Global and National Epidemiology of Cancer: Facts and Figures

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Professor of Medicine
ShSMC
Defining cancer

Cancer is an accumulation of abnormal cells that multiply through uncontrolled cell division and spread to other parts of the body by invasion and/or distant metastasis via the blood and lymphatic system.

- Normal cells
- Abnormal cells
- Tumour growth
- Metastasis

Uncontrolled cell division

Invasion into surrounding tissues

Spread via blood or lymphatic system
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World cancer burden (2012)

Incidence:

- An estimated **14.1 million** new cancer cases occurred in 2012.
- Lung, female breast, colorectal and stomach cancers accounted for more than **40%** of all cases.
- **Lung cancer** was the most common cancer (**16.7%**) in men
- **Breast cancer** was the most common cancer (**25.2%**) in women.

*Number of new cases per year per 100,000*
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Incidence 2012

Cancer incidence by country

Age standardised incidence rates per 100,000 population compared to the world average

- Higher: 338.1
- World average: 182.3
- Lower: 63.4
Epidemiology of Cancer: Facts and Figures
Incidence in both sexes

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>1.825</td>
</tr>
<tr>
<td>Breast</td>
<td>1.677</td>
</tr>
<tr>
<td>Colorectum</td>
<td>1.361</td>
</tr>
<tr>
<td>Prostate</td>
<td>1.112</td>
</tr>
<tr>
<td>Stomach</td>
<td>0.952</td>
</tr>
<tr>
<td>Liver</td>
<td>0.782</td>
</tr>
<tr>
<td>Cervix</td>
<td>0.528</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>0.456</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.430</td>
</tr>
<tr>
<td>Other</td>
<td>4.969</td>
</tr>
</tbody>
</table>

Male: 4 million
Female: 4 million
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Prevalence

- **32.5 million** people living with cancer at the end of 2012.
- Most were **women** with **breast** cancer (**6.3 million**)
- **Men** with **prostate** cancer (**3.9 million**),
- Men and women with colorectal cancer (**3.5 million**).

*Prevalence: Total number of cases in a population at one particular time*

**Age-standardised rate (ASR):** The rate that a population would have if it had a standard age structure
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**Prevalence 2012**

**Most prevalent cancer by country**

**Males**

1. **Prostate** - 124 countries worldwide
2. **Bowel** - 23 countries in Africa, Asia, and Eastern Europe
3. **Stomach** - 9 countries in Asia
4. **Lip, Oral Cavity** - 7 countries in South-Central Asia and Melanesia
5. **Bladder** - 7 countries in Northern Africa, Asia
6. **Kaposi Sarcoma** - Lesotho, Malawi, Mozambique, Swaziland, Zimbabwe, Zambia
7. **Liver** - Gambia, Laos
8. **Lung** - China, Vietnam
9. **Pharynx** - Bangladesh, Myanmar

**Females**

1. **Breast** - 151 countries worldwide
2. **Cervix** - 30 countries in Africa, the Americas and Asia
3. **Thyroid** - South Korea
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Prevalence

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>1.893</td>
</tr>
<tr>
<td>Breast</td>
<td>6.255</td>
</tr>
<tr>
<td>Colorectum</td>
<td>3.544</td>
</tr>
<tr>
<td>Prostate</td>
<td>3.924</td>
</tr>
<tr>
<td>Stomach</td>
<td>1.538</td>
</tr>
<tr>
<td>Liver</td>
<td>0.633</td>
</tr>
<tr>
<td>Cervix</td>
<td>1.547</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>0.464</td>
</tr>
<tr>
<td>Bladder</td>
<td>1.320</td>
</tr>
<tr>
<td>Other</td>
<td>11.427</td>
</tr>
</tbody>
</table>

Total Estimated Prevalence: 11.427 million people
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Human Development Index (HDI)

is a composite index of three dimensions of human development:

- **Life expectancy** (based on life expectancy at birth)
- **Educational attainment** (based on a combination of adult literacy rate and primary to tertiary education enrolment rates)
- **Income** (based on GDP per capita adjusted for purchasing-power parity (PPP US$)).
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Countries by HDI *

- **Low HDI**: Afghanistan, Bangladesh, Cameroon, Central African Republic, Chad...
- **Medium HDI**: Bhutan, China, India, Indonesia, Iraq, Jordan..........
- **HDI**: Algeria, Bahrain, Brazil, Costa Rica, Cuba..........
- **Very high HDI**: Australia, France, Germany, United Kingdom, United States of America.............

*UNDP estimates for 2012:
## Epidemiology of Cancer: Facts and Figures

### Estimates for all cancers in 2012 by HDI and sex (counts in millions)

<table>
<thead>
<tr>
<th>Level of human development (HDI)</th>
<th>Incidence&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Prevalence 5 year</th>
<th>Mortality</th>
<th>Healthy years lost&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>5.781 (41%)</td>
<td>16.334 (50%)</td>
<td>2.606 (32%)</td>
<td>39.276 (23%)</td>
<td>1,153 (16%)</td>
</tr>
<tr>
<td>High</td>
<td>2.126 (15%)</td>
<td>4.981 (15%)</td>
<td>1.244 (15%)</td>
<td>25.764 (15%)</td>
<td>1,042 (15%)</td>
</tr>
<tr>
<td>Medium</td>
<td>5.232 (37%)</td>
<td>9.237 (28%)</td>
<td>3.657 (45%)</td>
<td>97.766 (58%)</td>
<td>3,553 (50%)</td>
</tr>
<tr>
<td>Low</td>
<td>0.943 (7%)</td>
<td>1.993 (6%)</td>
<td>0.690 (8%)</td>
<td>6.487 (4%)</td>
<td>1,303 (18%)</td>
</tr>
<tr>
<td>Worldwide</td>
<td>14.090</td>
<td>32.545</td>
<td>8.201</td>
<td>169.295</td>
<td>7,054</td>
</tr>
</tbody>
</table>

<sup>a</sup> Excluding non-melanoma skin cancers  
<sup>b</sup> Disability-adjusted life years lost (DALYs), Data from 2008 estimates.

www.iarc.fr  
www.cruk.org/cancerstats  
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Most commonly diagnosed cancers by Human Development Index

New cases per 100,000 population, age standardised

Very high HDI
- Breast
- Prostate
- Lung
- Bowel
- Stomach

High HDI
- Breast
- Lung
- Prostate
- Bowel
- Stomach

Medium HDI
- Lung
- Liver
- Stomach
- Breast
- Bowel

Low HDI
- Breast
- Cervix
- Prostate
- Liver
- Oesophagus

Countries for which an HDI score has not been defined
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Mortality

- Cancer is a leading cause of death worldwide
- 8.2 million deaths in 2012.
- More than half of all cancer deaths each year are due to lung, stomach, liver, colorectal and female breast cancers.

*Mortality: Number of deaths per year per 100,000.*
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Mortality 2012 / Cancer mortality by country

Age standardised mortality rates per 100,000 population compared to the world average

- **Higher**: 161.0
- **World average**: 102.4
- **Lower**: 50.2
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Mortality

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>1.590</td>
</tr>
<tr>
<td>Breast</td>
<td>0.522</td>
</tr>
<tr>
<td>Colorectum</td>
<td>0.694</td>
</tr>
<tr>
<td>Prostate</td>
<td>0.307</td>
</tr>
<tr>
<td>Stomach</td>
<td>0.723</td>
</tr>
<tr>
<td>Liver</td>
<td>0.746</td>
</tr>
<tr>
<td>Cervix</td>
<td>0.266</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>0.400</td>
</tr>
<tr>
<td>Bladder</td>
<td>0.165</td>
</tr>
<tr>
<td>Other</td>
<td>2.789</td>
</tr>
</tbody>
</table>

People 4 million
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Healthy Years of Life Lost

- An estimated 169.3 million years of healthy life were lost globally because of cancer in 2008.
- Colorectal, lung, female breast and prostate cancers were the main contributors in most regions of the world.
- Explaining 18%-50% of the total healthy years lost.

*Sum of life years lost to premature mortality and the years lived with disability*
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World cancer trends

- Approximately 44% of cancer cases and 53% of cancer deaths occur in countries at a low or medium level of the HDI.

“Westernisation” Trends

- Low HDI countries becoming more developed through rapid societal and economic changes.
- Likely to become “westernised”.
- Pattern of cancer incidence is likely to follow that seen in high HDI settings.
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- Likely declines in cervix uteri and stomach cancer incidence rates
- Increasing incidence rates of female breast, prostate and colorectal cancers.
- Reductions in infection-related cancers
- Increasing burden of cancers more associated with reproductive, dietary and hormonal risk factors.
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Projections to 2030 (based on the following):

- Demographic changes (UN) plus
- changing annual age-adjusted incidence rates of six cancers (in 101 cancer registries).
- **Annual decreases** in stomach (2.5%) and cervical cancer (2%) worldwide, and lung cancer (1%) in high and very high HDI areas in men.
- **Increases** in colorectal (1%), female breast (2%) and prostate (3%) worldwide, and lung (1%) in high and very high HDI areas in women.
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Projections to 2030

- Burden of cancer will increase to 23.6 million new cases each year by 2030.
- An increase of 68% compared with 2012 (66% in low and medium HDI countries and 56% in high and very high HDI countries).
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### Projections for all cancers in 2030<sup>a</sup> by HDI and sex (counts in millions)

<table>
<thead>
<tr>
<th>Level of human development (HDI)</th>
<th>Population 2012</th>
<th>Incidence&lt;sup&gt;b&lt;/sup&gt; 2012</th>
<th>Incidence by HDI 2012 estimates</th>
<th>Incidence by HDI 2030 projections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very high</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,153</td>
<td>8.8</td>
<td>Males 3.1</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>1,042</td>
<td>3.5</td>
<td>Females 2.7</td>
<td>3.8</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Both 5.8</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>1,174</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,553</td>
<td>2.1</td>
<td>Males 1.1</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>1,925</td>
<td>5.2</td>
<td>Females 1.1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Both 2.1</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>4,072</td>
<td>49%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,303</td>
<td>0.9</td>
<td>Males 0.4</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td>1,925</td>
<td>23%</td>
<td>Females 0.5</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Both 0.9</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>2,125</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Worldwide</strong></td>
<td>7,054</td>
<td>14.1</td>
<td>Total projected 2030 incidence Males 12.85, Females 10.77, Both 23.62</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8,425</td>
<td>23.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Based on demographic changes (UN) plus trends in rates of six cancers on the basis of changing annual age-adjusted incidence in 101 cancer registries 1988–2002

<sup>b</sup> Excluding non-melanoma skin cancers
World cancer burden (2012)

Risk factors

- Tobacco is, by far, the single most important risk factor for cancer.
- Worldwide, it caused 22% of cancer deaths (1.7 million in 2008) and 71% of lung cancer deaths (almost 1 million in 2008).
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Specific Infections

- **2.1 million (16.4%)** of the 12.7 million new cases in 2008 attributable to infection.
- higher in less developed regions (23.4%) than in more developed regions (7.5%) of the world.
- The most important infectious agents are *Helicobacter pylori*, Hepatitis B and C viruses and Human papillomaviruses.
- Responsible for **1.9 million** cases of gastric, liver and cervix uteri cancers, respectively.
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Other important causes of specific types of cancer
- Reproductive behaviour
- Use of exogenous hormones
- Differences in weight, exercise, diet
- Alcohol consumption
  (associated with breast cancer)
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- Consumption of red and processed meat
- Lack of fibre
- Alcohols
- Difference in bodyweight and physical activity are (associated with the risk of colorectal cancer)
- Excessive sunlight exposure
- Certain occupational exposures.
- There is little established about causes of prostate cancer, except for genetic determinants.
CANCER BURDEN IN BANGLADESH

- According to the Bangladesh Bureau of Statistics, cancer is the sixth leading cause of death.
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Percentage of population living in urban areas: 28.4%
Population proportion between ages 30 and 70 years: 37.3%

Proportional mortality (% of total deaths, all ages, both sexes)*

Injuries 9%
Cardiovascular diseases 17%
Communicable, maternal, perinatal and nutritional conditions 32%
Cancers 10%
Chronic respiratory diseases 11%
Diabetes 3%
Other NCDs 18%

Total deaths: 886,000
NCDs are estimated to account for 59% of total deaths.
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Mortality

Men

- Lung: 12,352 (25.1%)
- Oesophagus: 7,925 (16.1%)
- Other pharynx: 7,796 (15.9%)
- Lip, oral cavity: 1,743 (3.5%)
- Stomach: 1,859 (3.8%)
- Larynx: 1,550 (3.2%)
- Colorectum: 3,816 (7.8%)
- Liver: 4,094 (8.3%)
- Non-Hodgkin lymphoma: 8,928 (14.1%)
- Other and unspecified: 5,311 (11.2%)
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Women

Mortality

- Breast: 10,237 (24.2%)
- Cervix uteri: 1,590 (3.8%)
- Oesophagus: 1,929 (4.6%)
- Gallbladder: 2,354 (5.6%)
- Lip, oral cavity: 2,166 (5.1%)
- Ovary: 1,977 (4.7%)
- Lung: 6,582 (15.6%)
- Stomach: 4,984 (11.8%)
- Other pharynx: 3,259 (7.7%)
- Other and unspecified: 7,142 (16.9%)
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Both sexes
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- Within the low-income countries
- Absolute burden of cancer is much lower in comparison with the high and very high HDI
- The number of new cases per year is 141.1 thousand
- 5-year cancer survival prevalence is 291.2 thousand.
- The number of cancer deaths is 103.3 thousand.

[GLOBOCAN 2012]
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- **IARC (2008)** has identified that the **10 leading** causes of deaths from cancer
- **in males** are lung, lip and oral cavity, pharynx, esophageal, stomach, larynx, colorectal, lymphoma, liver and bladder cancers.
- **in females** are breast, cervical, oro-pharyngeal, lung, esophageal, gallbladder, stomach, ovary, liver and colorectal cancers.

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- Childhood cancers represent only 1% of the overall incidence of the diseases
- The commonest five cancers in children are leukemia, lymphomas, central nervous system tumors, soft tissue sarcomas and renal tumors
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Aetiological factors

- Smoking and smokeless tobacco use
- Human papilloma virus infection, Hepatitis B and C infection, Helicobacter Pylori infection
- Arsenic contaminated groundwater
- Chemical carcinogens mainly formalin treated fruits, fish and vegetables at open market
- Tannery waste contaminated with chromium (which is used for poultry feed and fish feed preparation).
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www.globocan
www.cancerresearchuk.org/cancerinfo/cancerstat/world
www.dep.iarc.fr
THANK YOU ALL