



Incidence of Cancer from 2015 to 2019 in Northwestern of Iran: A Population-Based on Cancer Registry Profile of Maragheh County

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Abstract

Background: Cancer is a leading cause of death globally and poses a significant obstacle to increasing life expectancy in every country, including Iran, where it is a major health threat.

Objectives: This study aimed to assess the cancer situation in Maragheh County, Iran, from 2015 to 2019.

Methods: Data from Maragheh County for the years 2015 - 2019 were obtained from the Iranian National Population-Based Cancer Registry and the Statistical Center of Iran. The age-standardized rate (ASR) was calculated using the population model suggested by the WHO, with STATA software for data analysis.

Results: During the study period, Maragheh recorded a total of 1,700 cancer cases, with males accounting for 970 (54%) of these cases. The average age of cancer patients was 62.4 ± 22.2 years. The ASR for cancer in females ranged from 101.5 to 165.5 per 100,000 people, and for males, it ranged from 128.3 to 150.3 per 100,000 people.

Conclusions: The incidence rate of cancer in Maragheh was slightly different from that in Iran and East Azerbaijan province but remained below the global average. The most common cancers in men were stomach, lung, bladder, colorectal, and prostate cancer, while in women, they were breast, colorectal, stomach, leukemia, and thyroid cancer.

Keywords: Incidence, Cancer, Iran

1. Background

Cancer is among the top causes of death worldwide and significantly hinders the increase in life expectancy in countries around the globe (1). According to the World Health Organization (WHO) estimates for 2019, cancer is the foremost cause of death before the age of 70 in 57 out of 183 countries (2) and ranks second in 56 countries. This challenge disproportionately affects developing countries. Ongoing epidemiological and demographic shifts are expected to exacerbate this trend. The number of new cancer cases is projected to rise by over 20 million by 2025 (3). In 2018, the world saw 18 million new cancer cases and 9.6 million deaths from cancer (4). From 2007 to 2017, there was a 33% increase in cancer cases, though the rate of increase was less pronounced in developed countries (5).

In Iran, cancer poses a major threat to public health. Data from Iran's cancer registry indicates an expected increase in cancer cases from 112,000 in 2016 to 160,000 by 2025, marking a 49% rise. Of this increase, 13.9% can be attributed to risk factors and 28.7% to demographic

changes within the country, such as the aging population (6).

In 1981, Iran's parliament mandated that all pathology and medical diagnosis laboratories must report all malignancies and suspected cancer cases to the health system. Consequently, the cancer registration system in Iran was established in 1983, with county and province cancer registry centers collecting and registering neoplasm reports from accredited pathology and medical diagnosis laboratories (7). However, this method of recording faced challenges, such as incomplete reports from pathology laboratories, late patient referrals for care and diagnosis, deaths occurring before sampling could be conducted, and inadequate coverage of pathology centers across the country at the time. As a result, the population-based cancer registry (PBCR) was initiated and has been operational in Ardabil and Golestan provinces in Iran since 2000. These reports have been acknowledged in WHO reports across different editions detailing cancer status on five continents (7-10). The GLOBOCAN project has also utilized these cancer registry systems for its

estimations (4, 11, 12). Nonetheless, due to limitations within local cancer registry systems, such as insufficient organizational structure, limited fund accessibility, and variations in operational planning and data collection methods, the results from these registry systems could not be universally applied to Iran (13). Therefore, in 2010, Iran's Ministry of Health introduced new guidelines for cancer registration at cancer registration centers, incorporating three sources: pathological reports, clinical cases, and the death registration system.

Access to epidemiological data is crucial for planning cancer control strategies (13). In alignment with significant development objectives, all countries are encouraged to reduce the mortality rate from noncommunicable diseases such as cancer, heart disease, diabetes, and respiratory diseases by 30% (14, 15). Monitoring noncommunicable diseases like cancer is vital, and the registration and dissemination of cancer data are key to achieving these development goals. One approach to monitor the disease is by assessing its incidence in specific areas.

2. Objectives

Given that the incidence of cancer in Maragheh had not been thoroughly studied until now, this study aimed to examine the status of cancer in Maragheh County, Iran, from 2015 to 2019.

3. Methods

This study relied on data from Maragheh County spanning 2015 to 2019, which was sourced from the Iranian National Population-Based Cancer Registry (INPCR). The INPCR's primary data sources include pathology reports from pathology centers and clinical and para-clinical reports from hospitals. Additionally, the INPCR gathers information on cancer-related deaths from death certificates (DC) using a linkage method. All pertinent data are inputted into a specialized web-based application named Semai-ye-Saratan.

Pathology centers report all neoplasm cases to the University Cancer Registry, including pathologist diagnosis reports, original tumor sites, potential metastases, tumor grades, and unique national codes. Each case submitted to this registry is coded according to the international classification of cancer diseases (15) and entered into the Semai-ye-Saratan system. Cancer diagnoses in patients are coded following the international classification of diseases (16). Clinical and paraclinical observations by doctors, along with patient

characteristics, are collected from hospitals and entered into Semai-ye-Saratan as clinical cases since cancer cases are reported to Semai-ye-Saratan from three distinct sources—clinical cases, death certificates, and pathology reports—the data processing phase involves removing duplicate entries that may have been reported from two or three of these sources. In instances where a registered patient has been reported from multiple sources, including pathology, the pathology data is preferred for cancer case coding and diagnosis. Conversely, for patients with diagnostic information from two clinical sources in addition to the death certificate, clinical diagnostic data are used for cancer diagnosis and coding. The specifics of Iran's cancer registration program are detailed in another study (13). From 2015 to 2019, a total of 3,692 cancer cases were registered in Semai-ye-Saratan for Maragheh County. After processing the data and removing duplicate cases, 1,977 unique cancer cases remained and were included in the analysis.

Population data for Maragheh County, derived from the national censuses conducted in Iran in 2011 and 2016, was obtained from the Statistical Center of Iran. To estimate the population for the years when no census was conducted, the population growth rates across 18 age groups for both genders were first calculated. Then, the population for the intervening years was estimated using these growth rates in EXCEL. For data analysis, the age-standardized rate (ASR) was calculated using the population model recommended by the WHO (17) using STATA software.

4. Results

After excluding skin cancer cases from the study period, the total number of cancer cases in Maragheh County amounted to 1,799, with 970 (54%) being male patients. The average age of the cancer patients was 62.4 ± 22.2 years. The ASR for cancer in females ranged from 104.8 to 144.8 per 100,000 people, with the lowest and highest ASRs observed in 2015 and 2019, respectively. For males, the ASR for cancer varied from 141.5 to 170.6 per 100,000 people, with the lowest and highest rates recorded in 2017 and 2016, respectively (Figure 1). The 95% confidence interval shown in Figure 1 indicates that the incidence of cancer did not show a significant change over the years.

In this study, 53% of cancers in women and 51% in men were confirmed through pathology. Specifically, in men, stomach, colorectal, and bladder cancers were diagnosed via pathology at rates of 51%, 64%, and 76%, respectively. For women, breast, colorectal, and thyroid cancers were identified through pathology at rates of 66%, 63%, and 80%, respectively (Table 1).

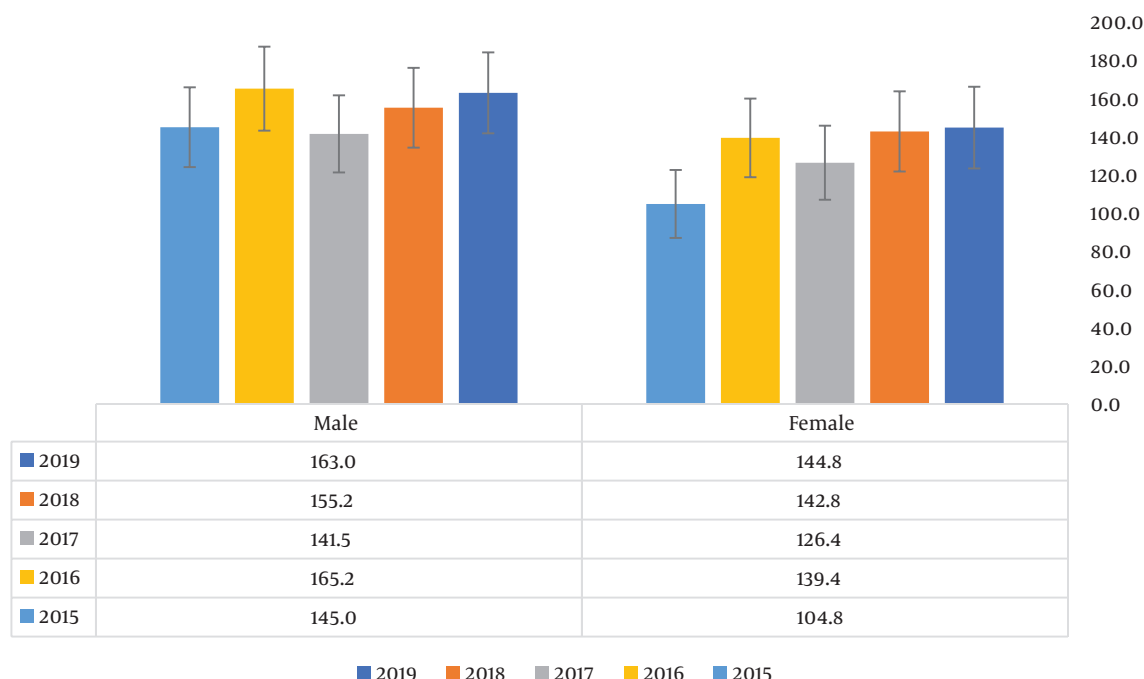


Figure 1. Age-standardized rate (ASR) and 95% confidence interval of cancer in Maragheh County from 2015 to 2019.

Table 1. Frequency of Five Prevalent Cancers According to Diagnosis Methods in Maragheh County from 2015 to 2019^a

Cancer	Pathology	Clinical	Death Certificate
Males			
Stomach	79 (51.6)	35 (22.9)	39 (25.5)
Lung	48 (41.4)	33 (28.4)	35 (30.2)
Bladder	68 (75.6)	19 (21.1)	3 (3.3)
Colorectal	56 (63.6)	18 (20.5)	14 (15.9)
Prostate	47 (54.0)	14 (16.1)	26 (29.9)
All cancers	502 (51.8)	258 (26.6)	210 (21.6)
Females			
Breast	124 (66.3)	51 (27.3)	12 (6.4)
Colorectal	49 (62.8)	18 (23.1)	11 (14.1)
Stomach	30 (42.3)	21 (29.6)	20 (28.2)
Leukemia	34 (54.0)	20 (31.7)	9 (14.3)
Thyroid	45 (80.4)	11 (19.6)	0 (0.0)
All cancers	440 (53.1)	249 (30.0)	141 (17.0)

^a Values are expressed as No. (%).

The five most common cancers among men in Maragheh include stomach, lung, bladder, colorectal, and prostate cancers. For women, the most prevalent types are breast, colorectal, stomach, leukemia, and thyroid cancers. Table 2 presents the ASR values for these top ten cancers for both genders.

5. Discussion

This study focused on the incidence of cancer in Maragheh County, Iran, revealing that during the years studied, the highest ASR was 150.3 per 100,000 people in men and 136.5 per 100,000 people in women. The most frequently diagnosed cancers were stomach cancer in men and breast cancer in women.

The age ASR of cancer in Iran is 177.0 for males and 141.2 for females per 100,000 people (13). Globally, these rates stand at 222.0 for males and 186.0 for females. In other world regions, ASR values include 109.5 for males and 115.8 for females in Central Africa, 242.3 for males and 196.4 for females in East Asia, and 397.9 for males and 332.3 for females per 100,000 people in North America (2). In Izmir, Turkey, the ASR of cancer is reported as 318 for males and 204 for females per 100,000 people (18). Another study indicates that in West Asia, the ASRs are 163.3 for

Table 2. Age-Standardized Rate of 5 Cancers in Men and Women of Maragheh County from 2015 to 2019

Cancer	2015	2016	2017	2018	2019
Males					
Stomach	24.0	23.2	18.4	20.3	19.7
Bladder	15.7	16.6	13.4	12.5	9.5
Colorectal	13.7	12.2	10.0	14.6	11.2
Lung	11.9	19.5	16.5	15.5	20.0
Prostate	8.1	12.0	11.4	14.6	11.5
Females					
Breast	19.8	28.0	22.4	29.6	35.1
Colorectal	12.1	9.7	11.1	14.5	11.7
Leukemia	10.7	6.5	11.0	13.1	10.0
Stomach	7.4	12.6	10.5	13.3	9.5
Thyroid	5.5	4.8	12.1	9.0	7.2

females and 198.3 for males (18). A 2014 study reported the ASR of cancer in Iranian men and women as 177 and 141 per 100,000 people, respectively (6). In East Azerbaijan, a northwest province of Iran, the ASR was 167.1 for males and 125.7 for females per 100,000 people (10). Hence, the cancer incidence rate in Maragheh does not significantly differ from that in Iran and East Azerbaijan Province but remains below the global incidence rate.

Stomach cancer is the most common cancer among males and the third most common among females in Maragheh. This aligns with a study from East Azerbaijan Province, Iran, which found the ASR of stomach cancer to be 29.7 for males and 13.3 for females per 100,000 people (10). Another study in Iran identified stomach cancer as the most common cancer in males, with an ASR of 21.2, and the third most common in females, with an ASR of 9.4 per 100,000 people (13). Globally, stomach cancer ranks fourth in males and seventh in females, with ASRs of 13.1 and 10.0 per 100,000 people, respectively (2). Therefore, Maragheh exhibits a higher incidence of stomach cancer compared to both the overall Iranian and global rates. Previous research has linked the high incidence of stomach cancer in the northwest regions of Iran to prevalent risk factors such as *Helicobacter pylori* infection, opium use, smoking, and dietary habits (13).

Breast cancer was identified as the most common type of cancer, with an ASR of 31.1 per 100,000 people in East Azerbaijan Province and 34.5 per 100,000 people across Iran (10, 13). These findings align with those from both the relevant province and the country as a whole. Globally, breast cancer is the most prevalent cancer, with an ASR of 45.7 per 100,000 people (4). Thus, the incidence of breast cancer in Maragheh mirrors that of Iran but remains lower

than the worldwide incidence rate.

Lung cancer is the leading cancer in men and the second most common in women globally, with ASRs of 31.5 and 14.6 per 100,000 people, respectively (2). In Iran, lung cancer's incidence rates are 12.7 for men and 5.2 for women per 100,000, making it the fourth and fifth most common cancer, respectively (13). In Maragheh, lung cancer ranks as the second most common in men and sixth in women. Its incidence rate in Maragheh aligns with that of Iran overall but is below the global incidence rate.

The ASR of colorectal cancer in this study varied from 11 to 20 per 100,000 men and from 11 to 14 per 100,000 women. In Eastern Mediterranean countries such as Turkey, the ASR for colorectal cancer was reported at 15.7 for women and 25.8 for men, while in Jordan, it was 14.9 for women and 19.6 for men (19). From 1990 to 2017, the global cases of colorectal cancer increased by 9.5%. Specifically, in the East Mediterranean region, this rise amounted to 39.8%, making it the third most common cancer globally (20). In Iran, colorectal cancer ranks as the third most common cancer in men (ASR: 16.5 per 100,000) and the second in women (ASR: 11.8 per 100,000), with its incidence expected to surge by 50% (6, 13). Thus, Maragheh's incidence rate of colorectal cancer is lower than that of some Eastern Mediterranean countries like Jordan and Turkey but is comparable to that of Iran overall.

The ratio of cases registered through pathological reports versus those from death registration data serves as a crucial metric for assessing the quality of cancer registration. High-quality registration data typically features a high proportion of cases registered through pathological findings and a low proportion from death certificates (18). In this study, 53% of cases were

registered via pathological reports and 17% through death registration data. Compared to Iran's cancer registration quality, where 68% of cases were documented from pathological reports and 5.6% from death certificates (13), the quality of cancer registration in Maragheh is moderate. However, in the reports on the status of cancer across five continents, the percentages of cases registered through pathological reports in countries such as Thailand, Zimbabwe, Argentina, and some provinces of China were similar to those found in this study (18).

5.1. Limitations

This study relied on cancer registration data, which limited the ability to assess risk factors and patient survival since these details were not captured in the data set. Cancer, being a disease with a long latency period, requires several years of study to understand its occurrence and prevalence fully. Yearly fluctuations might largely be due to random variations, changes in registry practices, and the precision of data reporting.

5.2. Conclusions

The incidence rate of cancer in Maragheh shows slight variation from that of Iran as a whole and East Azerbaijan Province, yet remains below the global average. Stomach cancer is the most common cancer among men, and breast cancer is the most prevalent among women in Maragheh.

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Footnotes

Authors' Contribution: A.S. and S.A. designed and directed the project. S.A. gathered and processed the data. A.S. analyzed the data. Both authors discussed the results and commented on the manuscript. Both authors approved the final manuscript.

Conflict of Interests: The authors declare that they have no competing interests.

Ethical Approval: The protocol of the current study was approved by the regional ethics committee of Maragheh University of Medical Sciences (IR.MARAGHEHPHC.REC.1401.013).

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