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Incidence, Mortality and Five-Year Survival of Colorectal Cancer in the Republic of Kazakhstan (2013–2023)

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Abstract

Background: Colorectal cancer remains a significant public health concern globally and in Kazakhstan, with rising incidence rates partly attributed to improved screening and lifestyle changes. This study aimed to assess epidemiological trends in colorectal cancer in Kazakhstan from 2013 to 2023, focusing on incidence, mortality, and five-year survival rates.

Methods: This population-based registry analysis utilized national cancer registry data on colorectal cancer (CRC) morbidity and mortality. All registered cases from 2013 to 2023 were included. Five-year survival was estimated using aggregated registry data (observed survival). Temporal trends were evaluated using simple linear regression.

Results: Between 2013 and 2023, colorectal cancer incidence in Kazakhstan slightly increased (from 8.9 to 9.8 per 100,000), while mortality significantly decreased by 32.7% (from 4.9 to 3.3; B = –6.64, reflecting an overall downward trend over the study period; $P < 0.001$), particularly in East Kazakhstan. Rectal cancer incidence increased in South Kazakhstan (B = 5.46; $P = 0.007$) and Astana (B = 1.59; $P = 0.014$), but declined in the Almaty region (B = –1.88; $P = 0.008$). Mortality decreased notably in the Almaty region, Almaty city, and North Kazakhstan. Five-year observed survival rates for CRC improved from 44.1% to 52.0%, and for rectal cancer from 42.0% to 47.0%.

Conclusion: Despite the decline in colorectal cancer mortality in Kazakhstan from 2013 to 2023, the persistently high rate of late-stage diagnoses underscores the urgent need to strengthen early detection efforts and implement region-specific interventions.

Keywords: Colorectal Cancer, Incidence, Mortality Rate

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Introduction

According to the International Agency for Research on Cancer (IARC) 2020 report, there were 19.3 million cancer cases worldwide, resulting in nearly 10 million deaths (1). Globally, lung cancer accounts for 11.7% of all cases, followed by colorectal cancer (CRC) with 10.0%, prostate cancer with 7.3%, and stomach cancer with 5.6%. By 2040, the global cancer burden is projected to reach 28.4 million cases, representing a 47% increase compared with 2020 levels (1). Cancer remains a leading cause of mortality and a major barrier to improving life expectancy in many countries (2).

CRC ranks third in incidence and second in mortality worldwide. According to GLOBOCAN, there were more than 1.9 million new cases of CRC (including anal cancer) and approximately 935,000 deaths globally in 2020, accounting for around 10% of all cancers (3, 4). The incidence of CRC is highest in Australia/New Zealand and Europe, while the lowest rates are observed in parts of Africa and South Asia (5). In the United States, CRC remains one of the most frequently diagnosed cancers, with 153,020 expected cases and 52,550 deaths in 2023 (6). Although overall CRC mortality has declined by approxi-

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↑What is "already known" in this topic:
Colorectal cancer (CRC) is a major global health concern, exhibiting significant geographical variations in incidence and mortality. In Kazakhstan, previous studies have reported an increasing burden of CRC, with limited regional analyses of epidemiological trends.

→What this article adds:
This study presents the first comprehensive ten-year assessment of CRC incidence, mortality, and survival across all regions of Kazakhstan. The findings demonstrate improved survival and declining mortality rates; however, notable regional disparities persist, highlighting the need to strengthen early detection programs and implement region-specific prevention strategies.

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mately 2% annually over the past decade, rates have increased among younger adults (7). In many countries in Eastern Europe, South-Eastern and South–Central Asia, and South America, incidence rates continue to rise, largely due to lifestyle factors such as diet, physical inactivity, and obesity (8). In the Russian Federation, CRC is among the most common malignancies, with more than 68,000 cases reported annually, and a substantial proportion diagnosed at advanced stages (9).

While global and regional trends provide important context, the burden of CRC in the Republic of Kazakhstan warrants particular attention due to its increasing incidence and changing survival patterns over the past decade. National cancer registry data enable a unique population-based analysis of these trends, addressing an existing gap in the international literature. From 2004 to 2014, the primary incidence rate increased from 16.0 to 20.1 per 100,000, and the introduction of population-based screening in 2011 contributed to further improvements in early detection (10). CRC is currently the third most common cause of cancer-related death in Kazakhstan, following lung, breast, and stomach cancers, with more than 2,000 deaths reported annually (11). Over the past decade, incidence increased from 21.9 to 25.0 per 100,000, while mortality stabilized at approximately 1,500 deaths per year. This study presents the first descriptive, registry-based analysis of colorectal cancer incidence, mortality, and survival trends over a ten-year period in Kazakhstan.

This analysis is guided by a conceptual model that considers how screening implementation, diagnostic capacity, and treatment accessibility may jointly influence national CRC trends. However, due to its descriptive design, these associations should not be interpreted as causal.

The aim of this study was to analyze the epidemiological indicators of colorectal cancer in the Republic of Kazakhstan for the period 2013–2023, including trends in incidence and mortality, and to estimate five-year observed survival rates.

Methods

A descriptive, registry-based analysis using aggregated national data was conducted to assess morbidity and mortality from colorectal cancer (CRC) in the Republic of Kazakhstan for the period 2013–2023. The study utilized aggregated data from the National Cancer Registry and population statistics obtained from the Bureau of National Statistics of Kazakhstan. All registered CRC cases during the study period were included, and duplicate entries were excluded.

Data sources comprised the official reports “Form No. 7 – Annual Report on Patients with Malignant Neoplasms” and “Indicators of Oncology Service of the Republic of Kazakhstan.” The analysis covered incidence, mortality, and five-year observed survival rates. Epidemiological indicators were calculated per 100,000 population, and regional trends were assessed by ranking areas from minimum to maximum values.

Simple linear regression was applied to describe temporal trends. Joinpoint or segmented regression will be implemented in future work when more detailed data become available. Calendar year was used as the independent variable (coded as a continuous variable), and incidence and mortality rates per 100,000 population were the dependent variables. The regression coefficient (B) represents the average annual change in the rate per 100,000 population. Regression coefficients are reported with 95% confidence intervals (CIs). A p-value of <0.05 was considered statistically significant.

Age-standardized rates were unavailable; therefore, only crude rates were analyzed, which may introduce bias when comparing regions and years.

The five-year observed survival was calculated from aggregated registry data. Individual-level data were unavailable, precluding the use of Kaplan–Meier or relative survival methods.

Results

Between 2013 and 2023 in Kazakhstan, CRC incidence slightly increased, while mortality decreased for both colon and rectal cancer. Specifically, incidence rose from 8.9 to 9.8 per 100,000 for colorectal cancer and from 8.2 to 8.8 per 100,000 for rectal cancer, whereas mortality declined from 4.9 to 3.3 and from 4.7 to 3.5 per 100,000, respectively (Figures 1–2).

Epidemiologic trend analysis demonstrated statistically significant downward trends in CRC mortality for both colorectal (B= −6.64, SE = 1.29, 95% CI: −9.17 to −4.11, P< 0.001) and rectal cancer (B = −6.89, 95% CI: −9.83 to −3.95, P = 0.001), with a more pronounced decline observed for rectal cancer mortality. B reflects the direction and magnitude of the overall temporal trend rather than a literal year-to-year change.

Given that the regions of the Republic of Kazakhstan differ substantially in living standards and access to medical care, it is of considerable interest to examine CRC incidence and mortality within a regional context.

Table 1 summarizes regional trends in colorectal cancer (CRC) incidence. The highest average incidence was observed in the Pavlodar and Kostanay regions, whereas the lowest rates were recorded in the South Kazakhstan and Kyzylorda regions. No statistically significant temporal trends were identified in most regions.

Table 2 presents regional trends in rectal cancer incidence. The regions were ranked by increasing average annual incidence, with the Pavlodar region

showing the most unfavorable epidemiological situation. Statistically significant upward trends were observed in the South Kazakhstan region and Astana, while the Almaty region demonstrated a significant downward trend. Incidence rates in other regions remained stable.

Table 3 presents regional trends in CRC mortality across Kazakhstan. The regions were ranked by increasing annualized mortality rate, with the Pavlodar region again showing the most unfavorable situation.

Table 3 shows regional mortality trends for colorectal cancer (CRC). The highest mortality rates were recorded in the Pavlodar and East Kazakhstan regions, while the lowest rates were observed in the southern regions. Significant downward trends were identified in the North Kazakhstan region, Almaty city, and East Kazakhstan.

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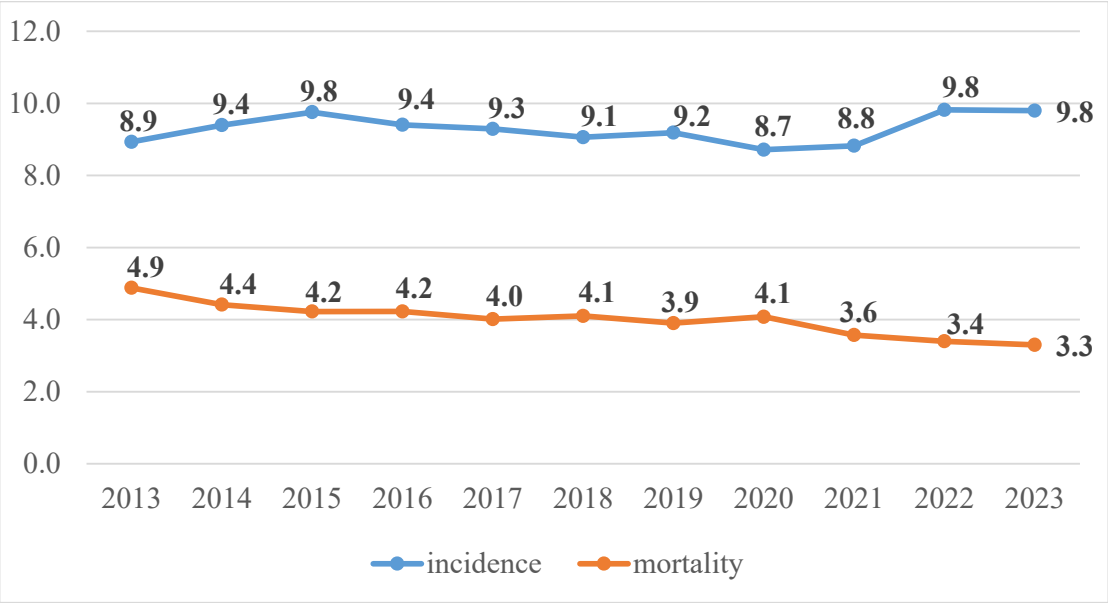

Figure 1. Dynamics of colorectal (colorectal) cancer incidence and mortality in Kazakhstan for the period 2013-2023 (per 100,000 population)

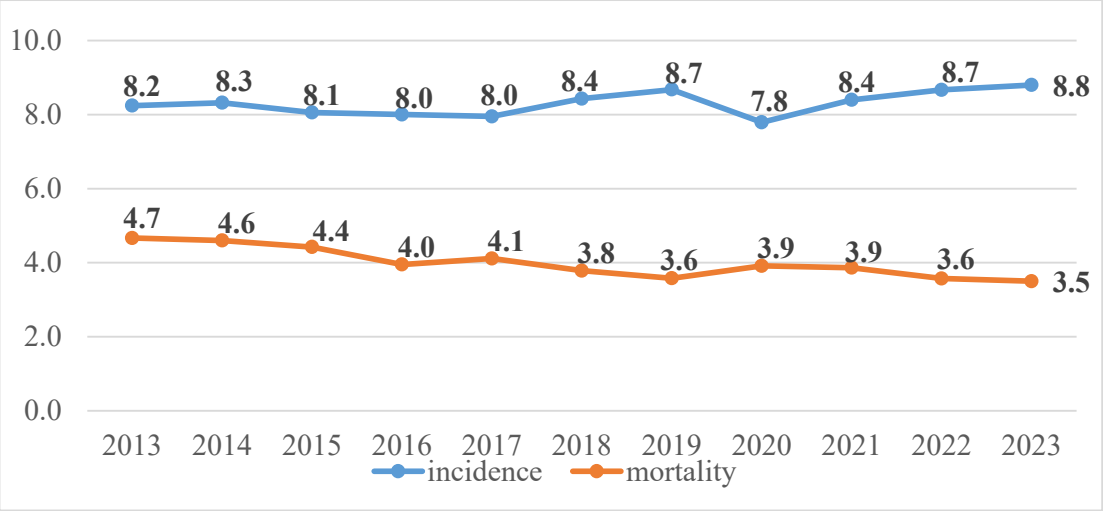

Figure 2. Dynamics of colorectal cancer (rectal cancer) incidence and mortality in Kazakhstan for the period 2013-2023 (per 100,000 population)

Table 4 presents regional mortality trends for rectal cancer. The regions were ranked by increasing average annual mortality rate, with the Pavlodar region exhibiting the most unfavorable situation. Significant downward trends were observed in the Almaty region, Almaty city, and North Kazakhstan, whereas mortality rates in other regions remained stable over time.

Analysis of Five-Year Survival Rates for CRC, 2013–2023

The five-year observed survival rate of CRC patients is an important indicator of the effectiveness of treatment interventions, which largely depends on the timely diagnosis of CRC at early stages. Figure 3 illustrates the dynamics of the five-year observed survival rate of CRC patients during the period 2013–2023.

As shown in Figure 3, the five-year observed survival rate for CRC in Kazakhstan increased from 44.1% in 2013 to 45.3% in 2015, followed by a slight decline to 44.2% in 2016, and then gradually rose to 52.0% by 2023. For rectal cancer, the five-year observed survival rate increased from 42.0% in 2013 to 42.7% in 2015, then slightly decreased to 41.6% in 2016, before gradually rising to 47.2% in 2021 and stabilizing at 47.0% in 2023.

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Table 1. Incidence of CRC (colorectal) per 100,000 population in the Republic of Kazakhstan by regions in 2013-2023

Region	Average annual value of the indicator	Regression coefficient	SE	95% CI for the regression coefficient		*P*
				Lower limit	Upper limit	
Republic of Kazakhstan	9.2	-0.92	3.29	-7,36	5.52	0.750
South Kazakhstan region	3.4	1.68	2.17	-2.58	5.94	0.390
Kyzylorda region	3.9	1.02	1.56	-2.03	4.08	0.773
Almaty region	4.7	-1.76	0.98	-3.70	0.17	0.068
Mangystau region	5.1	1.00	1.07	-1.08	3.09	0.298
Zhambyl region	5.5	1.09	1.53	-1.91	4.09	0.427
Atyrau region	6.7	1.00	0.61	-0.19	2.20	0.089
Aktobe region	7.3	1.72	1.12	-0.47	3.92	0.109
Astana	10.0	0.05	0.89	-1.70	1.80	0.063
West Kazakhstan region	10.6	-0.45	0.98	-2.38	1.48	0.605
Akmola region	12.5	0.64	0.60	-0.54	1.82	0.246
Almaty city	12.7	-1.13	1.36	-3.80	1.53	0.356
East Kazakhstan region	14.2	-1,29	1.03	-3.31	0.73	0.181
Karaganda region	15.1	-0.09	1.06	-2.16	1.99	0.926
North Kazakhstan region	15.8	0.23	0.63	-1.01	1.47	0.683
Pavlodar region	17.0	-0.51	0.73	-1.95	0.92	0.435
Kostanay region	17.1	0.24	0.79	-1.31	1.79	0.732

Table 2. Incidence of CRC (rectal cancer) per 100,000 population in the Republic of Kazakhstan by regions in 2013-2023

Region	Average annual value of the indicator	Regression coefficient	SE	95% CI for the regression coefficient		*P*
				Lower limit	Upper limit	
Republic of Kazakhstan	8.3	3.86	3.89	-3.78	11.49	0.278
South Kazakhstan region	3.5	5.46	1.80	1.94	8.98	0.007
Mangystau region	3.7	-1.18	1.39	-3.90	1.54	0.348
Kyzylorda region	4.0	0.22	1.45	-2.62	3.06	0.862
Zhambyl region	4.3	0.43	1.89	-3.28	4.14	0.796
Almaty region	5.4	-1.88	0.63	-3.13	-0.64	0.008
Atyrau region	6.8	0.51	1.03	-1.50	2.53	0.573
Aktobe region	8.1	0.58	0.98	-1.35	2.51	0.507
Almaty city	8.3	0.57	1.33	-2.03	3.17	0.626
Astana	8.3	1.59	0.59	0.42	2.75	0.014
West Kazakhstan region	10.5	0.70	0.90	-1.05	2.46	0.381
Karaganda region	11.3	1.15	0.99	-0.79	3.10	0.209
Akmola region	11.5	0.41	0.99	-1.53	2.35	0.638
East Kazakhstan region	13.9	0.77	1.55	-2.25	3.80	0.572
North Kazakhstan region	15.2	-0.84	0.76	-2.32	0.64	0.227
Kostanay region	15.3	1.21	0.97	-0.71	3.12	0.184
Pavlodar region	16.2	0.32	0.61	-0.88	1.52	0.560

Table 3. Mortality from CRC (colorectal) per 100,000 population in the Republic of Kazakhstan by regions in 2013-2023

Region	Average annual value of the indicator	Regression coefficient	SE	95% CI for the regression coefficient		*P*
				Lower limit	Upper limit	
Republic of Kazakhstan	4.1	-6.64	1.17	-9.17	-4.11	<0.001
South Kazakhstan region	1.7	3.97	4.94	-5.95	13.88	0.383
Kyzylorda region	1.9	-1.75	1.65	-4.94	1.43	0.240
Almaty region	2.3	-2.97	1.60	-6.33	0.39	0.076
Mangystau region	2.4	-3.02	2.12	-7.28	1.23	0.140
Atyrau region	2.6	-1.29	1.42	-4.12	1.53	0.322
Aktobe region	2.7	-1.77	1.42	-5.19	1.65	0.267
Zhambyl region	3.2	-1.26	1.51	-4.85	2.33	0.442
Astana	4.4	-1.89	1.33	-4.40	0.62	0.121
West Kazakhstan region	4.5	-1.14	1.44	-4.70	2.43	0.483
Akmola region	5.5	-2.36	1.35	-5.04	0.32	0.077
Kostanay region	5.7	0.17	2.63	-4.99	5,33	0.941
North Kazakhstan region	5.9	-1.62	0.81	-3.18	-0.06	0.043
Almaty city	6.0	-1.82	0.84	-3.44	-0.20	0.032
Karaganda region	6.0	-1.48	0.87	-3.22	0.27	0.087
East Kazakhstan region	7.1	-1.91	0.77	-3.41	-0.41	0.019
Pavlodar region	7.4	-1.44	0.78	-2.97	0.086	0.061

Discussion

According to the results of our study, an increase in colorectal cancer (CRC) incidence accompanied by a decrease in mortality was observed in Kazakhstan during the period 2013–2023.

Statistically significant downward trends in mortality were identified for both colorectal and rectal cancer, with a more pronounced reduction in rectal cancer mortality. The South Kazakhstan region and Astana demonstrated increasing trends in rectal cancer incidence, whereas the Almaty region showed a declining trend. Decreasing mortality trends for both colorectal and rectal cancer were

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Table 4. Mortality from colorectal cancer (rectal cancer) per 100 000 population in the Republic of Kazakhstan by regions in 2013-2023

Region	Average annual value of the indicator	Regression coefficient	SE	95% CI for the regression coefficient		*P*
				Lower limit	Upper limit	
Republic of Kazakhstan	4.0	-6.89	1.00	-9.83	-3.95	0.001
South Kazakhstan region	1.9	1.83	3.21	-4.53	8.20	0.525
Mangystau region	1.9	-2.67	1.67	-6.03	0.68	0.104
Kyzylorda region	2.0	-3.02	1.63	-6.44	0.41	0.077
Almaty region	2.8	-2.90	1.34	-5.26	-0.54	0.022
Zhambyl region	3.0	-1.04	2.44	-5.70	3.62	0.620
Atyrau region	3.5	-1.36	1.27	-3.92	1.12	0.253
Aktobe region	3.7	-0.58	1.22	-3.04	1.89	0.605
Astana	4.4	-0.96	1.18	-4.54	2.63	0.555
Almaty city	4.6	-1.89	0.93	-3.64	-0.15	0.037
West Kazakhstan region	4.7	0.72	1.56	-2.41	3.85	0.609
Karaganda region	4.7	-1.19	0.90	-3.54	1.14	0.272
Kostanay region	5.3	-1.29	0.50	-3.27	0.70	0.174
Akmola region	5.6	-1.33	0.17	-3.03	0.38	0.110
North Kazakhstan region	7.1	-1.39	0.12	-2.13	-0.66	0.002
East Kazakhstan region	7.5	-1.49	1.57	-3.99	0.99	0.204
Pavlodar region	7.9	-1.09	1.00	-5.81	3.63	0.607

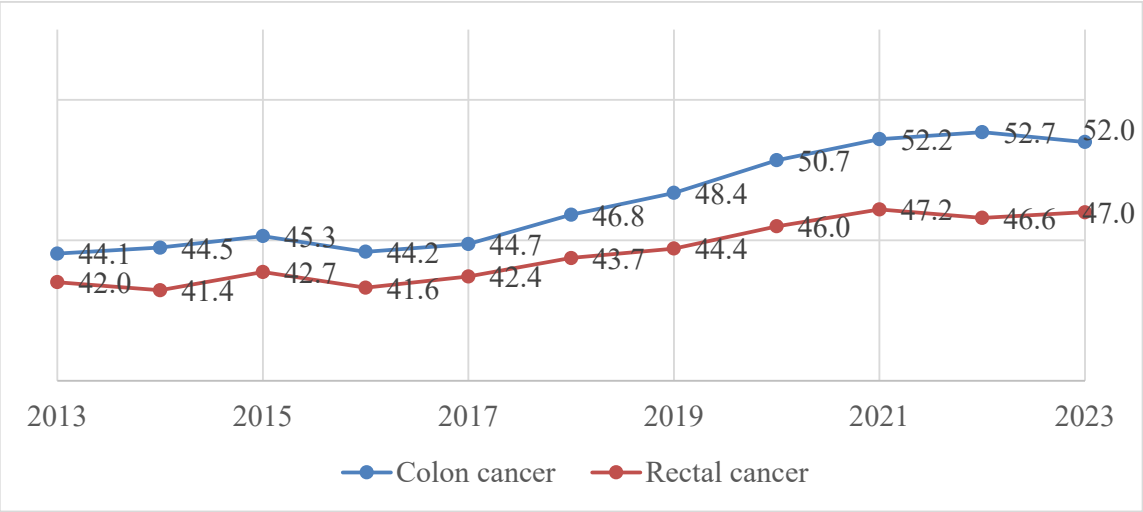

Figure 3. Five-year observed survival rates of patients with CRC (colorectal and rectal) for the period 2013-2023 (%)

recorded in the North- Kazakhstan, East Kazakhstan, and Almaty regions.

Despite improvements in patient outcomes, the majority of CRC cases continue to be diagnosed at advanced stages, contributing to lower survival rates.

Overall, the CRC situation in Kazakhstan has improved; however, substantial regional differences persist in epidemiological indicators and temporal trends. The observed changes may reflect both enhanced diagnostic capacity and more effective treatment strategies. Nonetheless, as the present analysis is based on aggregated data, causal inferences should be made with caution.

Globally, CRC incidence in transition countries is reported to be three to four times lower than in developed nations, although mortality rates vary less, with higher mortality observed in developing regions. CRC incidence differs by up to tenfold across the world, with the highest rates in Europe, Australia/New Zealand, and North America, and the lowest in Africa and South Asia. Cancer rates are rising in countries undergoing economic transition, likely due to lifestyle changes, including increased consumption of red meat and reduced physical activity. Known risk factors include smoking, alcohol consumption, red and processed meat intake, and obesity, while regular physical activity and a healthy diet provide protective effects (12).

In Kazakhstan, marked territorial differences in CRC incidence are observed, reflecting geographical, economic, and cultural characteristics across regions. The northern, eastern, and central areas—such as Pavlodar, North Kazakhstan, Kostanay, Akmola, Karaganda, East Kazakhstan, Almaty, and parts of West Kazakhstan,—are characterized by higher incidence rates, likely associated with high consumption of red meat and similar products. Western regions, including Aktobe, Mangistau, and Atyrau, exhibit moderate incidence levels, where fish consumption is common and meat intake is comparatively lower. The southern regions, where diets traditionally include more vegetables and fruits, demonstrate the lowest incidence rates (11).

The study by Gupta et al. in the United States demonstrated that colorectal cancer (CRC) inci-

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dence and mortality declined across all age groups over time. This reduction was attributed to improved control of risk factors, more effective treatment of established disease, and particularly the expansion of national screening programs. From 2000 to 2018, CRC incidence and mortality decreased from 56 and 20 cases per 100,000 population to 37 and 13 cases per 100,000, respectively (13).

In contrast, according to our findings, during the period 2013–2023 in the Republic of Kazakhstan, CRC incidence increased slightly while mortality declined. Specifically, colon cancer incidence rose from 8.9 to 9.8 per 100,000 population, accompanied by a decrease in mortality from 4.9 to 3.3 per 100,000. Similarly, rectal cancer incidence increased from 8.2 to 8.8 per 100,000 population, whereas mortality declined from 4.7 to 3.5 per 100,000. The absence of statistically significant incidence trends across most regions may indicate relatively stable underlying rates, as well as limitations inherent in the use of crude rate analyses. Future studies incorporating age-standardized or joinpoint regression analyses may yield more detailed insights into temporal and regional variations.

In the study by Almuhanna et al., patients from Saudi Arabia exhibited a five-year overall survival rate of 47.9%, with higher survival observed among those with better access to medical care (14). In our study, the five-year observed survival rate for CRC ranged from 42% to 52%, showing an upward trend from 2013 to 2023. The observed improvement in survival may, at least in part, reflect lead-time bias associated with advances in early detection and screening programs.

Screening for colorectal cancer (CRC) and polyps can be performed using fecal immunochemical test (FIT), colonoscopy (CC) or computed tomographic colonography (CTC). Colonoscopy reduces mortality from CRC by 68% but comes with risks of complications such as bleeding and immunochemical test (FIT), colonoscopy (CC), or computed tomographic colonography (CTC). Colonoscopy has been shown to reduce CRC mortality by approximately 68%, although it carries a risk of complications such as bleeding and perforation, occurring in 0.3–3.2 and 0.1–2 cases per 1,000 examinations, respectively) (15). The Asia-Pacific Working Group on CRC Screening recommends colonoscopy primarily for high-risk groups, as its overall effectiveness is limited by contraindications, low availability, and insufficient population participation (16).

Although screening programs are not yet widely implemented in many transitioning countries due to high costs, they can be cost-effective, particularly when non-invasive methods such as stool testing are used. In high-incidence countries, CRC incidence has declined as a result of lifestyle improvements and widespread screening; however, among young adults (under 50 years of age), incidence continues to rise. This increase has been attributed to higher obesity rates, physical inactivity, and alterations in the gut microbiome. To address the growing burden of early -onset CRC, the U.S. Preventive Services Task Force (USPSTF) updated its 2016 recommendations to align with those of the American Cancer Society, lowering the recommended age to initiate screening to 45 years (12).

An analysis of colorectal cancer (CRC) screening in Kazakhstan from 2011 to 2015 revealed a low adenoma detection rate (17%) and moderate population coverage among individuals with a positive screening result (72.5%). Since 2011, the primary CRC screening method in Kazakhstan has been the fecal immunochemical test (FIT), followed by colonoscopy for positive cases (17). Despite the implementation of a national CRC screening program, mortality from this disease remains high, indicating insufficient screening coverage and delays in initiating treatment. Differences in treatment strategies and clinical protocols among countries may partly explain the lower CRC mortality observed elsewhere (18).

A study by Toleutayeva et al. demonstrated limited public awareness in Kazakhstan regarding CRC, including its risk factors, symptoms, and screening methods. The main barriers to participation in screening were fear of positive results, fear of future illness, and a lack of information about CRC (19).

CRC screening also has a substantial impact on patients' quality of life, both during diagnosis and throughout treatment and recovery. Patients with CRC in Kazakhstan generally perform well on functional and symptom-related quality-of-life scales; however, their overall health status is rated as average. The most frequently reported symptoms include fatigue, insomnia, and loss of appetite. Assessing quality of life is directly linked to the quality of care provided, and systematic evaluations in the future may contribute to improving medical and rehabilitative support for this patient population (20).

Although CRC screening programs have been introduced in Georgia, Latvia, and Kazakhstan, they have not yet led to significant reductions in mortality in all these countries. In Kazakhstan and Lithuania, where screening programs are relatively more effective, positive trends in mortality reduction have been observed. The success of CRC screening depends heavily on patient follow-up, healthcare infrastructure, availability and quality of treatment, and the overall cost of interventions.

CRC remains the most common malignancy in Belarus, Latvia, Lithuania, Moldova, and Ukraine, with the highest incidence among men in Moldova and among women in Latvia. The incidence also remains elevated in many high-income countries. Screening programs are currently in place in Estonia, Georgia, Kazakhstan, Latvia, Lithuania, Ukraine, and Russia, although adenomas and cancer detection rates by colonoscopy vary across these nations. In Kazakhstan and Lithuania, detection outcomes are comparable to those of high-income countries. Cancer registries are maintained in all countries of the region; however, variations in data quality and registry structure hinder reliable cross-country comparisons.

Access to surgical care, the presence of specialized centers, and adherence to standardized diagnostic and treatment protocols play crucial roles in improving survival and screening effectiveness.

Strengthening healthcare infrastructure and treatment

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systems remains essential for effective CRC control (21).

To improve the epidemiological indicators of colorectal cancer (CRC) in Kazakhstan, it is essential to expand screening programs, particularly among individuals aged 50 years and older, and to enhance public awareness of CRC risk factors. Improving access to diagnostic and treatment services in rural and remote areas, as well as equipping medical professionals with modern diagnostic tools, should be prioritized. In addition, promoting healthy lifestyles—including balanced nutrition
and regular physical activity—remains a key strategy for CRC prevention.

Limitations

This study has several limitations. Sensitivity analyses were not performed, which may affect the robustness of the findings. The analysis was based on aggregated registry data; therefore, survival rates reflect observed rather than individual-level outcomes. As a result, these estimates may differ from true population-based survival and should be interpreted with caution. The absence of important clinical variables—such as tumor stage, treatment modalities, and comorbidities—further limits the depth of interpretation. Moreover, the use of simple regression models may not fully capture potential nonlinear temporal trends. Age-standardized rates were unavailable, and only crude rates were analyzed, which restricts comparability across regions and periods and may introduce bias. Finally, the aggregated nature of the dataset precluded adjustment for confounding factors and the analysis of individual-level risk factors.

Despite these limitations, the study provides valuable, nationally representative evidence on long-term trends in colorectal cancer epidemiology in Kazakhstan, contributing to a better understanding of disease dynamics and informing future public health strategies.

Conclusion

Between 2013 and 2023, Kazakhstan experienced a modest increase in colorectal cancer (CRC) incidence accompanied by a marked decline in mortality. These findings suggest progress in national cancer control efforts but also underscore persistent regional disparities. Strengthening early detection initiatives and ensuring equitable access to screening and treatment remain key public health priorities.

Acknowledgment

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Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

Dina Toleutayeva: Study design, manuscript writing; Gulnar Shalgumbayeva: Data analysis; Assel Tukinova: Manuscript writing, data analysis; Lyazzat Dyussenova: Data collection; Tolegen Toleutayev: Interpretation of data for the work.

Ethical Considerations

Ethical approval for this study was obtained from the Ethical Committee of Semey Medical University, Kazakhstan (Protocol No. 2, October 28, 2020). As the research utilized anonymized, aggregated data without any identifying patient information, informed consent from participants was not required. All procedures were conducted in accordance with relevant ethical principles and national research regulations.

Funding Support

N/A.

Data Availability

The data used in this study were obtained from aggregated reports of the National Cancer Registry and official statistics from the Bureau of National Statistics of the Republic of Kazakhstan and are available in summarized form through official sources. Individual-level patient data were not accessible to the authors due to administrative and ethical restrictions. Additional information regarding the data may be provided by the corresponding author upon reasonable request.

AI Use Statement

The authors declare that artificial intelligence tools were used solely for language editing. Artificial intelligence was not used for data analysis, interpretation of results, or preparation of scientific content. The authors assume full responsibility for the accuracy and integrity of the work.

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