INCTR

Developing Countries

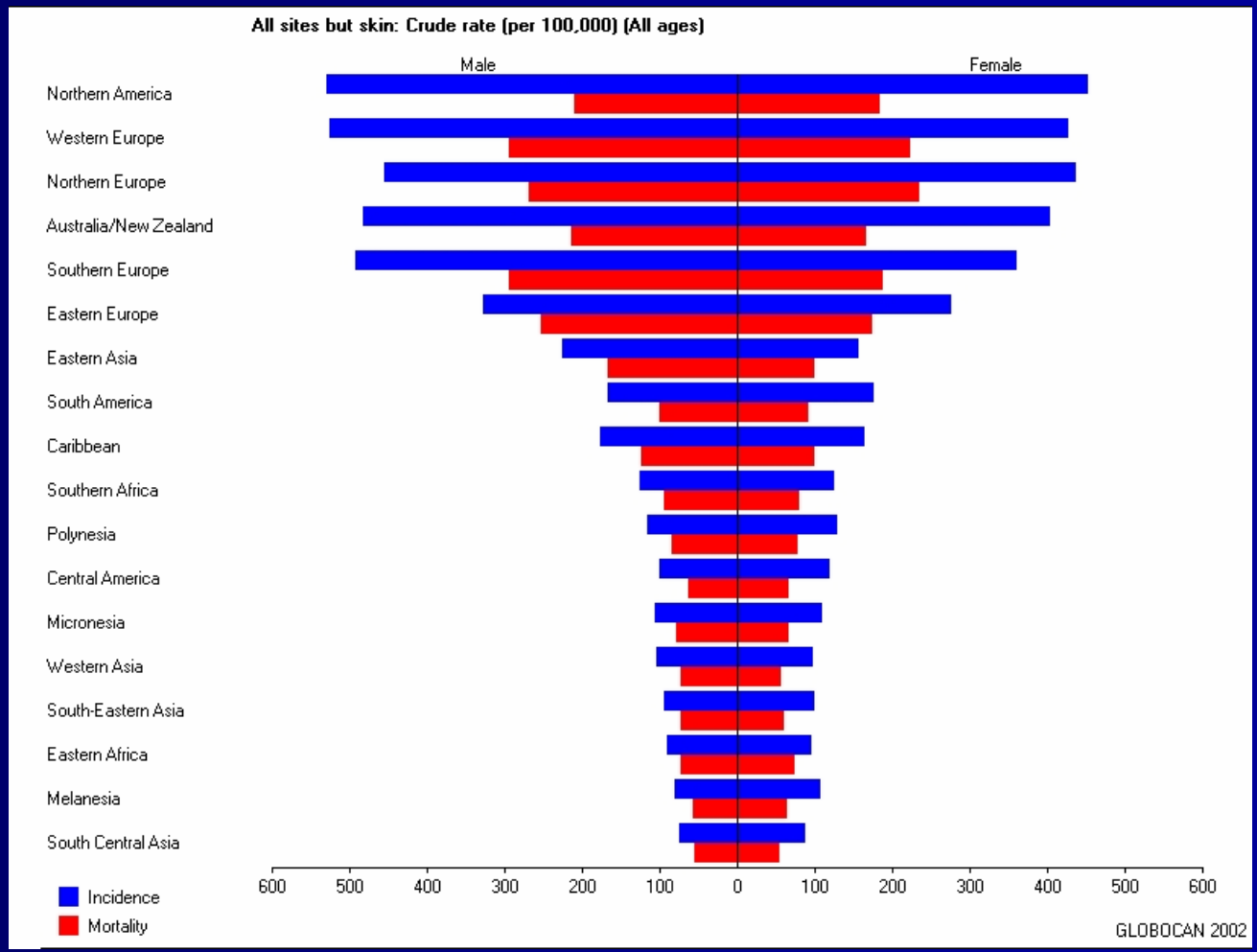
Cancer: A Global Perspective

The Size of the Problem

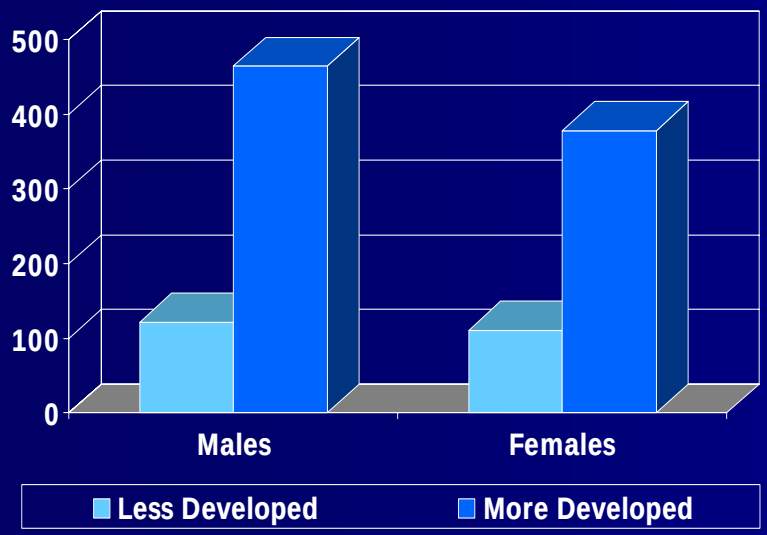
The incidence of cancer is lower in countries at a lower level of economic development, but a higher fraction of patients die

Crude Rates by Regions

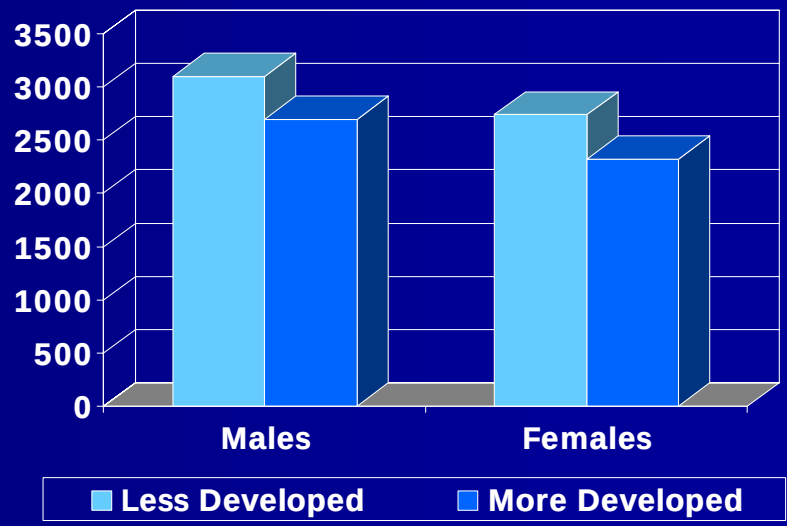
More affluent regions have higher actual incidence and mortality rates and higher mortality: incidence ratios



Less and More Developed
Crude Incidence versus Cases



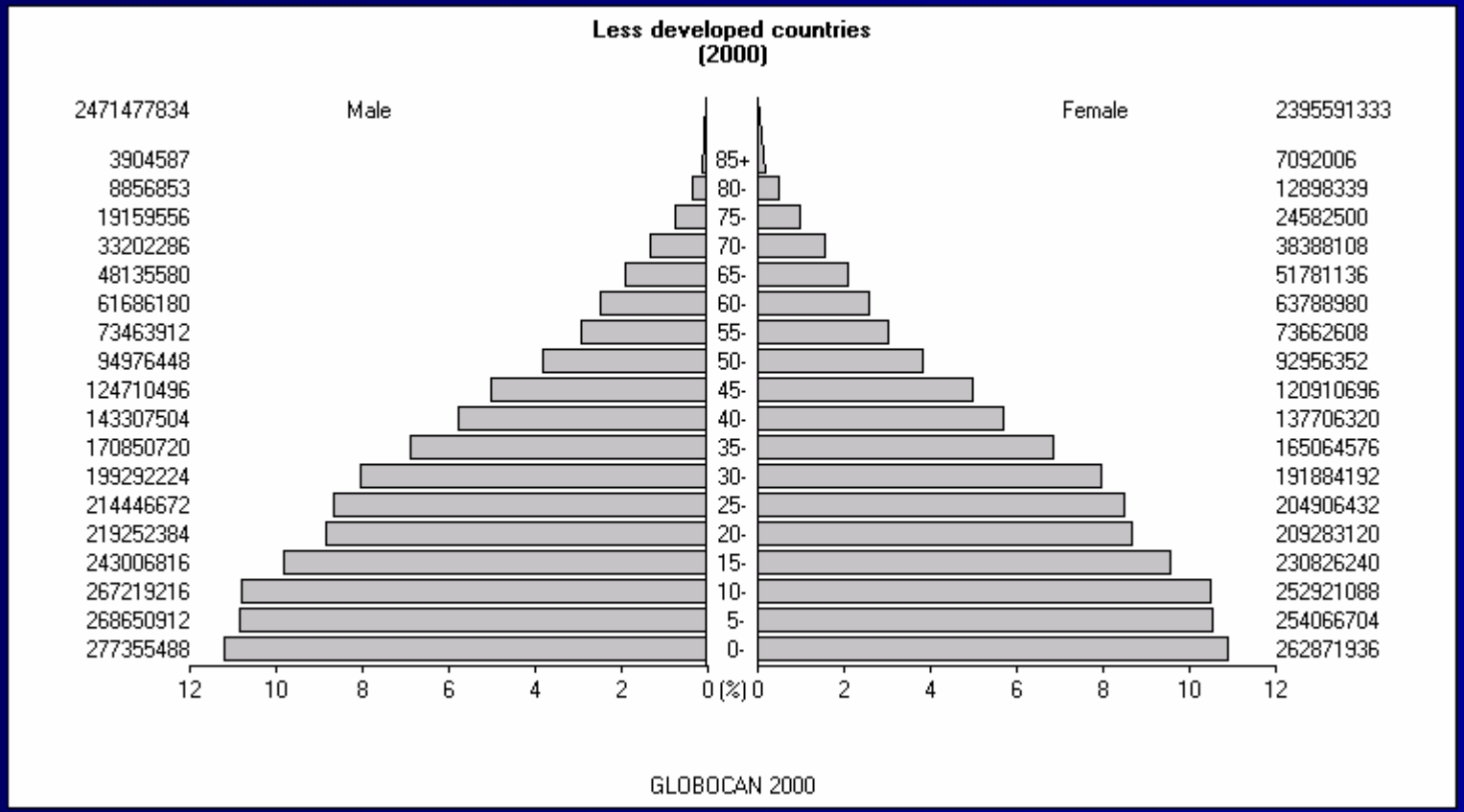
Per 100,000 per annum



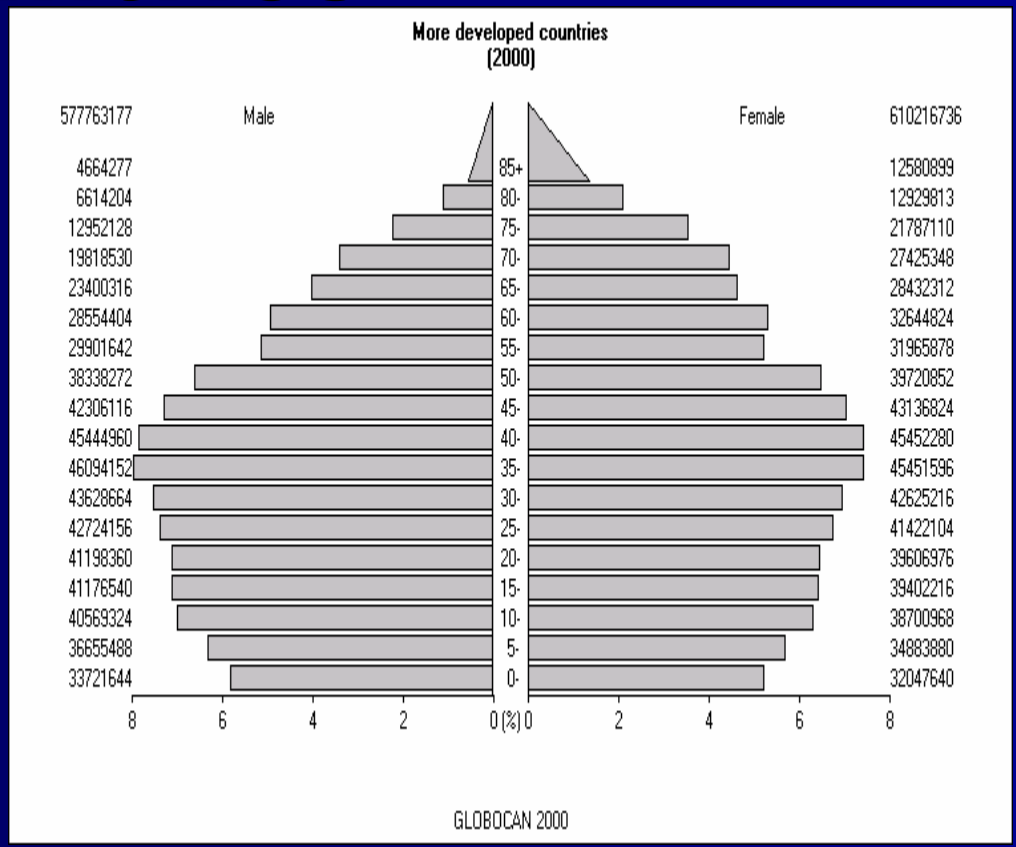
Thousands per annum

2002

Population Pyramid – Less Developed Countries

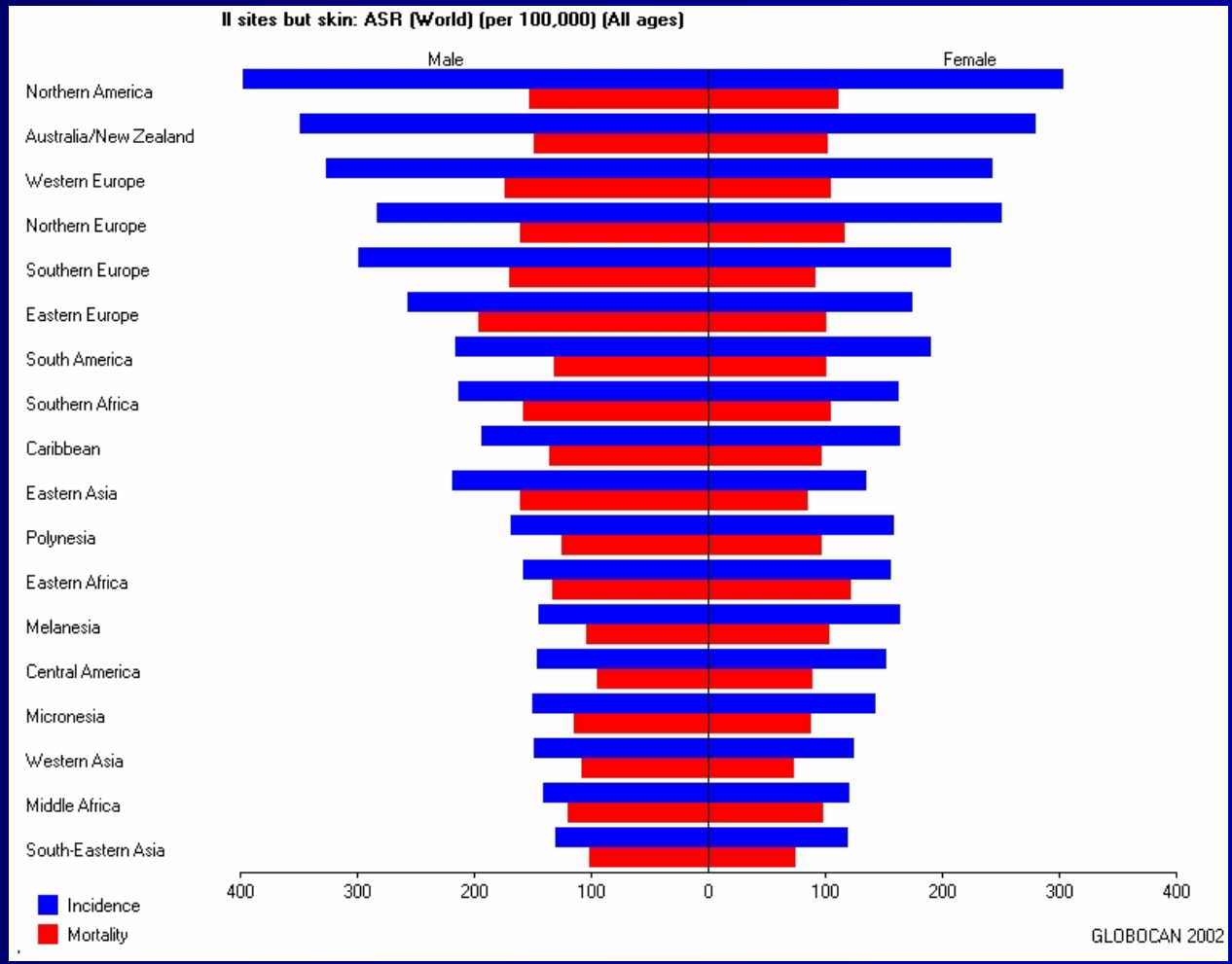


Population Pyramid – More Developed Countries

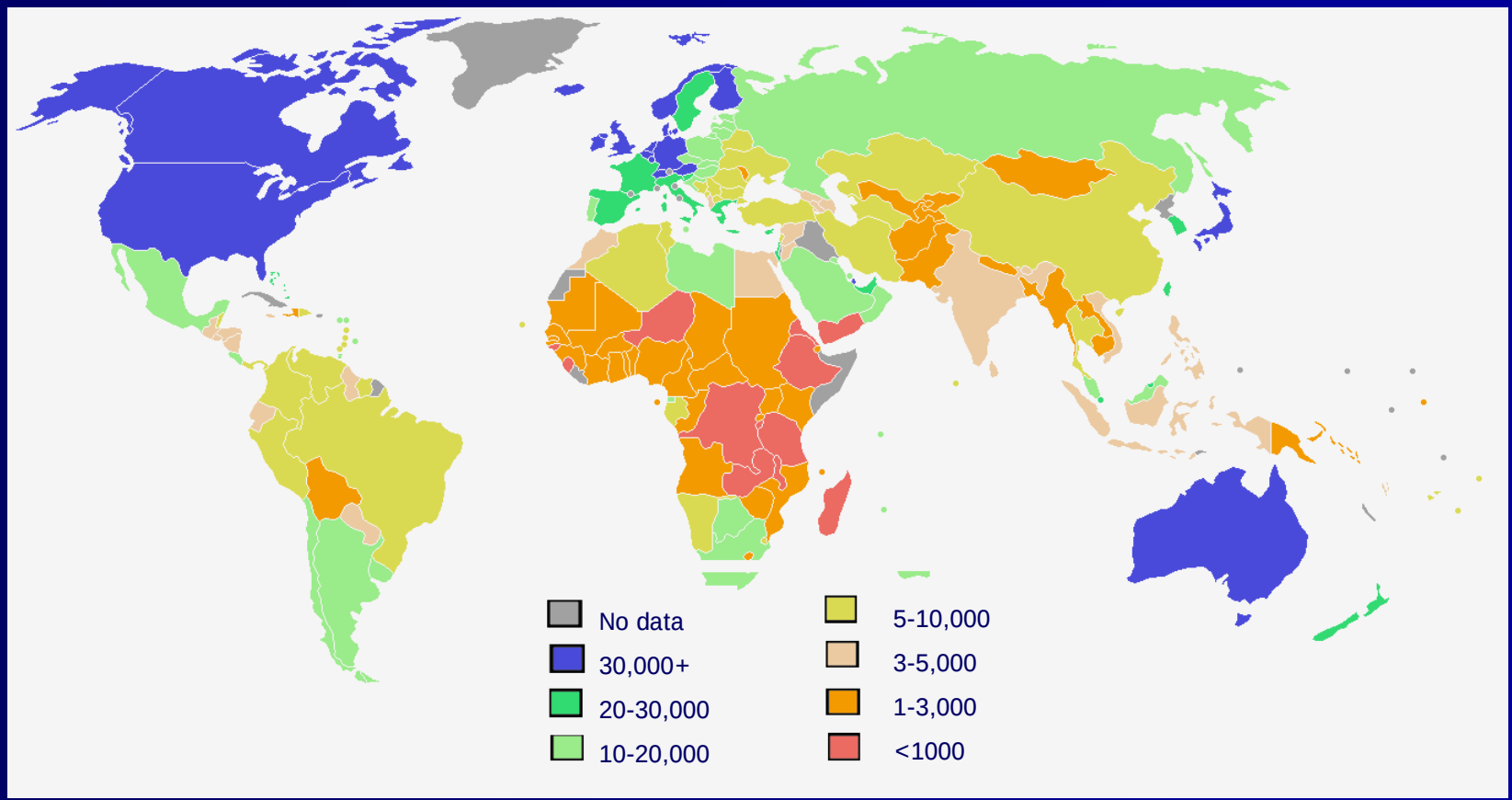


ASR (World) by region: Comparison: Effect of Age

Adjustment of rates to a world standard population creates similar mortality rates in all regions, but "smoothed" incidence rates still higher in richer countries

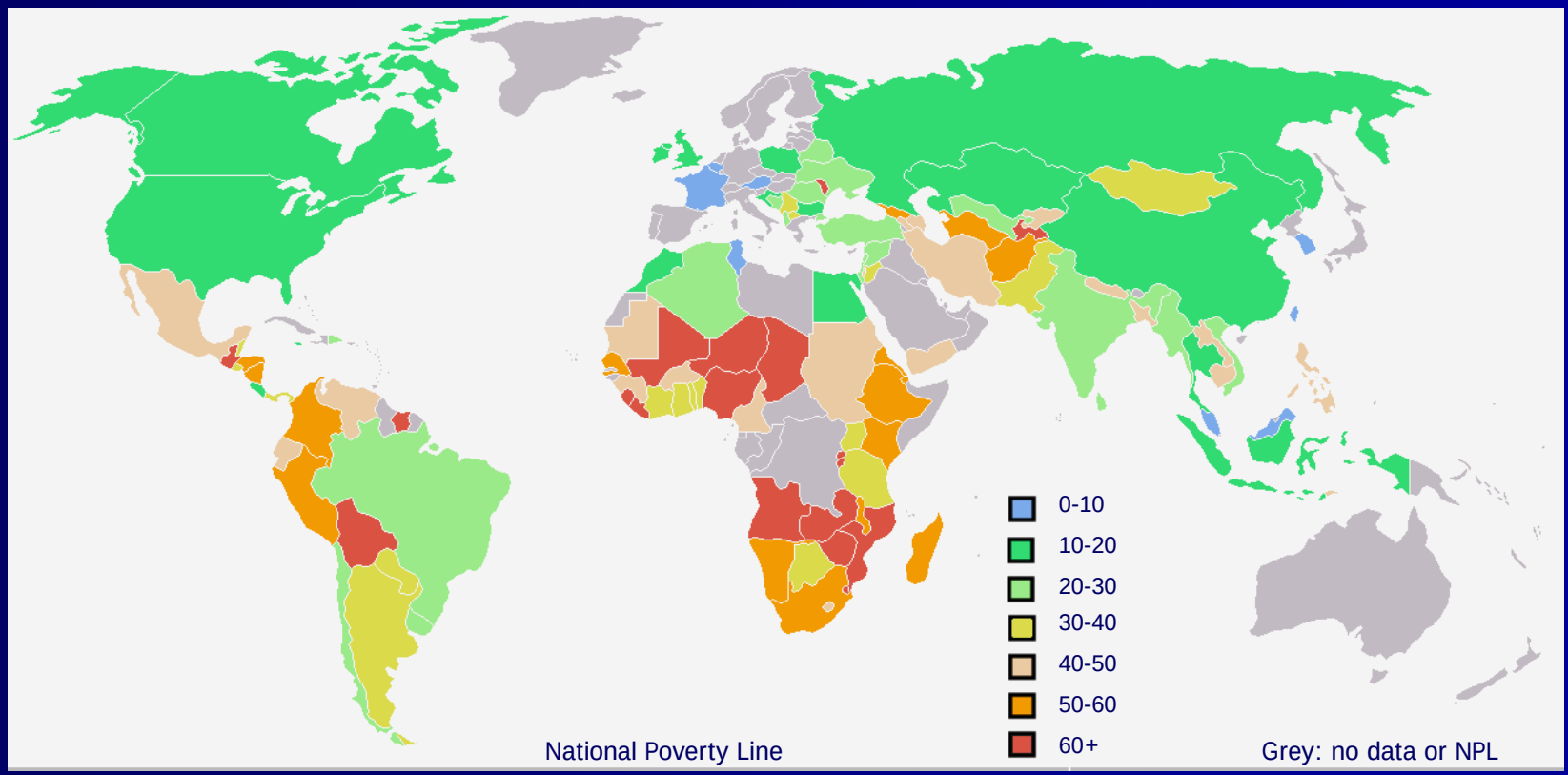


GDP $US ppp; 2005



Data from IMF

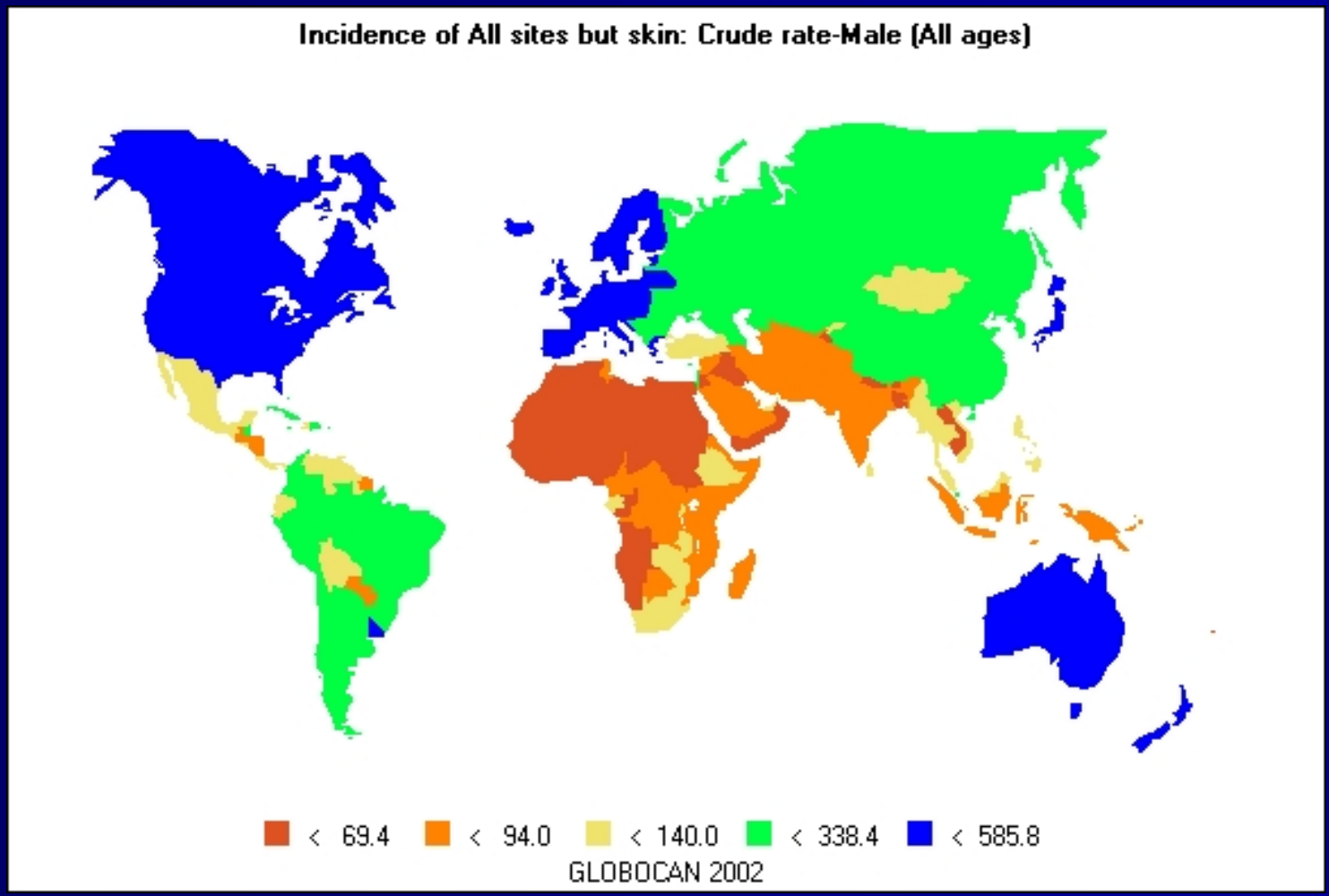
Percent in Poverty, 2005



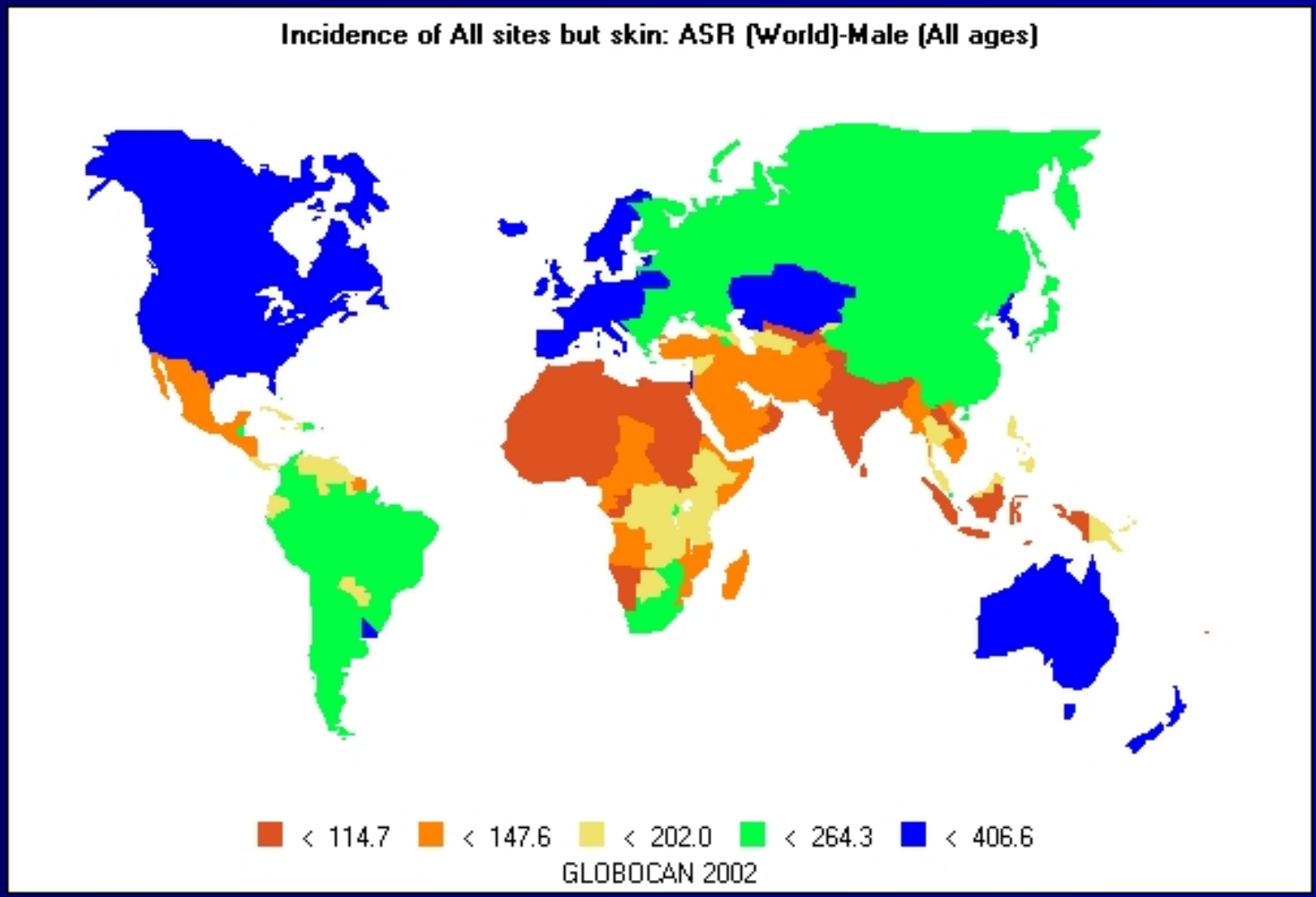
<$1 per day >1 billion; <$2 per day >2.7 billion)

Data from UNDP

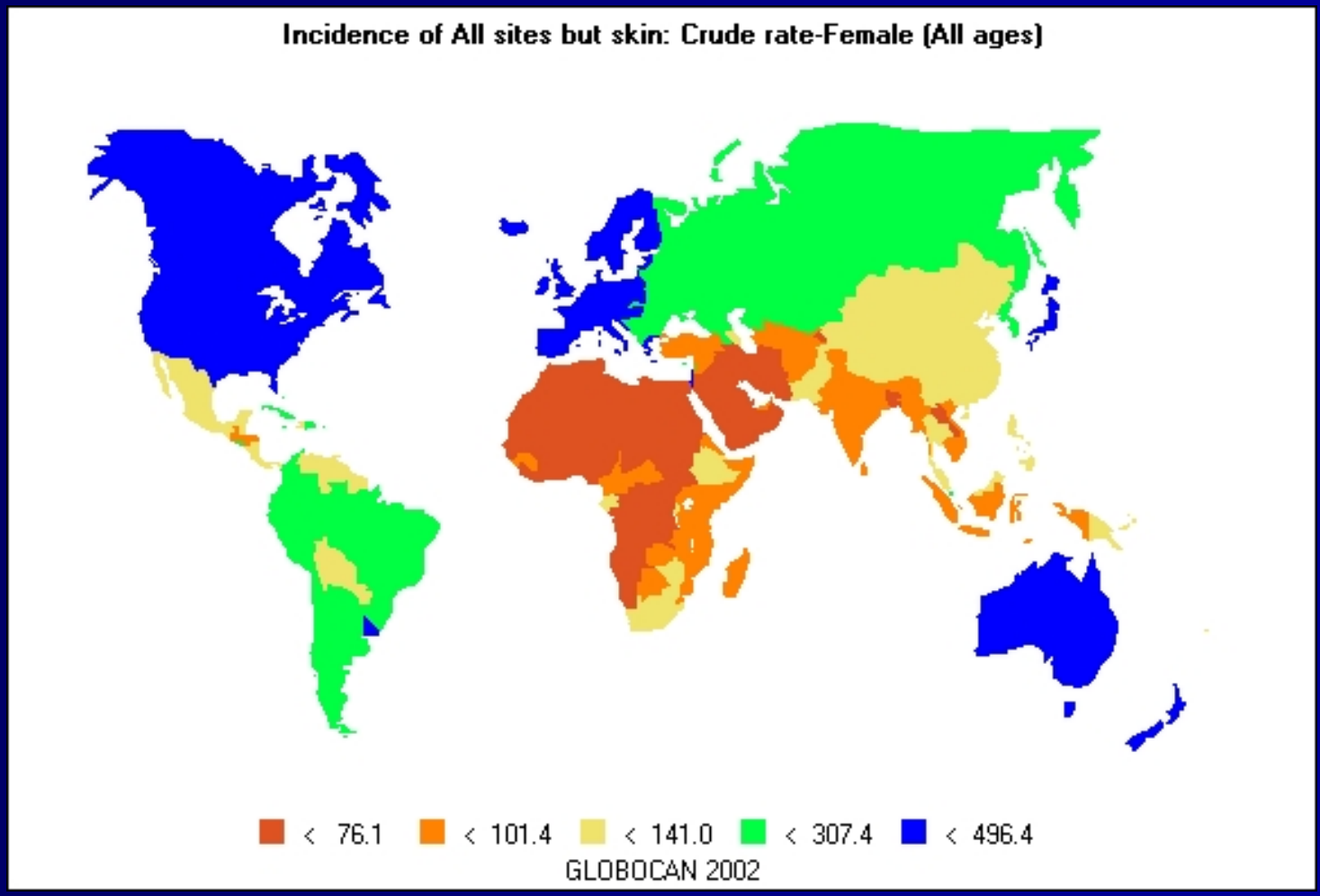
All Cancer; Crude Incidence Rates - Males



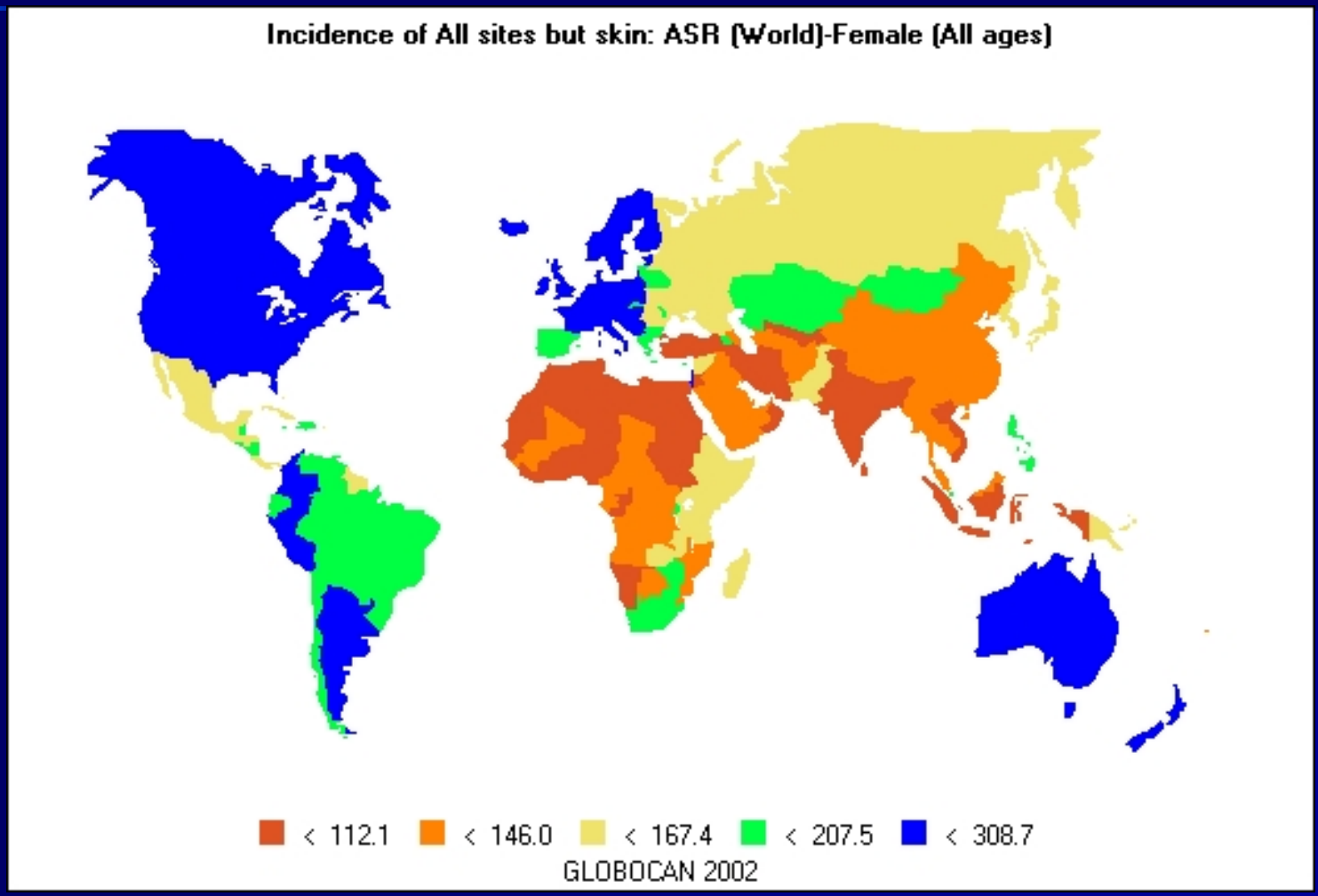
All Cancer: AS Incidence Rates - Males



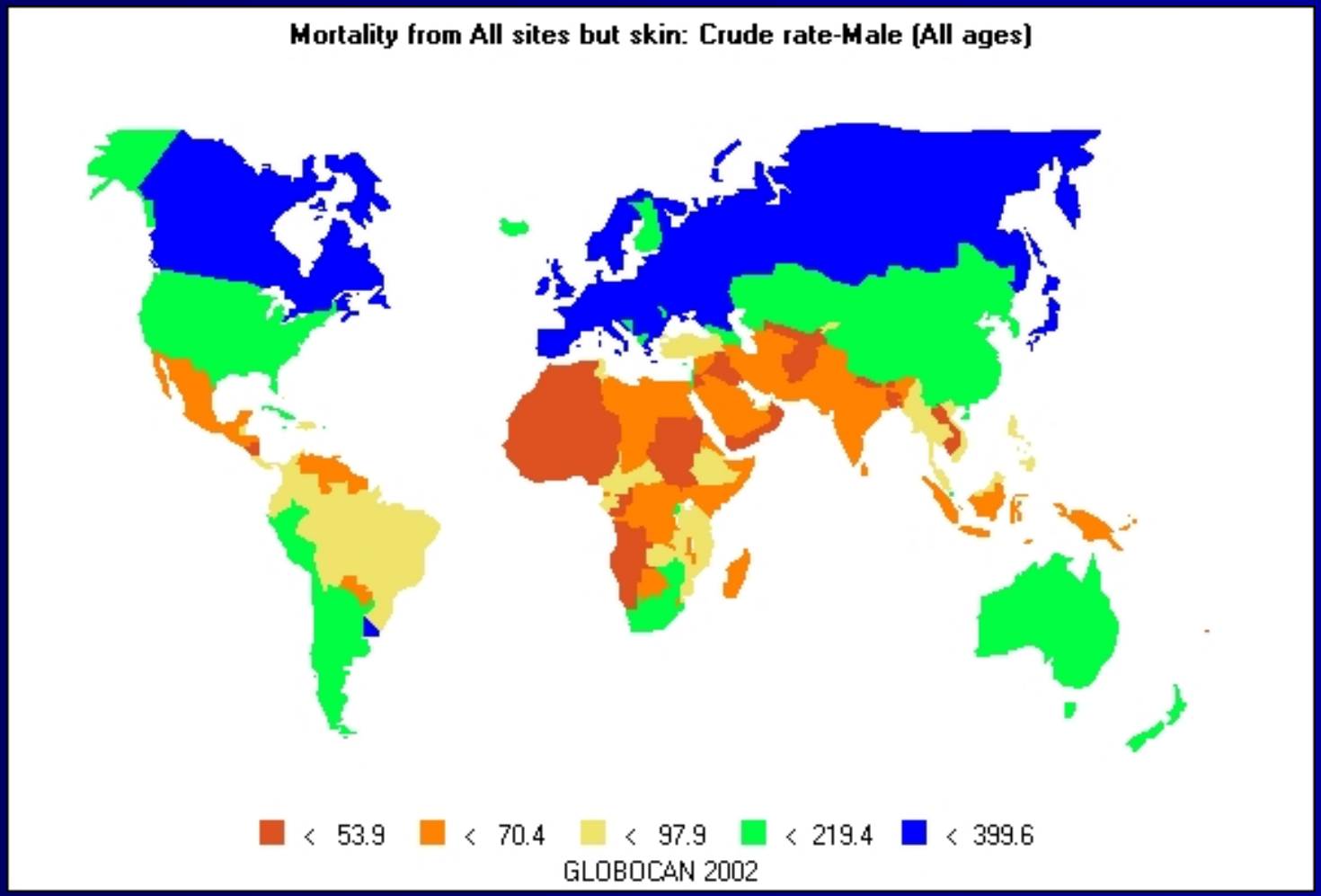
All Cancer; Crude Incidence Rates - Females



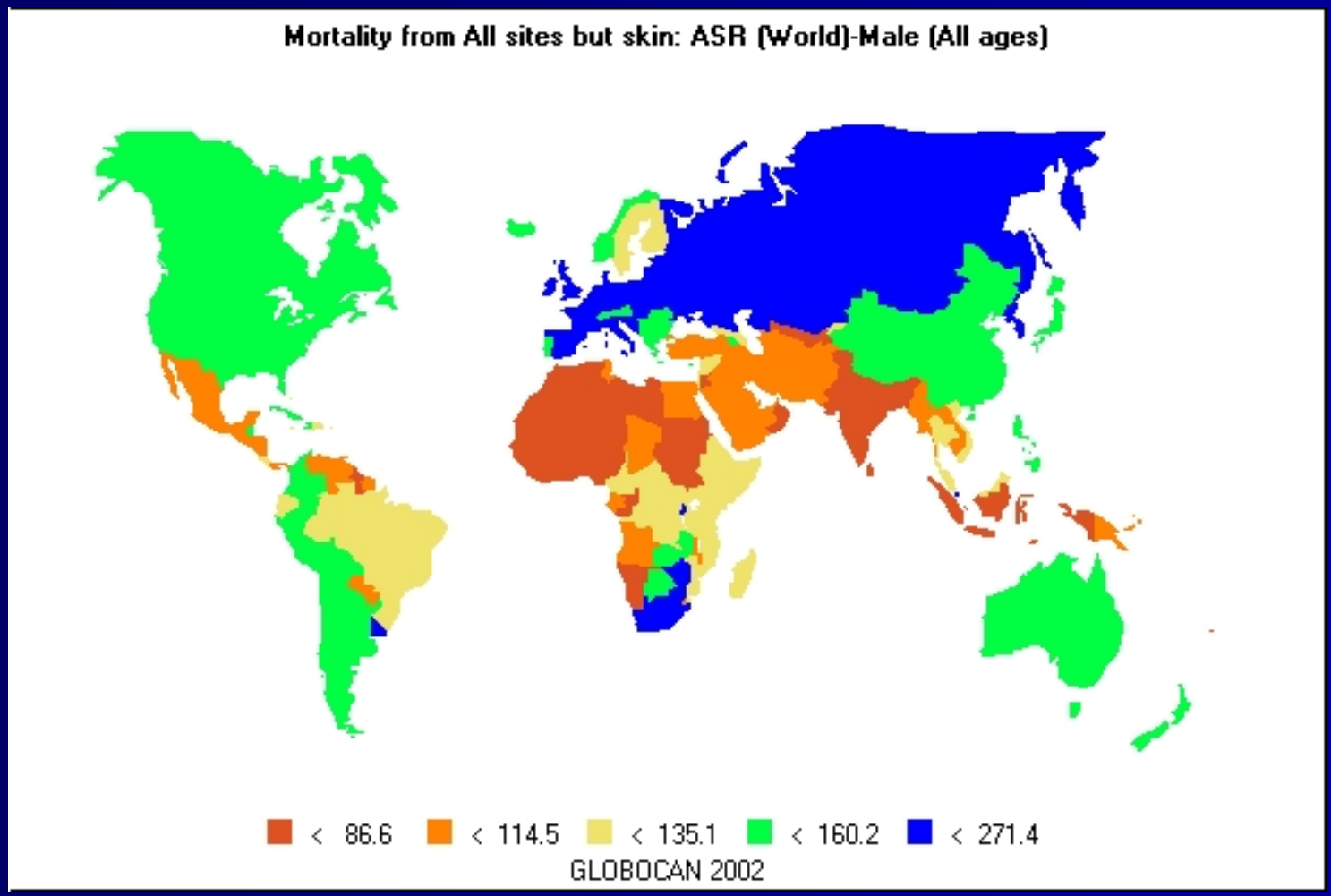
All Cancer; AS Incidence Rates - Females



All Cancer; Crude Mortality Rates - Male



All Cancer; AS Mortality Rates - Males



The Global Pattern of Cancer; Contrasts

Males	INCIDENCE		MORTALITY	
	Crude	ASR	Crude	ASR
N. America	530	398	210	153
W.Europe	526	326	295	174
Middle Africa	78	142	66	121
South Central Asia	76	106	55	78

Globocan 2002

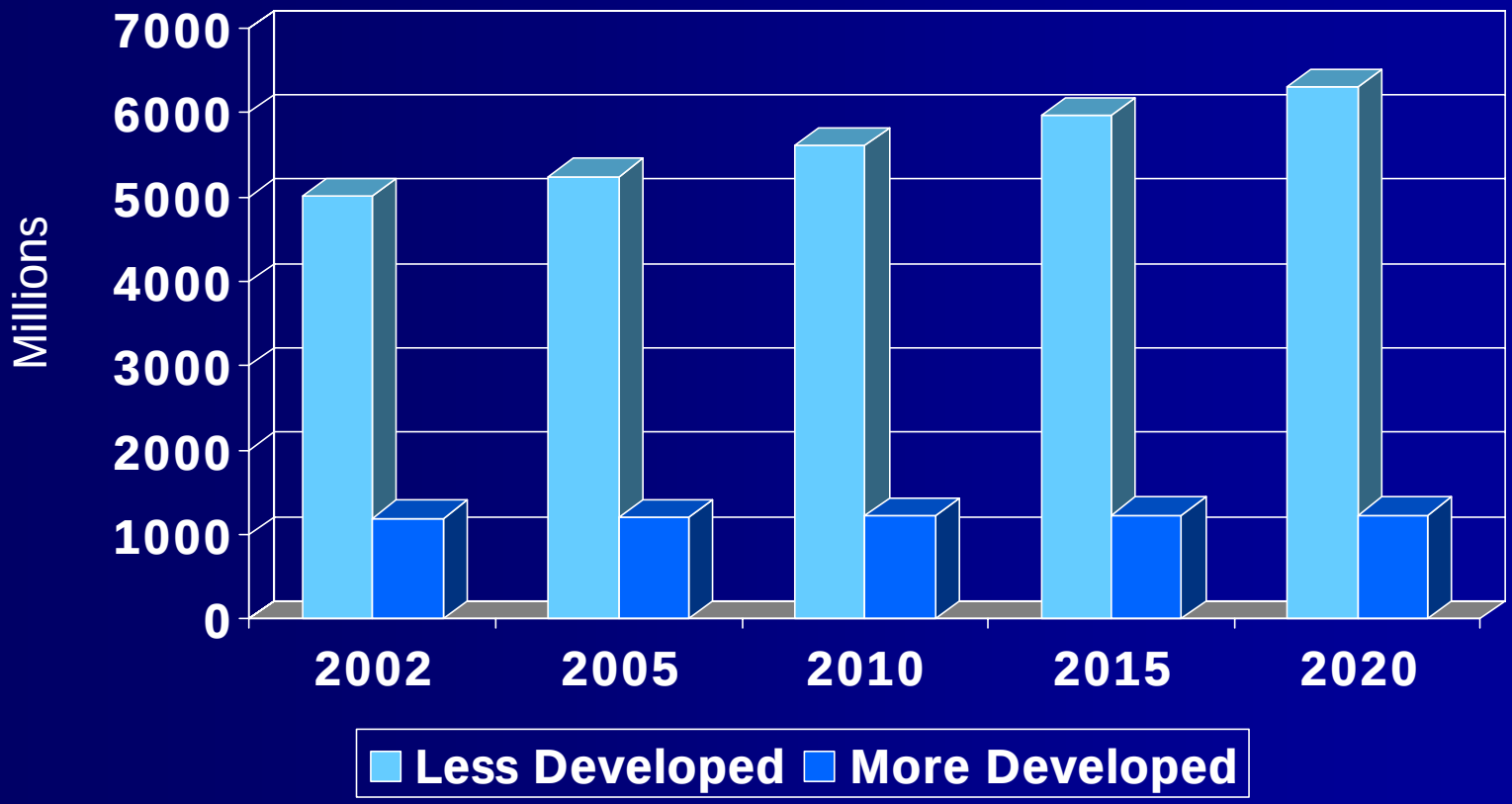
A Soluble Problem

- Higher socioeconomic status and industrialization is associated with a higher incidence of cancer (consumption, reproductive habits, environmental agents –effects intensified by age) even when age-adjusted
- Lower socioeconomic status is associated with a higher mortality from cancer
- Figures from developing countries suggest that a high proportion of cancer could be avoided by modifications in lifestyle and avoidance of exposure to potential carcinogens (chemical or infectious) – this will require political will, education and inducement

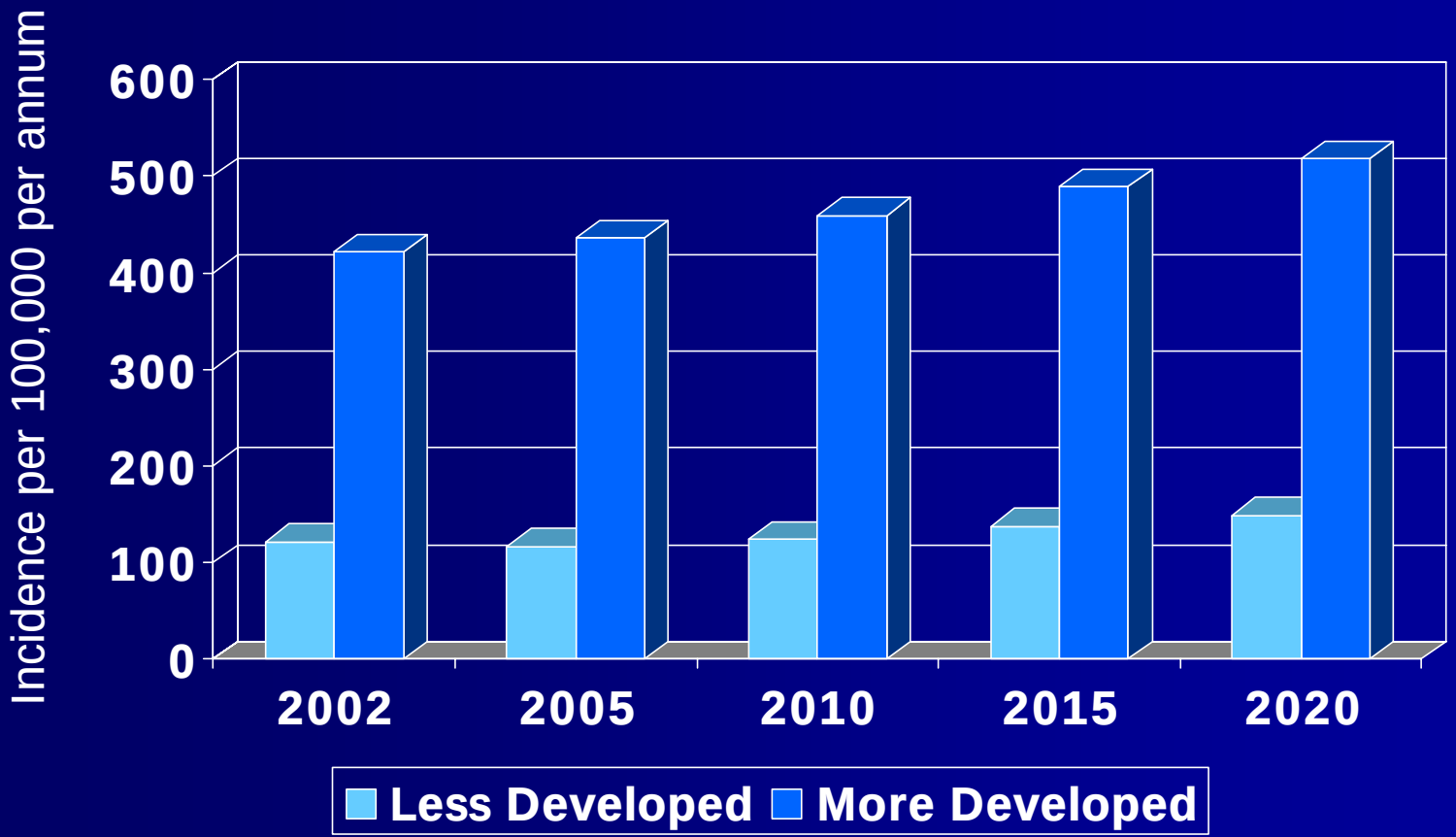
The Shape of Things to Come

The global cancer burden will increasingly shift to less economically developed countries

Estimates of Population

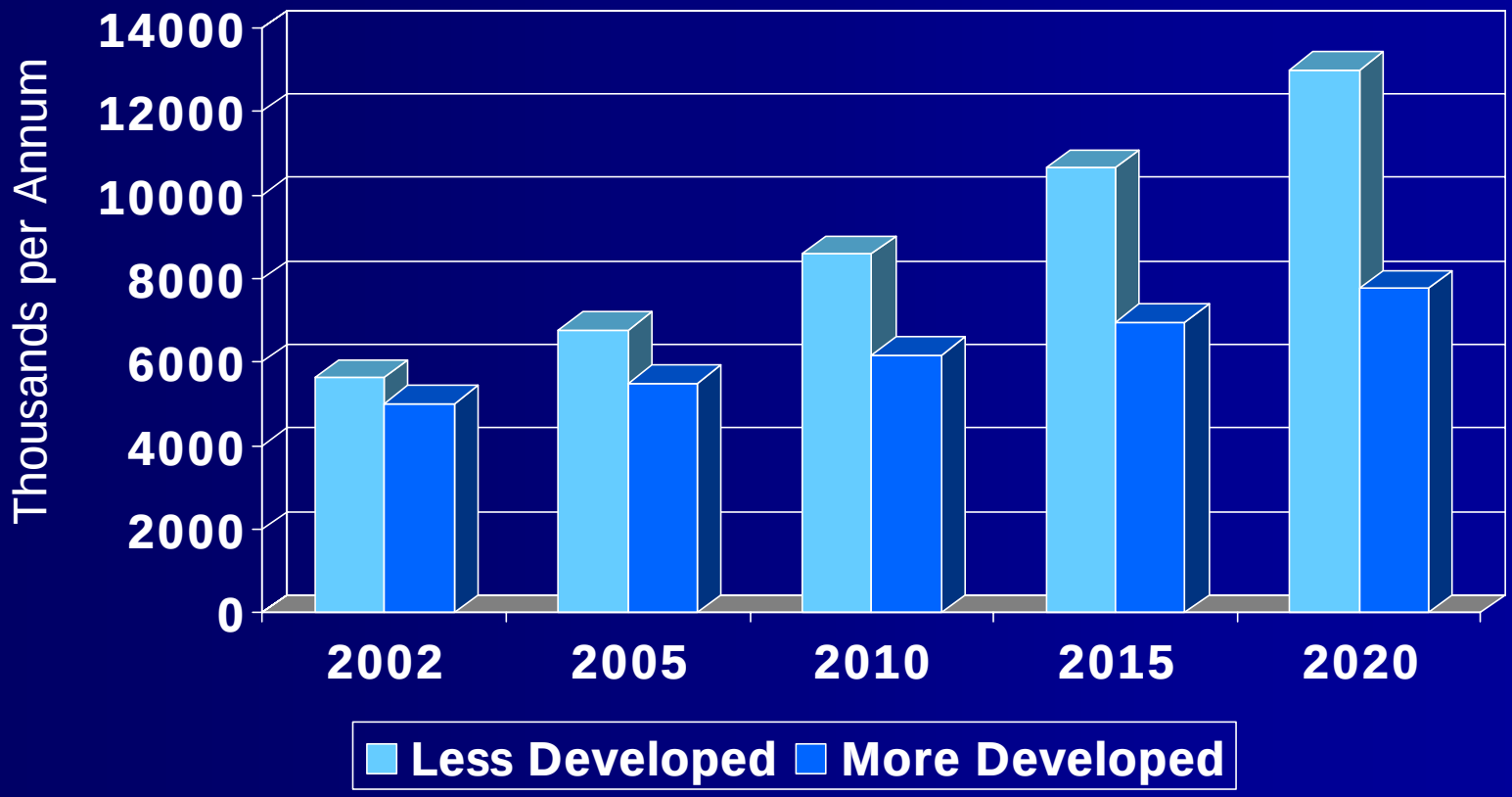


Estimates of Cancer Incidence Rates Males and Females



Demographic changes only – i.e. aging of populations

Estimates of All Cancer Cases, Males and Females, Trends Included



Influence of aging and increases in population size

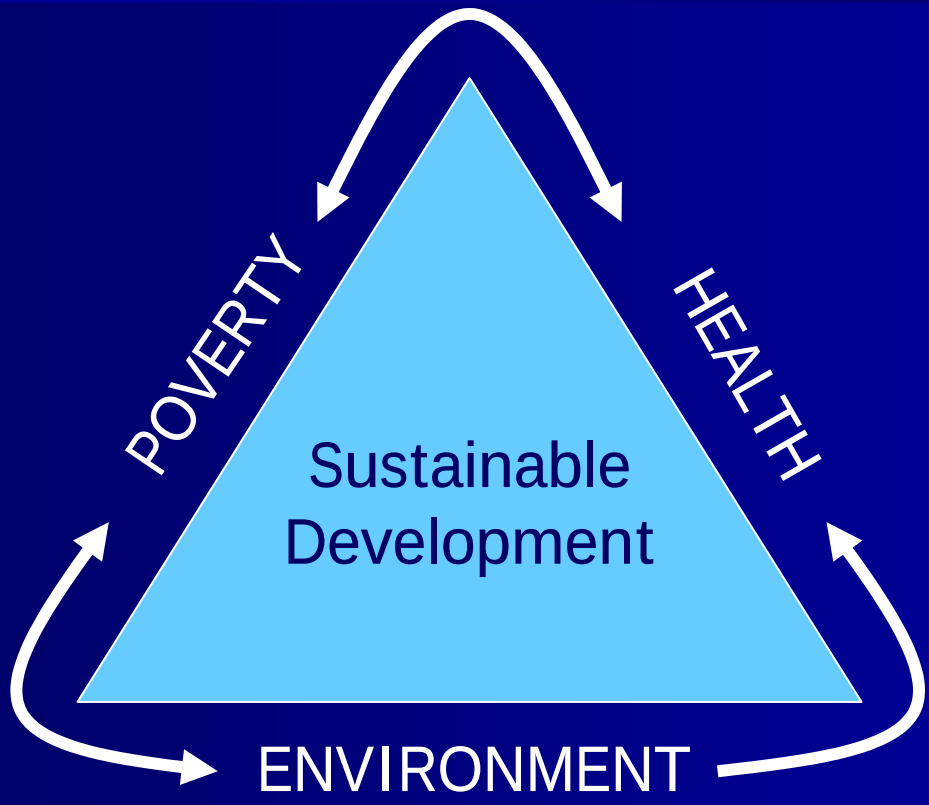
A Neglected Health Problem in Low Income Countries

- Cancer causes more deaths globally than AIDS, malaria and TB combined
- In 2002, >50% of the 11 million estimated patients with cancer and 70% of cancer deaths were in developing countries, which have perhaps 5-10% of global resources
- Developing countries will account for an ever increasing fraction of the global cancer burden: NOW IS THE TIME FOR ACTION
- The WHA has approved a resolution (May 2005) recommending that countries develop and implement cancer control plans

Obstacles to Controlling Cancer in Low and Middle Income Countries

Quantitative and qualitative deficiencies in human, material and financial resources at all levels of health care and within the community at large

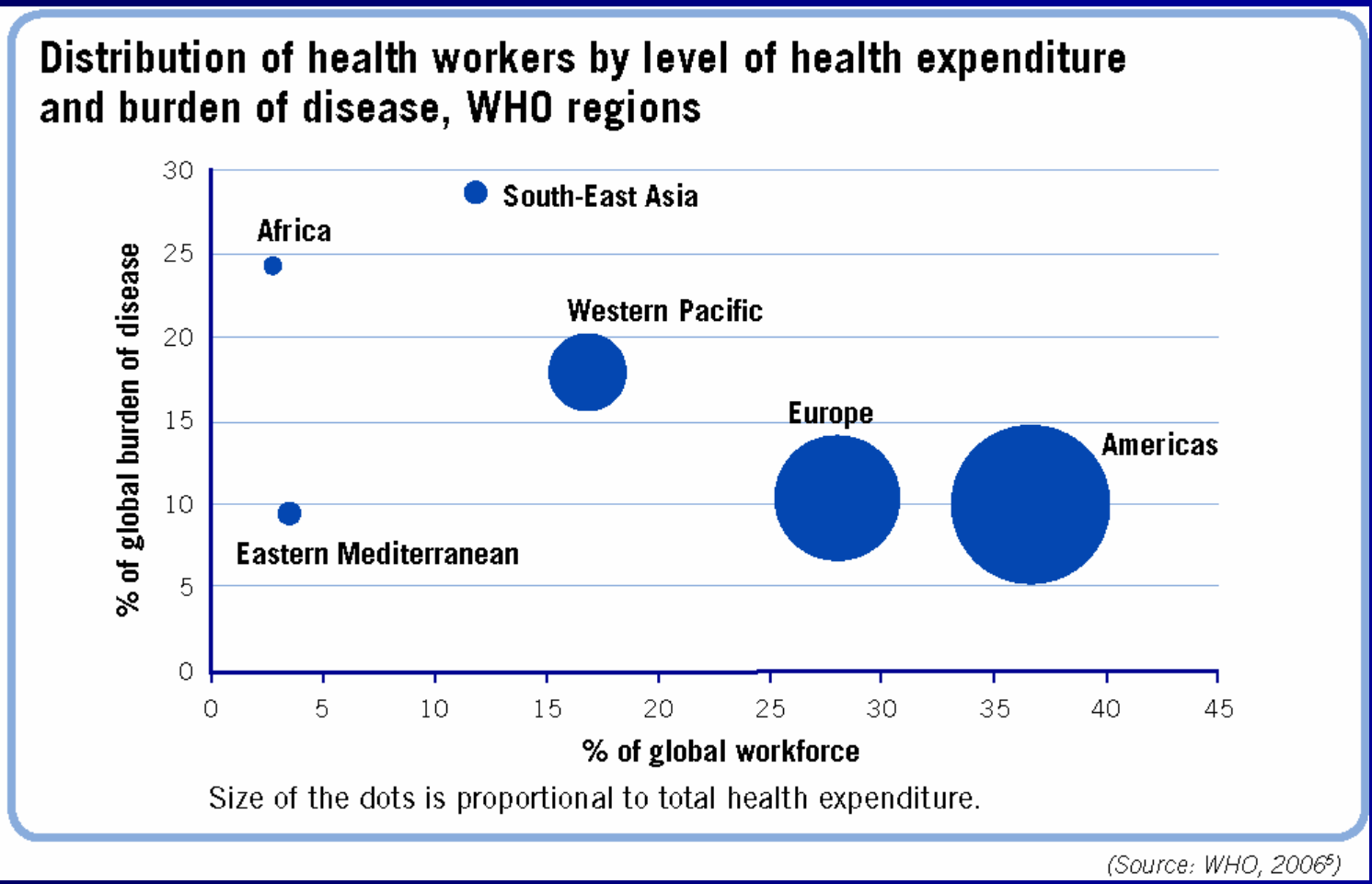
Health and Development



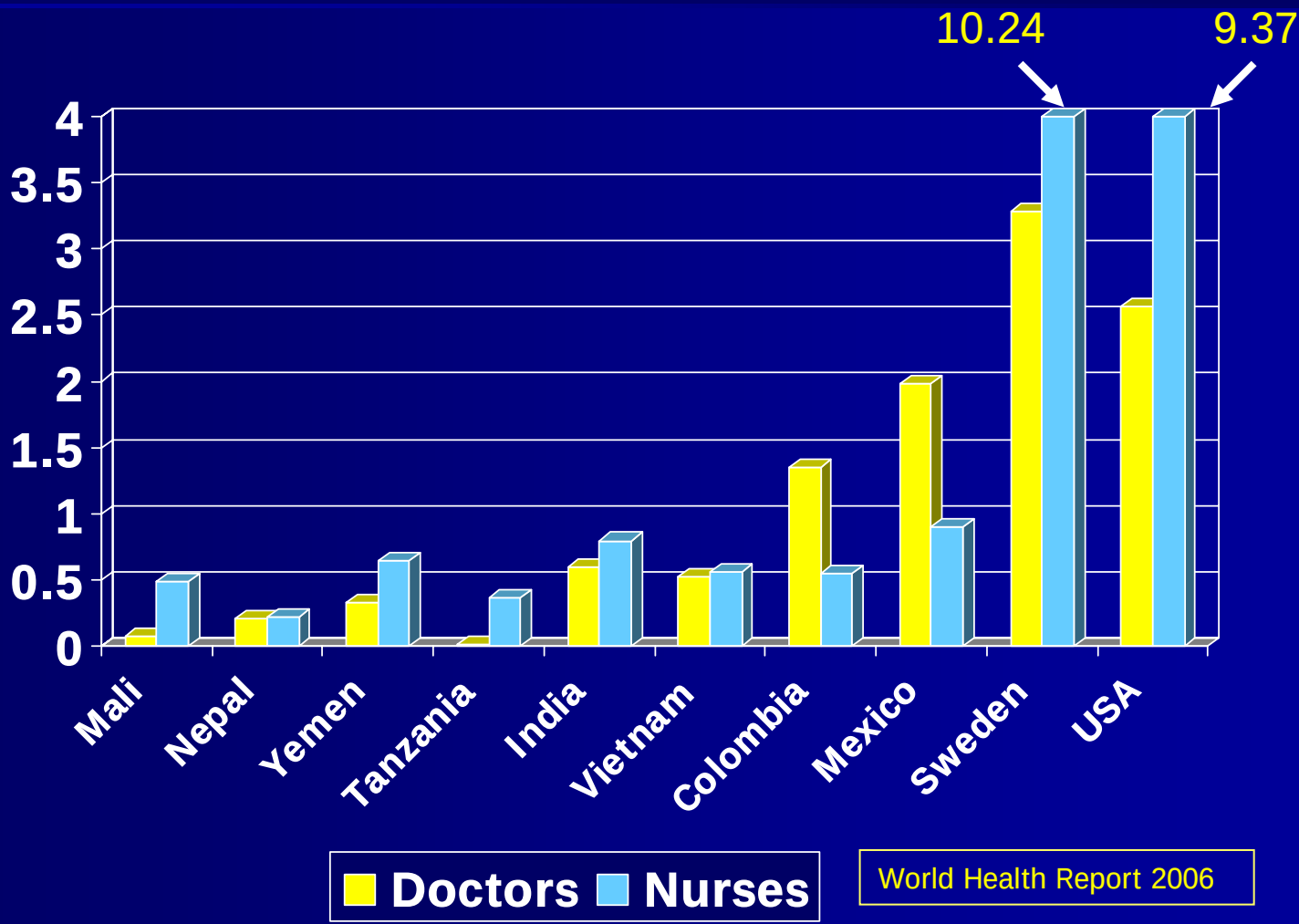
Health is an essential component of sustainable development

23% of deaths are caused by the environment and are avoidable (WHO 2006)

Disease Burden and Resources

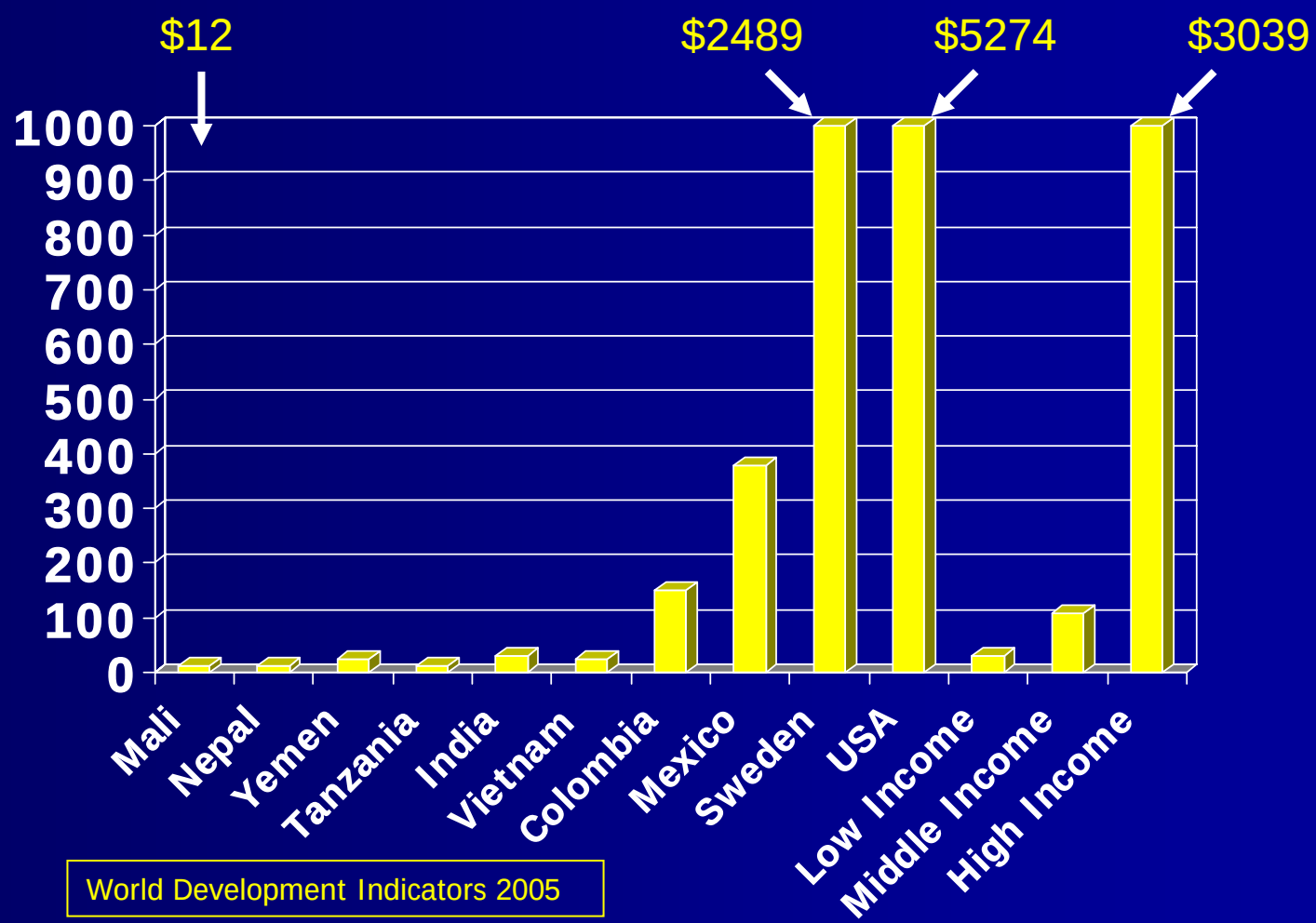


Physicians, Nurses per 1000



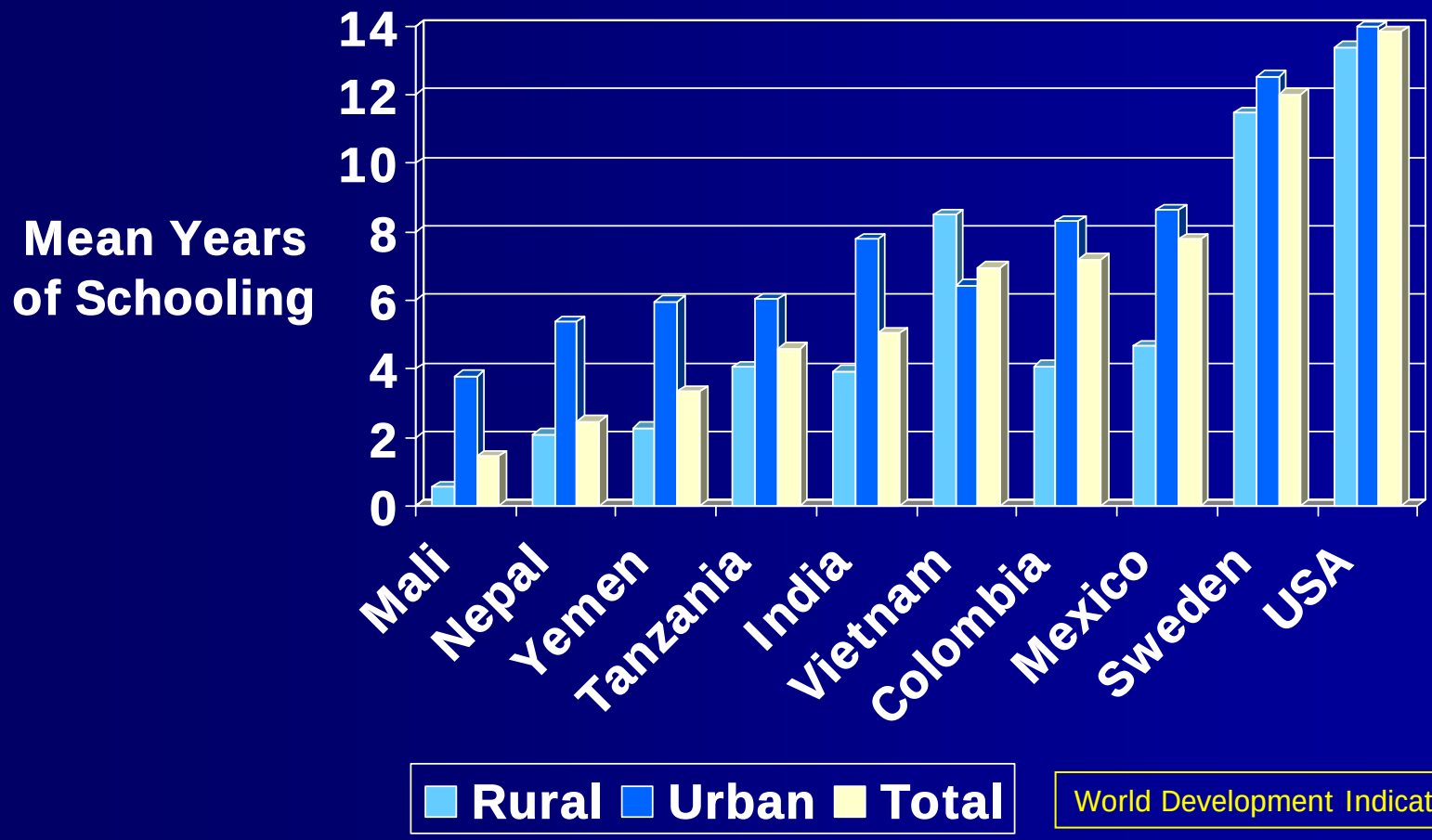
World Health Report 2006

Health Expenditure Per Cap



World Development Indicators 2005

Education (’98-’01)



World Development Indicators 2005

Recruitment Drives

Indian nurses' American dream

By Habib Beary
BBC correspondent in Bangalore

Sept 2003

Nursing students come from across India to train

Melody D'sa is ecstatic. Her dream has come true - a new life in America.

Melody is among hundreds of Indian nurses heading to the States, cashing in on a growing demand for trained nurses in the US.
The US, UK and Australia have all looked to India to provide nurses because of shortages of staff.
The dream of working abroad has spawned a slew of training centres in India.

Melody was taught at one of the popular training schools, *Nurses Anytime* in Bangalore, which recruits for hospitals in the US.

Why is Africa losing its best brains?

Mar 2004

African students prefer foreign universities

Thousands of Africa's professionals and students are leaving the continent for better prospects in Europe, USA or India.
For instance, it is estimated that more than 10,000 South Africans for instance left the country for America and Europe in the last year alone.
A majority of professionals who leave the continent include lecturers, nurses, doctors are leaving for greener pastures away from home. Most of them are reluctant to go back home, they would rather seek jobs abroad.

According to statistics, the so-called brain drain costs the continent an estimated 4 billion dollars per year - in what has been pronounced as a slow death for Africa

Nurses who joined the UK register from countries from which recruitment is banned (2004-5)

Source: Annual Report, 20005, Nursing and Midwifery Council, UK

South Africa	933	Kenya	99
Nigeria	466	Botswana	91
West Indies	352	Nepal	73
Zimbabwe	311	Swaziland	69
Ghana	272	Malawi	52
Pakistan	205	Sri Lanka	47
Zambia	162	Lesotho	43
Mauritius	102	Sierra Leone	24

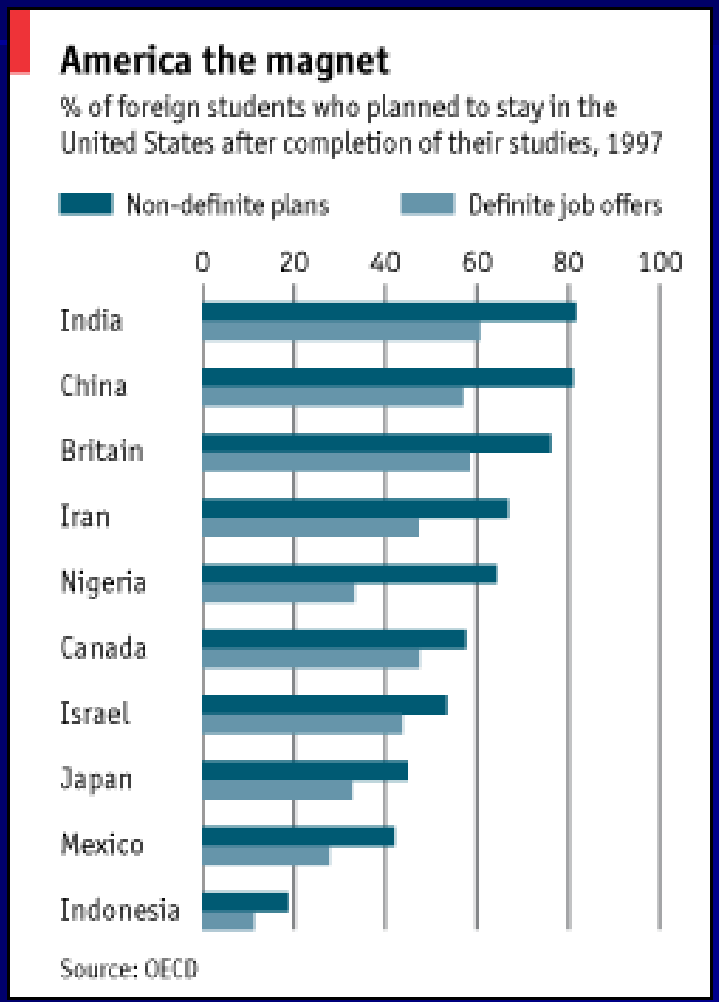
Total 3301

Initial Registrants: 33,257; Overseas (non-EU): 11,477
India: 3,690; Philippines: 2,521; Nigeria: 466;

Leakage of Talent to the USA

AIIMS:

56% of medical graduates emigrated from 1956-80, 49% in 90s



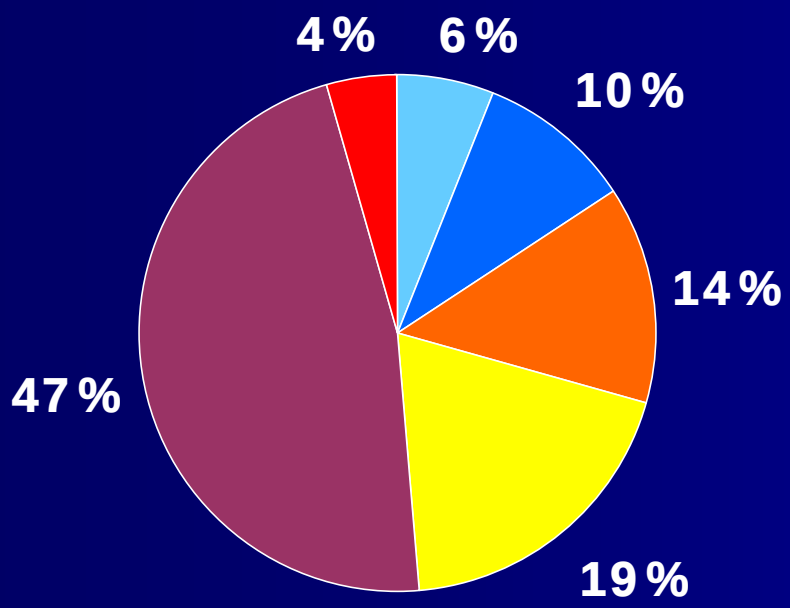
30% of Mexicans with PhD's are in the USA

The 1million Indians in the USA account for 0.1% of India's population but the equivalent of 10% of India's entire income

Recent Statement at UN

President Abel Pacheco de la Espriella of Costa Rica noted that in 2003 the world reached a new record by devoting $956 billion to military expenditure. That is 17 times the amount of resources devoted to development assistance and more than the sum of the foreign debt of the 64 countries with the lowest GDP, he said.

Cancer Registration; From CI on V Continents I-VIII



	Fraction of World Population
Africa	14%
Latin America	9%
N America	5%
Asia	60%
Europe	11%
Oceania	1%

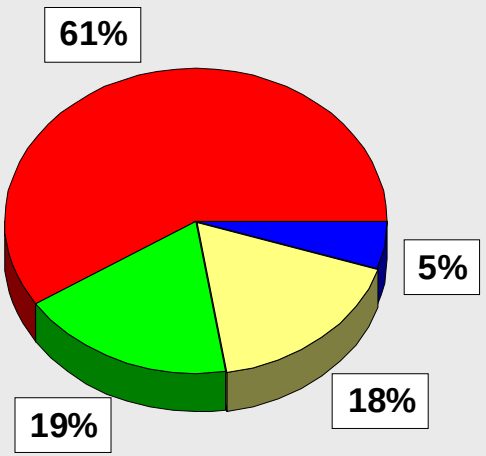
Number of registries does not accurately reflect population coverage (e.g., African registries cover approx 7 million of the 888 million people

Limitations in Resources for Radiotherapy

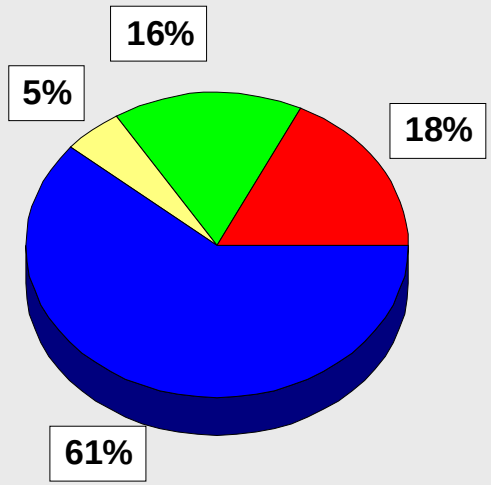
- In Dec 2004, there were approximately 2500 radiotherapy centers and 3700 machines for cancer therapy (enough for 1.85 million patients per year compared to 3 million who need it. Maldistribution: >20 countries – mostly African -have none. (DIRAC)
- Many existing machines are idle for lack of maintenance, expired sources or lack of radiotherapists or physicists
- Old cobalt sources require longer radiation times

Limitations in Resources

Anti-Cancer Drug Sales



Cancer



USA
Japan
Europe
Rest of World

Factors Limiting Access

- Poverty and ignorance delay seeking help
- Existing primary (and secondary) care suboptimal: lack of emphasis and knowledge leads to misdiagnosis and misinformation; traditional medicine prevalent
- Few specialized centers: long journeys to large cities
- Result: late diagnosis; advanced disease; limited options – even palliative care is rarely available

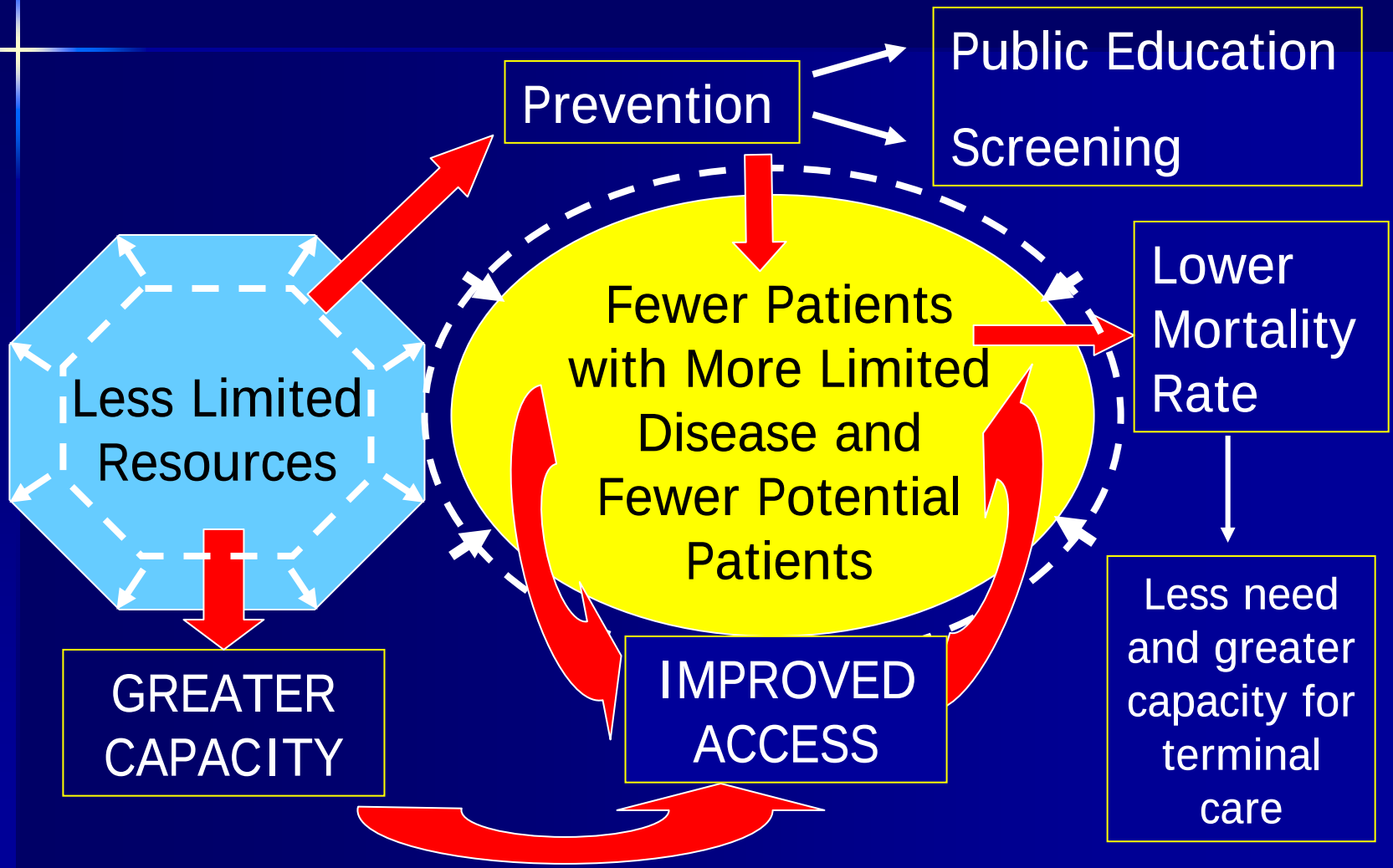
Factors Limiting Quality

- Inadequate numbers of cancer specialists - too many patients; too few staff
- Poorly trained staff deliver sub-optimal care and and provide sub-optimal education and training
- Limitations in material resources (drugs, equipment) and/or ability to pay
- Poor follow up results in limited evidence of what works and what doesn't

Reception area, Cancer Institute (CIA), Chennai, India

Interlocking Vicious Cycles

The Need: Greater Capacity



Differing Patterns of Cancer

Different environments, lifestyles and genetics (and sometimes screening programs) create differences in the patterns of cancer seen in different countries, regions and populations

Crude Incidence and Mortality, More Developed

Lung

Colon

Breast

Prostate

Stomach

Bladder

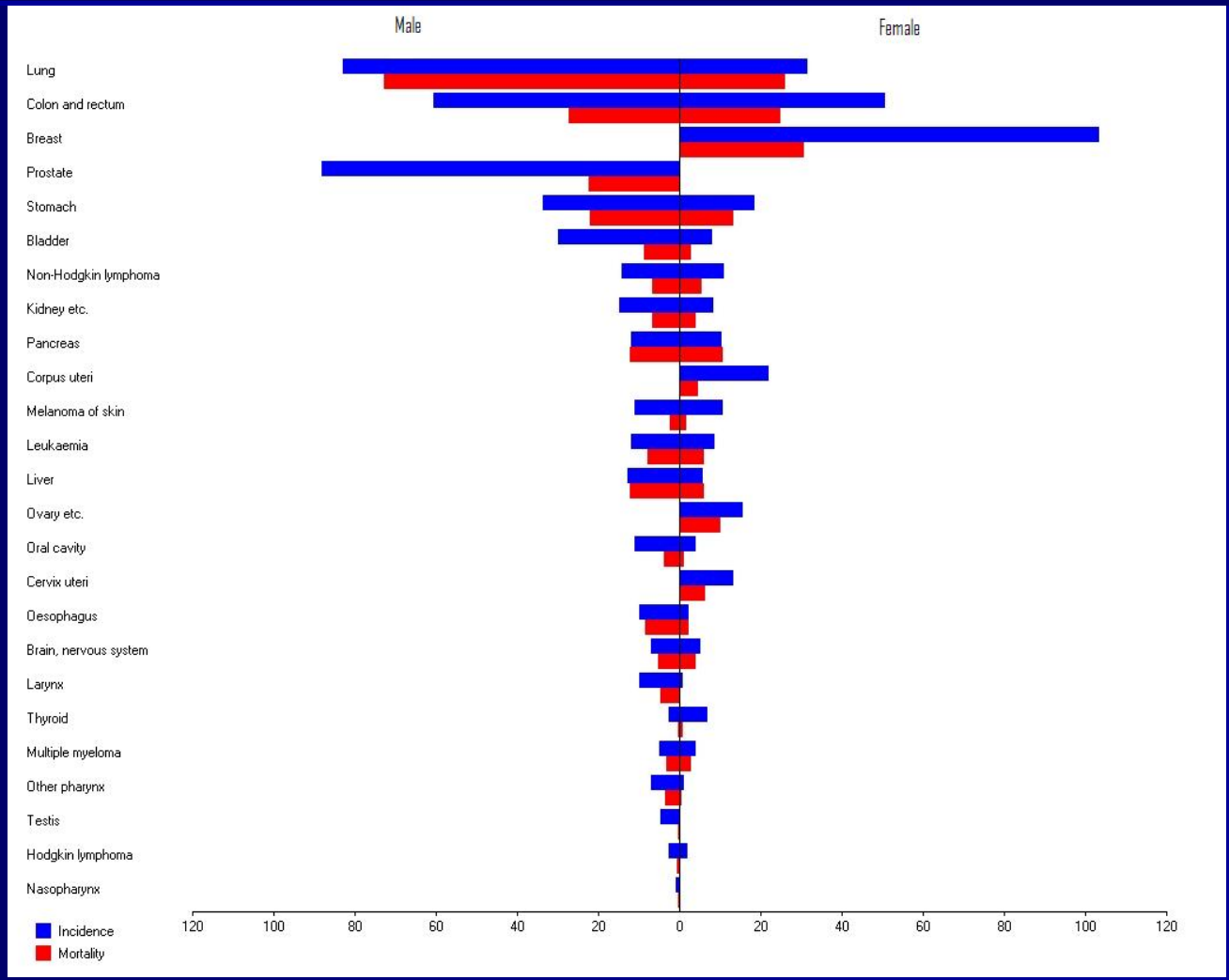
NHL

Kidney

Pancreas

Corp Uteri

2002



Crude Incidence and Mortality, Less Developed

Lung

Stomach

Breast

Cervix Uteri

Oesophagus

Colon

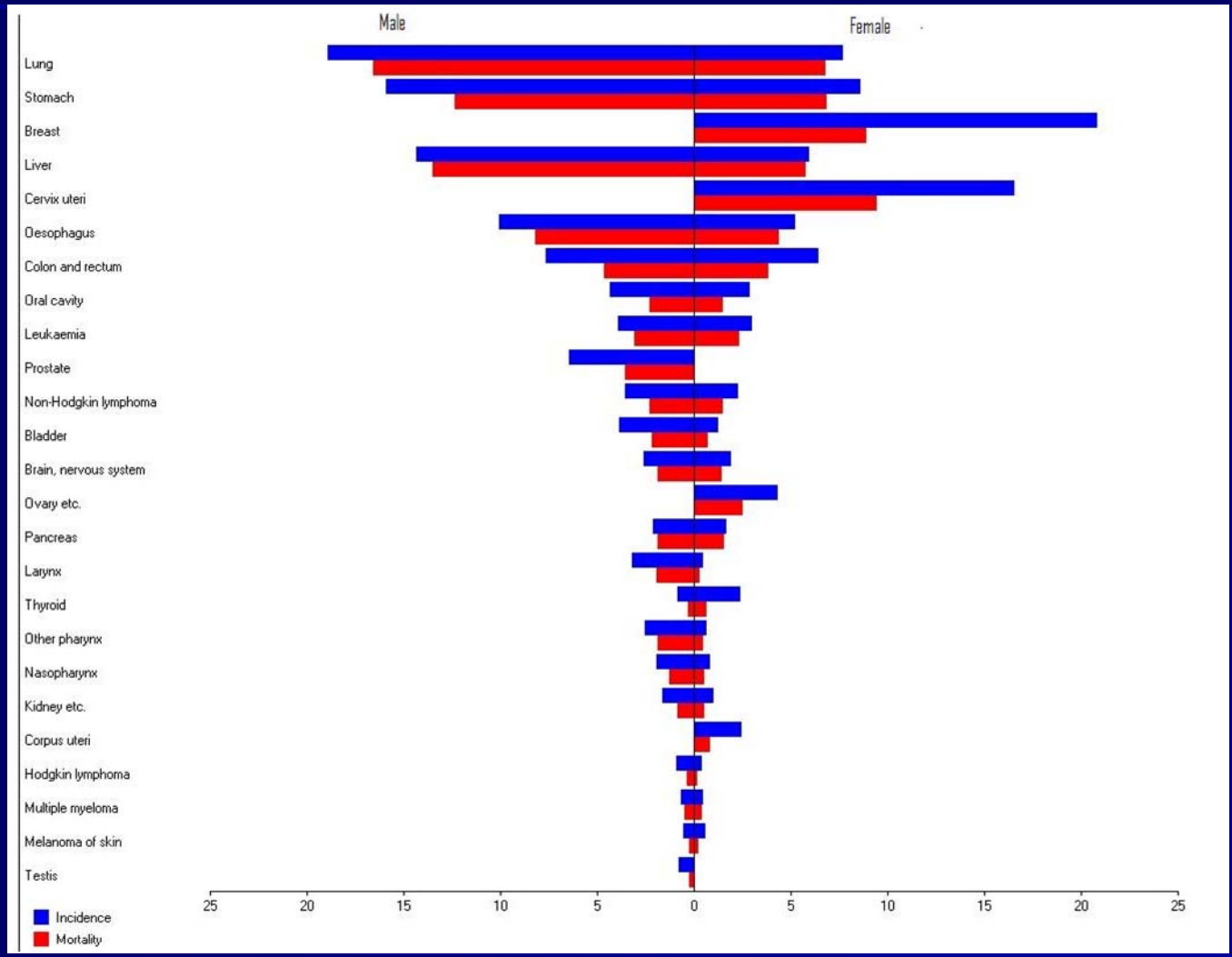
Oral

Leukemia

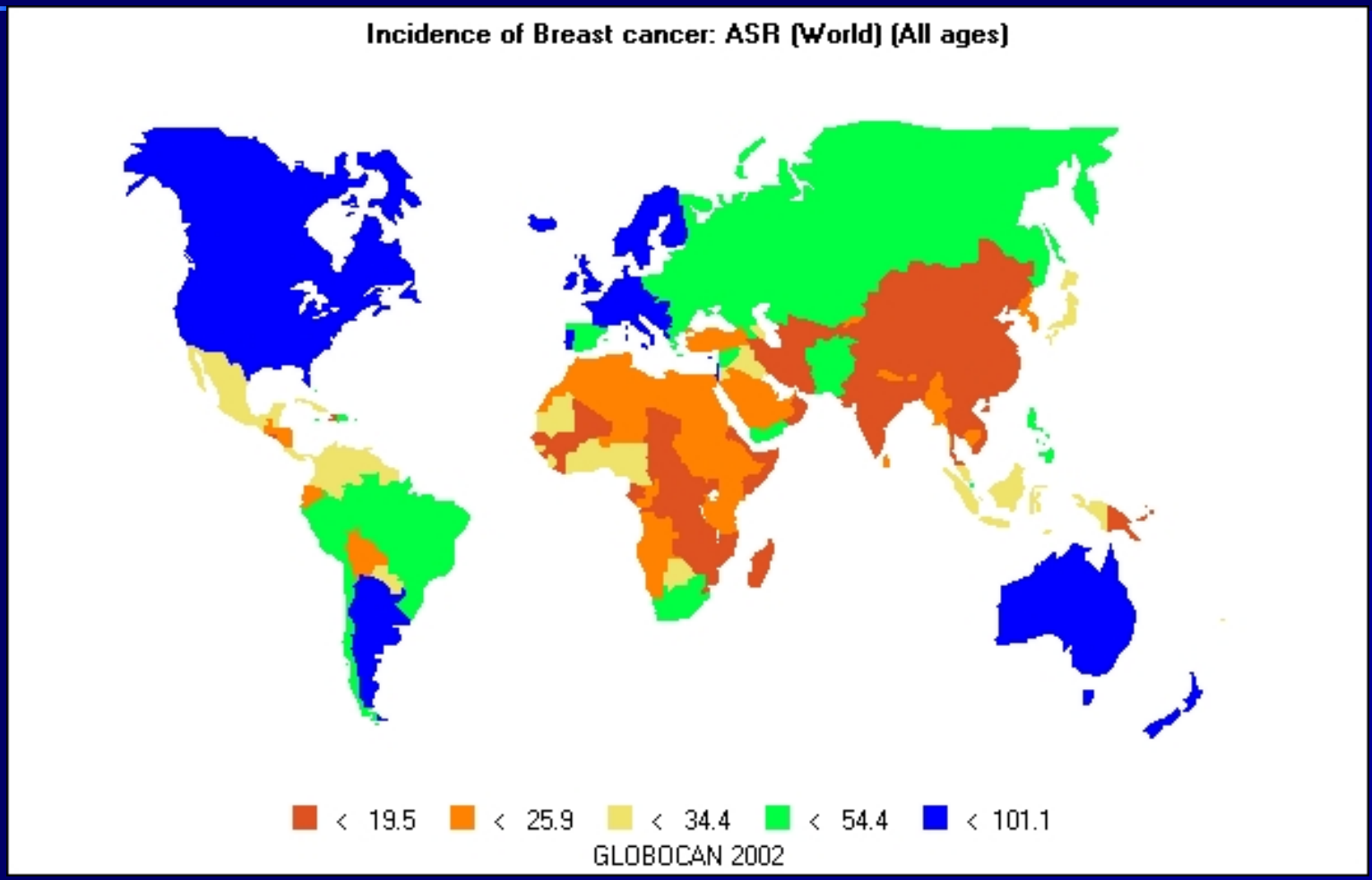
Prostate

NHL

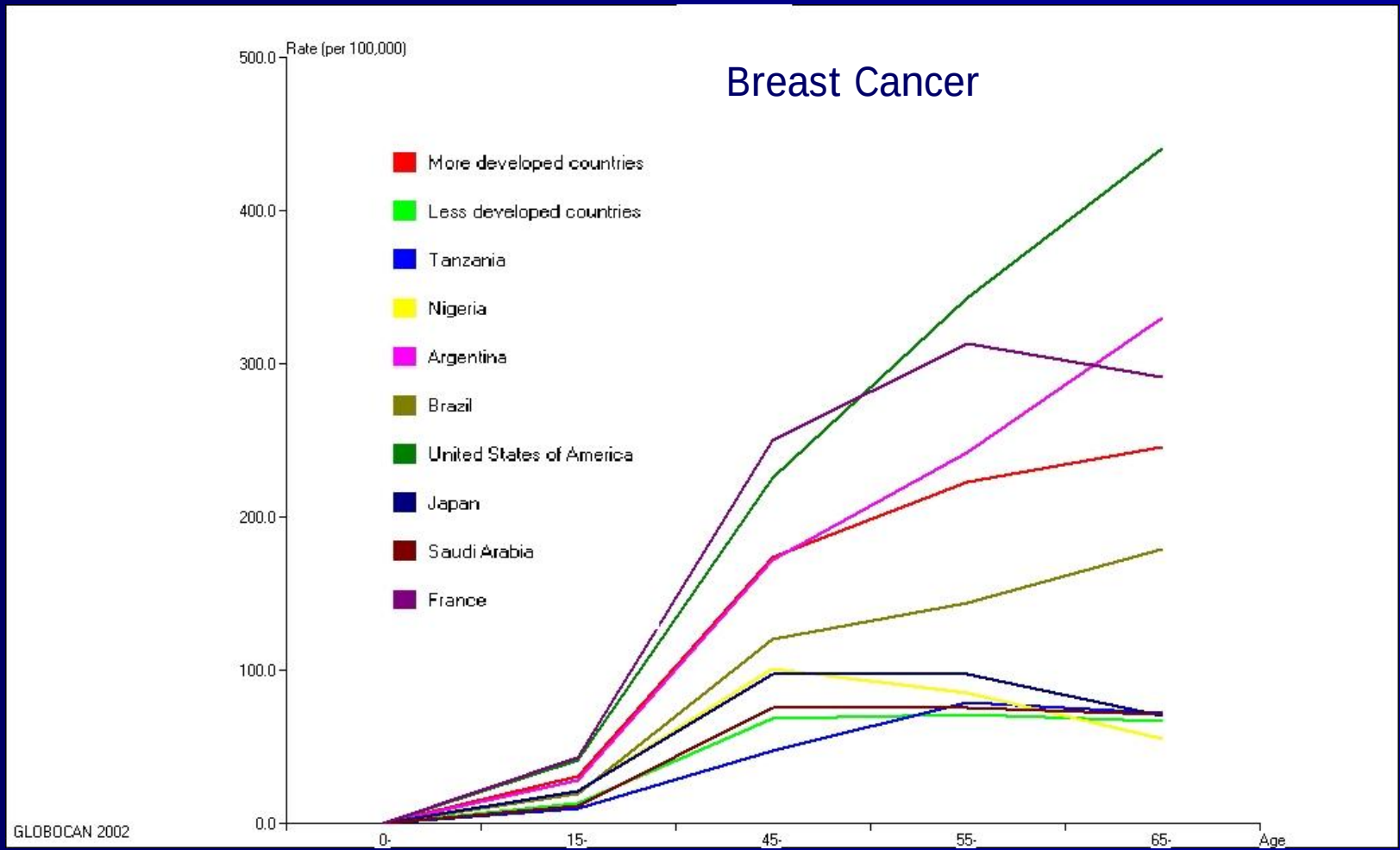
2002



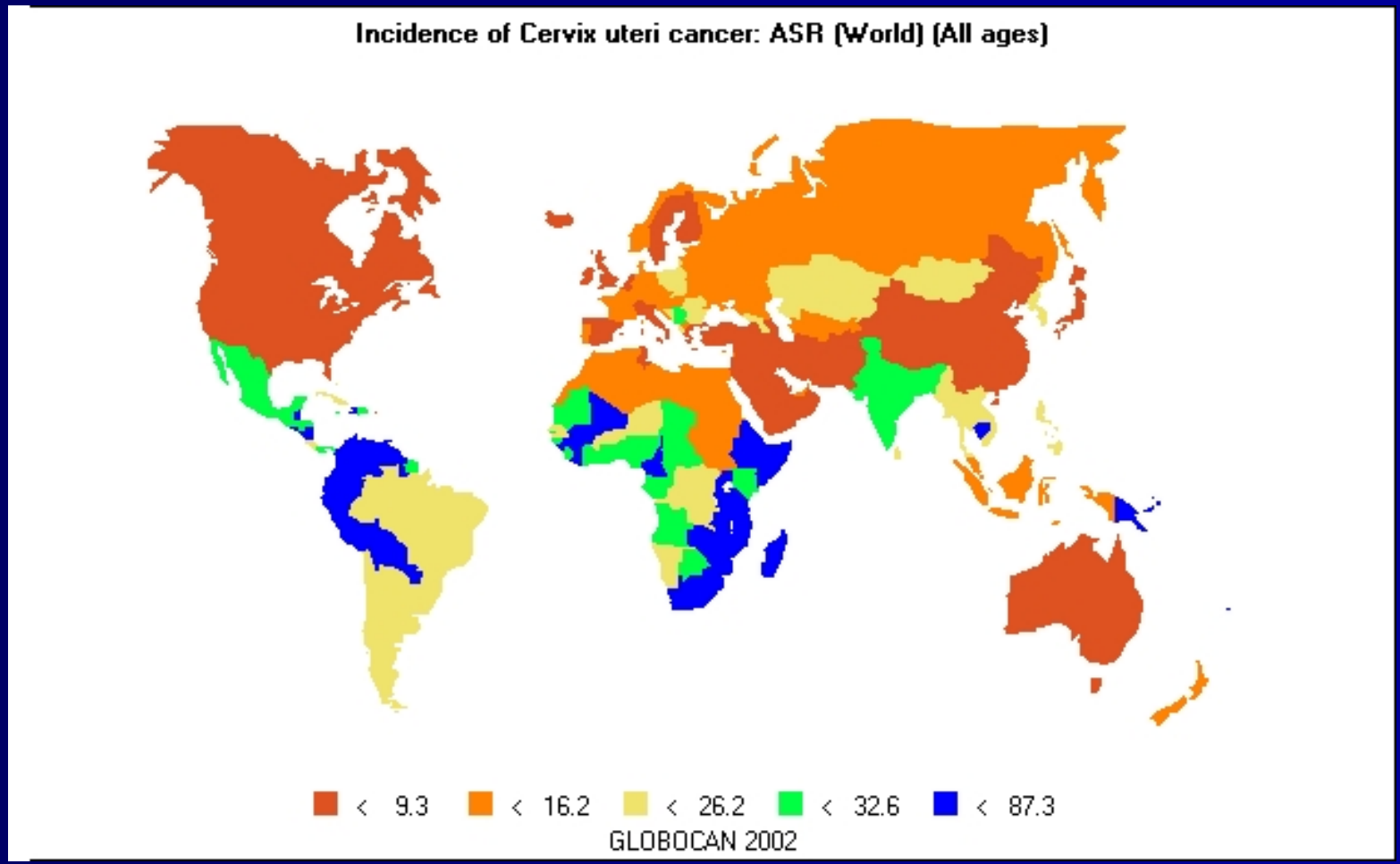
Breast Cancer; AS Incidence Rates



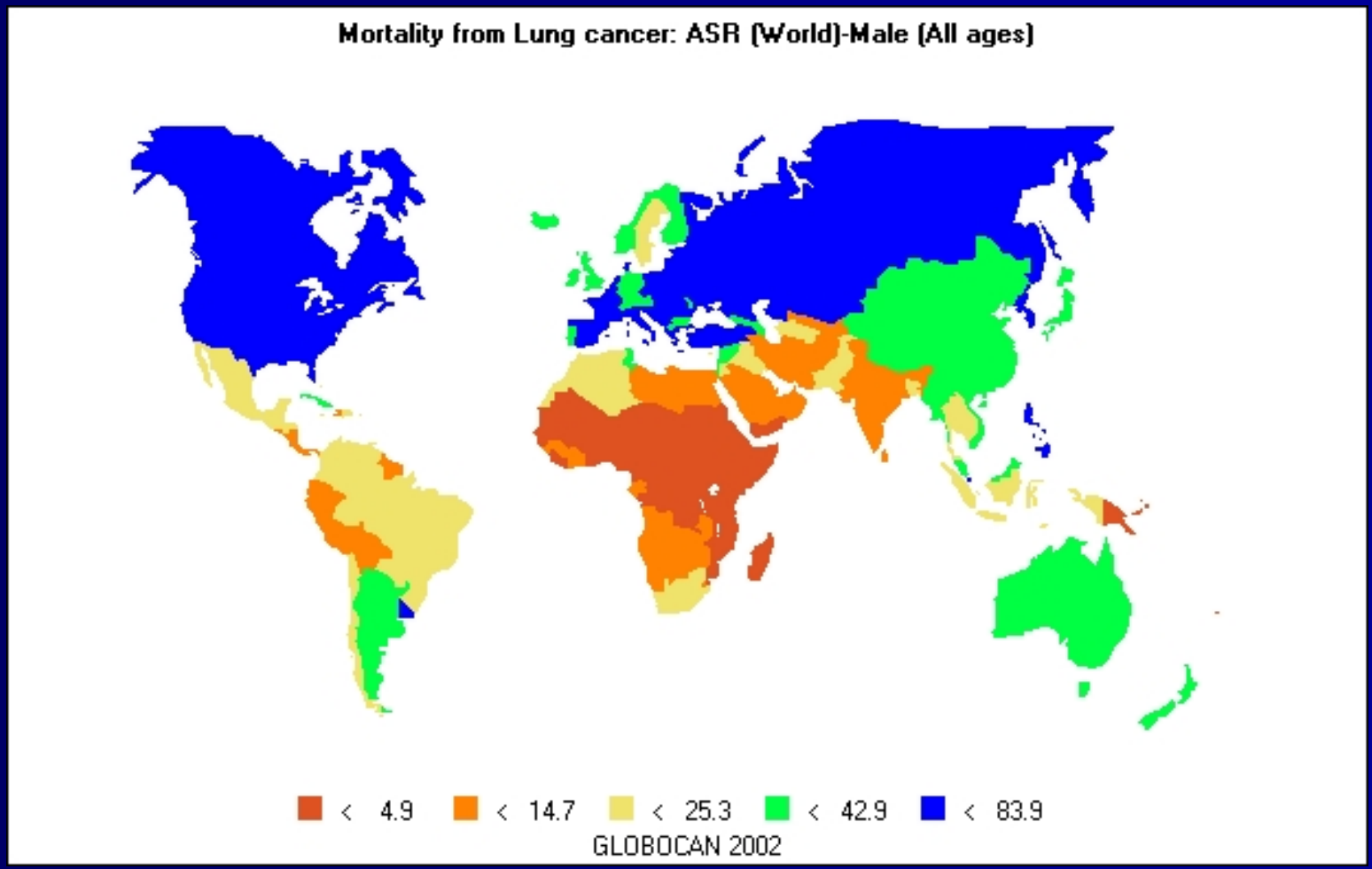
Breast Cancer; Age-Specific Incidence Rates



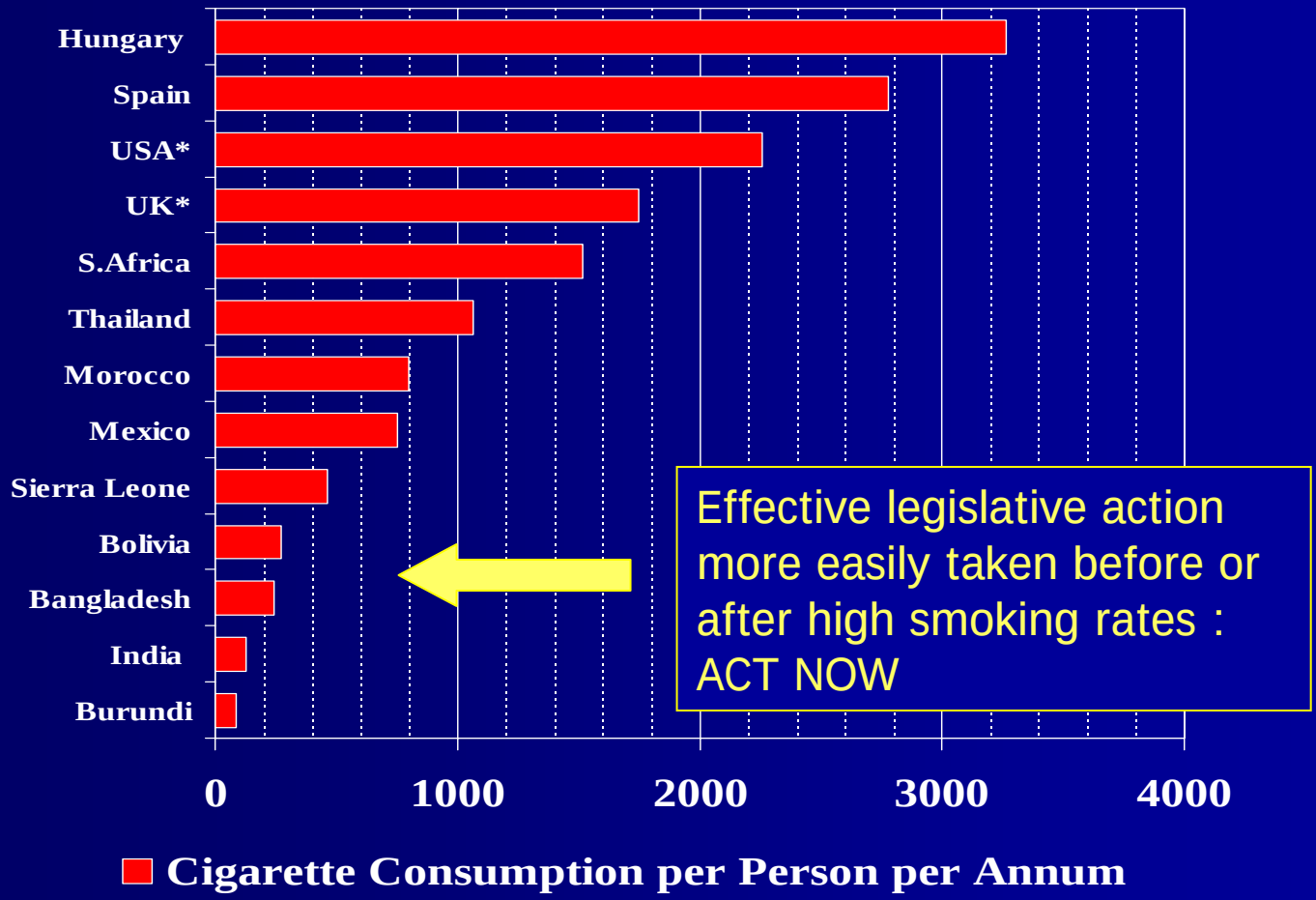
Cervical Cancer; AS Incidence Rates



Lung Cancer; AS Mortality Rates - Males



Progression of Tobacco Epidemic in Various Countries



Some Cancers Associated with Infection / Infestation

- Cervix, anus, penis, others: *HPV*
- Hepatocellular carcinoma: *HBV, HCV, aflotoxins*
- Stomach, lymphoma: *H.pylori*
- Bladder, bowel, liver, biliary system: *Schistosomiasis, Clonorchis and other flukes*
- Kaposi's Sarcoma: *HHV8, HIV*
- Lymphomas: *HIV, EBV, HHV8, HTLV1,HCV malaria*

Cancer arising on a background of chronic infections is more common in developing countries – up to 40% in some countries

Some “Regional Cancers”

- Nasopharyngeal Carcinoma
- Adult T cell leukemia lymphoma
- Gall bladder/bile duct cancer
- Bladder cancer
- Sino-nasal NK/T cell lymphoma
- Burkitt’s lymphoma
- Childhood adrenocortical carcinoma

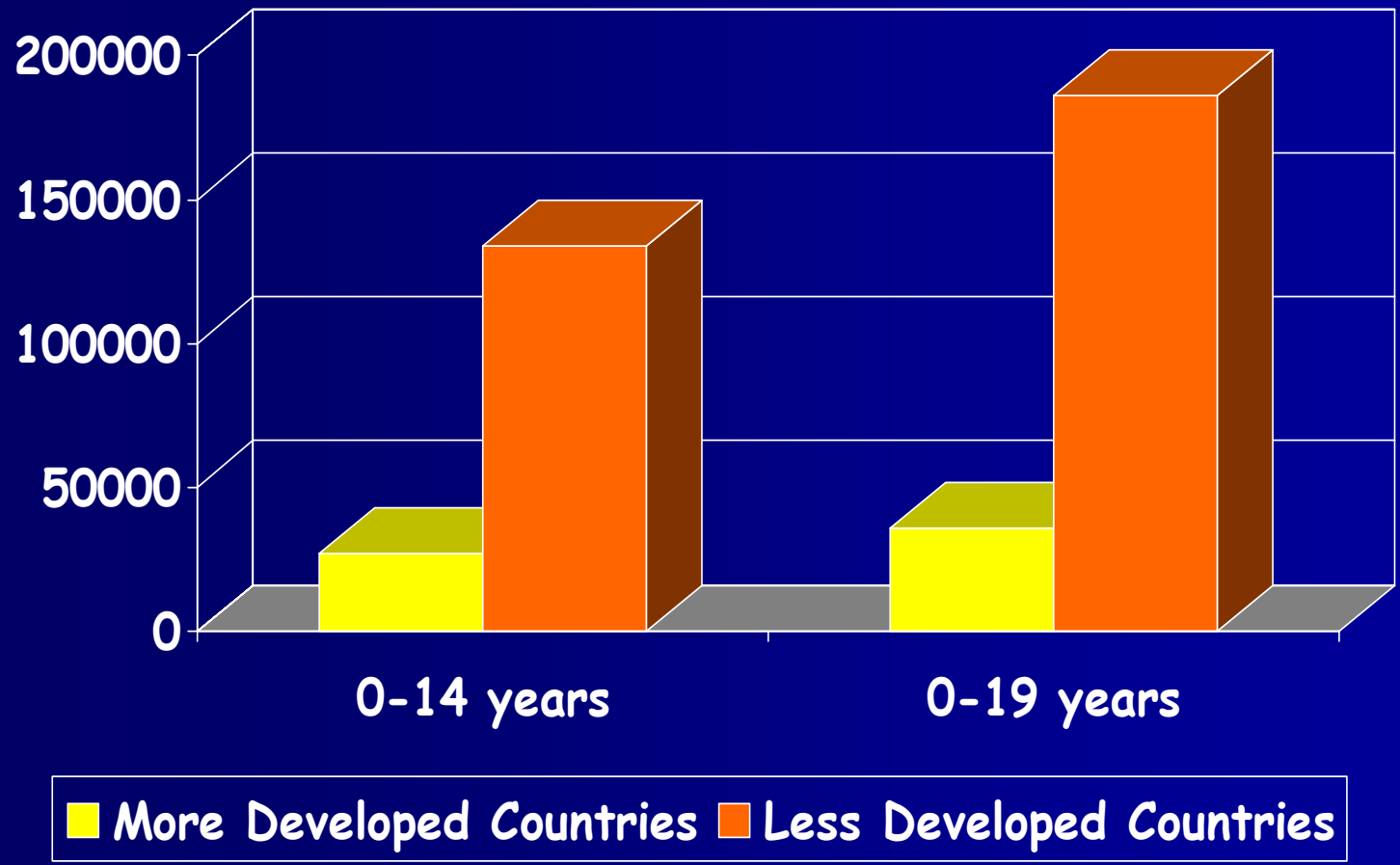
Cancer in Children

	0-14 yrs	15-19 yrs	0-19 yrs
Less Developed	139,614	46,538	186,152
More Developed	26,723	8,907	35,630
World	166,337	55,445	221,782

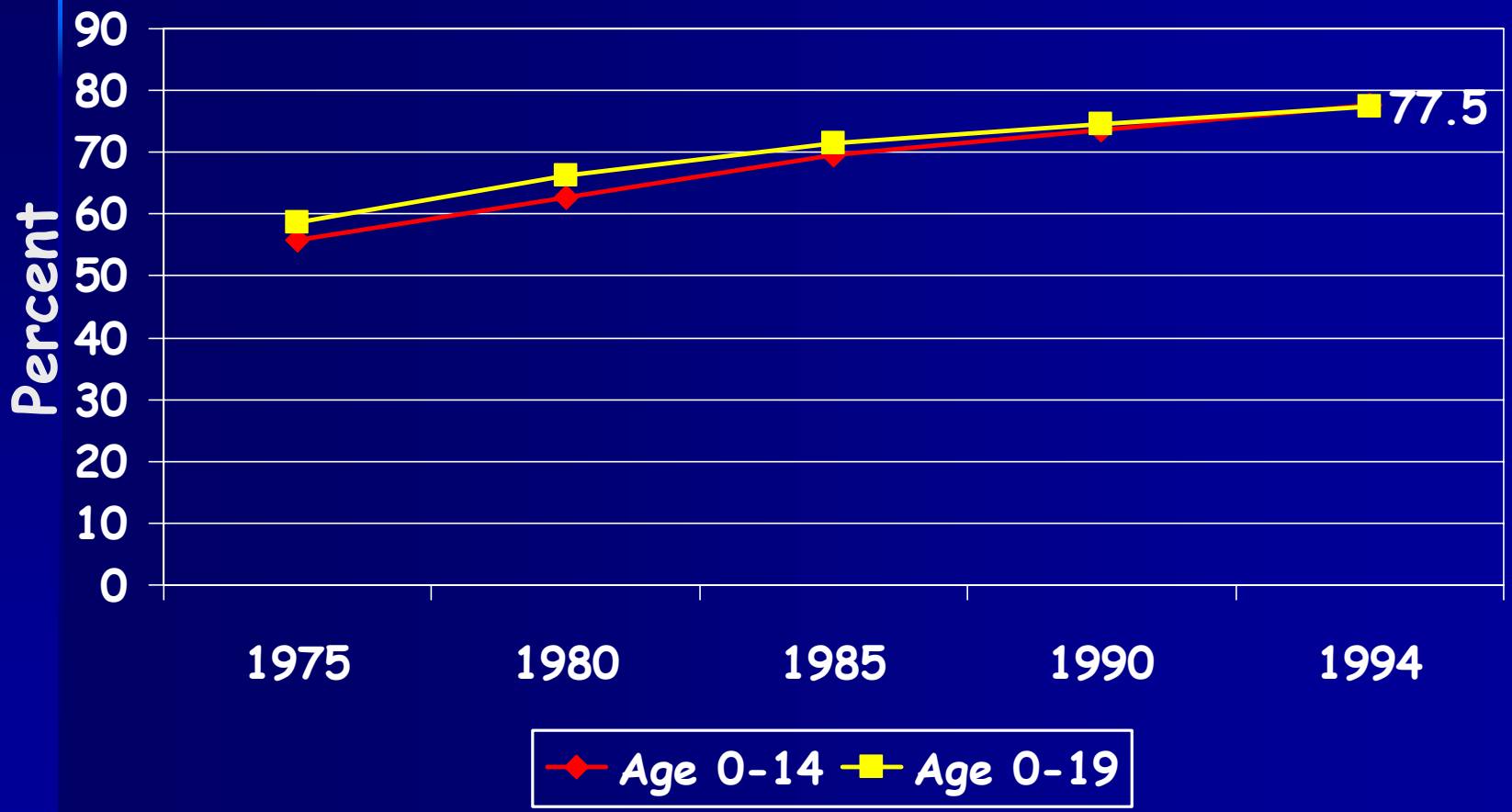
NB. Estimate for 15-19 is 25-33% of cancer 0-19

Data From CI5C VII; IARC 1997

Actual Numbers of Childhood and Adolescent Cancer



Relative 5 yr Survival Rates (SEER) All Sites, M and F



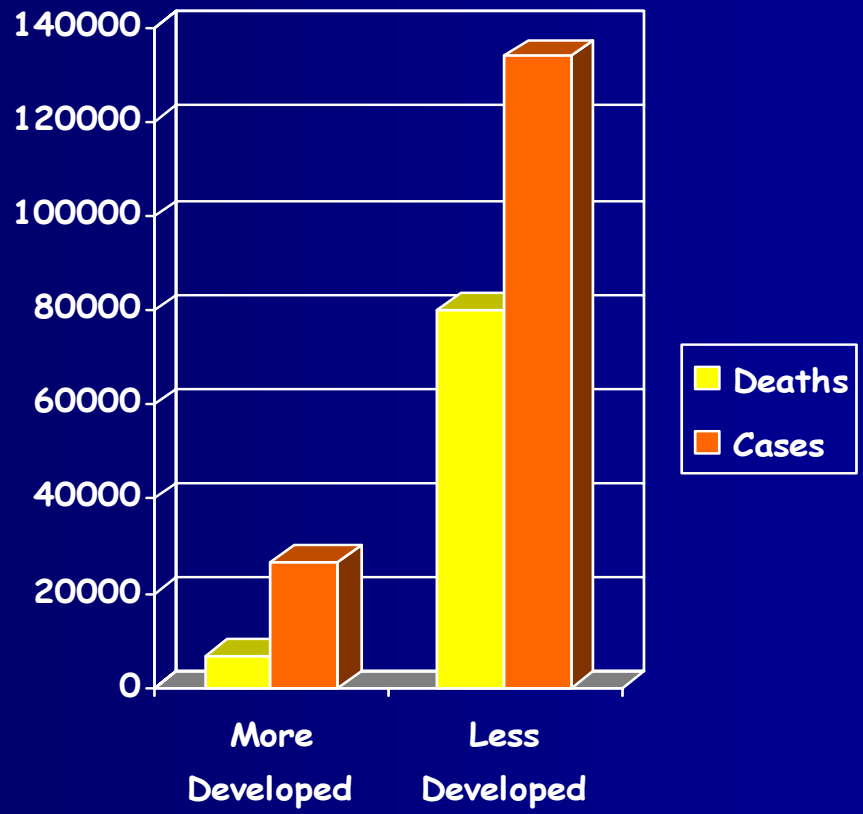
Ratio of Deaths to Cases (0-14 years)

	Deaths	Cases	Ratio
More Developed	6,893	26,864	0.256
Less Developed	80,116	133,931	0.598

Globocan 2002

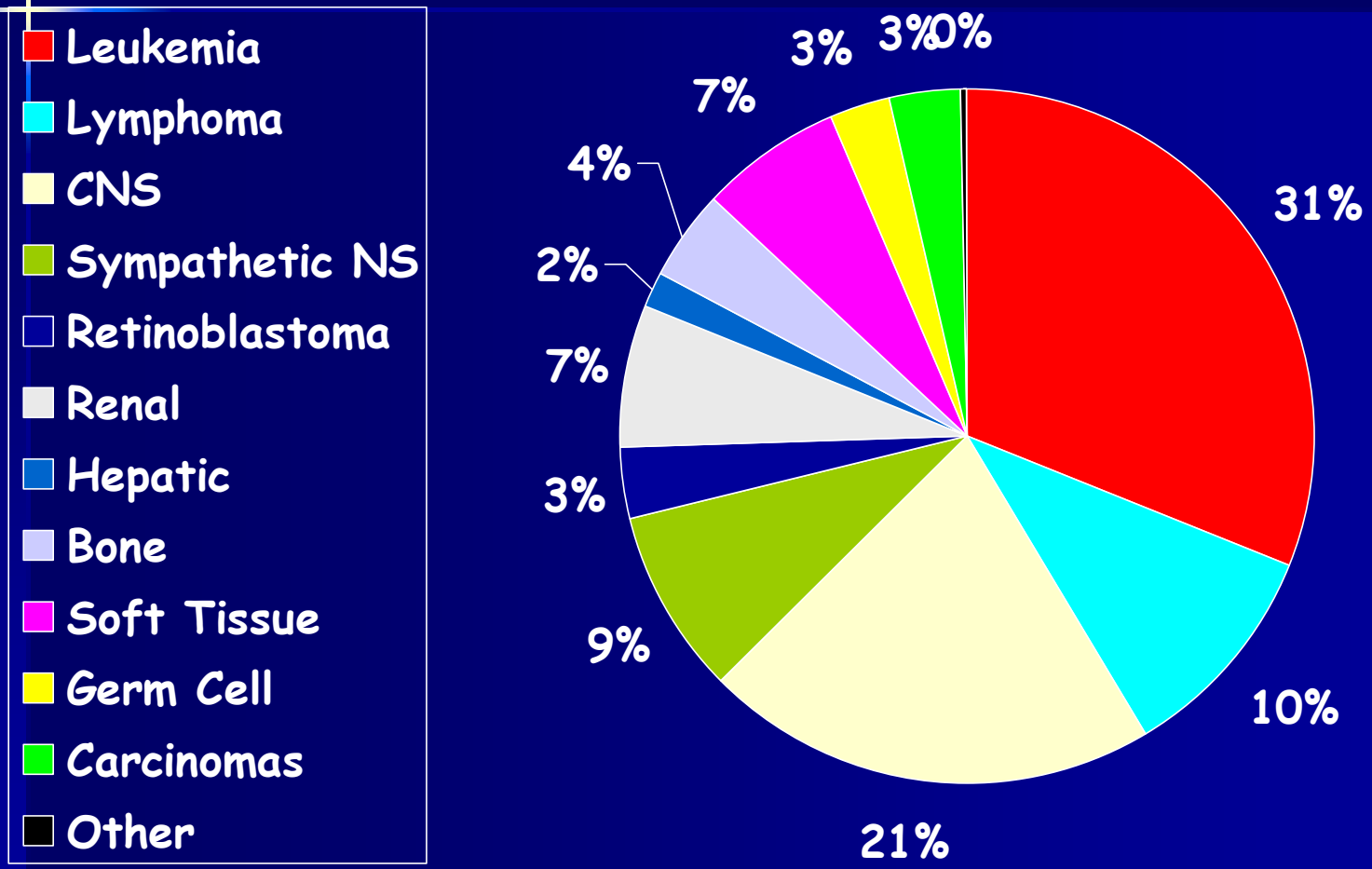
NB. Data extrapolated from existing registries – the true situation is probably significantly worse

Annual Deaths versus Cases



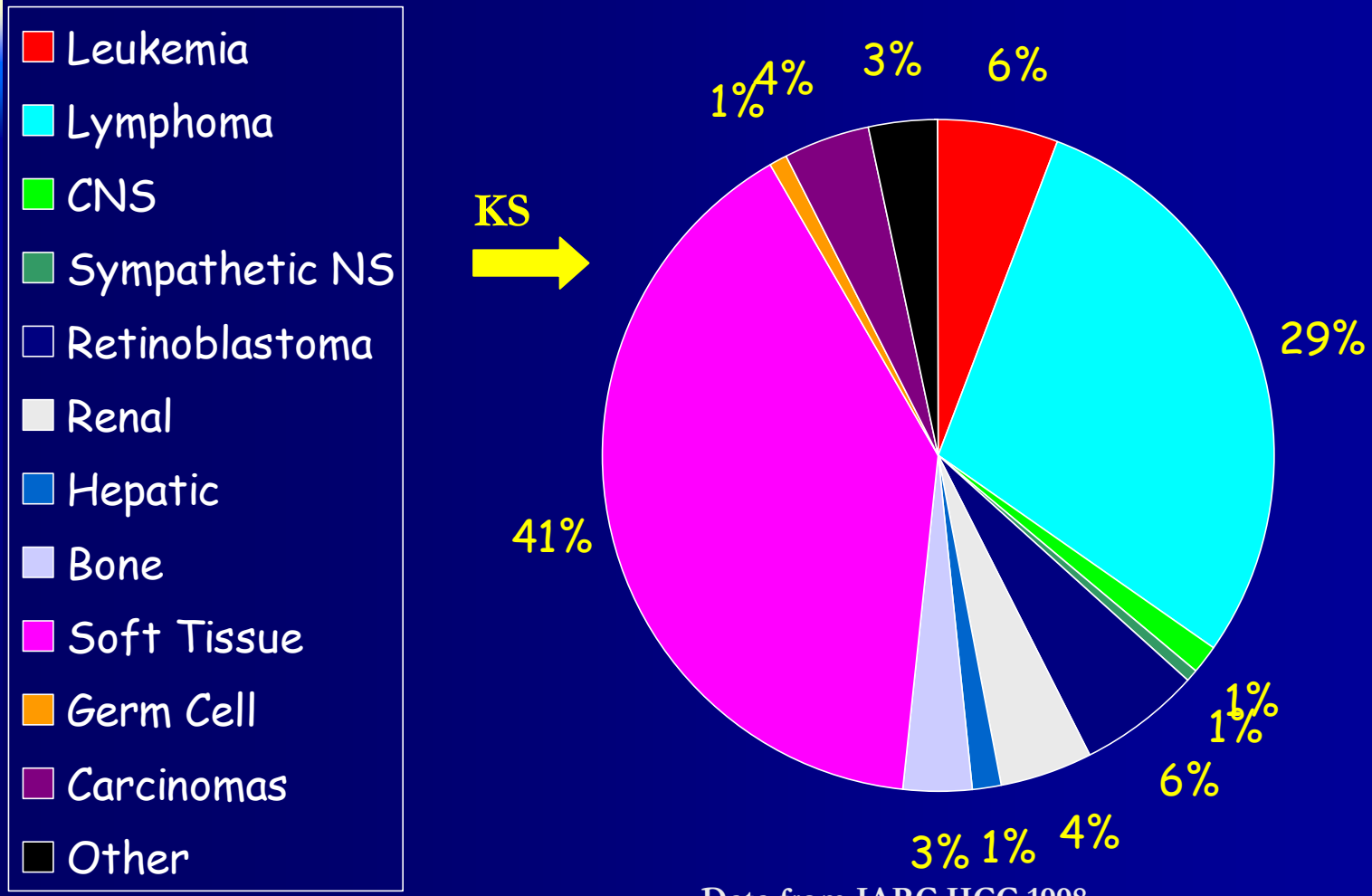
NB. Data extrapolated from existing registries – the true situation is probably significantly worse

USA Whites 83-92 (0-14 yrs)



Data from IARC IICC 1998

Uganda 1992-95 (0-14 years)



Data from IARC IICC 1998

Cancer Control

Reduction of the morbidity and mortality associated with cancer

Based on the best available evidence for primary prevention, early detection, diagnosis and treatment, palliative care

The Cancer Control Plan

- Initiative on part of government or NGO working with government to appoint cancer control committee
- Committee develops a plan based on national priorities – i.e., cancer pattern, feasibility of control of selected cancers

Prevention Measures

- Halving smoking rates would avoid 20-30 million deaths by 2025
- Chewing habits important in some countries
- In developing countries, infection control is important to cancer control: schistosomiasis treatment, eating and hygiene, HPV vaccine
- Exposure to workplace and environmental chemicals higher because of lax regulations or enforcement

Screening: Feasibility and Cost Effectiveness

- Approaches in high income countries may not be feasible or cost effective in developing countries - cytopathology, mammography, PSA, colonoscopy

Crude Incidence	Nigeria	USA
Breast (F)	20.6	143.8
Cervix Uteri (F)	16.7	9.0
Prostate (M)	10.3	168.9
Colon (M)	3.3	60
GNI per cap (2004)	$430	$41,440

Evidence Based Cancer Control

- Most evidence comes from high income countries
  - Not always relevant to the diseases, stages of disease, or resources in low and middle income countries
- Technology and knowledge transfer must be done with knowledge of the problems of low and middle income countries
  - Educational meetings and available literature often not adapted to needs and inaccessible to most health professionals in such countries
- Guidelines without education, supervision and improved/expanded resources unlikely to have a major impact

Comparison of Treatment Guidelines and Clinical Trials

Research

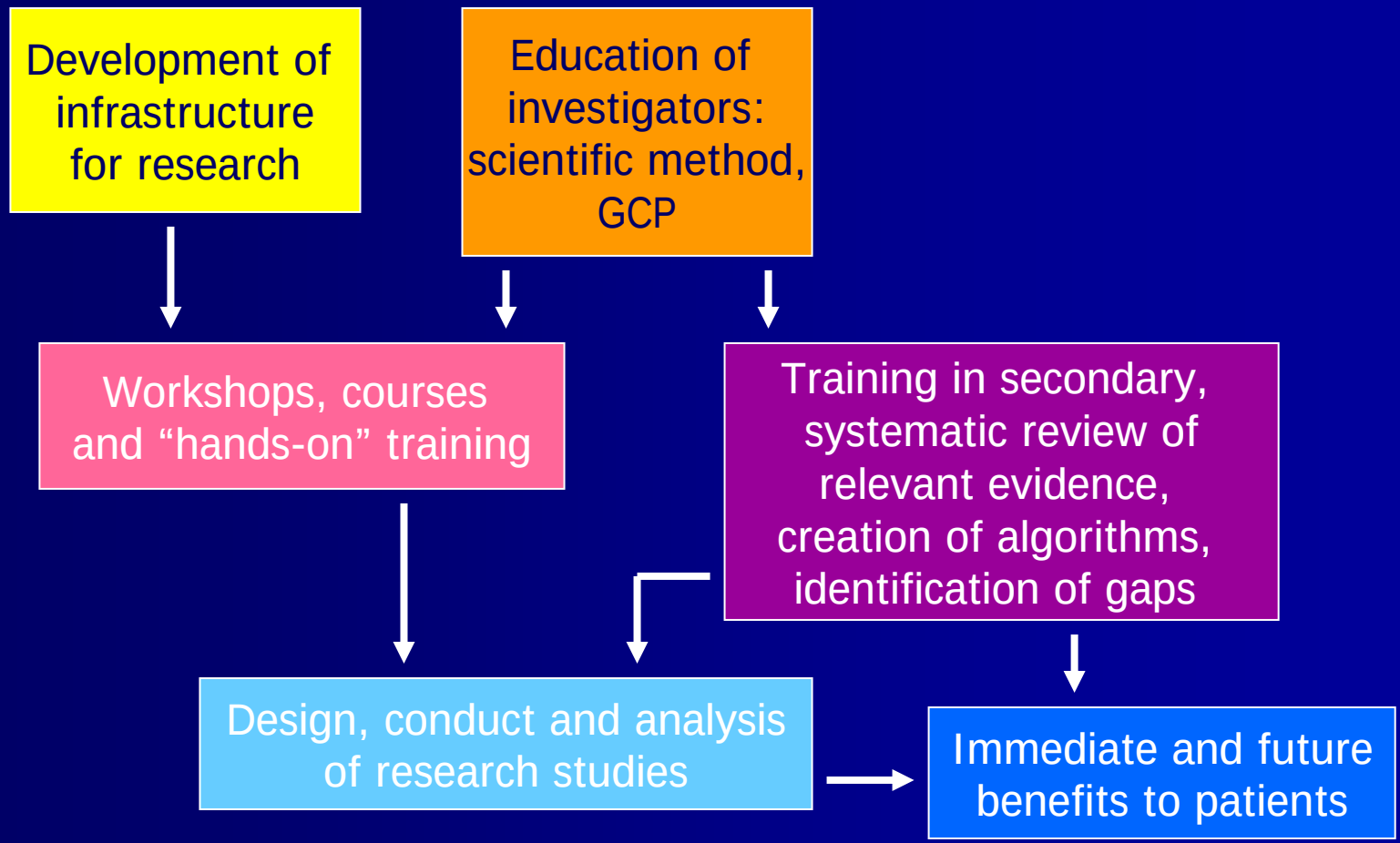
- Designed for a specific population in the context of available resources
- Usually entails collaboration and mutual learning
- Associated with quality assurance and ethical review
- Identifies deficiencies
- Associated with outcome measures
- Generates new contextually relevant information – builds the evidence base

Guidelines

- Based on available evidence – may be from a different population and with different resources
- Rarely entails collaboration or learning (except by rote)
- No quality control or ethical review (lack of resources!)
- May be modified such that validity questionable
- No outcome measures
- No new information generated

Benefits of Clinical Studies

Research Training



Necessary Networking

GOVERNMENT:

Legislation relevant to control of risk factors and opioid availability

Structuring health services

Supporting establishment of expert committees

PRIMARY CARE PROVIDERS:

Public education, early detection

Collaboration in care, follow-up and palliation

NGOs:

INDUSTRY:

NON-ONCOLOGY SPECIALISTS:

Early detection

Treatment of early stage disease

Rapid referral to oncologists

ONCOLOGY SPECIALISTS:

Expert diagnosis and treatment

Research: clinical and translational

Advising government

ACADEMIC ESTABLISHMENTS:

Education of health care professionals with basic knowledge of cancer

Leadership in epidemiological, public health, clinical and translational research

NGOs and Industry

NGOs:

Promotion, advocacy and support (directed at governments and professionals)

Professional and public education

Fund raising

INDUSTRY:

Development and Manufacture of drugs and equipment

Development of IT matrix

Collaboration with other societal elements

Donations

Conclusions

- Cancer is a high priority disease throughout the world
- It has been neglected in low and middle income countries because lack of control measures has led to late presentation and the need for specialists and sophisticated, expensive facilities in the small fraction of patients who still have curative options –
- The cancer burden will increase as populations age and epidemiological transitions occur
- Yet there is much that can be done across the spectrum of cancer control even in the poorest countries: prevention and early diagnosis will ease the pressure on treatment facilities and lead to to higher cure rates
- The most effective programs will probably entail access to a broad range of expertise in high income countries, via a process involving dialogue, capacity building, “front-line” collaboration and research