

## Cancer Incidence, Mortality and Survival in Türkiye as of 2020

Sultan Eser<sup>1\*</sup>, Hüseyin Örün<sup>2</sup>, Ege Hamavioğlu<sup>3</sup>, Fereshteh Lofti<sup>4</sup>

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1. Balıkesir University Faculty of Medicine, Department of Public Health, Balıkesir, Türkiye ; Regional Hub for Cancer Registration in Northern Africa, Central and Western Asia, WHO/IACR GICR, İzmir, Türkiye

2. Başkent University Faculty of Medicine, Department of Public Health, Ankara, Türkiye

3. Republic of Türkiye Ministry of Health, General Directorate of Public Health, Department of Cancer, Ankara, Türkiye

4. Cancer Research Center (CRC), Cancer Institute of Iran Tehran University of Medical Sciences, Tehran, Iran

\*Corresponding author:  
Prof. Dr. Sultan Eser, MD, PhD  
Balıkesir University, Faculty of Medicine,  
Department of Public Health & Regional Hub for Cancer Registration in Northern Africa, Central and Western Asia, WHO/IACR GICR, PI  
Tel: +90 266 6121010/2/6007  
Email: sultan.eser@gmail.com  
ORCID: <https://orcid.org/-00004540-4427-0003>

### ABSTRACT

**Background:** Cancer registration is better understood with the Globocan project. In our article, we compiled the cancer incidence, mortality, and survival data of Türkiye. We presented incidence and mortality-related data from the Global Cancer Observatory, and survival-related data from CONCORD-3. Non-melanoma skin cancers (NMSC) were excluded from interpretations for all indicators. The number of new cancer cases in Türkiye with a population of more than 80 million was estimated as 227,310 people in total, 128,802 in men and 98,508 in women. In the same year, 125,788 people were estimated that died due to cancer, of which 78,633 were men and 47,155 were women. The age-standardized incidence rate per 100,000 (ASIR, world standard population) of all cancers except for NMSC was estimated to be 225.6 (283.0 for men and 184.0 for women). The five most common cancers were breast cancer with an ASIR of 46.6, following prostate cancer (ASIR = 42.5), lung cancer (ASIR = 40.0), colorectal cancer (ASIR = 20.6), and thyroid cancer (ASIR = 14.3). The age-standardized mortality rate per 100,000 (ASMR, world standard population) of all cancers was estimated to be 119.9 (171.0 for men, 81.1 for women). The top 5 most common cancers for both sexes and all age groups were lung, breast, colorectal, prostate, and thyroid cancers, respectively. On the other hand, the top 5 most common cancer-caused deaths for both sexes and all age groups were lung, colorectal, stomach, pancreas, and breast cancers, respectively. The top 5 cancers with the worst 5-year age-standardized net survival rate for the sites of cancers in Türkiye between 2010 and 2014 were as follows: pancreas 10.4%, lung 14.9%, liver 15.9%, esophagus 19.0% and stomach 24.9%. Not only existing and increasing potential behavioral and possible environmental/occupational and metabolic risk factors over time are a public health threat for Türkiye, but also some unchangeable factors e.g. the aging population and the prolongation of life expectancy are contributing to increased cancer incidence. The prevalences of tobacco use and obesity are alarming. Policies to combat risk factors should be strengthened, especially the implementation of legal regulation regarding tobacco control in the field to achieve control of tobacco-related cancers. Incidence, mortality, and survival data are also considered, and preventive strategies with public health principles should be strengthened. In addition, population-based cancer registries and research on cancer epidemiology based on the data released from these registries should be supported.

**Keywords:** cancer cases, cancer statistics, incidence, mortality

**INTRODUCTION:**

Cancer registration is the core point of cancer control. Cancer registries are places that make important contributions to every stage of the data, information, knowledge, and wisdom quartet in the information hierarchy [1] and function as a kind of evidence-based policy center when used correctly [2]. The data is meticulously recorded, and data quality assessments are made at regular intervals, allowing active information to be produced. In addition, it fills the concept of evidence-based policy by providing necessary information in the application of primordial, primary, and secondary prevention strategies in particular also enabling the design of high-quality epidemiological studies [2].

The first cancer registry center in Türkiye was established in Izmir in 1991, the center was included in the Global Initiative for Cancer Registry Development (GICR) program as International Agency for Research on Cancer (IARC) Regional Hub for Cancer Registration in 2013 and covers 29 countries and regions in North Africa, Central, and West Asia. In the last volume (XI) of Cancer Incidence in Five Continents, 8 cancer registries from Türkiye, including Izmir, were found worth examining in terms of data quality [3]. These registries cover 17.1% of the population.

The burden of cancer, such as other non-communicable diseases, is increasing rapidly in the transition countries including Türkiye due to demographic and epidemiological transitions and gradual adaptation to a westernized lifestyle. We have presented the cancer pattern in Türkiye in 2006 most recently [4]. In this paper, we present incidence and mortality rates, 5-year prevalence, and survivals for the year 2020 and evaluate the trends in 15 years, also the prediction of cancer incidence in 2040.

**Methods:**

Incidence and mortality rates were obtained using Globocan estimates for 2020 from Global Cancer Observatory (GCO) database [5]. The Global Cancer Observatory (GCO) is an interactive web-based platform presenting

national cancer incidence, mortality, and prevalence for 36 cancer types in 185 countries. The data presented in the GCO are considered the best available in each country worldwide. The incidence data for Türkiye “Weighted average (using the regional population size) of Antalya, Bursa, Edirne, Erzurum, Eskisehir, Izmir, Samsun, and Trabzon (2010-2012) rates. Colon, rectum, breast and prostate cancers: rates (2003-2012) from five cancer registries (Izmir, Bursa, Antalya, Trabzon, Samsun) projected to 2020 and applied to the 2020 national population.” Mortality data: National mortality data for 2009-2016, adjusted for missing and ill-defined death causes, rates (2009-2016) projected to 2020 and applied to the 2020 population [6].

For survival, we used data from CONCORD-3 which presented estimations of 5-year net cancer survivals using the 2000-14 data provided by 322 population-based cancer registries in 71 countries including nine registries from Türkiye [7].

**Results:****a. Incidence, mortality and 5-year prevalence**

5-year prevalence of cancers excluding non-melanoma skin cancers (NMSC) (ICD-O-3 code C44) in Türkiye were 559,711 among both sexes, comprising 286,966 men and 272,745 women. The number of new cancer cases excluding NMSC in Türkiye with a population of more than 80 million was estimated as 227,310 people in total, 128,802 in men and 98,508 in women. In the same year, 125,788 people were estimated that died due to cancer excluding NMSC, of which 78,633 were men and 47,155 were women. The age-standardized incidence rate per 100,000 (ASIR, world standard population) of all cancers except for NMSC was estimated to be 225.6 (283.0 for men and 184.0 for women) (Table 1). The five most common cancers were breast cancer with an ASIR of 46.6, following prostate cancer (ASIR = 42.5), lung cancer (ASIR = 40.0), colorectal cancer (ASIR = 20.6), and thyroid cancer (ASIR = 14.3). The age-standardized mortality rate per 100,000 (ASMR, world standard population) of all cancers except for NMSC was estimated to be 119.9 (171.0 for men, 81.1 for women). The risk of

developing cancer before the age of 75 was calculated as 29.18% in men and 18.42% in women [5] Table 1. Summary statistics in 2020, all ages, Türkiye

The top 5 most common cancers for both sexes and all age groups were lung (n = 41,264), breast (n = 24,175), colorectal (n = 21,191), prostate (n = 19,444) and thyroid (n = 13,682) cancers. However, the top 5 most common cancer-caused deaths for both sexes and all age groups were lung (n = 37,070), colorectal (n = 10,798), stomach (n = 10,789), pancreas (n = 8,214), breast (n = 7,161) cancers [5]. The distribution of top 10 cancers and cancer-caused deaths can be followed in Figure 1 and 2, respectively [5].

Figures 3 and 4 show top 15 cancers with the highest ASIR and ASMR in all ages for men and women, respectively. While lung cancer in men was the most common cancer (ASIR = 74.8), it was followed by prostate (ASIR = 42.5), colorectum (ASIR = 26.2), bladder (ASIR = 22.9) and stomach cancer (ASIR = 17.8), respectively; for mortality, lung (ASMR = 67.5), stomach (ASMR = 15), colorectum (ASMR = 13), prostate (ASMR = 11.3)

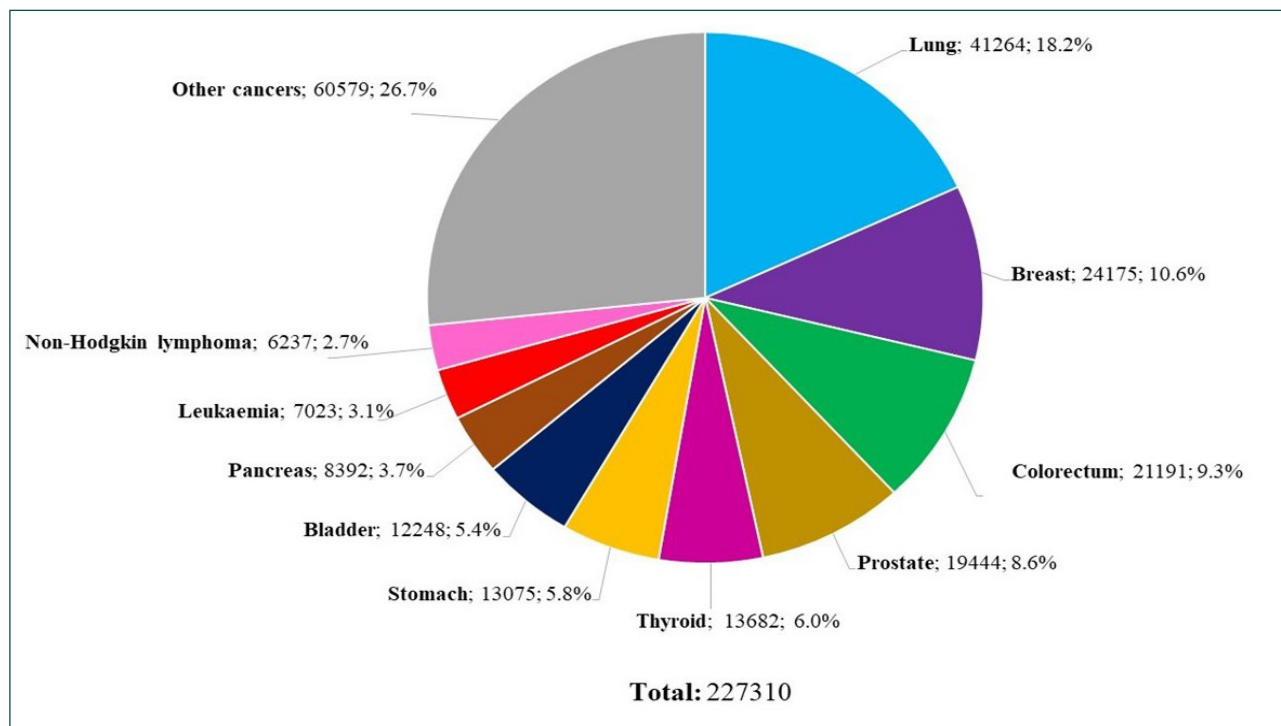
and pancreatic cancer (ASMR = 10.2) were observed, respectively (Figure 3, Table 2). The top 5 most common cancers per 100,000 men in 2006 were as follows: lung (ASIR = 60.3), prostate (ASIR = 22.8), bladder (ASIR = 19.6), stomach (ASIR = 16.3) and colorectum (ASIR = 15.4) [8]. The top 5 most common cancers per 100,000 for women are breast (ASIR = 46.6), thyroid (ASIR = 22.4), colorectal (ASIR = 16.2), lung (ASIR = 12) and corpus uteri (ASIR = 11.3) cancers, respectively. When mortality rates in women are examined, cancers of the breast (ASMR = 12.9), lung (ASMR = 10.7), colorectum (ASMR = 7.8), stomach (ASMR = 6.4) and pancreas (ASMR = 5.7) constitute the top 5 (Figure 4, Table 3). In 2006, the most common cancer per 100 000 women was breast cancer as 33.7 ASIR, followed by colorectal (ASIR = 11.5), stomach (ASIR = 8.8), thyroid (ASIR = 8.8) and lung (ASIR = 7.7) cancers [5]. Table 2 and Table 3 also show the estimated number of new cancer cases, cancer-related deaths, crude incidence and mortality rates, age-standardized incidence, and mortality rates in 2020; and lifetime cumulative risk for all cancers for men and

**Table 1.** Summary statistics in 2020, all ages, Türkiye

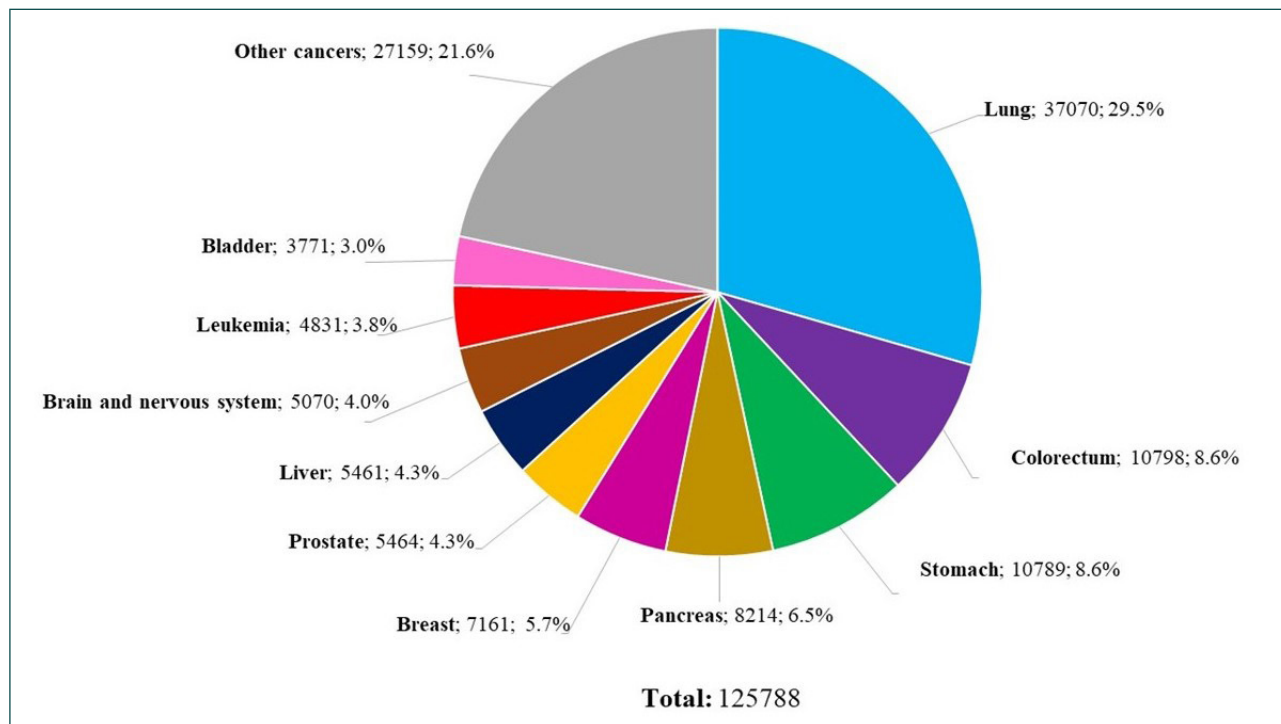
	Males	Females	Both sexes
Population*	41,915,985	41,698,377	83,614,362
Number of new all cancer cases, excluding NMSC**	128,802	98,508	227,310
Estimated number of deaths all cancers	78,949	47,386	126,335
Number of 5-year prevalent cases	286,966	272,745	559,711
Age-standardized incidence rate (per 100,000 World population)	291.5	188	231.5
Age-standardized mortality rate (per 100,000 World population)	171.0	81.1	119.9
Risk of developing cancer before the age of 75 years (%)	29.18	18.42	23.35
Top 5 common cancers sorted by both sexes	Age-standardized incidence rates (per 100,000, World Population)		
Breast	-	46.6	46.6
Prostate	42.5	-	42.5
Lung	74.8	12.0	40.0
Colorectum	26.2	16.2	20.6
Thyroid	5.7	22.4	14.3

Source: Global Cancer Observatory, Globocan 2020 [5], \*Turkish Statistical Institute (TURKSTAT), 2021 [8]

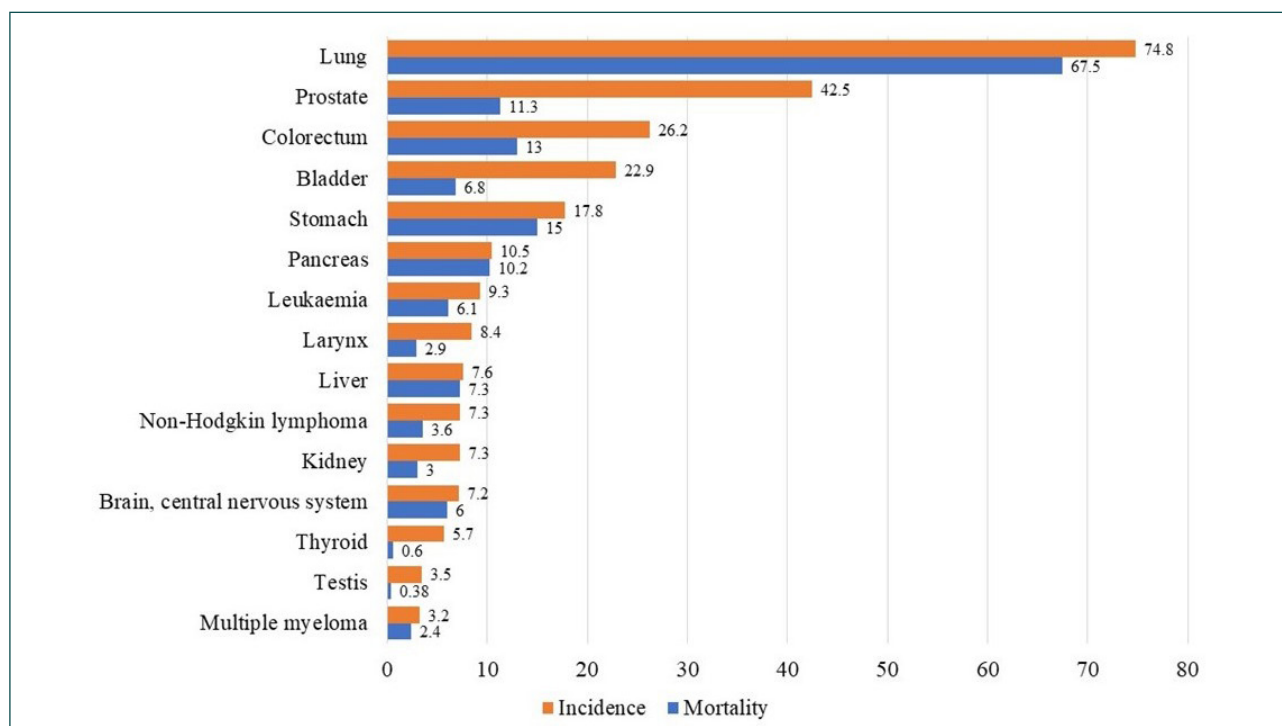
\*\*NMSC: non-melanoma skin cancer



**Figure.1.** The most common cancers, both sexes, all ages, 2020, Türkiye.  
Source: Global Cancer Observatory, Globocan 2020 [5]



**Figure.2.** The most common cancer-caused deaths, both sexes, all ages, 2020, Türkiye  
Source: Global Cancer Observatory, Globocan 2020 [5]



**Figure.3.** Age-standardized Incidence Rate (ASIR) and Mortality Rate (ASMR) per 100,000 for top 15 cancers in Turkish Men, 2020. Source: Global Cancer Observatory, Globocan 2020 [5]

women, respectively [5].

When analyzed according to 5-year prevalence, breast cancer (n = 83,973), prostate cancer (n = 69,682), colorectal cancer (n = 57,122), thyroid cancer (n = 47,883), lung cancer (n = 45,607), bladder cancer (n = 35,857) and leukemia (n = 20,820) constituted the top 7, respectively, 559,711 cases in total (Figure 5) [5].

#### b.5-year age-standardized net survival rate

According to the estimations of the CONCORD-3 [7], top 5 cancers with worst 5-year age-standardized net survival rate for the sites of cancers in Türkiye between 2010 and 2014 were as follows: pancreas 10.4%, lung 14.9%, liver 15.9%, esophagus 19.0% and stomach 24.9% (Table 4).

#### Discussion:

From 2006 [4] to 2020 [5], we observe how cancer trends have been changing. Population growth and population aging have been the major contributors to the increase in the number of newly diagnosed cases and the cancer

burden in the country. Notwithstanding, the incremental age standardized rates in total cancers, as well as in various sites are directing us to consider the changes in the prevalences of risk factors and some other factors, e.g., increasing accessibility to health care services. In 2006, ASIR for all ages found to be 210.1 in men and 129.4 in women [4]. When these values are compared with the 2020 estimates, it was observed that the ASIR in men increased by 27.9% to 291.5, and in women increased by 45.3% to 188 [5].

While lung cancer increases in men, it was remarkable that prostate cancer increased by 2 times and colorectal cancer increased by 1.5 times. Again, the incidence of colorectal and lung cancers in women increased 1.5 times. The rapid increase especially among women in incidence of thyroid cancers could be attributed to the raise in the health service utilization in the country due to transition of the health care services mostly and might be interpreted as a screening effect with the more sensitive diagnostic methods [9,10]. The same phenomena as well as increasing proportion of senior men in

**Table 2.** Estimated number, crude and age-standardized incidence and mortality rates per 100,000, lifetime cumulative risk of incidence and mortality for all cancers by sites excluding NMSC among men, in 2020, Türkiye.

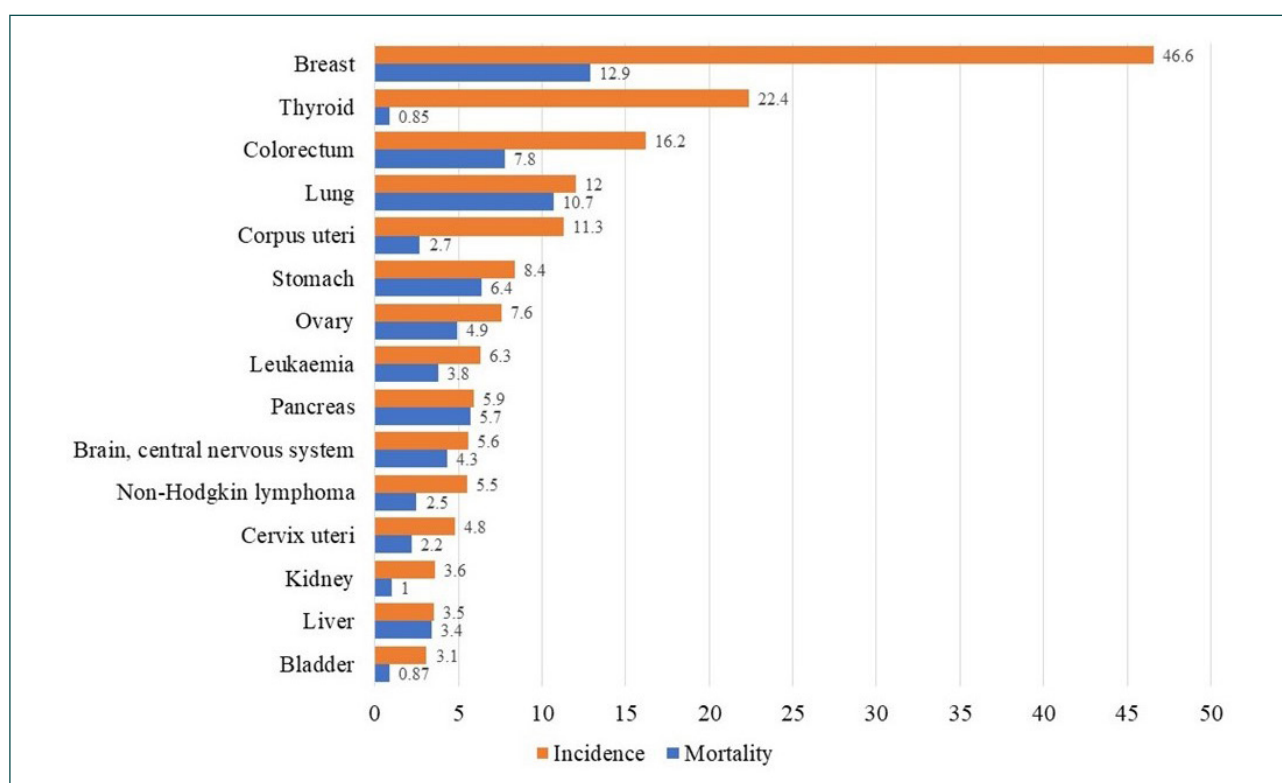
Site of cancer	Incidence				Mortality			
	Number	Crude IR	ASIR	Lifetime cumulative risk	Number	Crude MR	ASMR	Lifetime cumulative risk
Lung	34207	82.2	74.8	18.4	30749	73.9	67.5	17.0
Prostate	19444	46.7	42.5	12.9	5464	13.1	11.3	6.6
Colorectum	11989	28.8	26.2	*	6011	14.4	13.0	**
Bladder	10476	25.2	22.9	6.0	3180	7.6	6.8	2.9
Stomach	8187	19.7	17.8	4.8	6910	16.6	15.0	4.4
Pancreas	4822	11.6	10.5	3.2	4716	11.3	10.2	3.1
Leukaemia	3957	9.5	9.3	2.0	2776	6.7	6.1	1.8
Larynx	3805	9.1	8.4	1.7	1327	3.2	2.9	0.96
Liver	3480	8.4	7.6	2.3	3354	8.1	7.3	2.2
Non-Hodgkin lymphoma	3310	7.9	7.3	1.4	1652	4.0	3.6	0.94
Kidney	3282	7.9	7.3	1.4	1362	3.3	3.0	0.78
Brain, central nervous system	3196	7.7	7.2	1.4	2693	6.5	6.0	1.2
Thyroid	2648	6.4	5.7	0.78	276	0.66	0.6	0.2
Testis	1605	3.9	3.5	0.3	176	0.42	0.38	0.05
Multiple myeloma	1491	3.6	3.2	0.88	1124	2.7	2.4	0.78
Lip, oral cavity	1407	3.4	3.1	0.67	344	0.83	0.74	0.23
Melanoma of skin	890	2.1	1.9	0.48	547	1.3	1.2	0.38
Hodgkin lymphoma	837	2.0	1.9	0.22	207	0.5	0.46	0.09
Oesophagus	824	2.0	1.8	0.45	777	1.9	1.7	0.49
Nasopharynx	813	2.0	1.8	0.31	456	1.1	1.0	0.24
Mesothelioma	466	1.1	1.0	0.24	398	0.96	0.87	0.21
Kaposi sarcoma	347	0.83	0.75	0.26	47	0.11	0.1	0.04
Salivary glands	308	0.74	0.67	0.16	77	0.18	0.17	0.06
Gallbladder	249	0.6	0.53	0.19	210	0.5	0.45	0.17
Oropharynx	169	0.41	0.38	0.08	64	0.15	0.15	0.04
Hypopharynx	150	0.36	0.33	0.07	58	0.14	0.12	0.03
Penis	23	0.06	0.05	0.01	7	0.02	0.02	0.0

Source: Global Cancer Observatory, Globocan 2020 [5]

Abbreviations: IR, incidence rate; ASIR: age-standardized incidence rate; MR: mortality rate, ASMR: age-standardized mortality rate

\* Colon: 3.8; Rectum: 2.8; Anus: 0.06

\*\* Colon: 2.6; Rectum: 1.6; Anus: 0.03



**Figure.4.** Age-standardized Incidence Rate (ASIR) and Mortality Rate (ASMR) per 100,000 for top 15 cancers in Turkish Women, 2020. Source: Global Cancer Observatory, Globocan 2020 [5]

the population can explain the increase in the incidence of prostate cancer [11,12]. In the meantime, the ongoing increase in breast cancer incidence can be explained mostly with the rise in the exposure to reproductive risk factors, e.g., decreasing fertility rates, rising age at first birth for breast [13–15]. In the meantime, some of the increase in the breast cancer incidence could be interpreted as screening effect [12]. It was thought that the shift from the Mediterranean type to the Western type of diet for colorectal cancer and the increasing prevalence of obesity, also non-adequate physical activity contribute to the increasing incidence by time [16]. In Türkiye, the percentage of risk-attributable cancer age-standardized disability-adjusted-life-years rate (DALY ASR) over total cancer DALY ASR was found to be 45.2%. While the quintiles grouped risk-attributable cancer burden –the 5th quintile showed the highest values–, the country was at the 5th quintile for environmental and occupational risks (DALY ASR = 333.1), fourth quintile for behavioral risk factors (DALY ASR = 1088.9), and third

quintile for metabolic risks (DALY ASR = 287.8) [17]. But, considering risk factors, the current and estimated data is concerning especially tobacco use and obesity prevalence.

Considering the cancer risk factors in Türkiye, tobacco use is quite prominent. According to the STEPS 2017 study, 43.4% of men and 19.7% of women reported that they are current users of tobacco products [18]. In addition, when compared to OECD countries, the prevalence of daily cigarette smokers in individuals aged 15 and over was found to be 28.0 in Türkiye, making it the first country [19]. Previous studies have suggested that the difference in lung cancer incidence rate between men and women may be due to the difference in tobacco use prevalence [20]. This can be seen as the reason for the higher incidence of cancers that are associated with tobacco use [21] which was causal relationship with 20 different cancer types were showed by IARC and the United States Surgeon General, recently breast and advanced prostate cancers was added in the list

**Table 3.** Estimated number, crude and age-standardized incidence and mortality rates per 100,000, cumulative risk of incidence and mortality for all cancers by sites excluding NMSC among women, in 2020, Türkiye.

Site of cancer	Incidence				Mortality			
	Number	Crude IR	ASIR	Cumulative risk	Number	Crude MR	ASMR	Cumulative risk
Breast	24175	56.6	46.6	6.7	7161	16.8	12.9	2.8
Thyroid	11034	25.8	22.4	0.28	519	1.2	0.85	0.28
Colorectum	9202	21.5	16.2	*	4787	11.2	7.8	**
Lung	7057	16.5	12	3.4	6321	14.8	10.7	3.1
Corpus uteri	5918	13.9	11.3	1.9	1589	3.7	2.7	0.76
Stomach	4888	11.4	8.4	2.3	3879	9.1	6.4	2
Ovary	4059	9.5	7.6	1.4	2730	6.4	4.9	1.1
Pancreas	3570	8.4	5.9	1.9	3498	8.2	5.7	1.9
Leukaemia	3066	7.2	6.3	1.1	2055	4.8	3.8	0.92
Non-Hodgkin lymphoma	2927	6.9	5.5	1.1	1415	3.3	2.5	0.68
Brain, central nervous system	2906	6.8	5.6	1.1	2377	5.6	4.3	1
Cervix uteri	2532	5.9	4.8	0.78	1245	2.9	2.2	0.5
Liver	2169	5.1	3.5	1.2	2107	4.9	3.4	1.2
Kidney	1843	4.3	3.6	0.64	603	1.4	1	0.3
Bladder	1772	4.1	3.1	0.84	591	1.4	0.87	0.41
Multiple myeloma	1189	2.8	2.1	0.48	846	2	1.5	0.39
Melanoma of skin	866	2	1.6	0.34	341	0.8	0.56	0.19
Lip, oral cavity	696	1.6	1.2	0.32	248	0.58	0.4	0.15
Hodgkin lymphoma	683	1.6	1.5	0.17	171	0.4	0.31	0.08
Oesophagus	581	1.4	1	0.26	561	1.3	0.96	0.27
Gallbladder	518	1.2	0.88	0.25	295	0.69	0.48	0.16
Mesothelioma	430	1	0.8	0.16	309	0.72	0.55	0.13
Larynx	303	0.71	0.55	0.12	169	0.4	0.28	0.09
Vulva	286	0.67	0.49	0.14	93	0.22	0.15	0.05
Nasopharynx	276	0.65	0.54	0.09	157	0.37	0.29	0.06
Salivary glands	244	0.57	0.46	0.09	52	0.12	0.08	0.03
Kaposi sarcoma	178	0.42	0.29	0.1	28	0.07	0.05	0.02
Hypopharynx	117	0.27	0.23	0.03	40	0.09	0.07	0.02
Vagina	111	0.26	0.21	0.04	36	0.08	0.06	0.02
Oropharynx	50	0.12	0.09	0.02	22	0.05	0.04	0.01

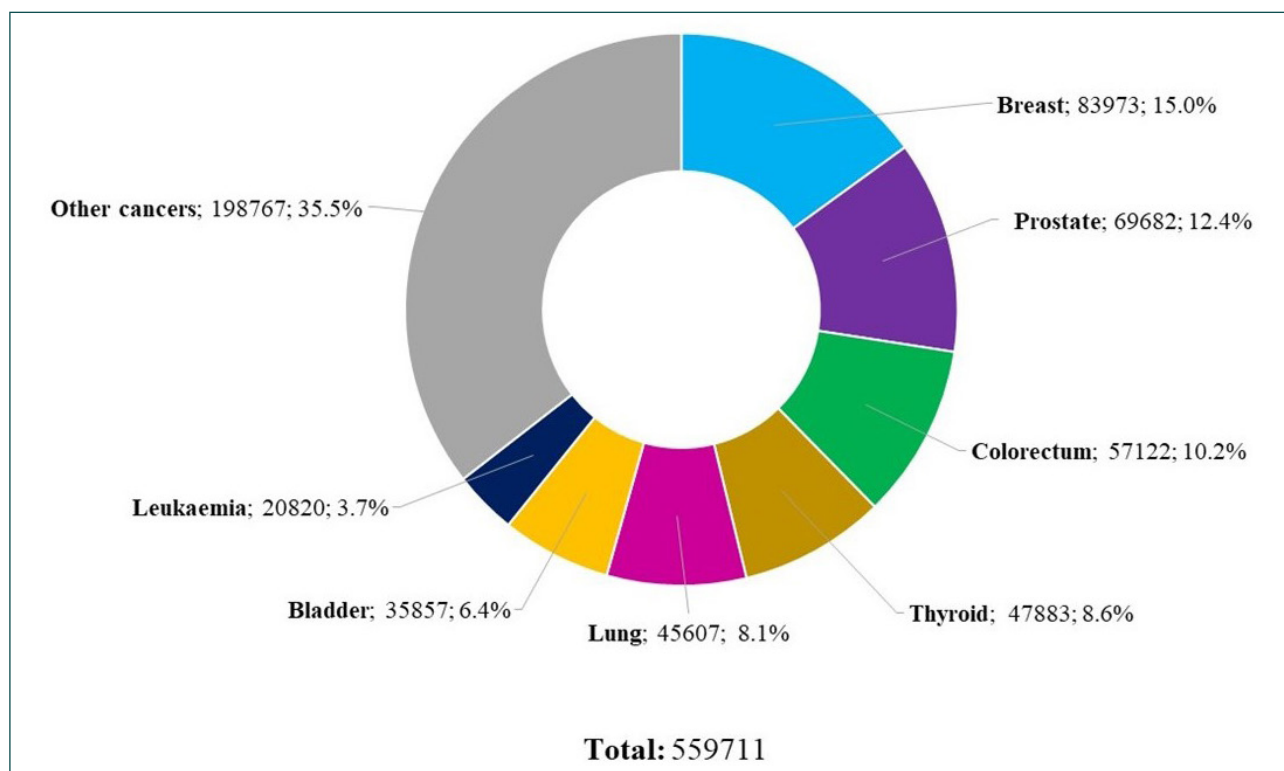
Source: Global Cancer Observatory, Globocan 2020 [5]

Abbreviations: IR, incidence rate; ASIR: age-standardized incidence rate; MR: mortality rate, ASMR: age-standardized mortality rate

\* Colon: 2.4; Rectum: 1.5; Anus: 0.05

\*\* Colon: 1.7; Rectum: 0.87; Anus: 0.02





**Figure 5.** 5-year prevalence of the most common cancers in Türkiye (both sexes)  
Source: Global Cancer Observatory, Globocan 2020 [5]

**Table 4.** Age-standardized 5-year net survival (%) with 95% CI, cancers by the principal site, 2010-2014, Türkiye.

Site	Age-standardized 5-year net survival (95% CI)	Site	Age-standardized 5-year net survival (95% CI)
<b>Gastrointestinal cancers</b>		<b>Haemopoietic malignancies (adults)</b>	
Oesophagus	19.0 (16.9-21.1)	Myeloid	54.0 (51.8-56.1)
Stomach	24.6 (23.6-25.6)	Lymphoid	54.5 (53.0-56.1)
Colon	55.2 (53.8-56.6)	<b>Childhood malignancies</b>	
Rectum	52.6 (50.6-54.5)	Brain	62.5 (58.4-66.7)
Liver	15.9 (14.0-17.8)	Acute lymphoblastic leukemia	80.9 (77.2-84.6)
Pancreas	10.4 (9.3-11.5)	Lymphoma	82.9 (79.1-86.7)
<b>Women's cancers</b>		Lung	14.9 (14.3-15.4)
Breast	82.1 (80.7-83.5)	Melanoma of the skin	82.1 (80.7-83.5)
Cervix	60.7 (58.1-63.3)	Prostate	83.8 (82.5-85.1)
Ovary	39.7 (37.3-42.0)	Brain (adults)	35.6 (34.1-37.0)

Source: CONCORD-3 [7]

[22]. In Türkiye, beside lung, the other cancers which have high attributable fractions to tobacco, e.g. bladder, larynx cancers, have high rates especially in males. Yüce et al. estimated population attributable fraction (PAF) for 2019, 54.2–61.9% of newly diagnosed cancer cases in tobacco-related cancers group in men, this value was calculated as 23.2–30.6% for females. Also, it was calculated that 22–22.4% in males and 23.7–24.3% in women were attributable cases to obesity-related cancers group. For tobacco it was showed that as 89.8%, 86%, 77.2% and 71.1% for respectively lung, larynx, oral cavity & pharynx and esophagus cancers in men. [23]. Eser and Özgür estimated the fraction of tobacco-related cancer attributable to smoking with using the data from Cancer Incidence in Five Continents vol.XI, they showed that 59.4% of all cancers were attributed to tobacco (74.5% in men, 6.8% in women). In men, the highest PAF was 89.4% in the lung, followed by larynx (86.4%), esophagus (70.3%), oral cavity and oropharyngeal (70.5%), kidney (54.4%), bladder (53.2%), pancreas cancer (41.3%), liver (39.1%), stomach (38.4%), and myeloid leukemia (30.4%), respectively. Although it was lower in women compared to men, the highest PAF was 38.4% in the lung again, followed by larynx (5.3%), esophagus (4.3%), oral cavity and oropharyngeal (3.1%), bladder (1.7%), pancreas (1.5%), stomach (1.1%), liver (1.1%), cervix (1.03%), myeloid leukemia (0.5%) and kidney (0.4%) [24]. Tobacco use is a behavioral risk factor is responsible for 1 in 4 cancer-related death [25]. From 1990 to 2019, the age-standardized cancer death rate attributed to smoking in Türkiye decreased by 24.4% from 50.4 to 38.1. Also, for the same period, age-standardized DALY attributed to smoking decreased from 1283.9 to 920.1 with a 28.3% decrease. On the other hand, although there were similar decreases with the world average for age-standardized cancer death rate and DALY attributed to smoking (23.0% and 28.6%, respectively), when the final values of 2019 were examined, in Türkiye, age-standardized cancer death rate and DALY attributed to smoking exceeded all regions except Central Europe and East Asia, and additionally high-income North America region for DALY, respectively [25]. In 2013, WHO Member States

committed to achieving the target of a 30% relative reduction in the prevalence of tobacco use by 2025 [26]. It can be said that the committed target for smoking prevalence is 19%, which was found 27.1% according to the GATS 2012 study in Türkiye [27], unfortunately the current prevalence (28.0) is far from the target [28]. The implementation areas of the tobacco control policy across the country, which was also appreciated by the World Health Organization, should be expanded and continued. The implementation problems in the field should be solved immediately, and modern interventions and policies should be produced to target especially the youth to achieve to reduce the prevalence of tobacco use, which desired trend was found to have disappeared for a while [28].

Compared to tobacco use, alcohol use may also not be considered a significant risk factor when compared with other countries, with the age-standardized rate attributable to alcohol use in 2020 at 1.6 for both sexes per 100,000. With this quite low value, Türkiye was at the 8th level among the countries, which was the lowest among the 8 level groups [5].

Ultraviolet radiation exposure was specified as 40.3% of the population attributable fraction for melanoma, according to the estimates in 2020 for both sexes and population over 30-year-old. Türkiye was included in the quintile three [5].

For all cancer-causing infectious agents, the rate attributed in 2018 for both sexes among all cancers was calculated as 8.2%, and Türkiye was at the second level from below among four country level groups [5].

Obesity is a common problem in Türkiye. In the STEPS 2017 study, 62.8% of men, 66.0% of women and 64.4% of people in total were overweight (Body Mass Index [BMI]  $\geq$  25 kg/m<sup>2</sup>). In addition, 21.6% of men, 35.9% of women and 28.8% of people in total were classified as obese (BMI  $\geq$  30 kg/m<sup>2</sup>) [18]. The rate attributed to obesity for all anatomical sites in 2012 for both sexes was calculated as 4.8% for Türkiye, and thus it was ranked second from the top 5 country level groups [5].

Considering the death rate for trachea, bronchus and lung cancers attributed to ambient and household air

pollution for both sexes per 100,000, it was calculated as 46.6 for 2016, which can be considered as relatively high [29]. Also, other environmental risk factors contribute the increasing incidence rate of some cancers.

Survivals on the other hand, seems poor to moderate for most of the sites when we compare with the figures in other countries in the region [7]. The mortality rates and survivals remain unfavorable despite the screening programs implemented in the country for breast and cervical cancers since 2007 and for colorectal cancer since 2014. In order to reach the targeted numbers in screenings, studies are carried out to increase community participation, such as integration into the family medicine system [30].

Also, it is clear that there are inequalities in the incidence, mortality and survival rates of cancers associated with many conditions such as place of residence and socioeconomic status [31–33]. The characteristics within the country are also crucial, for example the Gini index, which shows the inequality in income distribution within the country [34], was associated with the mortality incidence ratio [33], and this is probably also related to the survival rates. A large part of the population is affected by the income inequalities in Türkiye. When the Gini index, which was recorded as 41.9 in 2019, was compared with the European Union member countries, it was seen that Türkiye was the second worst (unjust) country [35]. To reduce inequalities, it is only possible to provide services to those who need the most, that is, only with equitable and inclusive policies.

### Conclusion:

Cancer burden in Türkiye is an increasing public health threat, as it is all over the world. The most challenging characteristic of the country is the high prevalence of tobacco use is the most important cancer-related well-defined risk factor. Although Türkiye has received many praises in the fight against tobacco, policies that expanded the areas of struggle and practices in the field should be adopted, and be continued with determination. Although alcohol use is not a major problem, the prevalence of obesity is on the rise, where barriers to the implementation

of health promotion-related public health programs must be completely removed. Air pollution can be reduced up to a certain point by eliminating the weakness of the monitoring systems and absence in legal regulations and implementations of existing ones. The change of risk factors over time is important, and behavioral risk factors should be followed up through prevalence studies and environmental risk factors such as air pollution should be followed through follow-up systems.

The prevalences of existing potential behavioral and possible environmental risk factors are a public health threat for Türkiye in terms of increasing cancer incidence by time. In addition, some unchangeable characteristics of the population dynamic, such as the aging population and the prolongation of life expectancy, will also be important. It is crucial that risk factors monitoring by epidemiological studies especially tobacco use to control more effectively tobacco-related cancers. In the meantime, unfavorable mortality and survival figures show the exigency for the improvement and strengthening of the early diagnostic and screening programs countrywide. All dimensions of cancer control, such as primary, tertiary preventions and treatment must be improved and strengthened to achieve the cancer control and reduce the burden in the country. At the same time, population-based cancer registries and research on cancer epidemiology based on the data released from these registries should be supported.

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