Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-Years for 29 Cancer Groups, 1990 to 2017
A Systematic Analysis for the Global Burden of Disease Study

Global Burden of Disease Cancer Collaboration

IMPORTANCE  Cancer and other noncommunicable diseases (NCDs) are now widely recognized as a threat to global development. The latest United Nations high-level meeting on NCDs reaffirmed this observation and also highlighted the slow progress in meeting the 2011 Political Declaration on the Prevention and Control of Noncommunicable Diseases and the third Sustainable Development Goal. Lack of situational analyses, priority setting, and budgeting have been identified as major obstacles in achieving these goals. All of these have in common that they require information on the local cancer epidemiology. The Global Burden of Disease (GBD) study is uniquely poised to provide these crucial data.

OBJECTIVE  To describe cancer burden for 29 cancer groups in 195 countries from 1990 through 2017 to provide data needed for cancer control planning.

EVIDENCE REVIEW  We used the GBD study estimation methods to describe cancer incidence, mortality, years lived with disability, years of life lost, and disability-adjusted life-years (DALYs). Results are presented at the national level as well as by Socio-demographic Index (SDI), a composite indicator of income, educational attainment, and total fertility rate. We also analyzed the influence of the epidemiological vs the demographic transition on cancer incidence.

FINDINGS  In 2017, there were 24.5 million incident cancer cases worldwide (16.8 million without nonmelanoma skin cancer [NMSC]) and 9.6 million cancer deaths. The majority of cancer DALYs came from years of life lost (97%), and only 3% came from years lived with disability. The odds of developing cancer were the lowest in the low SDI quintile (1 in 7) and the highest in the high SDI quintile (1 in 2) for both sexes. In 2017, the most common incident cancers in men were NMSC (4.3 million incident cases); tracheal, bronchus, and lung (TBL) cancer (1.5 million incident cases); and prostate cancer (1.3 million incident cases). The most common causes of cancer deaths and DALYs for men were TBL cancer (1.3 million deaths and 28.4 million DALYs), liver cancer (572 000 deaths and 15.2 million DALYs), and stomach cancer (542 000 deaths and 12.2 million DALYs). For women in 2017, the most common incident cancers were NMSC (3.3 million incident cases), breast cancer (1.9 million incident cases), and colorectal cancer (819 000 incident cases). The leading causes of cancer deaths and DALYs for women were breast cancer (601 000 deaths and 17.4 million DALYs), TBL cancer (596 000 deaths and 12.6 million DALYs), and colorectal cancer (414 000 deaths and 8.3 million DALYs).

CONCLUSIONS AND RELEVANCE  The national epidemiological profiles of cancer burden in the GBD study show large heterogeneities, which are a reflection of different exposures to risk factors, economic settings, lifestyles, and access to care and screening. The GBD study can be used by policy makers and other stakeholders to develop and improve national and local cancer control in order to achieve the global targets and improve equity in cancer care.

Group Information: The members of the Global Burden of Disease Cancer Collaboration appear at the end of the article.

Corresponding Author: Christina Fitzmaurice, MD, MPH, Division of Hematology, Department of Medicine, Institute for Health Metrics and Evaluation, University of Washington, 2301 5th Ave, Ste 600, Seattle, WA 98121 (cf11@uw.edu).
Cancer is now widely recognized as a global problem that unfortunately lacks a global solution. The latest United Nations high-level meeting on noncommunicable diseases (NCDs) exemplified this conundrum. Despite global commitment to reducing the risk of and disability from NCDs, including cancer, implementation of known solutions is inadequate to reach the 2011 Political Declaration on the Prevention and Control of Noncommunicable Diseases (25% reduction in premature mortality from NCDs by 2025) and the third Sustainable Development Goal (by 2030 reduce by one-third premature mortality from NCDs through prevention and treatment, and promote mental health and well-being).

To reduce cancer burden, identifying the scope of the problem and mapping out implementation of solutions is best done in National Cancer Control Plans (NCCPs). However, a recent review showed that only 29% of low-income countries had a NCCP, and even if NCCPs existed, cost, financing, monitoring, and expansion of information systems was often inadequate. Many highly effective prevention and treatment strategies exist for cancer. However, they are often very specific (e.g., vaccination for human papillomavirus and hepatitis B virus for prevention of cervical and liver cancer, or tyrosine kinase inhibitors for cancers with targetable mutations). Effective NCCPs therefore require detailed knowledge about the local burden of cancer and associated risk factors. We herein present results from the Global Burden of Disease (GBD) 2017 study describing cancer incidence, mortality, years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life-years (DALYs) for 195 countries from 1990 through 2017, which can inform cancer control through policy, resource allocation, and health system planning.

Methods

Methods have remained similar to the GBD 2016 study. Detailed descriptions of the methods can be found in the GBD 2017 publications as well as in the eAppendix, eFigures, and eTables in the Supplement. For each GBD study, the entire time series is re-estimated. This study therefore superseded prior GBD iterations. The GBD study is compliant with the Guidelines for Accurate and Transparent Health Estimates Reporting statement (eTable 1 in the Supplement). Compared with the prior GBD study (GBD 2016), the neoplasms category for GBD 2017 also includes benign and in situ neoplasms (International Statistical Classification of Diseases and Related Health Problems, Tenth Revision [ICD-10] codes C00-D49). Because disability associated with benign neoplasms is most often very small, we only estimated disability for the new cause: myelodysplastic, myeloproliferative, and other hematopoietic neoplasms. The terms malignant neoplasms or cancer in this article only include ICD-10 codes C00 through C96. Other changes since GBD 2016 are the addition of new data sources (eTable 3 in the Supplement) for GBD 2017 and improvements in the way we estimated cancer survival by using the mortality-to-incidence ratio (MIR). In this study, estimates are presented for 29 cancer categories and 195 countries and territories. Estimates for benign neoplasms as well as selected subnational estimates are available online (https://vizhub.healthdata.org/gbd-compare/ and http://ghdx.healthdata.org/gbd-results-tool). All rates are reported per 100,000 person-years. The GBD world population standard was used for the calculation of age-standardized rates. We report 95% uncertainty intervals for all estimates.

Estimation Framework

The GBD cancer estimation process starts with mortality. Mortality estimates are made based on vital registration system (83% of data), cancer registry (16% of data) (eTable 3 in the Supplement), and verbal autopsy data (1% of data) using an ensemble model approach. Predictive covariates used in the model can be found in the eAppendix (eTable 8 in the Supplement). Single-cause mortality estimates are scaled into the separately estimated all-cause estimate. To estimate cancer incidence, mortality estimates are divided by a separately estimated MIR for each cancer type, sex, 5-year age group, location, and year; additional information regarding incidence and MIR estimation can be found in the eAppendix and eFigure 2 in the Supplement. Data sources used for estimating MIRs are described in eTable 2 in the Supplement. MIRs allow for a uniform method to estimate incidence. Other cancer estimation frameworks have set a precedent for using MIRs for decades and have detailed its benefits, including greater representativeness, especially in settings that lack quality or complete population-based cancer registry systems. By determining incidence using mortality, we are able to account for uncaptured incident cases and, if mortality and incidence are determined correctly, estimating incidence based on MIRs should result in the similar results if using incidence directly. The correlation between survival data and the MIR is used to estimate 10-year cancer prevalence. Total prevalence is partitioned into 4 sequelae: (1) diagnosis/treatment, (2) remission, (3) metastatic/disseminated, and (4) terminal phase. Each sequela prevalence is multiplied by a disability weight to estimate YLDs. Lifetime prevalence of procedure-related disability is estimated for larynx, breast, colorectal, bladder, and...
Results

Global Incidence, Mortality, and DALYs

In 2017, there were 24.5 million (95% UI, 22.0-27.4 million) incident cancer cases worldwide and 9.6 million (95% UI, 9.4-9.7 million) cancer deaths (Table). Cancer caused 233.5 million (95% UI, 228.8-238.0 million) DALYs in 2017, of which 97% came from YLLs and 3% came from YLDs (eTable 15 and eFigure 4 in the Supplement). Globally, the odds of developing cancer during a lifetime (ages 0-79 years) were 1 in 3 for men and 1 in 4 for women (eTable 16 in the Supplement). These odds differ substantially among SDI quintiles, ranging from 1 in 7 at the lowest SDI quintile to 1 in 2 at the highest SDI quintile for both sexes. In 2017, skin; tracheal, bronchus, and lung (TBL); and prostate cancers were the most common incident cancers in men, accounting for 54% of all cancer cases. The most common causes of cancer deaths and DALYs for men were TBL, liver, and stomach cancers (Table). For women in 2017, the most common incident cancers were nonmelanoma skin cancer (NMSC), breast cancer, and colorectal cancer, accounting for 54% of all incident cases. The leading causes of cancer deaths and DALYs for women were breast, TBL, and colorectal cancers.

Between 2007 and 2017, the average annual age-standardized incidence rates (ASIRs) for all cancers combined increased in 123 of 195 countries. Between 2007 and 2017, the average annual age-standardized death rates for all cancers combined decreased within that timeframe in 145 of 195 countries. Incident cases for both sexes combined increased in all SDI quintiles between 2007 and 2017 for nearly all cancers (eTable 14 in the Supplement). The largest increase in cancer incident cases between 2007 and 2017 occurred in middle SDI countries, with a 52% increase, of which changing age structure contributed 24%, population growth 10%, and changing age-specific incidence rates 18%. The drivers behind increasing cancer incidence differ substantially by SDI. Whereas in the lowest SDI quintile, population growth is the major contributor to the increase in total cancer incidence, in low-middle SDI countries aging and changes in incidence rates contribute equally (each 12%), and in high-middle and high SDI countries, increased incidence is mainly driven by population aging (eTable 14 in the Supplement).

Global Top 10 Cancers in 2017

The global top 10 cancers were ranked by the highest number of incident cases, excluding “other malignant neoplasms.”

1. Nonmelanoma Skin Cancer

In 2017, there were 7.7 million (95% UI, 5.3-10.6 million) incident cases of NMSC, of which 5.9 million (95% UI, 3.7-8.7 million) were due to basal cell carcinoma and 1.8 million (95% UI, 1.1-2.6 million) due to squamous cell carcinoma. There were 65,000 (95% UI, 63,000-66,000) deaths due to NMSC (Table) and 1.3 million (95% UI, 1.3-1.4 million) DALYs, of which 97% came from YLLs (Figure 3) and 3% from YLDs (eTable 15 and eFigure 4 in the Supplement). Over a lifetime, the odds of developing NMSC were 1 in 7 for men and 1 in 10 for women globally. For men, the odds ranged from 1 in 71 in low SDI countries to 1 in 2 in high SDI countries, and for women from 1 in 104 in low SDI countries to 1 in 4 in high SDI countries (eTable 16 in the Supplement). An aging and growing population has led to a 33% (95% UI, 29%-36%) increase in NMSC cancer cases, from 5.8 million (95% UI, 4.1-7.8 million) in 2007 to 7.7 million (95% UI, 5.3-10.6 million) in 2017. The majority of this increase (20%) can be attributed to a change in the population age structure, and 13% can be attributed to population growth (eTable 14 and eFigure 11 in the Supplement).

2. Tracheal, Bronchus, and Lung Cancer

In 2017, there were 2.2 million (95% UI, 2.1-2.2 million) incident cases of TBL cancer and 1.9 million (95% UI, 1.8-1.9 million) deaths. Tracheal, bronchus, and lung cancer caused 40.9 million (95% UI, 40.0-41.9 million) DALYs in 2017, of which 99% came from YLLs and 1% from YLDs (eTable 15 and eFigure 4 in the Supplement). Men were more likely to develop TBL cancer over a lifetime than women (1 in 17 men vs 1 in 43 women) (eTable 16 in the Supplement). The odds were the highest in high-middle SDI countries for men (1 in 13) and in high SDI countries for women (1 in 28). In low SDI countries, the odds were the lowest (1 in 45 for men and 1 in 142 for women). Tracheal, bronchus, and lung cancer was the leading cause of cancer in high-middle SDI countries (eFigure 5 in the Supplement). It was the most common cause of cancer deaths by absolute cases globally, as well as in all SDI quintiles (eFigure 6 in the Supplement). For men, TBL cancer was the most common incident cancer in 48 countries and the most common cause for cancer deaths in 110 countries (eFigures 7 and 9 in the Supplement). For women, TBL cancer was the most common incident cancer in Greenland and the most common cause of cancer deaths in 22 countries (eFigures 8 and 10 in the Supplement). Between 2007 and 2017, TBL cancer cases increased by 37% (95% UI, 33%-40%). Changing age structure contributed 19%, population growth 13%, and changes in age-specific incidence rates 5% (eTable 14 and eFigure 11 in the Supplement). The ASIRs between 1990 and 2017 show diverging results between men and women globally and in high SDI countries, with ASIRs decreasing in men but increasing in women (eFigure 12 in the Supplement). In high-middle SDI countries, ASIRs remained stable for men but increased for women, whereas rates increased for both sexes in middle SDI countries (eFigures 13 and 14 in the Supplement).

3. Breast Cancer

Breast cancer was the third most common incident cancer overall with an estimated 2.0 million (95% UI, 1.9-2.0 million)
Table. 2017 Global Incidence and Deaths for All Cancers and 29 Cancer Groupsa

<table>
<thead>
<tr>
<th>Cancer Typeb</th>
<th>Incident Cases, Thousandsc</th>
<th>ASIR (per 100 000)</th>
<th>Deaths, Thousands</th>
<th>ASDR (per 100 000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>All malignant neoplasms</td>
<td>24,491 (22,041-27,441)</td>
<td>13,294 (11,992-15,035)</td>
<td>23,365 (22,041-27,441)</td>
<td>265 (240-295)</td>
</tr>
<tr>
<td>Lip and oral cavity</td>
<td>390 (374-404)</td>
<td>239 (226-249)</td>
<td>357 (347-368)</td>
<td>36 (32-40)</td>
</tr>
<tr>
<td>Nasopharynx</td>
<td>110 (104-116)</td>
<td>81 (76-87)</td>
<td>151 (144-159)</td>
<td>2.0 (1.9-2.2)</td>
</tr>
<tr>
<td>Other pharynx</td>
<td>179 (160-189)</td>
<td>131 (124-141)</td>
<td>84 (45-51)</td>
<td>3.3 (2.9-3.6)</td>
</tr>
<tr>
<td>Esophageal</td>
<td>473 (459-485)</td>
<td>331 (319-342)</td>
<td>142 (135-148)</td>
<td>8.9 (8.6-9.2)</td>
</tr>
<tr>
<td>Stomach</td>
<td>1,221 (1,189-1,255)</td>
<td>799 (771-830)</td>
<td>421 (408-434)</td>
<td>21.7 (21.0-22.6)</td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>1,833 (1,792-1,873)</td>
<td>1,015 (977-1,047)</td>
<td>819 (795-839)</td>
<td>28.0 (27.0-28.9)</td>
</tr>
<tr>
<td>Liver</td>
<td>953 (917-997)</td>
<td>690 (654-734)</td>
<td>264 (254-275)</td>
<td>17.9 (17.0-18.1)</td>
</tr>
<tr>
<td>Gallbladder and biliary tract</td>
<td>211 (186-225)</td>
<td>90 (77-100)</td>
<td>120 (104-131)</td>
<td>2.6 (2.2-2.9)</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>448 (439-456)</td>
<td>232 (225-239)</td>
<td>215 (210-221)</td>
<td>6.4 (6.2-6.6)</td>
</tr>
<tr>
<td>Larynx</td>
<td>211 (206-216)</td>
<td>178 (174-184)</td>
<td>33 (32-34)</td>
<td>4.6 (4.5-4.7)</td>
</tr>
<tr>
<td>Tracheal, bronchus, and lung</td>
<td>2,163 (2,117-2,213)</td>
<td>1,468 (1,424-1,514)</td>
<td>695 (674-715)</td>
<td>39.9 (38.7-41.1)</td>
</tr>
<tr>
<td>Malignant skin melanoma</td>
<td>309 (238-366)</td>
<td>157 (91-194)</td>
<td>152 (113-207)</td>
<td>4.2 (4.2-5.1)</td>
</tr>
<tr>
<td>Nonmelanoma skin cancer</td>
<td>7,664 (5,251-10,570)</td>
<td>4,350 (2,974-6,035)</td>
<td>3,314 (2,276-4,558)</td>
<td>122.1 (83.9-170.3)</td>
</tr>
<tr>
<td>Breast</td>
<td>1,961 (1,891-2,023)</td>
<td>23 (22-24)</td>
<td>193 (186-200)</td>
<td>0.6 (0.6-0.6)</td>
</tr>
<tr>
<td>Cervical</td>
<td>601 (554-625)</td>
<td>NA</td>
<td>601 (554-625)</td>
<td>14.5 (13.4-15.1)</td>
</tr>
<tr>
<td>Uterine</td>
<td>407 (397-418)</td>
<td>NA</td>
<td>407 (397-418)</td>
<td>9.6 (9.3-9.8)</td>
</tr>
<tr>
<td>Ovarian</td>
<td>286 (278-295)</td>
<td>NA</td>
<td>286 (278-295)</td>
<td>6.8 (6.6-7.1)</td>
</tr>
<tr>
<td>Prostate</td>
<td>1,334 (1,171-1,698)</td>
<td>1,334 (1,171-1,698)</td>
<td>NA</td>
<td>37.9 (33.0-48.0)</td>
</tr>
<tr>
<td>Testicular</td>
<td>71 (69-74)</td>
<td>71 (69-74)</td>
<td>NA</td>
<td>1.8 (1.7-1.9)</td>
</tr>
<tr>
<td>Kidney</td>
<td>393 (371-405)</td>
<td>241 (226-249)</td>
<td>152 (141-158)</td>
<td>6.4 (6.0-6.6)</td>
</tr>
<tr>
<td>Bladder</td>
<td>474 (462-492)</td>
<td>362 (350-380)</td>
<td>111 (108-115)</td>
<td>10.3 (10.0-10.8)</td>
</tr>
<tr>
<td>Brain and nervous system</td>
<td>405 (351-443)</td>
<td>221 (189-251)</td>
<td>184 (132-213)</td>
<td>5.8 (4.9-6.5)</td>
</tr>
<tr>
<td>Thyroid</td>
<td>255 (246-272)</td>
<td>76 (73-79)</td>
<td>179 (170-196)</td>
<td>1.9 (1.9-2.0)</td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>35 (34-36)</td>
<td>25 (24-26)</td>
<td>10 (10-11)</td>
<td>0.7 (0.7-0.7)</td>
</tr>
<tr>
<td>Hodgkin lymphoma</td>
<td>101 (88-119)</td>
<td>61 (50-75)</td>
<td>40 (34-48)</td>
<td>1.6 (1.3-1.9)</td>
</tr>
</tbody>
</table>

Downloaded From: https://jamanetwork.com/ on 09/21/2022

(continued)
### Table. 2017 Global Incidence and Deaths for All Cancers and 29 Cancer Groups (continued)

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Incident Cases, Thousands</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple myeloma</td>
<td>153 (141-173)</td>
<td>82 (70-98)</td>
<td>70 (67-82)</td>
<td>38 (38-38)</td>
<td>20 (20-20)</td>
<td>107 (99-119)</td>
<td>55 (55-64)</td>
<td>52 (52-64)</td>
<td>24 (24-24)</td>
<td>10 (10-10)</td>
<td>83 (83-93)</td>
<td>45 (45-62)</td>
<td>38 (38-38)</td>
<td>6 (6-6)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>716 (656-740)</td>
<td>383 (340-410)</td>
<td>333 (303-353)</td>
<td>173 (173-173)</td>
<td>90 (90-90)</td>
<td>360 (331-371)</td>
<td>187 (167-194)</td>
<td>173 (156-192)</td>
<td>82 (82-82)</td>
<td>45 (45-45)</td>
<td>278 (251-298)</td>
<td>142 (142-142)</td>
<td>36 (36-36)</td>
<td>2 (2-2)</td>
<td></td>
</tr>
<tr>
<td>Leukemia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute lymphoid</td>
<td>108 (91-117)</td>
<td>64 (64-71)</td>
<td>44 (44-52)</td>
<td>22 (22-22)</td>
<td>10 (10-10)</td>
<td>52 (46-57)</td>
<td>24 (24-24)</td>
<td>28 (28-28)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td>52 (46-57)</td>
<td>24 (24-24)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td></td>
</tr>
<tr>
<td>Chronic lymphoid</td>
<td>114 (108-121)</td>
<td>66 (62-72)</td>
<td>58 (54-76)</td>
<td>28 (28-28)</td>
<td>10 (10-10)</td>
<td>71 (64-80)</td>
<td>35 (28-43)</td>
<td>36 (36-43)</td>
<td>1 (1-1)</td>
<td>0 (0-0)</td>
<td>36 (36-43)</td>
<td>25 (25-32)</td>
<td>1 (1-1)</td>
<td>0 (0-0)</td>
<td></td>
</tr>
<tr>
<td>Acute myeloid</td>
<td>140 (127-157)</td>
<td>79 (79-94)</td>
<td>61 (54-67)</td>
<td>31 (31-31)</td>
<td>10 (10-10)</td>
<td>100 (91-105)</td>
<td>57 (51-61)</td>
<td>43 (38-48)</td>
<td>1 (1-1)</td>
<td>0 (0-0)</td>
<td>57 (51-61)</td>
<td>38 (38-43)</td>
<td>1 (1-1)</td>
<td>0 (0-0)</td>
<td></td>
</tr>
<tr>
<td>Chronic myeloid</td>
<td>46 (37-54)</td>
<td>23 (23-30)</td>
<td>23 (23-30)</td>
<td>11 (11-11)</td>
<td>5 (5-5)</td>
<td>24 (24-24)</td>
<td>13 (13-16)</td>
<td>11 (11-13)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td>13 (13-16)</td>
<td>7 (7-7)</td>
<td>0 (0-0)</td>
<td>0 (0-0)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>246 (232-267)</td>
<td>142 (123-167)</td>
<td>104 (85-113)</td>
<td>42 (42-42)</td>
<td>18 (18-18)</td>
<td>158 (140-176)</td>
<td>76 (65-80)</td>
<td>82 (82-82)</td>
<td>26 (26-26)</td>
<td>10 (10-10)</td>
<td>76 (65-80)</td>
<td>34 (34-38)</td>
<td>16 (16-16)</td>
<td>4 (4-4)</td>
<td></td>
</tr>
</tbody>
</table>

*Abbreviations: ASIR, age-standardized incidence rate; ASDR, age-standardized death rate.*

Incident cases of prostate cancer in 2017. The majority occurred in women (1.9 million [95% UI, 1.9-2.0 million]) (Table). Breast cancer was among the top 3 leading causes of cancer in all SDI quintiles except for the high and high-middle SDI quintiles, where it was the fourth most common cancer (eFigure 5 in the Supplement). It caused 601 000 (95% UI, 579 000-630 000) deaths in women and 11 000 (95% UI, 10 000-11 000) deaths in men, making it the fifth leading cause of cancer deaths for both sexes combined in 2017 globally (eFigure 6 in the Supplement). For women, breast cancer was the leading cause of cancer death in 2017 (Table). Breast cancer caused 17.7 million (95% UI, 16.9-18.7 million) DALYs for both sexes, of which 93% came from YLLs and 7% from YLDs (eTable 15 and eFigure 4 in the Supplement). Globally, 1 in 18 women developed breast cancer over a lifetime (eTable 16 in the Supplement). For women, the odds of developing breast cancer were the highest in high SDI countries (1 in 11), and the lowest in low SDI countries (1 in 38). For women, breast cancer was the most common cancer in 143 countries and the most common cause of cancer deaths in 112 countries (eFigures 8 and 10 in the Supplement). Overall, incident cases increased by 35% (95% UI, 30%-39%) because of a change in the population age structure (contributing 15%), population growth (contributing 13%), and an increase in age-specific incidence rates (contributing 7%) (eFigure II in the Supplement). Between 2007 and 2017, ASIRs for women decreased in high SDI countries but increased in the other SDI quintiles (eFigures 12-16 in the Supplement).
the [Supplement](#). Globally, the odds of developing prostate cancer were 1 in 18, ranging from 1 in 52 for low SDI countries to 1 in 9 in high SDI countries (eTable 16 in the [Supplement](#)). In 2017, prostate cancer was the cancer with the highest incidence for men in 114 countries and the leading cause of cancer-related deaths for men in 56 countries (eFigures 7 and 9 in the [Supplement](#)). The increasing incidence rates, together with an aging and growing population, have led to a 42% (95% UI, 37%-52%) increase in prostate cancer cases since 2007 (940 000 [95% UI, 774 000-1.2 million] in 2007 and 1.3 million [95% UI, 1.2-1.7 million] in 2017). Twenty-one percent of this increase can be attributed to a change in the population age structure, 13% to a change in the population size, and 8% to a change in the age-specific incidence rates (eTable 14 and eFigure 11 in the [Supplement](#)).

6. Stomach Cancer
In 2017, there were 1.2 million (95% UI, 1.2-1.3 million) incident cases of stomach cancer and 865 000 (95% UI, 848 000-885 000) deaths worldwide. Stomach cancer caused 19.1 million (95% UI, 18.7-19.6 million) DALYs in 2017, with 98% coming from YLLs and 2% coming from YLDs (eTable 15 and eFigure 4 in the [Supplement](#)). One in 33 men and 1 in 78 women developed stomach cancer over a lifetime. The highest odds for men and women were in high-middle SDI countries (1 in 21 and 1 in 57, respectively), and the lowest odds were for men in low SDI countries (1 in 78) and for women in low-middle SDI countries (1 in 104) (eTable 16 in the [Supplement](#)). Between 2007 and 2017, stomach cancer moved from the second leading cause of crude cancer YLLs to the third place with a 5% (95% UI, 2%-7%) increase in absolute YLLs (Figure 3). Overall, incidence between 2007 and 2017 increased by 25% (95% UI, 22%-29%), of which a change in the population age structure contributed 19%, population growth 13%, and falling age-specific rates −6% (eTable 14 and eFigure 11 in the [Supplement](#)). The ASIRs have dropped substantially since 1990 globally and for all SDI quintiles (eFigures 12-16 in the [Supplement](#)).

7. Liver Cancer
In 2017, there were 953 000 (95% UI, 917 000-997 000) incident cases of liver cancer globally and 819 000 (95% UI, 790 000-856 000) deaths. Liver cancer caused 20.8 million (95% UI, 19.9-21.8 million) DALYs in 2017, with 99% coming from YLLs and 1% coming from YLDs (eTable 15 and eFigure 4 in the [Supplement](#)). Globally, liver cancer was more common in men, with 1 in 42 men developing liver cancer compared with 1 in 118 women. The highest odds of developing liver cancer were in high-middle SDI countries for men (1 in 31) and in middle SDI countries for women (1 in 94), whereas the lowest were seen in low SDI countries (1 in 98 men and 1 in 177 wom-
Population aging and population growth were the drivers of the increase from 705,000 (95% UI, 690,000-734,000) cases in 2007 to 953,000 (95% UI, 917,000-997,000) cases in 2017 (eTable 14 and eFigure 11 in the Supplement). Of the 35% increase in cases between 2007 and 2017, 17% was due to population aging, 13% due to population growth, and 6% due to an increase in age-specific incidence rates.

8. Cervical Cancer
In 2017, 601,000 (95% UI, 554,000-625,000) women developed cervical cancer worldwide, and it caused 260,000 (95% UI, 241,000-269,000) deaths (Table). Cervical cancer caused 8.1 million (95% UI, 7.5-8.4 million) DALYs, with 96% coming from YLLs and 4% from YLDs (eTable 15 and eFigure 4 in the Supplement). Globally, 1 in 65 women developed cervical cancer during a lifetime (eTable 16 in the Supplement). The odds were the highest in low SDI countries (1 in 40) and the lowest in high SDI countries (1 in 106). In 2017, cervical cancer was the most common incident cancer for women in 50 countries (eFigure 8 in the Supplement) and the most common cause of cancer deaths in 39 countries (eFigure 10 in the Supplement). Between 2007 and 2017, incident cases increased by 19% (95% UI, 13%-23%) between 2007 and 2017, and DALYs by 15% (95% UI, 10%-19%). The ASIRs decreased globally and for all SDI quintiles (eFigures 12-16 in the Supplement).

9. Non-Hodgkin Lymphoma
In 2017, there were 488,000 (95% UI, 479,000-497,000) incident cases of non-Hodgkin lymphoma and 249,000 (95% UI, 243,000-253,000) deaths. Non-Hodgkin lymphoma caused 7.0 million (95% UI, 6.8-7.2 million) DALYs in 2017, with 97% coming from YLLs and 3% from YLDs (eTable 15 and eFigure 4 in the Supplement). Globally, 1 in 108 men and 1 in 162 women developed non-Hodgkin lymphoma over a lifetime. The highest odds were in high SDI countries (1 in 54 for men and 1 in 80 for women) and the lowest in low SDI countries (1 in 221 for men and 1 in 322 for women) (eTable 16 in the Supplement). Globally, incident cases between 2007 and 2017 increased by 39% (95% UI, 35%-42%), of which 15% was due to changing population age structure, 13% due to population growth, and 11% due to change in incidence rates (eTable 14 and eFigure 11 in the Supplement).

10. Bladder Cancer
In 2017, there were 474,000 (95% UI, 462,000-492,000) incident cases of bladder cancer and 197,000 (95% UI, 192,000-206,000) deaths. Bladder cancer caused 3.6 million (95% UI,
3.5-3.8 million) DALYs in 2017, with 93% coming from YLLs and 7% from YLDs (eTable 15 and eFigure 4 in the Supplement). Globally, 1 in 74 men and 1 in 301 women developed bladder cancer over a lifetime. The highest odds were in high SDI countries (1 in 42 for men and 1 in 185 for women) and the lowest in low SDI countries (1 in 198 for men and 1 in 489 for women) (eTable 16 in the Supplement). Globally, incident cases between 2007 and 2017 increased by 32% (95% UI, 30%-35%), of which 20% was due to changing population age structure and 13% to population growth (eTable 14 and eFigure 11 in the Supplement).

Cancer in Comparison to Other Diseases

Within the 22 mutually exclusive and collectively exhaustive GBD level 2 disease categories (eTable 17 in the Supplement), neoplasms ranked last for incidence in 1990 and 2017 (eTable 18 in the Supplement). For prevalence, neoplasms ranked last in 1990 but surpassed enteric infections in 2017. The YLDs ranking for neoplasms also increased between 1990 and 2017 from the 21st to the 19th position. Mortality due to neoplasms remained at the second place between 1990 and 2017. The largest increase was seen for neoplasm YLLs and DALYs, which increased from the sixth place in 1990 to the second place in 2017 after cardiovascular diseases (Figure 4). The 4 causes with higher DALYs in 1990 that had been surpassed by neoplasms in 2017 are respiratory infections and tuberculosis, maternal and neonatal disorders, enteric infections, and other infections.

Discussion

The GBD study results are updated on an annual basis. In this article we focus on changes over the past decade and present the most recent results from the GBD 2017 study using cancer registry, vital registration, and verbal autopsy data to estimate the burden of cancer for 195 countries and territories from 1990 through 2017.13,14 All results presented can also be found online at https://vizhub.healthdata.org/gbd-compare/ and http://ghdx.healthdata.org/gbd-results-tool. For this article, we also compare cancer burden with other diseases.
The GBD 2017 results show that there are 24.5 million incident cancer cases worldwide (16.8 million without NMSC) and 9.6 million deaths, which is similar to the latest GLOBOCAN estimates for 2018 that estimate 17.0 million cases (without NMSC) and 9.4 million deaths.\textsuperscript{15}

The largest change in our estimates compared with the last iteration of the GBD study (GBD 2016) are the incidence estimates for NMSC, which have substantially increased. Despite being the most common incident cancer in many populations, cancer registry data to inform incidence estimates are often unreliable or nonexistent. For GBD 2017 we have therefore used Marketscan data for the United States, which has led to substantially higher estimates for NMSC.\textsuperscript{16}

A key strength of the GBD study is the comparative health assessment. Our analysis shows how cancer has increased in importance as a global health problem. Although it ranked sixth in 1990 among the top causes for DALYs worldwide, it has risen to the second place in 2017 behind cardiovascular diseases. Cancer now occupies the second place in the ranking of global deaths, YLLs, and DALYs, and is among the top 2 leading causes of deaths, YLLs, and DALYs in the highest 3 SDI quintiles. This shift in disease burden owing to the demographic and epidemiological transitions has important implications on health policy: ensuring access to universal health coverage and protection against catastrophic health expenditure directly related to the cancer treatment, but also against the long-term costs associated with a cancer diagnosis for a household, has to be prioritized.\textsuperscript{17} Fifty percent of cancer cases occur in high SDI countries, but only 30% of cancer deaths, 25% of cancer DALYs, and 23% of cancer YLLs. To ensure sustainable global development, increased efforts are needed to reduce these health inequalities. Recognizing the strong interdependencies between socioeconomic status and health and the large contribution of cancer to the overall disease burden is a first step in making investments in cancer prevention and treatment a priority.\textsuperscript{18} Cervical cancer is likely the best example of inequalities in cancer with vast differences in burden by SDI. As a completely preventable cancer where cost-effective vaccination\textsuperscript{3} and screening approaches are available, cervical cancer has recently gained global attention through the World Health Organization’s call for elimination.\textsuperscript{19} Falling incidence rates in all SDI quintiles are encouraging, but countries with the least resources are still facing the largest burden because of lack of screening programs. Immunization against human papillomavirus, screening, and treatment of cervical cancer is therefore of utmost importance in all socioeconomic settings.

Deaths due to cancer contribute the majority of total health loss measured in DALYs, with disability contributing less than 12% for all cancers. As access to cancer care increases and treatments improve, cancer mortality decreases, but prevalence and disability in the survivor population increase, which is already the case in some high-income countries.\textsuperscript{20} The World Health Organization Global Action Plan for the Prevention and Control of NCDs and the United Nations Sustainable Development Goals focus on the reduction of premature mortality as the first goal. At the same time, infrastructure should be planned that can address the growing survivor population’s need.
Limitations

The most important limitation for the GBD, as for other disease burden estimation, is the lack of data for many locations. A key GBD principle is to take advantage of all available data sources. This means for cancer registration that incidence data from cancer registries, as well as mortality data from vital registration systems or verbal autopsies, is used to produce disease burden estimates. Despite these broad inclusion criteria for different types of data sources, certain locations have neither of these data sources available, and estimates rely either on predictive covariates or trends from neighboring locations. Also, diagnostic accuracy for cause of death data and ascertainment bias in cancer registries remains a limitation, which requires corrections for underregistration and redistribution algorithms for insufficiently specific or implausible diagnostic codes. Because of a lag in data availability, estimates for the most recent years are based on past time trends and covariates rather than data, which is reflected in larger uncertainty. Scarcity of reliable survival data requires the estimation of survival based on the mortality-to-incidence ratio, which is a surrogate for survival. For the majority of deaths due to Kaposi sarcoma the underlying cause of deaths is AIDS, deaths and incidence of Kaposi sarcoma are not estimated in the GBD. Also, common pediatric cancers are not estimated separately in the GBD and are estimated under the aggregated cause “other malignant neoplasms.”

Conclusions

The national epidemiological profiles of cancer burden in the GBD study show large heterogeneities, which are a reflection of different exposures to risk factors, economic settings, lifestyles, and access to care. The GBD study can be used by policy makers and other stakeholders to develop and improve local cancer control in order to achieve the global targets and improve equity in cancer care.
University of Medical Sciences, Jahrom, Iran (Abdoli); Department of Epidemiology, Arab University of Medical Sciences, Arak, Iran (Abdollahpour, Almasi-Hashiani); Multiple Sclerosis Research Center, Tehran, Iran (Abdollahpour); Public Health Research Center, New York University Abu Dhabi, Abu Dhabi, United Arab Emirates (Abdul); School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia (Abebe, Berhanie, Gizaw, Emene); Department of Public Health, Wachemo University, Hossana, Ethiopia (Abebe); Clinical Pharmacy Unit, Mekele University, Mekele, Ethiopia (Abrahama, T. D. Nasa, Niray); Department of Healthcare Policy and Research, Well Cornell Medical College in Qatar, Doha, Qatar (A. Raddad); Department of Sociology, Obabii Onabanjo University, Ago Iwoye, Nigeria (Adejolu); Social Behavioral Research Branch, National Institutes of Health, Bethesda, Maryland (Advanzi); Cancer Prevention and Control Program, Georgetown University, Washington, DC (Advanzi); Endocrinology and Metabolism Research Center, Tehran University of Medical Sciences, Tehran, Iran (Afarideh, Ghajar, Rahim); Zabol University of Medical Sciences, Zabol, Iran (Afshari); Department of Epidemiology and Biostatistics, Qom University of Medical Sciences, Qom, Iran (Aghaali, Mohammadi); Department of Health, Directorate for Health Information and Research, Pieta, Malta (Agus); Public Health Foundation of India, Gurugram, India (Agrawal, Awasthi, Lal, Mathur, Zodeey); Vital Strategies, Gurugram, India (Agrawal); Knowledge Utilization Research Center, Tehran University of Medical Sciences, Tehran, Iran (Ahmad); Department of Pharmacology and Toxicology, Tabriz University of Medical Sciences, Tabriz, Iran (Ahmadian, Eftekhar); Department of Parasitology and Mycology, Tabriz University of Medical Sciences, Tabriz, Iran (Ahmadpour); Department of Epidemiology, Jimma University, Jimma, Ethiopia (Ahmed, Gebrehiwot); Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Akbari, Khayamzadeh); Department of Population Health Sciences, Duke University, Durham, North Carolina (Akinyemiju); Department of Pharmacology and Toxicology, Tabriz University of Medical Sciences, Tabriz, Iran (Amini, Aghasemi); Department of Internal Medicine, Komfo Anokye Teaching Hospital, Kumasi, Ghana (Amoako); Mansoura University, Mansoura, Egypt (Anber); Carol Davila University of Medicine and Pharmacy, Bucharest, Romania (Andrei); Social Determinants of Health Research Center, Rasfanjan University of Medical Sciences, Rasfanjan, Iran (Anjomshoa); Research Center for Evidence Based Medicine, Health Management and Safety Promotion Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran (Ansari); School of Public Health, Hasanuddin University, Makassar, Indonesia (Ansari); Department of Sociology and Social Work, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana (Appiah); Center for International Health, Ludwig Maximilians University, Munich, Germany (Appiah); Department of Healthcare Management, Tabriz University of Medical Sciences, Tabriz, Iran (Aref); Department of Health Education and Health Promotion, Tehran University of Medical Sciences, Tehran, Iran (Arefi); School of Health Sciences, Birmingham City University, Birmingham, England, United Kingdom (Arena); School of Nursing and Midwifery, Addis Ababa University, Addis Ababa, Ethiopia (Arei); Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada (Artaman); Qom University of Medical Sciences, Qom, Iran (Ashar); Institute of Biomedical Science, Mekele University, Mekele, Ethiopia (Ashafi); Department of Clinical Chemistry, University of Gondar, Gondar, Ethiopia (Ashagre, Biadgo); Education Development Center, Mashhad University of Medical Sciences, Mashhad, Iran (Asadi); Non-communicable Diseases Research Center, Tehran University of Medical Sciences, Tehran, Iran (Ataeinia, Ebrahim, Farzadfar, Iravani, Mohebi, Pishgar); College of Nursing, Aksum University, Aksum, Ethiopia (Ataly, Gebremeskel, Weldesamuel); Department of Medical Laboratory Science, Haramaya University, Harar, Ethiopia (Ataro, Weldegebriel); University Institute of Public Health, The University of Lahore, Lahore, Pakistan (Atique); College of Public Health, University of Hail, Hail, Saudi Arabia (Atique); School of Business, University of Leicester, Leicester, England (Alt); United Kingdom (Auslos); Center for Health Systems Research, National Institute of Public Health, Cuernavaca, Mexico (Avila-Burgos, Ortega-Altaminano); Bénin Clinical Research Institute, Abomey-Calavi, Benin (Avokpah); Centre des Maladies Infectieuses, Laboratory of Research and Research Action in Health, Porte Mai, Benin (Avokpah); Indian Institute of Public Health, Gandhinagar, India (Awasthi); Department of Nursing, Wolaite Sodo University, Sodo, Ethiopia (Awoke, Chichiabellu, Demissie, Hanfore, Lakew); The Judith Lumley Centre, La Trobe University, Melbourne, Victoria, Australia (Ayele Quintanilla); General Office for Research and Technological Transfer, Peruvian National Institute of Health, Lima, Peru (Ayala Quintanilla); Department of Family and Community Health, School of Public Health, University of Health and Allied Sciences, Ho, Ethiopia (Ayala Quintanilla); Department of Biostatistics, Epidemiology, and Occupational Health, McGill University, Montreal, Quebec, Canada (Ayala Quintanilla); Public Health Division, Public Health Agency of Canada, Toronto, Ontario, Canada (Badawi); Department of Nutritional Sciences, University of Toronto, Toronto, Ontario, Canada (Badawi); Department of Chemistry, Sharif University of Technology, Tehran, Iran (Bagherzadeh, N. Rabiee); Department of Ophthalmology, University Hospital of Ioanna, Ioannina, Greece (Bagi); Institute of Molecular Biology & Biotechnology, Foundation for Research & Technology, Ioannina, Greece (Bagi); Department of Medical Microbiology, Haramaya University, Harar, Ethiopia (Balakrishnan); School of Nursing and Allied Medicine, Iran University of Medical Sciences, Tehran, Iran (Balouch); College of Medicine, Islamic Azad University of Global Health Research, University of Medicine and University Hospital, Heidelberg University, Heidelberg, Germany (Bärnighausen); Harvard T. H. Chan School of Public Health, Harvard University, Boston, Massachusetts (Bärnighausen, P. C. Gupta); Doctor Evidence, Santa Monica, California (Battista); Social Determinants of Health Research Center, Lorestan University of Medical Sciences, Khorraramabad, Iran (Masoud Behzadfar); Lorestan University of Medical Sciences, Khorraramabad, Iran (Masoud Behzadfar); Lorestan University of Medical Sciences, Khorraramabad, Iran (Masoud Behzadfar); Lorestan University of Medical Sciences, Khorraramabad, Iran (Masoud Behzadfar); Public Health Department, Mizan-Tepi University, Teppi, Ethiopia (Bekele, Hassen); Department of Pharmacoepidemiology and Social Pharmacy, Mekele University, Mekele, Ethiopia (Belay); AC Environments Foundation, Cuernavaca, Mexico (Belay); Department of Pharmacy, Wollo University, Dessie, Ethiopia (Belayneh, Geta); Division of Cardiothoracic Surgery, University of Washington, Seattle, Washington, USA (Berfield); Dental Institute, King’s College London, London, England, United Kingdom (Bernabe); Emergency Hospital of Bucharest, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania (Buean, Negu); Department of Global Pediatric Medicine, St. Jude Children’s Research Hospital, Memphis, Tennessee (Bhakta); Department of Biostatistics and Bioinformatics,
of Health Education and Behavioral Sciences, Jimma University, Jimma, Ethiopia (Feyissa); Jimma University, Jimma, Ethiopia (Feyissa); Department of Psychiatry, Kaiser Permanente, Fontana, California (Filip); School of Health Sciences, A.T. Still University, Mesa, Arizona (Filip); School of Public Health Medicine, Bielefeld University, Bielefeld, Germany (Fischer); James Cancer Hospital, Ohio State University, Columbus, Ohio (Fisher); Department of Oncology, St. Jude Children's Research Hospital, Memphis, Tennessee (Force); Abadan School of Medical Sciences, Abadan, Iran (Foroutan); Department of Chemical Sciences, Faculty of Pharmacy, University of Porto, Porto, Portugal (Freitas); Gene Expression and Regulation Programme, IPE, Philadelphia Pennsylvania (Fukumoto); Department of Dermatology, Kobe University, Kobe, Japan (Fukumoto); Department of Otolaryngology-Head and Neck Surgery, University of Washington, Seattle (Putran); Department of Environmental Hospital, Åland, Etho Negi (Urmia); Department of Pharmacological Research, Milan, Italy (Gallus); Faculty of Medicine and Pharmacy of Fez, University Sidi Mohammed Ben Abdellah, Fez, Morocco (Ganlpe); Non-communicable Disease Department, Laboratory of Studies and Research in Health, Porto Novo, Benin (Ganlpe); Department of Nursing, Wollega University, Nekelte, Ethiopia (Gayeza); Department of Nursing, Mekelle University, Mekelle, Ethiopia (Gebresmelsel); Bahr Dar University, Bahr Dar, Ethiopia (Gedefaw); Haramaya University, Dire Dawa, Ethiopia (Gedefaw); School of Pharmacy, Ambo University, Ambo, Ethiopia (Gelav); Institute of Epidemiology, Biostatistics and Informatics, Martin Luther University Halle-Wittenberg, Halle, Germany (Getachew); Department of Biostatistics, Mekelle University, Mekelle, Ethiopia (Geeza); Medical Surgical Department, Tabriz University of Medical Sciences, Tabriz, Iran (Ghaforfard); Department of Medicine, Massachusetts General Hospital, Boston (Ghajar); Department of Health Services Management, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran (Ghajar); Department of Physiology, Iran University of Medical Sciences, Tehran, Iran (Gholamian); Medical Department, Islamic Azad University, Rasht, Iran (Gholamian); Unit of Academic Primary Care, University of Warwick, Coventry, England, United Kingdom (Gill); Department of Public Health Medicine, University of KwaZulu-Natal, Durban, South Africa (Ginindza); Department of Biostatistics and Epidemiology, University of Oklahoma, Oklahoma City (Gopalani); Department of Health and Social Affairs, Government of the Federated States of Micronesia, Pohnpei, Federated States of Micronesia (Gopalani); Occupational and Environmental Epidemiology Section, Cancer Prevention and Research Institute, Florence, Italy (Gorini); Postgraduate Program in Epidemiology, Federal University of Rio Grande do Sul, Porto Alegre, Brazil (Goulet); School of Medicine, Boston University, Boston, Massachusetts (Graudia); Department of Public Health, Federal University of Juiz de Fora, Juiz de Fora, Brazil (Ribiero Guerra); School of Dentistry, State University of Montes Claros, Montes Claros, Brazil (Guimarães); Department of Epidemiology, Heals Sekhsaria Institute for Public Health, Mumbai, India (P. C. Gupta); West Virginia Bureau for Public Health, Charleston (R. Gupta); Department of Health Policy, Management & Leadership, West Virginia University, Morgantown (R. Gupta); University of Tampere, UKK Institute, Tampere, Finland (Hadihala); Department of PharmacoLOGY, Tehran University of Medical Sciences, Tehran, Iran (Arvin Haj-Mirzaia, Arya Haj-Mirzaia); Obesity Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Arvin Haj-Mirzaia); Department of Radiology, Johns Hopkins University, Baltimore, Maryland (Arya Haj-Mirzaia); Department of Family and Community Medicine, Arabian Gulf University, Manama, Bahrain (Hamadeh); School of Health and Environmental Studies, Hamdan Bin Mohammed Smart University, Dubai, United Arab Emirates (Hamdi); Biomedical Research Networking Center for Mental Health Network, Madrid, Spain (Haro); Research and Development Unit, San Juan de Dios Sanitary Park, Sant Boi de Llobregat, Spain (Haro); School of Nutrition and Food Sciences, Tabriz University of Medical Sciences, Tabriz, Iran (Hasankhani); Department of Microbiology, Maragheh University of Medical Sciences, Maragheh, Iran (Hasanzadeh); Department of Microbiology, Tehran University of Medical Sciences, Tehran, Iran (Hasanzadeh); Unit of Epidemiology and Social Medicine, University Hospital Antwerp, Wilrijk, Belgium (Hassens); International Foundation for Dermatology, London, England, United Kingdom (R. J. Hay); St John's Institute of Dermatology, King's College London, London, England, United Kingdom (R. J. Hay); Department of Health Metrics Sciences, School of Medicine, University of Washington, Seattle (S. I. Hay, Mokdad, Reiner, Sartorius, Vollset, Vos, Murray); Mizan-Tepi University, Teppi, Ethiopia (Henok); Department of Statistics and Econometrics, Buchanan University of Economics Studies, Bucharest, Romania (Herteliu, Ileanu, Pana); Department of Descriptive Epidemiology, Adigrat University, Adigrat, Ethiopia (Hidru); Center of Excellence in Behavioral Medicine, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam (Hoang, Vu); The University of Texas at Austin, Austin (Hale); Transdisciplinary Centre for Qualitative Methods, Manipal University, Manipal, India (Hoogar); Department of Pulmonology, Yokohama City University, Kanazawa-ku, Yokohama, Japan (Horita); National Human Genome Research Institute, National Institutes of Health, Bethesda, Maryland (Horita); Department of Epidemiology, Shibuya, Japan (Hutter); Albert Einstein College of Medicine, Bronx, NY (Hosgood); Department of Epidemiology and Biostatistics, Tehran University of Medical Sciences, Tehran, Iran ( Hosseini, Mansournia, Yasen); Department of Computer Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran ( Hosseinizadeh); Department of Computer Science, University of Human Development, Sulaimanyah, Iraq (Hosseinizadeh); Department of General Surgery, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania (M. Hosticu); Department of Internal Medicine, Bucharest Emergency Hospital, Bucharest, Romania (M. Hosticu); Faculty of Dentistry, Department of Legal Medicine and Bioethics, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania (S. Hosticu); Department of Information and Computing Technology, College of Science and Engineering, Hamad Bin Khalifa University, Doha, Qatar (Househ); Qatar Foundation, Doha, Qatar (Houshe); Department of Medical Laboratory Science, Arba Minch University, Arba Minch, Ethiopia (Hussen); Center for Health Outcomes & Evaluation, Bucharest, Romania (Ileanu, Pana); Department of Epidemiology, Faculty of Medical Sciences, University of Kragujevac, Kragujevac, Serbia (Illic); Department of Epidemiology and Biostatistics, Kraslava Institute for Health Development, Tallinn, Estonia (Innos); Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Irvani); Department of Surgery, USMAN Danfodiyo University Teaching Hospital, Sokoto, Nigeria (Iyi); Department of Health Promotion and Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Jahangiri); School of Medicine, Babol University of Medical Sciences, Babol, Iran (Jahani); School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Jahangir); Safety Promotion and Injury Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Jahangireh); Medical Sciences Department, University of Kragujevac, Kragujevac, Serbia (Jakovljevic); Newcastle University, Tyne, United Kingdom (Javanbakht); Department of Surgery, Virginia Commonwealth University, Richmond (Jayaraman); Department of Public Health, Yongsei University, Seoul, South Korea (Jee); Department of Clinical Learning, Harvard Medical School, Harvard University, Boston, Massachusetts (Jee); Faculty of Nursing & Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran (Jenabi); Department of Community Medicine, Banaras Hindu University, Varanasi, India (Jha); Department of Ophthalmology, Heidelberg University, Mannheim, Germany (Jonas); Beijing Institute of Ophthalmology, Beijing Tongren Hospital, Beijing, China (Jonas); School of Public Health and Community Medicine, University of New South Wales, Sydney, New South Wales, Australia (Jonnagaddala, Sitas); NSW Health, Sydney, New South Wales, Australia (Jonnagaddala); Health Services Management Training Centre, Semmelweis University, Budapest, Hungary (Joo); School of Health Sciences, Savitribai Phule Pune University, Pune, India (Jungrari); Institute of Family Medicine and Public Health, University of Tartu, Tartu, Estonia (Jurisson); Minimally Invasive Surgery Research Center, Iran University of Medical Sciences, Tehran, Iran (Kabir); Department of Biology, Morgan State University, Baltimore, Maryland (Kamangar); Institute for Epidemiology and Social Medicine, University of Münster, Münster, Germany (Karch); Immunogenetics
Conflict of Interest Disclosures: Dr Goulart reports receiving grants from the National Council for Scientific and Technological Development. Dr Haro reports being a contractor for Eli Lilly and Company and receiving personal fees from Lundbeck. Mr Hidr reports receiving grants, personal fees, nonfinancial support, and other support from Adigrat University. Dr Iseh reports receiving nonfinancial support from the Usmanu Danfodiyo University Teaching Hospital and the Institute of Human Virology, Nigeria. Dr Jakovljevic reports receiving grants from the Ministry of Education, Science and Technological Development of the Republic of Serbia. Dr James reports receiving grants from Sanofi Pasteur. Dr Lazarus reports receiving grants and personal fees from Abbvie, Gilead Sciences, and MSD. Dr Meretoja reports receiving grants from the Cancer Foundation Finland. Dr Moradi-Lakeh reports being a consultant for a project funded by Novartis. Dr Postma reports receiving grants from Quintiles and Bayer; personal fees from Abbvie, Astellas, and Pfizer; grants and personal fees from Bristol-Myers Squibb, AstraZeneca, Sanofi, Novartis, Janssen, GlaxoSmithKline, Pfizer, MSD, and Asc Academics, as well as serving as an advisor for the organization; and earnings from stock in Ingress Health and PAE BV. Dr Savic reports being an employee of the GlaxoSmithKline group of companies and holds restricted shares in the GlaxoSmithKline group of companies. Dr. Singh reports receiving personal fees from serving as a consultant for Crealta/Horizon, Medisys, Fijiia, UBM LC, Mediscape, WebMD, the National Institute of Health, and the American College of Rheumatology, earnings from stocks in the Amarin Corporation and Viking Therapeutics; and nonfinancial support from serving as a member of OMERACT, the US Department of Veterans Affairs Rheumatology Field Advisory Committee, and committees of the American College of Rheumatology. No other disclosures are reported.

Funding/Support: The Institute for Health Metrics and Evaluation received funding from the Bill & Melinda Gates Foundation.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Additional Contributions: We thank cancer registries worldwide for their efforts in generating data on cancer incidence.

REFERENCES


