Cancer in India: Prevalence, Management and Outcome

Prospects for Research

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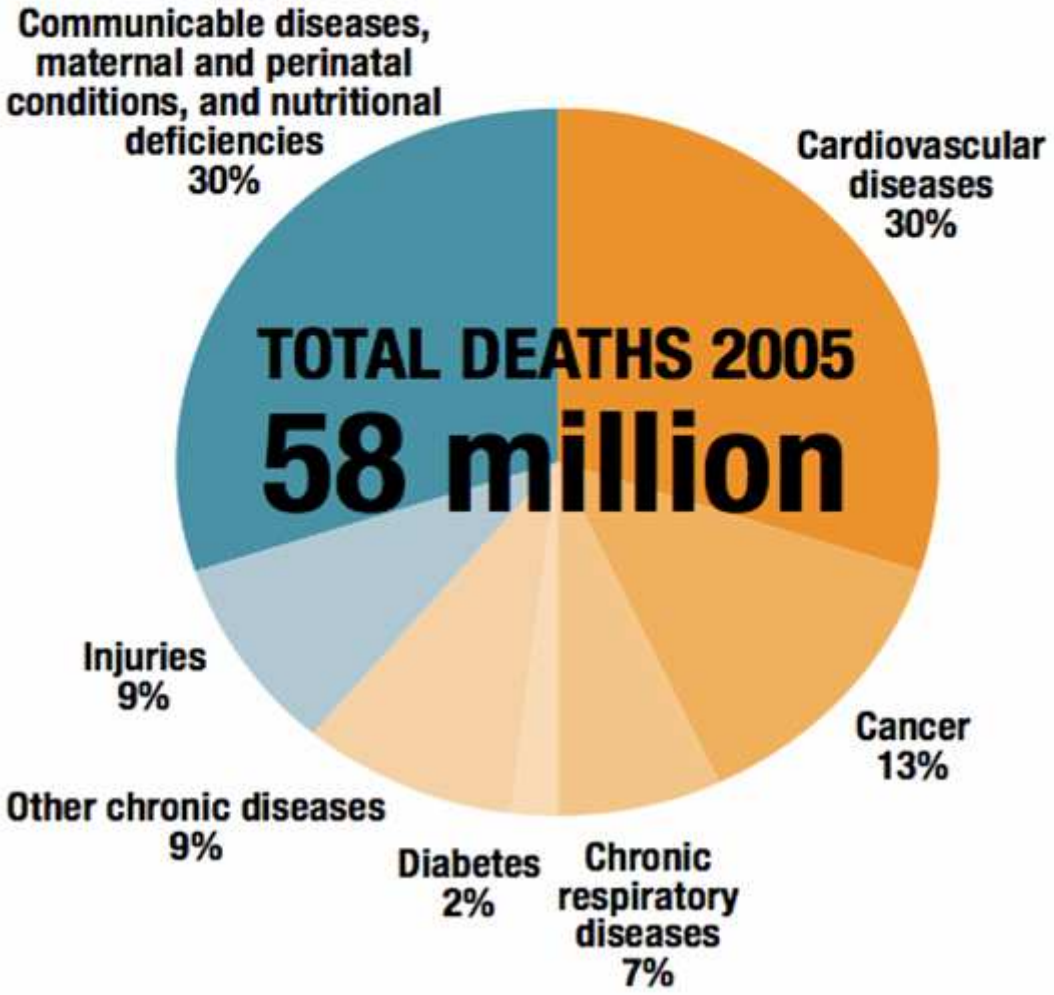
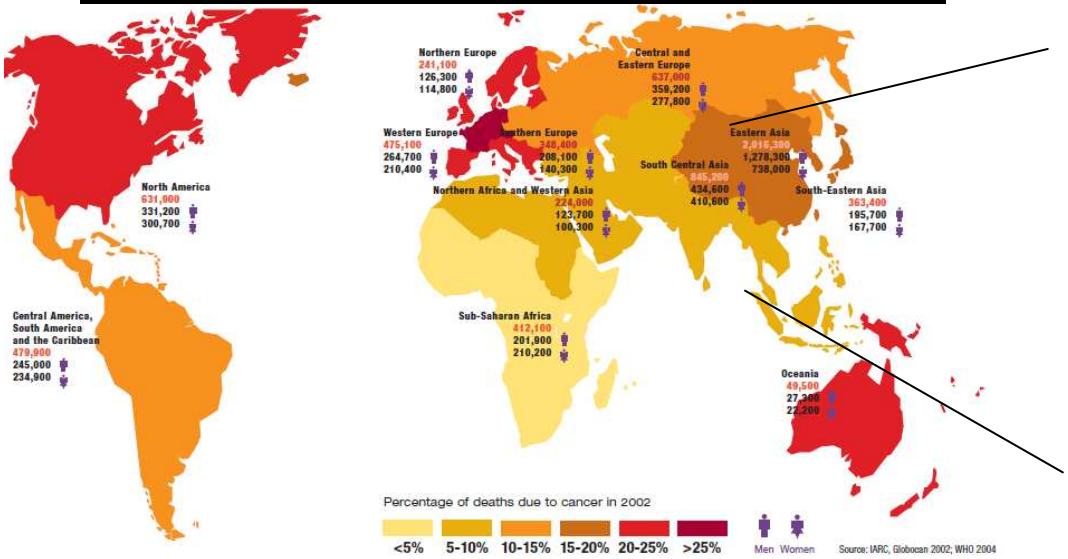
Projected main causes of death, worldwide, all ages, 2005



WHO

% distribution of cancer deaths in 2002

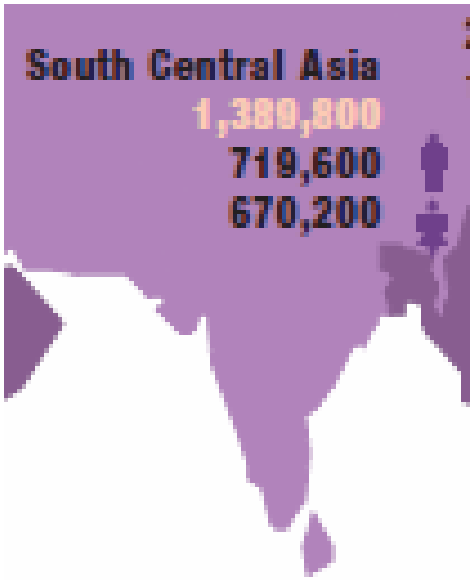


South central asia

845,200 deaths

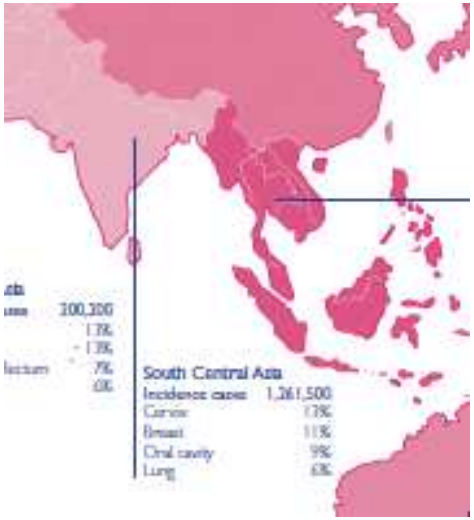
2002:
5-10% mortality

Estimated deaths in 2020



1,389,800 deaths

2020:
25-50% mortality

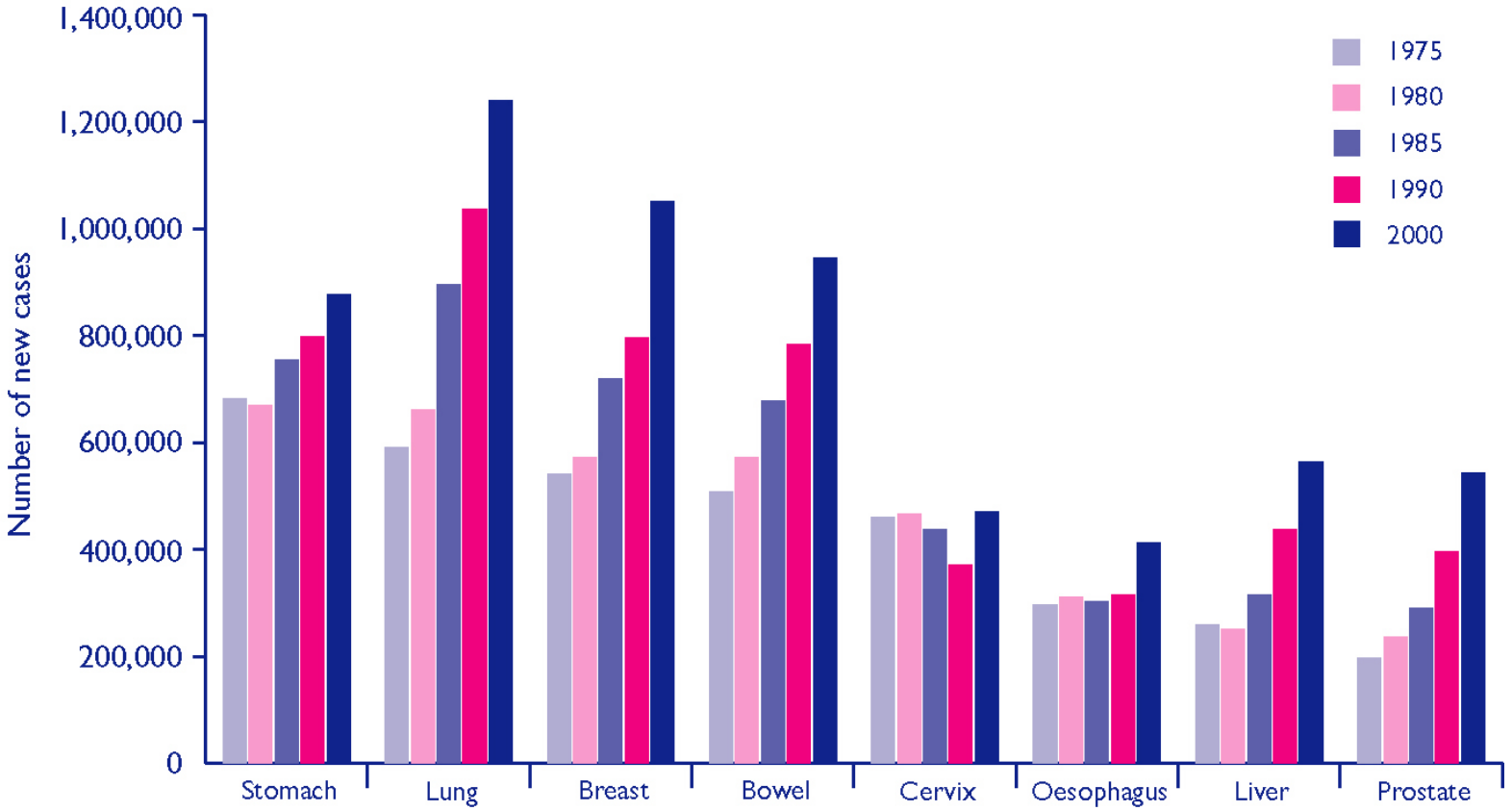


AAR of
new cases
in 2002

1,261,500 cases

Source: IARC, Globocan 2002; WHO 2004

Worldwide trend of cancer cases (1975-2000)



Source: IARC, Globocan 2002; WHO 2004

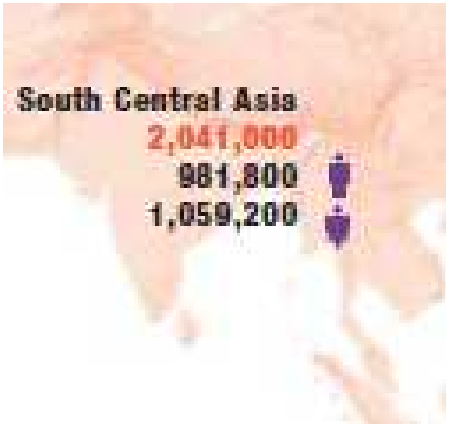
Estimate of cancer burden in 2004 (ICMR)

	Male	Female
Population (*in thousands*)	**550,404**	**515,354**
No. of cases of Cancer	**390,809**	**428,545**
No. of Deaths	**138,622**	**121,192**
No. of DALYs	**25,48,392**	**33,48,444**

Site specific cancer burden in 2004 (ICMR)

Site	Total DALYs	
	Males	Females
Mouth and oropharynx	516448	163132
Oesophagus	135737	110441
Stomach	129317	117724
Colon and rectum	101392	94036
Liver	82436	29182
Pancreas	36552	27128
Trachea, bronchus and lung	147747	45094
Melanoma and other skin	20369	23709
Breast	537	8,89,224
Prostate	62805	-
Bladder	45173	16571
Lymphomas and multiple myeloma	149613	1,02,980
Leukaemia	2,29,811	1,57,933
Cervix uteri	-	4,31,538
Corpus uteri	-	63661
Ovary	-	227088

Projected increase of cancer incidence by 2020 will be nearly 50% worldwide



Source: IARC, Globocan 2002; WHO 2004

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

Tobacco	Diet	Infections
Lung	Stomach	Cervix
Mouth	Oesophagus	Liver
Pharynx		
Oesophagus		

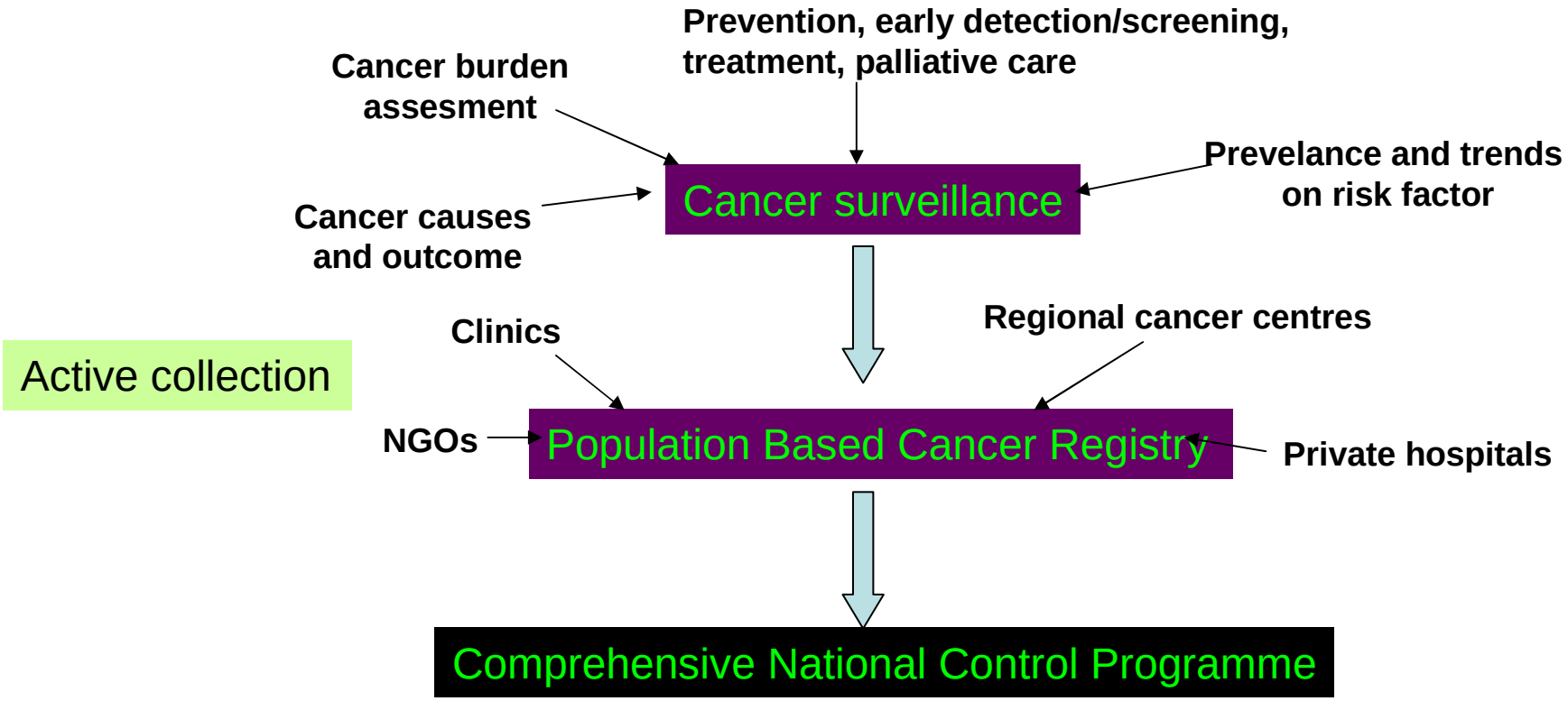
Possible prevention

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



INDIA

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.**

Population Based Cancer Registry of India

National Cancer Registry Programme : commenced in 1981

Three Hospital based cancer registeries (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

Old PBCR +2 new	new NE PBCR
Ahmedabad	Aizwal
Bangalore	Dibrugarh
Barshi (Rural)	Imphal
Bhopal	Kamrup dst
Chennai	Mizoram
Delhi	Mizoram(exc Aizwal distt)
Kolkata	Sikkim
Mumbai	Silchar

Source of presented data

Primary budget allocation in NCCP

Optimization and assesment 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

- **25 Regional Cancer centres** : ***comprise of 217 institutions possessing radiotherapy installations (2004).***

- **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.

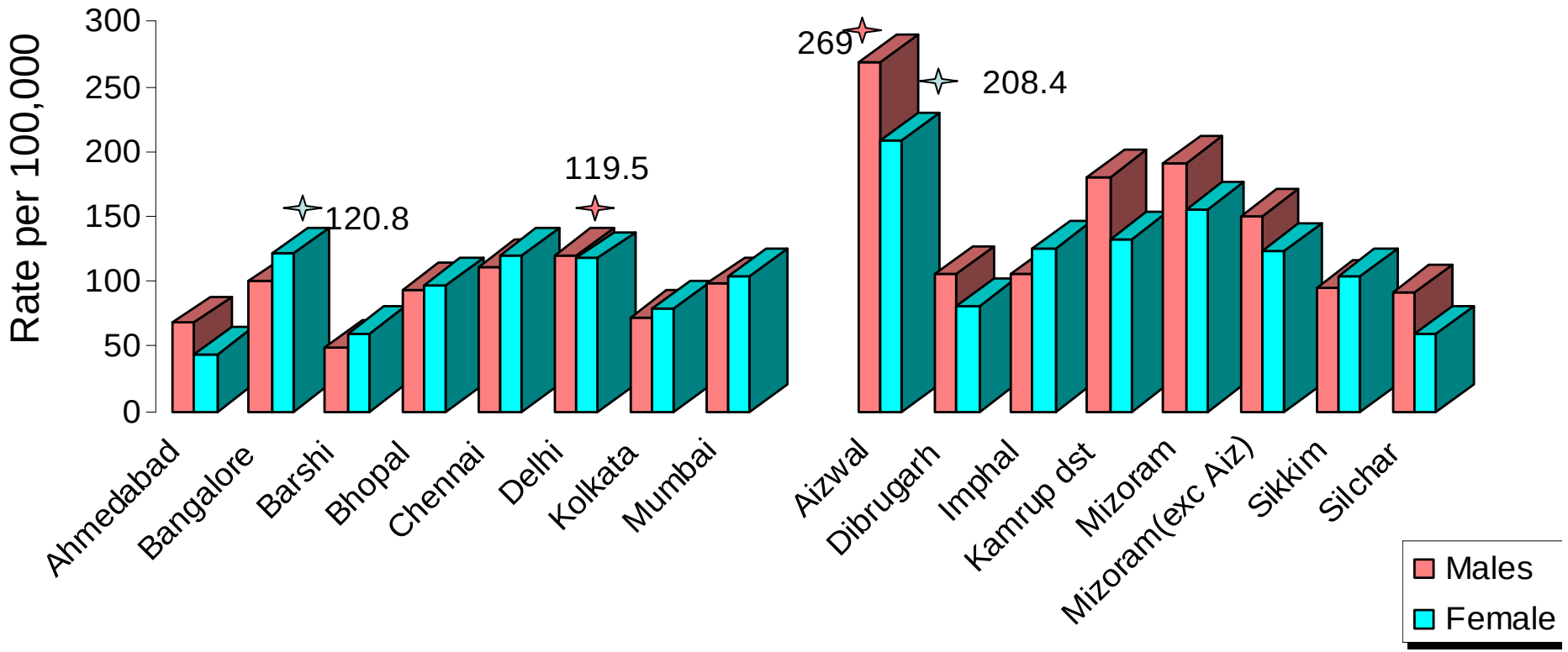
Though cancer per se does not feature in the United Nations 'Millennium Development Goal' health agenda, WHO predicts that by the year 2020, almost 70% of the world's 20 million cancers patients will be in the developing nations.

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.

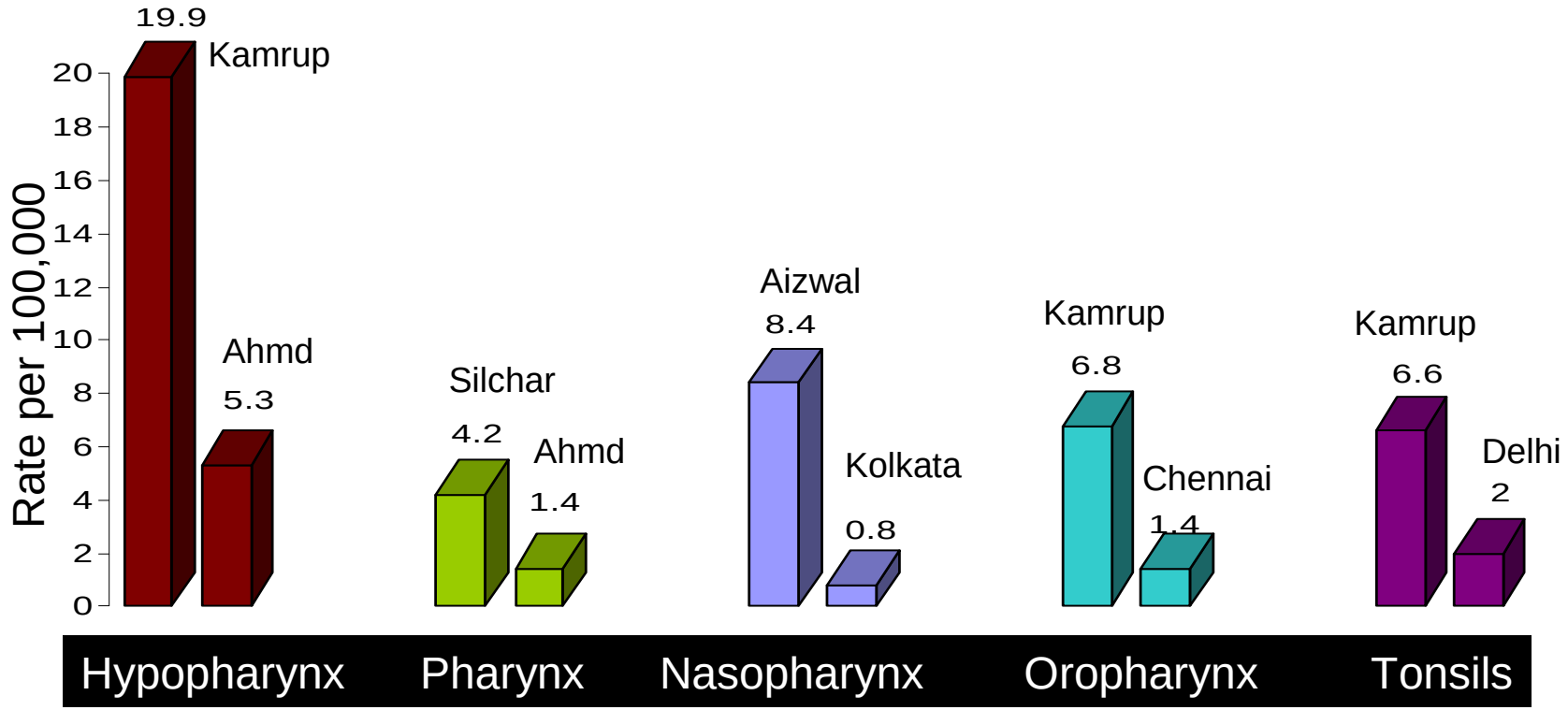
Comparison of Age Adjusted Incidence Rates (AAR's) of North East PBCR's (2005-2006) with the AAR's of other PBCR's (2004-2005).



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)



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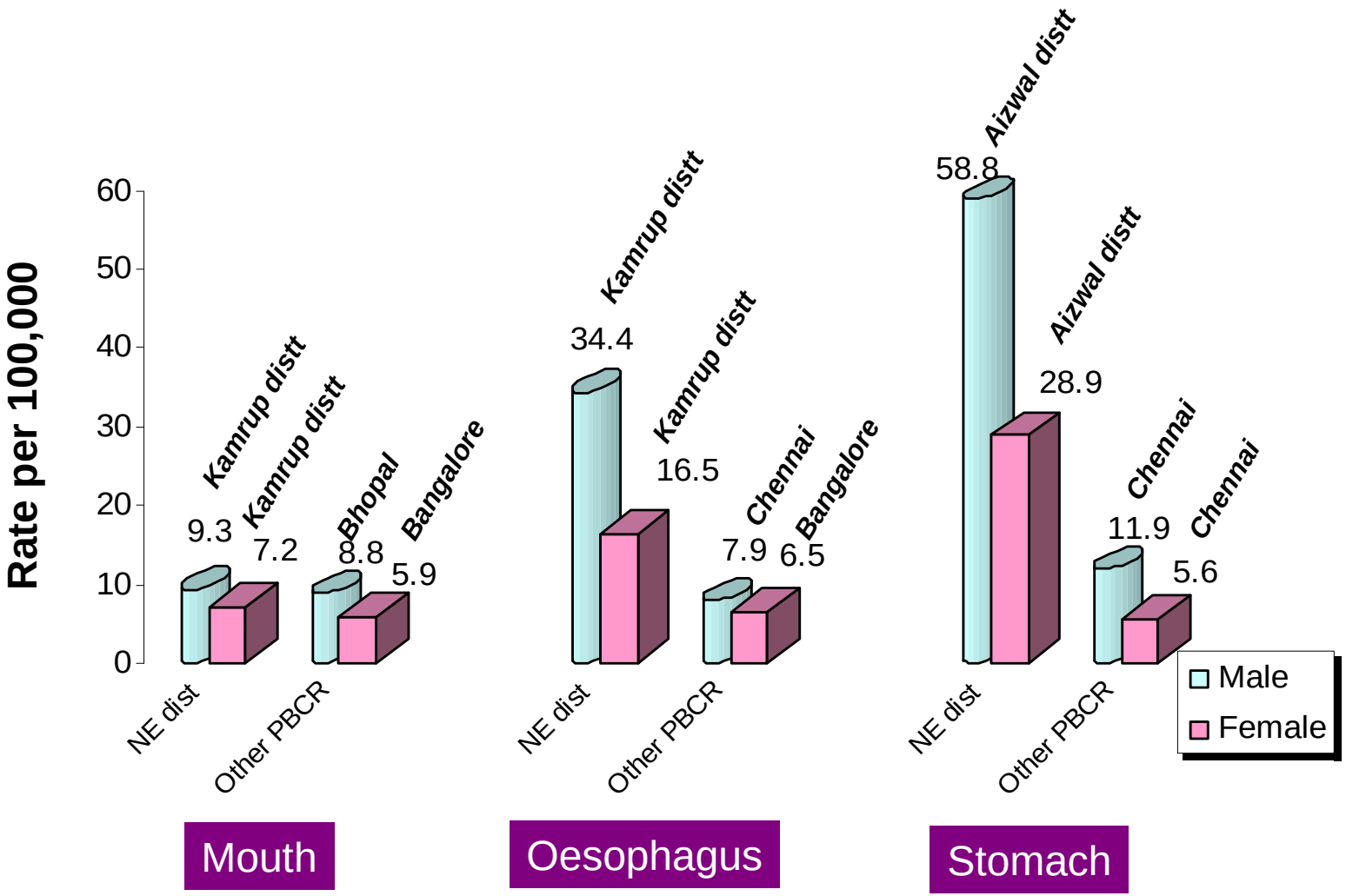

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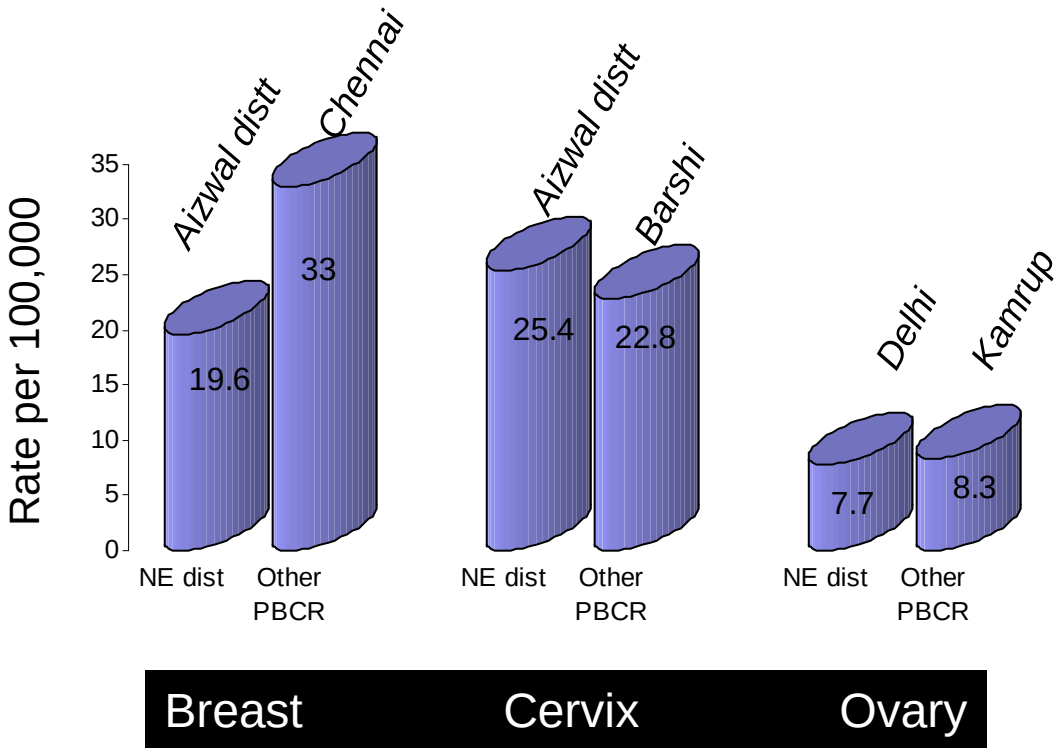

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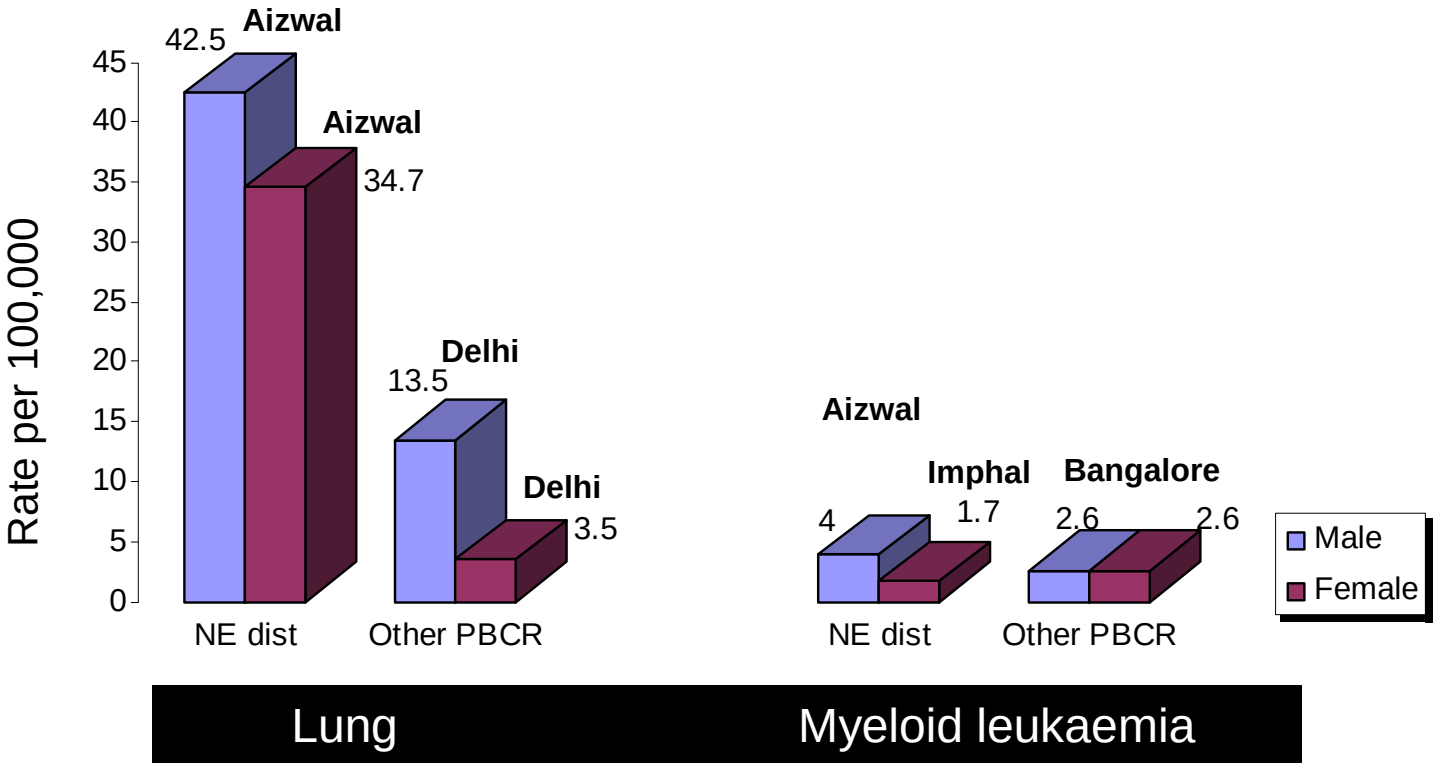
Site specific AAR (NE and old PBCRs)



Adapted from statistics on www.pbcrindia.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 Medial 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 chemoresistance

Development of recombinant antibodies to tumour antigens

Funding – Depts. of Biotechnology, Science and Technology, Indian Council of Medical Research

CNS cancers

Tumors of the CNS account for less than 2% above all malignancies (About 175,000 cases per year world wide)

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, prevelance and mortality

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

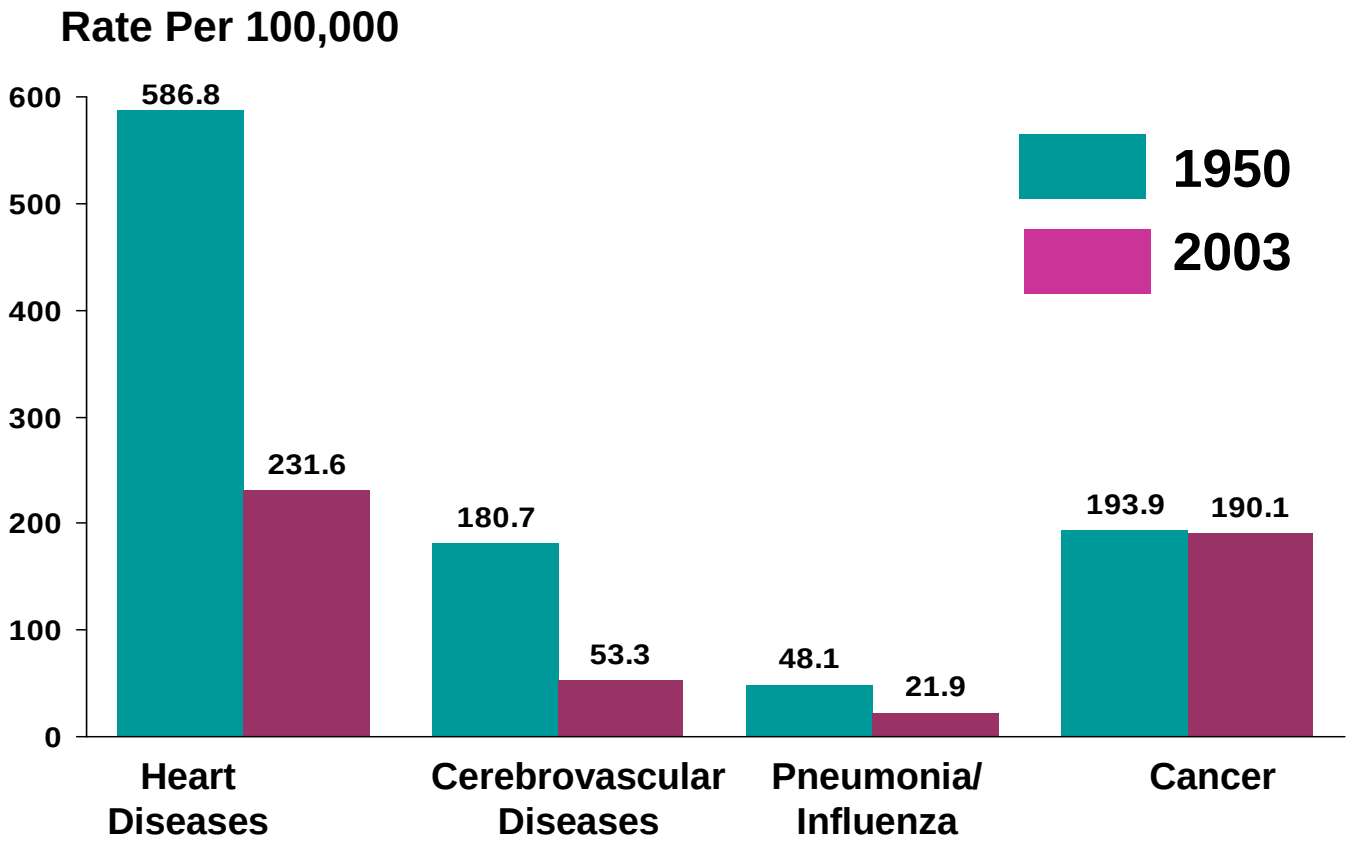
CIR: crude incidence rate; ASR: age standardized rate; CMR: crude mortality rate

Mortality in US, 2003

Rank	Cause of Death	No. of deaths	% of all deaths
1.	Heart Diseases	685,089	28.0
2.	**Cancer**	**556,902**	**22.7**
3.	Cerebrovascular diseases	157,689	6.4
4.	Chronic lower respiratory diseases	126,382	5.2
5.	Accidents (Unintentional injuries)	109,277	4.5
6.	Diabetes mellitus	74,219	3.0
7.	Influenza and pneumonia	65,163	2.7
8.	Alzheimer disease	63,457	2.6
9.	Nephritis	42,453	1.7
10.	Septicemia	34,069	1.4

Source: US Mortality Public Use Data Tape 2003, National Center for Health Statistics, Centers for Disease Control and Prevention, 2006.

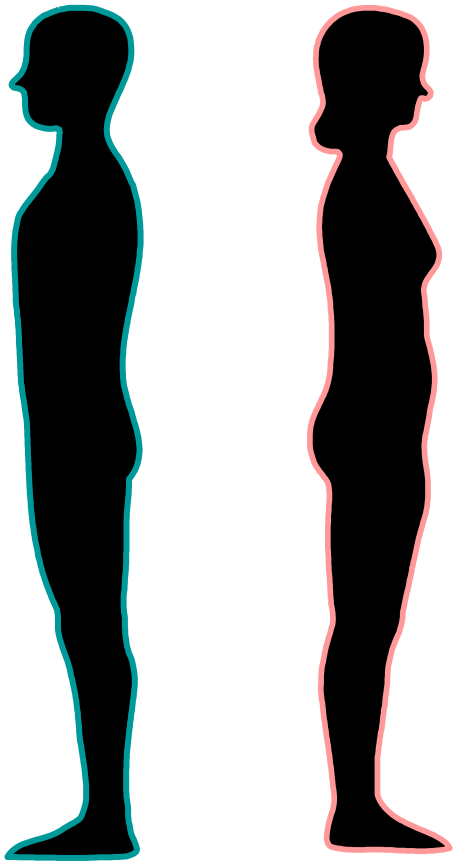
Trends of mortality in US from 1950-2003



*** Age-adjusted to 2000 US standard population.**
Sources: 1950 Mortality Data - CDC/NCHS, NVSS, Mortality Revised.
2003 Mortality Data: US Mortality Public Use Data Tape, 2003, NCHS, Centers for Disease Control and Prevention, 2006

2006 Estimated US Cancer Deaths*

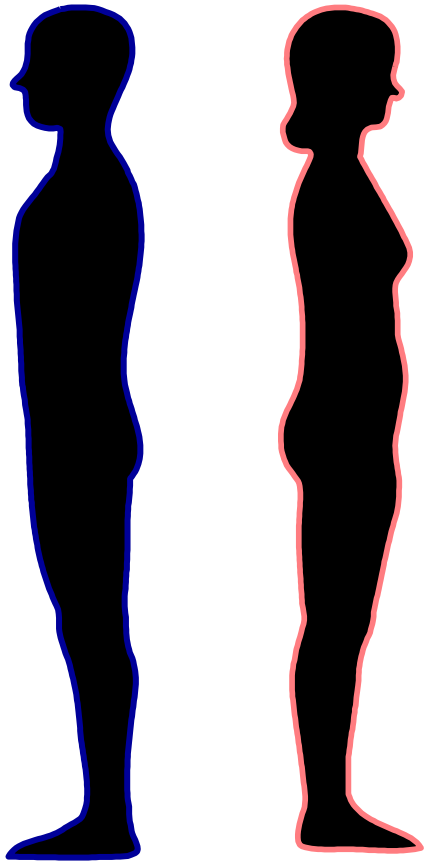
Men 291,270			Women 273,560	
Lung & bronchus	31%		26%	Lung & bronchus
Colon & rectum	10%		15%	Breast
Prostate	9%		10%	Colon & rectum
Pancreas	6%		6%	Pancreas
Leukemia	4%		6%	Ovary
Liver & intrahepatic bile duct	4%		4%	Leukemia
Esophagus	4%		3%	Non-Hodgkin lymphoma
Non-Hodgkin lymphoma	3%		3%	Uterine corpus
Urinary bladder	3%		2%	Multiple myeloma
Kidney	3%		2%	Brain/ONS
All other sites	23%		23%	All other sites



ONS=Other nervous system.
Source: American Cancer Society, 2006.

2006 Estimated US Cancer Cases*

Men 720,280			Women 679,510	
Prostate	33%		31%	Breast
Lung & bronchus	13%		12%	Lung & bronchus
Colon & rectum	10%		11%	Colon & rectum
Urinary bladder	6%		6%	Uterine corpus
Melanoma of skin	5%		4%	Non-Hodgkin lymphoma
Non-Hodgkin lymphoma	4%		4%	Melanoma of skin
Kidney	3%		3%	Thyroid
Oral cavity	3%		3%	Ovary
Leukemia	3%		2%	Urinary bladder
Pancreas	2%		2%	Pancreas
All Other Sites	18%		22%	All Other Sites



***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 atleast 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 Reearch 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

Regional Cancer Centre,
Indira 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 registeries

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%)

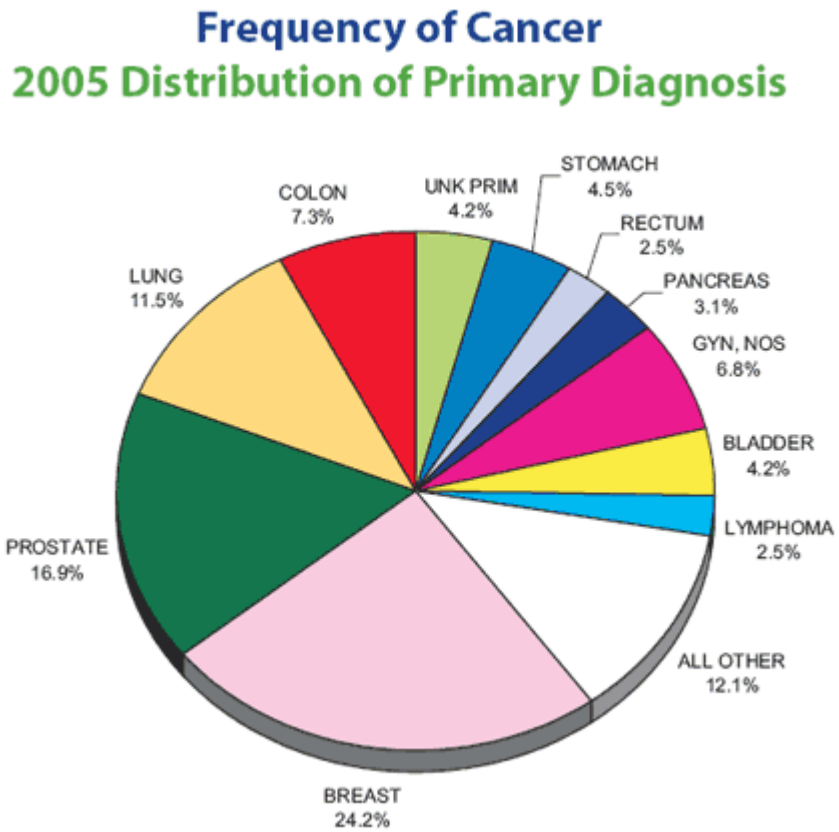
(0-25%)

WHO statistics

Age standardized mortality rate per 100,000

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



Quality checks in PBCR

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

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.

http://www.medscape.com/viewarticle/493232

In 2005, 7.6 million people died of cancer. More than 70% of those deaths occured 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

Approach	Cancers	Strategy
Prevention	Tobacco-related cancers	Tobacco control/ cessation
Early detection	Oral/Breast/Cervix	Propagation of awareness and self-examination Opportunistic examination Diagnostic support
Diagnosis and treatment	Common cancers	Training Treatment guidelines Infrastructure Referral practices
Palliative care	All advanced cancers	Oral morphine availability, Human resource development Community participation

From WHOindia

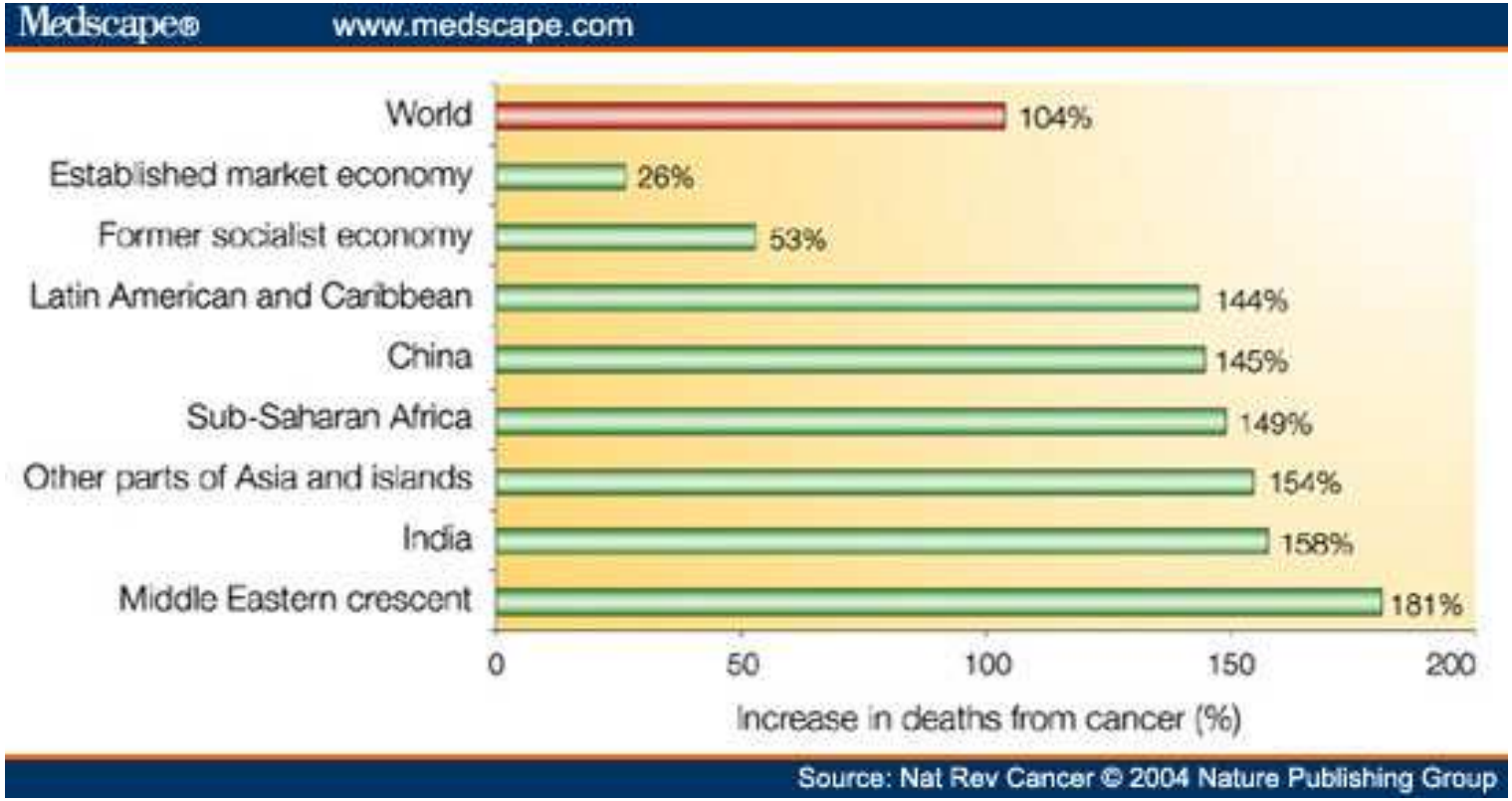
Infective agent	Cancer	Prevention
Human Papilloma virus	Cancer of the Uterine Cervix, Oesophageal carcinoma, Anal cancer, Penile cancer, Oral cancer	Safe sexual practices, avoiding multiple sexual partners
Hepatitis B and Hepatitis C virus	Hepatocellular carcinoma can occur from chronic active infection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

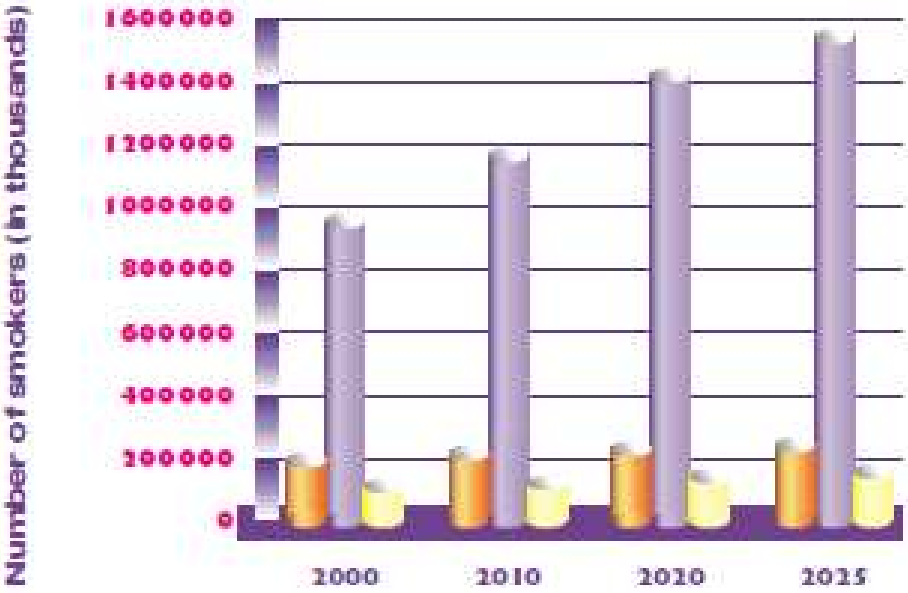
From WHOindia

In India, cancer is not a reportable disease

Considering the lifestyle changes
Is it time?

for appropriate allocation of funds
stronger policies
strengthening directives





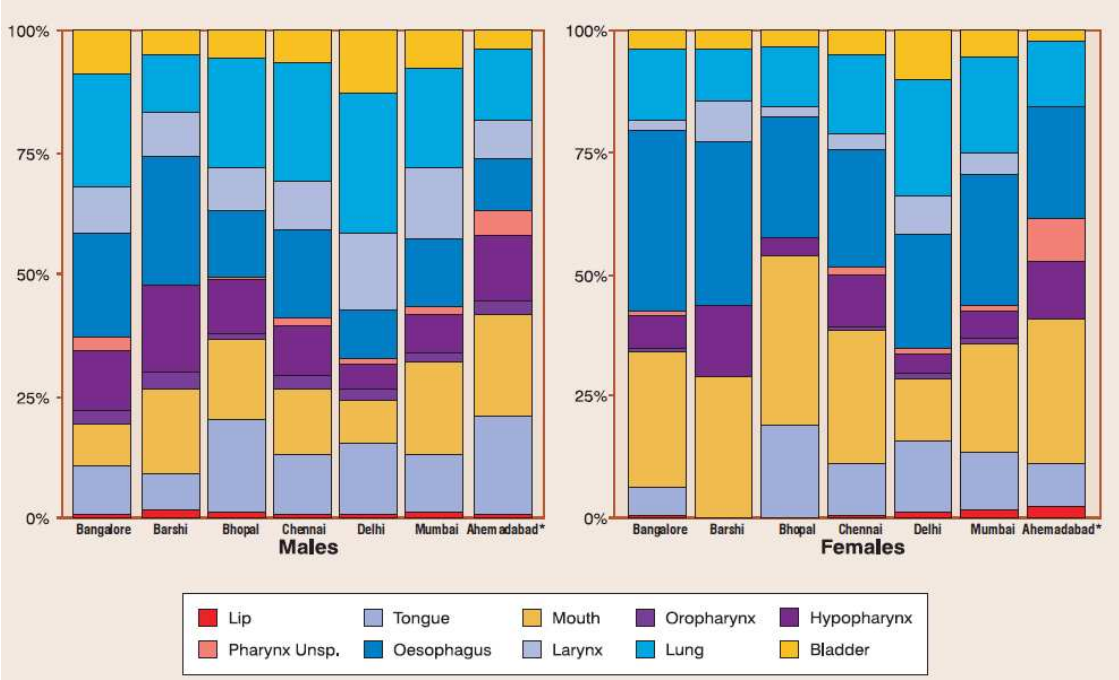
Developed

Developing

Transition

Source: WHO & World Bank 2003

In India



Leading cancer sites

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