

# EPIDEMIOLOGICAL ANALYSIS OF MORBIDITY AND MORTALITY FROM CANCER OF THE UTERINE BODY OF THE POPULATION OF ALMATY IN 2012-2022

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## ABSTRACT

**Relevance:** Cancer of the uterine body (CUB) is one of the most common types of malignant neoplasms and ranks 6th among the most frequently diagnosed cancers in women in the world. Despite the improvement of treatment methods, the incidence and mortality from CUB remain high. According to forecasts by the International Agency for Research on Cancer, by 2040, the incidence of CUB is expected to increase by more than 50%. Therefore, studying the epidemiological features of CUB is important for developing prevention and treatment strategies.

**The study aimed to** analyze the morbidity and mortality from CUB in the females of Almaty in 2012-2022.

**Methods:** The material for the study was data from the information system «Electronic Register of Inpatient Patients» on newly identified cases and those registered at the dispensary with a histologically confirmed diagnosis of CUB «Malignant neoplasm of the uterine body» (From 54 to ICD-10) of the population of Almaty for the period from 2012 to 2022. Epidemiological indicators were calculated per 100,000 females. The absolute growth, growth rate, and visibility indicators were calculated to analyze changes in intensive indicators over time. The database was formed, and the results were statistically processed using Microsoft Excel and the SPSS Statistics 26 statistical package.

**Results:** There was an increase in the crude incidence of CUB in the females of Almaty in 2012-2022 by 3.14 times. The incidence of CUB increased with age, where the peak incidence was noted in the age group of 60-64 years ( $58.9 \pm 8.68$  cases per 100,000 females 95% CI=39.5-78.2). Mortality from CUB decreased from 13.5 cases in 2012 to 1.3 cases per 100,000 females in 2022 (10.4 times).

**Conclusion:** The conducted epidemiological analysis showed the need for further detailed study of the risk factors contributing to the occurrence of CUB and improvement of the activities of health services, starting from the primary health care level.

**Keywords:** uterine body cancer, morbidity, mortality, prevention, early diagnosis, morphological verification.

**Introduction:** Cancer of the uterine body (CUB) is a malignant neoplasm that affects the body of the uterus and poses a threat to a woman's life. Its danger lies in its latent course and rapid spread through lymphatic vessels to other vital organs [1, 2].

According to estimates from the International Agency for Research on Cancer, in 2020 about 417 000 new cases and 97,000 deaths due to CUB have been registered worldwide. Along with this, the incidence of CUB is much higher in developed countries than in less developed countries [3]. According to the latest epidemiological analysis of GLOBOCAN (Global Cancer Statistics), the average annual incidence of CUB in North America consists of 21.1 cases per 100,000 females. In European countries, this indicator varies within different limits: in France – 31.9, New Zealand – 27.9, Spain – 13.7, Denmark – 7 cases per 100,000 females [4, 5]. In China, the latest report released by the National Cancer Center showed that

the incidence rate of CUB was 7.74 cases and the mortality rate was 1.6 cases per 100,000 females [6]. In Russia, the incidence of CUB was 33.6 per 100,000 women in 2021 [7]. In the CIS countries (Moldova, Uzbekistan, Kyrgyzstan, Kazakhstan, Azerbaijan, Belarus), the incidence of CUB ranges from 5-11 to 18-22 cases per 100,000 [8]. The lowest rates are observed in Central Africa, where the incidence rate of CUB comprises 2.3 cases per 100,000 females [4].

According to data from the literature, 90% of CUB cases occur in perimenopausal women, 25% in premenopausal women, and only 4% in women of reproductive age [9, 10]. Despite the great successes of surgical treatment, radiation, and chemotherapy for oncological diseases, the prognosis for advanced stages of CUB remains unfavorable, where the overall five-year survival rate is only 16.3% [3].

The epidemiological analysis of malignant neoplasms is known to be one of the important tools for

evaluating the health status of the population and the quality of cancer control measures [11]. Therefore, an epidemiological analysis of CUB morbidity and mortality in our region is relevant for understanding CUB prevalence and identification of high-risk groups and therefore for planning and organizing the delivery of medical care.

**The study aimed to** analyze the morbidity and mortality from CUB in the females of Almaty in 2012-2022.

**Materials and Methods:** The material for the study was data from the information system "Electronic Register of Inpatient Patients" on newly identified cases and those registered at the dispensary with a histologically

confirmed diagnosis of CUB "Malignant neoplasm of the uterine body" (From 54 to ICD-10) of the population of Almaty for the period from 2012 to 2022. Data on the average annual number of females for the period from 2012 to 2022 have been taken from the official website of the National Bureau of Statistics 'Agency for Strategic Planning and Reforms of the Republic of Kazakhstan' [12].

The study design: descriptive, epidemiological. The intensive epidemiological indicators were calculated per 100,000 females. The calculation formulas used to calculate the indicators are described in detail in the statistics textbooks [13-15] and summarized below:

$$\text{CUB morbidity} = \frac{\text{Number of newly diagnosed cases per year}}{\text{Average annual number of females in Almaty city}} \times 100\,000$$

In order to analyze the changes of intensive indicators over a certain period, special methods of time series have been used. The indicators of absolute growth, increment rate, growth rate and visibility indicator have been calculated [13]. To align the indicators of the time series (trends), the analytical method of least squares was used, which was calculated using the following formula [14]:

$$y = a_0 + a_1n$$

where y – the magnitude of a phenomenon that changes over time; a<sub>0</sub> – initial level; a<sub>1</sub> – initial row velocity; n – time frame; n – number of observations.

The formation of the database and statistical processing of the results were carried out with the use of Microsoft Excel and the SPSS Statistics 26 statistical software package.

The study was approved by the Ethics Committee of the Kazakhstan Medical University "KSPH" (protocol No. 2 as of 10/28/2020).

**Results:** The trends in intensive (crude) CUB morbidity rates has been observed among the females of Almaty for the period of 2012-2022 is presented in Figure 1. Although the trends in changes in the intensive morbidity rates of CUB in the females of Almaty had a wavelike character, the equalized indicators of the time series showed an increase in morbidity rates by an average of 11.3% annually.

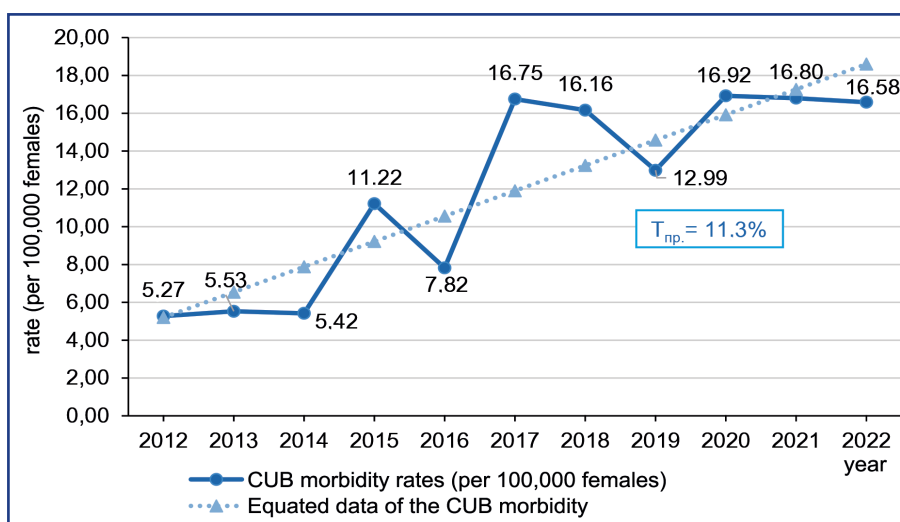


Figure 1 – Trends in intensive (crude) CUB morbidity in Almaty, 2012-2022 (per 100,000 females)

The elevation of intensive (crude) CUB morbidity rates has been observed from 5.27 cases per 100,000 females in 2012 to 16.52 cases per 100,000 females in 2022, that is, by 3.14 times. The analysis of CUB morbidity in the fe-

males of Almaty showed that in 2012-2015 there was a sharp increase in the rate – from 5.27 to 11.22 cases per 100,000 females, with a subsequent decline in 2016 to 7.82 cases per 100,000 females. In 2017 the rate increased

again to 16.75 cases per 100,000 females. Namely, this year the absolute growth of the CUB morbidity was the highest at 8.92 cases, the increment rate was 214.07%, and the growth rate was 114.07% (Table 1). In the next two years (2018-2019), a decrease in the rate to 12.99 cases per 100,000 females has been observed. However, in 2020 a 1.3-fold increase in the rate was observed com-

pared to 2019 (16.92 cases per 100,000 females), which was statistically significant ( $t=2.28, p=0.022$ ). In the next two years (2021-2022), there was a stabilization of the CUB morbidity rate in the range of 16.80-16.58 cases among the females. The average annual CUB morbidity for the analyzed period composed  $11.96 \pm 1.53$  cases (95% CI = 8.54-15.36) (Table 1).

**Table 1 – Intensive rate of morbidity from CUB (crude) in Almaty, 2012-2022 (per 100,000 females)**

Year	Morbidity	Absolute growth	Growth rate, %	Increment rate, %	Visibility coefficient compared to 2012
2012	5.27				
2013	5.53	0.26	104.85	4.85	104.85
2014	5.42	-0.11	98.05	-1.95	102.81
2015	11.22	5.80	206.94	106.94	212.75
2016	7.82	-3.40	69.73	-30.27	148.36
2017	16.75	8.92	214.07	114.07	317.58
2018	16.16	-0.58	96.51	-3.49	306.49
2019	12.99	-3.18	80.34	-19.66	246.24
2020	16.92	3.94	130.32	30.32	320.90
2021	16.80	-0.12	99.26	-0.74	318.53
2022	16.58	-0.22	98.72	-1.28	314.45

As a result of the analysis of CUB mortality, a positive trend toward its decline by 10.4 times was established: from 13.5 cases in 2012 to 1.3 cases per 100,000 females in 2022 (Fig. 2). The average annual CUB mortality rate was  $2.87 \pm 1.09$  cases (95% CI=0.45-5.29), and the average annual decline of the equated CUB mortality was -23,3%.

It should be noted that the mortality rate had a sharp decline from 2012 to 2014. In the following years until 2022, there was actually stable dynamics (with a slight decline): no statistical difference between the indicators of 2014 (1.8 cases) and 2022 (1.3 cases) ( $t=0.86, p=0.388$ ) has been revealed.

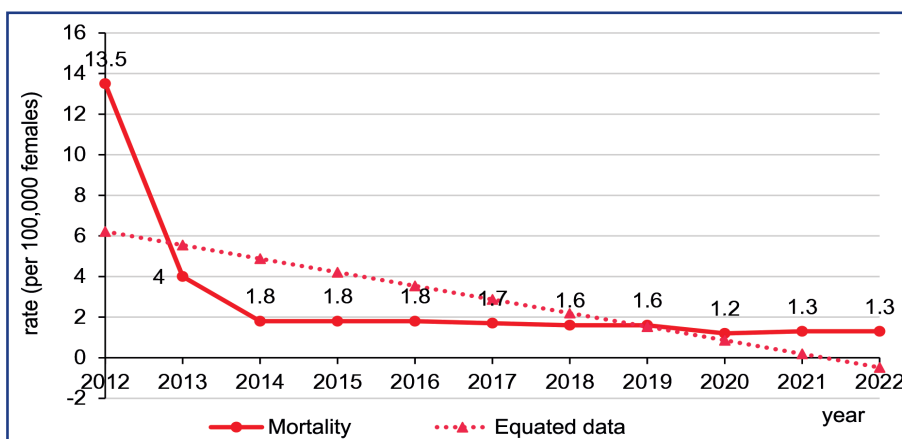


Figure 2 – Trends in CUB mortality in Almaty, 2012-2022 (per 100,000 females)

The mean age of women diagnosed with CUB composed  $60.8 \pm 0.3$  years (95% CI 60.2-61.4); the minimum age was 23 years and the maximum age was 93 years.

The age groups of 60 to 64 years (58.9 cases per 100,000 females), 65 to 69 years (58.8 cases per 100,000 females) and 70 years and older (38.4 cases per 100,000 females) were more susceptible to CUB.

The prevalence of CUB was slightly lower at the age of 55 to 59 years (37.5 cases per 100,000 fe-

males), 50-54 years (24.9 cases per 100,000 females), 45-49 years (15.6 cases per 100,000 females). It was even less common in the age group of 40-44 years (7.9 cases per 100,000 females) and 35-39 years (3.37 cases per 100,000 females). The lowest rates of CUB morbidity were revealed in the age group of 30-34 years (1.37 cases per 100,000 females) and 29 years and below (0.08 cases per 100,000 females) (Figure 3, Table 2).

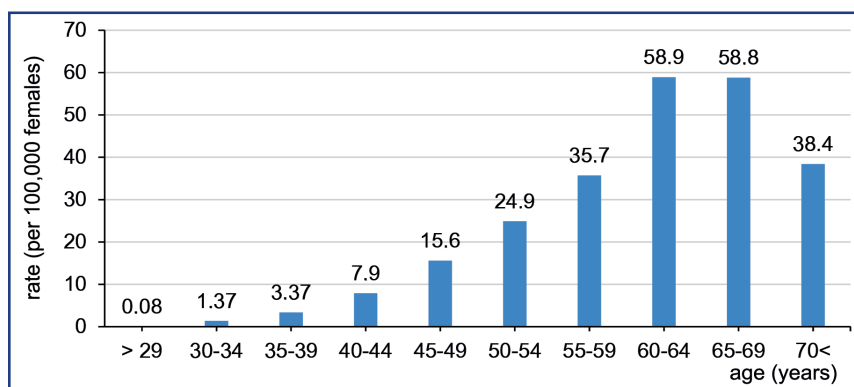


Figure 3 – Average annual intensive (crude) CUB morbidity in Almaty by age, 2012-2022 (per 100,000 females)

Table 2 – Trends in intensive (crude) rates of CUB morbidity by age in 2012-2022 (per 100,000 females)

Age/year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Average Annual Level (M±m)	95% CI
> 29	0.00	0.00	0.00	0.25	0.00	0.23	0.00	0.00	0.00	0.23	0.21	0.08 ± 0.04	0.01-0.16
30-34	1.54	0.00	0.00	0.00	1.21	3.40	2.09	1.90	0.86	2.38	1.72	1.37 ± 0.03	0.64-2.11
35-39	3.44	1.70	1.68	3.16	4.42	1.41	2.69	2.55	7.18	3.36	5.49	3.37 ± 0.53	2.19-4.54
40-44	3.89	5.66	5.50	10.39	6.55	7.97	9.33	9.10	14.65	8.42	5.42	7.9 ± 0.91	5.88-9.92
45-49	6.03	4.10	4.15	15.97	11.34	30.97	26.24	25.24	1.47	25.33	21.23	15.6 ± 3.22	8.46-22.8
50-54	10.68	4.14	4.05	25.19	18.76	35.87	28.56	28.64	39.67	38.64	40.15	24.9 ± 4.15	15.7-34.2
55-59	12.99	22.78	18.44	32.12	31.96	40.58	52.63	51.09	44.51	42.28	43.66	35.7 ± 3.98	26.9-44.6
60-64	23.95	23.16	22.70	67.50	30.97	95.39	89.21	85.24	55.10	75.41	78.86	58.9 ± 8.68	39.5-78.2
65-69	23.72	49.27	42.39	54.25	42.46	86.51	57.22	55.62	80.97	76.33	77.92	58.8 ± 5.90	45.7-71.9
70<	20.32	18.33	18.48	23.89	12.66	42.58	54.50	52.04	72.84	57.47	49.13	38.4 ± 6.12	24.7-52.03

Despite a varied CUB morbidity in the Almaty females, the trends in equated indicators of the time se-

ries demonstrate the increase in morbidity in all age groups annually over the past 11 years (Figure 4).

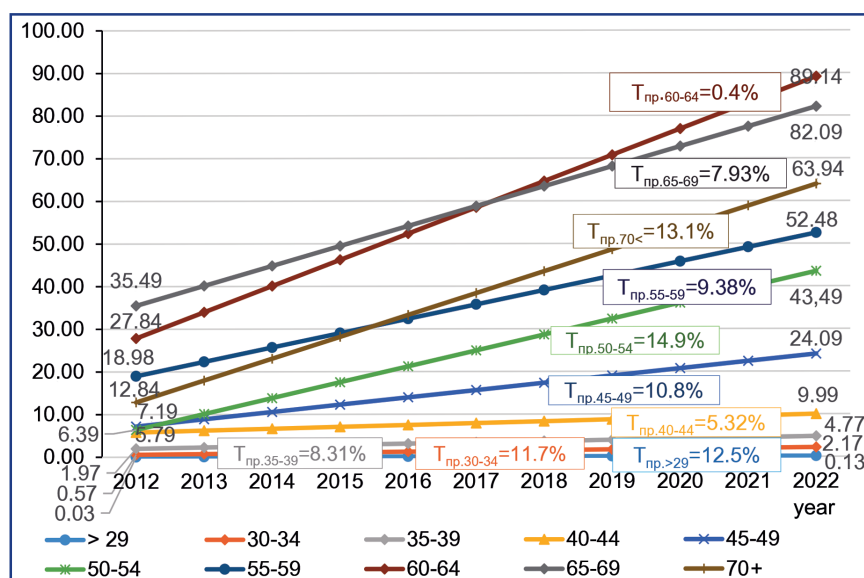


Figure 4 – Trends of equated average annual intensive (crude) CUB morbidity in Almaty by age, 2012-2022 (per 100,000 females)

The morphological verification of CUB has slightly declined in the analyzed period, from 98.3% in 2012 to 97% in 2022. The average annual morphological veri-

fication rate was  $97.5 \pm 0.39$  (95% CI 96.7-98.4), and the average annual increment in the equated indicators was +0.03% (Figure 5).

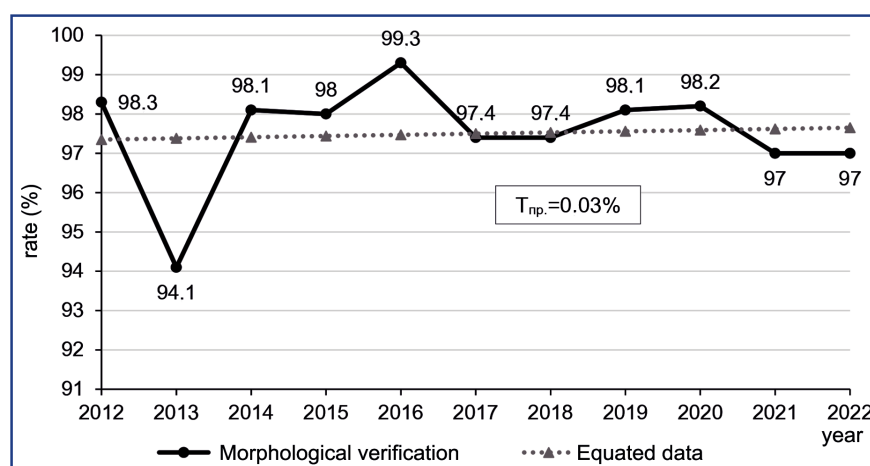


Figure 5 – Morphological verification of the CUB diagnosis in Almaty, 2012-2022 (%)  
 Legend:  $T_{np}$  - increment rate

**Discussion:** According to the literature, CUB morbidity is steadily growing, especially in developed countries, ranking 7<sup>th</sup> in Western Europe and 3<sup>rd</sup> in the United States among malignant diseases in women [16]. According to the latest statistical and analytical data of the collected volume «Indicators of the Oncological Service of the Republic of Kazakhstan», CUB ranks 6<sup>th</sup> among all women's oncological diseases in Kazakhstan [17].

The study showed that during the reviewed period (2012-2022) the increase in intensive (crude) CUB morbidity among the females of Almaty. The average annual CUB morbidity rate amounted to  $11.96 \pm 1.53$  cases (95% CI=8.54-15.36). The elevation of these indicators evidences the deterioration of the health status of the females of Almaty.

In recent years, the growth of CUB morbidity in a large metropolitan area can be partly explained by impact on the female body of a diet high in fat, sugar, and calories, as well as a lifestyle with a low level of physical activity. American scientists also assure that the increase in CUB incidence in large cities is associated with the neglect of a healthy lifestyle and the growth of obesity prevalence [18]. As is known, obesity is one of the main risk factors for CUB development, since aromatization of adipose tissue leads to hyperestrogenemia, which, in turn, leads to malignancy of the endometrium [19].

According to our data, CUB mortality in Almaty has been steadily declining from 2012 (13.5 cases per 100,000 females) to 2022 (1.3 cases per 100,000 females). The decline in CUB mortality can be explained in a large way by significant progress in the treatment of this disease, including hormonal and modern immunotherapy, as well as the implementation of the State Program for the Development of Health Care of the Republic of Kazakhstan "Salamatty Kazakhstan" for 2011-2015, due to which the strengthening of preventive measures, expansion of screening studies, and improvement

of the diagnosis and treatment of oncological diseases had been initiated [20].

CUB morbidity among women in Almaty increased from the youngest age group to the oldest, reaching its peak at the age of 60-64 years, and then declined. Our data is similar to the results of Romanian scientists, according to which CUB morbidity also increases with age, and the highest incidence occurred in the age group 60-64 years [21]. Interestingly, Chinese scientists in a large-scale global study conducted in 1990-2019 confirmed the age-related effect of CUB, and the maximum concentration of this pathology has been observed at the age of 50-69 years [22]. Consequently, CUB is a disease of the elderly, as there is a link between cancer and cellular senescence [23]. Therefore, physicians in medical organizations must be vigilant about this category of women and conduct screening examinations in a timely manner.

However, it should be noted that the trends of the equated indicators of the time series have shown the annual growth of disease morbidity in all age groups over the last 11 years. As revealed, the age group of 50 to 54 years has occupied the leading position in terms of the increase in the average rate of increased CUB morbidity, which consists of 14.9%. This shows that it is necessary to draw the attention of primary care obstetricians and gynecologists to that age category, as during this period, in most cases, distinct endocrine (hormonal) changes occur for the menopausal period, contributing to the development of malignant diseases in the absence of dynamic follow-up.

There was also an increase in CUB morbidity among women of active reproductive age (15-49 years), where age groups of 29 and younger (increment rate = 12.5%) and 30-34 years (increment rate 30-34 = 11.7%) showed the highest average increment rates. The CUB of young women is most likely associated with changes in the reproductive behavior of the modern females due to a de-

lay in having children to a later age for career interests and independent economic status of women in a city environment.

It is a common fact that the high fertility rate, which protects against CUB, is declining in most countries due to the tenet of women toward pregnancy [24]. This trend is also observed in the city of Almaty. According to the analytical review 'Analysis of the Population Situation of the Republic of Kazakhstan', the trends in the average age of urban mothers at birth of children raised from 26.5 years old in 2000 to 30 years old in 2018 [25]. Therefore, PHC doctors, especially from family planning centers, must actively promote the need to carry out the main reproductive function among women of child-bearing age: to become a mother.

CUB requires histological confirmation. As is known, one of the main factors affecting the success of treatment is proper morphological verification of the diagnosis in patients with cancer [26]. The findings of our study showed that during the analyzed period, the average annual level of morphological verification of the CUB diagnosis composed 97.5±0.39 (95% CI 96.7-98.4). However, this figure does not reach 100%, which may show insufficiently high level of pathology training and quality of biopsy sampling.

**Conclusions.** The conducted epidemiological analysis permits us to draw the following conclusions:

In Almaty, despite the decline in the CUB mortality rate, an elevation in the CUB morbidity rates was observed over the years studied.

The mean age of women with newly detected CUB was 60.8±0.30 years (95% CI 60.2-61.4). It was established that the CUB rate increased with age, with a peak morbidity observed in the age group of 60-64 years old (58.9±8.68 cases per 100,000 females, 95% CI=39.5-78.2).

Trends in equated CUB incidence demonstrate that despite the different distributions of the disease in age groups, there is an annual increase in the average growth rate across all ages. This trend was especially evident in the following four groups: 50-54 years of age (14.9%), 70 years of age and older (13.1%), 29 years of age and younger (12.5%), 30-34 years of age (11.7%).

The decline in the confirmation rate of histological diagnosis during the study period has been observed.

Consequently, the epidemiological analysis showed the peculiarities of the course of CUB among the females of Almaty for the study period (2012-2022). The identified trends in morbidity and mortality, as well as the distribution of CUB between age groups, reflect changes in the population in risk factors for CUB, which requires a thorough study for the development of treatment and prevention strategies. At the same time, for the success-

ful implementation of treatment and preventive measures, the healthcare system must improve the qualifications of primary care and hospital physicians, as well as pathologists, because the success of treatment depends on the proper collection of diagnostic material and the correctly established histological diagnosis. The data obtained on the morbidity and mortality of the population of CUB can be used for justification of efforts to reduce the burden of cancer in Almaty and monitor the performance of health services.

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## АНДАТПА

### 2012-2022 жылдар АРАЛЫҒЫНДАҒЫ АЛМАТЫ ҚАЛАСЫ ТҮРҒЫНДАРЫНЫҢ ЖАТЫРДЫҢ ҚАТЕРЛІ ІСІГІНЕН СЫРҚАТТАНУШЫЛЫҚ ПЕН ӨЛІМ-ЖІТІМДІ ЭПИДЕМИОЛОГИЯЛЫҚ ТАЛДАУ

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**Өзектілігі:** Жатыр денесінің қатерлі ісігі (ЖДҚІ) қатерлі ісіктердің ең көп таралған түрлерінің бірі болып табылады және әлемдегі әйелдерде жиі диагноз қойылған қатерлі ісіктердің арасында 6-шы орынды алады. Емдеу әдістерінің жоғарғы дәрежеде жетілдірілуіне қарамастан, ЖДҚІ-нен сырқаттанушылық пен өлім-жітім әлі де жоғары болып қала береді. Халықаралық қатерлі ісіктерді зерттеу агенттігінің болжамы бойынша 2040 жылға қарай ЖДҚІ ауруының 50%-дан астам өсуі күтілуде. Сондықтан ЖДҚІ эпидемиологиялық ерекшеліктерін зерттеу алдын алу және емдеу стратегияларын өзгерту үшін өте маңызды.

**Зерттеудің мақсаты** – 2012-2022 жж. аралығында Алматы қаласының әйелдер халқының ЖДҚІ-нен болған сырқаттанушылық және өлім-жітім көрсеткіштерін талдау.

**Әдістері:** Зерттеуге арналған материал 2012 жылдан 2022 жылға дейінгі кезеңде Алматы қаласы тұрғындарының "жатыр денесінің қатерлі ісігі" (C54-10 ХАЖ) гистологиялық расталған ЖДҚІ диагнозымен алғаш рет анықталған және диспансерлік есепте тұрған жағдайлар туралы "Стационарлық науқастардың электрондық тіркелімі" ақпараттық жүйесінен алынған деректер болды. Динамикадағы қарқынды көрсеткіштердің өзгеруін талдау үшін абсолютті өсу, өсімділіктің қарқыны, өсу қарқыны және айқындылық көрсеткіштері есептелді. Мәліметтер базасын құру және нәтижелерді статистикалық өңдеу Microsoft Excel және SPSS Statistics 26 бағдарламасының статистикалық пакеті арқылы жүзеге асырылды.

**Нәтижелері:** 2012-2022 жж. аралығында Алматы қаласы әйел халқының ЖДҚІ – пен сырқаттанушылықтың қарқынды көрсеткіштерінің (өрескел) ұлғаюы байқалды (3,14 есе). ЖДҚІ сырқаттанушылық жасына қарай ұлғайып, сырқаттанушылық шыңы 60-64 жас тобында байқалды (100 000 әйел халыққа шаққанда 58,9±8,68 жағдай 95% СА = 39,5-78,2). ЖДҚІ-нен өлім-жітім 2012 жылғы 13,5 жағдайдан 2022 жылғы 100 000 әйел адамға шаққанда 1,3 жағдайға дейін төмендеді (10,4 есе).

**Қорытынды:** Жүргізілген эпидемиологиялық талдау ЖДҚІ пайда болуына ықпал ететін қауіп факторларын терең зерттеу және алғашқы медициналық-санитарлық көмек деңгейінен бастап денсаулық сақтау қызметтерінің қызметін жетілдіру қажеттілігін көрсетті.

**Түйінді сөздер:** жатырдың қатерлі ісігі, ауру, өлім, алдын-алу, ерте диагностика, морфологиялық тексеру.

## АННОТАЦИЯ

# ЭПИДЕМИОЛОГИЧЕСКИЙ АНАЛИЗ ЗАБОЛЕВАЕМОСТИ И СМЕРТНОСТИ ОТ РАКА ТЕЛА МАТКИ НАСЕЛЕНИЯ ГОРОДА АЛМАТЫ ЗА 2012-2022 ГГ.

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**Актуальность:** Рак тела матки (РТМ) является одним из наиболее распространенных типов злокачественных новообразований и занимает 6 место среди часто диагностируемых видов рака у женщин в мире. Несмотря на совершенствование методов лечения, заболеваемость и смертность от РТМ остается высокой. По прогнозам Международного агентства по изучению рака, к 2040 году ожидается рост заболеваемости РТМ более чем на 50%. Поэтому изучение эпидемиологических особенностей РТМ имеет важное значение для разработки стратегий профилактики и лечения.

**Цель исследования** – проанализировать показатели заболеваемости и смертности от РТМ населения г. Алматы за 2012-2022 гг.

**Методы:** Материалом для исследования послужили данные из информационной системы «Электронный регистр стационарных больных» о впервые выявленных случаях и состоящих на диспансерном учете с гистологическим подтвержденным диагнозом РТМ «Злокачественное новообразование тела матки» (C54 по МКБ-10) населения г. Алматы за период с 2012 по 2022 гг. Эпидемиологические показатели рассчитывались на 100 000 женского населения. Для анализа изменений интенсивных показателей в динамике вычислены показатели абсолютного прироста, темпа прироста, темпа роста и наглядности. Формирование базы данных и статистическая обработка результатов проводилась с помощью Microsoft Excel и статистического пакета программы SPSS Statistics 26.

**Результаты:** Отмечено увеличение интенсивных (грубых) показателей заболеваемости РТМ среди населения г. Алматы в 2012-2022 гг. в 3,14 раза. Заболеваемость РТМ увеличивалась с возрастом; пик заболеваемости отмечен в возрастной группе 60-64 лет (58,9±8,68 случая на 100 000 женского населения 95% ДИ=39,5-78,2). Смертность от РТМ снизилась с 13,5 случая в 2012 г. до 1,3 случая на 100 000 женского населения в 2022 г. (в 10,4 раза).

**Заключение:** Проведенный эпидемиологический анализ показал необходимость дальнейшего детального изучения факторов риска, способствующих возникновению РТМ и совершенствования деятельности служб здравоохранения, начиная с уровня первичной медико-санитарной помощи.

**Ключевые слова:** рак тела матки, заболеваемость, смертность, профилактика, ранняя диагностика, морфологическая верификация.

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