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ARTICLE

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Global cancer statistics 2024: GLOBOCAN estimates of incidence and mortality worldwide for 34 cancers in 186 countries

Hyuna Sung PhD[1] | Adalberto M. Filho PhD[2] | Mathieu Laversanne Msc[2] | Jacques Ferlay ME[2] | Rebecca L. Siegel MPH[1] | Isabelle Soerjomataram MD, MSc, PhD[2] | Ahmedin Jemal DVM, PhD[1] | Freddie Bray BSc, MSc, PhD[2]

[1]Surveillance, Prevention, and Health Services Research, American Cancer Society, Atlanta, Georgia, USA

[2]Cancer Surveillance Branch, International Agency for Research on Cancer, Lyon, France

Correspondence
Hyuna Sung, American Cancer Society, 270 Peachtree St NW, Suite 1300, Atlanta, GA 30303, USA.
Email: hyuna.sung@cancer.org

Abstract

This article provides updated global cancer statistics for the year 2024 based on the GLOBOCAN estimates of the International Agency for Research on Cancer. The authors describe national cancer incidence and mortality by world region and the Human Development Index and predict the burden in 2050 based on demographic trends. In 2024, an estimated 20.6 million new cancer cases (19.5 million excluding nonmelanoma skin cancer) and 9.8 million deaths (9.7 million excluding nonmelanoma skin cancer) occurred worldwide, equivalent to one in five people developing cancer during their lifetime and one in nine men and one in 13 women dying from the disease. Lung cancer is the most frequently diagnosed cancer, responsible for almost 2.6 million new cases (12.8%), followed by female breast (11.8%), colorectal (9.9%), prostate (7.5%), and stomach (4.7%) cancer. Lung cancer is also the leading cause of cancer death, with an estimated 1.9 million deaths (19.1%), followed by colorectal (9.4%), liver (7.5%), female breast (7.1%), and stomach (6.6%) cancer. Incidence rates vary four- to five-fold across regions, with the highest rates found in Australia/New Zealand (men, 477 per 100,000; women, 396 per 100,000), whereas mortality rates differ two-fold, with elevated rates in Eastern Europe for men (158 per 100,000) and Melanesia for women (108 per 100,000). The incidence burden is predicted to reach 34.4 million by 2050, up 67% from 2024, with the largest proportional increases in lower Human Development Index countries. Although global variation in cancer profiles demands a nuanced approach to cancer control at national and regional levels, primary prevention must be at the forefront, including intensified efforts to reduce tobacco use, prevent infections, lower alcohol consumption and excess body weight, and increase physical activity.

KEYWORDS
cancer incidence, cancer mortality, global burden, GLOBOCAN, prevention and control

INTRODUCTION

Cancer is a major public health challenge in the 21st century and an important barrier to increasing life expectancy worldwide. In 2021, it accounted for nearly one in six deaths (17%) globally, and almost one in four deaths (23%) from noncommunicable diseases. The disease also imposes substantial societal and macroeconomic costs[1]; in 2022, premature deaths from cancer resulted in an estimated US $566 billion in global productivity losses, comprising losses from both paid work (US $305 billion) and unpaid activities (US $260 billion), including caregiving and domestic labor.[2] Nevertheless, decades of advances in cancer research from basic discovery to clinical and population science have enabled considerable progress in global cancer prevention and control, making a substantial proportion of cancers preventable and treatable. Indeed, nearly one half (48%) of all cancer-related deaths are estimated to be potentially avoidable worldwide, through either primary prevention targeting modifiable risk factors (33%) or early detection and improved access to treatment (15%). Yet the proportion of avoidable deaths varies markedly by world region because of differences in risk factor profiles and the availability of effective interventions. In sub-Saharan Africa, for example, the proportion estimated to be avoidable exceeds 60%, reflecting the high burden of cancer deaths that are either largely preventable (e.g., cervical cancer) or highly treatable when detected early (e.g., breast cancer).[3]

Understanding the magnitude and geographic distribution of the global cancer burden is essential to guide effective and equitable prevention and control efforts. To this end, this article presents updated global cancer statistics for 2024 based on the latest GLOBOCAN estimates produced by the International Agency for Research on Cancer (IARC) and disseminated online through *Cancer Today* on the Global Cancer Observatory (GCO) website (http://gco.iarc.who.int).[4] Consistent with previous reports,[5–9] our objectives are three-fold: (1) to describe the global burden of cancer incidence and mortality, (2) to assess geographic and socioeconomic variation across 20 predefined world regions and according to the Human Development Index (HDI), and (3) to predict the burden of cancer in 2050 based on demographic projections. Focusing on the 10 most common cancer types worldwide, we also briefly discuss current patterns and recent trends together with the underlying determinants, as well as the prospects of equitable and sustainable global cancer control.

DATA SOURCES AND METHODS

The sources and methods used in compiling the GLOBOCAN estimates have been described previously[10] and are freely available online through the GCO.[4] The GCO platform provides tools for tabulating and visualizing the incidence and mortality estimates at the global, regional, and national levels by cancer type, sex, and age group. In brief, national estimates are derived from the best available cancer incidence and mortality data within each country, with validity depending on the quality, representativeness, and timeliness of the underlying data sources. The methods used to produce the 2024 estimates largely follow those developed previously, with an emphasis on the use of short-term predictions and modeled mortality-to-incidence ratios, where applicable.[11] The GCO provides cancer-specific estimates for 186 countries or territories worldwide by sex and 18 age groups (birth to 4 years, 5–9 years, …, 80–84 years, 85 years and older).

The number of new cancer cases and cancer deaths were extracted for all cancers combined (International Classification of Disease 10th revision [ICD-10], version 2010; codes C00–C97) and for 34 cancer types: lip, oral cavity (C00–C06); salivary glands (C07–C08); oropharynx (C09–C10); nasopharynx (C11); hypopharynx (C12–C13); esophagus (C15); stomach (C16); colorectum (C18–C21); liver (C22, including intrahepatic bile ducts); gallbladder (C23); pancreas (C25); larynx (C32); lung (C33–C34, including trachea and bronchus); melanoma of skin (C43); nonmelanoma skin cancer (NMSC; C44, excluding basal cell carcinoma for incidence); mesothelioma (C45); Kaposi sarcoma (C46); female breast (C50); vulva (C51); vagina (C52); cervix uteri (C53); corpus uteri (C54); ovary (C56); penis (C60); prostate (C61); testis (C62); kidney (C64–C65, including renal pelvis); bladder (C67); brain, central nervous system (C70–C72); thyroid (C73); Hodgkin lymphoma (C81); non-Hodgkin lymphoma (C82–C86, C96); multiple myeloma (C88 and C90, including immunoproliferative diseases); and leukemia (C91–C95). For consistency with previous reports,[12] we combine colon (C18), rectum (C19–C20), and anus (C21) as *colorectal cancer* (ICD-10 codes C18–C21), whereas NMSC is included in the overall estimation of the total cancer burden (unless otherwise stated) and included within the *other* category when making comparisons of the relative magnitude of different cancers types. Cancer type–specific, aggregated counts at global, regional, and national levels were used to identify the most common cancer types for incidence and mortality at each level.

We also present two complementary measures that allow comparisons across populations with differing age structures: age-standardized incidence and mortality rates (ASRs) per 100,000 person-years, standardized to the 1966 Segi–Doll world standard population,[13] and the cumulative risk of developing or dying from cancer before age 75 years, expressed as a percentage and assuming the absence of competing causes of death.

Geographic and socioeconomic variation in the burden and profile of cancer was examined across 20 aggregated regions defined by the United Nations Population Division (Figure 1A) and by countries classified according to the HDI (Figure 1B), based on the

2022 Human Development Report from the United Nations Development Program. Analyses used both the predefined, four-tier HDI classification (low, medium, high, and very high) and a binary grouping (low and medium HDI vs. high and very high HDI). The cancer profiles for India and China are also presented separately given their large population shares (17.8% and 17.5% globally in 2024, respectively).[14]

Finally, we project the global cancer burden to 2050 using demographic projections while assuming constant incidence or mortality rates. Throughout, the terms *transitioning*, *emerging*, and *lower HDI* countries/economies refer to nations classified as low or medium HDI, whereas *transitioned* or *higher HDI* countries/economies refer to nations classified as high or very high HDI.

RESULTS

Distribution of cases and deaths by world region and cancer type

Figure 2 presents the distribution of new cases and deaths by world region for both sexes combined and by sex. Overall, an estimated 20.6 million new cases worldwide (19.5 million excluding NMSC) and 9.8 million cancer deaths (9.7 million excluding NMSC) occurred in 2024 (Table 1). More than one half of all cancer cases (50.7%) and deaths (56.5%) were in Asia in 2024 (Figure 2), where 58.8% of the world's population resides (Figure 1A). The cancer mortality burden in Africa and Asia is disproportionately higher than incidence, reflecting both the regional variation in cancer types and a generally lower survival proportion. In contrast, Europe has a disproportionately high burden of both cases (21.0%) and deaths (20.0%) because it comprises only 9.2% of the global population.

Table 2 presents the number of new cancer cases and deaths, age-standardized incidence and mortality rates, and the cumulative risk of developing and dying from cancer, overall and for the 34 cancer types by sex. The incidence rate for all cancers combined was about 13% higher in men (209.6 per 100,000) than in women (185.8 per 100,000) in 2024, much smaller than the 46% sex difference for mortality (106.2 vs. 72.8 per 1000,000). Approximately one in five men (21.4%) and women (18.5%) will develop cancer before the age of 75, while about one in nine men (11.0%) and one in 12 women (7.6%) will die from the disease.

Figure 3 illustrates the top 10 most common cancer types overall and by sex in 2024 (with NMSC included in the "other" category), which together account for more than 60% of all newly diagnosed cancer cases and cancer deaths. Lung cancer is the most commonly diagnosed cancer worldwide (12.8% of all cases), followed by cancers of the female breast (11.8%), colorectum (9.9%), prostate (7.5%), and stomach (4.7%). Lung cancer is also the leading cause of cancer death (19.1% of all deaths), followed by colorectal (9.4%), liver (7.5%), female breast (7.1%) and stomach (6.6%) cancers. In men, lung cancer ranks first for both incidence and mortality, followed by prostate and colorectal cancer for incidence, and colorectal and liver cancer for mortality. In women, breast cancer ranks first for both incidence and mortality, followed by lung and colorectal cancers.

Global cancer patterns

Figures 4 and 5 present global maps of the most commonly diagnosed cancers and leading causes of cancer death by sex in 186 countries. The maps highlight substantial geographic diversity in common cancer types, particularly for both incidence and mortality in men (in whom eight different cancer types lead in different countries) and mortality in women (in whom seven different cancers lead). In men, prostate cancer is the most frequently diagnosed cancer in 123 countries, followed by lung cancer in 31 countries, with colorectal, liver, and stomach cancers ranking first in 11, nine, and six countries, respectively (Figure 4). In contrast, incidence patterns among women are dominated by two cancer types: breast cancer, which ranks first in 164 countries and cervical cancer, which ranks first in 19 of 22 remaining countries, with the exceptions in China and North Korea (lung cancer) and Mongolia (liver cancer). In terms of mortality, lung cancer is the leading cancer in men in 89 countries, followed by prostate cancer in 68 countries and liver cancer in 15 countries (Figure 5). In women, breast cancer leads in 122 countries, followed by cervical cancer in 26 countries, and lung cancer in 26 countries.

Cancer incidence and mortality patterns by four-tier HDI, China and India

Figure 6 presents the five most common cancers in terms of incidence and mortality for countries grouped by HDI: very high, high (excluding China), medium (excluding India), and low HDI, as well as China and India separately. For incidence, female breast cancer is the leading cancer across all HDI levels and in India, whereas lung cancer ranks first in China. For mortality, lung cancer leads across all HDI levels, in China, and in India, except in low HDI countries, where female breast cancer ranks first. Colorectal cancer ranks among the five most common cancers for both incidence and mortality across HDI levels, except in medium HDI countries and India. Prostate cancer is among the top five for incidence across all HDI levels, and among the top five for mortality in very high HDI and in low HDI countries. The five most common cancers account for 43-51% of total incidence and mortality across each of the four-tier HDI levels and in India but represent a larger share in China (59% of incidence and 67% of mortality), largely reflecting the high burden of lung cancer in the country.

Marked differences in infection-related cancers and other regionally prevalent risk factors contribute to distinct cancer profiles across HDI levels. Liver cancer is the second leading cause of cancer death in China, ranking third or fourth in all HDI levels except very high HDI and India. Cervical cancer is the second most commonly diagnosed cancer in low HDI countries, third in medium HDI countries, and fifth in India. In India, lip and oral cavity cancer ranks

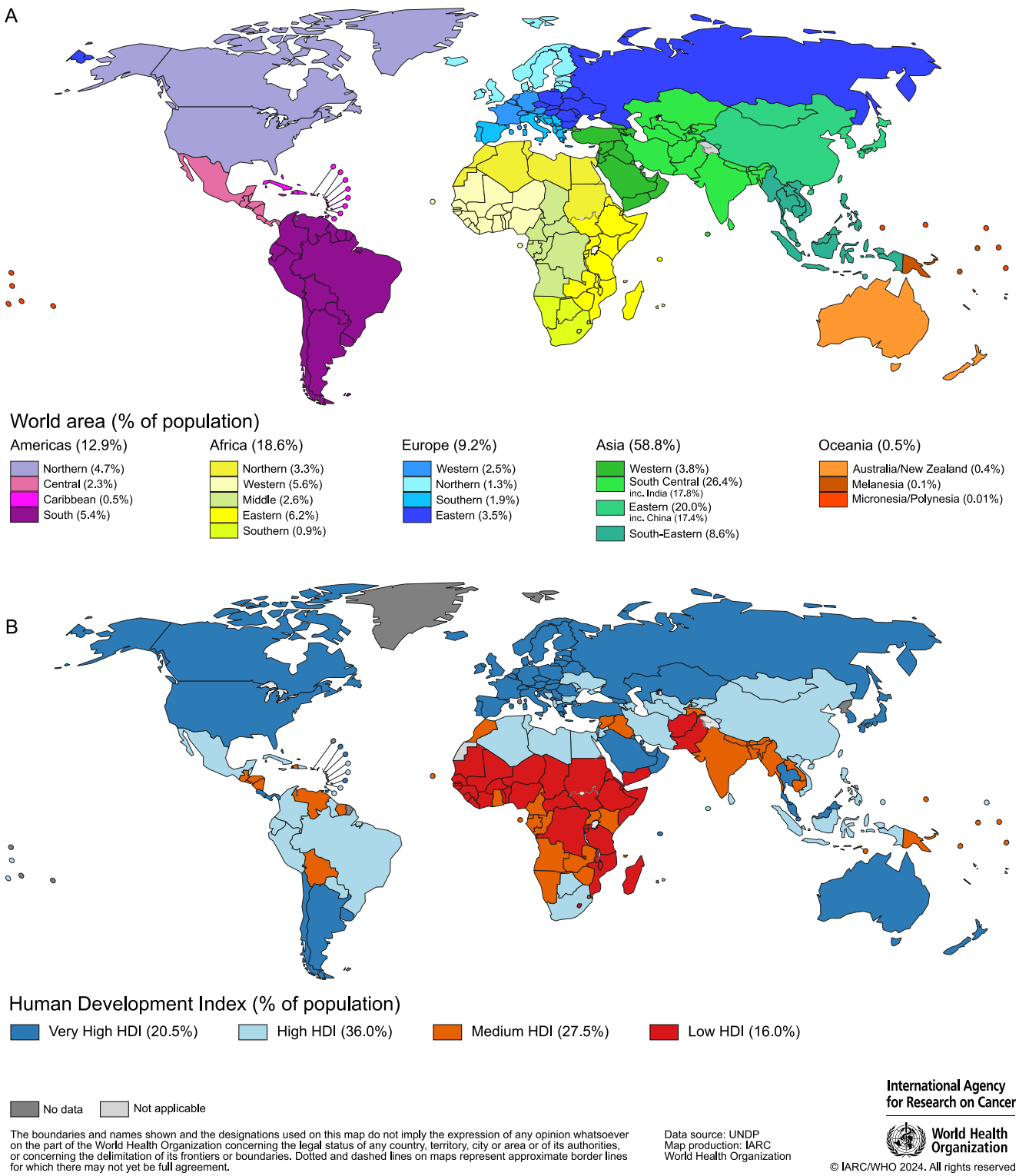

FIGURE 1 Global maps present (A) 20 areas of the world and (B) the four-tier HDI. The sizes of the respective populations are included in the legend. HDI indicates human development index; UNDP, United Nations Development Program. *Source*: United Nations Population Division/UNDP.

second for incidence and third for mortality, reflecting one of the world's highest oral cancer burdens.

The risk of developing cancer tends to rise incrementally with increasing HDI. In 2024, the cumulative risk ranged from about 11% in low HDI countries to more than 30% in very high HDI countries for men, and from approximately 12% to 25% for women (Table 3). By contrast, differences in the risk of dying from cancer across HDI levels are much smaller, with a lifetime risk ranging from about 8% in

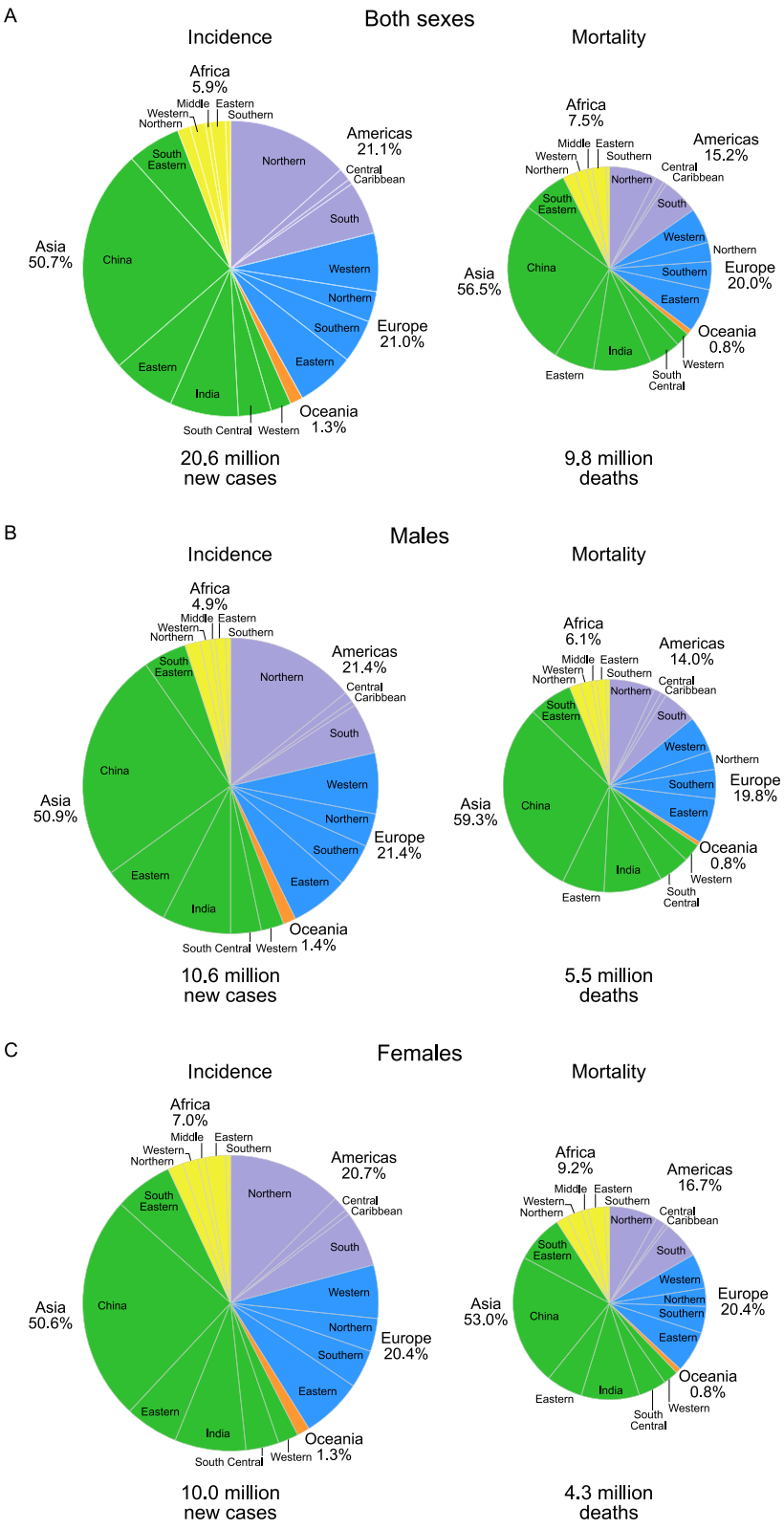

FIGURE 2 Pie charts present the distribution of cases and deaths by world area in 2024 for (A) both sexes, (B) males, and (C) females. For each sex, the area of the pie chart reflects the proportion of the total number of cases or deaths. *Source*: GLOBOCAN 2024.

TABLE 1 New cases and deaths for 34 cancers and for all cancers combined in 2024.

	Incidence			Mortality		
	Rank	Incidence	Percentage of all cases	Rank	No. of deaths	Percentage of all deaths
Lung, bronchus, and trachea	1	2,637,005	12.8	1	1,861,839	19.1
Female breast	2	2,434,087	11.8	4	693,660	7.1
Colorectum	3	2,041,007	9.9	2	917,895	9.4
Prostate	4	1,546,112	7.5	8	419,849	4.3
Stomach	5	980,286	4.7	5	641,554	6.6
Thyroid	6	959,281	4.6	25	48,070	0.5
Liver and intrahepatic bile duct	7	843,045	4.1	3	732,489	7.5
Bladder	8	635,264	3.1	13	227,626	2.3
Cervix uteri	9	604,196	2.9	10	279,583	2.9
Non-Hodgkin lymphoma	10	562,793	2.7	12	234,903	2.4
Pancreas	11	531,318	2.6	6	490,786	5.0
Leukemia	12	495,113	2.4	9	292,234	3.0
Esophagus	13	494,320	2.4	7	441,994	4.5
Lip, oral cavity	14	452,205	2.2	15	194,108	2.0
Kidney and renal pelvis	15	442,570	2.1	16	144,871	1.5
Corpus uteri	16	434,620	2.1	18	100,680	1.0
Melanoma of skin	17	337,969	1.6	22	58,398	0.6
Ovary	18	330,731	1.6	14	203,850	2.1
Brain, central nervous system	19	324,095	1.6	11	248,964	2.5
Multiple myeloma	20	196,157	1.0	17	119,029	1.2
Larynx	21	193,937	0.9	19	96,619	1.0
Gallbladder	22	126,384	0.6	20	92,029	0.9
Nasopharynx	23	119,750	0.6	21	62,060	0.6
Oropharynx	24	107,887	0.5	23	51,823	0.5
Hypopharynx	25	91,464	0.4	24	49,748	0.5
Hodgkin lymphoma	26	84,555	0.4	28	19,515	0.2
Testis	27	70,863	0.3	32	9240	0.1
Salivary glands	28	55,229	0.3	27	20,707	0.2

TABLE 1 (Continued)

	Incidence			Mortality		
	Rank	Incidence	Percentage of all cases	Rank	No. of deaths	Percentage of all deaths
Vulva	29	48,894	0.2	29	18,868	0.2
Penis	30	34,765	0.2	30	12,346	0.1
Kaposi sarcoma	31	34,230	0.2	31	10,727	0.1
Mesothelioma	32	27,350	0.1	26	22,715	0.2
Vagina	33	18,143	0.1	33	7484	0.1
Nonmelanoma skin cancer[a]	–	1,138,314	5.5	–	58,721	0.6
All cancers excluding nonmelanoma skin cancer[a]	–	19,498,464	94.5	–	9,703,786	99.4
All cancers	–	20,636,778	100.0	–	9,762,507	100.0

[a]Nonmelanoma skin cancer excludes basal cell carcinoma.

Source: GLOBOCAN 2024.

lower HDI countries to 12% in higher HDI countries for men and varying little (around 7-8% across four-tier HDI) for women.

Figure 7 compares cancer incidence and mortality ASRs between lower and higher HDI countries in men and women separately. Incidence rates for most cancer types are higher in higher HDI countries in 2024, with the largest variation (greater than seven-fold) observed for thyroid cancer in both sexes. In contrast, higher incidence rates for cancers of the lip and oral cavity and the cervix are seen in lower HDI countries. Mortality patterns broadly mirror incidence patterns, although differences between incidence and mortality are evident for prostate and female breast cancers. Despite three-fold greater incidence rates of prostate cancer in higher versus lower HDI countries (34.9 vs. 13.1 per 100,000), corresponding mortality rates are reasonably comparable (7.4 vs. 6.9 per 100,000). Similarly, incidence rates of breast cancer incidence are substantially greater in higher HDI countries (54.1 vs. 33.6 per 100,000), yet mortality rates are greater in lower HDI countries (14.7 vs. 11.7 per 100,000).

Cancer incidence and mortality rates by sex and world region

Cancer incidence varies markedly across regions, with roughly four-fold differences worldwide (Table 3). Rates are highest in Australia/New Zealand for both men (476.8 per 100,000) and women (396.1 per 100,000) and lowest in Eastern Africa among men (99.8 per 100,000) and South-Central Asia among women (106.0 per 100,000). The regional variation in mortality is smaller at approximately two-fold. Mortality rates are the highest in Eastern Europe among men (157.5 per 100,000) and in Melanesia among women (108.0 per 100,000) and the lowest in Eastern Africa among men (68.7 per 100,000) and South-Central Asia among women (58.6 per 100,000). Correspondingly, the cumulative risk of dying from cancer is highest in Eastern Europe for men (17.4%) and in Melanesia for women (12.1%) compared with the lowest risks in Central America for men (7.0%) and South-Central Asia (6.6%) and Eastern Asia (6.5%) for women.

The regional variations in cancer incidence and mortality largely reflect differences in exposure to major risk factors, the distribution of associated cancer types, and disparities in effective prevention, early detection, and curative treatment. Below, we examine these patterns in greater detail across world regions, focusing on incidence and mortality patterns of the 10 most common cancers, describing these in the context of recent literature. Nine of these cancers rank among the top 10 for both incidence and mortality, whereas thyroid cancer ranks among the top 10 for incidence only (Figures 8–17).

Lung cancer

Lung cancer is the most frequently diagnosed cancer and the leading cause of cancer death worldwide, with about 2.6 million new cases and 1.9 million deaths estimated in 2024 (Table 1). It ranks first among men and second among women for both incidence and

TABLE 2 Incidence (cases, age-standardized rate, cumulative risk) and mortality (deaths, age-standardized rate, cumulative risk) for 34 cancers and all cancers combined by sex in 2024.

	Incidence						Mortality					
	Males			Females			Males			Females		
	No. of cases	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of cases	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of deaths	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of deaths	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %
Lip, oral cavity	319,340	6.7	0.75	132,865	2.4	0.27	137,207	2.8	0.32	56,901	1.0	0.11
Salivary glands	31,855	0.7	0.07	23,374	0.4	0.05	13,119	0.3	0.03	7588	0.1	0.01
Oropharynx	86,735	1.8	0.22	21,152	0.4	0.05	42,729	0.9	0.11	9094	0.2	0.02
Nasopharynx	84,931	1.8	0.20	34,819	0.7	0.07	45,356	0.9	0.11	16,704	0.3	0.04
Hypopharynx	76,048	1.6	0.19	15,416	0.3	0.04	42,002	0.8	0.10	7746	0.1	0.02
Esophagus	360,271	7.1	0.88	134,049	2.3	0.27	321,474	6.3	0.75	120,520	2.0	0.23
Stomach	638,780	12.4	1.47	341,506	5.7	0.64	418,996	8.0	0.90	222,558	3.5	0.37
Colorectum	1,138,656	22.4	2.58	902,351	15.3	1.72	504,807	9.6	1.00	413,088	6.3	0.64
Liver and intrahepatic bile ducts	586,676	11.8	1.39	256,369	4.3	0.49	504,643	10.1	1.17	227,846	3.7	0.42
Gallbladder	44,672	0.9	0.10	81,712	1.4	0.16	32,951	0.6	0.07	59,078	1.0	0.11
Pancreas	280,061	5.4	0.63	251,257	4.0	0.44	258,680	5.0	0.56	232,106	3.5	0.38
Larynx	169,734	3.4	0.43	24,203	0.4	0.05	85,254	1.7	0.21	11,365	0.2	0.02
Lung, bronchus, and trachea	1,632,033	31.8	3.86	1,004,972	17.1	2.05	1,259,331	24.1	2.83	602,508	9.5	1.09
Melanoma of skin	180,515	3.5	0.38	157,454	2.9	0.31	33,634	0.6	0.06	24,764	0.4	0.04
Nonmelanoma skin cancer[a]	679,574	12.4	1.17	458,740	6.8	0.65	34,197	0.6	0.05	24,524	0.3	0.03
Mesothelioma	19,500	0.3	0.04	7850	0.1	0.01	16,630	0.3	0.03	6085	0.1	0.01
Kaposi sarcoma	24,827	0.5	0.05	9403	0.2	0.02	7767	0.2	0.01	2960	0.1	0.01
Female breast	—	—	—	2,434,087	47.8	5.15	—	—	—	693,660	12.9	1.38
Vulva	—	—	—	48,894	0.8	0.09	—	—	—	18,868	0.3	0.03
Vagina	—	—	—	18,143	0.3	0.04	—	—	—	7484	0.1	0.01
Cervix uteri	—	—	—	604,196	12.4	1.33	—	—	—	279,583	5.5	0.61
Corpus uteri	—	—	—	434,620	8.3	1.00	—	—	—	100,680	1.7	0.21
Ovary	—	—	—	330,731	6.5	0.72	—	—	—	203,850	3.8	0.43

TABLE 2 (Continued)

	Incidence						Mortality					
	Males			Females			Males			Females		
	No. of cases	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of cases	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of deaths	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	No. of deaths	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %
Penis	34,765	0.7	0.08	—	—	—	12,346	0.2	0.03	—	—	—
Prostate	1,546,112	29.3	3.57	—	—	—	419,849	7.5	0.65	—	—	—
Testis	70,863	1.6	0.13	—	—	—	9240	0.2	0.02	—	—	—
Kidney and renal pelvis	284,131	5.8	0.67	158,439	2.9	0.33	94,395	1.8	0.20	50,476	0.8	0.08
Bladder	492,178	9.3	1.03	143,086	2.3	0.25	171,165	3.1	0.29	56,461	0.8	0.08
Brain, central nervous system	172,783	3.7	0.38	151,312	3.0	0.31	138,644	2.9	0.31	110,320	2.1	0.22
Thyroid	246,101	5.3	0.53	713,180	15.4	1.51	18,297	0.4	0.04	29,773	0.5	0.06
Hodgkin lymphoma	49,149	1.1	0.10	35,406	0.8	0.07	11,677	0.2	0.02	7838	0.1	0.01
Non-Hodgkin lymphoma	318,677	6.5	0.69	244,116	4.4	0.49	138,560	2.7	0.27	96,343	1.6	0.16
Multiple myeloma	108,052	2.1	0.25	88,105	1.5	0.18	65,685	1.2	0.14	53,344	0.8	0.10
Leukemia	281,091	6.1	0.57	214,022	4.3	0.40	164,777	3.4	0.31	127,457	2.4	0.22
All cancers excluding nonmelanoma skin cancer[a]	9,934,047	197.2	20.4	9,564,417	179.0	18.0	5,448,245	105.5	11.0	4,255,541	72.5	7.5
All cancers	10,613,621	209.6	21.4	10,023,157	185.8	18.5	5,482,442	106.2	11.0	4,280,065	72.8	7.6

[a]Nonmelanoma skin cancer excludes basal cell carcinoma.

Source: GLOBOCAN 2024.

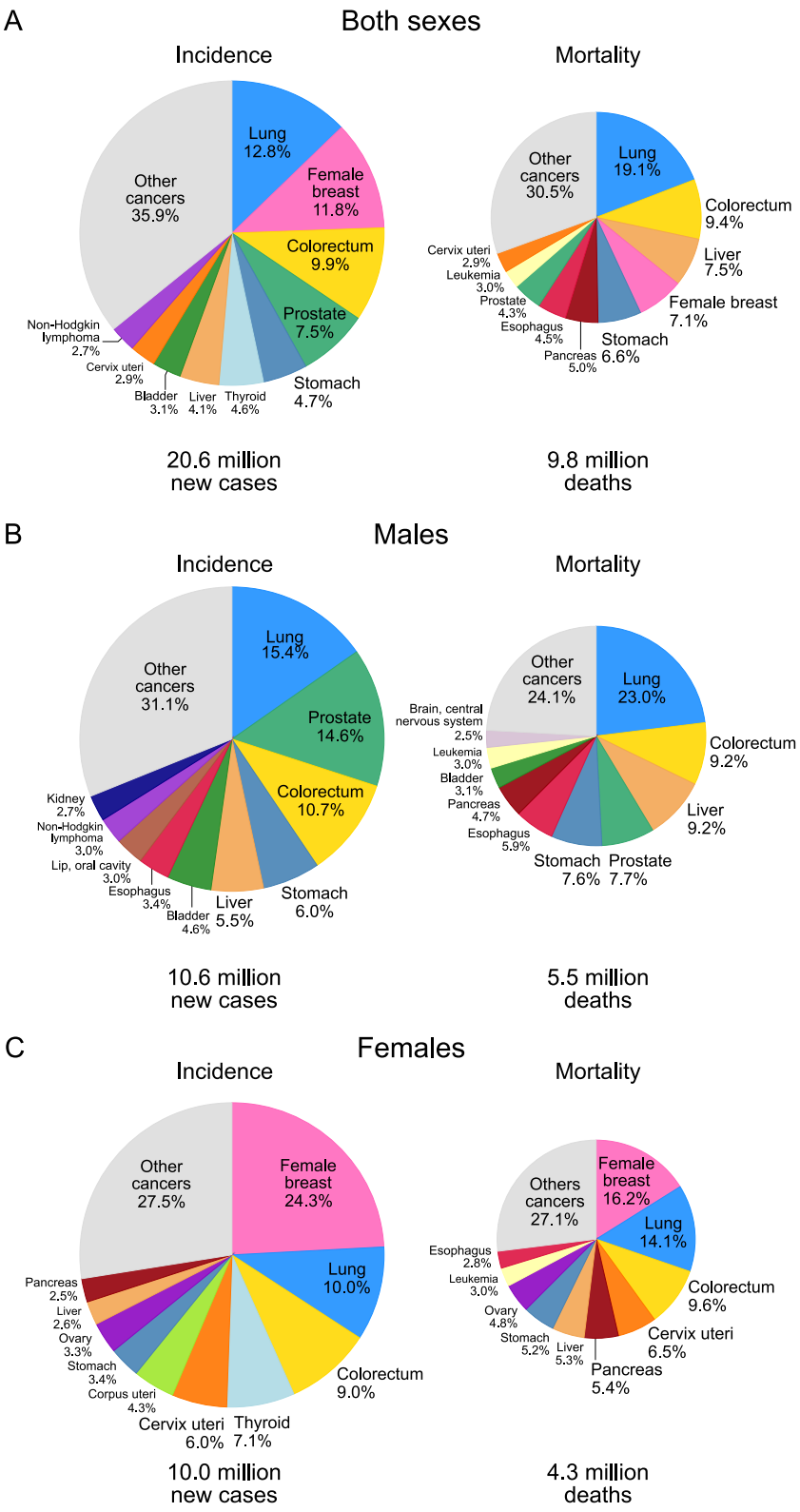

FIGURE 3 Pie charts present the distribution of cases and deaths for the top 10 most common cancers in 2024 according to the four tiers of the HDI (excluding China and India in high and medium HDI countries, respectively), and for China and India, for both sexes. Nonmelanoma skin cancers (excluding basal cell carcinoma) are included in the *other* category. HDI indicates Human Development Index. *Source*: GLOBOCAN 2024.

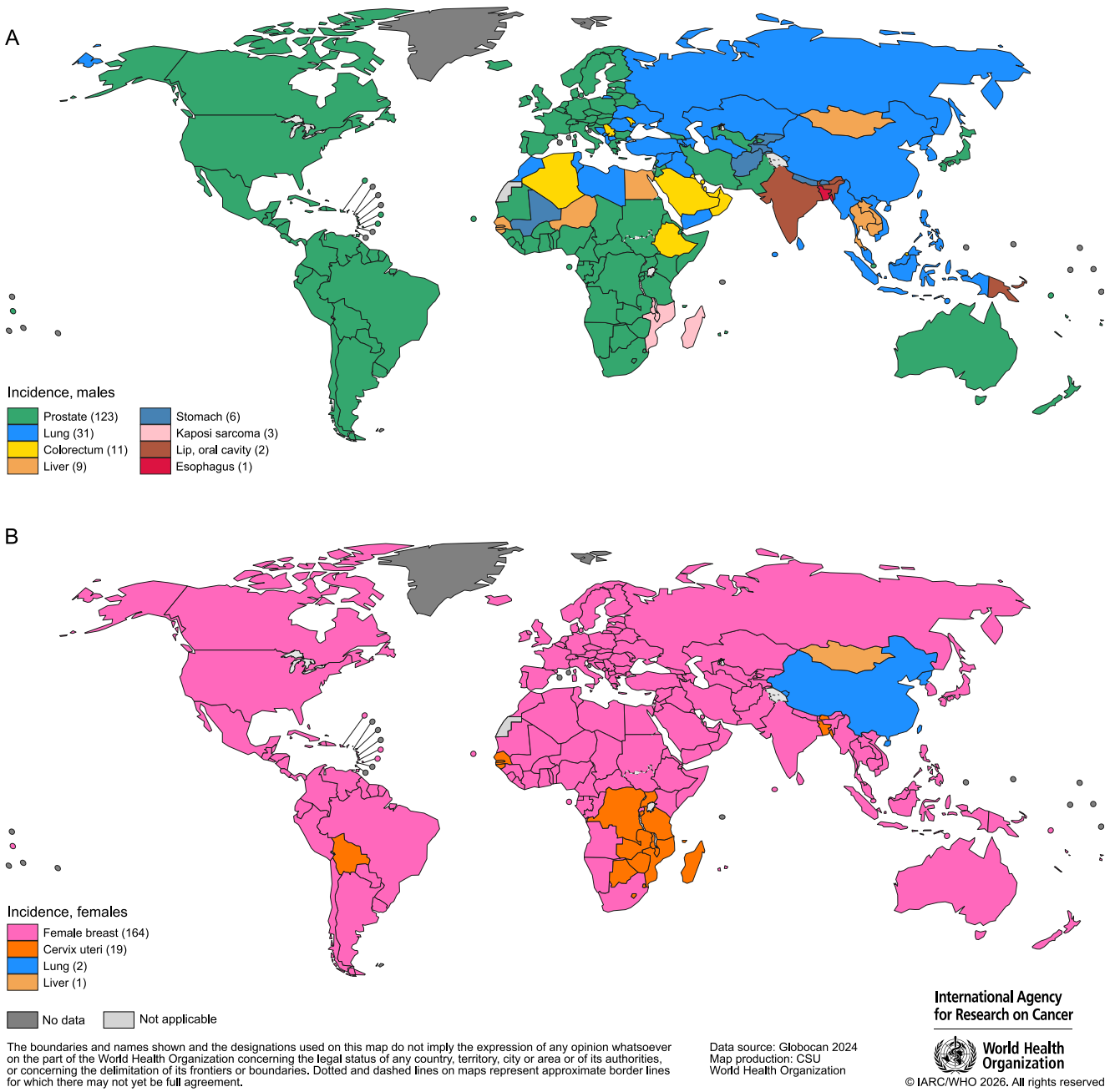

FIGURE 4 Global maps present the most common type of cancer incidence in 2024 in each country among (A) males and (B) females. The numbers of countries represented in each ranking group are included in the legend. Nonmelanoma skin cancer (excluding basal cell carcinoma) is the most common type of cancer in Australia and New Zealand among males and females and in the United States among males; however, it is excluded when making global maps. *Source*: GLOBOCAN 2024. CSU, Cancer Surveillance Unit.

mortality (Figure 3). Incidence rates are about two-fold higher in men than in women, but the male-to-female ratios vary widely by region, from close to unity in Northern America and Northern Europe to 4–5 in Northern Africa and Eastern Europe (Figure 8). Among men, lung cancer is the most commonly diagnosed cancer in 31 countries (Figure 4A) and the leading cause of cancer death in 89 countries (Figure 5A), with the highest incidence rates observed in Eastern Asia, followed by Eastern Europe, and Micronesia/Polynesia (44–52 per 100,000). Among women, lung cancer ranks first for mortality in 26 countries, including China and the United States (Figure 5B), with the highest incidence rates observed in Eastern Asia, Northern America, and Northern Europe (26–32 per 100,000) (Figure 8). Lung cancer incidence is highest among men in Hungary and women in Denmark. The lowest incidence rates are observed in Western, Middle, and Eastern Africa and in Central America (1.9–6.6 per 100,000) in both sexes and in Northern Africa among women (3.4 per 100,000).

The marked geographic and temporal patterns in lung cancer burden largely reflect the stage of the tobacco epidemic as well as differentials in the historic patterns of tobacco exposure: the

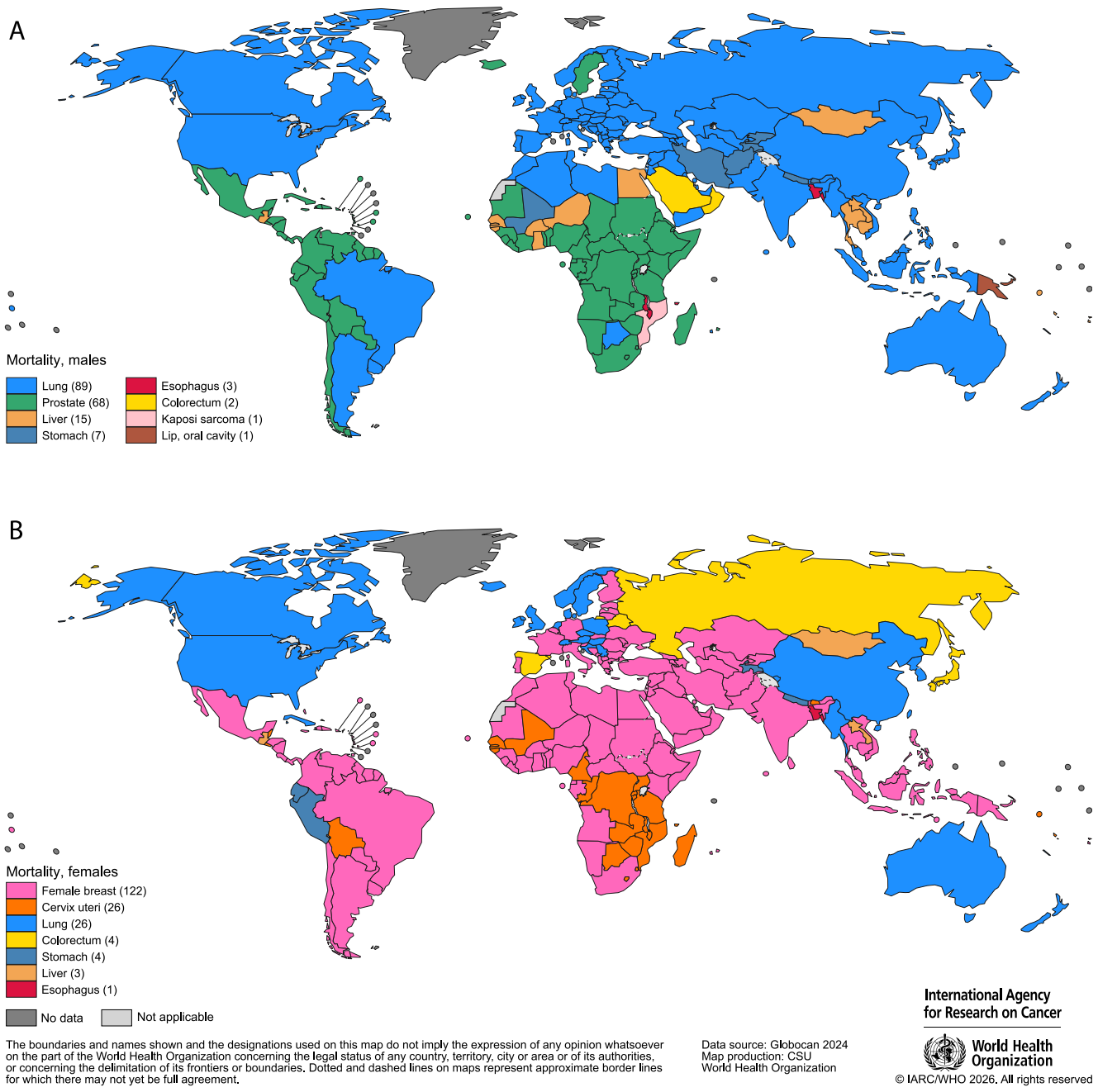

FIGURE 5 Global maps present the most common type of cancer mortality in 2024 in each country among (A) males and (B) females. The numbers of countries represented in each ranking group are included in the legend. *Source*: GLOBOCAN 2024. CSU, Cancer Surveillance Unit.

intensity and duration of smoking, the type of cigarettes consumed, and the degree of inhalation.[15–18] In those high-income countries where the tobacco epidemic was established at the turn of the last century (e.g., the United Kingdom, the United States, Australia), lung cancer rates among men have been declining since the 1980s and 1990s, 20–40 years after cigarette smoking prevalence peaked. In most transitioning countries, where the epidemic is at an earlier stage, smoking prevalence has either peaked recently or continues to increase,[19] hence lung cancer rates will likely continue to increase over the next decades.[20] The potential for a substantial rise in the global lung cancer burden is of pressing concern because several populous countries have among the highest current daily smoking prevalence in men (ages >15 years), such as Indonesia (71%) and China (45%) in 2022.[21–23] The tobacco epidemic among women remains at an earlier stage than among men, although the extent to which female smoking trends mirror those previously observed in men varies across regions.[15,24] In many transitioned countries, lung cancer rates among women continue to rise,[25] with stabilization or declines observed in a few countries (e.g., the United States, the Netherlands).[25–27] Consequently, in parts of Europe and Northern America, incidence rates among women at younger or middle ages are approaching or even exceeding those among men, signaling a

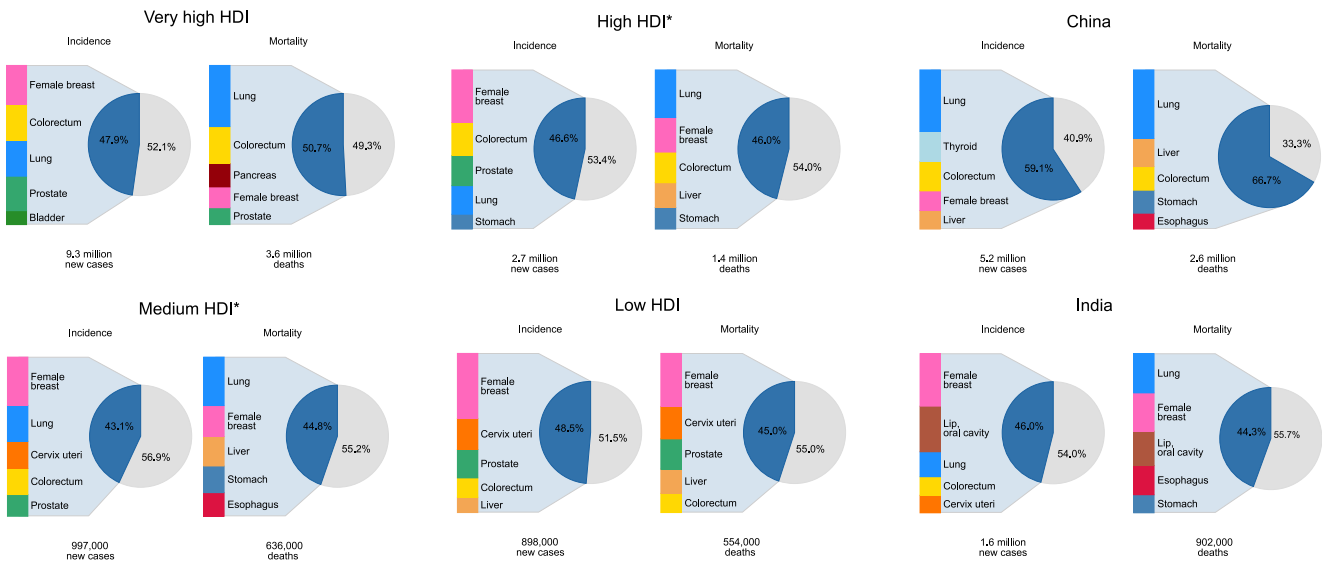

FIGURE 6 Pie charts present the distribution of cases and deaths for the top five cancers in 2024 for (A) both sexes, (B) males, and (C) females according to the four tiers of the HDI (excluding China and India in high and medium HDI countries, respectively; asterisks), and for China and India, for both sexes. HDI indicates Human Development Index. *Source*: GLOBOCAN 2024.

potentially greater lung cancer burden among women in the coming decades.[25,28,29]

Globally, nearly 60% of male lung cancers and 32% of female lung cancers in 2022 have been attributed to smoking[30] and thus are preventable through effective tobacco-control policies and regulations. To support countries in implementing measures that reduce tobacco demand, the World Health Organization (WHO) Framework Convention on Tobacco Control introduced the MPOWER package in 2005, which outlines six key policy interventions (monitoring tobacco use; protecting people from tobacco smoke; quitting tobacco; warning about the dangers of tobacco; enforcing tobacco advertising, promotion, and sponsorship bans; and raising taxes on tobacco). According to the 2025 WHO report on the global tobacco epidemic, about 6.1 billion people residing in 155 countries (>75% of the global population) are protected by at least one MPOWER measure.[31] Progress in implementing these interventions remains uneven, however. Tobacco taxation, one of the most effective strategies for reducing tobacco demand, has increased in four WHO regions, yet only 40 countries (25 high-income and 15 middle-income) met the WHO-recommended benchmark of taxes accounting for at least 75% of the retail price in 2024.[31] A recent modeling work highlighted the substantial potential impact of stronger tobacco control in the greater Europe region, estimating that more than 1.6 million lung cancer cases could be prevented over 20 years under the highest level of policy implementation.[32] Furthermore, several countries are adopting or proposing *endgame* strategies aimed at eliminating tobacco use, including reducing nicotine levels in cigarettes and other tobacco products to nonaddictive levels and introducing plain packaging.[33]

Smokeless tobacco (e.g., chewed tobacco, snuff, snus) has been neglected in tobacco control and continues to cause life-threatening diseases, including head and neck cancers. A 2019 study reported that only 41 of 180 countries (23%) mandated pictorial health warnings; 16 (9%) had comprehensive bans on advertising, promotion, and sponsorships; 34 (19%) taxed these products; and just six (3%) regulated their content and emissions of smokeless tobacco products.[34] The rising popularity of noncombusted tobacco products (e.g., nicotine pouch, electronic cigarettes, and heated tobacco products), particularly among youth, poses further challenges in many countries.[35] In response, regulatory efforts are expanding, with 133 countries adopting policies to regulate or ban electronic nicotine delivery systems as of 2024.[31]

As smoking prevalence declines, an increasing proportion of lung cancers occur among individuals without a history of smoking. In the United States and the United Kingdom, they account for about 15%–20% of lung cancer deaths, ranking among the top 10 leading causes of cancer death.[36] The changing risk factor profile of lung cancer may also be reflected in the increasing predominance of adenocarcinoma, which accounted for 46% of all lung cancer diagnoses in men and 60% in women in 2022.[37] Incidence rates of adenocarcinoma exceeded those of squamous cell carcinoma in 170 countries in men and in all 186 countries in women, with the highest incidence burden estimated in Eastern Asia, especially in China.[37] The reasons for the increasing predominance of adenocarcinoma are not fully understood, but increasing air pollution documented in many urban areas in countries with a rapidly transitioning economy may contribute to this shift.[38–41] China alone accounts for nearly 70% of global lung adenocarcinoma cases attributable to ambient particulate matter pollution, underscoring the importance of prioritizing air-quality management programs and expanding access to clean energy to reduce exposure in high-burden settings.[37] Lung cancer in never-smokers further contributes to the elevated risk observed among women in China and among women of Asian descent in the United States, where lung cancer risk is relatively high despite substantially low smoking prevalence in this population.[42–45] Possible

TABLE 3 Incidence and mortality rates (age-standardized rate per 100,000, cumulative risk) for 24 world areas and by sex for all cancers combined in 2024.

	Incidence				Mortality			
	Males		Females		Males		Females	
	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %
UN Population Division								
Eastern Africa	99.8	10.7	128.6	13.3	68.7	7.7	79.8	8.8
Middle Africa	115.2	12.6	123.6	12.8	80.1	9.1	76.7	8.5
Northern Africa	134.1	14.5	134.3	13.8	87.7	10.0	67.6	7.5
Southern Africa	186.8	20.2	149.8	15.3	104.3	11.4	81.2	8.7
Western Africa	103.8	11.3	128.1	13.3	72.8	8.2	78.4	8.6
Caribbean	210.8	21.3	179.9	17.6	121.1	12.4	89.1	9.4
Central America	133.5	13.3	144.3	14.1	69.7	7.0	64.6	6.7
South America	209.6	20.3	192.5	18.4	101.8	10.0	80.2	8.2
Northern America	389.3	36.5	333.1	31.2	90.3	9.2	73.5	7.7
Eastern Asia	227.1	23.0	213.5	20.4	121.0	12.5	63.9	6.5
Eastern Asia (without China)	299.6	29.6	239.9	22.8	111.8	10.9	64.4	6.2
China	211.6	21.8	207.9	20.0	121.3	12.8	63.2	6.6
South-Eastern Asia	144.6	15.5	149.7	15.4	101.2	11.3	80.1	8.8
South Central Asia	111.8	12.1	106.0	11.3	73.6	8.3	58.6	6.6
South Central Asia (without India)	128.7	14.0	111.8	11.8	92.6	10.5	67.1	7.5
India	105.4	11.4	103.5	11.1	66.4	7.5	55.1	6.2
Western Asia	187.1	19.9	154.6	15.7	106.2	11.7	66.7	7.3
Eastern Europe	291.2	30.2	227.7	22.8	157.5	17.4	83.7	9.2
Northern Europe	327.4	31.6	287.5	27.4	109.0	10.7	82.9	8.5
Southern Europe	311.6	30.3	249.4	23.8	119.1	12.2	73.2	7.6
Western Europe	309.6	30.5	269.0	25.9	114.9	11.8	78.7	8.2
Australia/New Zealand	476.8	42.8	396.1	35.6	99.5	9.4	71.4	7.1
Melanesia	186.5	18.0	203.7	20.6	113.9	11.3	108.0	12.1
Micronesia/Polynesia	220.2	24.1	193.4	19.7	107.7	11.0	72.0	7.8

TABLE 3 (Continued)

	Incidence				Mortality			
	Males		Females		Males		Females	
	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %	Age-standardized rate (world)	Cumulative risk: Birth to age 74 years, %
Four-tier HDI								
Very high HDI countries	312.1	30.7	257.8	25.0	113.5	11.7	75.6	7.9
High HDI countries	196.3	20.3	187.6	18.4	115.2	12.1	69.9	7.3
Medium HDI countries	114.5	12.3	113.0	11.9	75.7	8.4	62.7	7.0
Low HDI countries	105.7	11.4	121.7	12.6	74.4	8.4	73.7	8.1
World	209.6	21.4	185.8	18.5	106.2	11.0	72.8	7.6

Abbreviations: HDI, Human Development Index; UN, United Nations.

Source: GLOBOCAN 2024.

explanations include exposure to household burning of solid fuels for heating and cooking, second-hand smoking, air pollution, and environmental exposures (e.g., radon and arsenic).[27,29,46,47] Genetic susceptibility may also play a role because *EGFR* mutations occur in approximately 40%–60% of adenocarcinomas among Asian women without a history of smoking.[43,48] In addition, the rapid uptake of lung cancer screening and increasing diagnosis of early stage tumors in urban China has been suggested to partly explain the sharp increase in adenocarcinoma among young women: a 19-fold rise from 2011 to 2017.[49]

Five-year survival from lung cancer tends to be under 20% in most countries,[50] with relatively modest variation across HDI levels.[51] Because most lung cancer cases are diagnosed at a later stage when curative treatment is not possible, there has been a longstanding focus on screening of high-risk individuals (smokers and former smokers). The US Preventive Services Task Force currently recommends annual lung cancer screening with low-dose computed tomography in those aged 50–80 years with a 20–pack-year smoking history who currently smoke cigarettes or quit within the past 15 years; the 2024 guideline update by the American Cancer Society removed the years since quitting criteria because the influence of age on lung cancer risk among former smokers supersedes that of cessation years.[52] Australia introduced a national lung cancer screening program in July 2025 for smokers and former smokers at high risk[53]), whereas the European Commission is also proposing the introduction of lung cancer screening to its 27 member states through its Europe's Beating Cancer Plan.[54] However, translating mortality benefits demonstrated in randomized controlled trials to the general population has been challenging[55,56] because of high costs and infrastructure requirements; limited awareness; low participation rates, especially among disadvantaged populations; and concerns about false positives, overdiagnosis, and complications.[57] As lung cancer screening becomes more widespread and effective targeted therapies expand in the highest income countries,[58] survival differences by region are likely to widen in the absence of equitable access to such interventions.[59–61]

Female breast cancer

With an estimated 2.4 million new cases and 694,000 deaths, female breast cancer is the second most commonly diagnosed cancer and the fourth leading cause of cancer death in 2024, accounting for 11.8% of all cases and 7.1% of all deaths (Table 1, Figure 3). Among women, breast cancer is the most common cancer for both incidence and mortality worldwide, ranking first for incidence in 164 countries (Figure 4B) and for mortality in 122 countries (Figure 5B). Incidence rates are 60% greater in higher versus lower HDI countries (54.1 vs. 33.6 per 100,000), whereas mortality rates are 26% greater in lower HDI countries (14.7 vs. 11.7 per 100,000; Figure 7B). Incidence rates are elevated in Australia/New Zealand, Northern America, and Northern Europe (90–102 per 100,000) and are approximately three times higher than those in Eastern Africa, South Central Asia, and

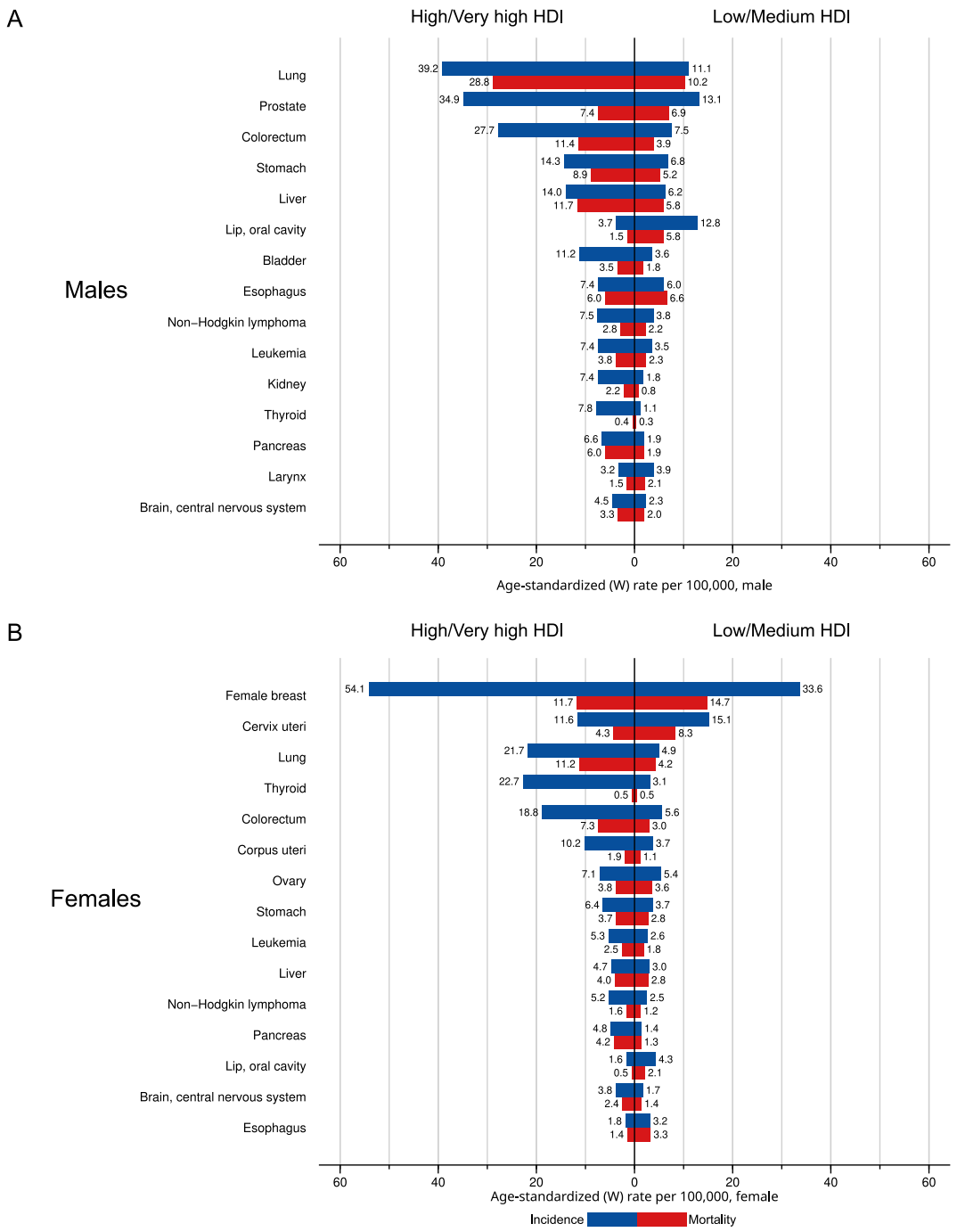

FIGURE 7 Bar charts of incidence and mortality age-standardized rates in 2024 in high/very high HDI countries versus low/medium HDI countries among (A) males and (B) females. The 15 most common world (W) cancers are shown in descending order of the overall age-standardized rate for both sexes combined. HDI indicates Human Development Index. *Source*: GLOBOCAN 2024.

Middle Africa (29–33 per 100,000; Figure 9). Mortality rates range from 20 to 25 per 100,000 in Melanesia, Micronesia/Polynesia, and Western Africa and from six to 10 per 100,000 in Eastern Asia and Central America.

The marked geographic variation in female breast cancer incidence largely reflects differences in risk factor prevalence and screening practices, whereas the disproportionately higher mortality rates in transitioning countries highlight persistent inequities in access to timely diagnosis and effective treatment. Since the early 1980s, countries in Northern America, Oceania, and Europe saw consistent and rapid increases in breast cancer incidence rates,[62,63] which levelled off by the early 2000s, likely because of a decline in the use of combined estrogen–progesterone menopausal hormone-replacement therapy and a possible plateau in screening participation.[64,65] Driven by the impact of early detection and several treatment breakthroughs (e.g., systemic endocrine, chemotherapy, and HER2-targeted therapy), mortality rates have declined substantially in most of these regions since around 1990. In the United States, treatment advances contributed to

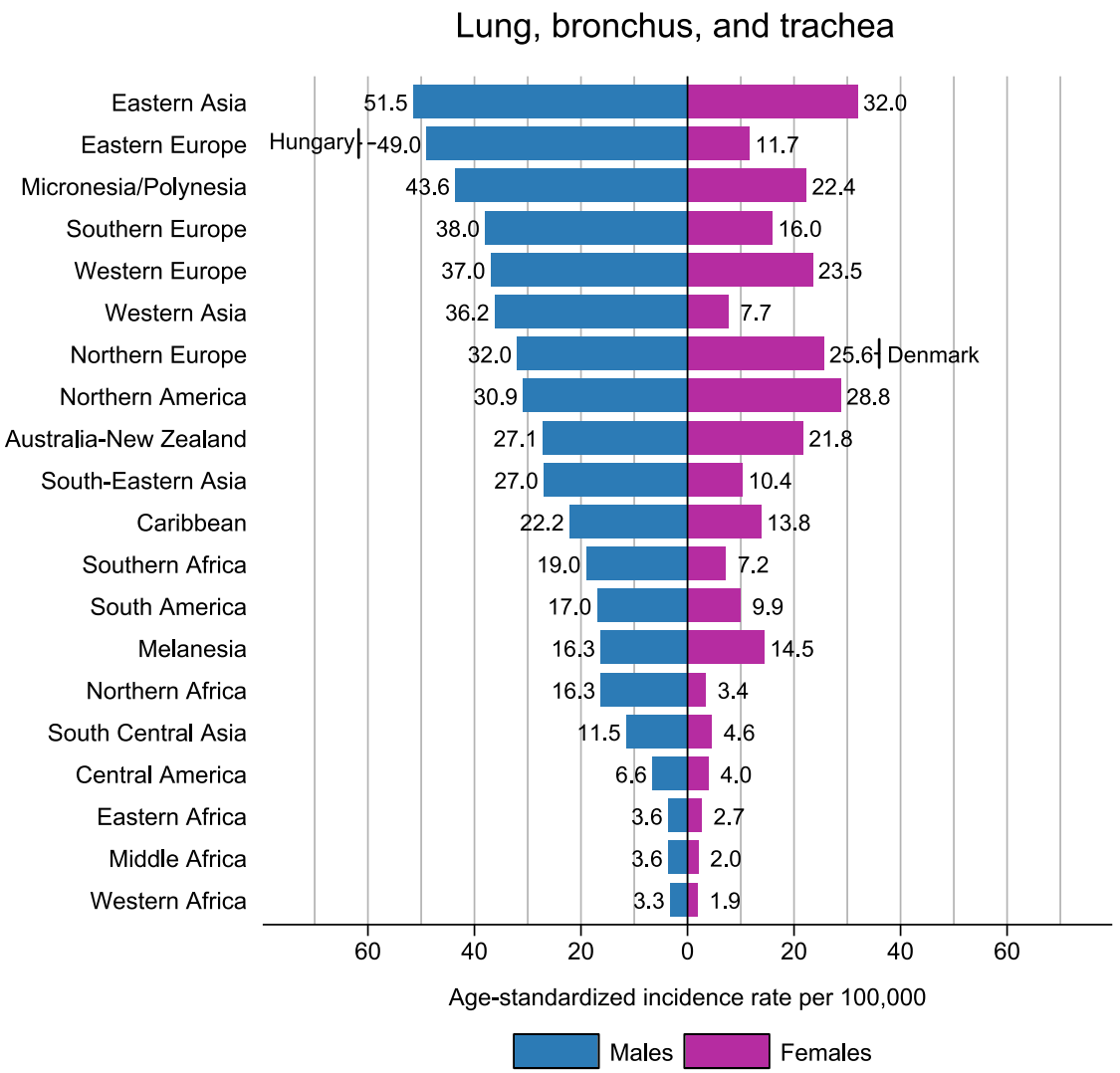

FIGURE 8 Bar chart of region-specific incidence age-standardized rates by sex for lung cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate in males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

75% of the 44% reduction in the death rate since its 1989 peak, with the remainder attributed to mammography screening.[58] More recent trend analysis through 2017 indicates that incidence rates in historically high-risk countries have generally remained stable or increased slowly among both premenopausal and postmenopausal women (e.g., Norway, Canada, England, Australia), although declines have been observed in a few countries, including Germany and Denmark.[66] Mortality rates continued to decline, with the fastest reductions during the latest decade (2%–3% per year) in Denmark, Switzerland, the Netherlands, Norway, Sweden, Australia, the United Kingdom, and New Zealand, whereas increases persist in Romania and Poland.[66]

Although female breast cancer incidence rates remain lower in South America, Africa, and Asia, several countries have experienced some of the most rapid increases in risk over the recent 2 decades, particularly those economies undergoing rapid transition.[67–69] Between 2008 and 2017, incidence rose by 3%–5% per year in South Korea, Japan, Bahrain, Thailand, China, and India, with concurrent increases in mortality in South Korea, Brazil, Mexico, and Uruguay.[66] These trends likely reflect changes in reproductive patterns, including declining parity and delayed childbearing, alongside rising excess body weight, reduced physical activity, and increased alcohol consumption, whereas expanded breast cancer screening likely plays an additional role in some higher-income countries (e.g., South Korea, Japan).[70] In sub-Saharan Africa, the future burden is expected to grow substantially, with breast cancer deaths projected to nearly quadruple from 2024 to 2050, largely driven by rapid population growth and ageing together with ongoing social transitions.

Given its immense disease burden and the availability of effective screening and treatment, breast cancer accounts for more treatable deaths than any other cancer in 2022 (0.2 million; approximately 15% of all treatable deaths).[3] In terms of early detection, the WHO recommends organized, population-based mammography every 2 years for women aged 50–69 years at average risk in well resourced settings.[71] In resource-limited settings, however, mammography screening is often neither feasible or cost-effective, thus efforts focus on timely diagnosis of symptomatic

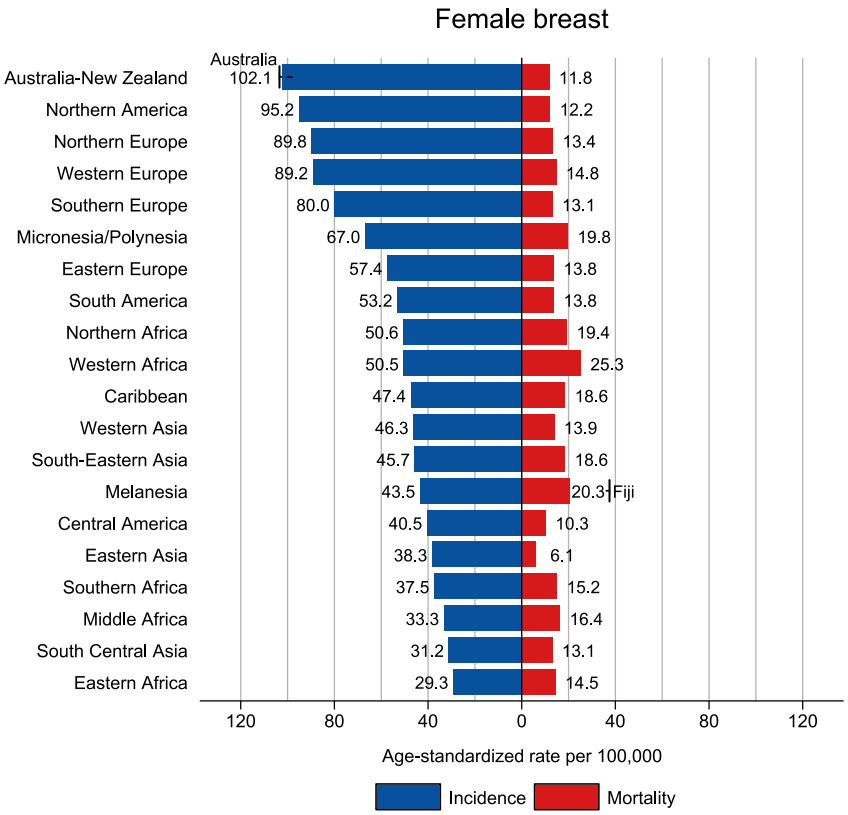

FIGURE 9 Bar chart of region-specific incidence and mortality age-standardized rates for female breast cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate, and the highest national age-standardized rates for incidence and mortality are superimposed. *Source*: GLOBOCAN 2024.

cases. Despite a lower incidence, sub-Saharan Africa bears a disproportionately high share of breast cancer deaths, reflecting the high fatality of a largely treatable disease because of late-stage presentation. In the African Breast Cancer-Disparities in Outcomes study, a hospital-based cohort in Namibia, Nigeria, South Africa, Uganda, and Zambia, 50%–90% of women were diagnosed at stage III or IV (2014–2019) compared with about 30% in the United States (2013–2022).[72,73] In the same study, the proportion of women with nonmetastatic disease who fully completed guideline-recommended treatment was low at 3%–6% in Uganda, Nigeria, and Zambia and at 27% in Namibia.[74] Often compounded by stigma, low awareness, and social barriers that delay care seeking, poor survival in these settings reflects both late-stage diagnosis and limited access to effective treatment. Together with the region's younger population age structure, poor cancer outcomes result in a profound societal and intergenerational impact; a recent study estimated that every 100 maternal deaths leave about 121 children motherless.[75]

In response, the WHO established the Global Breast Cancer Initiative in 2021 to unite stakeholders worldwide around the goal of reducing breast cancer mortality by 2.5% per year, an effort projected to save 2.5 million women's lives by 2040. The initiative's operational approach is built on three key pillars: health promotion and early detection, timely diagnosis, and comprehensive breast cancer management.[76] Evidence indicates that shortening the time from the first contact with a health care provider to diagnosis is a critical window for downstaging.[77] In a 2022 study of women in five hospitals in Ethiopia, 45% of women spent more than 2 months, exceeding the Global Breast Cancer Initiative's benchmark of diagnosis, with delays associated with longer travel times, limited social support, and multiple consultations before pathology evaluation.[78] Strengthening breast cancer awareness and establishing fast-track referral pathways for women with suspicious symptoms are essential to enable earlier diagnosis and improve outcomes in the region.[77]

Globally, about 20% of new breast cancer cases are linked to non-genetic known risk factors, with insufficient physical activity (33%) contributing most, followed by high body mass index (29%), alcohol use (21%), and suboptimal breastfeeding (18%), highlighting the potential of lifestyle changes and breastfeeding promotion to reduce incidence.[30] Maintaining healthy body weight and regular physical activity also improve breast cancer prognosis, making lifestyle promotion increasingly important for the growing population of women with a history of the disease.

Colorectal cancer

Colorectal cancer is the third most commonly diagnosed cancer and the second leading cause of cancer death globally, with more than 2.0 million new cases and 918,000 deaths estimated in 2024 (Table 1). Incidence rates are up to four times greater in higher versus lower

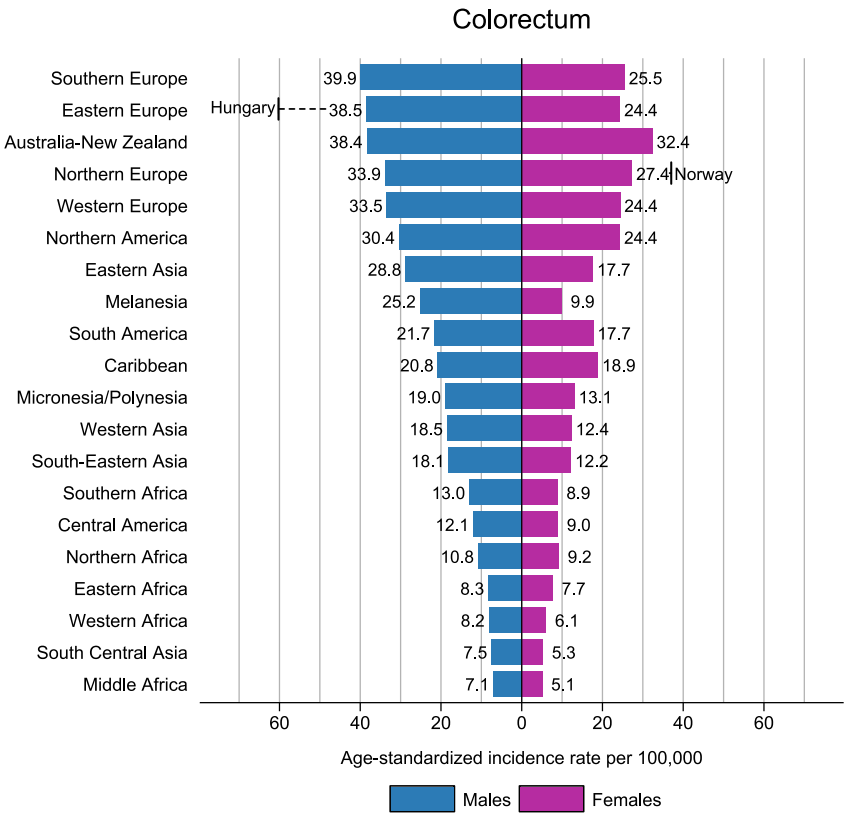

FIGURE 10 Bar charts of region-specific incidence age-standardized rate by sex for colorectal cancer (including anus) in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

HDI countries, reflecting the strong link between colorectal cancer and socioeconomic development (Figure 7). Nevertheless, mortality rates vary less because of higher case fatality in lower HDI countries. By region, colorectal cancer incidence rates vary by five-fold to six-fold in men and women, with the highest rates observed in Europe, Australia/New Zealand, and Northern America (30–40 per 100,000 in men and 24–32 per 100,000 in women; Figure 10) and the lowest in Eastern, Western, and Middle Africa and South-Central Asia (from five to eight per 100,000).

There is strong evidence that tobacco smoking, red or processed meat consumption, alcohol use, and excess body weight increase colorectal cancer risk, whereas higher intake of wholegrains and fiber, dairy consumption, and physical activity reduce risk.[79] Approximately 10% of new colorectal cancer cases in both sexes are attributable to modifiable risk factors worldwide, with smoking the largest contributor (50%), followed by alcohol (32%), high body mass index (10%), and insufficient physical activity (8%) in men.[30] In high-risk settings, the potential of primary prevention may be even greater; a US study incorporating a broader range of established risk factors estimated that up to 55% of colorectal cancer cases could be prevented.[80]

Colorectal cancer incidence and mortality rates have declined for decades in many historically high-risk countries in Europe, Oceania, and Northern America. The declines reflect both population-level improvements in lifestyle factors (e.g., reductions in smoking)[81,82] and widespread screening, which has accelerated progress since the early 2000s.[83–85] Colonoscopy reduces incidence by removing precancerous polyps and further contributes to mortality reduction through the detection of asymptomatic cancer. Screening has been estimated to account for 79% of averted colorectal cancer deaths in the United States, with the remainder attributable to advances in treatment.[58]

However, these gains are being offset by rising colorectal cancer incidence rates among young adults (typically defined as younger than 50 years) that began in the mid-1990s in the United States and a few years later in other countries, including the United Kingdom, Australia, New Zealand, and Canada, with mortality rates also rising in these countries.[86–89] A similar pattern of diverging trends in incidence by age group has been shown in other high-income countries in diverse regions (e.g., France, Germany, Argentina).[86] Part of the observed increase, particularly among young individuals, is likely an artifact of a revision in the behavior code for some carcinoid tumors from borderline malignant (unreported) to malignant, and thus reportable, in the 2013 revision of the WHO International Classification of Diseases for Oncology, third revision.[90–92] In 2016, two thirds of appendiceal cancers in individuals younger than 50 years in the United States were carcinoid tumors,[93] which is one reason many studies of early onset colorectal cancer exclude appendiceal cancer from the analysis. Multiple studies that exclude appendiceal cancers demonstrate a consistent rise in colorectal cancer incidence among young adults predating the classification change that is accompanied

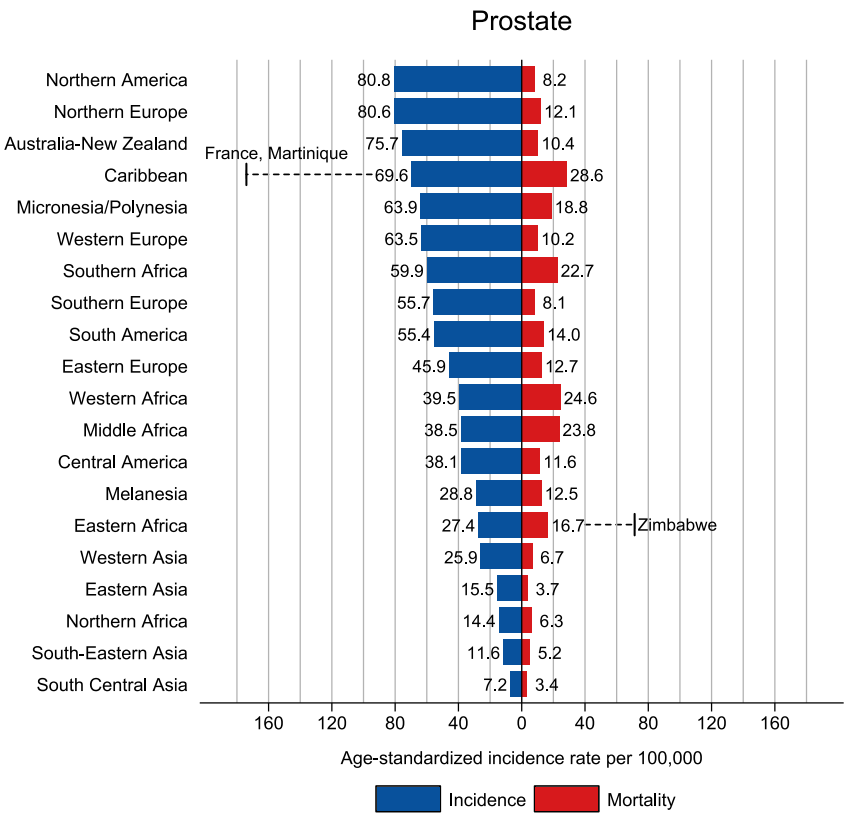

FIGURE 11 Bar chart of region-specific incidence and mortality age-standardized rates for prostate cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate, and the highest national age-standardized rates for incidence and mortality are superimposed. *Source*: GLOBOCAN 2024.

by increasing mortality.[87,94–97] The findings support a genuine increase in colorectal cancer burden among young individuals that is unlikely to be explained solely by changing disease classification. Several studies have reported that these trends are the result of a strong birth-cohort effect associated with increased risk of colorectal cancer among subsequent generations born after the second half of the 20th century, implicating behavioral and/or environmental exposures that remain unclear.[87–89,94,95] Studies of early onset disease are limited but have linked several factors to increased risk of colorectal cancer or its precursor, including prolonged sitting, poor diet quality, ultraprocessed foods, alcohol consumption, excess body weight, diabetes, and metabolic syndrome,[98–105] largely implicating metabolic health-related disruptions as a key underlying mechanism.[89,106,107] A large, tissue-based genomic study of nearly 1000 samples from 11 countries reported enriched mutational signatures (SBS88 and ID18) linked to colibactin, a genotoxin produced by *Escherichia coli* and related microorganisms, in early onset colorectal cancer, supporting a potential role of early life microbial exposures in shaping birth-cohort risk.[108]

To address the elevated risk of colorectal cancer among younger adults, the recommended age to begin screening was lowered from 50 to 45 years in 2018 by the American Cancer Society and in 2021 by the US Preventive Services Task Force.[109] Screening uptake among adults aged 45–49 years increased from 20% in 2019 to 37% in 2024[110] and was accompanied by a 22% annual rise in the diagnosis of local-stage disease.[111] However, three in four diagnoses before age 50 years are advanced-stage disease, and colorectal cancer became the leading cause of cancer death among individuals younger than 50 years in the United States in 2023, surpassing breast cancer for the first time.[96] Expanding screening to younger ages remains controversial, even in high-resource settings, given the low absolute incidence in younger populations and concerns about diverting screening capacity from older or higher-risk groups who derive greater benefit, albeit fewer life-years gained.[112] Reflecting setting-specific considerations, Australia lowered the starting age for its National Bowel Cancer Screening Program from 50 to 45 years in 2024,[113] whereas the European Commission Initiative on Colorectal Cancer suggested no screening of adults younger than 50 years as of 2025 (conditional, very low certainty of the evidence).[114]

Colorectal cancer incidence rates in Japan quadrupled between 1970 and 1990 to a level not dissimilar to US Whites,[115] paralleling postwar economic development and changing lifestyle. Today, there are similar rises in colorectal cancer incidence rates in many transitioning countries.[116] Particularly rapid increases have been observed in parts of Latin America and the Caribbean (e.g., Chile, Costa Rica, Ecuador) and across several African countries.[86,117] A recent analysis of 12 population-based registries in 11 countries assessing trends up to 2020 documented consistent increases across all regions of Africa, with the steepest rises, approximately 6% per year, reported in Brazzaville (Congo) and Ibadan (Nigeria).[117]

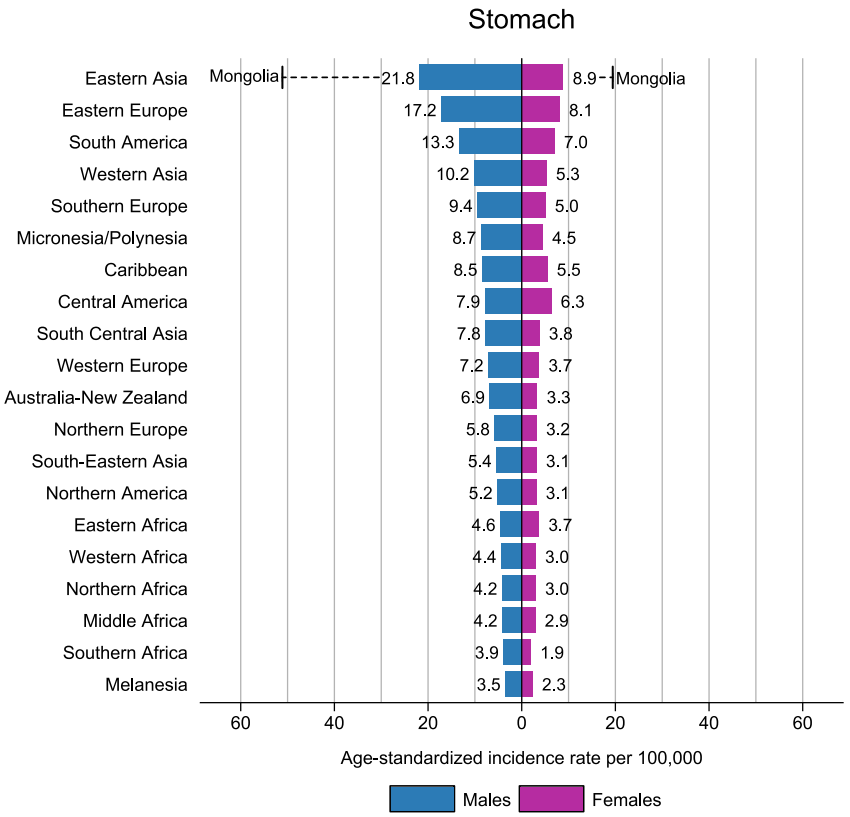

FIGURE 12 Bar chart of region-specific incidence age-standardized rates by sex for stomach cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

Survival, however, remains poor in many of these settings because of late-stage presentation and low receipt of guideline-concordant care; 5-year relative survival among cases diagnosed in low HDI countries in Africa was 39%,[118] which was substantially poorer compared with about 70% in Australia during the same period.[119] Rapidly increasing incidence and poor survival are likely to increase the death toll,[120] highlighting an urgent need to increase disease awareness and improve access to timely diagnosis and effective treatment in these settings. Population-based screening is recommended only in settings with adequate capacity to ensure diagnostic follow-up and treatment; in many low/limited-resource settings, increasing awareness, early diagnosis, and broader health system strengthening remain higher priorities.[116,121]

Prostate cancer

Prostate cancer is the second most frequent cancer and the fourth leading cause of cancer death in men worldwide, with about 1.5 million new cases and 420,000 deaths estimated in 2024 (Table 1, Figure 3). It is the most frequently diagnosed cancer in men in nearly two thirds (123 of 186) of the world's countries (Figure 4A). Incidence rates are almost three times higher in transitioned than in transitioning countries (34.9 vs. 13.1 per 100,000; Figure 7) and vary more than 11-fold across regions, with the highest rates observed in Northern America, Northern Europe, Australia/New Zealand, and the Caribbean (≥70 per 100,000) (Figure 11). In contrast, mortality differs only modestly between countries with higher and lower HDI (7.4 vs. 6.9 per 100,000), and rates are disproportionately higher in the Caribbean, sub-Saharan Africa, and Micronesia/Polynesia. Prostate cancer is the leading cause of cancer death among men in 68 countries, including many in the Caribbean and sub-Saharan Africa, as well as several in Central and South America (e.g., Colombia, Peru, Venezuela, and Chile) and Sweden in Europe (Figure 5A). The lowest incidence and mortality rates are found in South Central Asia, South-Eastern Asia, Eastern Asia, and Northern Africa (Figure 11).

Despite being one of the most commonly diagnosed cancers and a leading cause of cancer death in men, few modifiable risk factors have been firmly established for prostate cancer. Advancing age, family history, and certain inherited genetic mutations remain the only well stablished risk factors, whereas smoking, excess body weight, and some dietary factors have been suggested but remain inconclusive.[122] The higher incidence rates observed in the Caribbean and sub-Saharan Africa may partly reflect greater genetic susceptibility because multiple genetic variants associated with disease risk are more common among men with Western African ancestry.[123]

Much of the international variations in prostate cancer incidence patterns and trends reflects difference in diagnostic practices at the national level.[124] In Northern America, parts of Northern Europe, and Australia, incidence rates rose sharply in the late-1980s and early-

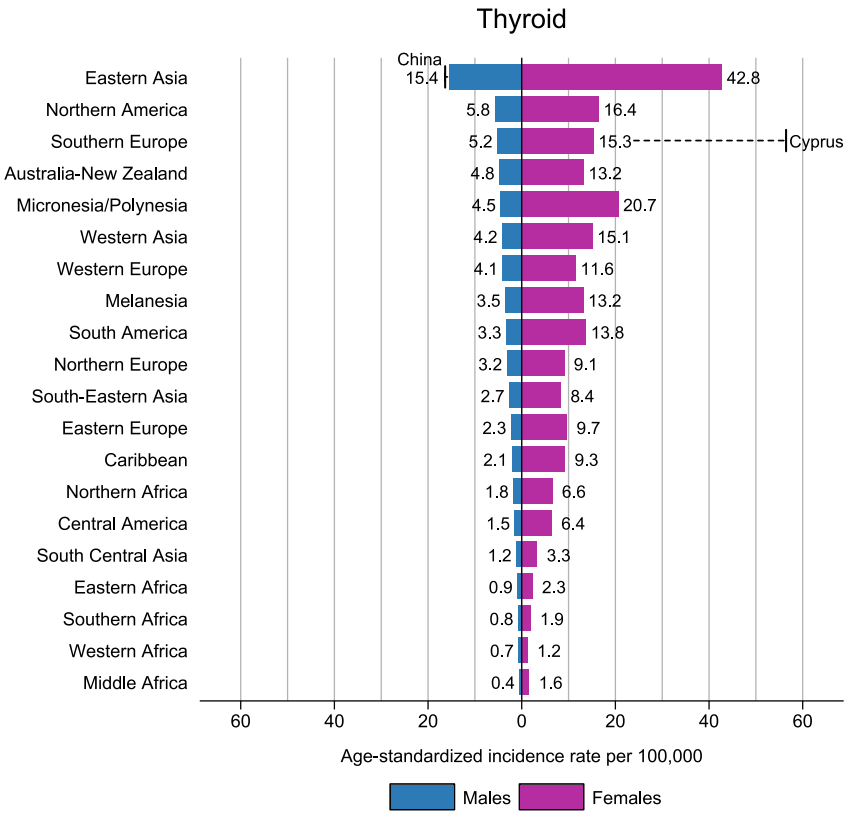

FIGURE 13 Bar chart of region-specific incidence age-standardized rates by sex for thyroid cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

1990s, coinciding with the widespread introduction of prostate-specific antigen (PSA) testing.[125] These increases were followed by rapid declines, initially because of a depletion in prevalent cases and later reflecting reduced PSA testing after changes in screening guidelines.[125–132] More recent declines in some high-income countries may also partly reflect greater use of multiparametric magnetic resonance imaging, the integration of which is associated with a reduction in unnecessary biopsies and overdiagnosis.[133]

After about 2 decades of decline, prostate cancer incidence in the United States increased by about 3% per year during 2014–2019, with steeper rises for regional and distant-stage disease (4.6%–4.8% annually) than for localized disease.[134] The increase in advanced-stage diagnoses is thought to reflect, in part, reduced PSA testing,[135] although reasons for the increases observed across men of all ages remain unclear.[134] The US Preventive Services Task Force has since revised its recommendation to informed decision for men aged 55–69 whereby individualized decisions about PSA screening can be made after discussing potential benefits and harms with health care providers.[136] Trends in incidence in greater Europe, Southern and Central America, and much of Asia have been more modest, reflecting later and less widespread adoption of PSA testing.[124] In contrast, incidence rates continue to increase in China, India, the Baltic countries, and Eastern Europe.[124] Rapid increases have also been reported in parts of sub-Saharan Africa (1995–2018),[137] likely because of increased awareness and improved access to diagnostic services, including PSA testing and transurethral procedures.[137]

In contrast to incidence rates, mortality rates have declined in most high-income countries since the mid-1990s, including those in Northern America, Oceania, and Northern and Western Europe,[124] likely reflecting earlier detection and advancements in effective treatment.[138,139] During the same period, mortality rates increased in many countries in Central and Eastern Europe, Asia, and Africa[125] and continued until recently in some countries,[140] partly because of rising incidence and limited access to PSA testing and curative treatment. More recent trends show continued declines in transitioned countries across much of Europe outside of the Baltic and Eastern Europe countries.[140,141] In the United States, the pace of decline has slowed from over 3% per year during the 1990s to 0.6% per year over the past decade, partly reflecting a steep increase in advanced-stage diseases.[134]

Stomach cancer

Stomach cancer remains the fifth most common cancer and cancer death worldwide, with an estimated 980,000 new cases and 642,000 deaths in 2024 (Table 1, Figure 3). Incidence rates vary four-fold to six-fold across regions, with the highest rates in Eastern

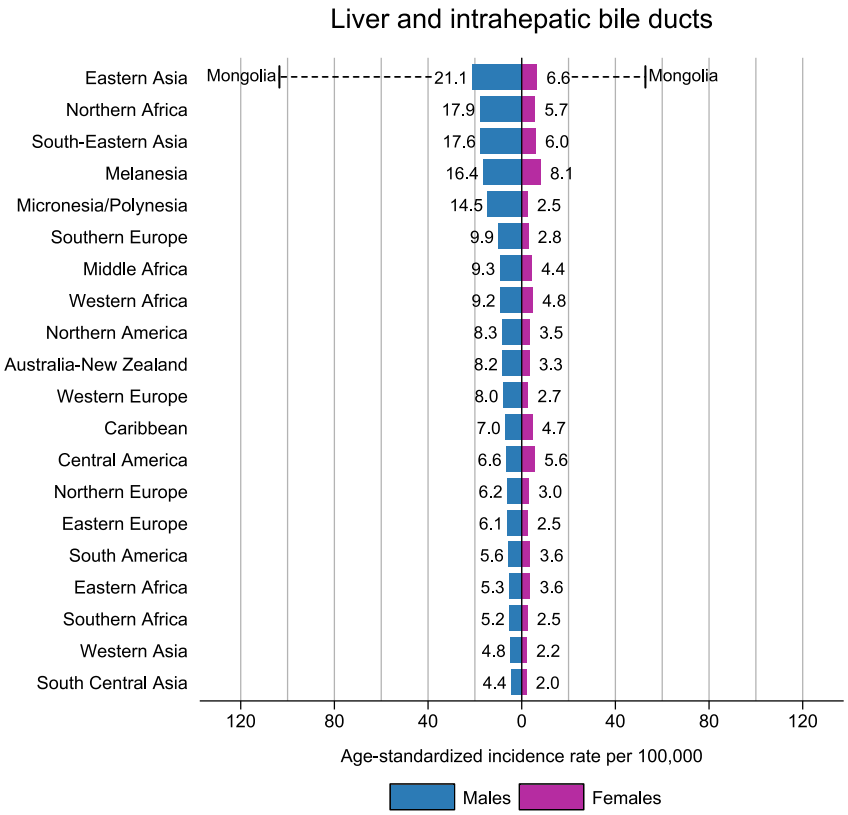

FIGURE 14 Bar chart of region-specific incidence age-standardized rates by sex for liver cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

Asia—ranking highest in Mongolia for both sexes—followed by Eastern Europe and South America, and the lowest in Melanesia, Africa, and Northern America (Figure 12). Stomach cancer is the most commonly diagnosed cancer and the leading cause of cancer death among men in six countries (Afghanistan, Bhutan, Kyrgyzstan, Mali, Nepal, and Tajikistan), and it is also the leading cause of cancer death among women in Ecuador, Nepal, Peru, and Tajikistan (Figures 4 and 5).

The large geographic variations in stomach cancer rates mainly reflect differences in the prevalence of chronic *Helicobacter pylori* infection—the principal cause of gastric cancer—which accounts for approximately 90% of noncardia (lower stomach) gastric cancer cases worldwide.[142,143] Noncardia gastric cancer is the predominant subtype in high-incidence countries in Eastern Asia and South America, with exceptions in Iran and in some regions of China. Chronic *H. pylori* infection is highly prevalent in these regions, infecting up to 79% of adults in Mongolia (2015–2022), compared with a global prevalence of about 44%.[142–144] Nonetheless, only a small fraction of infected individuals develop cancer, likely because of differences in bacterial strain virulence, host genetic susceptibility, timing and duration of infection, and other factors that may synergize with *H. pylori* to promote carcinogenesis, such as smoking and micronutrient deficiencies.[145,146] Additional risk factors for noncardia gastric cancer include alcohol consumption, tobacco smoking, high-salt or pickled foods, low fruit and vegetable intake, and nitrosamine.[79] In contrast, cardia (upper stomach below the esophageal-gastric junction) gastric cancer predominates in historically low-risk countries, such as in the United States and the United Kingdom.[147] Its risk factors resemble those of esophageal adenocarcinoma (EAC), with excess body weight and gastroesophageal reflux disease as major contributors, whereas *H. pylori* infection accounts for 20% of cardia cases globally but as high as 62% of cases in China.[148,149] Globally, nearly 80% of all gastric cancer cases are linked to modifiable risk factors.[30] In the United States, about 71% are attributable to modifiable risk factors, including *H. pylori* infection (41%), smoking (22%), physical inactivity (18%), and excess body weight (17%).[80]

Incidence and mortality rates of stomach cancer have substantially decreased worldwide over the past century and continue to decline in the 21st century,[82] reflecting decreases in *H. pylori* infection, associated with economic development, as well as declines in smoking and intake of salt-preserved foods.[144,150,151] These favorable trends are driven primarily by decreases in noncardia gastric cancer, whereas cardia gastric cancer has shown stable or slowly increasing trends, especially in historically low-risk countries (e.g., the United Kingdom, the United States, Sweden, and the Netherlands).[152–156] Despite overall declines, a projection from a 2025 study for cohorts born in 2008–2017 suggests that 58% of 15.6 million future cases of gastric cancer will occur in historically

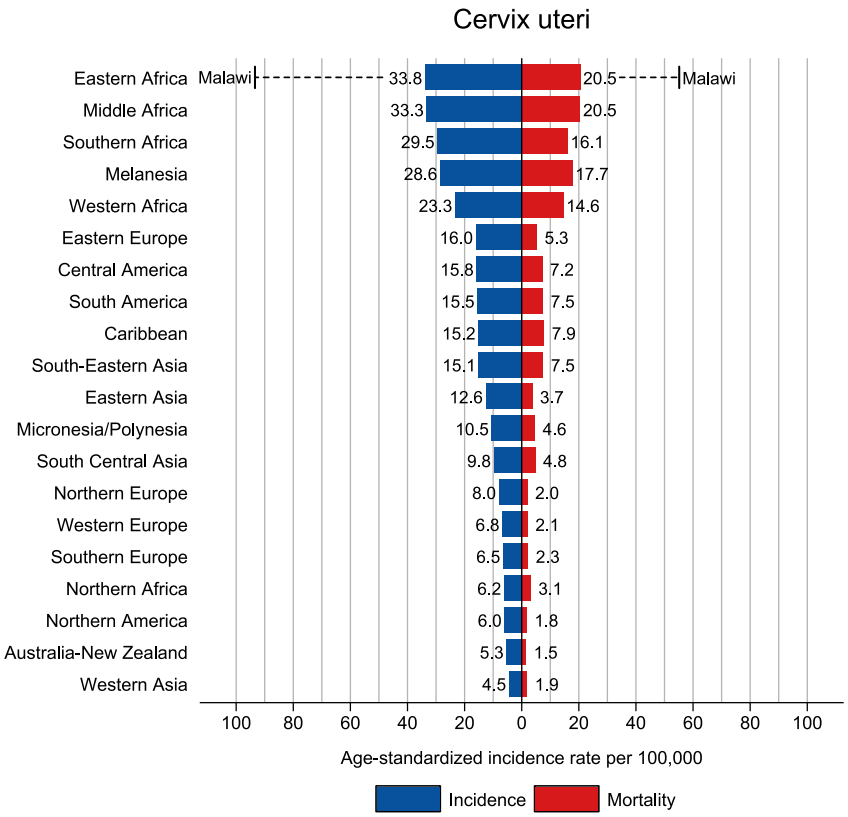

FIGURE 15 Bar chart of region-specific incidence and mortality age-standardized rates for cervical cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate, and the highest national age-standardized rates for incidence and mortality are superimposed. *Source*: GLOBOCAN 2024.

high-incidence regions and 42% in lower incidence regions, largely reflecting demographic changes.[157] In particular, the burden in sub-Saharan Africa is projected to rise sharply, with case numbers up to six times those estimated for 2022.[157] Importantly, an estimated 76% of all future cases are caused by *H. pylori* infection, for which eradication therapy has consistently been shown to significantly reduce the risk of atrophic gastritis, gastric intestinal metaplasia, and gastric cancer in infected individuals.[158]

In line with the evidence, the WHO/IARC Working Group has highlighted population-based *H. pylori* screen-and-treat approach (screening and eradication) as a feasible primary prevention strategy in high-incidence settings, considering local disease burden, screening methods and treatment regimens, antibiotic stewardship, outcome measures, and cost-effectiveness.[159,160] For secondary prevention, upper gastrointestinal endoscopy-based screening has shown to be cost-effective in high-incidence countries or high-risk subpopulations (e.g., non-Hispanic Black, Hispanic, and Asian populations living in the United States).[161–163] Japan and South Korea have both implemented nationwide organized screening for gastric cancer in 1983 and 1999, respectively.[159,164] In South Korea, screening was associated with a 41% mortality reduction 15 years after implementation,[165] primarily through treatment of precancerous lesions and stage downshifting: the proportion of early stage gastric cancers rose from 39% in 2001 to 73% in 2016,[166] and the 5-year net survival increased from 49% in 2000 to 77% during 2013–2019,[50,167] which is substantially higher than the 38% observed in the United States from 2015 to 2021.[168]

Thyroid cancer

With close to 959,000 cases worldwide in 2024, thyroid cancer ranks as the sixth most commonly diagnosed cancer overall and the fourth in women (Table 1, Figure 3). Incidence rates are about seven times higher in transitioned versus transitioning countries for both sexes (Figure 7). Across regions, incidence rates are three to four times higher in women than in men and vary markedly within each sex, ranging from 39-fold in men and 36-fold in women (Figure 13). The highest rates occur in Eastern Asia (15.4 per 100,000 men and 42.8 per 100,000 women), followed by women in Micronesia/Polynesia, Northern America, and Southern Europe; whereas the lowest rates are observed in men in sub-Saharan Africa and South Central Asia (0.4–0.9 per 100,000). With an estimated 48,000 deaths worldwide, thyroid cancer ranks 25th in mortality, substantially lower than its incidence ranking, and mortality rates vary little by sex, region, or HDI level (0.3–0.5 per 100,000) (Figure 7).

Thyroid cancer incidence rates have increased substantially over the last 4 decades in many countries, with few exceptions (e.g., Uganda, India, the Philippines, and Thailand), whereas mortality rates have remained largely stable or declined (e.g., Austria and

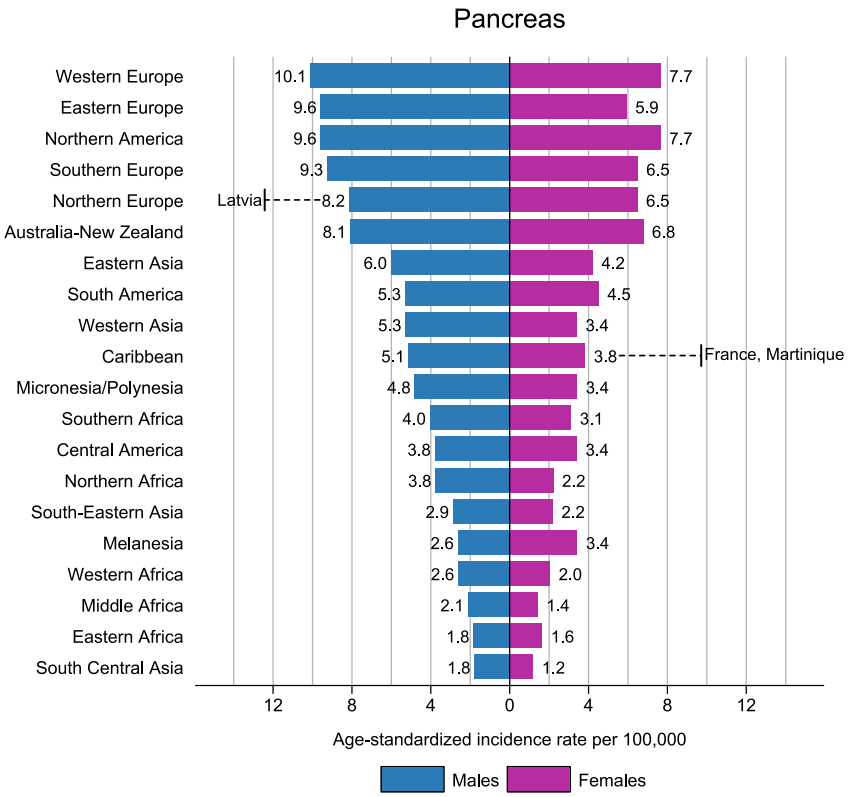

FIGURE 16 Bar chart of region-specific incidence age-standardized rates by sex for pancreatic cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

Switzerland).[169] Papillary thyroid carcinoma was the main contributor to the overall increase in incidence rates during the last decades.[165] The steep rises in incidence, particularly during the 2000s, has been largely attributed to the increasing use of ultrasonography and other highly sensitive diagnostic technologies that detect small, clinically indolent tumors.[170,171] Incidence continues to rise in many countries (e.g., Cyprus, Ecuador, China, Turkey, and Costa Rica), suggesting that overdiagnosis remains substantial and has rapidly expanded to transitioning countries.[169] Recent evidence suggests that overdiagnosis is likely a major driver of the sharp increases in thyroid cancer incidence among younger populations since the early 2000s.[172] Overall, an estimated 76% of thyroid cancer cases diagnosed during 2013–2017 were attributed to overdiagnosis, ranging from none (e.g., Uganda, Zimbabwe, and Trinidad and Tobago) to more than 85% among women in Cyprus, China, South Korea, and Turkey.[169] Notably, the earlier rapid increase has been followed by declines since around 2010 in several countries, including South Korea, the United States, Canada, Israel, France, Italy, Austria, and Ireland.[169] The declines coincide with growing recognition of substantial overdiagnosis and overtreatment of indolent tumors and the escalating cost associated with treatments of overdiagnosed cases that prompted revisions to national and international clinical guidelines.[12,173–175] Contemporary guidelines recommend against routine screening in asymptomatic individuals and support active surveillance for low-risk papillary thyroid microcarcinoma (<1 cm).[176,177] Surveys of clinicians in the United States showed increasing acceptance of observation over intervention for appropriately selected patients, accompanied by more refined risk stratification to minimize unnecessary treatment.[178,179]

Efforts to reduce overdiagnosis represent an important component of lowering the incidence burden of thyroid cancer and associated costs. Opportunities for primary prevention remain limited because few risk factors are well established, including ionizing radiation, benign thyroid diseases, and excess body weight.[180] Therefore, avoiding unnecessary ionizing radiation exposure (e.g., x-rays, gamma-radiation), particularly during childhood and adolescence, and maintaining a healthy body weight are key preventive measures.

Liver cancer

Liver cancer remains highly fatal, with an estimated 843,000 new cases and 732,000 deaths in 2024, ranking seventh in incidence but third in mortality worldwide (Table 1, Figure 3). Incidence and mortality rates are about three times higher in men than in women (Table 2), making it the third leading cause of cancer death among men (Figure 3). Incidence rates vary about five-fold across regions in men, with the highest incidence rates in Eastern Asia, Northern Africa, South-Eastern Asia, and Melanesia (16–21 per 100,000 men) and the lowest in South Central Asia, Western Asia, several African regions, and South America

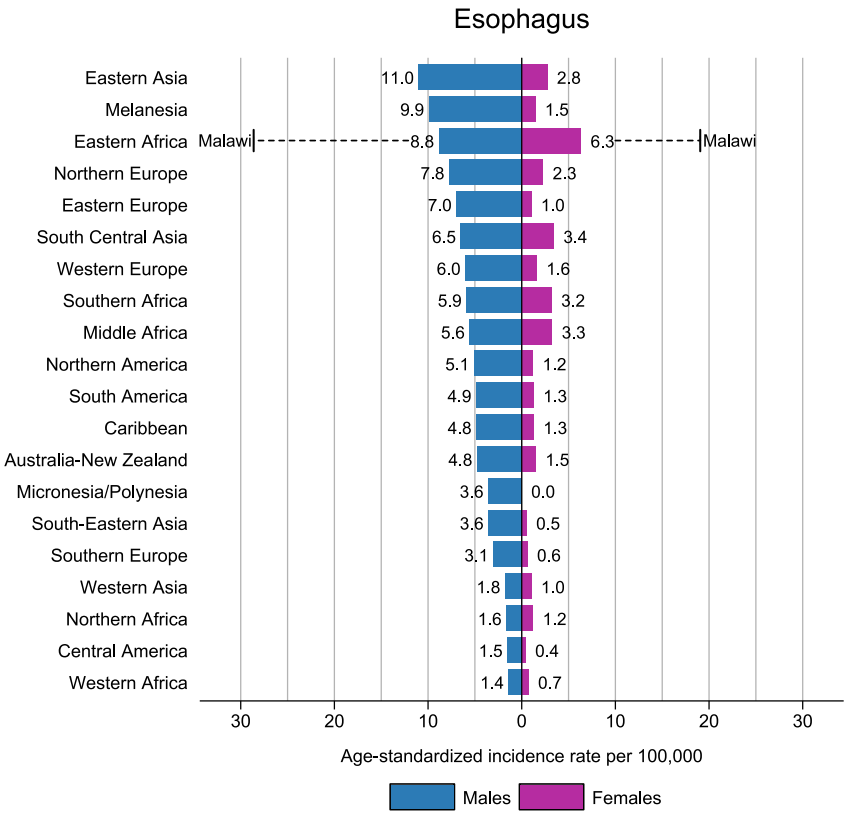

FIGURE 17 Bar chart of region-specific incidence age-standardized rates by sex for esophageal cancer in 2024. Rates are shown in descending order of the world (W) age-standardized rate among males, and the highest national rates among males and females are superimposed. *Source*: GLOBOCAN 2024.

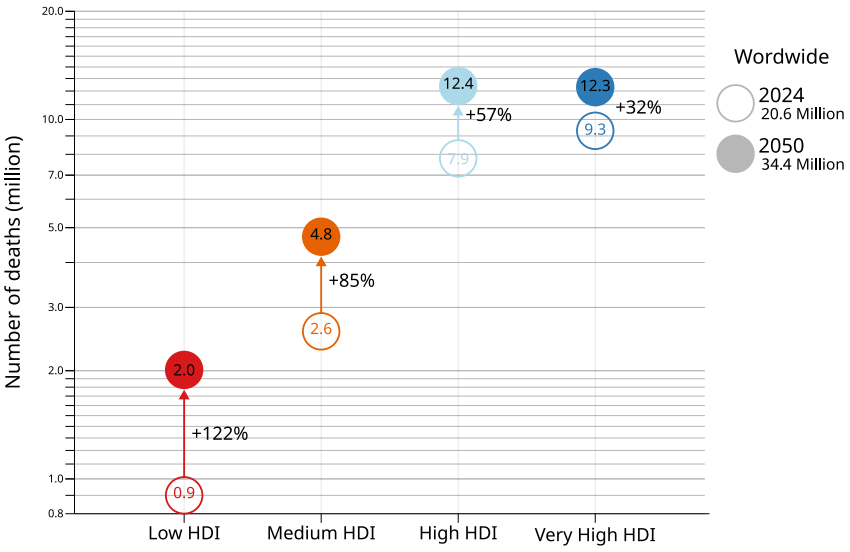

FIGURE 18 Projected number of new cases for all cancers combined (including nonmelanoma skin cancer except basal cell carcinoma) in 2050 according to the four-tier Human Development Index (HDI). The overall predicted number of cases worldwide in 2050 does not equal the sum of the predicted numbers across the four HDI tiers (https://gco.iarc.who.int/tomorrow/en/about#how-to). *Source*: GLOBOCAN 2024.

(4.4–5.6 per 100,000 men; Figure 14). Among women, rates vary more than four-fold, with the highest in Melanesia, Eastern Asia, South-Eastern Asia, Northern Africa, and Central America (5.6–8.1 per 100,000 women). Liver cancer is the leading cause of cancer death in several geographically diverse countries in both sexes in Mongolia, Guatemala, and the Lao People's Democratic Republic, and in men in an additional 12 countries across South-Eastern Asia (Cambodia, Thailand), Melanesia (Solomon Islands, Fiji, Vanuatu), and Northern

and Western Africa (Egypt, Senegal, The Gambia, Guinea-Bissau, Ghana, Niger, Burkina Faso; Figure 5).

Primary liver cancer comprises mainly hepatocellular carcinoma (HCC; 75%–85% of cases) and intrahepatic cholangiocarcinoma (10%–15%). Chronic hepatitis B virus (HBV) or hepatitis C virus (HCV) infections account for 21%–55% of HCC globally,[142,181] whereas other risk factors include aflatoxin B_1 exposure, alcohol consumption, smoking, excess body weight, type 2 diabetes, and metabolic dysfunction-associated steatotic liver disease.[182] The relative importance of these risk factors varies by region and over time. For example, in most high-risk HCC areas (e.g., China and Eastern Africa), chronic HBV infection and aflatoxin exposure predominate, whereas HCV infection is the main contributor in a diverse set of countries, including Egypt, Italy, and Japan. In Mongolia, HBV and HCV viruses, co-infections of HBV carriers with HCV or hepatitis delta virus, and alcohol consumption collectively drive one of the world's highest national rates in men and women. Aflatoxin exposure remains a continuing public health concern in some countries (e.g., Guatemala),[183] where corn is a dietary staple and socioeconomic conditions are limited. There is a growing concern that climate change may further increase aflatoxin contamination even in high-income settings.[184] Major risk factors for intrahepatic cholangiocarcinoma are also region-specific, including liver flukes (e.g., *Opisthorchis viverrini* endemic in the northeast region of Thailand)[185] and metabolic conditions (including excess body weight, diabetes, nonalcoholic fatty liver disease), alcohol consumption, smoking, and viral hepatitis.[186–189]

Liver cancer incidence and mortality rates have decreased steadily in many high-risk countries in East Asia (e.g., China, Taiwan, Japan, and South Korea) since the late 20th century.[82,190,191] Earlier declines are largely attributable to reductions in aflatoxin exposure, with further reductions after the introduction of HBV vaccination programs in the early 1980s.[192] In contrast, incidence has increased in historically low-risk countries across Europe, Northern America, Australia/New Zealand, and South America, alongside rising metabolic risk factors.[190,193] More recent data suggest that HCC incidence rates may have peaked in the United States and the United Kingdom since the mid-2010s, coinciding with the introduction of direct-acting antivirals for HCV treatments, whereas intrahepatic cholangiocarcinoma incidence has continued to increase, likely reflecting the emergence of metabolic conditions.[187–189]

Although nonviral risk factors are becoming increasingly important and should be addressed through health promotion strategies, elimination of viral hepatitis remains the cornerstone of primary prevention of liver cancer. Globally, in 2022, an estimated 254 million people were living with HBV infection, and 50 million were living with HCV infection, with men accounting for 58% of all infections and children for 12%.[194] That year, 1.1 million people died from viral hepatitis, and 2.2 new infections occurred (1.2 million HBV and 1 million HCV), disproportionately affecting individuals exposed to unsafe blood supplies or medical procedures, infants vulnerable to mother-to-child transmission, indigenous populations, migrant populations from high-prevalence regions, and specific populations, such as people who inject drugs, incarcerated individuals, sex workers, and men who have sex with men.[194] This pattern underscores the importance of targeted, culturally tailored strategies for effective diagnosis and treatment. The WHO's global hepatitis strategy aims to reduce new infections by 90% and related deaths by 65% by 2030, potentially preventing 15 million liver cancer cases. As of 2022, the HBV vaccine had been introduced nationally in 190 countries, with 84% global coverage for the three-dose series,[195] yet the coverage for birth dose within 24 hours remains low at 45%, ranging from 80% in the WHO Western Pacific region to 18% in the WHO African region, where 65% of new HBV infections occur.[195,196] The WHO target of reducing HBV infection among children younger than 5 years to <1% by 2020 has been achieved in all regions except Africa.[196]

More than 30% of new HCV infections occurred in the Eastern Mediterranean, the region with the highest prevalence.[196] Despite the availability of curative therapy for HCV and effective treatment that reduces mortality from HBV, most infections remain undiagnosed and untreated.[196] Globally, in 2019, diagnostic coverage was only 21% for HCV and 10% for HBV, with treatment coverage at 13% and 2%, respectively.[196] Stronger political commitment and sustained financing are critical in reducing the burden of hepatitis and related diseases[197] through the scale-up of affordable diagnostics and antivirals, decentralization of care, and the prioritization of screening and linkage to care among high-risk populations. Egypt provides an exemplary case study in which some of those challenges were overcome, demonstrating that large-scale national screening and the rapid scale-up of affordable antiviral treatment can substantially reduce the burden of HCV.[198,199]

Cervical cancer

With an estimated 604,000 new cases and 280,000 deaths worldwide in 2024, cervical cancer remains the fifth most commonly diagnosed cancer and the fourth leading cause of cancer death among women (Table 1, Figure 3). This preventable cancer is the leading cause of cancer death in women in 26 countries (Figure 5), primarily in sub-Saharan Africa (e.g., Democratic Republic of Congo, Tanzania, and Uganda) and also in parts of South and Central America (Bolivia, Belize, El Salvador), Melanesia (Solomon Islands, Vanuatu), and South-Eastern Asia (Bhutan). Incidence rates vary by approximately eight-fold across regions, with the highest rates in sub-Saharan Africa and Melanesia and the lowest in Western Asia, Australia/New Zealand, and Northern America (Figure 15). Mortality patterns broadly mirror incidence. Rates remain higher in transitioning countries than in transitioned countries (incidence, 15.1 vs. 11.6 per 100,000; mortality, 8.3 vs. 4.3 per 100,000; Figure 7)

As a disease strongly linked to low socioeconomic status, the marked geographic and socioeconomic disparities in cervical cancer rates largely reflect inequities in access to screening and treatment as well as differences in the prevalence of persistent human

papillomavirus (HPV) infection and cofactors such as human immunodeficiency virus (HIV) infection.[200] In many high-income countries in Northern America and Europe, cervical cancer incidence and mortality steadily declined during the latter one half of the 20th century, largely because of the introduction of Papanicolaou cytology-based screening from the late 1950s to the 1970s, in addition to other factors (e.g., declines in parity), making the disease now relatively uncommon in these regions.[200,201] Although these declines have been most notable for women older than 30 years, for whom screening is highly effective, some countries have seen moderations of the declines over the last 10–20 years,[202–204] which are thought to result from the lower sensitivity of cytology screening in detecting adenocarcinomas combined with changes in sexual behaviors.[200,205,206] Although incidence rates remain relatively high, declines have also been observed in many Asian and Latin American countries despite limited screening, possibly attributable to decreasing parity and safer sexual behaviors.[207] Japan and China are among the few countries where cervical cancer incidence has increased, based on a study examining trends through 2021, which appear to reflect low screening uptake and shifts in sexual mores, such as earlier sexual debut and more partners.[204,208,209] Cervical cancer incidence remains highest and continues to increase in many sub-Saharan African countries: Blantyre (Malawi) recorded the fastest rise (7.9% annually), with significant increases also observed in Eastern Cape (South Africa) and Eldoret (Kenya).[210,211] Incidence rates increased by 2.2% annually in Kampala (Uganda) until 2006 before declining slightly, whereas Mauritius was the only registry in the region showing a steady 2.5% annual decrease.[210,211]

HPV is a necessary but not sufficient cause of cervical cancer, with 13 of 118 known HPV types classified as group 1 carcinogens by the IARC Monographs.[212] Other important cofactors include sexually transmitted infections (HIV and *Chlamydia trachomatis*), smoking, high parity, immunosuppressive drug use (e.g., transplantation recipients), and low intake of certain micronutrients (including carotenoids and vitamin E).[200] Women living with HIV face an increased risk of cervical cancer and account for 6% of all women newly diagnosed with cervical cancer globally, with the highest proportions in Southern Africa (64%) and Eastern Africa (27%).[211] Overall, 91% of cervical cancer cases are attributable to infections, with the remainder linked to smoking.[30]

The WHO launched the CCEI (Cervical Cancer Elimination Initiative) in 2020, aiming to eliminate cervical cancer as a public health problem this century.[213] The strategy centers on the *90–70–90* targets for 2030: 90% HPV vaccination coverage among girls by age 15 years, 70% screening of women with a high-performance test at ages 35 and 45 years, and 90% treatment of women with precancerous lesions or invasive cancer, with the goal of reducing incidence below four per 100,000 women.[213] Despite these ambitious targets, coverage remains far from sufficient: in 2024, only about 31% of girls had received at least one dose of HPV vaccine globally[195]; and as of 2019, roughly one third of women aged 30–49 years had ever been screened,[214] with particularly low coverage in low-income countries where the burden is greatest.

Nevertheless, vaccination coverage has increased substantially, rising from 17% in 2019 to 31% in 2024, driven by an expansion in several high-risk, highly populated countries and strengthened through program implementation and the adoption of a single-dose schedule after the WHO's 2022 SAGE (Strategic Advisory Group of Experts on Immunization) recommendation.[215] A single-dose HPV vaccine lowers logistical barriers and costs, allowing programs to expand secondary screening for women who no longer fully benefit from vaccination.[216] A modeling exercise suggested that, in Ethiopia, an estimated savings of $4 million from a single-dose schedule could fund screening for approximately 280,000 women in 1 year using primary HPV DNA testing, supporting the scaling-up of screening and treatment services for women who remain unvaccinated and at the highest risk.[216–218] As of March 2026, 91 of the 194 countries with national HPV vaccination programs have adopted single-dose schedules.[219] For example, in November 2025, Kenya officially transitioned its national program from a two-dose to a single-dose schedule, an intervention expected to double the coverage using existing resources and achieve substantial social and economic impact.[220] Of note, China recently introduced HPV vaccination into its national program, implementing the official two-dose schedule beginning in November 2025.[221]

In parallel, an increasing number of countries recommend HPV testing as the primary screening method: as of 2022, an estimated 48 of 139 countries with cervical cancer screening programs had adopted HPV testing as the primary test,[214] with some also introducing self-sampling either as a primary screening approach or to reach underscreened populations (e.g., Australia, Malaysia, Denmark, Argentina, and the Netherlands).[222–224] In 2025, the American Cancer Society updated its screening guidelines to incorporate HPV self-sampling.[225] In Australia, projected to be among the first countries to achieve cervical cancer elimination nationally,[226] incidence rates remain two to three times higher in Indigenous than non-Indigenous women,[227] and the expansion of self-collection to all screening-eligible women through primary care in 2022 is expected to help improve equity in screening participation.[228] Management and treatment of precancerous lesions are critical to effective secondary prevention. Ensuring timely clinical follow-up after positive screening results remains challenging, particularly in resource-limited settings. To address this, the WHO recommends a *screen-and-treat* approach, providing treatment immediately or shortly after a positive HPV screening test, which is especially advised for women living with HIV.[229]

Pancreatic cancer

With an estimated 531,000 new cases and 491,000 deaths in 2024, pancreatic cancer ranks as the 11th most commonly diagnosed cancer but the sixth leading cause of cancer death (Table 1), representing approximately one in 20 cancer deaths in both sexes combined (Figure 3). Incidence and mortality rates are about 1.5-fold higher in men than in women and about three times higher in higher

HDI versus lower HDI countries (Figure 7). The highest incidence rates are found in Europe, Northern America, and Australia/New Zealand, and the lowest are in South Central Asia, Africa, and South-Eastern Asia (Figure 16).

In many parts of the world, pancreatic cancer incidence and mortality rates have been either stable or slowly rising for the past few decades.[82,230,231] Geographic variation in pancreatic cancer burden and trends may partly reflect differences in the prevalence of these risk factors as well as access to diagnostic imaging services with varying sensitivities (e.g., high-quality computed tomography with intravenous contrast, endoscopic ultrasound, magnetic resonance cholangiopancreatography). Although the underlying etiology remains poorly understood, established risk factors include smoking, excess body weight, and diabetes, with limited suggestive evidence for red meat, processed meat, alcohol consumption, and foods and beverages containing fructose and saturated fatty acids.[232] A recent estimate suggests that more than 20% of new cases in women and over 30% in men are attributable to smoking and excess body weight.[30] In addition, part of the increase in pancreatic cancer incidence in some high-income countries also likely reflects evolving classification of pancreatic neuroendocrine tumors and subsequent changes in registrations and disease reporting,[233,234] particularly after revisions in the 2010 WHO tumor classification and coding changes in the WHO International Classification of Diseases for Oncology, third revision.[235]

Despite therapeutic advances over the past decade, progress in pancreatic cancer treatment has been incremental, and the population-level impact remains limited.[236,237] Survival for pancreatic cancer remains poor worldwide, reflecting the aggressive biology of the disease and the fact that patients typically present with advanced disease, often because of the absence of specific symptoms. Even in high-income settings, approximately three quarters (75%) of cases present with either locally advanced or metastatic disease, and the 5-year relative survival rate is low: 13% in the United States for patients diagnosed in 2015–2021, 8% in the United Kingdom in for those diagnosed in 2014, and 14% in Australia for those diagnosed in 2014.[238] Efforts to reduce the global burden of pancreatic cancer should prioritize reducing exposure to key modifiable risk factors, such as smoking and excess body weight. Complementary strategies include improving the identification of risk factors, surveillance of high-risk individuals, strengthening health system capacity for timely diagnosis, and continuing research to enhance treatment effectiveness.

Esophageal cancer

Esophageal cancer is the 13th most commonly diagnosed cancer and the seventh leading cause of cancer death worldwide, with an estimated 494,000 new cases and 442,000 deaths in 2024 (Table 1, Figure 3). With more than 70% of cases and deaths occurring in men (Table 2), the malignancy ranks seventh for incidence and sixth for mortality in men (Figure 3). Overall incidence and mortality rates are about three-fold higher in men than in women (Table 2), although the male-to-female ratio varies widely across regions, from 1.4 in Eastern Africa (8.8 vs. 6.3 per 100,000) to 3.9 in Eastern Asia (11.0 vs. 2.8 per 100,000; Figure 17). The highest rates occur in Eastern Asia (largely driven by China), Melanesia, Eastern Africa, Northern Europe, and Eastern Europe among men, and in Eastern Africa, South-Central Asia, and Middle Africa among women; whereas the lowest rates are observed in Western Africa, Central America, Northern Africa, and Western Asia among men and in Micronesia/Polynesia, Central America, and South-Eastern Asia among women (Figure 17).

These geographic and sex differences partly reflect variations in the distribution of histologic subtypes and their underlying etiologies.[239] Globally, esophageal squamous cell carcinoma accounts for approximately 84% of all cases and predominates in high-risk regions, including parts of the regions called *central Asian esophageal cancer belt*[240] and Eastern Africa's *esophageal cancer corridor*,[241] where consumption of very hot beverages (Southern China, Iran),[242–244] opium smoking (Iran),[245] nutritional deficiencies,[246,247] low fruit and vegetable intakes,[248] indoor air pollution,[248] and poor oral hygiene,[249,250] have been associated with the disease risk. Esophageal squamous cell carcinoma incidence rates have decreased in many countries, likely due to improved diets in high-risk regions and reduced tobacco use in high-income Western settings.[251]

In contrast to esophageal squamous cell carcinoma, EAC predominates in high-income Western countries, representing roughly two thirds of all esophageal cancer cases in Northern Europe and Northern America.[252] Furthermore, incidence rates of EAC have increased steadily over the last decades, partly reflecting increased prevalence of gastroesophageal reflux disease, Barrett esophagus, and excess body weight and also declining prevalence of *H. pylori* infection, which is inversely associated with the risk of EAC.[253] Recent projections indicate that the incidence of EAC is expected to continue rising, likely becoming the predominant esophageal cancer subtype in an increasing number of high-income and very high-income countries.[226] In high-income Western populations, up to 85% of new cases are estimated to be attributable to cigarette smoking, excess body weight, and alcohol consumption, highlighting the central role of primary prevention in reducing the future disease burden.[80]

The future cancer incidence burden in 2050

Based on the projected population growth and aging, and assuming overall cancer incidence rates remain constant, approximately 34.4 million new cancer cases are predicted worldwide in 2050, representing a 67% increase from the 20.6 million cases estimated in 2024 (Figure 18). Demographic change is the primary driver of this rise, with the global population projected to grow from 8.2 billion in 2024 to 9.7 billion by 2050.[254] An annual decline of 2% in global incidence rates would be required over the next decades to ensure that the number of new cases predicted in 2050 does not exceed the current incidence burden, as estimated in 2024. Although the largest

absolute increases are projected in high HDI (including China) and very high HDI countries, with an additional 4.5 and 3.0 million cases, respectively, the greatest relative increases are expected in lower HDI countries. The number of new cases is projected to rise by 122% from 0.9 to 2.0 million in low HDI countries and by 85% from 2.6 to 4.8 million in medium HDI countries (including India).

STRENGTHS AND LIMITATIONS

This study represents a comprehensive and up-to-date assessment of the global cancer incidence and mortality burden, leveraging the latest GLOBOCAN 2024 estimates from the IARC. Geographic variations in 34 distinct cancer types across 186 countries and territories are explored in detail for the 10 most frequent cancer types by world region and level of human development. The results of these cross-national, regional, and development-level comparisons are interpreted in the context of recent literature—spanning descriptive studies to policy documents—to identify and document the prospects of delivering equitable global cancer control.

The underlying national cancer incidence and mortality statistics are built up using a tiered estimation process, synthesizing the best available data to project close to current-year estimates. The GLOBOCAN estimates rely on recorded incidence data from national or subnational population-based cancer registries (PBCRs), which track new cancer diagnoses within defined geographic areas, and national mortality data made available from civil registration and vital statistics systems. Although the methodologic approach is data-driven and transparent—the specific sources and methods are described at the country level within the GCO—there are clearly challenges in completing this exercise. A clear limitation is the distinct heterogeneity in the validity of the national estimates given the quality, representativeness, and timeliness of the underlying source information. In many low and medium HDI countries, high-quality, representative PBCRs and civil registration and vital statistics systems are still lacking: only one in three countries currently reports high-quality incidence according to IARC's *Cancer Incidence in Five Continents Volume XII*[255]; whereas one in four countries correspondingly reports high-quality national mortality to the WHO.[256] For consistency with prior reports and comparability between incidence and mortality, 34 ICD-based cancer site groupings were used. These groupings, however, combine etiologically and clinically distinct cancers (e.g., colorectal cancer includes anal cancer; code C21) and may increase uncertainty for cancer types not routinely collected across PBCRs (e.g., nonmelanoma skin cancer), warranting caution in interpretation.

Irrespective of the availability of high-quality routine data, such periodic country-level benchmarks of incidence and mortality offer a valuable exposition of the scale and profile of cancer but are not intended as a substitute for the continuous approaches to routine data collection afforded by PBCRs and civil registration and vital statistics systems. The former institutions are key providers of local statistics on cancer incidence and survival by cancer type and thus are a critical resource to policymakers (and the primary source of these estimates), providing the evidence base from which to plan, monitor, and evaluate the effect of national cancer control programs and the 2030 national targets of the WHO signature cancer initiatives. Given the critical importance of building capacity for local data production, analysis, and dissemination within the countries themselves, the Global Initiative for Cancer Registry Development (https://gicr.iarc.fr/e-learning/) was launched by the IARC in 2012. That initiative provides the necessary regional infrastructure through IARC hubs and designated centers of expertise to assist registries through a broad set of knowledge-transfer and capacity-building activities.[257]

The coronavirus disease 2019 pandemic caused over six million deaths in 2020–2022 and severely affected health systems worldwide. While studies reported a substantial decline in cancer incidence, particularly in 2020, available data—mainly from very high HDI countries, showed that after 2022 cancer incidence has returned to its expected rates. Although reductions in screening and diagnoses, treatment delays, and reduced survival have been documented for some cancer sites,[258–260] no clear impact on mortality was seen during the early phase of the pandemic.[258,261] The estimates provided here for 2024 however do not reflect the impact of the pandemic as they are largely based on extrapolations of cancer data collected prior to 2020, yet we do not believe this would substantially change the estimates for reasons mentioned above. In addition to the incidence data available through the IARC's *Cancer Incidence in Five Continents* series,[255] we were able to use recent cancer registry data in collaboration with registry networks and programs worldwide. The estimates in the 40 countries that comprise the EU-27 and greater Europe were developed in collaboration with the European Commission's Joint Research Center and the European Network of Cancer Registries (https://www.encr.eu/). The estimates of the cancer burden in China were built up in collaboration with the National Cancer Registry Program and are based on the extensive and up-to-date, high-quality cancer registry data available in the country.[262] Through the Global Initiative for Cancer Registry Development, we have benefited from the availability of recent registry data, including from members of the African Cancer Registry Network (http://afcrn.org), we exploited the SURVCAN-3 (Cancer Survival in Africa, Central and South America, and Asia) survival database[263] to complement estimates derived from mortality-to-incidence ratios, where applicable.

Finally, the inclusion of demographic projections of cancer incidence to 2050 seeks to enable actionable foresight, providing a critical tool for policymakers to anticipate future health care demands and resource allocation, particularly in lower HDI countries where the burden is projected to rise markedly. However, because such projections are driven purely by population growth and aging, they operate on the assumption that current incidence and mortality rates will remain constant. This is a limitation because it does not account for the dynamic nature of cancer causes and their control, some of which have been documented in this article. They include future changes in the prevalence of modifiable risk factors, the

impact of effective primary prevention strategies, or the introduction of novel early detection and screening modalities.

CONCLUSIONS

Almost 21 million people were newly diagnosed with cancer and nearly 10 million people died from the disease in 2024. Population growth and ageing alone are expected to drive a continued rise in the global cancer burden, with the annual number of new cases projected to reach about 34.4 million by 2050, an increase of 67%. The scale of the disease burden, together with pronounced variation in cancer profiles across world regions and levels of human development, highlights the pressing need to accelerate and strengthen cancer-control strategies globally. Reducing exposure to preventable risk factors, including tobacco use, cancer-related infections, alcohol consumption, excess body weight, and physical inactivity, offers the most powerful and sustainable approach to lowering cancer risk and has the potential to prevent millions of future cases and deaths while generating substantial societal and economic benefits.[264] Effective cancer prevention and control are also closely aligned with the United Nations Sustainable Development Goals, particularly those aimed at reducing premature mortality from noncommunicable diseases and strengthening the implementation of health promotion policies.[265] Expanding vaccination programs, organized screening, and early detection initiatives, alongside equitable access to timely diagnosis, effective treatment, and palliative care, is essential to curb the growing cancer burden. Equally, strong political commitments to national investments in surveillance are needed to ensure meaningful and measurable progress in cancer control worldwide.

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CONFLICT OF INTEREST STATEMENT

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ORCID

Hyuna Sung https://orcid.org/0000-0002-8021-5997
Adalberto M. Filho https://orcid.org/0000-0002-3655-8482
Mathieu Laversanne https://orcid.org/0000-0002-1568-7218
Rebecca L. Siegel https://orcid.org/0000-0001-5247-8522
Isabelle Soerjomataram https://orcid.org/0000-0002-6017-741X
Ahmedin Jemal https://orcid.org/0000-0002-0000-4111
Freddie Bray https://orcid.org/0000-0002-3248-7787

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