Economic value of disability-adjusted life years lost to cancers, 2008

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Abstract

Cancer is one of the leading causes of premature death in the world today with 12.4 million new cases and 7.6 million deaths in year 2008 according to the World Cancer Report. With 53% of the new cancer cases and 60% of the cancer related deaths, developing countries share an increasing burden of cancer. However, the economic loss from cancer has never been estimated across the countries on a comparable scale. This paper estimates the economic loss from 17 types of cancers measured by the economic value of Disability Adjusted Life Years (DALY) lost to cancers in the world. The economic value of DALYs lost due to cancer amounted to US$895 billion in 2008 globally. This represents roughly 1.5% of the world GDP. The top three cancers which account for the highest economic value of DALYs are lung cancer (19.9%) at US$178 billion, colon/rectum cancer (11.0%) at US$99 billion and breast cancer (9.8%) at US$88 billion. The economic value of DALYs lost to cancers on average amounts to 2.22% of GDP in low-income countries whereas in high-income countries this loss amounts to about 1.69% of GDP. For nearly half the countries in the world the economic value of DALYs lost to cancer amount to more than 1% of annual GDP. This finding suggests that cancer prevention warrants attention as a major economic and health policy strategy.

Introduction

According to the World Cancer Report[1] cancer is one of the leading causes of premature death in the world with 12.4 million new cases and 7.6 million deaths in 2008. According to the report 53% of the new cancer cases and 60% of the cancer related deaths occur in low-income countries. Given the current rates of deaths, the report predicts that the global cancer deaths could almost double by the year 2030 reaching 13 million.

Since cancer occupies such a prominent spot in the global disease burden, it is important to gauge the economic loss from cancer. Information on the economic loss from cancer can help in setting priorities for policy-making, interventions, and research. Research and interventions should be concentrated where disease burden is relatively high and the potential for cost-effective reduction of burden is greatest. Assessing current and projected future economic loss from cancer may encourage governments to implement cancer surveillance, prevention and control measures as well as fund cancer research at both national and sub-national levels.

Despite the impact of cancer on global health and its predominant role as a leading cause of death worldwide, there have not been many prior attempts to estimate the global economic loss from cancers. Estimation of these loss can be very data intensive, thus feasible only for few high-income countries. In the United States, for example, the cost of cancer has been estimated by the National Institutes of Health and National Heart Lung and Blood Institute.[2] The latest estimates suggest that the total economic cost of all cancers in the United States reached US$243.4 billion in 2009, of which US$99.0 billion were direct healthcare costs. In the U.K. the expenditure on cancer treatment by the National Health Service in 2000-01 was estimated to be US$3.2 billion.[3] Estimates of the cost of productivity loss due to cancer are also available in the United States. A recent study estimate[4] that the annual productivity loss from cancer mortality in the United States amount to approximately $115.8 billion for the year 2000.

The main objective of this study is to estimate the global economic loss from cancers, measured by the economic value of disability-adjusted life years (DALYs) lost to cancers, in 2008.

Material and Methods

One major approach to measure the burden of disease develops measures designed to assess the impact of disease on health related quality of life (HRQOL)[5] by combining the mortality and morbidity dimensions of illness into a single summary score. A detailed review of HRQOL measures is outside the scope of current discussion, but Brown et al. provides an excellent overview[5]. One of the measures is called DALY and was developed by Murray and Lopez[6] explicitly for measuring the global burden of disease. DALYs are the sum of years of life lost (YLL) and years lived with disability (YLD) resulting from a disease. They represent the sum of potential life-years lost due to premature mortality caused by a disease and the equivalent years of "healthy life" lost due to living with a disease. In other words, one DALY is equal to one year of healthy life lost. In simple terms, YLL for a particular disease is computed by multiplying number of deaths from that disease with standard life expectancy after the average age at death from this disease. YLD, on the other hand, is a product of the number of incident cases, disability weight, and the mean duration of disease.[7] Although DALYs have been used by academics[8-10] and the World Health Organization (WHO) to measure disease burden, the concept has not been free of criticism.[7,11] The disability weights and the discount rate can highly influence DALYs.[12]

If one could estimate the economic value of a year of healthy life, one can multiply that with the estimated DALYs to derive the economic value of DALYs. There is a growing body of literature[13-16] on different methods to value life and DALYs. Based on the concept of an "acceptable threshold", the WHO Commission on Macroeconomics and Health suggested that interventions costing less than three times per capita Gross Domestic Product (GDP) for each DALY averted represent good value for the money for an intervention.[17] The World Health Report[18] by the WHO defines very cost-effective

interventions as those which avert each additional DALY at a cost less than GDP per capita, and cost-effective interventions as those where each DALY averted costs between one and three times GDP per capita. In reporting the economic value of DALYs, it is preferable to use more conservative methods of valuation. The group of experts on the Commission made the assumption that each DALY can be valued at one year of per capita GDP to arrive at a conservative estimate of the economic value of DALY. To our knowledge, one other study[19] has used this method to estimate the economic value of DALYs. Since data on per capita GDP are readily available for most countries in the world, using per capita GDP to value each DALYs is a feasible method to derive the economic value of DALYs for every country. Since the economic value of DALYs as measured here are affected by the size of per capita GDP, expressing these values as percentage of each country's GDP would provide a more meaningful metric for cross-country comparisons.

We first classified the countries in the world into four aggregated groups based on the World Bank's income classification criteria in their World Development Report 2004[20]: high- income, upper middle income, lower middle income, and low-income countries. Countries are divided according to the 2004 gross national income (GNI) per capita: ≥ US$10,066 for high-income countries, US$3,256–10,065for upper middle-income countries, US$826–3,255 for lower middle income countries, and less than US$825 for low-income countries. According to this classification, out of the total of 205 countries in 2004, 53 were classified as high-income countries with a world population share of 14.8%, 39 were upper middle income countries with a world population share of 8.8%, 54 were lower middle income countries with a population share of 37.7%, and 59 were low-income countries with a world population share of 38.7%.

Then, we estimated the economic value of DALYs lost to cancers, hereafter the economic loss cancers, for each of the four groups of countries. Particularly, we calculated the product between each group's average per capita GDP and the corresponding DALYs lost to cancers in that group in 2008. Finally, we summed up the products across these four groups of countries to derive the world total. Note that the per capita GDP was

expressed in 2008 US dollars in 2008. Estimates were also obtained similarly for WHO member countries for the year 2004 since similar data were not available for each member country for the year 2008.

Data Sources

Data on DALYs and the death rates were obtained from the WHO Global Burden of Disease estimates[21] for 2004 for each member country and for 2008 for each of the four aggregated country income groups. Data on GDP per capita were obtained from the World Bank's World Development Indicators data base.

Results

Table 1 presents the DALYs by types of cancers in the world for 2008. Approximately 83 million DALYs were lost to cancers in the year 2008 with a total economic loss equivalent to US$895 billion. This is roughly 1.5% of the world GDP for 2008. The types of cancers in Table 2 are listed in descending order of the estimated DALYs except the combined category, other malignant neoplasm. The top three cancers which account for the highest number of DALYs are lung cancer (15.5%), stomach cancer (9.6%) and liver cancer (8.6%), whereas the top three cancers which account for the highest economic value of DALYs are lung cancer (19.9%) at US$178 billion, colon/rectum cancer (11.0%) at US$99 billion and breast cancer (9.8%) at US$88 billions.

Table 2 presents the DALYs and their economic value for different cancer types by country-income groups. The top three cancers which account for the highest DALYs as well as the economic value of DALYs are lung cancer, colon/rectum cancer and breast cancer for both high-income and upper middle income countries; lung cancer, stomach cancer and liver cancer for the lower middle income countries; and mouth/oral cancer, cervix/uterus cancer and breast cancer for low-income countries, respectively. Thus while lung cancers account for the highest portion of the economic loss from cancers in the three higher income groups, mouth cancers account for the largest share in low-income countries. India, the world's second most populous country, which is a low-income

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country having one of the highest rates of mouth/oral cancers in the world could be driving the results for low-income countries. Contribution of esophageal cancer to economic value of DALYs varies from the 4th highest for lower middle income countries to the 13th highest for upper middle income countries. Cancers of the cervix and uterus have a more significant contribution to the total economic loss from cancer in low-income countries (10.3%) compared to high-income countries, ranked from the 2nd highest for low-income countries to the 16th for high-income countries.

Table 2 also shows the economic loss from cancers as a proportion of GDP. While the economic value of DALYs lost to cancer amounts to 2.22% of GDP in low-income countries, it amounts to 1.69% in high-income countries. This percentage is lower in the two categories of middle income countries at around 0.9% of GDP.

Table 3 lists the top 25 countries in terms of the DALYs lost to cancer in year 2004 as the country level data for DALYs were not available for the period after 2004.[*] China, India and the United States are the top three countries with the highest number of DALYs lost to cancer mainly due to the fact that these are the three most populated countries in the world. The United States has the highest economic loss from cancers in the world in terms of absolute dollar amounts at US$202 billion. However, as a percentage of GDP, United State's economic loss from cancers is ranked as the 38th at 1.73% of GDP. The economic value of DALYs as a percentage of GDP varies from as high as 3.18% in Serbia and Montenegro to 0.18% in Qatar. Detailed country-wise information is available in the appendix Table A1. For nearly half of the countries (87 countries), the economic value of DALY lost to cancers is higher than 1% of their respective GDP and for 25 countries it is more than 2% of their GDP. Clearly the ranking of countries based on the number of DALYs is not in line with the rankings based on its economic value of DALYs. The simple reason for this discrepancy is the differences in economic development in these countries. A number of countries that rank highly in both DALY

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[*] The data sources and methods used for the estimation of deaths by cause for each member state were summarized into four levels of evidence primarily based on the availability of data. See http://www.who.int/topics/global_burden_of_disease/en/ for details.

and its economic value are early industrialized countries in the advanced stages of tobacco epidemic with high cancer death rates.

Economic value of DALYs as a percentage of country's GDP actually exposes the extent of economic loss associated with cancers in each country. In this respect, Serbia & Montenegro, Hungary, Croatia, the Czech Republic, Slovenia, Poland, and Denmark are among the countries with highest economic loss from cancer while Middle Eastern countries such as Qatar, United Arab Emirates (UAE), and Kuwait have the lowest loss.

Table 4 compares the economic loss from the top 15 diseases with the highest number of deaths in the world in 2008 as given in *Global Cancer Facts & Figures*.[22] It should be noted that these 15 diseases are not the top 15 diseases in terms of the economic value of DALYs. Cancer emerges as the disease with the highest economic loss contributing 12% of the total economic value of DALYs lost from the top 15 causes of deaths in the world. The ranking of these diseases based on their economic value of DALY is different from its ranking based on the number of deaths. While the top 15 diseases accounted for nearly 79% of the total number of deaths in the world, these 15 disease account for only 47% of the economic value of DALYs. This is mainly due to the way DALYs account for both morbidity and mortality. As DALY is a sum of the years of life lost (YLL) and the years lived with disability (YLD), the age of onset of the disease, the rate of survival, and rate of incidence play vital roles in determining the DALYs lost due to each disease. For example, suicides could have a higher years of life lost but lower disability. Many road traffic accidents on the other hand could lead to many years of life with disability but lower mortality rates. So it is possible to find diseases with low mortality but higher DALYs and vice versa.

Limitations

Since the results of economic loss presented here are based on estimated DALYs from the WHO global burden of disease project, the validity of the findings is subject to the validity of the estimates of DALYs themselves. However, this estimate of DALYs is perhaps the only available data to gauge the economic loss from cancers for all countries

in the world on a comparable scale. It is possible that some countries with very low per capita incomes and high rate of DALYs lost to cancer may not have gotten proper attention in the discussion precisely because their economic values of DALYs are not very significant at a global level. Hence it is important to consider a variety of factors such as DALYs, economic value of DALYs, GDP per capita, and population size while making conclusions on the economic loss from cancers in different countries. It should be also noted that the estimates present here do not include direct cost of cancer care and in that respect they underestimate the true economic loss from cancer. However, despite all its limitations it is important to compute the economic value of DALYs lost to cancer to have a fair understanding of the global economic damage caused by cancers.

Discussion

Our results show that 83 million DALYs with an economic value amounting to US$895 billion, roughly 1.5% of the world GDP, were lost to cancers globally in 2008. This did not include the direct medical cost of treating cancers. The top three cancers which account for the highest economic value of DALYs are lung cancer (19.9%) at US$178 billion, colon/rectum cancer (11.0%) at US$99 billion and breast cancer (9.8%) at US$88 billions. The economic value of DALYs associated with cancers amounts to more than one percent of annual GDP in nearly half the countries in the world. Therefore, cancer imposes a severe burden on these economies. As the cancer incidence and mortality rate show an increasing trend in low-income countries, the global economic loss from cancers can only worsen. By 2020, nearly 70% of cancer deaths will be in economically disadvantaged countries, where survival rates are often less than half of those in high-income countries[23].

At an economic value of US$895 billion in 2008, cancer emerges as the leading disease accounting for 12% of the total economic value of DALYs lost from the top 15 causes of deaths in the world. This finding suggests that cancer prevention warrants attention as a major economic and health policy strategy.

The majority of cancers in low-income countries are preventable and the efficacy of treatment can be improved with early detection.[24] More than 50% of the cancer deaths in the United States could be prevented with modification in lifestyle risk factors and effective use of cancer screening tests.[25] As part of the global strategy to fight cancer, the WHO has put forth several initiatives such as the Framework Convention of Tobacco Control (an international treaty ratified by 168 countries to fight against tobacco), global strategies on diet and physical activities, reproductive health, and planning and implementation of cervical cancer prevention and control programs including, but not limited to, the use of visual examination with acetic acid and HPV screening for cervical cancer.[24]

Investing in cancer prevention strategies could also have positive implications on the economic burden contributed by other diseases. For example, an intervention program targeted to reduce tobacco use could also produce favorable effects on cardiovascular diseases and tuberculosis as tobacco use is known to cause these diseases.[26,27] Considering the enormous economic loss from cancer measured by the economic value of DALYs lost to cancer, investing in feasible and cost-effective cancer prevention programs should be a major economic and health policy strategy.

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Tables

Table 1: Estimated number of DALYs and its economic value by types of cancers in the world for the year 2008

Cancer Types	DALYs ('000)		Economic Value of DALYs (Current US$ Billion)	
Trachea/bronchus/lung cancers	12,811	15.46%	178.15	19.90%
Stomach cancer	7,960	9.61%	59.97	6.70%
Liver cancer	7,116	8.59%	47.46	5.30%
Breast cancer	7,023	8.48%	87.80	9.81%
Colon/rectum cancer	6,180	7.46%	98.59	11.01%
Esophagus cancer	5,198	6.27%	29.23	3.26%
Leukaemia	5,001	6.04%	37.49	4.19%
Lymphomas, multiple myeloma	4,514	5.45%	43.84	4.90%
Mouth and oropharynx cancers	4,108	4.96%	23.83	2.66%
Cervix uteri cancer	3,906	4.71%	16.48	1.84%
Pancreas cancer	2,320	2.80%	39.75	4.44%
Prostate cancer	2,036	2.46%	33.81	3.78%
Ovary cancer	1,844	2.23%	21.94	2.45%
Bladder cancer	1,568	1.89%	21.37	2.39%
Corpus uteri cancer	1,029	1.24%	20.24	2.26%
Melanoma and other skin cancers	728	0.88%	14.37	1.61%
Other malignant neoplasms	9,514	11.48%	120.88	13.50%
All cancers	**82,855**	100.00%	**895.2**	100.00%

Table 2: Estimated number of DALYs and the economic value of DALYs by types of cancer and by country-income group for 2008 (current US $ billion)

Cancer Type	High-Income		Upper Middle Income		Lower Middle Income		Low-Income	
	DALY ('000)	Economic Value (US$ bl.)	DALY ('000)	Economic Value (US$ bl.)	DALY ('000)	Economic Value (US$ bl.)	DALY ('000)	Economic Value (US$ bl.)
Trachea/bronchus/lung cancers	3754.7	151.8	1433.7	12.8	5902.0	12.6	1720.7	1.0
Colon/rectum cancer	2117.9	85.6	854.8	7.6	2252.4	4.8	954.8	0.6
Breast cancer	1828.9	73.9	846.1	7.5	2448.4	5.2	1899.3	1.1
Stomach cancer	1033.6	41.8	806.3	7.2	4792.1	10.2	1328.4	0.8
Lymphomas, multiple myeloma	900.3	36.4	383.1	3.4	1386.3	3.0	1844.3	1.1
Pancreas cancer	864.5	34.9	330.3	2.9	781.8	1.7	343.5	0.2
Liver cancer	852.7	34.5	265.5	2.4	4589.2	9.8	1408.5	0.8
Prostate cancer	743.2	30.0	270.0	2.4	492.8	1.1	529.6	0.3
Leukaemia	676.3	27.3	507.2	4.5	2195.8	4.7	1621.2	0.9
Esophagus cancer	493.5	19.9	232.6	2.1	2961.3	6.3	1510.6	0.9
Bladder cancer	451.9	18.3	185.9	1.7	583.2	1.2	346.9	0.2
Ovary cancer	450.2	18.2	246.6	2.2	563.1	1.2	583.8	0.3
Corpus uteri cancer	434.9	17.6	231.2	2.1	252.3	0.5	110.6	0.1
Mouth and oropharynx cancers	431.3	17.4	301.0	2.7	1122.9	2.4	2252.4	1.3
Melanoma and other skin cancers	316.7	12.8	133.7	1.2	139.2	0.3	138.2	0.1
Cervix uteri cancer	233.3	9.4	384.2	3.4	1097.7	2.3	2191.0	1.3
Other malignant neoplasms	2510.1	101.5	1314.9	11.7	2828.2	6.0	2860.7	1.7
Total All cancers	18094.0	731.4	8727.3	77.7	34388.7	73.5	21644.6	12.6
Economic value as a % of GDP		1.69%		0.92%		0.93%		2.22%

Table 3: Top 25 countries in terms of the Disability Adjusted Life Years (DALY) lost to cancer in year 2004

DALY Rank	Country	Rank EV of DALYs	Death Rate*	DALYs ('000)	EV of DALYs (Million $)	EV of DALYs as %GDP	Health Exp (% of GDP)
1	China	7	136.0	19302	28766	1.49%	4.7%
2	India	21	65.3	8487	5469	0.79%	5.0%
3	United States of America	1	193.7	5085	202248	1.73%	15.4%
4	Russian Federation	11	194.5	3109	12729	2.16%	6.0%
5	Japan	2	252.9	2406	86342	1.88%	7.8%
6	Indonesia	30	89.2	2406	2811	1.11%	2.8%
7	Brazil	15	104.6	2159	7092	1.17%	8.8%
8	Germany	3	261.1	1747	58228	2.12%	10.6%
9	France	4	272.5	1355	46102	2.24%	10.5%
10	United Kingdom	5	266.5	1204	42887	2.01%	8.1%
11	Nigeria	53	67.5	1203	673	0.93%	4.6%
12	Italy	6	272.5	1202	35632	2.07%	8.7%
13	Bangladesh	61	56.4	1123	457	0.81%	3.1%
14	Ukraine	39	192.3	980	1339	2.07%	6.5%
15	Pakistan	55	53.4	972	614	0.64%	2.2%
16	Thailand	33	132.0	913	2317	1.43%	3.5%
17	Poland	17	253.7	906	5993	2.37%	6.2%
18	Mexico	22	69.2	816	5462	0.80%	6.5%
19	Spain	8	234.7	809	19698	1.89%	8.1%
20	Republic of Korea	12	174.3	785	11107	1.63%	5.6%
21	Turkey	26	80.8	760	3236	1.07%	7.7%
22	Philippines	52	55.2	683	759	0.84%	3.4%
23	Viet Nam	62	79.4	666	366	0.81%	5.5%
24	Egypt	54	55.6	595	646	0.82%	5.9%
25	Canada	9	209.2	584	17823	1.82%	9.8%

Source: DALYs and Death rates were taken from WHO Global Burden of Disease estimates[22].

Note: EV = economic value. * Death rate is per 100,000 population.

Table 4: Economic value of DALYs for the top 15 diseases with the highest number of deaths in the world for the year 2008

Disease	Rank EV of DALYs	Economic Value of DALY (US$ billion)	%
Malignant neoplasms (2)	1	895.2	12.16%
Heart diseases (1)	2	753.2	10.23%
Cerebrovascular disease (3)	3	298.2	4.05%
Diabetes mellitus (12)	4	204.4	2.78%
Road traffic accidents (11)	5	204.4	2.78%
Chronic obstructive pulmonary disease (5)	6	203.1	2.76%
HIV/AIDS (6)	7	193.3	2.63%
Perinatal conditions (7)	8	192.8	2.62%
Suicides (13)	9	140.8	1.91%
Lower respiratory infections (4)	10	125.8	1.71%
Cirrhosis of the liver (14)	11	92.8	1.26%
Diarrhoeal diseases (8)	12	70.1	0.95%
Tuberculosis (9)	13	45.4	0.62%
Malaria (10)	14	24.8	0.34%
Measles (15)	15	8.1	0.11%
All Causes		7,362.7	100.00%

Source: Top 15 diseases with highest number of deaths taken from Adapted from *Global Cancer Facts & Figures* (American cancer Society).

Notes: Values in parenthesis shows the ranking based on number deaths from Table 1. EV= Economic Value

Appendix

Table A1: Estimated number of disability adjusted life years (DALYs) and economic value of DALYs lost to cancers in 2004 for 188 WHO member countries.

Rank %GDP	Country	Rank DALY	Death Rate	DALYs ('000)	EV of DALY (Million $)	EV of DALY %GDP	Health Exp (% of GDP)
1	Serbia and Montenegro	45	235.2	257	776	3.18%	10.1%
2	Hungary	40	328.5	308	3070	3.05%	7.9%
3	Croatia	78	284.5	118	936	2.65%	7.7%
4	Czech Republic	44	287.3	262	2779	2.57%	7.3%
5	Slovenia	114	272.5	49	800	2.45%	8.7%
6	Poland	17	253.7	906	5993	2.37%	6.2%
7	Denmark	75	292.8	127	5758	2.35%	8.6%
8	Latvia	108	259.3	54	322	2.34%	7.1%
9	Estonia	130	269.3	31	262	2.33%	5.3%
10	France	9	272.5	1355	46102	2.24%	10.5%
11	Armenia	101	210.4	67	79	2.21%	5.4%
12	Belgium	48	278.3	227	7798	2.18%	9.7%
13	Lithuania	96	234.5	75	489	2.18%	6.5%
14	Bulgaria	64	216.0	169	526	2.17%	8.0%
15	Russian Federation	4	194.5	3109	12729	2.16%	6.0%
16	Slovakia	79	219.2	115	882	2.15%	7.2%
17	Romania	31	201.6	460	1600	2.12%	5.1%
18	Germany	8	261.1	1747	58228	2.12%	10.6%
19	Netherlands	37	250.3	343	12800	2.11%	9.2%
20	Macedonia, FYR	124	179.0	43	113	2.10%	8.0%
21	Italy	12	272.5	1202	35632	2.07%	8.7%
22	Ukraine	14	192.3	980	1339	2.07%	6.5%
23	Belarus	54	199.2	202	476	2.05%	6.2%
24	Portugal	51	233.5	213	3597	2.03%	9.8%
25	United Kingdom	10	266.5	1204	42887	2.01%	8.1%
26	Uruguay	104	238.2	66	254	1.92%	8.2%
27	Austria	67	235.6	155	5593	1.90%	10.3%
28	Greece	52	247.1	210	3973	1.90%	7.9%
29	Spain	19	234.7	809	19698	1.89%	8.1%
30	Norway	89	243.9	87	4814	1.89%	9.7%
31	Japan	5	252.9	2406	86342	1.88%	7.8%
32	Canada	25	209.2	584	17823	1.82%	9.8%
33	Bosnia and Herzegovina	97	164.0	71	169	1.81%	8.3%
34	Luxembourg	148	215.1	8	603	1.79%	8.0%
35	Kazakhstan	42	153.7	269	773	1.79%	3.8%
36	Switzerland	74	221.2	129	6272	1.75%	11.5%
37	Mongolia	123	158.3	44	28	1.74%	6.0%
38	United States of America	3	193.7	5085	202248	1.73%	15.4%
39	Ireland	98	204.4	70	3181	1.72%	7.2%

40	Barbados	159	166.9	5	48	1.72%	7.1%
41	New Zealand	100	193.7	69	1677	1.70%	8.4%
42	Malta	155	183.5	7	90	1.68%	9.2%
43	Sweden	68	228.1	151	5886	1.68%	9.1%
44	Republic of Moldova	99	152.8	70	43	1.66%	7.4%
45	Australia	38	192.5	332	10828	1.65%	9.6%
46	Albania	110	146.2	51	122	1.65%	6.7%
47	Republic of Korea	20	174.3	785	11107	1.63%	5.6%
48	Grenada	171	148.0	2	7	1.61%	6.9%
49	Finland	90	201.6	84	2999	1.61%	7.4%
50	Bolivia	71	139.3	144	139	1.60%	6.8%
51	Dominica	177	159.6	1	4	1.56%	5.9%
52	China	1	136.0	19302	28766	1.49%	4.7%
53	Argentina	26	157.8	568	2266	1.48%	9.6%
54	Iceland	161	179.1	4	187	1.43%	9.9%
55	Thailand	16	132.0	913	2317	1.43%	3.5%
56	Marshall Islands	181	85.3	1	2	1.34%	15.2%
57	St. Vincent & the Grenadines	174	113.6	2	5	1.30%	6.1%
58	Trinidad and Tobago	138	104.8	17	158	1.30%	3.5%
59	Maldives	163	148.9	4	10	1.28%	7.7%
60	Antigua and Barbuda	179	155.8	1	10	1.27%	4.8%
61	Sierra Leone	102	90.4	67	13	1.25%	3.3%
62	Cambodia	63	78.8	169	64	1.22%	6.7%
63	Israel	91	142.1	82	1417	1.21%	8.7%
64	Seychelles	180	104.9	1	9	1.21%	6.1%
65	Azerbaijan	83	91.4	99	104	1.20%	3.6%
66	Peru	39	113.5	327	828	1.19%	4.1%
67	Singapore	113	120.6	50	1271	1.18%	3.7%
68	Brazil	7	104.6	2159	7092	1.17%	8.8%
69	Chile	58	131.7	187	1104	1.16%	6.1%
70	Angola	61	75.7	176	224	1.14%	1.9%
71	South Africa	28	90.9	521	2411	1.12%	8.6%
72	Dominican Republic	84	109.8	98	205	1.11%	6.0%
73	Indonesia	6	89.2	2406	2811	1.11%	2.8%
74	Sri Lanka	50	100.5	215	221	1.10%	4.3%
75	St. Lucia	170	113.3	2	8	1.10%	5.0%
76	Cyprus	149	113.0	8	167	1.09%	5.8%
77	Côte d'Ivoire	55	78.4	192	166	1.07%	3.8%
78	Turkey	21	80.8	760	3236	1.07%	7.7%
79	Lebanon	128	77.3	38	231	1.07%	11.6%
80	Guyana	150	84.8	8	8	1.06%	5.3%
81	Equatorial Guinea	157	91.4	5	34	1.06%	1.6%
82	Jamaica	132	124.5	28	93	1.05%	5.2%
83	Suriname	160	83.6	5	12	1.04%	7.8%
84	St. Kitts and Nevis	187	103.1	0	4	1.02%	5.2%
85	Sudan	36	67.2	361	218	1.02%	4.1%

86	Kyrgyzstan	111	77.2	51	22	1.00%	5.6%
87	Georgia	122	90.3	45	51	1.00%	5.3%
88	Malaysia	46	83.6	244	1159	0.98%	3.8%
89	Chad	88	69.0	89	41	0.94%	4.2%
90	Ecuador	77	87.0	123	307	0.94%	5.5%
91	Yemen	56	49.5	191	122	0.94%	5.0%
92	Palau	188	60.8	0	1	0.94%	9.7%
93	Nigeria	11	67.5	1203	673	0.93%	4.6%
94	Central African Republic	129	77.6	37	12	0.93%	4.1%
95	Cameroon	70	71.1	149	147	0.93%	5.2%
96	Costa Rica	126	91.8	39	171	0.92%	6.6%
97	Colombia	34	81.5	413	890	0.92%	7.8%
98	Gambia	141	73.2	13	4	0.91%	6.8%
99	Niger	76	83.1	123	28	0.91%	4.2%
100	Jordan	115	60.3	49	104	0.91%	9.8%
101	Nicaragua	119	69.7	47	41	0.91%	8.2%
102	Paraguay	109	85.7	52	46	0.90%	7.7%
103	Guinea-Bissau	140	69.2	14	2	0.89%	4.8%
104	Burkina Faso	80	70.3	113	42	0.88%	6.1%
105	Djibouti	154	52.4	7	6	0.87%	6.3%
106	Nepal	47	63.0	231	59	0.87%	5.6%
107	Mauritius	142	77.9	11	53	0.87%	4.3%
108	Ghana	59	64.8	186	76	0.86%	6.7%
109	Venezuela, RB	49	68.6	224	940	0.86%	4.7%
110	Turkmenistan	125	60.0	41	58	0.86%	4.8%
111	Panama	133	80.1	27	121	0.85%	7.7%
112	Senegal	85	81.1	97	65	0.85%	5.9%
113	Honduras	107	77.3	60	64	0.85%	7.2%
114	Burundi	106	63.0	62	6	0.85%	3.2%
115	Samoa	173	59.0	2	3	0.85%	5.3%
116	Philippines	22	55.2	683	759	0.84%	3.4%
117	Lao PDR	116	67.9	48	21	0.83%	3.9%
118	Fiji	153	52.6	7	21	0.83%	4.6%
119	Liberia	134	56.7	27	4	0.83%	5.6%
120	Guinea	95	67.1	76	33	0.82%	5.3%
121	Congo, Dem. Rep.	32	61.6	458	54	0.82%	4.0%
122	Egypt	24	55.6	595	646	0.82%	5.9%
123	Viet Nam	23	79.4	666	366	0.81%	5.5%
124	Bangladesh	13	56.4	1123	457	0.81%	3.1%
125	Vanuatu	172	48.2	2	3	0.80%	4.1%
126	Comoros	158	47.8	5	3	0.80%	2.8%
127	Mexico	18	69.2	816	5462	0.80%	6.5%
128	Togo	117	62.0	48	16	0.80%	5.5%
129	Papua New Guinea	120	48.7	46	31	0.79%	3.6%
130	Benin	105	58.8	65	32	0.79%	4.9%
131	India	2	65.3	8487	5469	0.79%	5.0%
132	Guatemala	86	65.0	96	213	0.78%	5.7%

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133	Iran, Islamic Rep.	27	63.4	524	1270	0.78%	6.6%
134	Tanzania	41	63.0	293	88	0.78%	4.0%
135	Zimbabwe	82	66.9	100	37	0.78%	7.5%
136	Madagascar	73	61.5	138	33	0.76%	3.0%
137	El Salvador	112	72.2	51	118	0.75%	7.9%
138	Rwanda	103	56.8	66	14	0.75%	7.5%
139	Ethiopia	29	57.1	515	72	0.74%	5.3%
140	Belize	169	68.5	2	8	0.73%	5.1%
141	Mauritania	135	68.8	22	11	0.73%	2.9%
142	Mozambique	72	59.7	142	43	0.73%	4.0%
143	Tonga	182	58.1	1	1	0.73%	6.3%
144	Gabon	145	77.4	10	52	0.72%	4.5%
145	Sao Tome and Principe	178	70.7	1	0	0.72%	11.5%
146	Brunei Darussalam	167	53.2	3	39	0.71%	3.2%
147	Mali	87	78.6	93	35	0.71%	6.6%
148	Zambia	93	58.6	79	37	0.69%	6.3%
149	Micronesia, Fed. Sts.	183	48.0	1	2	0.67%	7.6%
150	Bhutan	162	59.0	4	5	0.67%	4.6%
151	Saudi Arabia	69	46.9	151	1678	0.67%	3.3%
152	Libyan Arab Jamahiriya	127	45.9	38	200	0.66%	3.8%
153	Uzbekistan	65	42.6	168	78	0.65%	5.1%
154	Pakistan	15	53.4	972	614	0.64%	2.2%
155	Malawi	92	55.9	80	12	0.64%	12.9%
156	Swaziland	152	54.6	7	16	0.63%	6.3%
157	Algeria	53	56.7	204	537	0.63%	3.6%
158	Morocco	60	44.6	185	310	0.62%	5.1%
159	Timor-Leste	156	40.7	6	2	0.60%	11.2%
160	Uganda	66	49.4	164	40	0.59%	7.6%
161	Botswana	144	48.4	10	56	0.58%	6.4%
162	Lesotho	143	56.8	10	8	0.57%	6.5%
163	Kenya	57	48.4	189	92	0.56%	4.1%
164	Bahrain	164	50.5	4	61	0.56%	4.0%
165	Oman	139	41.8	14	135	0.56%	3.0%
166	Solomon Islands	168	35.9	3	1	0.56%	5.9%
167	Haiti	118	55.4	47	21	0.55%	7.6%
168	Cape Verde	166	51.0	3	5	0.55%	5.2%
169	Congo, Rep	137	53.9	20	23	0.52%	2.5%
170	Eritrea	136	40.9	22	3	0.51%	4.5%
171	Kiribati	186	34.5	0	0	0.50%	13.7%
172	Tajikistan	131	37.3	31	10	0.49%	4.4%
173	Tunisia	121	43.4	46	129	0.46%	NA
174	Syrian Arab Republic	94	27.9	78	104	0.42%	4.7%
175	Namibia	151	40.7	8	22	0.39%	6.8%
176	Kuwait	147	21.5	8	200	0.34%	2.8%
177	United Arab Emirates	146	16.1	10	231	0.22%	2.9%
178	Qatar	175	14.3	1	58	0.18%	2.4%
NA	Myanmar	30	83.4	485	NA	NA	2.2%

NA							
NA	Iraq	33	84.4	458	NA	NA	5.3%
NA	Afghanistan	35	82.5	402	NA	NA	4.4%
NA	Korea, Dem. Rep.	43	94.8	266	NA	NA	3.5%
NA	Cuba	62	171.1	174	NA	NA	6.3%
NA	Somalia	81	77.2	109	NA	NA	NA
NA	Bahamas	165	93.6	4	NA	NA	6.8%
NA	Andorra	176	227.5	1	NA	NA	7.1%
NA	San Marino	184	278.1	1	NA	NA	7.4%
NA	Monaco	185	210.6	1	NA	NA	9.9%

Source: DALYs and Death rates were taken from WHO Global Burden of Disease estimates[22].

Note: EV = economic value. * Death rate is per 100,000 population.