University of Jordan

Faculty of medicine

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Medical Committee
The University of Jordan

Global health

Slide # : 2

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Designed by Esraa Al-Salamin , dedication to Ghaida khraisat.

Global Health: The Global Burden of Diseases

The Global Burden of Chronic Diseases

Health Transition

- **Health Transition**: is a concept that describes the change in disease patterns that occur during socio-economic development.

  Health Transition is composed by two interlinked components: **epidemiologic transition** and **demographic transition.**

The Epidemiologic Transition

A transition from infectious disease to chronic, degenerative, or man-made diseases as the primary causes of mortality.

Causes of Epidemiologic Transition

- 1. Socioeconomic development brings better nutrition, better housing, increased literacy, safe water and sanitation, and better living conditions.
- 2. Modern health technology, access to vaccines and antibiotics.
- 3. Cultural and behavior factors affecting hygiene, use of health service, tobacco, alcohol, safe sex, etc.

Theory of Epidemiologic Transition

The theory of epidemiologic transition consists of the following premises:

1. Mortality is a fundamental factor in population dynamics.
2. During the transition, a long-term shift occurs in mortality and disease patterns whereby pandemics of infection are gradually displaced by degenerative and man-made diseases as the chief form of morbidity and primary cause of death.
3. During the epidemiologic transition the most profound changes in health and disease patterns obtain among children and young women.
4. The shift in health and disease patterns that characterize the epidemiologic transition are closely associated with the demographic and socioeconomic transition that constitute the modernization complex.

Four major successive stages of the epidemiologic transition:

A) The Stage of Pestilence and Famine (today's collapsed countries): when mortality is high and mainly determined by infectious diseases, malnutrition, and pregnancy & birth related disorders. Some of the infections, such as the plague and smallpox were spread in epidemics. Fertility rates are high. Population growth is slow or nonexistent because the high fertility is counterbalanced by high mortality. In this stage the average life expectancy at birth is low and variable, ranging between 20-40 years. Collapsed countries are Sierra Leone, Somalia, and Afghanistan.

Four major successive stages of the epidemiologic transition (cont.):

B) The Stage of Receding Pandemics (today's low income countries): when mortality declines but fertility remains high, with a resulting exponential population growth. The average life expectancy at birth increases steadily from about 30 to about 50 years. Larger epidemics become less frequent, but infectious diseases, maternal disorders, and malnutrition are still the main causes of mortality. Most of low and middle-income countries entered this stage in the end of the 1940s. Many of the low income countries are still at this stage today, especially those in Sub-Saharan Africa.

Four major successive stages of the epidemiologic transition (cont.):

C) The Stage of Non-Communicable diseases (today's middle-income countries) this stage is entered through socio-economic development, improved living conditions. With declining mortality due to infectious diseases, life expectancy at birth increases to 70 years of age and beyond. With an ageing population, the disease changes from a high prevalence of infectious diseases to a greater degree of chronic and NCD.

Most middle-income countries in the world have entered this stage now. Some middle income countries are already in the fourth stage.

Four major successive stages of the epidemiologic transition (cont.):

D) The Stage of delayed Degenerative Diseases (today's high-income countries): when mortality due to IHD and cancer start to decrease. When tobacco smoking and dietary fat intake is reduced people will die from Alzheimer's disease. Instead of suffering from heart attack and COPD people will live 10 years longer and then suffer from osteoporosis. Many high income countries will suffer from allergy, eating disorders, psychosocial diseases and chronic fatigue syndrome. Many high- income countries have low fertility far less than 2 children per women. This increases the elderly population and problems for caring for them.

The Demographic Transition

The transition of a country from high birth rate and high death rates to low birth rate and low death rates.

Demographic Transition

- Demographic transition is a theory that explains population change. It is a three stage pattern of population change that occurs as societies industrialize and urbanize. Demographic transition model is based on the change in crude birth rate (CBR) and crude death rate (CDR) over time.

There are three stages (phases) of demographic transition:

1. Stage one: High birth rate, high death rate, and slow growth rate of a population characterize the first stage of demographic transition. Examples of nations that are in the first stage are Ethiopia, Angola, and Nigeria.
2. Stage two: High birth rates, but low death rates and skyrocketing growth rates of a population. Death rates decline because of better health conditions, improved medicine, better food, etc. Nations that are in the second stage include most of today's Third World countries.

Demographic Transition

3. Stage three: Low birth rates, low death rates, and a stable population characterize the third stage. This stage includes most of Europe, Japan, and USA. Populations become more urban. Parents are encouraged to keep families small, in part, because children become an economic burden in advanced industrial societies. People are less dependent on their children as a personal labor force. Later in life, the state provides for social security.

Demographic Transition

- Most developed countries are beyond stage three of the model.
- The majority of developing countries are in stage two or stage three.
- The major (relative) exceptions are some poor countries, mainly in Sub-Saharan Africa, and some Middle Eastern countries, which are poor or affected by government policy or civil war such as Pakistan, Palestine, Yemen and Afghanistan.

Demographic Transition

Three different patterns of demographic transition have been described as:

A) The Classical or Western model. Example: England and Wales. Socio-economically driven. Occurred over a period of almost 200 years.

The classical model describes the gradual, progressive transition from high mortality and high fertility to low mortality and low fertility in most western European societies.

Slow growth rate of the population was observed.

Demographic Transition

B) The Accelerated model. Example: Japan. Medicine and technology driven. Lasted less than one century. Lower mortality rate and lower birth rate characterized this model.

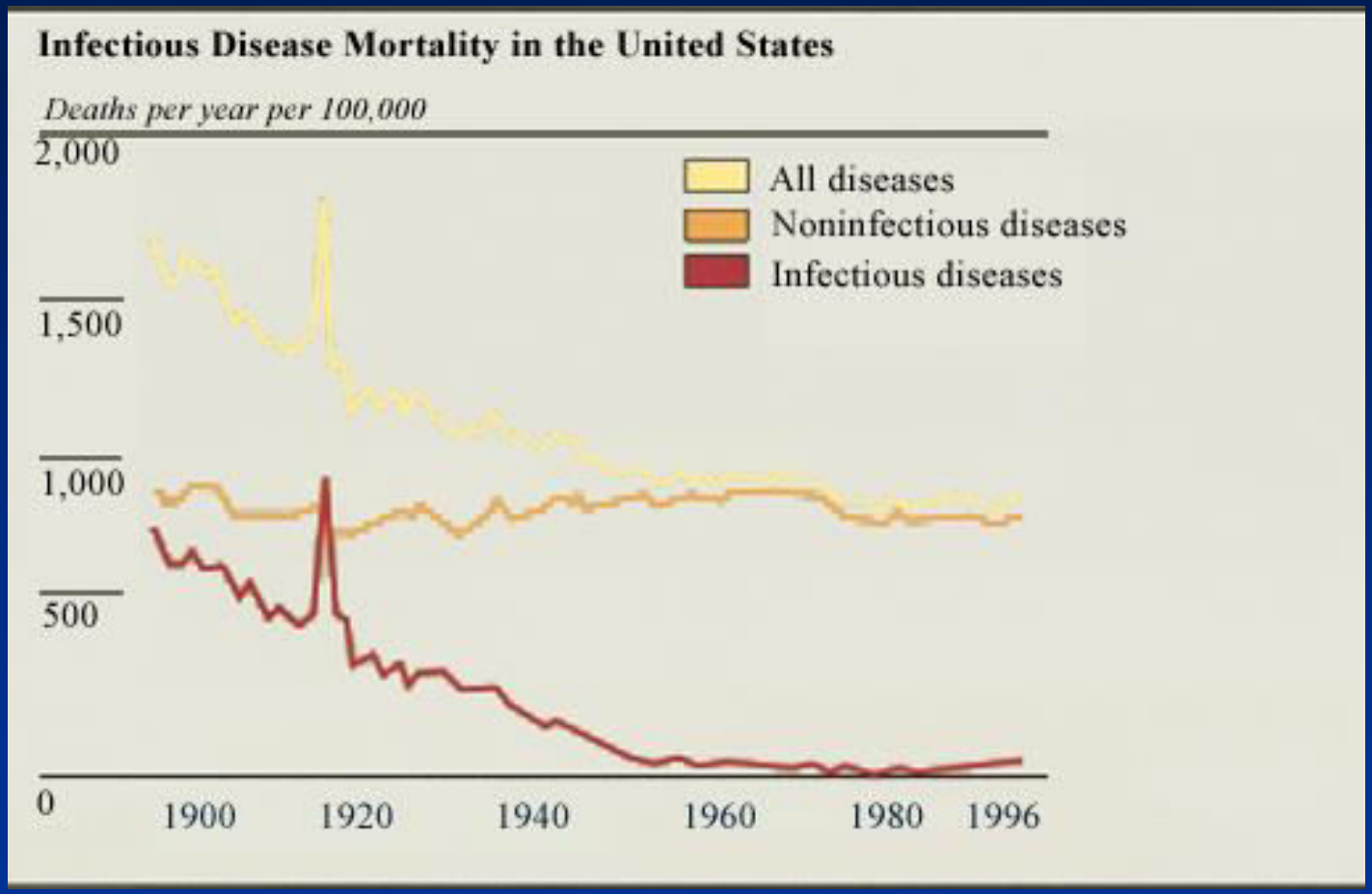
C) The Delayed model. Example: Sir Lanka. Population growth and medical advances driven. Low mortality and low birth rate but not rapid which kept the population growth high.

Changes in Life Expectancy

	1900	1950	1980	2000	2030
USA	49.3	**68.9**	**74.1**	**77.4**	**81.2**
Mexico	< 30	**50.8**	**67.4**	**74.9**	**80.1**
Brazil	< 30	**50.9**	**63.3**	**71.1**	**77.4**
China	≈ 30	40.8	**65.5**	**72.0**	**77.4**
India	< 25	37.4	**56.6**	**62.9**	**72.6**
LDCs		40.8	**58.8**	**64.1**	**71.5**

Ref: The 2006 Revision and World Urbanization Prospects: The 2005 Revision, http://esa.un.org/unpp, Wednesday, March 12, 2008

The Epidemiologic Transition

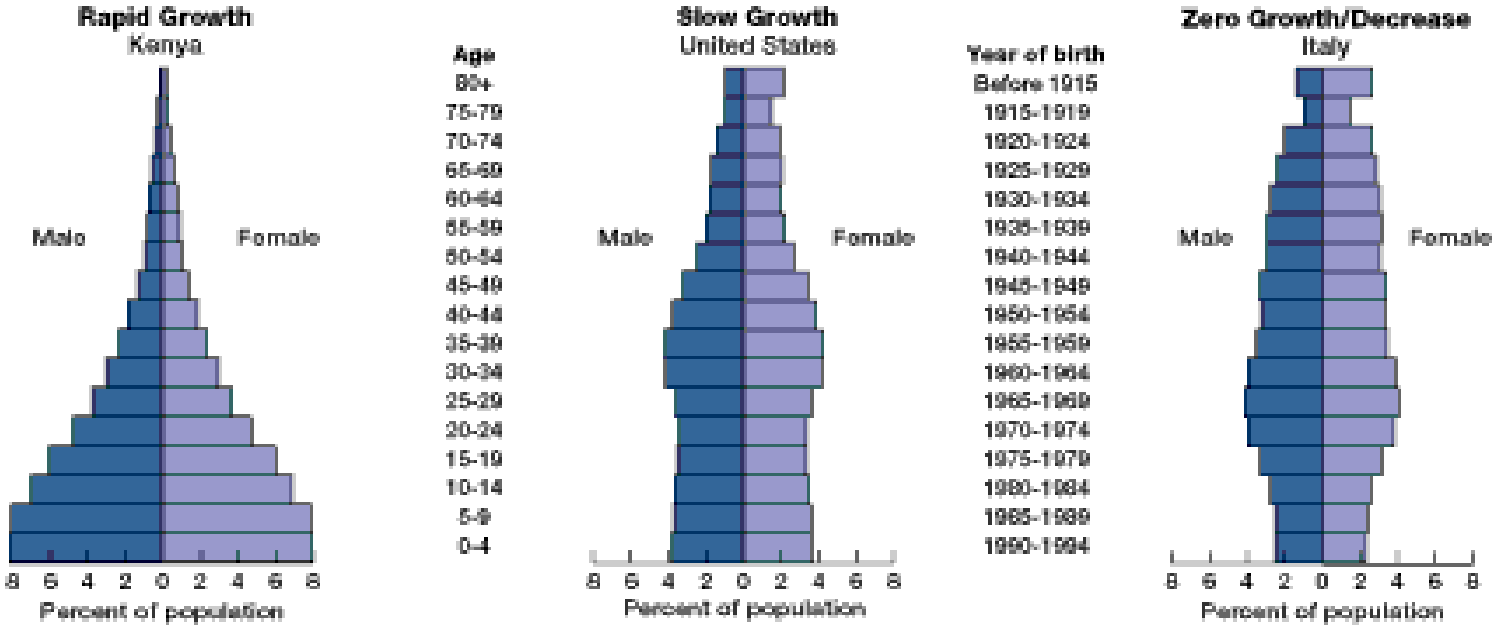


Ref: National Intelligence Council, The Global Infectious Disease Threat and Its Implications for the United States, 2000. Adapted.

Population Pyramids by Growth Pattern

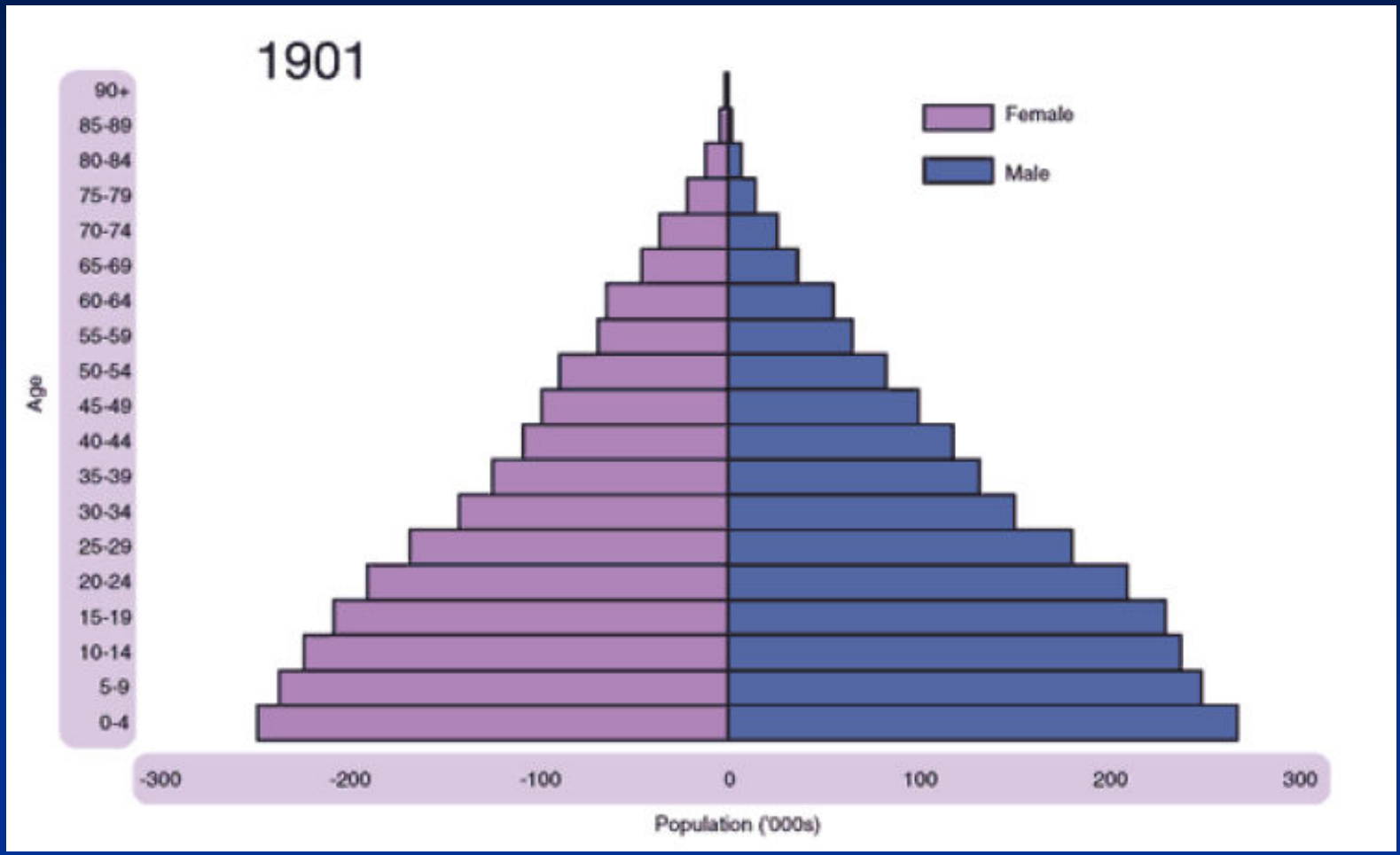
Figure 6

Population Pyramids: Kenya, United States, and Italy, 1995



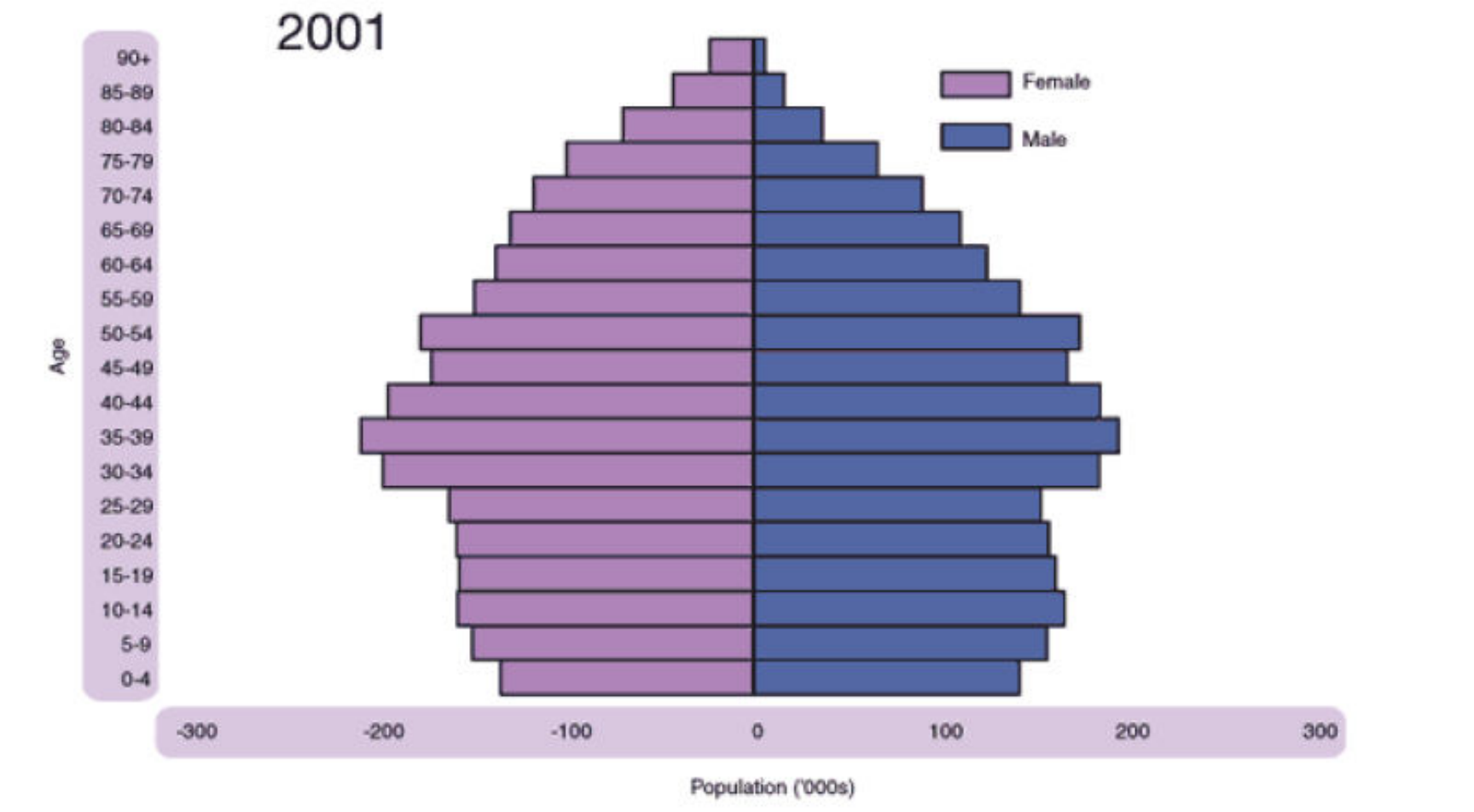
Sources: U.S. Bureau of the Census, "U.S. Population Estimates by Age, Sex, Race, and Hispanic Origin: 1990 to 1995," PPL-41 (Feb. 14, 1996); (United States); Council of Europe, *Recent Demographic Developments in Europe 1997*: table 1-1 (Italy); United Nations, *The Sex and Age Distribution of the World Populations—The 1996 Revision*: 500-1 (Kenya).

Population Pyramid: Scotland, 1901



Ref: General Register Office for Scotland. Available at: www.gro-scotland.gov.uk/files/04fig2.4.gif. Accessed 12 February 2008.

Population Pyramid: Scotland, 2001



Ref: General Register Office for Scotland. Available at: www.gro-scotland.gov.uk/files/04fig2.4.gif. Accessed 12 February 2008.

Projected rankings for 15 leading Causes of Death, 2002 vs 2030

	2002	2030
Group I	Ischemic heart disease	Ischemic heart disease
Group I	Cerebrovascular disease	Cerebrovascular disease
Group II	Lower respiratory infection	HIV/AIDS
Group II	HIV/AIDS	COPD
Group II	COPD	Lower respiratory infections
Group II	Perinatal condition	Trachea, bronchus, lung cancers
Group II	Diarrheal disease	Diabetes mellitus
Group II	Tuberculosis	Road traffic accidents
Group II	Trachea, bronchus, lung cancers	Perinatal conditions
Group III	Road traffic accidents	Stomach cancers
Group II	Diabetes mellitus	Hypertensive heart disease
Group II	Malaria	Self-inflicted injuries
Group II	Hypertensive heart disease	Nephritis and nephrosis
Group III	Self-inflicted injuries	Liver cancers
Group II	Stomach cancer	Colon and rectum cancers

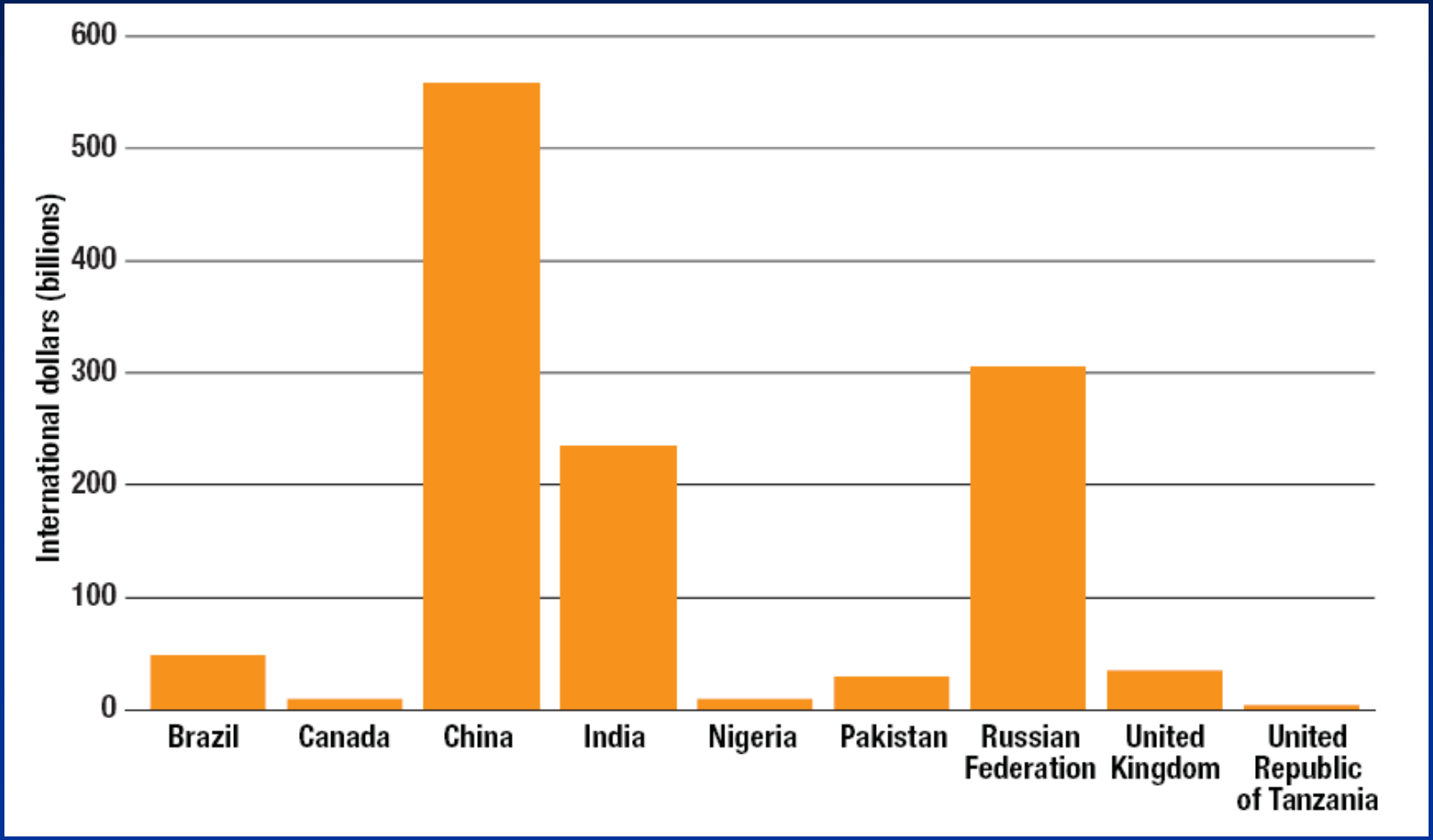
Ref: Mathers CD, Loncar D. PLoS Med. 2006 Nov;3(11):e442.

Projected rankings for Causes of Death, high vs low income, 2030

	High-income countries	Low-income countries
Group I	Ischemic heart disease	Ischemic heart disease
Group II	Cerebrovascular disease	HIV/AIDS
Group III	Trachea, bronchus, lung cancers	Cerebrovascular disease
	Diabetes mellitus	COPD
	COPD	Lower respiratory infections
	Lower respiratory infection	Perinatal conditions
	Alzheimer and other dementias	Road traffic accidents
	Colon and rectum cancers	Diarrheal disease
	Stomach cancer	Diabetes mellitus
	Prostate cancer	Malaria

Ref: Mathers CD, Loncar D. PLoS Med. 2006 Nov;3(11):e442.

Projected foregone income due to early mortality from heart disease, stroke and diabetes, 2005–2015



Ref: WHO. Preventing chronic diseases: a vital investment (2005).

Driving the Demographic and Epidemiologic Transitions

- Western model: driven gradually by economic, scientific, and technological development
- New model: driven more rapidly by economic development plus rapid uptake of health-related science and technology

The New Risk Factors

- Industrialization has led to Chronic Disease
- Risk factors:
  - Smoking
  - Pollution
  - Automobiles
  - Diet
  - Sedentary lifestyle
- Aging population
- Urban migration

Most smokers live in developing countries

Current smokers in 1995 (in millions)

Region	*Number*	
Low/Middle income	**933**	
High Income	***209***	
World		***1,142***

Quit rates low in low income countries

- 5-10% in China, India
- 30-40% in UK

Source: Jha *et al*, 2002, AJPH

Large and growing number of deaths from smoking

Past and future tobacco deaths (in billions)

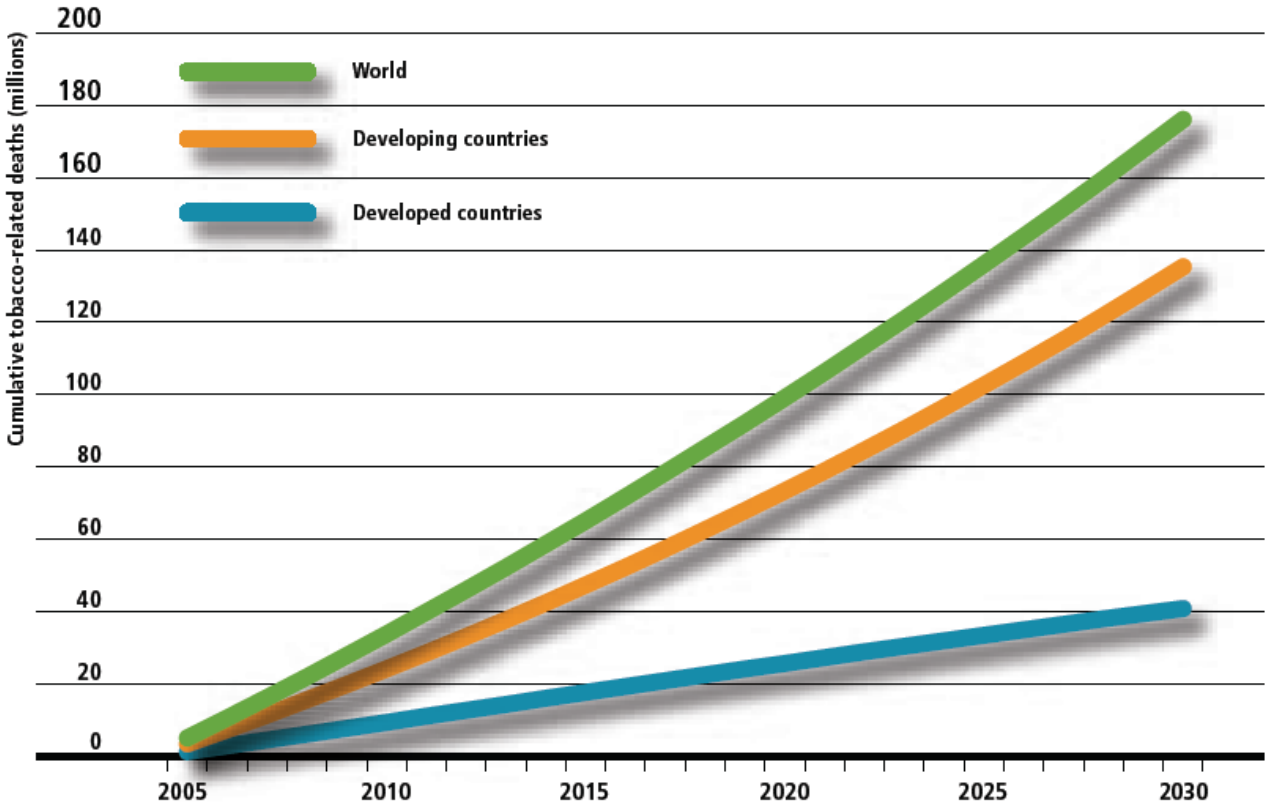
Time	*Billions of deaths*	
1901-2000	**0.1**	**(mostly in developed countries)**
2001-2100	**1.0**	**(mostly in developing countries)**

- 0.5 B among people alive today
- *1 in 2 of long-term smokers killed by their addiction*
- *1/2 of deaths in middle age (35-69)*

Source: Peto and Lopez, 2001

TOBACCO WILL KILL OVER 175 MILLION PEOPLE WORLDWIDE BETWEEN NOW AND THE YEAR 2030

Cumulative tobacco-related deaths, 2005–2030

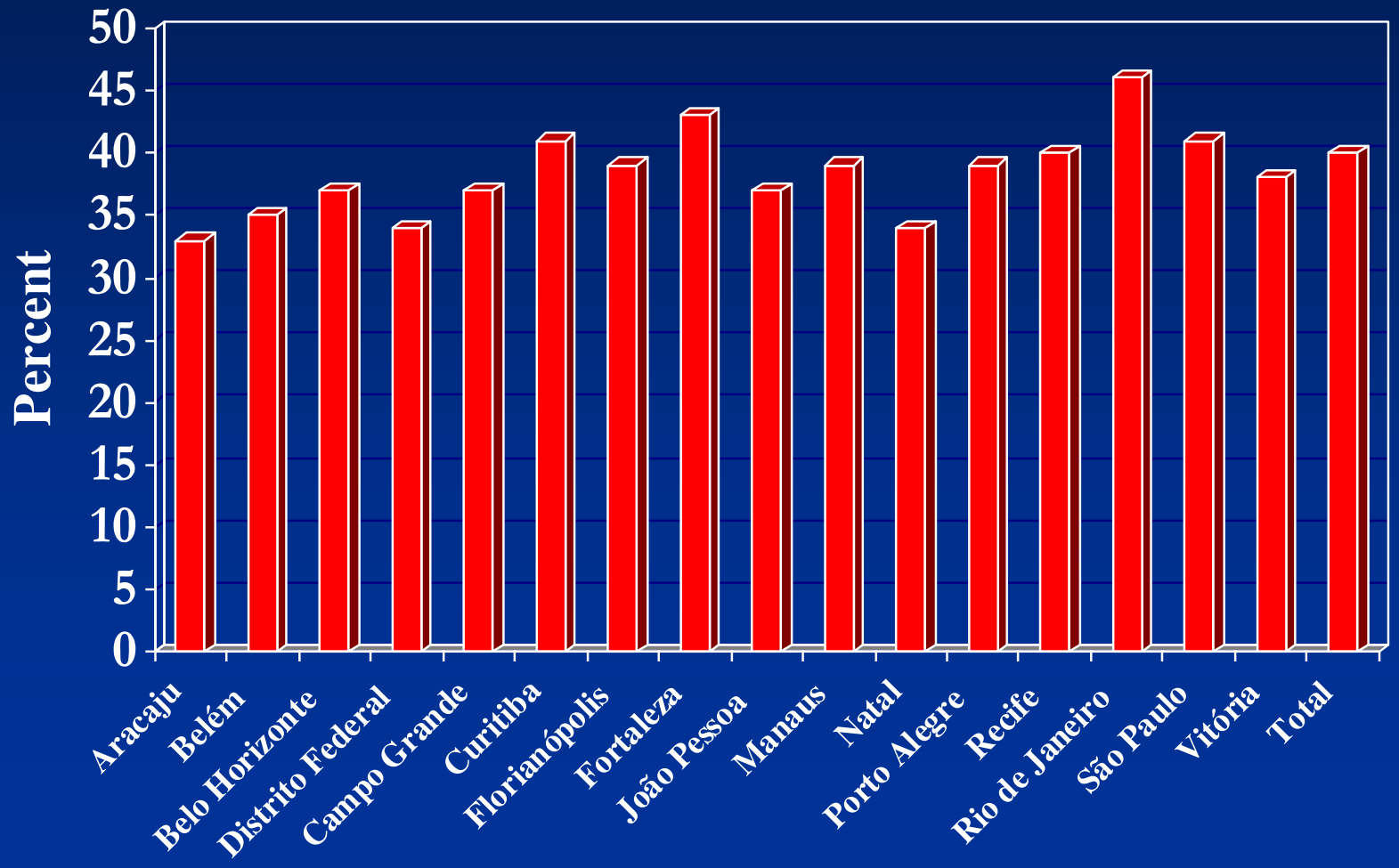


Source: Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Medicine*, 2006, 3(11):e442.

Ref: WHO. *Report on the Global Tobacco Epidemic* (2008).

Obesity Brazil

Prevalence of excess weight (Body Mass Index ≥ 25)
Population of 15 years of age in 15 Brazilian Capitals and FD 2002-2003



Mexico

- From ’88 to ’99, in 2 - 4 year olds the rate of obesity or at risk
- for obesity increased from 21.6% to 28.7%

- 6-11 year olds, 21% obese or at risk for obesity

- 24% of Mexican adults are obese

- 8% of adults ≥ 20 yr. old have type 2 Diabetes

- 30% have HBP

MEXICO

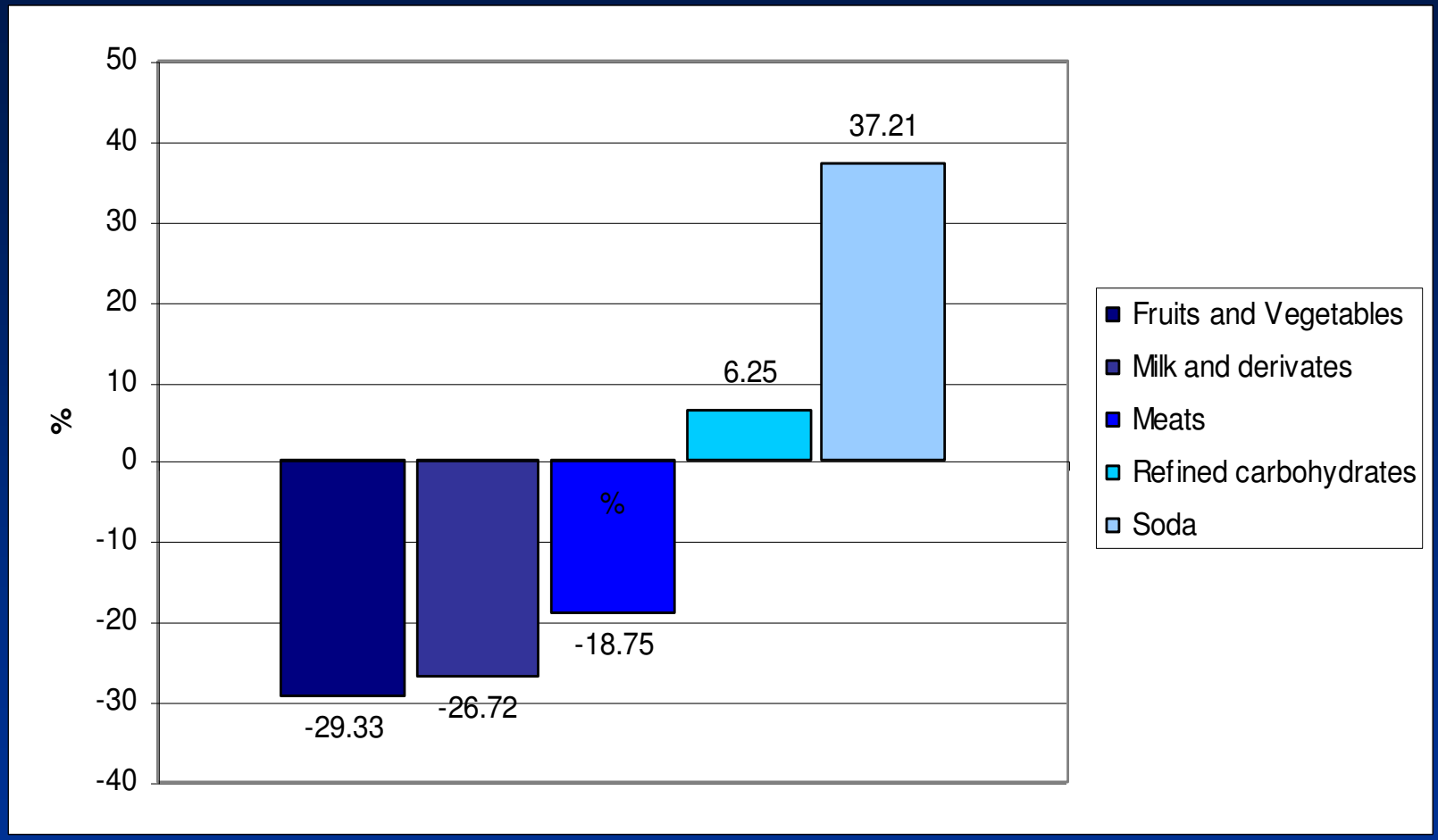
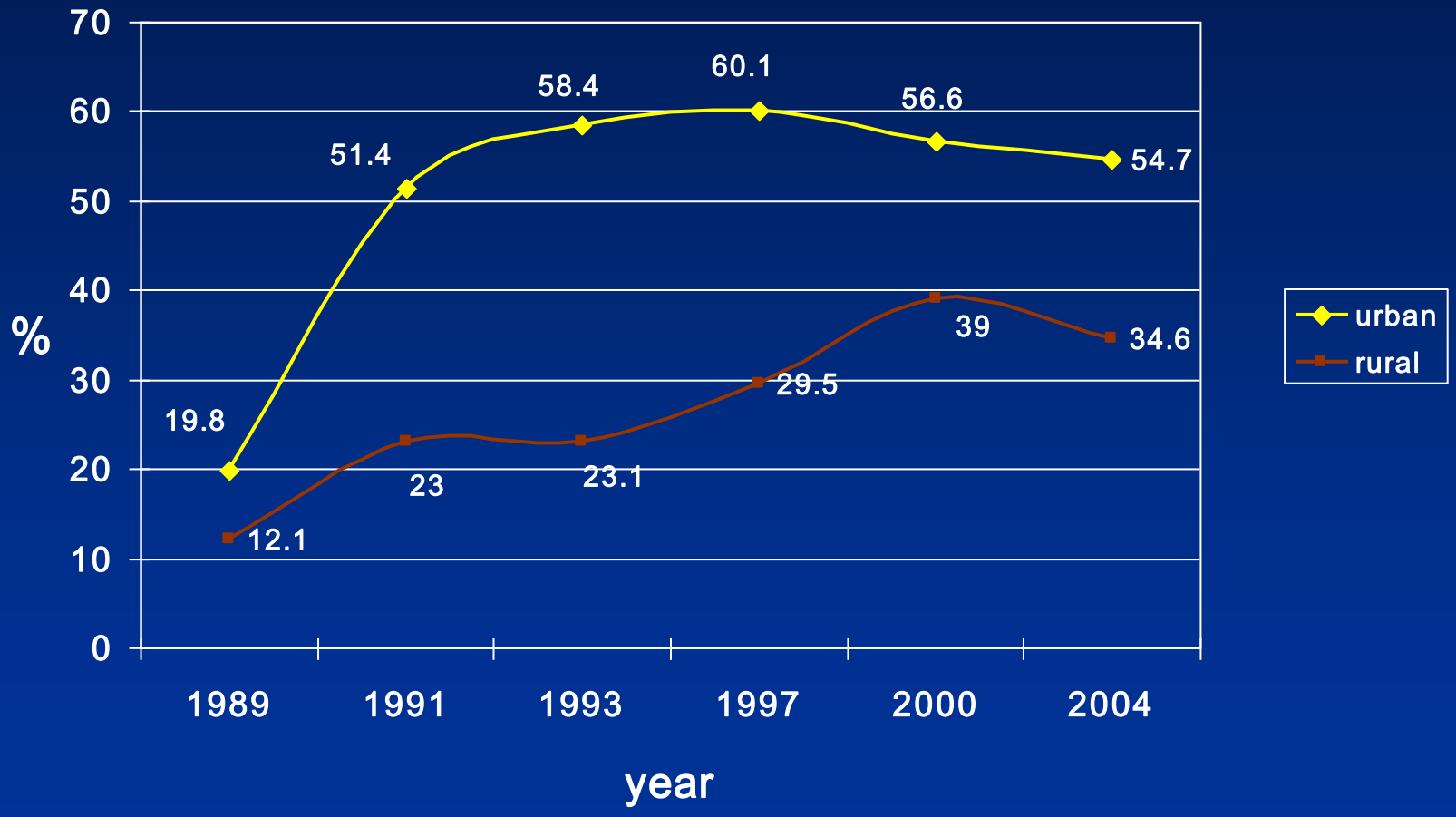


Figure 7 Changes in mean food purchases in 1996 (relative to 1994) by food group.

Source: Rivera et al., 2004

CHINA

Dietary energy from fat more than 30%



Source: The China Economic Population Nutrition and Health Survey

Sample size: 5789 (1989), 5838 (1991),5468 (1993), 5334 (1997), 4831 (2000), 4474 (2004)

MEXICO

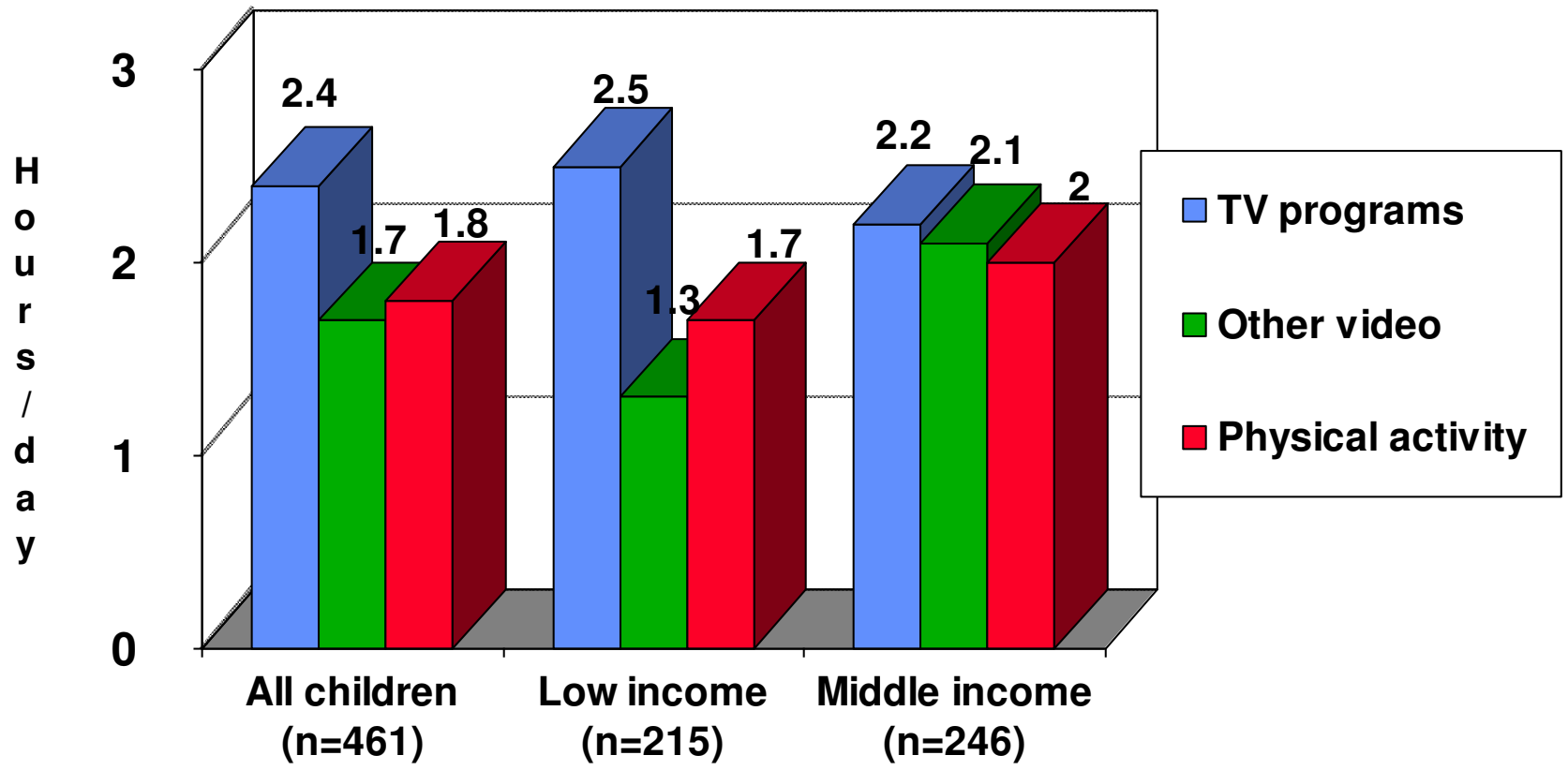


Figure 5 Mean Time dedicated to video viewing and physical activity, Mexico City Children 9-16 years old 1999

Ref: Mexico Nutrition Survey 1999

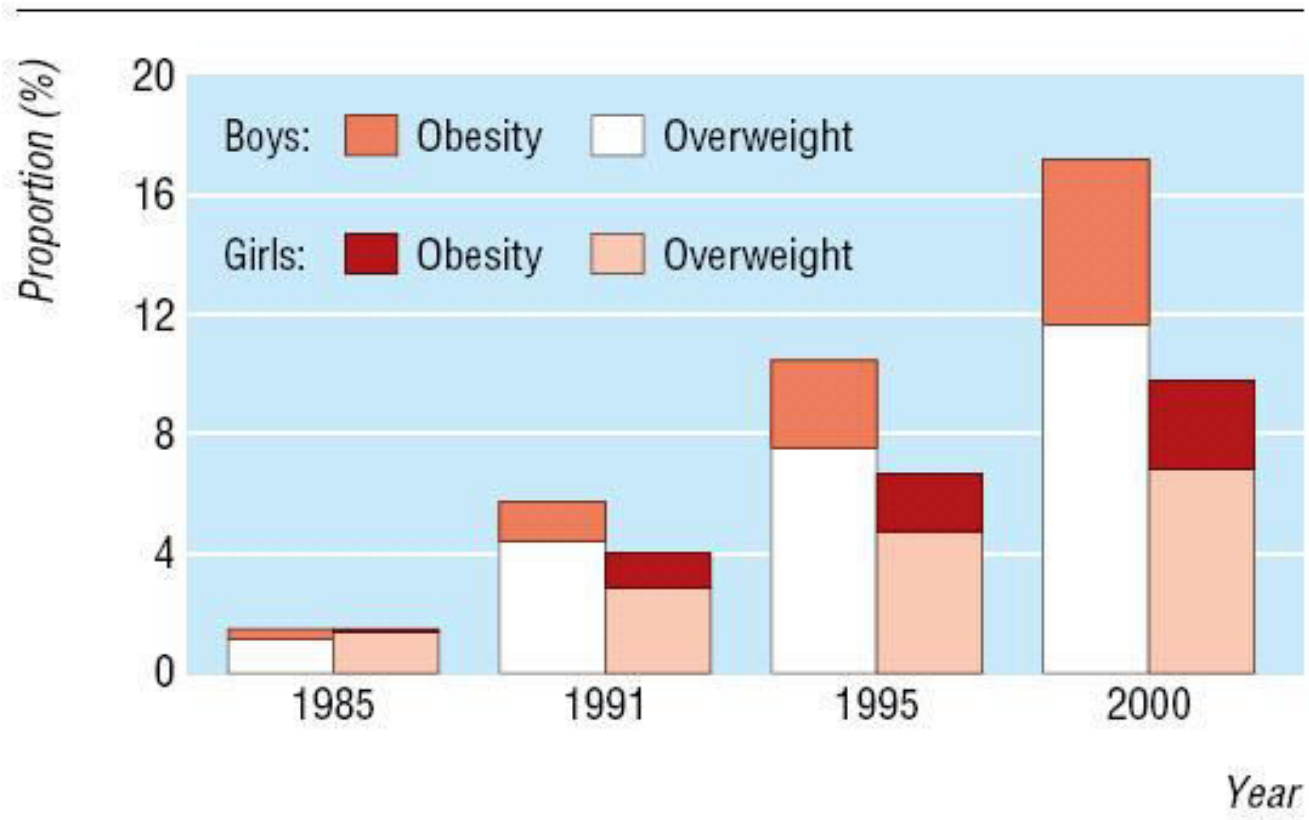
CHINA

Number of color TV sets owned per 100 households

year	Urban	rural
1985	17.21	
1990	59.04	
1995	89.79	16.92
1999	111.57	
2000	116.56	48.74
2001	120.52	54.41
2002	126.38	
2003	130.50	

Source: State Statistical Bureau, China Statistical Yearbook, 1985-2005

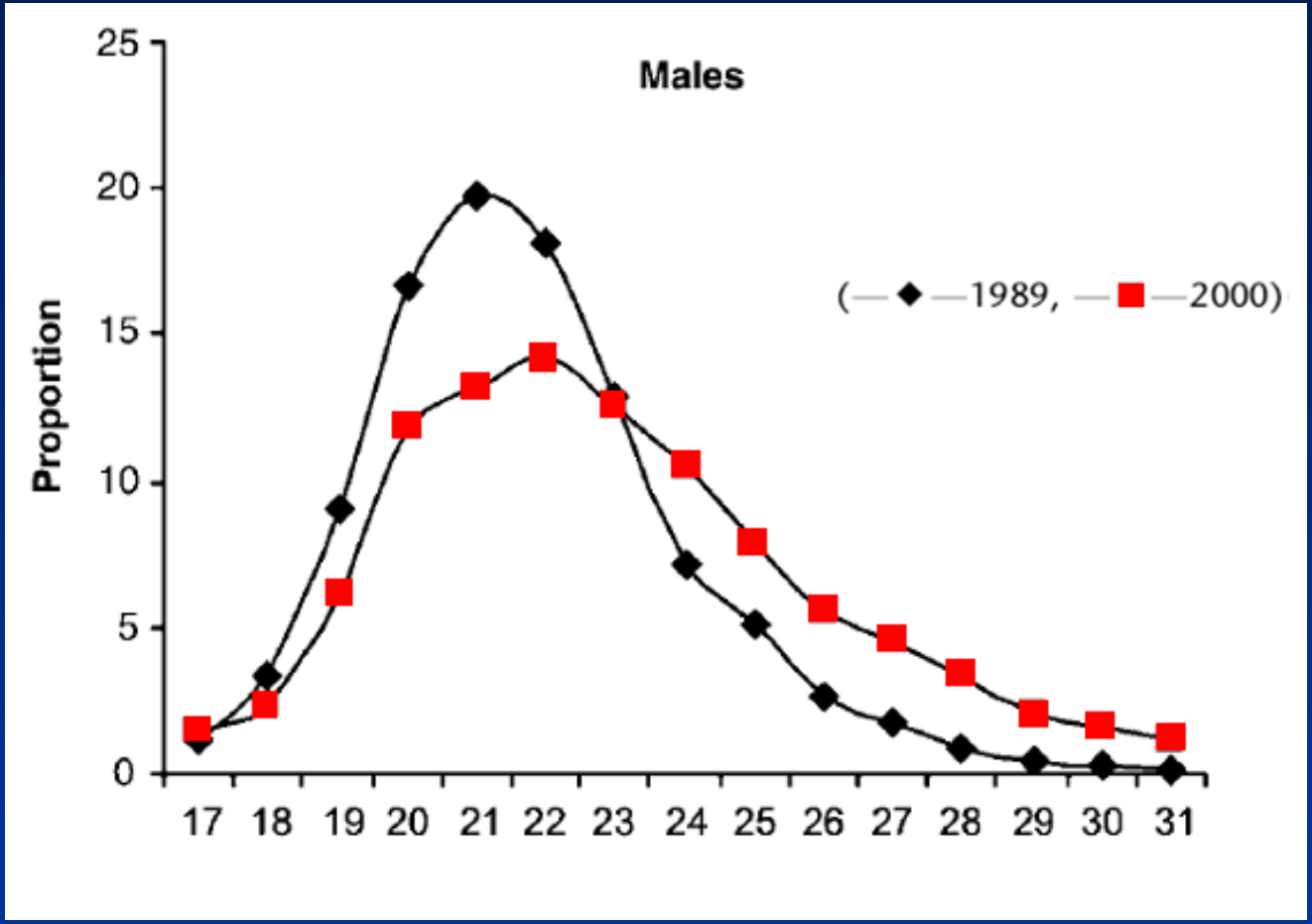
CHINA



Overweight and obesity in schoolchildren aged 7-18 in large cities in China[5]

Ref: Yangfeng Wu; Overweight & obesity in China, website: bmj.com 19 Aug 2006

Shifts in the BMI distribution for Chinese men, 1989–2000



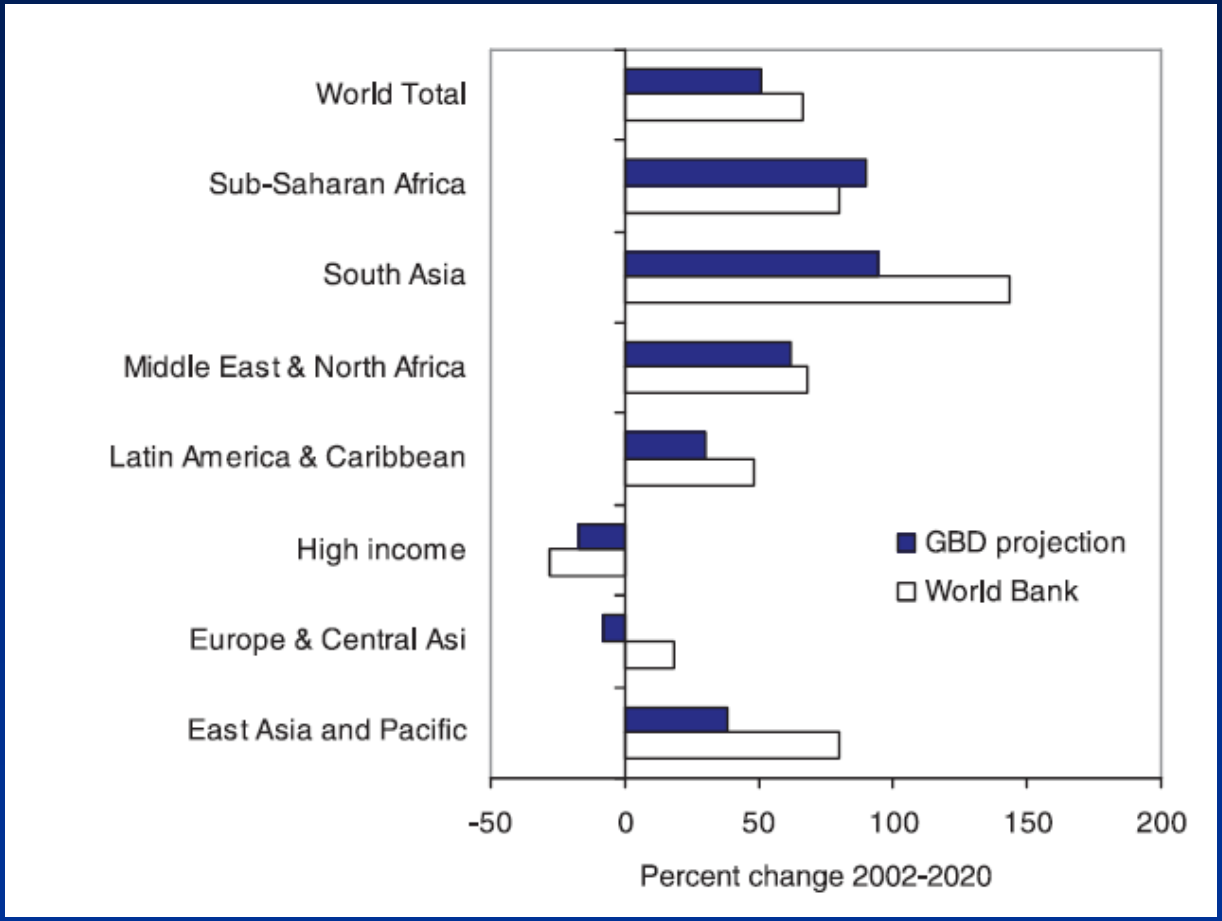
Ref: Wang H, Du S, Zhai F, Popkin BM. Trends in the distribution of body mass index among Chinese adults, aged 20–45 years (1989–2000). *International Journal of Obesity* 31(2007):272–278.

India

Metabolic Syndrome – 5 to 50% prevalence

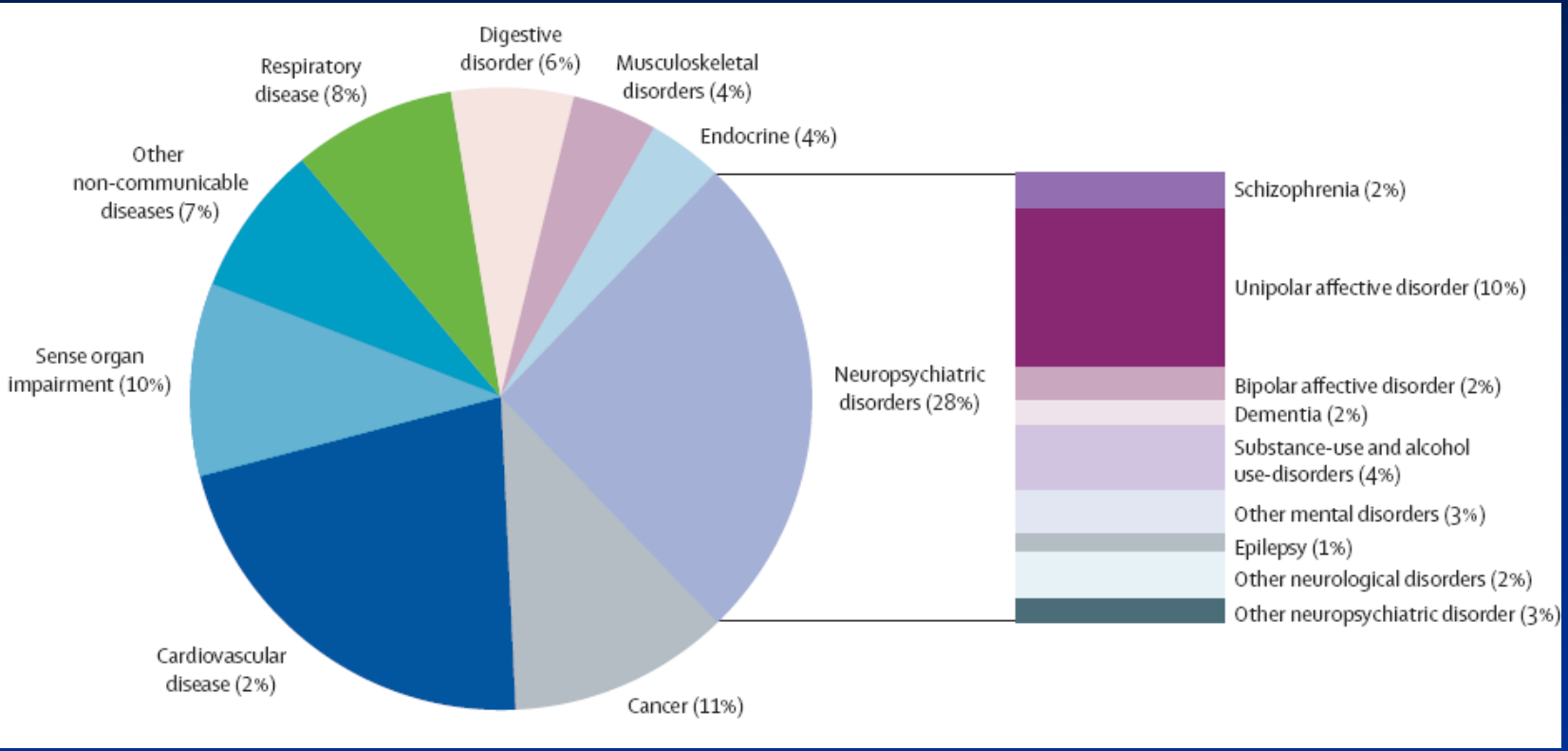
- insulin resistance
- glucose intolerance
- abdominal obesity
- hyper insulinemic
- hyper triglyceridemic

Projected Growth in Road Traffic Fatalities, 2002–2020



Ref: Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med.* 2006 Nov;3(11):e442.

Global Prevalence of Mental Health Disorders



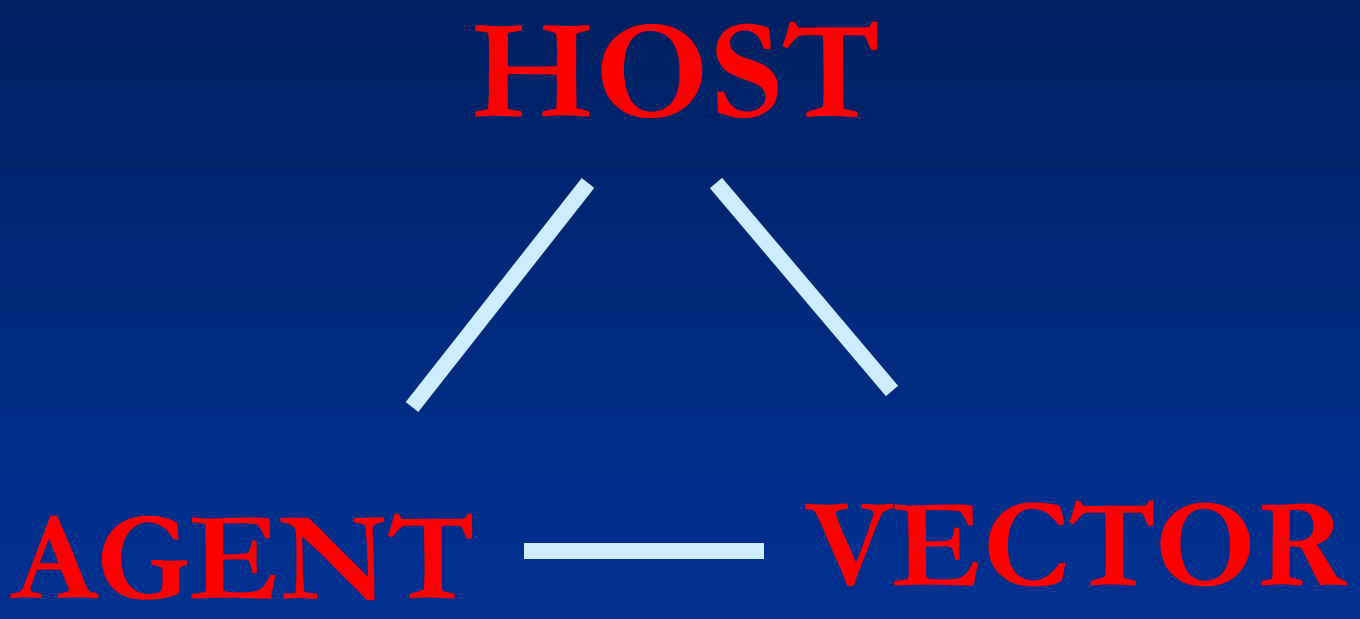
Ref: Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007;370:859-877.

The Behavioral Transition

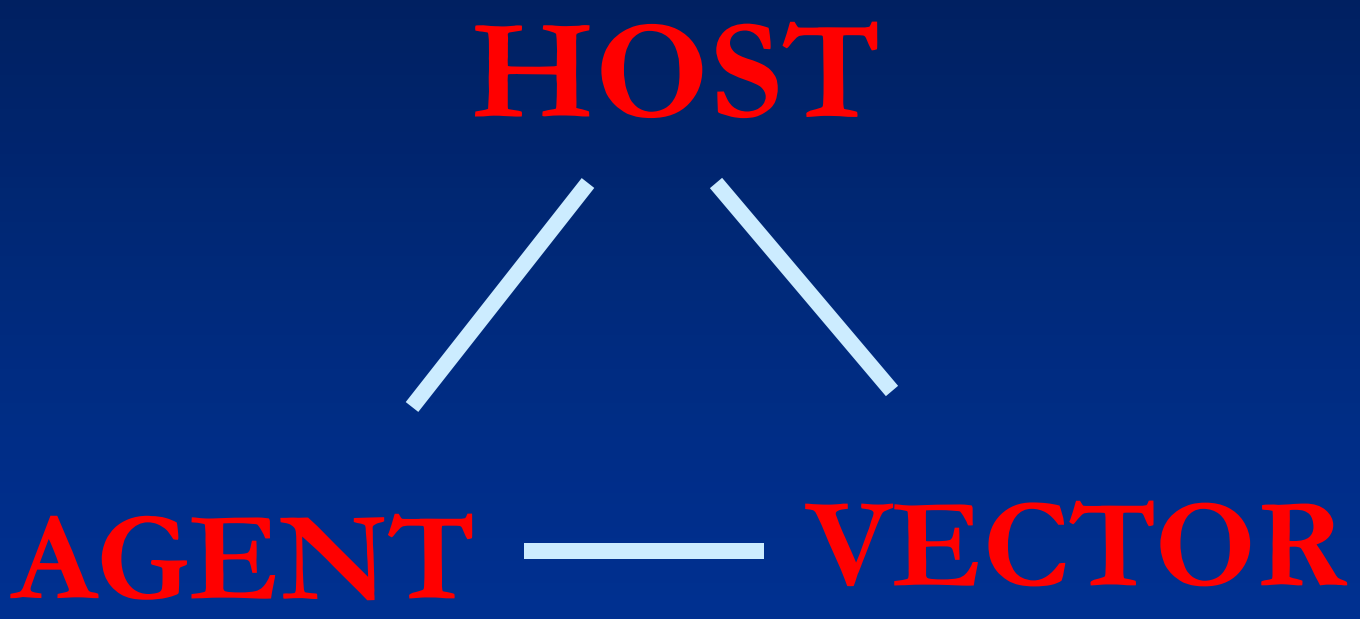
An increase in individual and collective behaviors, promoted and spread by global communication, that leads to the increased prevalence of unwanted health outcomes.

The behavioral transition has led to an increase in "communicated diseases."

Communicable Disease Model



Communicated Disease Model?



Communicable/Communicated Diseases

Communicable:

AGENTS

- Micro organisms
  - viruses
  - bacteria
  - parasites

Communicated:

- Food
- Drink
- Tobacco
- Inactivity

Communicable/Communicated Diseases

Communicable:

Vectors

- Insects

Communicated:

- Media
- Sports
- TV/Cinema
- Social pressure

Communicable/Communicated Diseases

Environmental Conditions

Communicable:

- Global warming

Communicated:

- Increased affluence
- Urbanization

Communicable/Communicated Diseases

Socio-cultural Context

Communicable:

- Waste disposal
- Hygiene
- Coughing etiquette

Communicated:

- No smoking places
- Value of activity
- Safe driving/roads

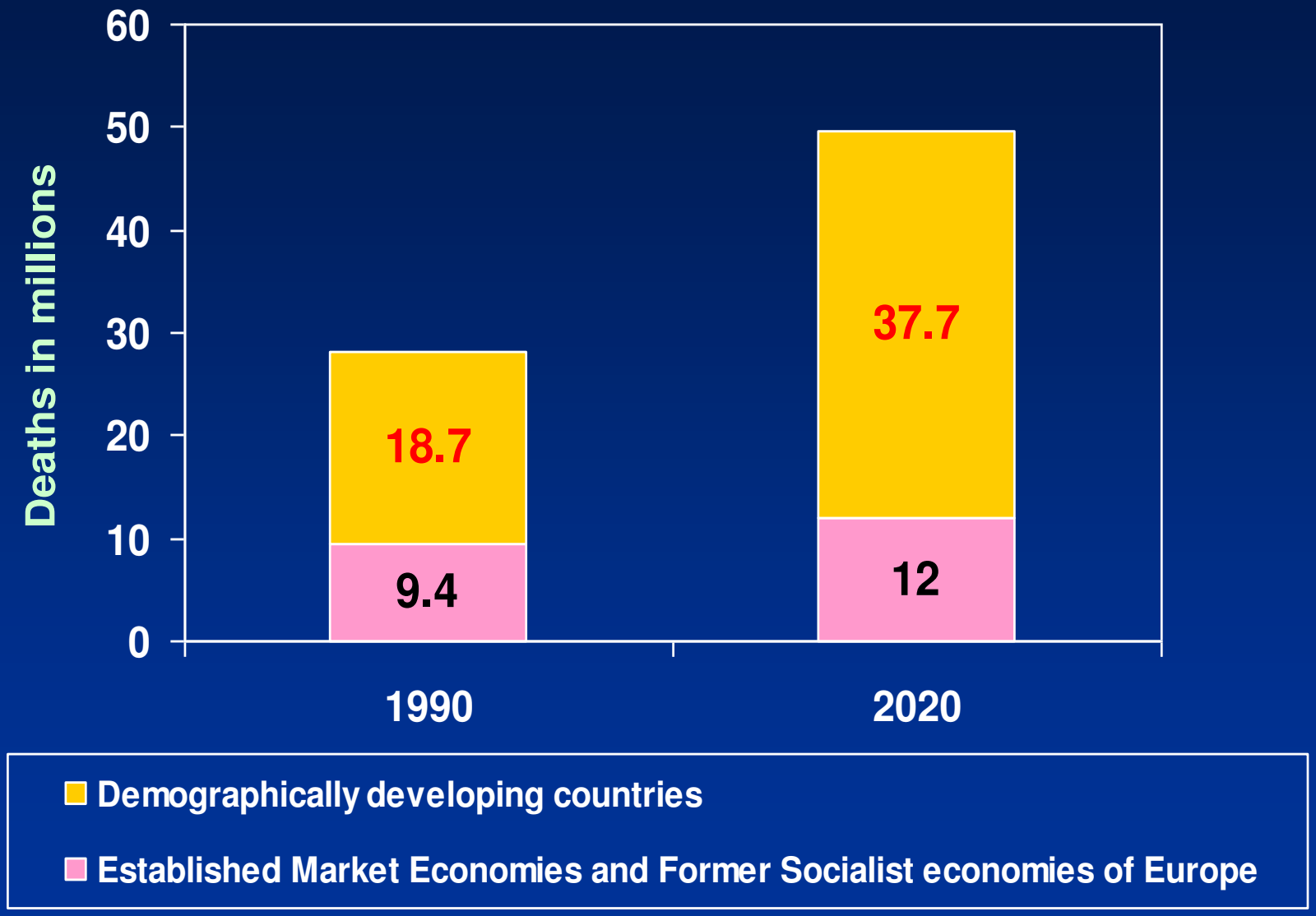
Communicable/Communicated Diseases

	Hosts	Outcomes
Communicable:	*Humans	*Preventable disease and death
Communicated:	*Humans	*Preventable disease and death

Communicated Diseases

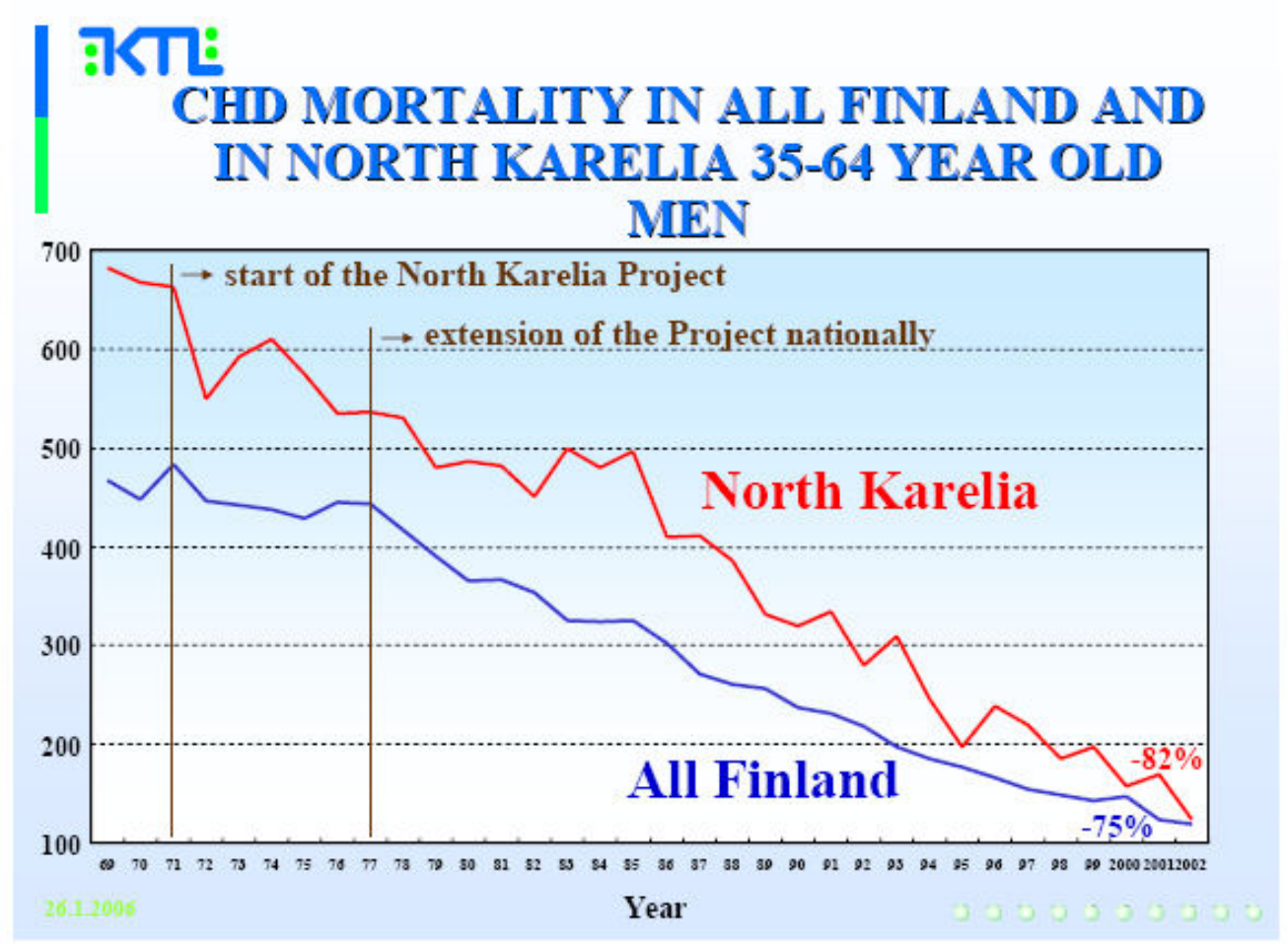
- obesity
- motor vehicle collisions and injuries
- decreased fitness and activity
- CHD
- diabetes
- hypertension
- stroke
- many cancers
- chronic lung disease

DEATHS DUE TO CHRONIC DISEASES (NCDs)



Interventions

- Community health promotion
- School base programs
- Legislation/regulation
- Taxation
- Mass media
- Partnerships
- Government leadership



KTL website (www.ktl.fi)