RESEARCH ARTICLE

Incidence and Mortality due to Colorectal Cancer in Mongolia, 2018-2022

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Abstract

Objective: We aimed to update data on the morbidity and mortality rate of colorectal cancer (CRC) among the population of Mongolia by province between 2018 and 2022. **Methods:** This study was designed using a descriptive method. The data were collected from 21 general hospitals of provinces, 9 general hospitals of districts, and the National Cancer Center in 2018–2022. The incidence and mortality were calculated as mean annual numbers per 100,000 populations. The age-standardized rate (ASR) was utilized by the direct method, and it was rated by weighted average of age-specific incidence rates against the world population. **Result:** In the country, a total of 1316 new cases were diagnosed and 782 deaths were caused by CRC in the last 5 years (2018–2022). The incidence of CRC in the last 5 years (2018–2022) was 7.9 per 100,000 populations, and the mortality rate was 4.7 per 100,000. The provinces of Orkhon (12), Khentii (11), and Central (10) reported the highest incidences of CRC, whereas the provinces of Sukhbaatar (6.9), Selenge (6.6), Dornod (6), and Darkhan-Uul (6) had the highest death rates (per 100,000 populations). The incidence of CRC didn't differ statistically significantly between men and women. Additionally, the estimated incidence has grown dramatically with patients' ages. **Conclusion:** Our study presents evidence of a steadily increasing CRC incidence in Mongolia over the past five years. Therefore, it is necessary to determine the distribution of risk factors, learn from the experience of developed countries, and develop a comprehensive strategy for prevention, diagnosis, and treatment.

Keywords: Colorectal cancer- age-standardized rate- incidence- mortality rate- Mongolia

Introduction

Cancer is one of the major health problems in the world and the leading cause of death in the entire population [1]. In 2020, according to the World Health Organization (WHO), more than 19.2 million people were diagnosed with cancer, and 10 million people died of cancer-related causes [2]. From this, an estimated 1.9 million individuals had CRC, with a mortality rate of 935,000 [2]. CRC is the third most common morbidity cancer and the second leading cause of death among cancers worldwide [3]. CRC is more prevalent in developed European countries, but in the last 20 years, the incidence and mortality have increased exponentially in Asian countries [4]. Therefore, if comprehensive measures for early detection are not taken, it is estimated that the incidence and mortality will increase by 2-3 times in the next 20 years.

According to 2020 WHO GLOBOCAN data, Mongolia has the highest mortality rate of cancer-related deaths in the world [5]. In addition, Mongolian CRC incidence and mortality were 6.3 and 4.0 per 100,000 populations, respectively.

The total land area of Mongolia is 1,564,116 square kilometres and the current population is 3,457,548. The population of Mongolia is equivalent to 0.04 percent of the total world population. The population density is two people per km2 (six people per m²). In addition, Mongolian people are represented by almost 20 ethnic groups: Khalkh 83.8%, Kazakh 3.8%, Durvud 2.6%, Bayad 2%, Buriad 1.4%, Zakhchin 1.2%, Dariganga 1.1%, and others 4.1%.. Mongolia has one metropolitan city (Ulaanbaatar), 21 provinces, and more than 300 parts (soum). The territory of Mongolia is divided into western, khangai, central, and eastern regions, and each region includes the following provinces:
• Western region: Bayan-Ulgii, Govi-Altai, Zavkhan,

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Uvs, and Khovd provinces;

• Khangai region: Arkhangai, Bayankhongor, Bulgan, Orkhon, Uvurkhangai, and Khuvsgul provinces;

• Central region: Govisumber, Darkhan-Uul, Dornogovi, Dundgovi, Umnugovi, Selenge, and Tuv provinces;

• Eastern region: Dornod, Sukhbaatar, and Khentii provinces.

While studies on cancer prevalence in Mongolia have previously been conducted, we do not have any research on the prevalence of CRC now. Also, CRC studies are left behind the liver and stomach cancer studies in our country. Thus, the aim of this study was to update data on the morbidity and mortality of CRC among the population of Mongolia by provinces between 2018 and 2022.

Materials and Methods

Study design

This study was designed as a descriptive method, and data were collected from 21 general hospitals of provinces, 9 general hospitals of districts and National Cancer Center in 2018–2022. We collected data of newly diagnosed cases of CRC, based on the ICD-10 classification (C18 and C20). The population number was derived from the official data of the National Statistics Office. A landlocked country sandwiched between Russia to the north and China to the south, Mongolia is one of the largest countries in Asia and the 19th biggest country in the world. However, despite its size, Mongolia has one of the lowest average population densities, with an estimated population of 3.4 million. Mongolia has more than 20 ethnic groups, most of which are Khalkh people.

The incidence of CRC in 21 provinces and 9 districts of the capital city was calculated as mean annual numbers per 100,000 populations. The age-standardized rate (ASR) was utilized by the direct method, and it was rated by weighting age-specific incidence rates against the world population [6] using the following formula:

N= (Incidence x 100'000)/Population

Nationwide CRC numbers were estimated per 100,000 populations and analyzed age and gender differences using arithmetic mean at 5-year.

Microsoft Excel software and SPSS version 20 were used for data entry and analysis. A p value of less than 0.05 was considered statistically significant.

Ethical Declaration

This study was approved by the Institutional Review Board (IRB) of the Institute of Medical Sciences, Mongolian National University of Medical Sciences, on January 14, 2023. Ethical approval for this study was obtained from the Ethics Committee of the Ministry of Health on March 17, 2023 (approval number: 23/012).

Results

In the country, a total of 1316 (Table 1) new cases were diagnosed and 782 deaths were caused by CRC in the last 5 years (2018–2022). And with each passing year, morbidity and mortality are steadily increasing (Figure 1). Comparing 2018 to 2022, both new cases and deaths of CRC increased: the morbidity rate of ASR increased from 6.8 to 8.8 and the mortality rate increased from 4.3 to 5 per 100,000 populations.

New cases of CRC have been reported with a national average ASR of 7.9 per 100,000 populations for the last 5 years. In Ulaanbaatar, the capital city of Mongolia, new cases of CRC ASR have been reported in 8.24 per 100,000 populations in the last 5 years (Figure 2). The highest incidence rates of CRC ASR were observed in the east region, which were 9.67 per 100,000 populations. Contrary to this, the Western region had the lowest incidence rates (8.24 per 100.000 population) of CRC. Among the provinces, Dornod, Sukhbaatar, Khentii, Orkhon, Gobi-altai, Darkhan-Uul, Tuv, Uvurkhangai, and Selenge provinces had a higher incidence than the national average (9.0 per 100,000 population) (Figure 2).

The mortality rate of CRC has been reported with a national average ASR of 4.7 per 100,000 populations for the last 5 years. In Ulaanbaatar, the capital city of Mongolia, the mortality rate of CRC ASR has been
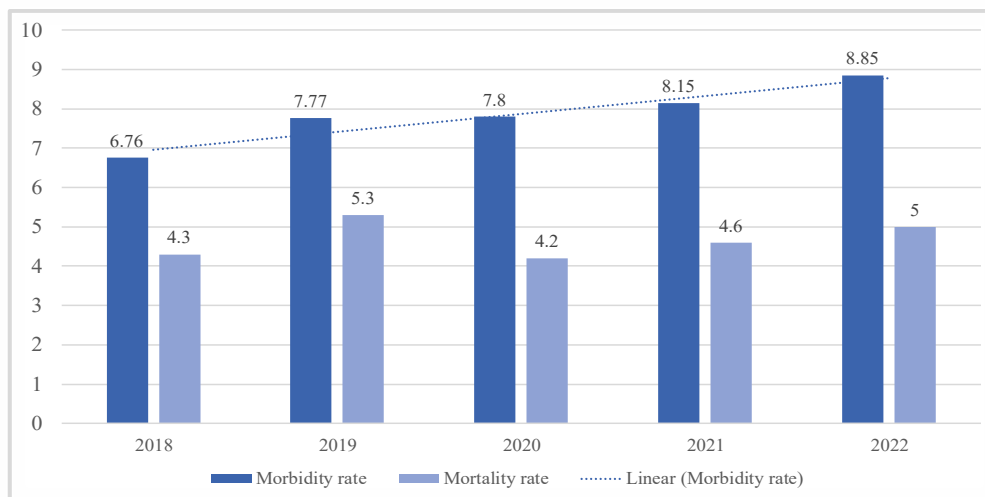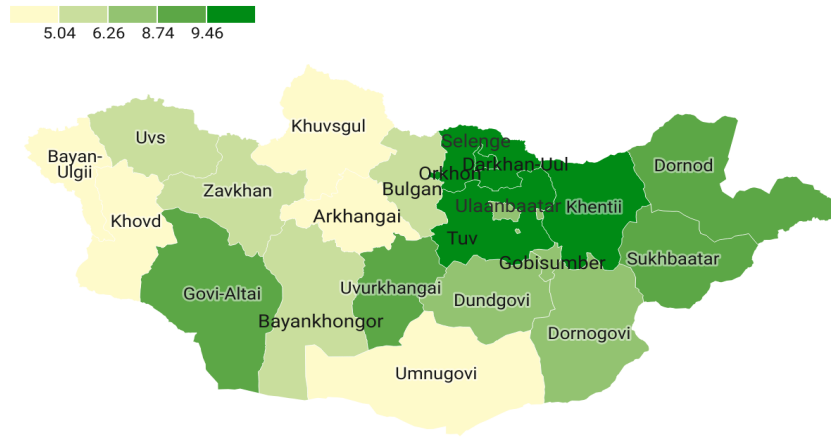

Figure 1. Change in the National Average Number of Incidences and Mortality Rates from 2018 to 2022 per 100,000 Population in Mongolia

Figure 2. New Incidence Rate of Colorectal Cancer by an Average Number from 2018–2022, by Provinces, per 100,000 Population in Mongolia

Table 1. CRC situation in Mongolia in 2018-2022

Variables	N (%)
Age group (%)	
0-9 (%)	2 (0.1)
10-19 (%)	3 (0.2)
20-29 (%)	24 (1.8)
30-39 (%)	100 (7.6)
40-49 (%)	161 (12.2)
50-59 (%)	302 (22.9)
60-69 (%)	348 (26.4)
>70 (%)	376 (28.5)
Gender, male (%)	634 (48.1)
TNM classification	
0 stage (%)	13 (0.9)
I stage (%)	46 (3.5)
II stage (%)	225 (17)
III stage (%)	576 (43.7)
IV stage (%)	456 (34.6)

reported in 4.8 per 100,000 population in the last 5 years. The highest incidence rates of CRC ASR were observed in the east region, which were 5.9 per 100,000 populations. In contrast, the western region had the lowest incidence rates (3.4 per 100,000 population) of CRC and was similar to the morbidity rate prevalence (Figure 3). The incidence of CRC was males (7.7 per 100,000) and females (7.9 per 100,000), with no statistically significant difference between genders ($P > 0.05$). It is observed that both men and women are suffering from CRC from the

Table 2. Survival Year of CRC, Mean of 2018-2022 Years in Mongolia

Survival years	Number of patients
< 1 year	89.4
1-3 year	40.6
3-5 year	13.2
5-7 year	5.4
7-10 year	3.4
>10year	4.4
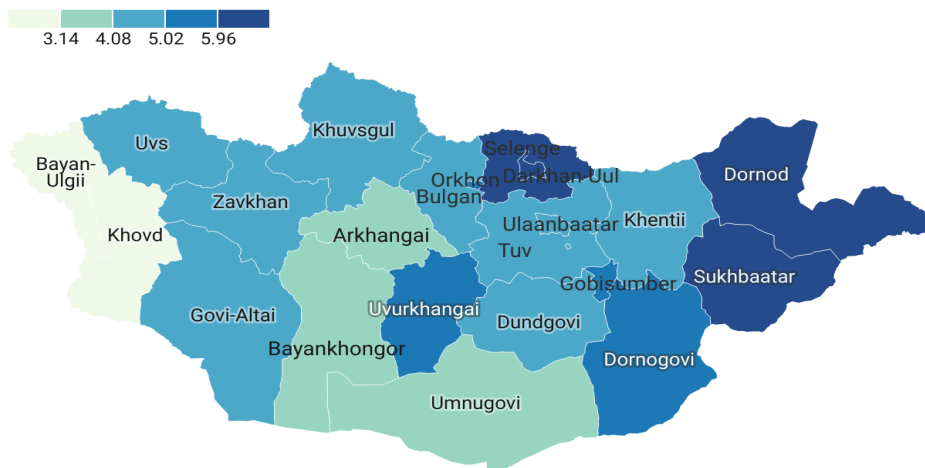
Figure 3. Mortality Rate of Colorectal Cancer by an Average Number from 2018–2022, by Provinces, per 100,000 Population in Mongolia
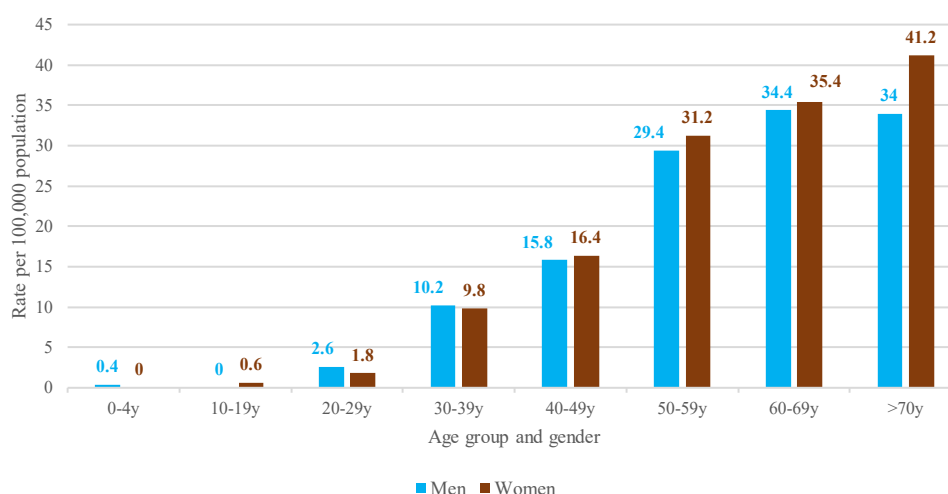
Figure 4. The Incidence of Colorectal Cancer (CRC) per 100,000 Populations by Age and Gender in 2018–2022 in Mongolia

age of 20, and the estimated incidence has significantly increased with older ages (Figure 4). Considering the time of diagnosis of CRC, it is usually diagnosed at a late stage and in stages III and IV according to the TNM classification (Table 1).

Discussion

Globally, CRC is one of the most frequently diagnosed cancers. Mongolia has the highest incidence of liver and stomach cancer, and it ranks first in morbidity and mortality rates of these cancers around the world. But it ranks 7th in terms of the incidence and mortality of CRC. The disease has historically been a major health issue in industrial countries; however, CRC rates are rising in developing and highly developed countries. In recent years, the urbanization levels of the population have increased in our country, and there have been significant changes in lifestyle habits and dietary patterns. Thus, we have determined and analyzed the morbidity and mortality of CRC in Mongolia in the last 5 years. According to our study, the incidence and mortality of this CRC have been increasing in the last 5 years, although they are relatively low when compared to developed countries such as the USA, Japan, Australia, and Canada [7]. In recent years, Asia, Japan, Korea, China, Turkey, and Thailand have been the leading countries in incidence and mortality rates of CRC. In contrast, Iran, Vietnam, Indonesia, and India had the lowest rates of occurrence [8]. As can be observed, our country has had comparatively low incidence and mortality rates from CRC in the last five years when compared to these countries.

Many factors have been implicated in the development of CRC. It was demonstrated that non-modifiable risk factors (age, gender, race, and family history), precancerious condition, lifestyle factors (overweight und obesity, physical inactivity, cigarette smoking, alcohol consumption, and inappropriate dietary patterns), and socioeconomic factors increase CRC risk [9, 10]. According to studies, approximately 90% of new cases of CRC occur in people over 50 years old. For example,

it is estimated that people after the age of 65 have about three times greater risk of developing CRC in comparison to those at the age of 50–64 and about 30 times greater risk than people at the age of 25–49 [7]. In our country, CRC has been diagnosed more commonly in people over 50 than in younger people. However, according to the results of several studies, the incidence of CRC in young people (ages 20–49) is increasing in the United States and Europe [11, 12].

Most studies conducted in other countries revealed that men have a higher incidence of CRC [13-15]. The American Cancer Society states that men are 30 percent more likely than women to develop CRC [16]. The results of these studies are similar to our findings. In contrast, according to some studies, the morbidity and mortality rates of CRC in populations over 65 years old are higher in females than in males. The scientists explain that women are more likely to develop right-sided colon cancer than men because it is diagnosed at a more advanced stage and is more aggressive than left-sided tumors [17, 18]. The reason for the gender difference has not been fully determined; it is assumed that it may be related to the differences in exposure risk factors (for example, alcohol, tobacco, red meat consumption, etc.), dietary, and sex hormones [19].

In our country, the endoscope and surgical treatment of CRC and its precancerious condition are relatively developing. However, our study's findings indicate that almost 80% of individuals with CRC have a delayed diagnosis. Additionally, the majority of CRC patients have a survival rate of <1 year (Table 2). In our country, there is only one national cancer diagnosis and treatment institution with 275 inpatient beds. As of 2022, 18,141 patients have received hospital admissions, while 169,593 have received outpatient examinations. The cancer is often diagnosed late, and there are many problems in remote rural areas, including a lack of mass cancer screening, equipment, and staff of oncologists, especially in primary care.

Onset in 2022, Mongolia is organizing National screening program among the population for the detection

of colorectal disease in people over the age of 31, with fecal occult blood tests being performed. In the world, the general principle of early detection and diagnosis is the use of criteria such as being painless, harmless, non-side-effect, able to provide information in a short period of time, and cost-effective. Several studies have shown that CRC mortality rates have been steadily decreasing for at least two decades in many high-income countries in Northern America and Northern and Western Europe [10, 20]. For this reason, early detection and screening have been suggested to play an important role. The implementation of early detection has been shown to lead to short-term increases in CRC incidence as a result of increased detection of morbidity, typically followed by a long-term reduction in morbidity and mortality from CRC due to the removal of adenomatous polyps [21, 22].

In the future, it is necessary to determine the distribution of risk factors for CRC among the population, take measures to prevent it, and provide education on public health. Furthermore, it is required to study ways to improve early detection and diagnosis, such as new non-invasive diagnostic methods and new methods of cancer chemotherapy, immunology, and target therapy.

In summary, our study presents evidence of a steady increase in CRC incidence in Mongolia over the last five years. It also predicts further increases in the near future. Other countries have gone through this process and explored feasible screening programs to reduce the burden of CRC. Facing the growth burden of the CRC, Mongolia should learn from the experience of developed countries and formulate comprehensive prevention and control policies.

Author Contribution Statement

YTs, SZ, ND, GD, UT – Data preparation and gathering, initial material processing, and verification; YTs, SZ, ND, TsG, BB– Statistical processing and writing the text of the article (material and methods, results); YTs, SZ, TL, AB, – Writing the text of the article (introduction, discussion); BB, TL, GD – Concept, design and control of the research, approval of the final version of the article.

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Conflict of Interest
We have no conflicts of interest to disclosure.

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