# MEDICAL-DEMOGRAPHIC SITUATION AND THE STATE OF HEALTH OF THE ADULT POPULATION IN CONNECTION WITH DISEASES OF NEOPLASMS IN THE ALMATY REGION OF KAZAKHSTAN

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## ABSTRACT

*Relevance: Various aspects of the state of public health in connection with malignant neoplasms, as well as the issues of improving the system of providing cancer care to the population, are the subject of many years of research by the authors. Concerns and increased attention to cancer are features of modern healthcare. Worldwide, there is an increase in the incidence of non-communicable chronic diseases associated primarily with the growth of the socio-economic well-being of countries, an increase in life expectancy, and preventive measures aimed at identifying cancer.*

*The study aimed to assess the incidence of malignant neoplasms in the southern region of the Almaty region to improve mortality indicators and five-year survival rates.*

*Methods: an analysis of data from annual medical reporting forms No. 7 on patients and diseases with malignant neoplasms in the Almaty region (the form approved by the Ministry of Health of the Republic of Kazakhstan for 2018-2022), annual regional statistical collections of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan for 2018-2022, and the collections "Health of the population of the Republic of Kazakhstan and activities of healthcare organizations" of the Ministry of Health of the Republic of Kazakhstan.*

*Results: High cancer incidence in Kazakhstan, including the Almaty region, owes mainly to lung and stomach cancers in men and breast and cervical cancers in women.*

*The incidence in Kazakhstan and the Almaty region is decreasing, but the target has not been achieved yet.*

*Cancer mortality remains stable in the country and is decreasing in the Almaty region. The mortality structure is dominated by lung cancer, followed by stomach cancer the 2nd, breast cancer the 3rd, and esophageal cancer the 4th.*

*Conclusion: The reduction in mortality is primarily due to the introduction of screening programs, improved early detection of malignant neoplasms, and increased treatment effectiveness. However, the mortality indicator remains high.*

*The conducted epidemiological study of cancer incidence and mortality in the Almaty region evidences the need to improve screenings, introduce new forms of screening for stomach and lung cancers, activate screening programs, and enhance preventive and awareness-building outreach among the population.*

*Keywords: public health, medical and demographic situation, incidence, mortality, malignant neo-plasms, prevention.*

**Introduction:** Cancer mortality remains high according to the new GLOBOCAN report on the global burden of cancer in 2022 by world region and human development level, on April 4, 2024 (Table 1). There were an estimated 20.0 million new cases and 9.7 million deaths from cancer worldwide in 2022 for both sexes. Almost half of all cases (49.2%) and the majority (56.1%) of cancer deaths worldwide in 2022 are estimated to have occurred in Asia, where 59.2% of the world's population lives. The burden of cancer mortality in the African and Asian regions is disproportionately more significant than the corresponding incidence burden. This reflects the respective distribution of cancer types along with comparatively higher case-fatality rates in these continents, partly due to late diagnosis. Europe has a disproportionately high cancer incidence and mortality, given that the continent accounts for one-fifth of the world's cancer cases (22.4%) and cancer deaths (20.4%) but accounts for less than 10% of the world's population (9.6%) [9].

The Government of the Republic of Kazakhstan is developing measures to improve the country's medical and demographic situation. The Comprehensive Cancer Plan for 2023-2027 can be noted among them. Implementing the Comprehensive Plan activities is envisaged for 5 years in 5 main areas: prevention and management of risk factors, highly effective early diagnosis, development of specialized treatment, palliative care and rehabilitation, and development of human resources and science [1]. Kazakhstan continues to have an unfavorable medical and demographic situation characterized by a decline in the natural population due to high mortality rates. At the same

time, one of the leading medical and demographic problems today is the increase in mortality from cancer among the adult population. Cancer is a general term for a large group of diseases that can affect any organ. Other terms are also used to describe them: malignant tumors and neoplasms. Cancer occurs due to the transformation of normal cells into atypical cells, during which a precancerous lesion turns into a malignant tumor [2]. There are three cat-

egories of harmful factors:

– physical carcinogens (alpha, beta, gamma, and X-ray radiation, proton and neutron fluxes, ultraviolet radiation, radon, mechanical injuries);

– chemical carcinogens (arsenic, lead, nickel, chromium, mercury, cadmium);

– biological carcinogens (viruses, bacteria, or parasites).

**Table 1 – Cancer incidence, mortality, and total population in some countries for 2022, abs. figures**

| Country | Average annual population | Incidence | Mortality |
|---|---|---|---|
| Sweden | 10 218 972 | 91 444 | 25 569 |
| Italy | 60 262 779 | 436 242 | 199 706 |
| France | 65 584 514 | 483 568 | 190 612 |
| Belgium | 11 668 276 | 81 132 | 29 005 |
| Germany | 83 883 587 | 605 805 | 253 170 |
| Netherlands | 17 211 499 | 168 070 | 49 790 |
| Spain | 46 719 147 | 372 121 | 115 590 |
| Portugal | 10 140 568 | 81 251 | 33 762 |
| Kazakhstan | 19 205 039 | 36 225 | 20 686 |

Risk factors for cancer include chronic infections, especially in developing countries. Carcinogenic infections such as Helicobacter pylori, Human papillomavirus (HPV), hepatitis B virus, hepatitis C virus, and Epstein-Barr virus are responsible for about 15% of cancer cases diagnosed in 2012. Hepatitis B and C viruses and carcinogenic HPV types increase the risk of liver and cervical cancer, respectively. HIV infection significantly increases the risk of cancer, such as cervical cancer. Another fundamental factor in the development of cancer is age. With age, the incidence of cancer rises sharply due to the layering of various risk factors. The accumulation of risk factors, impaired apoptosis, and decreased immunity become more pronounced as a person ages. Smoking, including e-cigarettes, drinking alcoholic beverages, surrogates, synthetic drugs, poor nutrition, and physical inactivity have been and remain the main risk factors for cancer development in the world.

One of the clinical signs of cancer is metastasis or rapid formation of atypical cells that grow beyond their tissues and are capable of developing into nearby tissues and are carried to other organs with the flow of biological fluids. Metastasis is often one of the leading causes of cancer mortality [2]. Malignant neoplasms (MN) consistently occupy second place in the structure of the population of Kazakhstan seeking medical care - 15.7% according to statistics, the opinion of many authors, and official statistics. MN mortality ranks second after circulatory system diseases. The share of MN in the structure of overall mortality of the population consistently exceeds 50%, and the high level of incidence with temporary loss of ability to work and disability due to MN additionally emphasizes the social significance of this disease [3]. 56% of those affected are people of working age. 30-50% of cancers can be avoided by reducing the influence of risk factors and carrying out primary prevention. In addition, the burden of cancer can be reduced by early detection and management

of patients who develop cancer. With timely diagnosis and adequate treatment, there is a high chance of curing many types of cancer. Unfortunately, the existing system of medical institutions does not fully meet the population's needs in terms of volume, accessibility, and quality of specialized medical care, primarily at the primary level.

Various aspects of public health status regarding MNs and improving the system of providing oncological care have been studied for many years [4]. A wide range of examinations used to diagnose MNs include laboratory, immunological, ultrasound, X-ray, endoscopic methods, magnetic resonance imaging (MRI), computed tomography with and without contrast enhancement, and positron emission tomography (PET).Most modern methods of research provide timely diagnosis and prevention of cancer. Organizational issues of attracting the population to screenings and other research methods for early diagnostics of MNs and increasing patient responsibility for their health remain open.

***The study aimed to*** assess the incidence of malignant neoplasms in the southern region of the Almaty region, with the hopeful goal of improving mortality indicators and significantly enhancing five-year survival rates.

***Materials and Methods:*** The analysis of data from medical reporting forms No. 7 on patients with MNs in the Almaty region, annual regional statistical digests of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, digests "Health of the population of the Republic of Kazakhstan and activities of health care organizations" of the Ministry of Health of the Republic of Kazakhstan was carried out [3, 5, 6].

***Results:*** Cardiovascular and oncological diseases caused 71% of deaths in the European Region, according to the World Health Organization (WHO) [7, 8]. According to WHO forecasts, the incidence and mortality from MNs in 2020 worldwide increased by 1.5-2 times [9]. The increase

in incidence is mainly due to lung cancer and stomach cancer in men and breast and cervical cancer in women.

Mortality from cancer in Kazakhstan ranks second in the structure of population mortality. Every year, about 13,000 people die from cancer, 42% of whom are people of working age. Almost half of primary patients are diagnosed with stage III-IV disease, which indicates low oncological alertness of medical workers and the population.

In 2018, malignant neoplasm incidence in the Republic of Kazakhstan was 229.5 per 100,000, while this indicator in the Almaty region was 154.4 per 100,000 (Figure 1, Table 2). In 2022, the MN incidence rate decreased to 221.9 nationwide and 123.3 in the Almaty region. The southern part of the Almaty region includes 9 rural areas with 1,506,000 people [3]. Today, MN incidence is decreasing.
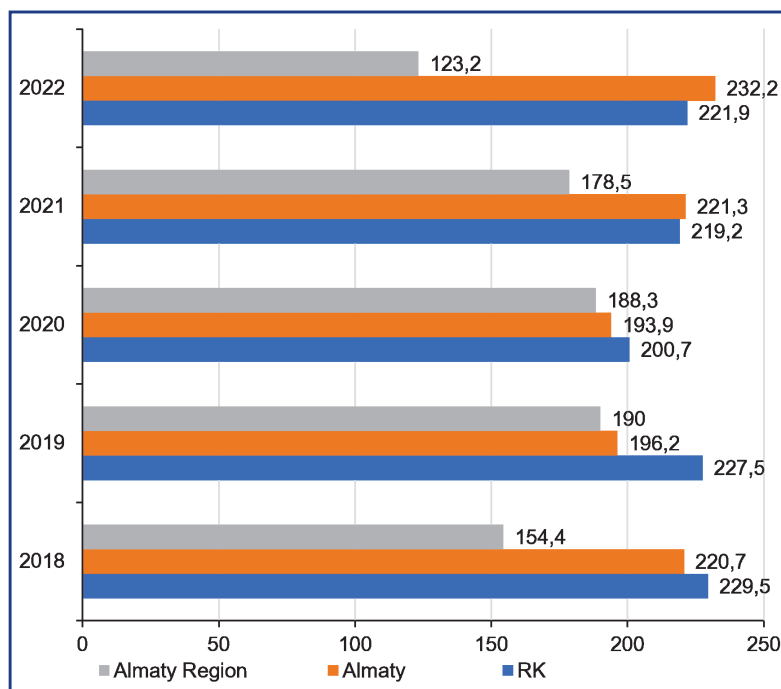


Figure 1 – MN incidence in Kazakhstan and the Almaty Region compared with the figures for RK and the city of Almaty, 2018-2022.

**Table 2 – MN incidence in the Republic of Kazakhstan, Almaty, and Almaty Region, 2018-2022**

| Region | Urban population | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Abs. | | | | | Per 100 000 population | | | | |
| | 2018 | 2019 | 2020 | 2021 | 2022 | 2018 | 2019 | 2020 | 2021 | 2022 |
| the Republic of Kazakhstan | 24340 | 24798 | 22379 | 24928 | 26849 | 229.5 | 227.5 | 200.7 | 219.2 | 221.9 |
| Almaty | 4035 | 3760 | 3833 | 4482 | 4950 | 220.7 | 196.2 | 193.9 | 221.3 | 232.2 |
| Almaty Region | 712 | 858 | 857 | 820 | 299 | 154.4 | 190.0 | 188.3 | 178.5 | 123.3 |

The MN structure in women is dominated by breast cancer (C50), accounting for 23.0% of all localizations, followed by skin neoplasms (C44, C46.0) with a share of about 11%, and cervical cancer (C53), with 8.6% (table 3). In the structure of gynecological cancers, cervical cancer ranks first, ahead of uterine cancer and ovarian cancer.

In men, lung cancer (C33-34) ranks first, with a share of 18.0%, followed by stomach cancer (C16), with 11.3%, and skin neoplasms (C44, C46.0), with 9.2%.

The nationwide mortality from MNs is decreasing slowly, from 78.6 per 100,000 people in 2018 to 66.4 in 2022. In the Almaty region, the mortality from MNs has also decreased. The figures for the Almaty region in Figure 2 do not consider the 2019 territorial changes and the establishment of the Zhetysu region in 2022.

Over the past five years, one-year mortality from cancer in the republic fluctuated from 7.0 to 7.9%, with the lowest figure in 2021 and the highest in 2018. In general, positive dynamics are observed. In the Almaty region, the one-year mortality rate fluctuated from 7.2 to 7.8%, with a minimum value in 2021 and a maximum value in 2020 (Figure 3).

In the structure of mortality from malignant neoplasms in both sexes in the republic, lung cancer ranks first (16.5%), stomach cancer ranks second (11.5%), breast cancer ranks third (8.5%), and esophageal cancer ranks fourth (5.8%) [10]. In the structure of mortality from malignant neoplasms in both sexes in the Almaty region, a similar picture is observed: lung cancer ranks first (14.4%), stomach cancer ranks second (12.2%), breast cancer ranks third (8.8%), and rectal cancer ranks fourth (4.9%) (Figure 4).

Early diagnosis of oncological diseases of stages 0-I for 2020 amounted to 25.5% of the total structure of new cases of malignant neoplasms. Five-year survival rate at the end of 2020 was 54.0% (2019 - 52.5%). Analysis of the implementation of target indicators in the region revealed a slight decrease in mortality from oncological pathology in 2021, with an indicator of 48.7 per 100,000 population against 58.0 per 100,000 population in 2020. There is an increase in the proportion of stage I-II malignant neoplasms of the cervix – 90.7% in 2020, while in 2021, this indicator was 87.4% [12].

**Table 3 – MN incidence structure in the Almaty Region, 2021-2022**

| No | Localization of malignant neoplasms | Sex | Code according to the ICD, X revision | Total cases, 2021 | Total, 2022 |
|---|---|---|---|---|---|
| **01** | **All malignant neoplasms, including,** | **f** | **C00-C97** | **15400** | **16688** |
| **02** | | **m** | | **20727** | **22389** |
| 03 | Lips | m | C00 | 83 | 84 |
| 04 | | f | | 36 | 34 |
| 05 | Tongue, oral cavity, and oropharynx, kaposi's sarcoma of the palate | m | C01-C06, C09, C10, C46.2 | 328 | 283 |
| 06 | | f | | 192 | 200 |
| 07 | Salivary gland (except minor salivary glands) | m | C07-C08 | 79 | 69 |
| 08 | | f | | 64 | 67 |
| 09 | Nasopharynx | m | C11 | 54 | 54 |
| 10 | | f | | 22 | 34 |
| 11 | Larynx | m | C12, C13, C14 | 119 | 103 |
| 12 | | f | | 50 | 48 |
| 13 | Esophagus | m | C15 | 654 | 639 |
| 14 | | f | | 476 | 469 |
| 15 | Stomach | m | C16 | 1693 | 1895 |
| 16 | | f | | 883 | 1020 |
| 17 | Colon | m | C18 | 776 | 886 |
| 18 | | f | | 910 | 1054 |
| 19 | Rectum, rectosigmoid junction, anus (anus) and anal canal | m | C19-C21 | 856 | 920 |
| 20 | | f | | 748 | 793 |
| 21 | Liver and intrahepatic bile ducts | m | C22 | 583 | 602 |
| 22 | | f | | 316 | 401 |
| 23 | Pancreas | m | C25 | 576 | 552 |
| 24 | | f | | 552 | 623 |
| 25 | Larynx | n | C32 | 325 | 334 |
| 26 | | f | | 40 | 36 |
| 27 | Trachea, bronchi, lung | m | C33-C34 | 2806 | 3014 |
| 28 | | f | | 809 | 911 |
| 29 | Bones and articular cartilages | m | C40-C41 | 71 | 90 |
| 30 | | f | | 72 | 91 |
| 31 | Connective and other soft tissue | m | C45, C46.1, C47,C49 | 213 | 194 |
| 32 | | f | | 226 | 216 |
| 33 | Skin melanoma | m | C43 | 144 | 125 |
| 34 | | f | | 216 | 211 |
| 35 | Other skin neoplasms | m | C44, C46.0 | 1352 | 1537 |
| 36 | | f | | 2203 | 2461 |
| 37 | Female mammary gland | f | C50 | 5021 | 5171 |
| 38 | Cervix | f | C53 | 1804 | 1934 |
| 39 | Uterine body | f | C54 | 1240 | 1315 |
| 40 | Ovary | f | C56 | 1249 | 1201 |
| 41 | Prostate gland | m | C61 | 1169 | 1465 |
| 42 | Testicle | m | C62 | 122 | 133 |

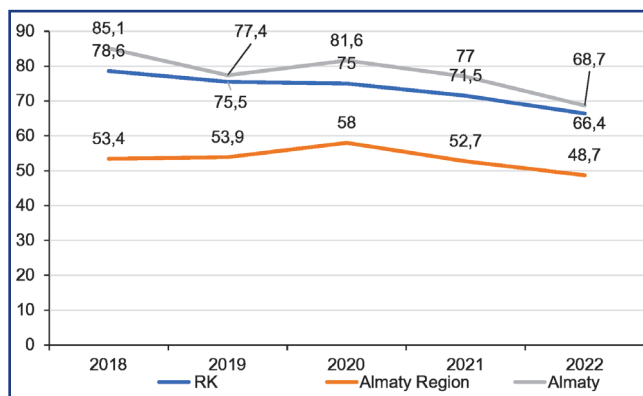*Note: the localizations of malignant neoplasms ranking first in the incidence structure are marked red.*



Figure 2 - Mortality from MNs in the Almaty region compared with the figures for RK and the city of Almaty, 2018-2022
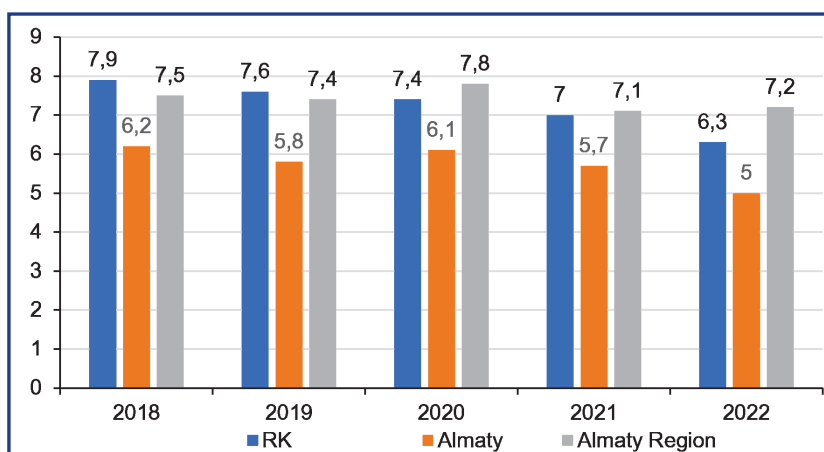
Figure 3 - One-year mortality from MNs in the Almaty Region compared
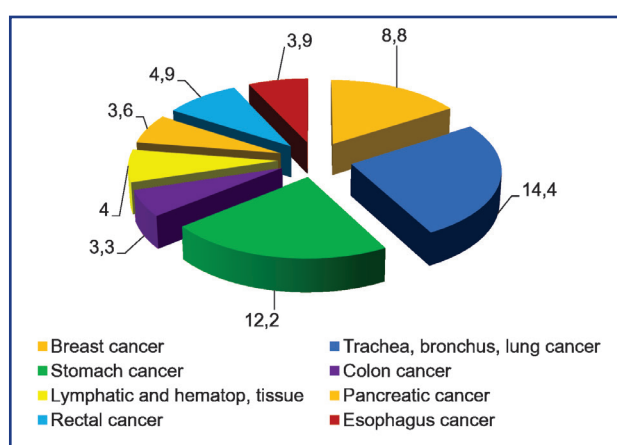with the figures for RK and the city of Almaty, 2018-2022



Figure 4 – MN mortality structure in the Almaty region,
2018-2022

**Discussion:** Some features of modern healthcare are cancer alertness and increased attention to cancer diseases. All over the world, there is an improvement in the detection of malignant neoplasms, primarily due to the growth of countries' socio-economic well-being, an increase in life expectancy, and the implementation of preventive measures to identify cancer diseases.

Most of the cancer diseases encountered in Kazakhstan can be diagnosed at early stages (tumors of the mammary gland, skin, cervix, esophagus, stomach, liver, colon and rectum, prostate gland) by conducting screening programs. Accordingly, a decrease in mortality from tumors of this localization can become a reserve for reducing overall mortality from cancer diseases [13].

Timely and early diagnosis of cancer diseases can significantly improve treatment outcomes and increase patient survival. To further enhance the prevention of oncological diseases in the republic, early diagnostic (screening) programs have been introduced, the availability of high-tech diagnostic and treatment methods with scientifically proven effectiveness has been increased, and a modern system of rehabilitation

and palliative care for cancer patients has been introduced [14].

**Conclusion:** The reduction in mortality is primarily due to the introduction of screening programs, improved early detection of malignant neoplasms, and increased treatment effectiveness. However, the mortality indicator remains high. Following the introduction of screening as an indicator of the work of primary health care, the coverage of the population with screening programs is improving. However, it is necessary to constantly monitor the correctness of the screening programs, the adequacy of the interpretation of the results by medical personnel, and reliable information about the screening results for patients. Conducting targeted on-the-job training for medical personnel who routinely or occasionally conduct screening activities is essential. The methodological recommendations developed by the Kazakh Institute of Oncology and Radiology should become a reference guide for doctors and nurses in contact with the risk group for malignant neoplasms. Conducting educational work among students of secondary schools, colleges, and higher educational institutions should be mandatory and systematic. Resuming preventive examinations among employees of large

industries and public and private organizations is relevant. Educational videos calling for responsibility for their health and timely medical examinations should appear more often on social networks. However, due to the active implementation of an integrated model of oncological care with increased supervision of primary health care organizations by the oncological service, the work of district curators has improved significantly. Managing the oncological situation regarding neoplasm incidence is only possible with a comprehensive approach, including work with all objects of influence: patients, general practitioners (or physicians), and oncologists.

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**АНДАТПА**

## ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ АЛМАТЫ ОБЛЫСЫ БОЙЫНША ІСІК АУРУЛАРЫНА БАЙЛАНЫСТЫ МЕДИ-ЦИНАЛЫҚ-ДЕМОГРАФИЯЛЫҚ ЖАҒДАЙ МЕН ЕРЕСЕК ХАЛЫҚТЫҢ ДЕНСАУЛЫҚ ЖАҒДАЙЫ

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***Өзектілігі:*** *Аллогендік гемопоэтикалық дің жасушаларын трансплантациялау (АГЖТ) әдісі болып табылады жоғары мамандандырылған көмек көрсету, науқастарға, онкологиялық және гематологиялық аурулармен, ауыр аралас бастапқы иммунодефициттами, сондай-ақ басқа да туа біткен және тұқым қуалаушылық аурулары өтетін зақымданған қан түзетін және иммундық жүйелер.*

***Зерттеудің мақсаты*** *– аллогенді АГЖТ жүргізген нәтижелерді және жынысы, кондиционерлеу режимі, донордың үй-лесімділігі, АГЖТ жүргізген кездегі негізгі аурудың мәртебесі сияқты факторлардың жоғары қауіпті топтардың онкоге-матологиялық аурулары бар науқастардың өмір сүру көрсеткіштеріне ықтимал әсерін зерттеу.*

***Әдістері:*** *Алматы облысы бойынша қатерлі ісіктері бар науқастар мен аурулар туралы № 7 жылдық медициналық есеп нысандарының деректеріне талдау 2018-2022 жылдар (Қазақстан Республикасы Денсаулық сақтау министрлігі бекіткен нысан), ҚР Ұлттық статистика бюросының жыл сайынғы өңірлік статистикалық жинақтары. Қазақстан Рес-публикасы Стратегиялық жоспарлау және реформалар агенттігі, Қазақстан Республикасы Денсаулық сақтау ми-нистрлігінің «Қазақстан Республикасы халқының денсаулығы және денсаулық сақтау ұйымдарының қызметі» жинақтары 2018-2022 жылдар.*

***Нәтижелері:*** *Алматы облысында және республикада онкологиялық аурулардың жоғары деңгейін негізген ерлерде өкпе және асқазан обыры, әйелдерде сүт безі мен жатыр мойны обыры құрайды. Алматы облысында және жалпы Респуб-лика бойынша онкологиялық аурулар көрсеткішінің төмендеу үрдісі байқалады. Алайда, мақсатты көрсеткішке қол жет-кізілген жоқ. Республика бойынша онкологиялық аурулардан болатын өлім-жітім деңгейі іс жүзінде тұрақты, ал Алматы облысында төмендеу байқалады. Өлім құрылымында бірінші орында өкпе ісігі, екінші орында асқазан ісігі, үшінші орында сүт безі обыры, төртінші орында өңеш ісігі.*

***Қорытынды:*** *Өлім-жітім деңгейін төмендетудегі табыс скринингтік бағдарламаларды енгізу, қатерлі ісік ауруын ер-те сатысында диагностикалауды жақсарту және емдеудің тиімділігіне байланысты, бірақ өлім-жітім деңгейі әлі де жоғары болып отыр. Алматы облысында онкологиялық аурулардан болатын аурушаңдық пен өлім-жітімді эпидемиоло-гиялық зерттеу скринингтік тексеруді жақсарту, асқазан және өкпе обырын анықтау үшін скринингтің жаңа нысандарын енгізу, скринингті күшейту, сондай-ақ халық арасында профилактикалық және ағарту жұмыстарын күшейту қажеттігін көрсетеді.*

***Түйінді сөздер:*** *халықтың денсаулығы, медициналық-демографиялық жағдайы, аурушаңдық, өлім-жітім, қатерлі ісіктер, алдын алу.*

**АННОТАЦИЯ**

## МЕДИКО-ДЕМОГРАФИЧЕСКАЯ СИТУАЦИЯ И СОСТОЯНИЕ ЗДОРОВЬЯ ВЗРОСЛОГО НАСЕЛЕНИЯ В СВЯЗИ С БОЛЕЗНЯМИ НОВООБРАЗОВАНИЙ В АЛМАТИНСКОЙ ОБЛАСТИ РЕСПУБЛИКИ КАЗАХСТАН

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***Актуальность:*** *Онконастороженность и повышенное внимание к онкологическим заболеваниям – одна из особенностей современного здравоохранения. Во всем мире отмечается улучшение выявляемости злокачественных новообразований (ЗНО), связанное, прежде всего, с ростом социально-экономического благополучия стран, увеличением продолжительности жизни, проведением профилактических мероприятий, направленных на выявление онкологических заболеваний.*

***Цель исследования*** *– оценка заболеваемости злокачественными новообразованиями в Алматинской области для улучшения индикаторов смертности и пятилетней выживаемости.*

***Методы исследования:*** *Проведен анализ данных из ежегодных медицинских отчетных форм №7 о больных и болезнях ЗНО по Алматинской области (форма, утвержденная Министерством здравоохранения РК за 2018-2022 годы), ежегодные региональные*

статистические сборники Бюро Национальной статистики Агентства по стратегическому планированию и реформам Республики Казахстан за 2018-2022 годы, сборники «Здоровье населения РК и деятельность организаций здравоохранения» Министерства Здравоохранения Республики Казахстан.

*Результаты:* Высокий уровень заболеваемости ЗНО по Алматинской области и по Республике в основном достигается за счет рака легкого и рака желудка у мужчин и рака молочной железы и шейки матки у женщин.

Отмечается тенденция к снижению показателей заболеваемости ЗНО по Алматинской области и по Республике в целом. Тем не менее целевой индикатор не достигнут.

Смертность от ЗНО по Республике остается практически стабильной, при этом по Алматинской области наблюдается снижение. В структуре смертности первое место занимает рак легкого, второе – рак желудка, третье – рак молочной железы, четвертое – рак пищевода.

*Заключение:* Успехи по снижению показателя смертности обусловлены внедрением скрининговых программ, усовершенствованием диагностики ЗНО на ранних стадиях и эффективностью лечения, однако показатель смертности все еще остается высоким.

Проведенное эпидемиологическое исследование заболеваемости и смертности от ЗНО в Алматинской области свидетельствует о необходимости совершенствования скрининга, внедрения новых форм скрининга для выявления рака желудка и легкого, активизации скрининга, а также усиления профилактической и просветительской работы среди населения.

*Ключевые слова:* здоровье населения, медико-демографическая ситуация, заболеваемость, смертность, злокачественные новообразования (ЗНО), профилактика.

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