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## PRIMARY DISABILITY DUE TO NEOPLASMS IN UKRAINE: STRUCTURE, TRENDS, INFLUENCING FACTORS

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**Key words:** neoplasms, malignant neoplasms, adult and able-bodied population, level, structure, tendencies to changes in the level of primary disability, the need for rehabilitation measures

**Ключові слова:** новоутворення, злоякісні новоутворення, доросле та працездатне населення, рівень, структура, тенденції змін рівня первинної інвалідності, потреба в реабілітаційних заходах

**Ключевые слова:** новообразования, злокачественные новообразования, взрослое и трудоспособное население, уровень, структура, тенденции изменения уровня первичной инвалидности, потребность в реабилитационных мероприятиях

**Abstract.** Primary disability due to neoplasms in Ukraine: structure, trends, influencing factors. Ipatov A.V., Khaniukova I.Y., Moroz O.M., Sanina N.A. A full study was conducted using the statistical method of research in order to analyze the status and structure of primary disability of the adult population of the regions of Ukraine due to

tumors in the period 2010–2019 and identify the causes that affect the indicators of primary disability and regional characteristics. We have performed the analysis of expanded statistical information regarding disability in Ukraine with the help of the "Report on the causes of disability, indications for medical, professional and social rehabilitation" (form № 14, approved by order of the Ministry of Health of Ukraine in coordination with State Statistics Committee of Ukraine dated 10.07.2007 № 378) within 24 regions of Ukraine and Kyiv over the last ten years. In addition, the correlation analysis was performed using Microsoft Excel<sup>®</sup> to find the connection between primary disability due to neoplasms and a number of medical and social factors using Pearson-Brave correlation coefficient ( $r$ ). Over the last ten years, the rates of primary disability due to neoplasms and malignant tumors of both adults and able-bodied population have been increasing steadily. They have always been among the top three causes of disability in Ukraine. However, cardiovascular diseases occupied the first place over the last 27 years. In 2019, tumors took the first place. Fluctuations in primary disability due to neoplasms are connected with a number of medical and non-medical causes. The main ones are morbidity, prevalence of neoplasms, number of beds in cancer dispensaries and availability of specialized oncology medical expert commissions in the region, changes in legislation regarding criteria for assessing disability groups. In the structure of primary disability due to neoplasms people of working age (40-60 years) dominate, their number varies by year, but the tendency to predominance persists. Among the disability groups a severe second disability group dominates, which indicates a late diagnosis due to untimely treatment of these people and the predominance of the so-called "neglected" forms of the disease. This trend takes place during the observation period of all ten years. The highest rates of primary disability due to neoplasms are also stable throughout the ten-year observation period and are observed in the regions that are considered the most affected by Chornobyl disaster: Kyiv region, Kyiv, Zhytomyr, Chernihiv, Volyn, Rivne. However, the increase in this indicator in Poltava region over the last three years is not entirely motivated. The obtained results will be the basis for the development of national and regional measures for the rehabilitation of people with disabilities caused by tumors and contribute to public funds saving due to their targeted distribution in regions and keeping labor resources.

**Реферат. Первинна інвалідність внаслідок новоутворень в Україні: структура, тенденції, фактори впливу.** Іпатов А.В., Ханюкова І.Я., Мороз О.М., Саніна Н.А. З метою аналізу стану та структури первинної інвалідності дорослого населення регіонів України внаслідок новоутворень за період 2010-2019 роки, виявлення причин, які впливають на показники первинної інвалідності, та регіональних особливостей проведено суцільне дослідження із використанням статистичного методу дослідження. Аналізувалась розширена статистична інформація щодо стану інвалідності в Україні за офіційною формою Державного комітету статистики України «Звіт про причини інвалідності, показання до медичної, професійної і соціальної реабілітації» (ф. № 14, затверджена наказом МОЗ України за погодженням з Держкомстатом України 10.07.2007 р. № 378) за відповідні десять років з 24 областей України та м. Києва. Також проводили кореляційний аналіз за допомогою програми Excel для встановлення зв'язків між показниками первинної інвалідності внаслідок новоутворень та низкою медичних та соціальних факторів за допомогою коефіцієнта Браве Пірсона ( $r$ ). За останні десять років показники первинної інвалідності внаслідок новоутворень та злоякісних новоутворень як дорослого, так і працездатного населення поступово зростали. Вони завжди входили в першу трійку причин інвалідності населення України. Проте перше місце останні 27 років займали серцево-судинні захворювання. У 2019 році новоутворення посіли перше місце. Коливання показників первинної інвалідності внаслідок новоутворень пов'язані з низкою медичних та немедичних причин. Основними з них є: захворюваність, розповсюдженість новоутворень, кількість ліжок в онкодиспансерах та наявність спеціалізованих онкологічних медико-експертних комісій в регіоні, зміни законодавства щодо критеріїв установлення груп інвалідності. У структурі первинної інвалідності внаслідок новоутворень переважають особи працездатного віку (40-60 років), їх кількість коливається по роках, проте тенденція до переваги зберігається. За групами інвалідності переважає тяжка II група інвалідності, що говорить про пізню діагностику внаслідок несвоєчасного звернення такого контингенту за медичною допомогою та перевагою так званих «запущених» форм захворювання. Ця тенденція також притаманна усім десяти рокам спостереження. Найбільші показники первинної інвалідності внаслідок новоутворень також стабільно протягом усього десятирічного періоду спостереження відзначаються в областях, які вважаються найбільше постраждалими від Чорнобильської катастрофи: Київська область, м. Київ, Житомирська, Чернігівська, Волинська, Рівненська. Проте спостерігається й не зовсім мотивоване зростання зазначеного показника в Полтавській області останні три роки. Отримані результати стануть підставою для розробки загальноукраїнських та регіональних заходів щодо реабілітації осіб з інвалідністю внаслідок новоутворень, будуть сприяти збереженню державних коштів внаслідок їх цілеспрямованого розподілу по регіонах та збереженню трудових ресурсів.

Over the last decades neoplasms have become one of the most pressing issues of modern medicine around the world, and our country is no exception. Ukraine ranks second in Europe in terms of cancer

spread. It is found out that more than 160 thousand people in Ukraine have cancer every year. Every year about 90 thousand people die from cancer, and 35% of whom are people of working age. Every day

in Ukraine 450 people get cancer, 250 of them die. Every hour in Ukraine, more than 20 new cases of the disease are registered, and 10 people die from cancer. Over the past ten years, the number of patients has increased by 25%. According to forecasts, starting from 2020, in Ukraine the number of cancer patients may grow to 200,000 annually. The overall incidence of malignant neoplasms has reached 370.7 per 100 thousand population [7, 9, 10].

The problem of tumors is not only a medical issue, but it also deals with many aspects of social life. The social consequences of cancer result in high economic losses, which reach 67%, including disability due to tumors [2, 3, 6, 8].

The purpose of the study is to analyze the state and structure of primary disability of the adult population due to tumors in the regions of Ukraine for the period of 2010-2019, the causes and correlations of fluctuations.

#### MATERIALS AND METHODS OF RESEARCH

The study is full using the statistical method of research. We have performed the analysis of expanded statistical information regarding disability in Ukraine with the help of the "Report on the causes of disability, indications for medical, professional and social rehabilitation" (form No. 14, approved by order of the Ministry of Health of Ukraine in coordination with State Statistics Committee of Ukraine dated 10.07.2007 No. 378) [7]. This form contains the following tables: table 1000 (Diagnostic findings of people who are first sent to medical and social expert commission); Table 2000 (Diagnostic findings and re-examination of citizens to determine the percentage of disability due to injury or other damage to health owing to the performance of duties); table 3000 (Diagnostic findings of employees' initial examinations); table 4000 (Classification of the first declared disabled according to classes of diseases and separate nosological forms); table 5000 (The total number of first-time declared disabled); table 6000 (Diagnostic findings of people with disabilities to establish the disability group); table 7000 (Recommendations for medical, professional and social rehabilitation for the first and re-declared disabled people); table 8000 (General data). The observation period was 2010-2019. The correlation was performed using Microsoft Excel© (licensed product Microsoft 365, license number 00201-11617-43662-AA947) to find the connection between primary disability due to neoplasms and a number of medical and social factors using Pearson-Brave correlation coefficient ( $r$ ) [1, 5].

#### RESULTS AND DISCUSSION

The growth rate of incidence and prevalence of tumors could not have influenced the indicators of

primary disability in Ukraine. Neoplasms have always been among the top three "leaders" in the structure of primary disability. Only sometimes, there was a rotation between the classes of "neoplasms" and the class of "injuries, poisoning and some other consequences of external causes", which, in turn, took the second or third place.

In 2019, there was a change of a "leader" in the ranking of medical and biological causes of disability in Ukraine. For the first time over the last twenty-eight years, neoplasms became the main "leader" among the causes of disability among both adults and the working population. Until this year, diseases of a cardiovascular system occupied the first place. This fact was preceded by a gradual increase in primary disability due to tumors, including malignant ones over the last ten years. Regarding indicators of primary disability due to neoplasms among the adult population, 2010 was the exception with no changes at all, and in 2013, 2014 and 2016, when disability slightly decreased. A significant increase by more than 5% was observed in 2011. This fact can be explained not only by medical reasons. In 2011, the legal framework was changed. In 2011, the Order of the Ministry of Health of Ukraine № 561 dated 05.09.2011 approved a new Instruction on assessment of disability groups. The new document contained significant changes in the approaches to the criteria for assessment of disability groups. There was a complete transition from medical to a medical and social model of disability, the introduction of which began in Ukraine in 1993. The criteria for disability were not only the loss of labour capacity, other types of life were also considered (ability to move independently, to self-care, to control one's behavior, to communicate and to learn). In other words, there were opportunities to assess disability group based on many factors, which were used by doctors and patients. This tendency was not the first time in the history of medical and social examination. In addition, for the first time there was a rule of law according to which the third disability group was assessed without a period of re-examination (i.e. indefinitely) in unilateral mastectomy due to a malignant neoplasm. Changes in legislation have always affected fluctuations in primary disability. On October 1, 2011, the Pension Reform Law came into force, which provided an increase in the retirement age for women from 55 to 60 years with an annual six months' increase. At the same time, until 2015, women aged 55 with at least 30 years of insurance period, had the right to early retirement. Many women who previously had had a neoplasm but hadn't contacted any medical and social expert

commissions due to their personal circumstances, after increasing the retirement age and the required length of service for early retirement, decided to exercise their right to receive the status of a person with a disability.

It should be noted that another change in legislation that took place in 2015, when the Cabinet of Ministers of Ukraine approved Resolution № 10 of 21.01.2015 “On approval of the list of anatomical defects, other irreversible disorders of organs and systems, conditions and diseases for which the disability group is assessed without specifying the

term of re-examination”, influenced the fluctuations of primary disability due to tumors, including malignant ones. This resolution introduced a rule of law, according to which the disability group was assessed without a period of re-examination in case of extended hysterectomy if there are oncological diseases.

Regarding the indicators of primary disability among the working population, its growth was also gradual. The year 2012 was similar in terms of increase to 4.2-4.4%, which is partly due to the same reasons as for the disability indicators of the adult population.

This trend is reflected in more detail in Tables 1-2.

Table 1

**Primary disability due to neoplasms in Ukraine in 2010-2019 per 10 thousand of adult population**

Years	Number of initially declared as people with disability		% of growth compared to the previous year	
	tumors	of which are malignant	tumors	of which are malignant
2010	8.9	8.5	-	-
2011	9.4	9.0	+5.6	+5.9
2012	9.5	9.1	1.1	+1.1
2013	9.4	8.8	-3.2	-3.3
2014*	9.2	8.8	-2.1	-2.2
2015*	9.7	9.3	+5.4	+5.7
2016*	9.6	9.2	-1.0	-1.1
2017*	9.7	9.3	+3.1	+2.2
2018*	10.0	9.5	+3.1	+2.2
2019*	10.2	9.7	+2.0	+2.1

Note. \* Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation / joint force operation zone.

In order to obtain reliable evidence of the connection between the influence of various factors on changes in the level of primary disability, we conducted a correlation analysis between different medical and social factors and indicators of primary disability due to tumors in Ukraine and its regions. Here are the most significant and probable correlations. Thus, in general, in relation to indicators in Ukraine and by region, a direct correlation was obtained with the following medical factors: the incidence of tumors ( $r=0.36$ ;  $p=0.009$ ), the prevalence of tumors ( $r=0.31$ ;  $p=0.009$ ); social factors – changes of legislation that directly or indirectly affect the appeal of population to medical and social expert commissions ( $r=0.17$ ;  $p=0.005$ ). Regional features were such correlation indicators as age

distribution of the population ( $r=0.29$ ;  $p=0.003$ ), the presence of specialized oncological medical and social expert commissions in the region ( $r= -0.15$ ;  $p=0.009$ ), number of beds in oncology dispensaries ( $r= -0.14$ ;  $p=0.008$ ).

Speaking about the comparison of the obtained results with the situation in other countries, it is possible to compare our data only with the data of the former USSR republics, as there exists a statistic report on persons with disabilities comparable to ours. In the most other countries, the collection of information on disabled is limited to household surveys which are carried out by social workers using short questionnaires, and data on medical conditions is not collected. In addition, in other countries there is no such thing as a "disability group".



Table 2

**Primary disability due to neoplasms in Ukraine  
for 2010-2019 per 10 thousand of working population \***

Years	Number of initially declared as people with disability		% of growth compared to the previous year	
	tumors	of which are malignant	tumors	of which are malignant
2010	9.3	8.8	-	-1.1
2011	9.5	9.0	+2.2	+2.3
2012	9.9	9.4	+4.2	+4.4
2013	9.9	9.3	-	-1.1
2014*	9.8	9.4	-	-
2015*	9.9	9.4	+1.0	+1.1
2016*	10.1	9.6	+2.0	+1.1
2017*	10.2	9.7	+2.0	+1.0
2018*	10.4	9.8	+2.0	+1.0
2019*	10.6	9.8	+1.9	-

**Note.** \* Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation / joint force operation zone.

Data on disability due to neoplasms in Ukraine are somewhat like those obtained in the Republic of Belarus, Kazakhstan, and in the Russian Federation. As well as in our country, tumors there occupy leading places in disability across the population. However, there are differences: tumors in these countries are second to cardiovascular disease. So, there was a similar situation for our country until 2019. It should be noted that as in our country, in the Republic of Belarus there is a predominance of tumors as causes of disability in the regions affected by the Chernobyl accident [82, 8].

The analysis of the classification of initially declared persons with disabilities due to neoplasms showed that the patients with severe second group of disability predominated throughout the observation period. Their share ranged from 61.8% in 2010 to 55.5% in 2013. In 2018 and 2019, this figure was 56.4% and 56.1%, respectively. It should be noted that starting from 2018, the share of people with the third disability group increased (from 21.5% in 2010 to 30.1% and 30.6% in 2018 and 2019, respectively). A similar trend is among the initially declared persons with disabilities due to neoplasms, who have a severe first disability group. If in 2010 there was 16.7% of the initially declared people with disabilities, then in subsequent years their share decreased and was 13.3% in 2019 (this is the lowest figure over the last decade) (Table 3).

These indices, apparently, still indicate an improvement of the diagnosis of tumors in early stages of development and changes in obtaining positive results of treatment of such diseases over the past two years.

Success of modern medicine plays a significant role as well. Every year new ways to combat oncology (nanotherapy, neutron and low-intensity electro-resonance therapy) appear, as a result the chances of recovery increase. Classical methods such as chemotherapy, surgery and radiation therapy are also used. An individual approach, active participation of many specialists (chemotherapists, radio oncologists, anesthesiologists, rehabilitation therapists) provide complete treatment or long-term remission.

The classification of people initially declared as disabled due to age-related neoplasms showed the predominance of the share of people of working age (Table 4).

There are slight fluctuations in the range from 55.1% to 60.7%. The largest share of people of working age declared as disabled was in 2017, the lowest was in 2011. The data obtained once again emphasizes the urgency of the problem and the need to take measures soon. The demographic situation in Ukraine and the aging population create a significant shortage of manpower resources, so the prevention of tumors, their timely diagnosis in early stages of the disease and administration of the modern adequate treatment will make a positive contribution to solving the problem.

Table 3

**Classification of initially declared people with disabilities due to neoplasms according to disability groups among the population of Ukraine for 2010-2019 (%)\***

Years	1 <sup>st</sup> group	1 <sup>st</sup> A group	1 <sup>st</sup> B group	2 <sup>nd</sup> group	3 <sup>rd</sup> group
2010	16.7	-	-	61.8	21.5
2011	16.0	6.7	9.3	60.2	23.8
2012	15.7	8.9	6.8	56.3	28.0
2013	14.8	7.2	7.6	55.5	29.7
2014*	15.3	7.2	7.6	56.0	28.6
2015*	15.4	6.9	8.5	56.0	28.6
2016*	15.4	6.4	9.0	56.6	28.0
2017*	14.3	5.6	8.7	56.9	28.7
2018*	13.5	5.2	8.3	56.4	30.1
2019*	13.3	5.0	8.3	56.1	30.6

**Note.** \* Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation / joint force operation zone.

The indices of primary disability due to neoplasms according to regions are also stable throughout the ten-year follow-up period. They are the largest in the regions that are considered the most affected by Chernobyl disaster: Kyiv region, Kyiv, Zhytomyr, Chernihiv, Volyn, Rivne. Ho-

wever, there is a not entirely motivated growth of this indicator. Thus, consistently high rates of initially declared disabled people per 10 thousand population due to tumors are in Cherkasy, Lviv and Poltava regions, which requires an additional analysis to determine the causes.

Table 4

**Classification of initially declared people with disabilities due to neoplasms according to age in 2010-2019 (%) \***

Years	Up to 39 years	From 40 to 60 years	Over 60 years
2010	15.7	56.7	27.6
2011	16.2	55.1	28.7
2012	15.7	56.7	27.6
2013	16.6	57.4	26.0
2014*	16.5	57.5	26.0
2015*	16.3	57.7	26.0
2016*	15.7	60.5	23.8
2017*	14.9	60.7	24.4
2018*	14.9	59.4	25.7
2019*	13.6	60.2	26.2

**Note.** \* Excluding the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation / joint force operation zone.

Thus, over the last ten years, the rates of primary disability due to tumors and malignant neoplasms of both adults and the working population have been gradually increasing. They have always been among the top three causes of disability in Ukraine. However, the first place for the last 27 years was occupied by cardiovascular diseases. In 2019, neoplasms took first place.

Fluctuations in primary disability due to tumors are caused by several medical and non-medical reasons. The main ones are incidence, prevalence of neoplasms, the number of beds in oncology dispensaries and the presence of specialized oncological medical expert commissions in the region, changes in legislation on the criteria for assessing disability groups. Within primary disability due to neoplasms, people of working age (40-60 years) dominate, their number varies by year, but the tendency to predominance persists. Among the disability groups a severe second disability group dominates, which indicates a late diagnosis due to untimely treatment of these people and the predominance of the so-called "neglected" forms of the disease. This trend is specific to a ten years' observation period. The highest rates of primary disability due to neoplasms are also stable throughout a ten-years observation period and are observed in the regions that are considered the most affected by Chernobyl disaster: Kyiv region, Kyiv, Zhytomyr, Chernihiv, Volyn, Rivne. However, in some regions there is a not quite motivated growth, which requires an additional analysis to determine the causes.

The obtained results will be the basis for the development of national and regional measures for the rehabilitation of people with disabilities due to tumors and contribute to saving of public funds due to their targeted distribution in regions and keeping labor resources.

These results will be useful taking in account the main areas of work developed by the Ministry of Health and the government to help reduce cancer rate and mortality. The following documents have been developed for submission: Development of the Cancer Control Strategy, Public Procurement of Medicines and Medical Devices and the Medical Guarantee Program.

The Strategy of Cancer Control is planned to be presented at Parliament proceedings soon. It is aimed not only at helping cancer patients, but also at disease prevention. The WHO experts have also joined its development.

From April 1, 2020, the Medical Guarantees Program started working, with separate packages to be

paid for as part of its implementation. The Program includes the examinations that will help provide patients with an early diagnosis of cancer. 1 billion UAH is provided for this purpose. The guaranteed package of free examinations includes mammography, hysteroscopy, esophagogastroduodenoscopy, colonoscopy, cystoscopy, and bronchoscopy.

The Program also includes packages "Diagnosis and chemotherapeutic cancer treatment of adults and children" and "Diagnosis and radiological cancer treatment of adults and children."

The expenses for the procurement of chemotherapeutic drugs are increasing every year, and prices for drugs are declining, and this allows us to move up to 100% of the needs covered by the purchase's stock list. Procurement lists include all major chemotherapeutic drugs that are commonly included in the WHO and National List.

It is planned to allocate funds in the amount that will provide 100% of the need for drugs from the stock range in 2020. The final amount of expenses will be known after the collection of applications from the regions (previously it is expected that it will be more than UAH 2 billion).

## CONCLUSIONS

1. Thus, 2020 may be the first year in history when 100% demand for all drugs included in the purchase list will be met. To achieve this goal, the government has taken a number of steps, in particular: Verkhovna Rada allocated an additional 3.2 billion UAH while drawing up the state budget, so the total budget for the purchase of medicines and medical devices in 2020 will be about 9.5 billion UAH that is a historical maximum. The cost of drugs that have a serious impact on the budget have been reduced significantly, for the cancer group there are such drugs as trastuzumab and rituximab. When forming the list of drugs that will be purchased, such a tool as medical technology assessment is already used, which allows comprehensively assessing not only the effectiveness but also the economic feasibility of certain drugs. That is why the Ministry of Health undertakes only those obligations to provide medicines that it cannot fulfill.

2. Thus, we believe that soon, under the implementation of all planned measures, we will see a decrease in disability due to tumors in Ukraine.

Conflict of interests. The authors declare no conflict of interest.

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