*	9,2	9,3
Dnipropetrovsk	8,0	7,6	*	7,9	9,0
Donetsk[1]	4,0	*	*	*	4,0
Zhytomyr	7,3	9,3	+ 2,0	6,6	13,3
Zakarpattia	7,9	7,1	*	7,9	16,1
Zaporizhzhia	11,4	10,3	*	11,7	14,4
Ivano-Frankivsk	9,2	8,5	*	9,1	12,2
Kyivska	9,2	8,2	*	8,3	10,4
Kirovohradsk	7,8	7,7	*	6,7	8,3
Luhansk[1]	2,7	*	*	*	0,3
Lviv	12,6	12,5	*	12,2	16,6
Mykolayivska	10,9	10,5	*	10,2	12,7
Odesa	9,3	10,0	+0,7	8,6	20,2
Poltava	10,6	12,4	+1,8	10,5	16,3
Rivne	8,3	8,6	*	8,5	8,9
Sumy	7,3	7,2	*	6,7	9,5
Ternopilska	9,3	9,1	*	9,8	11,2
Kharkivska	9,4	11,3	+ 1,9	8,9	9,6
Khersonska	7,1	5,8	*	6,5	3,0
Khmelnytska	10,4	11,1	+ 0,7	10,5	8,8
Cherkassy	9,6	9,2	*	8,1	9,0
Chernivtsi	10,9	11,6	+ 0,7	10,8	17,7
Chernihivska	10,0	10,6	+ 0,6	9,5	10,9
Kyiv	11,8	10,5	*	10,7	10,0
Ukraine[1]	8,8	9,2	+0,6	9,3	11,4

[1] Data are given only from the Ukrainian-controlled part of Donetsk and Luhansk regions

* Data cannot be calculated

Similar features are observed among indicators of primary disability of the population of working age (Table 2). During 2015-2022, a significant increase in these indicators was observed in Zhytomyr (from 9.5 to 15.9 per 10,000 population of working age), Zaporizhzhia – from 10.0 to 11.6; Mykolayivskyi – from 10.7 to 11.3; Odesa – from 8.7 to 19.5; Poltava – from 9.8 to 16.7; Sumy – from 6.9 to 7.3; Ternopilska – from 8.9 to 9.9; Kharkivska – from 10.0 to 10.5; Chernivtsi – from 9.2 to 13; in the Chernihiv region – from 9.0 to 9.8, and in Ukraine as a whole – from 8.6 to 10.9, respectively.

The analysis of the structure of primary disability among the adult population in the cross-section of regions of Ukraine per 10,000 showed that in 2023, the highest rates of primary disability due to diseases of the circulatory system relative to the average for Ukraine (18.2) were in Chernivtsi (28.2), Lviv (27.2), Odesa (29.1), Vinnytsia (27.7) regions. Among persons of working age, an increase in these indicators relative to the average for Ukraine (14.0) is also noted in Odesa (25.1), Lviv (20.6), Zhytomyr (24.2), and Kharkiv (20.8) regions.

In recent years, there have been consistently low rates of primary disability due to acute rheumatic fever and chronic rheumatic heart disease among both adults and the able-bodied population in all regions – 0.1 per 10,000 population.

In 2023, the rate of primary disability due to hypertension continues to increase. The highest rates of primary disability per 10,000 population in adulthood due to hypertension, compared to the average for Ukraine (0.6), are registered, as in recent years, in the Odesa region (3.8) and in working age (4.8) with an average indicator of 0.8. In this region, 648 people of working age are recognized as disabled as a result of AH. Also, the highest rates of primary disability due to hypertension, relative to the average for Ukraine, are registered in Zaporizhzhia (1.6), Vinnytsia (1.3), Cherkasy (1.3) regions among the adult population. Among the able-bodied – Zakarpattia

Table 2 – Indicators of primary disability of the population of working age in Ukraine during 2015-2022

Administrative territory	Primary disability due to diseases of the circulatory system per 10,000 adults				
	2015 year			2016 year	2022 year
	actually	forecast	"hidden"	forecast	actually
Vinnytsia	10,5	9,0	*	10,2	14,6
Volynsk	10,1	10,3	+0,2	9,9	8,9
Dnipropetrovsk	8,6	9,1	+0,5	8,5	7,8
Donetsk[1]	4,7	*	*	*	4,8
Zhytomyr	9,5	12,2	+2,7	8,5	15,9
Zakarpattia	9,3	9,0	*	9,8	14,4
Zaporizhzhia	10,0	10,1	+0,1	10,6	11,6
Ivano-Frankivsk	10,0	9,4	*	9,7	11,8
Kyivska	8,3	9,7	+0,5	8,8	8,9
Kirovohradska	5,8	5,4	*	6,3	7,4
Luhansk[1]	3,1	*	*	*	0,2
Lviv	13,6	12,2	*	12,3	16,5
Mykolayivska	10,7	11,5	+0,8	10,4	11,3
Odesa	8,7	10,6	+1,9	8,6	19,5
Poltava	9,8	11,2	+1,4	9,5	16,7
Rivne	8,4	8,3	*	7,5	8,7
Sumy	6,9	7,5	+0,6	6,7	7,3
Ternopilska	8,9	9,9	+1,0	8,3	9,9
Kharkivska	10,0	10,9	+0,9	9,7	10,5
Khersonska	7,1	6,7	*	6,8	3,3
Khmelnytska	8,8	9,6	+0,8	7,8	8,5
Cherkassy	9,3	7,7	*	9,6	8,6
Chernivtsi	9,2	11,1	+1,9	8,8	13,0
Chernihivska	9,0	9,7	+0,7	8,8	9,8
Kyiv	9,4	9,0	*	9,2	8,9
Ukraine[1]	8,6	10,0	+1,4	9,2	10,9

[1] Data are given only from the Ukrainian-controlled part of Donetsk and Luhansk regions

* Data cannot be calculated

(1.8) and Vinnytsia (1.4) oblasts – with an average indicator of 0.8.

In the structure of disability due to diseases of the cardiovascular system, ischemic heart disease occupies a leading place. Cardiovascular diseases, especially the combination of coronary heart disease, diabetes and hypertension, are one of the most important medical and social problems in Ukraine and in the world.

The specific weight of CHD in the structure of primary disability of the adult population increased to 8.0% in 2023. (7.4% in 2022); among the population of working age, there is no tendency to increase (6.6% in 2023 and 7.4% in 2022).

Among the adult population, disability due to CHD in 2023 exceeds the average indicators in Chernivtsi (12.8), Lviv (11.2), Zakarpattia (9.5), Mykolaiv (10.4) regions, with an average indicator of 6.1 per 10 thousand population. Among the able-bodied population, primary disability due to CHD is highest in Lviv (8.3), Zakarpattia (8.4), and Mykolaiv regions, while the average for Ukraine is (4.8). All this has a significant economic effect in each specific case, which is especially important due to the fact that the number of endovascular and cardiosurgical interventions for myocardial revascularization increases every year.

Thus, in the structure of primary disability of the adult and able-bodied population by forms of diseases in 2022, the specific weight of diseases of the circulatory system among both the adult and able-bodied population remained the highest and amounted to 24.0% and 19.3%, respectively.

In 2023, there was a 59.6% increase in primary disability due to diseases of the circulatory system among the adult population – from 11.4 to 18.2 cases per 10,000 adults compared to 2022, and by 28.4% – among the population of working age – from 10.9 to 14.0 cases per 10,000 working-age population.

In the class of diseases of the circulatory system, primary disability due to cerebrovascular pathology and ischemic heart disease continues

to prevail. A negative trend has emerged in recent years in the increase in disability rates for hypertension.

The leading role of the HSC in the permanent loss of working capacity of the country's population determines the priority of further improvement of primary, specialized cardiology and medical and social care in wartime conditions.

Conclusions. 1. During 2021-2022, there was a negative growth trend of 20 and 11.2% in the number of initially recognized persons with disabilities (from 9.5 to 11.4 per 10,000 adult population) and (from 9.8 to 10.9 per 10,000 working-age population); in 2023, this trend continued.

2. The specific weight of diseases of the circulatory system among both adults and the able-bodied population in the structure of primary disability by forms of diseases in 2023 remained the highest and amounted to 24.0% and 19.3%, respectively. There was a 59.6% increase in primary disability due to diseases of the circulatory system among the adult population – from 11.4 to 18.2 cases per 10,000 adults compared to 2022, and by 28.4% – among the working-age population.

3. The development, definition and calculation of new indicators of public health, namely the risk of growth and "hidden" disability, makes it possible to identify regions with a high probability of an increase in the incidence of diseases of the circulatory system among the population of working age.

4. Adaptive methods of short-term forecasting indicate the possibility and explain the reasons for the increase in primary disability due to diseases of the circulatory system of the adult and able-bodied population in different regions of Ukraine.

5. During the period of Russia's military aggression in Ukraine, the reform of the health care sector in Ukraine, its reconstruction on the basis of insurance medicine, there is a need to form new approaches to the organization and functioning of monitoring systems for the assessment of morbidity/disability as indicators of the public health of the nation. The development, definition and calculation of new indicators of morbidity/disability will provide an opportunity for a more in-depth analysis of trends in their changes, will create the basis for improving management measures in the health care system in order to prevent possible negative trends.

Prospects for further research. Society puts forward an urgent need for the modernization of the entire health care system of Ukraine, which requires the creation of a single model for monitoring all indicators of population health (from fertility to mortality) with the definition of monitored indicators, sources of information and its periodicity, levels of observation, software for informational support of the functioning of the entire healthcare system in the country.

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ОСОБЛИВОСТІ ТЕНДЕНЦІЙ ПОКАЗНИКІВ ПЕРВИННОЇ ІНВАЛІДНОСТІ ПРИ ХВОРОБАХ СИСТЕМИ КРОВООБІГУ В УКРАЇНІ

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Анотація. В усьому світі серцево-судинні захворювання (ССЗ) є однією з актуальною медико-соціальною проблемою. В роботі було проаналізовано підходи до оцінки показників первинної інвалідності внаслідок хвороб системи кровообігу. Статистичну інформацію щодо стану інвалідності в Україні отримували зі «Звіту про причини інвалідності, показання до медичної, професійної і соціальної реабілітації» (ф. № 14). Провідними елементами інформаційної технології аналізу динаміки інвалідності були обчислювальні технології оцінки рівнів та прогнозування первинної інвалідності на основі методів кластерного аналізу та адаптивних методів короткострокового прогнозування. У 2023 р. відбулося зростання на 59,6% первинної інвалідності внаслідок хвороб системи кровообігу серед дорослого населення – з 11,4 до 18,2 випадків на 10 тис. дорослого населення в порівнянні з 2022 р., та на 28,4% – серед населення працездатного віку. Збільшення інвалідності внаслідок хвороб системи кровообігу протягом 2022-2023 рр. відбувалося за всіма нозологічними одиницями, крім гострої ревматичної гарячки та хронічних ревматичних хвороб серця. В 2023 р., в порівнянні з 2022 р. продовжувалась негативна тенденція збільшенні показників інвалідності дорослого і працездатного населення при гіпертонічній хворобі на 20% і 33,3%; внаслідок ІХС – на 69,4% і 26, 3% відповідно. Розробка, визначення та розрахунок нових показників захворюваності/інвалідності надасть можливість більш поглибленого аналізу тенденцій їх змін, створить засади для поліпшення управлінських заходів в системі охорони здоров’я задля попередження можливих негативних тенденцій.

Ключові слова: первинна, «скрита», прогнозована інвалідність, хвороби системи кровообігу, інформаційна технологія, адаптивні методи прогнозування.

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