Cancer in India: Prevalence, Management and Outcome

Prospects for Research

Subrata Sinha
Department of Biochemistry
All India Institute of Medical Sciences New Delhi
sub_sinha@hotmail.com
Projected main causes of death, worldwide, all ages, 2005

TOTAL DEATHS 2005

- Cardiovascular diseases: 30%
- Other chronic diseases: 9%
- Diabetes: 2%
- Chronic respiratory diseases: 7%
- Cancer: 13%
- Injuries: 9%
- Communicable diseases, maternal and perinatal conditions, and nutritional deficiencies: 30%

WHO
% distribution of cancer deaths in 2002

South central asia
845,200 deaths

2002:
5-10% mortality

Estimated deaths in 2020

AAR of new cases in 2002
1,261,500 cases

2020:
25-50% mortality
## Estimate of cancer burden in 2004 (ICMR)

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population <em>(in thousands)</em></td>
<td>550,404</td>
<td>515,354</td>
</tr>
<tr>
<td>No. of cases of Cancer</td>
<td>390,809</td>
<td>428,545</td>
</tr>
<tr>
<td>No. of Deaths</td>
<td>138,622</td>
<td>121,192</td>
</tr>
<tr>
<td>No. of DALYs</td>
<td>25,48,392</td>
<td>33,48,444</td>
</tr>
</tbody>
</table>
The following table presents the site-specific cancer burden in 2004 as reported by the ICMR.

<table>
<thead>
<tr>
<th>Site</th>
<th>Males</th>
<th>Total DALYs</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth and oropharynx</td>
<td>516448</td>
<td></td>
<td>163132</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>135737</td>
<td>110441</td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td>129317</td>
<td>117724</td>
<td></td>
</tr>
<tr>
<td>Colon and rectum</td>
<td>101392</td>
<td>94036</td>
<td></td>
</tr>
<tr>
<td>Liver</td>
<td>82436</td>
<td>29182</td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td>36552</td>
<td>27128</td>
<td></td>
</tr>
<tr>
<td>Trachea, bronchus and lung</td>
<td>147747</td>
<td>45094</td>
<td></td>
</tr>
<tr>
<td>Melanoma and other skin</td>
<td>20369</td>
<td>23709</td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>537</td>
<td><strong>8,89,224</strong></td>
<td></td>
</tr>
<tr>
<td>Prostate</td>
<td>62805</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bladder</td>
<td>45173</td>
<td>16571</td>
<td></td>
</tr>
<tr>
<td>Lymphomas and multiple myeloma</td>
<td>149613</td>
<td>1,02,980</td>
<td></td>
</tr>
<tr>
<td>Leukaemia</td>
<td>2,29,811</td>
<td>1,57,933</td>
<td></td>
</tr>
<tr>
<td>Cervix uteri</td>
<td>-</td>
<td>4,31,538</td>
<td></td>
</tr>
<tr>
<td>Corpus uteri</td>
<td>-</td>
<td>63,661</td>
<td></td>
</tr>
<tr>
<td>Ovary</td>
<td>-</td>
<td>227,088</td>
<td></td>
</tr>
</tbody>
</table>
Projected increase of cancer incidence by 2020 will be nearly 50% worldwide.

Primary factors responsible for 4.4 million new cases and 43% deaths in 2002:

<table>
<thead>
<tr>
<th>Tobacco</th>
<th>Diet</th>
<th>Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>Stomach</td>
<td>Cervix</td>
</tr>
<tr>
<td>Mouth</td>
<td>Oesophagus</td>
<td>Liver</td>
</tr>
<tr>
<td>Pharynx</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oesophagus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Possible prevention
| Burden of cancer in India |

**Most frequent cancer in males:**
- Mouth/oropharynx
- Oesophagus
- Stomach
- Lungs/bronchus/trachea

**Most frequent cancer in females:**
- Cervix
- Breast
- Mouth/oropharynx
- Oesophagus
India’s cancer control programme

Comprehensive National Control Programme

Cancer surveillance

Cancer burden assessment

Cancer causes and outcome

Prevalence and trends on risk factors

Prevention, early detection/screening, treatment, palliative care

Population Based Cancer Registry

Clinics

Regional cancer centres

NGOs

Private hospitals

Active collection

Comprehensive National Control Programme
National Cancer Control Programme (from 1975)

Objective: primary prevention, early detection, treatment and rehabilitation.

*Third revision in December 2004.*

- The primary focus is on correcting the geographic imbalance in the availability of cancer care facilities across the country.
- The scope of the programme and the quantum of assistance under the various schemes have been increased.
**National Cancer Registry Programme : commenced in 1981**

Three Hospital based cancer registries (HBCRs) and three Population Based Cancer Registry (PBCRs) commenced data collection in 1982

the ICMR commenced PBCRs in four of the eight North Eastern states in 2003, and from January 2009 in three additional states of the North East.

Now 23 PBCRs are actively involved under the NCRP

<table>
<thead>
<tr>
<th>Old PBCR +2 new</th>
<th>new NE PBCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad</td>
<td>Aizwal</td>
</tr>
<tr>
<td>Bangalore</td>
<td>Dibrugarh</td>
</tr>
<tr>
<td>Barshi (Rural)</td>
<td>Imphal</td>
</tr>
<tr>
<td>Bhopal</td>
<td>Kamrup dst</td>
</tr>
<tr>
<td>Chennai</td>
<td>Mizoram</td>
</tr>
<tr>
<td>Delhi</td>
<td>Mizoram(exc Aizwal distt)</td>
</tr>
<tr>
<td>Kolkata</td>
<td>Sikkim</td>
</tr>
<tr>
<td>Mumbai</td>
<td>Silchar</td>
</tr>
</tbody>
</table>

Source of presented data
Primary budget allocation in NCCP

Optimization and assessment of existing resources

*Primary prevention*
*Early detection and screening*
*Treatment (surgery, radiotherapy, chemotherapy)*
*Palliative care*

*Educating the public on cancer*

*Educating health workers on current practices*

National Strategic Task Force National Cancer Control Programme for the Eleventh Five-Year Plan.

Training: increase the capacity of the health staff at all levels of health care. Training manuals have been developed in cancer control, tobacco cessation, cytology and palliative care.

Onconet-India: 25 RCCs are linked with each other and also each RCC is in turn be linked to 5 peripheral centres.

Under the 11th 5-year plan

Inter-agency projects: new insights in cancer biology—identification of novel targets and development of target based molecular medicine;

A proton therapy unit would be assembled and installed in the Advanced Centre for Treatment, Research and Education in Cancer, Navi Mumbai, for clinical application in treatment of cancer. Medical cyclotron, which is under construction, would also be available during the Eleventh Five Year Plan period.
Though cancer per se does not feature in the United Nations 'Millennium Development Goal' health agenda, WHO predicts that by the year 2020, almost 70% of the world’s 20 million cancers patients will be in the developing nations.

India’s initiative

Approximate budget allocation under the 5 schemes of the Revised Programme:

• Recognition of new Regional Cancer Centres (RCCs) by providing a onetime grant of Rs. 5.00 crore (existing 25).

• Strengthening of existing RCCs by providing a one-time grant of Rs. 3.00 crore.

• Development of Oncology Wing by providing enhanced grant of Rs. 3.00 crore to the Government institutions (Medical Colleges as well as government hospitals).

• Development of District Cancer Control Programme by providing the grant-in-aid of Rs. 90.00 lakh spread over a period of 5 years.

• Decentralised NGO Scheme by providing a grant of Rs. 8000 per camp to the NGOs for IEC activities.
Comparison of Age Adjusted Incidence Rates (AAR’s) of North East PBCR’s (2005-2006) with the AAR’s of other PBCR’s (2004-2005).

The NE PBCR show a higher incidence of cancer than the other PBCRs

Adapted from statistics on www.pbcrindia.org
Site specific AAR (NE and old PBCRs)

Adapted from statistics on www.pbcrcindia.org
Site specific AAR (NE and old PBCRs)

- **Mouth**
  - Kamrup distt: Male 9.3, Female 7.2
  - Other PBCR: Male 8.8, Female 5.9

- **Oesophagus**
  - Kamrup distt: Male 34.4, Female 16.5
  - Other PBCR: Male 7.9, Female 6.5

- **Stomach**
  - Kamrup distt: Male 58.8, Female 28.9
  - Other PBCR: Male 11.9, Female 5.6

Adapted from statistics on www.pbcrindia.org
Site specific AAR (NE and old PBCRs)

Adapted from statistics on www.pbcrindia.org
Site specific AAR (NE and old PBCRs)

Adapted from statistics on www.pbcринdia.org
Research on Cancer

**Basic, Translational, Applied**
Utilizing strengths already created for in Basic Sciences, Clinical Research and Epidemiology

Agencies funding cancer research in India:

- Department of Biotechnology
- Indian Council of Medical Research
- Department of Science and Technology
- Council of Scientific and Industrial Research
- Department of Atomic Energy
Areas for research

Causation –

Multifactorial gene-environment interactions

Utilizing the vast diversity of gene pools as well as the environmental dynamics that are reflected in the differences in the prevalence of different cancers in different parts of the country

Also changes in cancer prevalence with time
Early detection

Biomarkers for screening

Markers in serum and body fluids for early detection

Identification of precancerous lesions and their progression

Multidisciplinary approaches including imaging technology

Issues related to cost and automation, robustness

Ease of applicability
Analysis of neoplasia -

Cell and molecular biology of neoplasia

Systems biology and mathematical modeling

Animal models: conventional and genetically modified

Primary tumours and tumour behaviour, including the pathways associated with tumour behaviour and therapeutic response

In vivo imaging, including dynamic imaging like PET

MR spectroscopy

Loco-regional spread and metastasis
Development of Therapeutics and Intervention

Pathway specific drugs – (Natl Cancer Control Programme)
Molecular analysis of drug response and resistance
Conventional chemotherapy
Drug toxicity and pharmacogenomics
Tumour vaccines, Antibody mediated therapy
Mechanisms of drug resistance
Genomic instability in tumours
Hypoxia in tumours
Angiogenesis
Development of Therapeutics and Intervention (cont)

Multidisciplinary efforts related to drug delivery, including targeted therapy and Nanotechnology

Radiotherapy - major component of Natl. Cancer Control programme
Increasing effectiveness - Radioprotectors and radiosensitizers

Cost adversely affects the delivery of cancer care – however not a very glamorous area to work on

Hence a thrust on increasing the effectiveness of existing drugs - including new indications for off-patent drugs, development of rational combinations (may be based on molecular typing of tumours)

Development of biosimilars (within existing IPR laws)
Our research

Molecular alterations in primary human glioma associated with tumour grade

Molecular determinants of in-vitro chemosensitivity in glial cells

Hypoxia and cell response – genomic instability and chemo-resistance

Development of recombinant antibodies to tumour antigens

Funding – Depts. of Biotechnology, Science and Technology, Indian Council of Medical Research
Tumors of the CNS account for less than 2% above all malignancies (About 175,000 cases per year worldwide)

Average age adjusted incidence rates (per 100,000 for CNS cancers(from 1982-1983 to 2002-2003, ICMR)

- males: 2.53 (Chennai registry) to 4.14 (Delhi registry)
- females: 1.46 (Bhopal registry) to 2.66 (Delhi registry).

In United States 2005, there were 43,800 new cases of brain tumors (1.4% of all cancers, 2.4 percent of all cancer deaths and **20–25 percent of pediatric cancers**. Brain tumors responsible for 13,000 deaths per year in the United States
Thank You
Estimates suggest 0.61% (1 in 165) people will be diagnosed cancer of the brain and other nervous system during their lifetime.
THANK YOU
### Estimated increase in cancer incidence, prevalence and mortality

<table>
<thead>
<tr>
<th></th>
<th>Male (M)</th>
<th>Female (F)</th>
<th>M + F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2004 estimates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident cases</td>
<td>374,506</td>
<td>432,174</td>
<td>806,680</td>
</tr>
<tr>
<td>Prevalent cases</td>
<td>936,265</td>
<td>1,080,435</td>
<td>2,016,700</td>
</tr>
<tr>
<td><strong>2015 estimates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident cases</td>
<td>461,681</td>
<td>536,772</td>
<td>998,453</td>
</tr>
<tr>
<td>Prevalent cases</td>
<td>1,154,203</td>
<td>1,341,930</td>
<td>2,496,133</td>
</tr>
<tr>
<td><strong>2004 estimates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incidence, 35–64 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIR/10^5</td>
<td>119.5</td>
<td>176.5</td>
<td>153.7</td>
</tr>
<tr>
<td>ASR/10^5</td>
<td>155.1</td>
<td>234.3</td>
<td>202.6</td>
</tr>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMR/10^5</td>
<td>51.8</td>
<td>46.4</td>
<td>49.1</td>
</tr>
<tr>
<td>Deaths</td>
<td>293,219</td>
<td>245,638</td>
<td>538,858</td>
</tr>
<tr>
<td><strong>2015 estimates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incidence, 35–64 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIR/10^5</td>
<td>119.5</td>
<td>176.5</td>
<td>153.7</td>
</tr>
<tr>
<td>ASR/10^5</td>
<td>155.1</td>
<td>334.3</td>
<td>202.6</td>
</tr>
<tr>
<td>Mortality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMR/10^5</td>
<td>51.8</td>
<td>46.4</td>
<td>49.1</td>
</tr>
<tr>
<td>Deaths</td>
<td>361,474</td>
<td>305,000</td>
<td>666,563</td>
</tr>
</tbody>
</table>

CIR: crude incidence rate; ASR: age standardized rate; CMR: crude mortality rate
<table>
<thead>
<tr>
<th>Rank</th>
<th>Cause of Death</th>
<th>No. of deaths</th>
<th>% of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Heart Diseases</td>
<td>685,089</td>
<td>28.0</td>
</tr>
<tr>
<td>2</td>
<td>Cancer</td>
<td>556,902</td>
<td>22.7</td>
</tr>
<tr>
<td>3</td>
<td>Cerebrovascular diseases</td>
<td>157,689</td>
<td>6.4</td>
</tr>
<tr>
<td>4</td>
<td>Chronic lower respiratory diseases</td>
<td>126,382</td>
<td>5.2</td>
</tr>
<tr>
<td>5</td>
<td>Accidents (Unintentional injuries)</td>
<td>109,277</td>
<td>4.5</td>
</tr>
<tr>
<td>6</td>
<td>Diabetes mellitus</td>
<td>74,219</td>
<td>3.0</td>
</tr>
<tr>
<td>7</td>
<td>Influenza and pneumonia</td>
<td>65,163</td>
<td>2.7</td>
</tr>
<tr>
<td>8</td>
<td>Alzheimer disease</td>
<td>63,457</td>
<td>2.6</td>
</tr>
<tr>
<td>9</td>
<td>Nephritis</td>
<td>42,453</td>
<td>1.7</td>
</tr>
<tr>
<td>10</td>
<td>Septicemia</td>
<td>34,069</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Trends of mortality in US from 1950-2003

Rate Per 100,000

- **Heart Diseases**: 586.8 in 1950, 231.6 in 2003
- **Cerebrovascular Diseases**: 180.7 in 1950, 53.3 in 2003
- **Pneumonia/Influenza**: 48.1 in 1950, 21.9 in 2003
- **Cancer**: 193.9 in 1950, 190.1 in 2003

* Age-adjusted to 2000 US standard population.
Sources: 1950 Mortality Data - CDC/NCHS, NVSS, Mortality Revised.
2006 Estimated US Cancer Deaths*

**Men**

- Lung & bronchus: 31%
- Colon & rectum: 10%
- Prostate: 9%
- Pancreas: 6%
- Leukemia: 4%
- Liver & intrahepatic bile duct: 4%
- Esophagus: 4%
- Non-Hodgkin lymphoma: 3%
- Urinary bladder: 3%
- Kidney: 3%
- All other sites: 23%

**Women**

- Lung & bronchus: 26%
- Breast: 15%
- Colon & rectum: 10%
- Pancreas: 6%
- Ovary: 6%
- Leukemia: 4%
- Non-Hodgkin lymphoma: 3%
- Uterine corpus: 3%
- Multiple myeloma: 2%
- Brain/ONS: 2%
- All other sites: 23%

ONS=Other nervous system.
Source: American Cancer Society, 2006.
<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>33%</td>
<td>31%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>6%</td>
<td>6%</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Kidney</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Oral cavity</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>All Other Sites</td>
<td>18%</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Excludes basal and squamous cell skin cancers and in situ carcinomas except urinary bladder.
Source: American Cancer Society, 2006.
THE CONVENTIONAL MODELS

1. OPPORTUNISTIC SCREENING: successful in America. In India rural populations are illiterate and have no access to such facilities.

2. ORGANIZED POPULATION BASED SCREENING: successful in Finland. WHO recommends this project for developing countries - atleast once in a lifetime screening for women between 35 & 60 years and covering at least 80% of the population.

The existing programme through Mobile Cancer Detection Unit and Hospital Based Cancer Detection Unit is based on opportunistic screening.

LIMITATIONS

1. Dependency on voluntary organization to conduct camps.
2. Camps are usually clubbed with the major political programmes and the importance of the camps was therefore diluted.
3. Camps end-up with screening the low risk population.
4. Experiences in 20 years has revealed the rate of picking suspected case is 2.2% and frank case is 1.6%.
5. Camps are conducted in remote villages far from regional centres.
6. Mobile camps are not cost effective as it costs Rs.2000/- to detect a frank case or suspected case. Rs. 100/- for screening a person
7. and Rs. 30,000/- for conducting a camp.

Fear of the unknown among people

Low cost screening methods have proved to be increasingly dubious and confirmatory expensive methods have taken over. While improving the low cost methods is not worked at, efforts should be made to make the confirmatory methods cost-effective.
This model is COMPREHENSIVE because it encompasses the concepts of education for cancer awareness and prevention of disease; specified, regular, fixed time-place cancer detection clinics for early detection; and provision of cost-effective treatment as near to patient’s home as possible. It is INTEGRATED because it revolves around participation of existing Govt. health infrastructure, Panchayath Raj system, NGO’s and a Regional Cancer Centre. It is in a way incorporation of practical features of various models, that are described earlier, to suit our set up.

Main theme is “Population based systematic health education with early detection clinics”. This is significant paradigm shift from “ACTIVE INTERVENTION” TO “ACTIVE MOTIVATION and SELF EMPOWERMENT”. With this model primary thrust is motivation in order to make people take measures to prevent cancers (and other diseases by “bystander effect”) and come soon for examination resulting in early detection. The message that will be conveyed to the person in the remotest of the village is -”you are responsible for your health”.
Kamla Nehru Memorial Hospital, Allahabad-211002. UP

Regional Cancer Centre, Medical College Compound, Thiruvananthapuram

Chittaranjan National Cancer Institute, Kolkata – 700 026.

Kidwai Memorial Instt. of Oncology, Bangalore – 560 029,Karnataka.

Regional Cancer Institute (WIA), Adyar, Chennai – 600 020 TN

Gujarat Cancer Research Institute, Ahmedabad – 380 016. Gujarat

MNJ Institute of Oncology, Andhra Pradesh

Dr. B.B. Cancer Institute, Guwahati – 781 016

Acharya Harihar Regional Cancer, for Cancer Research & Treatment, Cuttack – 753 007

Indian Gandhi Medical College, Shimla – 171001, Himachal Pradesh

Tata Memorial Hospital
Mumbai – 400 012 Maharashtra

Cancer Hospital & Research Centre, Gwalior – 474 009, Madhya Pradesh.

Pondicherry Cancer Care Society, JIPMER, Pondicherry-605006,

Regional Cancer Centre, Pt. B.D. Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana

Pt. J.N.M. Medical College & RCC, Raipur, Chhatisgarh.

Indira Gandhi Institute of Medical Sciences, Patna – 800 014 Bihar.

Indian Rotary Cancer Institute, (A.I.I.M.S), New Delhi -110029

Acharya Tulsi Regional Cancer Trust & Research Institute (RCC)
Bikaner, Rajasthan - 334003

R.S.T. Cancer Hospital & Research Centre, Nagpur – 440 003, Maharashtra
Mode of data collection for cancer registries

In most developing countries including India, the provision of information is on voluntary basis. Exact methodology of data collection would necessarily depend upon the local circumstances.

Passive method: The hospitals in areas with compulsory notification and the hospital cancer registries, abstract the information from the patient records on a specified proforma and send it to the registry.

Active method: The workers from registry scan through the patient records in different hospitals, clarify incomplete or contradictory information, and abstract data (followed in India) with collection of data from hospital records interview of patients. Periodic population surveys on cancer occurrence in rural areas

In surveys, the information is collected on cancer occurrence, the registration number of health care agency attended (which may be within or outside the defined geographic area of interest), as well as the outcome.

Finland, Denmark & some states in USA, notification of cancer cases is compulsory for every hospital. Such a legislation facilitates the collection of data for population based cancer registries.
In Europe
Cancer accounts for 24% death in men and 20% death in women

Mid 80’s ‘Europe against cancer’ initiative associated with avoiding 92,000 expected cancer cases in 2000

Europe has responded positively to cancer

Recognizing cancer as a disease to be controlled
Active screening centers and awareness

Projected increase in mortality due to cancer is much less than other areas

(10-15%) (0-25%)
Mortality for adult (for both sexes) : 258
Mortality due to Non communicable disease : 750
Mortality due to cancer : 109
Mortality due to Cardiovascular disease : 428
Mortality due to Injuries : 117
Distribution of site specific cases in India

**Frequency of Cancer**

2005 Distribution of Primary Diagnosis

- Breast: 24.2%
- Prostate: 16.9%
- Lung: 11.5%
- Stomach: 4.5%
- Colon: 7.3%
- Unknown Primary: 4.2%
- Rectum: 2.5%
- Pancreas: 3.1%
- GYN. NOS: 6.8%
- Bladder: 4.2%
- Lymphoma: 2.5%
- All Other: 12.1%
1. Completeness of coverage: to obtain information on all cancers diagnosed in the population so as to ensure a high degree of case ascertainment;

2. Adequacy of data: to have certain core and critical items of patient information on all cases;

3. Accuracy of data: to ensure that data are free from erroneous abstraction, coding, data entry etc.;

4. Comparability of data: to adopt information techniques in coding, classification etc., that would assure comparability internally and externally;

5. Reliability of data: to ensure reliability of data through periodic audits

Quality checks in PBCR
Sir, managed to fish it out from google images…I had done many searches with many keys..sort of got confusing. This is the legend to the economy and % graph with increase in death in India also marked

From *Nature Reviews Cancer*

**Opportunities for Cancer Epidemiology in Developing Countries**
Tanuja Rastogi; Allan Hildesheim; Rashmi Sinha
Authors and Disclosures
Published: 11/11/2004

**Figure 1.**
Changes in cancer mortality by region. According to the World Health Organization, death from cancer is expected to increase 104% worldwide by the year 2020. The largest increases are predicted to occur among people living in developing countries (Latin America, the Caribbean, Asia, the Middle East and Africa) in comparison with those in developed countries (established market economies and the former Soviet economy). Although actual cancer incidence rates are still lower in developing countries than in North America and Europe, the rise in cancer-related deaths will represent a significant burden to the already overwhelmed health systems in developing countries.

Data taken from Ref. 53.

In 2005, 7.6 million people died of cancer. More than 70% of those deaths occurred in low and middle income countries.

Sir ..please put this logo where the slide for NCCP is
Cancer is the cause of 12% deaths worldwide

- PBCRs provide data on cancer incidence and survival

- Incidence of cancer in India is 70-90 per 100,000.

- The most common cancers in India are:
  - Cancers of the lungs, stomach, and oral cavity among men
  - Cancers of the uterine cervix and breast among women

From WHOIndia
## Cancer prevention and control

<table>
<thead>
<tr>
<th>Approach</th>
<th>Cancers</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>Tobacco-related cancers</td>
<td>Tobacco control/ cessation</td>
</tr>
<tr>
<td>Early detection</td>
<td>Oral/Breast/Cervix</td>
<td>Propagation of awareness and self-examination opportunistic examination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diagnostic support</td>
</tr>
<tr>
<td>Diagnosis and treatment</td>
<td>Common cancers</td>
<td>Training</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Treatment guidelines, infrastructure, referral practices</td>
</tr>
<tr>
<td>Palliative care</td>
<td>All advanced cancers</td>
<td>Oral morphine availability, human resource development, community participation</td>
</tr>
</tbody>
</table>

From WHOIndia
<table>
<thead>
<tr>
<th>Infective agent</th>
<th>Cancer</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Papilloma virus</td>
<td>Cancer of the Uterine Cervix, Oesophageal carcinoma, Anal cancer, Penile cancer, Oral cancer</td>
<td>Safe sexual practices, avoiding multiple sexual partners</td>
</tr>
<tr>
<td>Hepatitis B and Hepatitis C virus</td>
<td>Hepatocellular carcinoma can occur from chronic active infection</td>
<td>Universal precautions, Safe sexual practices, vaccine for Hepatitis B</td>
</tr>
<tr>
<td>Epstein- Barr virus</td>
<td>Burkitt Lymphoma, Nasopharyngeal carcinoma</td>
<td>No specific interventions</td>
</tr>
<tr>
<td>Schistosoma haematobium</td>
<td>Bladder cancer</td>
<td>Preventing water pollution with human waste, treating patients, controlling intermediate hosts (snails)</td>
</tr>
<tr>
<td>Clonorchis sinensis</td>
<td>Cholangiocarcinoma</td>
<td>Preventing water pollution with human waste, treating patients, controlling intermediate hosts (snail, fish), avoid eating raw fish</td>
</tr>
<tr>
<td>Helicobacter Pylori</td>
<td>Stomach cancer</td>
<td>Treating patients with symptomatic infection</td>
</tr>
</tbody>
</table>

From WHOIndia
In India, cancer is not a reportable disease

Considering the lifestyle changes
Is it time?
for appropriate allocation of funds
stronger policies
strengthening directives
Leading cancer sites in India:

- Oropharynx
- Hypopharynx
- Oesophagus
- Lung

Source of consolidated report from PBCRs 2001:2004
General aspects of a cancer control programme

- tobacco control
- healthy diet
- physical activities and avoidance of obesity
- reducing alcohol use
- reducing carcinogenic occupational exposures
- immunization against hepatitis B virus
- combating schistosomiasis
- avoidance of prolonged exposure to the sun
- health education