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AVOIDABLE DEATHS FROM ONCOLOGY DISEASE IN AKTOBE REGION

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Abstract

Introduction. Population health is the primary outcome of a health care system. Measuring the performance of a health care system is essential to assessing the effectiveness of existing programs. Therefore, **the aim of our study** to assess the avoidable deaths from oncological disease in Aktobe region.

Materials and methods: We extracted data from the National research center for health development in Aktobe region by urban and rural area. In calculation population by age; death rates from oncologic diseases from 2019 to 2023, by gender and 5-year age group (0, 1–4, 5–9, 69) were included. Join point regression used to identify the average annual percentage change.

Results. Avoidable deaths from oncological disease decrease from 29.92 to 27.94 per 100000 population during 2019-2023. The preventable deaths from oncological diseases per 100000 populations fluctuated between 17.20 to 17.08, where the peak increase was in 2021 to 19.51, whereas treatable deaths rate decreased from 15.06 to 10.87 in studied years The avoidable deaths was higher among male and rural residents. The absolute changes were for avoidable deaths – 1.98, where preventable was -1.86 and treatable -1.98. Relative changes were -0.07, with the difference between preventable and treatable as -0.11 to -0.01.

Conclusion. The leading causes of avoidable death were colorectal and lung cancer. Despite some reduction in avoidable mortality, it remains high among rural residents and males, which requires studying the causes and developing measures among them.

Keywords*: avoidable death, oncological disease, quality of care, health policy, public health.*

Резюме

ПРЕДОТВРАТИМАЯ СМЕРТНОСТЬ ОТ ОНКОЛОГИЧЕСКИХ ЗАБОЛЕВАНИЙ В АКТЮБИНСКОЙ ОБЛАСТИ

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Актуальность. Здоровье населения является основным результатом деятельности системы здравоохранения. Оценка эффективности системы здравоохранения имеет важное значение для оценки эффективности существующих программ. Поэтому **цель нашего исследования** - оценить количество предотвратимых смертей от онкологических заболеваний в Актюбинской области.

Материалы и методы. Данные были получены из Национального исследовательского центра развития здравоохранения Актюбинской области в разбивке по городским и сельским районам. При расчете численности населения по возрасту были включены показатели смертности от онкологических заболеваний за период с 2019 по 2023 год в разбивке по полу и 5-летним возрастным группам (0, 1-4, 5-9, 69). Регрессия точки соединения используется для определения среднегодового процентного изменения.

Результаты. В течение 2019-2023 годов смертность от онкологических заболеваний, которой можно было избежать, снизилась с 29,92 до 27,94 случаев на 100 000 населения. Показатель предотвратимой смертности от онкологических заболеваний на 100 000 населения колебался в пределах от 17,20 до 17,08, причем пик роста пришелся на 2021 год и составил 19,51, в то время как показатель излечимой смертности снизился с 15,06 до 10,87. В исследуемые годы уровень предотвратимой смертности был выше среди мужчин и сельских жителей. Абсолютные изменения были для предотвратимых смертей – 1,98, где предотвратимые составили -1,86, а излечимые -1,98. Относительные изменения составили -0,07, а разница между предотвратимыми и поддающимися лечению показателями составила от -0,11 до -0,01.

Выводы. Основными причинами предотвратимой смертности были колоректальный рак и рак легких. Несмотря на некоторое снижение предотвратимой смертности, она остается высокой среди сельских жителей и мужчин, что требует изучения причин и разработки, соответствующих мер.

Ключевые слова: *предотвратимая смерть, онкологические заболевания, качество медицинской помощи, политика в области здравоохранения, общественное здравоохранение.*

Түйіндеме

АҚТӨБЕ ОБЛЫСЫНДА ОНКОЛОГИЯЛЫҚ АУРУЛАРДАН БОЛАТЫН АЛДЫН АЛУҒА БОЛАТЫН ӨЛІМ-ЖІТІМ

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Кіріспе. Халықтың денсаулығы денсаулық сақтау жүйесінің негізгі нәтижесі болып табылады. Денсаулық сақтау жүйесінің тиімділігін өлшеу қолданыстағы бағдарламалардың тиімділігін бағалау үшін өте маңызды. Сондықтан **біздің зерттеуіміздің мақсаты-**Ақтөбе облысында онкологиялық аурулардан болатын өлімнің алдын алуға болатын жағдайларды бағалау.

Материалдар мен әдістері. Біз Ақтөбе облысының Денсаулық сақтауды дамыту ұлттық зерттеу орталығының деректерін қалалық және ауылдық аудандар бойынша бөліп алдық. Жасы бойынша халық санын есептеу кезінде 2019-2023 жылдар аралығындағы кезеңде онкологиялық аурулардан болатын өлім-жітім көрсеткіштері жынысы және 5 жас топтары бойынша бөлінді (0, 1-4, 5-9, 69). Қосылу нүктесінің регрессиясы орташа жылдық пайыздық өзгерісті анықтау үшін қолданылады.

Нәтижесі. 2019-2023 жылдар аралығында онкологиялық аурулардан болатын өлім-жітім 100000 тұрғынға шаққанда 29,92-ден 27,94 жағдайға дейін төмендеді. Онкологиялық аурулардан болатын алдын алуға болатын өлім-жітім көрсеткіші 100 000 тұрғынға шаққанда 17,20-дан 17,08-ге дейін ауытқиды, өсудің шыңы 2021 жылы 19,51-ге жетті, ал емделетін өлім-жітім 15,06-дан 10,87-ге дейін төмендеді. Зерттелген жылдары ерлер мен ауыл тұрғындары арасында алдын алуға болатын өлім деңгейі жоғары болды. Алдын алуға болатын өлім үшін абсолютті өзгерістер болды – 1,98, мұнда алдын алуға болатын -1,86 және емделетін -1,98. Салыстырмалы өзгерістер -0,07, ал алдын алуға болатын және емдеуге болатын көрсеткіштер арасындағы айырмашылық -0,11 - ден -0,01-ге дейін болды.

Қорытынды. Алдын алуға болатын өлім-жітімнің негізгі себептері тік ішек және өкпе қатерлі ісіктері болды. Алдын алуға болатын өлім-жітімнің біршама төмендеуіне қарамастан, бұл ауыл тұрғындары мен ер адамдар арасында жоғары болып қала береді, бұл себептерді зерттеуді және тиісті шараларды әзірлеуді талап етеді.

Түйінді сөздер: *алдын алуға болатын өлім, онкологиялық аурулар, медициналық көмектің сапасы, денсаулық сақтау саясаты, денсаулық сақтау.*

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Introduction

Cancer and its related mortality are one of the leading causes of death from noncommunicable diseases (NCD) worldwide. According to GLOBOCAN, in 2020, there were approximately 10.0 million cancer deaths globally (9.9 million excluding non-melanoma skin cancer), where the lung cancer is in first place with about 18% deaths, followed by colorectal cancer with 9.4% and liver 8.3% deaths and others [22].

To meet the Sustainable Development Goal 3 target and reduce premature – avoidable mortality from NCDs, numerous countries are making efforts to strengthen primary healthcare (PHC). The universal health coverage (UHC) policy plays a key role by ensuring that all individuals, regardless of their financial situation, have access to high-quality medical and preventive care through an improved PHC model. PHC serves as the cornerstone of healthcare delivery, addressing the majority of health needs and promoting prevention, early diagnosis, and management of chronic conditions. In addition, UHC also aims to reduce health inequities by providing equitable access to care across different populations, particularly vulnerable and underserved groups. By improving access to essential health services at the community level, PHC can play a key role in early detection and the management of risk factors like hypertension, diabetes, and smoking, which are major contributors in reducing NCDs.

The productivity of the healthcare system can be provided by assessing the indicators as premature or avoidable mortality, disability adjustive life years and others. *Rutstein D.D. and colleagues* in 1976 first time initialized the concept of avoidable mortality and refined by subsequent researchers, is currently being assessed in countries such as Canada, Australia, and those in the European Region to address avoidable deaths within healthcare systems [2,5,15,16,19]. For decision makers in healthcare one of the priority issue include reducing health inequalities, eliminating gaps and barriers in access to health and preventive care services and ensuring cost-effective investments through the rational use of resources and the reduction of excess and increased productivity. Furthermore, tackling avoidable mortality contributes to building a fairer healthcare system, ultimately improving the health and well-being of the entire population.

The development of PHC can be more efficient in using existing resources, and providing sustainable health system for the long term. Investment to primary care lead to create strong system by reducing unnecessary costs for hospitalizations or referrals to specialists through increased prevention of disease complications as well as improving health outcomes. Thus, Kazakhstan has implemented policies to enhance PHC as many other countries. Over the past several decades, the country has introduced various state programs (Salamatty Kazakhstan, Densaulyk ..) that have strengthened PHC services. These include the establishment of screening programs, educational initiatives for chronic disease patients, and disease management programs (diabetes, hypertension, and chronic heart failure) [7,18]. Furthermore, since 2022, Kazakhstan has launched a WHO PHC demonstration platform in the Enbeekshi-Kazakh district of the Almaty region, where a multidisciplinary approach to PHC has been integrated. This platform serves as a center for sharing successful PHC transformation strategies, allowing visiting countries to gain insights into well-functioning models of PHC and learn how to overcome challenges and barriers to effective healthcare delivery [24].

To effectively evaluate the impact and success of the programs being implemented, it is essential to base the assessment on data derived from scientific research. Such data provides an objective foundation for understanding the outcomes of various health initiatives and helps to identify areas of success as well as those that need improvement. By analyzing this evidence, it becomes possible to pinpoint the strengths of current programs and recognize any limitations or gaps in service delivery. This, in turn, allows policymakers and health administrators to make informed decisions, reallocate resources, and adjust strategies to address priority areas more effectively. Furthermore, by integrating research findings into program planning and implementation, the healthcare system can be better positioned to achieve long-term health goals, such as reducing avoidable mortality and enhancing health outcomes across the population. Thus, the purpose of our research to assess the avoidable mortality from oncological disease in Aktobe region by living place and gender.

Materials and methods

We analyzed the number of registered deaths from oncologic disease between 2019 and 2023 which took from the National Research Center for Health Development in the Aktobe region, with data categorized by urban and rural regions. In addition, population data by age, along with death rates categorized by gender and five-year age groups (0, 1–4, 5–9, 65-69), were included in the analysis. Avoidable deaths were assessed using the methodology provided by the expert group of the Organization for Economic Cooperation and Development (OECD) and the Eurostat working group. The OECD/Eurostat list of preventable and treatable causes of death (January 2022 version) used to identify the causes of avoidable deaths [3]. To facilitate comparison with European countries, we utilized age-standardized death rates from the OECD

(2015) [17], and calculated the corresponding 95% confidence intervals (95% CIs) for the 0–69 age group, separated by gender.

Preventable deaths included: Lip, oral cavity and pharynx cancer (C00 -C14), Oesophageal cancer (C15), Stomach cancer (C16), Liver cancer (C22), Lung cancer (C33 -C34), Mesothelioma (C45), Skin (melanoma) cancer (C43), Bladder cancer (C67); Treatable deaths: Colorectal cancer (C18-C21), Breast cancer (female only) (C50), Uterus cancer (C54, C55), Testicular cancer (C62), Thyroid cancer (C73), Hodgkin's disease (C81), Lymphoid leukaemia (C91.0, C91.1), Benign neoplasm (D10-D36). Cases that were not clearly to be classified as preventable or treatable due to lack of evidence or data, were equality distributed (50% to 50%) between both categories according to the methodology proposed by OECD experts. In this group included only Cervical cancer (C53).

The analysis divided avoidable deaths into two categories: preventable and treatable deaths. Preventable deaths are those that can largely be avoided through effective public health and primary prevention strategies, while treatable deaths are those that can mainly be prevented with timely and effective healthcare interventions, including secondary prevention and medical treatment. The following formula was applied to calculate avoidable deaths:

$$t_{preventable} = \sum_{i=1}^{m} t_{st_i}$$

for i=1. m causes of death included as preventable.

$$t_{treatable} = \sum_{i=1}^{m} t_{st_i}$$

for i=1. m causes of death included as treatable.

$$t_{avoidable} = \sum_{i=1}^{m} t_{st_i}$$

for i=1. m causes of death included as avoidable.

$$t_{st} = \sum_{j=1}^{n} p_{ej}/p_e * t_j$$

where “n” number of age groups considered for adjustment;

Pej standard population jth age group (j=1, …, n)

$$p_e = \sum_{j=1}^{n} p_{ej}$$

Pe is the total standardized population; and:

$t_j = c_j/p_j$ is a weight indicator jth age group, where

c_j the number of deaths in jth age group (j = 1, · · ·, n);

p_j population jth age group measured per 100 000 populations.

Joinpoint regression is a robust analytical tool for examining trends in health data over time, identifying shifts in mortality patterns, and assessing the effectiveness of public health interventions. In this study, we applied Joinpoint regression to calculate the average annual percentage change (AAPC). The AAPC is derived by averaging the annual percentage changes over a defined period, which helps to capture the overall trend in the dataset (e.g., mortality rates) across time [6,25]. The formula for calculating the AAPC is as follows:

$$\text{AAPC} = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{Y_i - Y_{i-1}}{Y_{i-1}} \times 100\right)$$

Where:

- Yi is the value of the data point in year iii,
- Yi−1 is the value of the data point in the previous year,
- N is the number of years for which you're calculating the average change.

This method allows for a comprehensive assessment of trends in mortality rates, enabling the evaluation of how interventions or other factors influence changes over time.

The study design was approved by the Local Committee on Bioethics, Marat Ospanov West-Kazakhstan Medical University, Aktobe, Republic of Kazakhstan (Protocol 9, No. 09.01/03, 29 September 2023).

Results

Avoidable deaths from oncological disease decrease from 29.92 to 27.94 per 10000 population, where the peak of increase was in 2021 per 100000 populations 31,86. Male has higher avoidable deaths in comparison to female. However, in studied period the avoidable death decreased among male from 48.02 to 35,44, whereas in female grew from 17.31 to 23.18 per 100000 populations. AAPC of the avoidable deaths were-0,7 (-15,1; 16,1), where for male -2,6 (-15,0; 11,6) and female 4,6 (-19,7; 36,3) (figure 1).

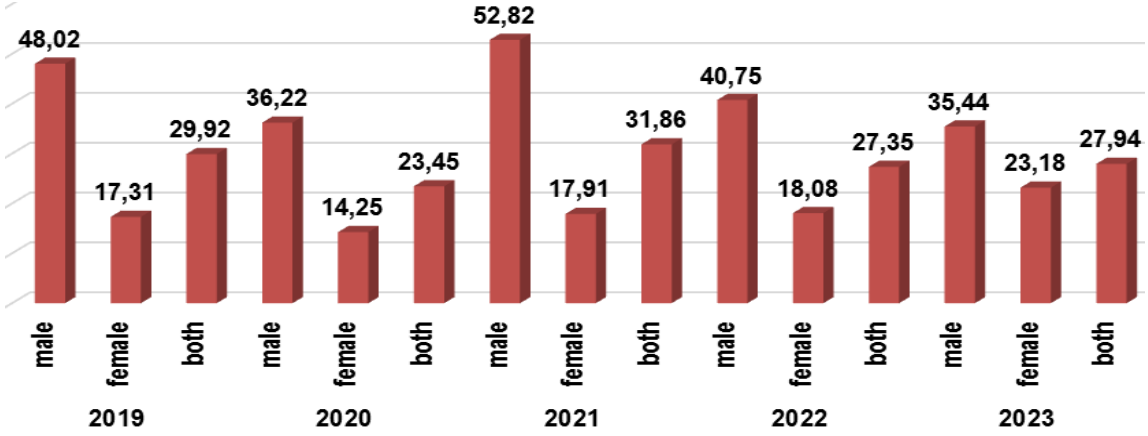

Figure 1. Avoidable deaths from oncological disease in Aktobe region between 2019-2023 by gender.

Preventable deaths from oncological diseases per 100000 populations fluctuated between 17.20 to 17.08, where the peak increase was in 2021 to 19.51. Preventable mortality was higher in rural respondents in comparison to urban, and in male, it were more than three times higher than female. The main cause of preventable deaths was lung cancer. The change in AAPC per 100000 population was for both regions -2.5 (-15.8; 12.9), where for male it was -8.3 (-28.4; 17.3) and female 7.5 (-10.9; 29.7). Among urban residents, the AAPC was for male -3.9 (-21.6; 17.7) and female 4,3 (-26.0; 46.8), whereas for both were -1.9 (-22.2; 23.7). While for rural male 0.6 (-13.6; 17.1) and female 8.4 (-14.1; 36.8), as well as for both 3.0 (-11.6; 20.0), table 1.

The treatable deaths rate decreased from 2019 to 2023 from 15.06 to 10.87, where the peak growth was in 2022 with number 13.48 per 100000 population. The treatable deaths rate in male decreased from 15.06 to 5.96 per 100000 population, while in female it increased from 10.99 to 15.00. Changes in AAPC were for male 1.4 (-9.0; 12.9) and female 13.8 (-8.8; 42.0) for both 5.3 (-6.8; 19.1). Among the urban population, the difference in treatable deaths between female and male was not high, except for 2021, where the difference was more than three times, with a prevalence of the indicator among male. AAPC changes were among urban residents 2.0 (-21.6; 22.4) (male -4.4 (-51.7; 89.1) and female 9.4 (-16.3; 43.1). Regarding the rural population, the treatable death rate increased from 14.13 to 17.44 per 100000 population, and opposite to the urban in 2021, higher treatable deaths was among female than male. The AAPC changes were 8.7 (-14.0; 37.5) for rural populations where male was 1.3 (-23.4; 33.9) and female 18.9 (-8.2; 53.9) table 2. The cause of deaths was colorectal cancer for both regions.

The absolute changes were for avoidable deaths – 1.98, where preventable was -1.86 and treatable -1.98. The positive absolute changes were in rural area 4.14 and 3.31 for preventable and treatable mortality respectively. For urban area the absolute changes for preventable deaths were -1.24 and treatable -3.44. In urban area in treatable deaths among male was the higher changes -11.36 (table 3).

Relative changes were -0.07, with the difference between preventable and treatable as -0.11 to -0.01 respectively. Negative relative changes of the avoidable deaths identified among male -0.26, whereas for female was positive 0.34, whereas the treatable relative changes were higher comparison to preventable. Female from rural place had the higher relative changes (table 4).

Discussion

Overall, in studies indicated a decrease in mortality rate from cancer worldwide [20,21], however the grew was identified in COVID-19 time. According to statistics from the Ministry of Health, oncological diseases are relevant not only in Kazakhstan, but also around the world. Over the past 20 years, the incidence of cancer in the country has increased by 25%, and cancer mortality has decreased by 33%. According to statistics from the Ministry of Health for 2022, Kostanay, Akmola, Aktobe, and Mangystau regions are classified as unfavorable regions [8,14]. Our study results show the We also identified a reduction in avoidable cancer-related deaths in the Aktobe region, primarily attributed to treatable deaths. This indicates that managers at hospital level need an improvement process and care as well as secondary prevention in PHC. However, it is crucial for policymakers to investigate the rise in avoidable (particularly treatable) deaths among women in rural areas. A disparity in avoidable mortality persists, with higher rates observed among men, which is typically linked to their delayed seeking of medical and preventive care, as well as the excessive use of risk factors [1,4,23].

The COVID-19 pandemic contributed to an increase in avoidable or excess deaths, especially among individuals with chronic conditions and comorbidities. A systematic review with cumulative meta-analysis identified several factors that predicted severe COVID-19 outcomes and higher mortality, including chronic obstructive pulmonary disease, cerebrovascular disease, cancer and others [10]. In our assessment we also found the increase of avoidable deaths from cancer disease in 2021. Previous research has shown that reducing avoidable deaths could help reduce life expectancy disparities within the European Union [11]. Similarly, for Kazakhstan, studying avoidable mortality is essential to address gender inequality, where the life expectancy gap between men (70.0 years) and women (79.0 years) was about 9 years in 2023 [13] as well as identify future priority area [12]. A study in Wales revealed an increasing life expectancy gap between the sexes during 2002 to 2020, the primary factor behind this trend is a steady reduction in life expectancy among the most disadvantaged groups. The study also highlighted that the life expectancy gap for women is predominantly associated with cardiovascular disease, cancer, respiratory disease and other related factors, while for men, it was more associated with alcohol- and drug-related deaths and injuries [9].

Limitation and future direction: The scope of the study was limited to a five-year timeframe, which, while valuable, is relatively short and does not account for long-term trends in avoidable mortality between urban and rural areas. This short timeframe prevents a more comprehensive analysis of the enduring patterns and changes in avoidable deaths over a longer period. Additionally, the mortality data was obtained from a single source, while life expectancy and other demographic data were sourced from the Bureau of Statistics. This reliance on different data sources may introduce limitations in drawing definitive conclusions about the broader effectiveness of health strategies, particularly those aimed at reducing avoidable mortality over time. For instance, in 2021 males deaths rates was 1.84 per 100000 populations which may be related to the mistakes in registration. Furthermore, various factors, such as underreporting of deaths, gaps in data collection, and potential inaccuracies in death registration, could undermine the reliability and generalizability of the findings. These issues might also hinder the ability to assess the full impact of health interventions and policies. To address these limitations, future research should explore the interplay between regional economic conditions, levels of deprivation, and individual socioeconomic status, as these factors are likely to influence avoidable mortality rates. Also crucial to explore how the level of urbanization, especially the contrasts between small rural and large urban areas, affects disparities in preventable deaths. This research could offer

Table 1.

Preventable deaths from oncological disease in Aktobe region be gender from 2019-2023 per 100000 populations.

Year	Gender	C00-C14	C15	C16	C22	C33-C34	C43	C45	C53	C67	Total	AAPC
		Total										
2019	male	5.09	1.59	1.27	1.22	22.28	0.00	0.00	0.00	1.51	32.96	Male -8.3 (-28.4; 17.3); Female 7.5 (-10.9; 29.7); Total -2.5 (-15.8; 12.9)
	female	1.60	0.00	0.00	0.26	2.81	0.00	0.35	0.71	0.58	6.31	
	both	3.06	0.68	0.57	0.66	10.71	0.00	0.21	0.38	0.94	17.20	
2020	male	6.02	0.36	2.11	1.79	17.00	0.00	0.00	0.00	0.22	27.50	
	female	0.33	0.25	0.33	1.27	2.59	0.00	0.00	0.62	0.33	5.73	
	both	2.67	0.29	1.08	1.57	8.63	0.00	0.00	0.34	0.31	14.88	
2021	male	5.37	0.77	5.44	0.48	22.86	0.00	0.00	0.00	0.48	35.39	
	female	1.57	0.16	0.84	0.00	4.43	0.00	0.00	1.37	0.32	8.70	
	both	3.15	0.41	2.71	0.19	11.90	0.00	0.00	0.76	0.38	19.51	
2022	male	4.94	0.49	0.00	2.49	18.23	0.00	0.28	0.00	0.00	26.43	
	female	1.03	0.71	0.00	0.24	1.26	0.00	0.00	1.37	0.30	4.92	
	both	2.65	0.61	0.00	1.15	8.43	0.00	0.13	0.72	0.18	13.87	
2023	male	3.08	0.00	0.00	4.01	22.11	0.00	0.00	0.00	0.29	29.48	
	female	2.04	1.03	0.00	1.22	2.05	0.00	0.00	1.84	0.00	8.18	
	both	2.41	0.57	0.00	2.49	10.48	0.00	0.00	1.00	0.13	17.08	
		Urban										
2019	male	5.82	1.75	0.88	1.77	19.78	0.00	0.00	0.00	0.43	30.44	Male -3.9 (-21.6; 17.7); Female 4.3 (-26.0; 46.8); Total -1.9 (-22.2; 23.7)
	female	0.36	0.00	0.00	0.00	3.33	0.00	0.49	0.48	0.80	5.46	
	both	2.61	0.73	0.39	0.73	9.66	0.00	0.30	0.26	0.66	15.33	
2020	male	3.75	0.00	3.04	1.05	11.49	0.00	0.00	0.00	0.31	19.64	
	female	0.00	0.35	0.45	0.59	2.06	0.00	0.00	0.51	0.00	3.96	
	both	1.50	0.18	1.51	0.82	5.81	0.00	0.00	0.28	0.15	10.25	
2021	male	5.43	0.42	0.00	0.00	20.96	0.00	0.00	0.00	0.67	27.48	
	female	1.01	0.21	0.00	0.00	3.83	0.00	0.00	0.80	0.43	6.29	
	both	2.84	0.30	0.00	0.00	10.63	0.00	0.00	0.47	0.53	14.77	
2022	male	5.12	0.41	0.00	1.94	11.69	0.00	0.39	0.00	0.00	19.55	
	female	0.79	0.27	0.00	0.00	0.95	0.00	0.00	0.96	0.00	2.97	
	both	2.51	0.32	0.00	0.75	5.30	0.00	0.18	0.51	0.00	9.57	
2023	male	2.79	0.00	0.00	3.06	18.77	0.00	0.00	0.00	0.41	25.03	
	female	1.31	0.70	0.00	1.17	1.91	0.00	0.00	1.65	0.00	6.74	
	both	1.84	0.40	0.00	1.97	8.76	0.00	0.00	0.93	0.18	14.09	
		Rural										
2019	male	3.64	1.19	2.09	0.00	27.92	0.00	0.00	0.00	3.75	38.60	Male 0.6 (-13.6; 17.1); Female 8.4 (-14.1; 36.8); Total 3.0 (-11.6;20.0)
	female	4.78	0.00	0.00	0.91	1.62	0.00	0.00	1.34	0.00	8.64	
	both	4.18	0.55	1.00	0.46	13.23	0.00	0.00	0.68	1.59	21.69	
2020	male	11.36	1.14	0.00	3.53	28.87	0.00	0.00	0.00	0.00	44.89	
	female	1.22	0.00	0.00	2.97	4.03	0.00	0.00	0.91	1.22	10.33	
	both	5.66	0.53	0.00	3.40	15.37	0.00	0.00	0.46	0.71	26.13	
2021	male	5.11	1.64	17.88	1.64	27.31	0.00	0.00	0.00	0.00	53.58	
	female	3.08	0.00	3.08	0.00	6.06	0.00	0.00	3.07	0.00	15.30	
	both	3.89	0.70	9.54	0.70	15.15	0.00	0.00	1.52	0.00	31.50	
2022	male	4.12	0.83	0.00	3.79	35.06	0.00	0.00	0.00	0.00	43.80	
	female	1.87	1.98	0.00	0.98	2.28	0.00	0.00	2.66	1.27	11.04	
	both	2.94	1.42	0.00	2.26	17.31	0.00	0.00	1.34	0.73	26.01	
2023	male	3.71	0.00	0.00	6.32	31.12	0.00	0.00	0.00	0.00	41.15	
	female	4.37	2.01	0.00	1.39	2.59	0.00	0.00	2.49	0.00	12.86	
	both	4.05	0.99	0.00	3.94	15.65	0.00	0.00	1.19	0.00	25.83	

Lip, oral cavity and pharynx cancer (C00 -C14), Oesophageal cancer (C15), Stomach cancer (C16), Liver cancer (C22), Lung cancer (C33 -C34), Mesothelioma (C45), Skin (melanoma) cancer (C43), Bladder cancer (C67)

Table 2.

Treatable deaths from oncological disease in Aktobe region be gender from 2019-2023 per 100000 populations.

Year	Gender	C18-C21	C50	C53	C54,C55	C62	C73	C81	C91.0,C91.1	D10-D36	Total	AAPC
		Total										
2019	male	10.45	0.00	0.00	0.00	0.00	0.00	0.84	0.00	3.77	15.06	Male 1.4 (-9.0; 12.9); Female 13.8 (-8.8; 42.0); Total 5.3 (-6.8; 19.1)
	female	5.26	3.50	0.71	0.29	0.00	0.00	0.00	0.49	0.75	10.99	
	both	7.64	1.97	0.38	0.16	0.00	0.00	0.31	0.25	2.00	12.72	
2020	male	6.59	0.00	0.00	0.00	0.00	0.79	0.00	0.00	1.34	8.72	
	female	3.10	1.92	0.62	0.85	0.00	0.25	0.00	0.00	1.77	8.51	
	both	4.62	1.07	0.34	0.48	0.00	0.47	0.00	0.00	1.60	8.57	
2021	male	13.89	0.00	0.00	0.00	0.00	0.00	0.00	0.34	3.20	17.43	
	female	4.57	1.15	1.37	0.27	0.00	0.26	0.24	0.16	1.19	9.21	
	both	8.34	0.66	0.76	0.14	0.00	0.15	0.13	0.22	1.95	12.35	
2022	male	10.46	0.00	0.00	0.00	0.00	0.00	0.00	1.72	2.13	14.32	
	female	4.76	3.14	1.37	1.81	0.00	0.54	0.00	0.50	1.05	13.17	
	both	7.25	1.75	0.72	1.01	0.00	0.31	0.00	0.94	1.50	13.48	
2023	male	2.49	0.00	0.00	0.00	0.00	0.82	0.00	0.98	1.66	5.96	
	female	5.09	1.57	1.84	2.39	0.00	1.28	0.00	0.92	1.92	15.00	
	both	3.89	0.90	1.00	1.35	0.00	1.06	0.00	0.90	1.78	10.87	
		Urban										
2019	male	7.75	0.00	0.00	0.00	0.00	0.00	1.25	0.00	4.20	13.20	Male -4.4 (-51.7; 89.1); Female 9.4 (-16.3; 43.1); Total -2.0 (-21.6; 22.4)
	female	5.86	3.32	0.48	0.40	0.00	0.00	0.00	0.67	0.70	11.43	
	both	6.80	1.92	0.26	0.23	0.00	0.00	0.45	0.36	2.13	12.14	
2020	male	6.94	0.00	0.00	0.00	0.00	0.43	0.00	0.00	1.22	8.59	
	female	2.86	1.91	0.51	1.18	0.00	0.35	0.00	0.00	2.11	8.93	
	both	4.48	1.09	0.28	0.67	0.00	0.38	0.00	0.00	1.80	8.70	
2021	male	15.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	18.35	
	female	3.52	0.73	0.80	0.00	0.00	0.36	0.33	0.23	0.61	6.58	
	both	8.31	0.41	0.47	0.00	0.00	0.21	0.19	0.11	1.39	11.09	
2022	male	9.76	0.00	0.00	0.00	0.00	0.00	0.00	1.60	2.17	13.53	
	female	5.12	3.48	0.96	1.76	0.00	0.32	0.00	0.35	1.07	13.06	
	both	7.07	1.99	0.51	1.01	0.00	0.18	0.00	0.82	1.51	13.10	
2023	male	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.42	0.71	1.84	
	female	5.59	1.42	1.65	1.42	0.00	1.35	0.00	0.94	1.54	13.92	
	both	3.16	0.84	0.93	0.82	0.00	1.05	0.00	0.68	1.21	8.70	
		Rural										
2019	male	16.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	19.12	Male 1.3 (-23.4; 33.9); Female 18.9 (-8.2; 53.9); Total 8.7 (-14.0; 37.5)
	female	3.70	4.02	1.34	0.00	0.00	0.00	0.00	0.00	0.88	9.94	
	both	9.54	2.16	0.68	0.00	0.00	0.00	0.00	0.00	1.74	14.13	
2020	male	5.86	0.00	0.00	0.00	0.00	1.70	0.00	0.00	1.70	9.25	
	female	3.62	1.93	0.91	0.00	0.00	0.00	0.00	0.00	0.88	7.33	
	both	4.92	1.00	0.46	0.00	0.00	0.71	0.00	0.00	1.16	8.24	
2021	male	10.17	0.00	0.00	0.00	0.00	0.00	0.00	1.08	4.36	15.61	
	female	7.44	2.25	3.07	0.94	0.00	0.00	0.00	0.00	2.74	16.45	
	both	8.41	1.26	1.52	0.47	0.00	0.00	0.00	0.51	3.44	15.60	
2022	male	12.40	0.00	0.00	0.00	0.00	0.00	0.00	2.19	2.18	16.77	
	female	3.68	1.98	2.66	1.94	0.00	1.27	0.00	1.01	0.98	13.52	
	both	7.84	0.98	1.34	1.00	0.00	0.73	0.00	1.34	1.48	14.71	
2023	male	9.69	0.00	0.00	0.00	0.00	0.97	0.00	2.52	4.25	17.43	
	female	3.56	2.14	2.49	5.46	0.00	0.98	0.00	1.00	3.04	18.66	
	both	6.32	1.12	1.19	2.86	0.00	0.97	0.00	1.61	3.37	17.44	

Colorectal cancer (C18-C21), Breast cancer (female only) (C50), Uterus cancer (C54, C55), Testicular cancer (C62), Thyroid cancer (C73), Hodgkin's disease (C81), Lymphoid leukaemia (C91.0, C91.1), Benign neoplasm (D10-D36).

Table 3.

Absolute Changes of Avoidable deaths from oncological disease in Aktobe region **by gender from 2019 to 2023.**

Area	Urban			Rural			Total		
Gender	male	female	both	male	female	both	male	female	both
C00-C14 - preventable	-3.03	0.95	-0.77	0.07	-0.40	-0.13	-2,02	0,44	-0,65
C15 - preventable	-1.75	0.70	-0.32	-1.19	2.01	0.44	-1.59	1.03	-0.11
C16 - preventable	-0.88	0.00	-0.39	-2.09	0.00	-1.00	-1.27	0.00	-0.57
C18-C21 - treatable	-7.75	-0.26	-3.64	-6.43	-0.14	-3.22	-7.96	-0.17	-3.76
C22 - preventable	1.29	1.17	1.24	6.32	0.48	3.49	2.79	0.96	1.83
C33-C34 - preventable	-1.01	-1.42	-0.90	3.20	0.98	2.43	-0.18	-0.76	-0.22
C43 - preventable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C45 - preventable	0.00	-0.49	-0.30	0.00	0.00	0.00	0.00	-0.35	-0.21
C50 - treatable	0.00	-1.90	-1.07	0.00	-1.88	-1.05	0.00	-1.93	-1.07
C53 - preventable	0.00	1.17	0.68	0.00	1.15	0.52	0.00	1.13	0.62
C53 - treatable	0.00	1.17	0.68	0.00	1.15	0.52	0.00	1.13	0.62
C54,C55 - treatable	0.00	1.02	0.59	0.00	5.46	2.86	0.00	2.10	1.18
C62 - treatable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C67 - preventable	-0.02	-0.80	-0.47	-3.75	0.00	-1.59	-1.23	-0.58	-0.81
C73 - treatable	0.71	1.35	1.05	0.97	0.98	0.97	0.82	1.28	1.06
C81 - treatable	-1.25	0.00	-0.45	0.00	0.00	0.00	-0.84	0.00	-0.31
C91.0,C91.1 - treatable	0.42	0.26	0.32	2.52	1.00	1.61	0.98	0.44	0.65
D10-D36 - treatable	-3.50	0.84	-0.92	1.24	2.16	1.62	-2.11	1.17	-0.22
Total - preventable	-5.41	1.28	-1.24	2.55	4.21	4.14	-3.48	1.87	-0.12
Total - treatable	-11.36	2.48	-3.44	-1.69	8.73	3.31	-9.10	4.00	-1.86
Cancer avoidable	-16.77	3.76	-4.68	0.86	12.94	7.45	-12.58	5.87	-1.98

Table 4.

Relative Changes of Avoidable deaths from oncological disease in Aktobe region **by gender from 2019 to 2023.**

Area	**Urban**			**Rural**			**Total**		
Gender	male	female	both	male	female	both	male	female	both
C00-C14 - preventable	-0.52	2.60	-0.29	0.02	-0.08	-0.03	-0.40	0.27	-0.21
C15 - preventable	-1.00		-0.45	-1.00		0.79	-1.00		-0.16
C16 - preventable	-1.00		-1.00	-1.00		-1.00	-1.00		-1.00
C18-C21 - treatable	-1.00	-0.04	-0.53	-0.40	-0.04	-0.34	-0.76	-0.03	-0.49
C22 - preventable	0.73		1.70		0.53	7.66	2.29	3.68	2.79
C33-C34 - preventable	-0.05	-0.43	-0.09	0.11	0.60	0.18	-0.01	-0.27	-0.02
C43 - preventable									
C45 - preventable		-1.00	-1.00					-1.00	-1.00
C50 - treatable		-0.57	-0.56		-0.47	-0.48		-0.55	-0.54
C53 - preventable		2.44	2.64		0.86	0.76		1.59	1.64
C53 - treatable		2.44	2.64		0.86	0.76		1.59	1.64
C54,C55 - treatable		2.55	2.53					7.28	7.20
C62 - treatable									
C67 - preventable	-0.05	-1.00	-0.72	-1.00		-1.00	-0.81	-1.00	-0.86
C73 - treatable									
C81 - treatable	-1.00		-1.00				-1.00		-1.00
C91.0,C91.1 - treatable		0.39	0.89					0.90	2.55
D10-D36 - treatable	-0.83	1.19	-0.43	0.41	2.46	0.93	-0.56	1.56	-0.11
Total - preventable	-0.18	0.23	-0.08	0.07	0.49	0.19	-0.11	0.30	-0.01
Total - treatable	-0.86	0.22	-0.28	-0.09	0.88	0.23	-0.60	0.36	-0.15
Cancer avoidable	-0.38	0.22	-0.17	0.01	0.70	0.21	-0.26	0.34	-0.07

valuable understanding of the context-specific elements that contribute to avoidable mortality. Additionally, a more in-depth examination of the risk factors influencing preventable deaths would be beneficial, especially at the PHC level, could help inform the development of more targeted and effective interventions. This approach would allow for tailored strategies that address the unique needs of different populations, thereby maximizing the potential impact of public health initiatives. Moreover, it needs investigate the influence of socio-demographic characteristics, as education levels, health literacy, and awareness of preventive health indicators linked with avoidable mortality. Understanding how these factors contribute to health outcomes can inform public health education campaigns and policy development. Finally, measuring avoidable deaths over extended periods, incorporating data from multiple time points, would allow for continuous monitoring and assessment of the effectiveness of existing policies. This longitudinal approach would provide a more robust evaluation of health strategies aimed at reducing avoidable deaths and ensuring the achievement of UHC, allowing policymakers to make data-driven decisions and adjust interventions as needed.

Conclusion

The leading causes of avoidable cancer death were colorectal and lung diseases. Despite some reduction in avoidable mortality, it remains high among rural residents and males, which requires studying the causes and developing measures among them. Moreover, it was identified the grows of treatable mortality among female in rural area, thus policy makers in health departments need to deeper learn the reasons and to develop strategies to decrease the avoidable deaths. This will help to decrease the inequality and realize UHC goals.

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