HUMAN CAPITAL

EE 462 Development Macroeconomics

Semester 1/2022

Topics

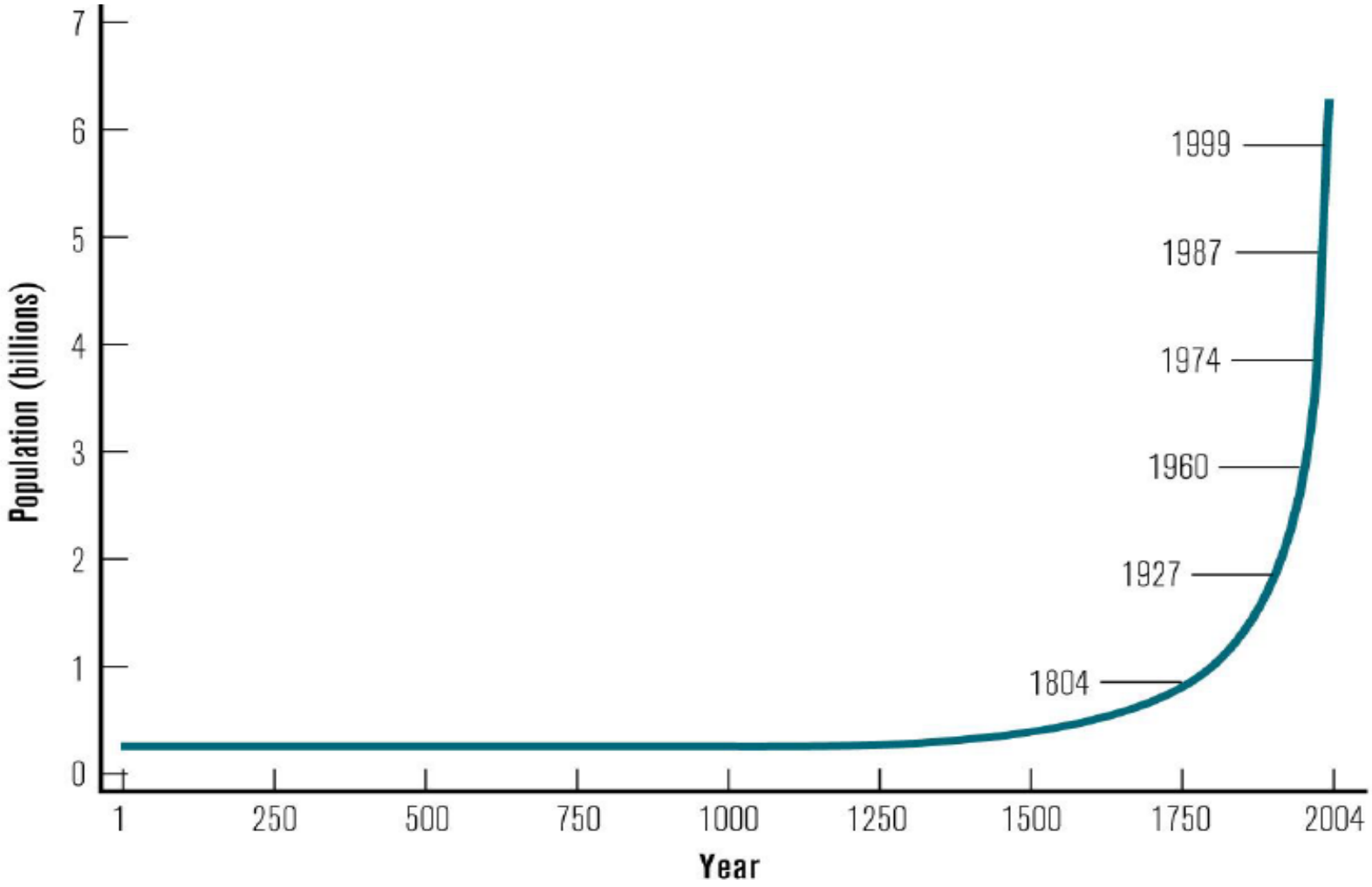
- Population
  - Demographic Transition
  - Cause of Population Growth
  - Population Growth and Economic Development
  - Population Policy
- Education
- Health
  - Health Measures
  - Transitions in Global Health
  - Health, Income, and Growth

POPULATION

Questions of Interests

- Do rising population numbers matter?
- Should we reduce population growth?
- Is population growth “good” or “bad” for development?
- What is the relationship between population growth and economic development?

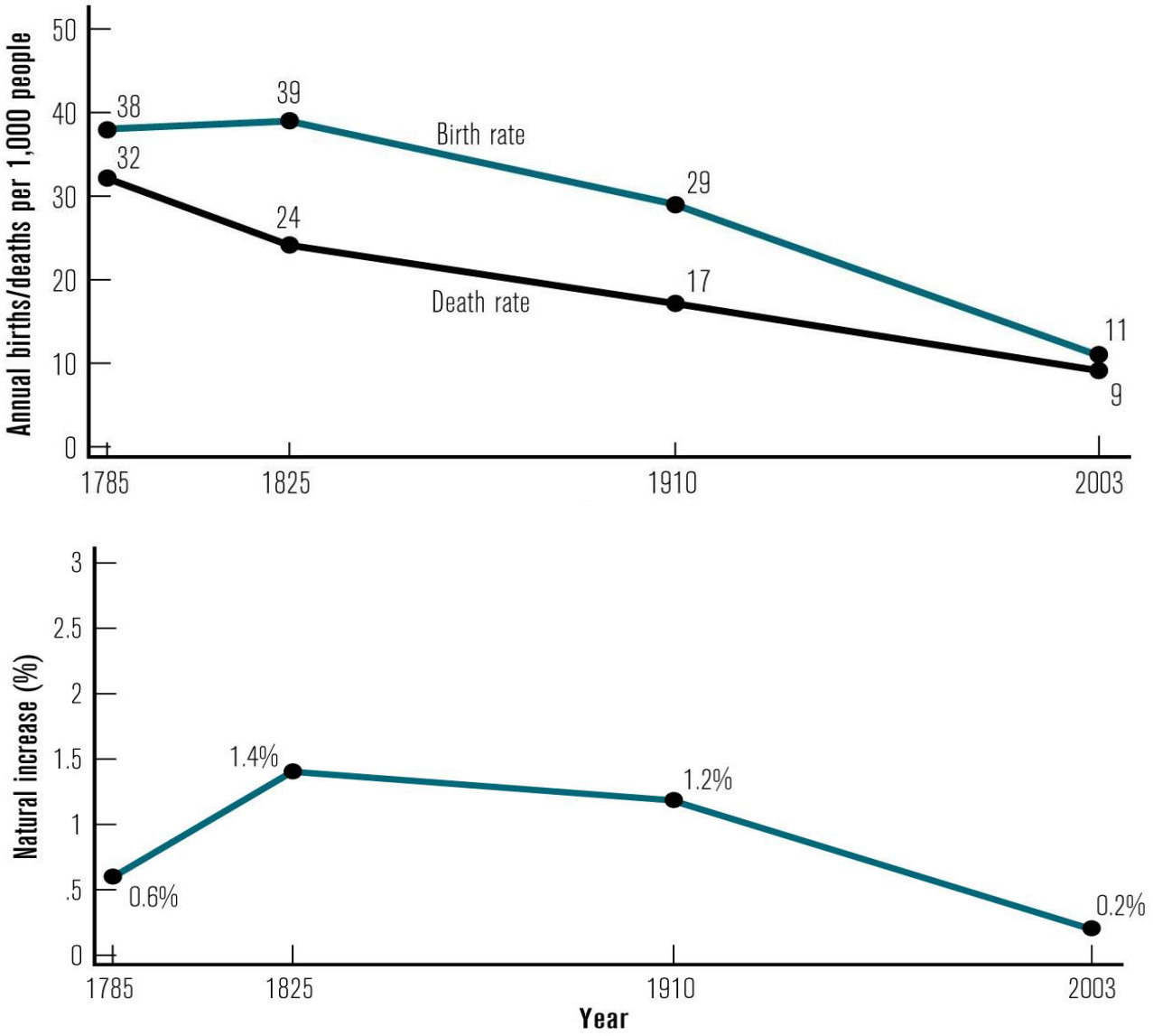
World Population Growth through History: Years Need to Add 1 Billion More People



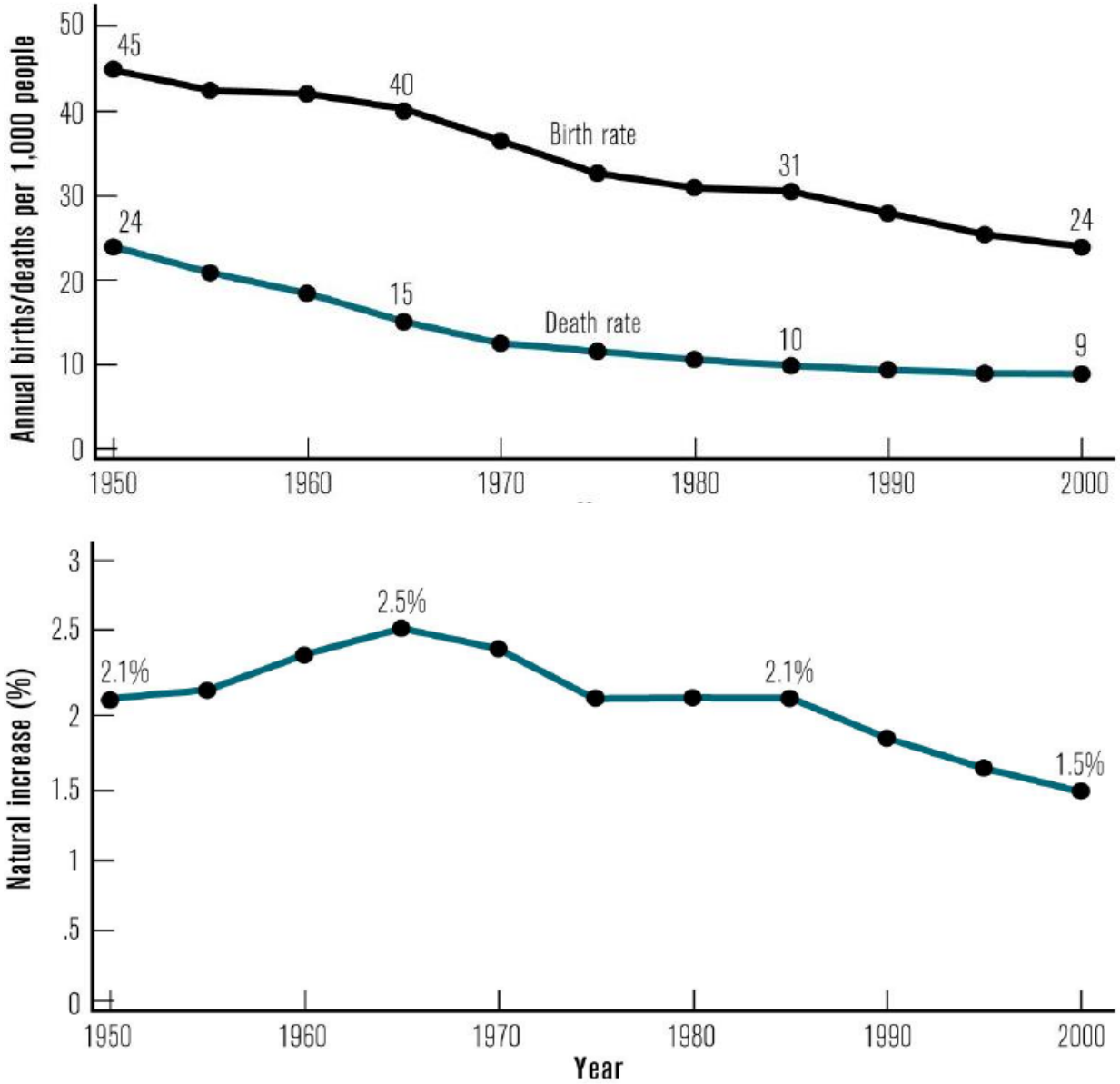
Demographic Transition

- Demographic transition occurs when population starts with low growth rates due to **high birth rates and high death rates**, moves through rapid growth stage with **high birth rates and low death rates**, and later becomes stable with low growth rates where **both birth and death rates are low**.
- Some definitions:
  - Crude birth rate = the number of live births per 1000 people (per year)
  - Crude death rate = the number of deaths per 1000 people (per year)
  - Natural increase = crude birth rate – crude death rate

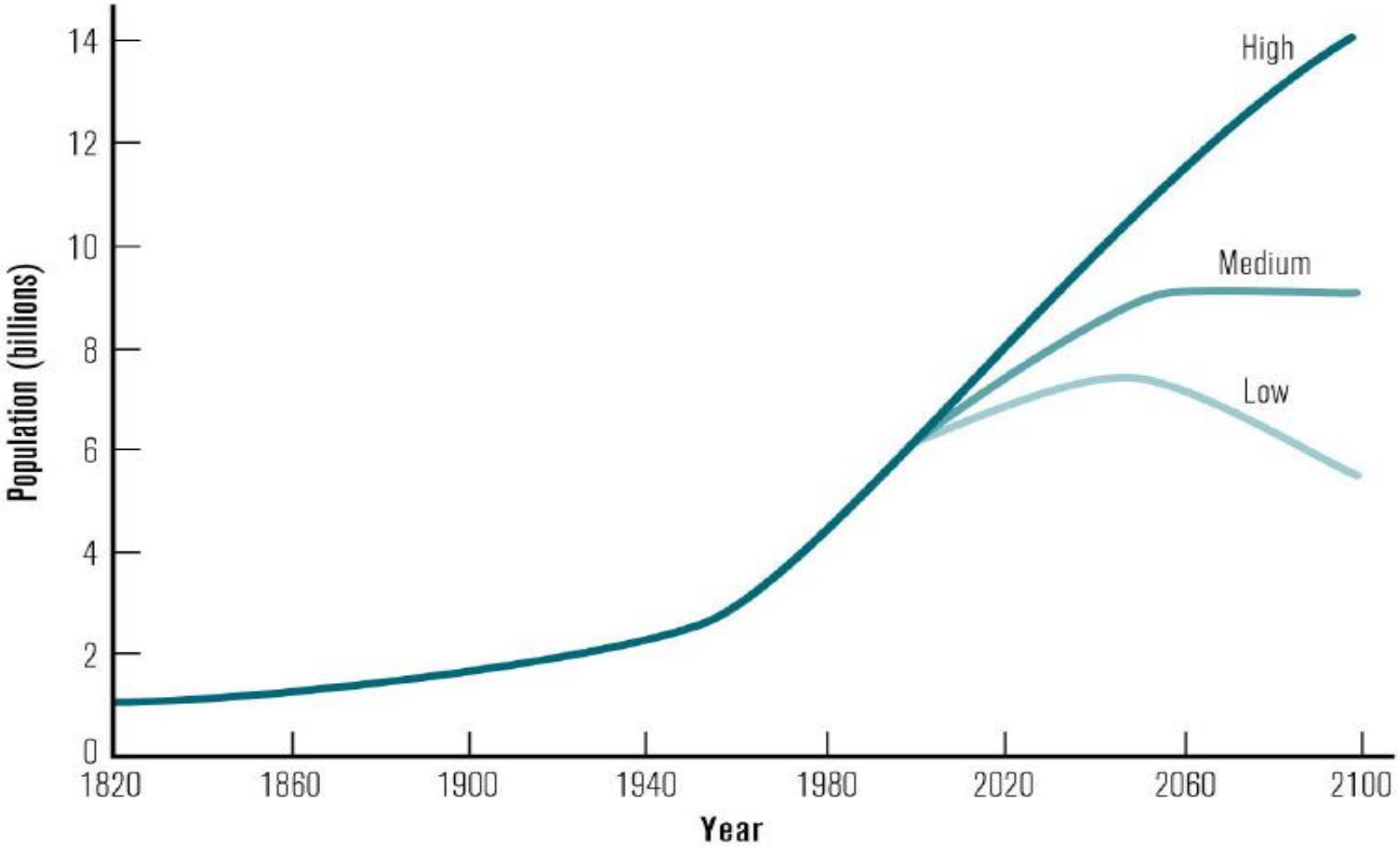
Demographic Transition for Finland, 1785-2003



Demographic Transition for Less-Developed Regions, 1950-2000



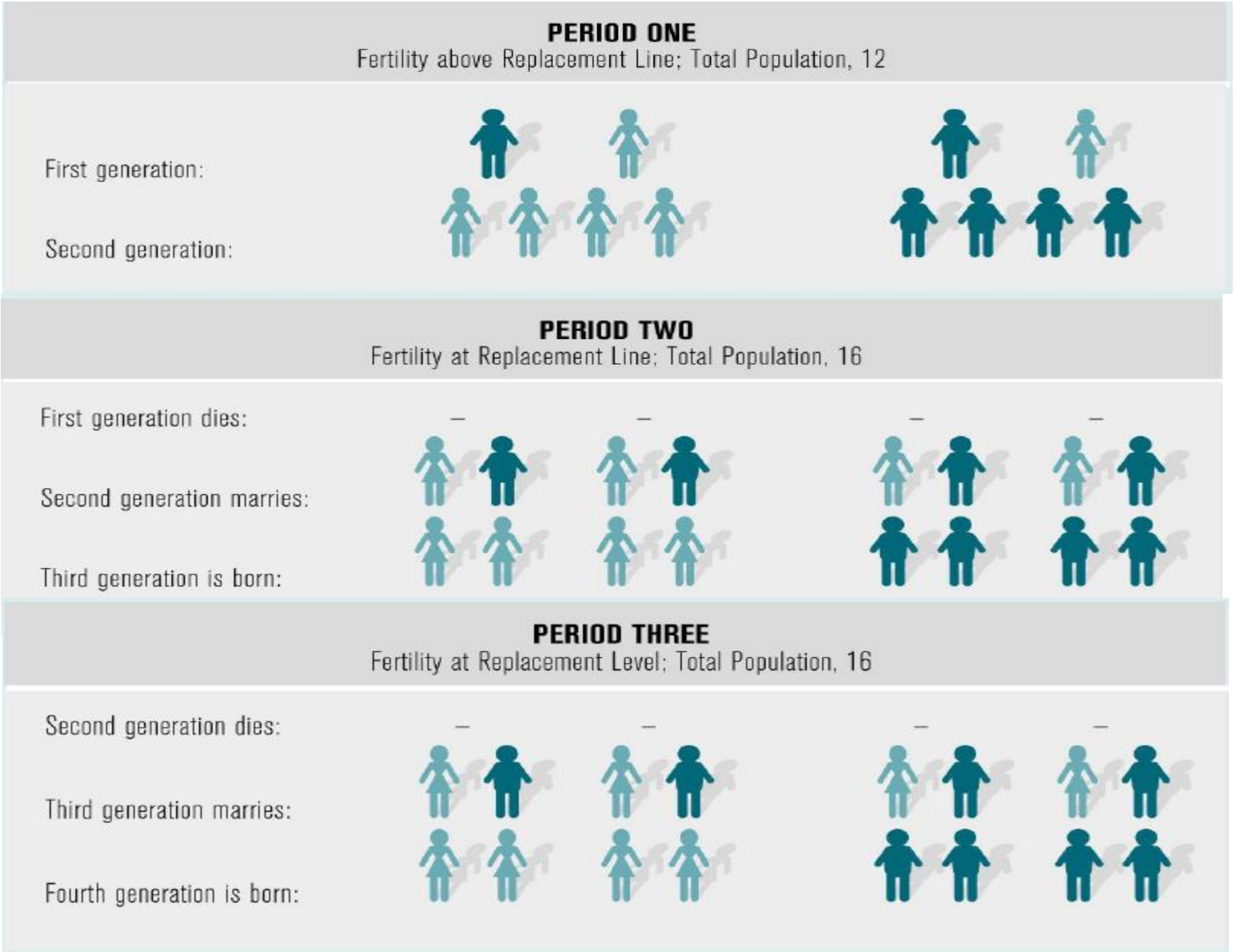
World Population Historical Trends and Projections



The Demographic Future

- For all three scenarios, world population is expected to continue to grow over the next 50 years due to:
  - A desire for large families
  - A failure to achieve the desired number of children
  - Population momentum
- Population momentum is a dynamic latent process of population growth that continues *even after the birth rates fall* due to large youthful population that widens population's parent base.
  - This implies a given population will not stabilize until 2 or 3 generations.

Population Momentum



Most Populous Countries, 2010 and 2050

2010

COUNTRY	POPULATION (MILLIONS)
China	1,338
India	1,189
United States	310
Indonesia	235
Brazil	193
Pakistan	185
Bangladesh	164
Nigeria	158
Russia	142
Japan	127

2050

COUNTRY	POPULATION (MILLIONS)
India	1,748
China	1,437
United States	423
Pakistan	335
Nigeria	326
Indonesia	309
Bangladesh	222
Brazil	215
Ethiopia	174
Congo, Dem. Rep.	166

Source: Population Reference Bureau, *2010 World Population Data Sheet*, www.prb.org/pdf10/10wpds_eng.pdf.

The Causes of Population Growth

- Thomas Malthus was population "pessimist".
- Malthus believed that "passion between the sexes" would cause population to grow as long and far as food supplies permitted.
  - He argued population grows geometrically and food production grows arithmetically at best, leading to famines and starvation.
- It can only prevented by natural *positive checks* such as epidemics, famines, plague, natural disasters, and wars.
- Malthus did not live long enough to see European population growth decline.
- *Why did Birth Rates Decline in spite of Malthus pessimism?*

Why Birth Rates Decline?

- Alternative view: Children impose costs and incur benefits.
- Economic costs of children: Explicit (cash outlays) & Implicit (opportunity costs)
- Implications of viewing children as an "economic decision":
  - Fertility should be higher when children earn income and contribute to the household.
  - Reducing infant deaths should lower fertility.
  - Institutionalized social security and pension will lower the need for parents to depend on their children for support in their old age.
  - Fertility should be lower if there is more opportunity for employment, especially for women.
  - Fertility may be higher with higher income because the explicit costs are more easily borne.

Becker's Theory of Household Economics

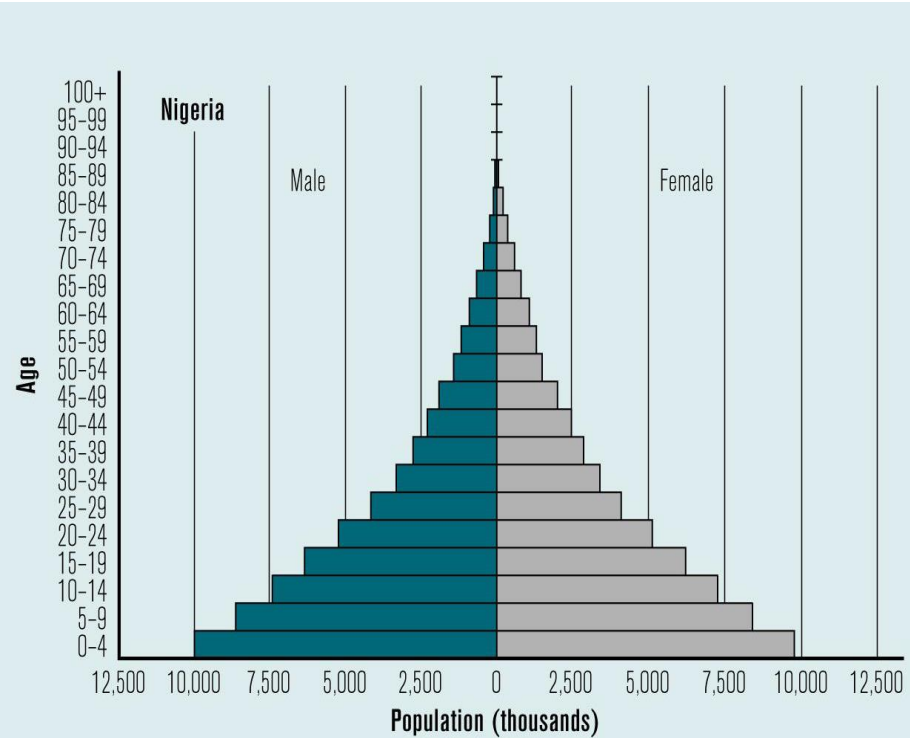
- Gary Becker analyzed whether children are "normal" or "inferior" goods.
  - Couples maximize *joint total utility function* from having children which is a function of the following factors: (i) number of children, (ii) child quality (associated with health &education), (iii) goods and services, subject to constraints of time and income or cost of goods and services.
  - Fertility falls as income rises over time due to higher cost of children, especially when the opportunity cost of parents' time goes up.
  - Given the rising cost of child *quantity*, parents opt to invest in child *quality* and spend more time and money on a smaller number of children. ➔ demand for children is a "normal good".

Population and Accumulation

- Population pessimists - perceived population growth as harmful to economic development.
- Coale and Hoover argue that a *reduction in birth rate could raise per capita income* in three ways:
  1. With lower fertility, capital per worker for growing number of workers (*capital widening*) would decrease and permit more investment to be used to increase capital per worker (*capital deepening*).
  2. With lower fertility, investment will be diverted away from education and health toward physical capital investment.
  3. Slow population growth would lower *dependency ratio*, which is the ratio of non-working population (0-14 & 65 and over) divided by total working population.

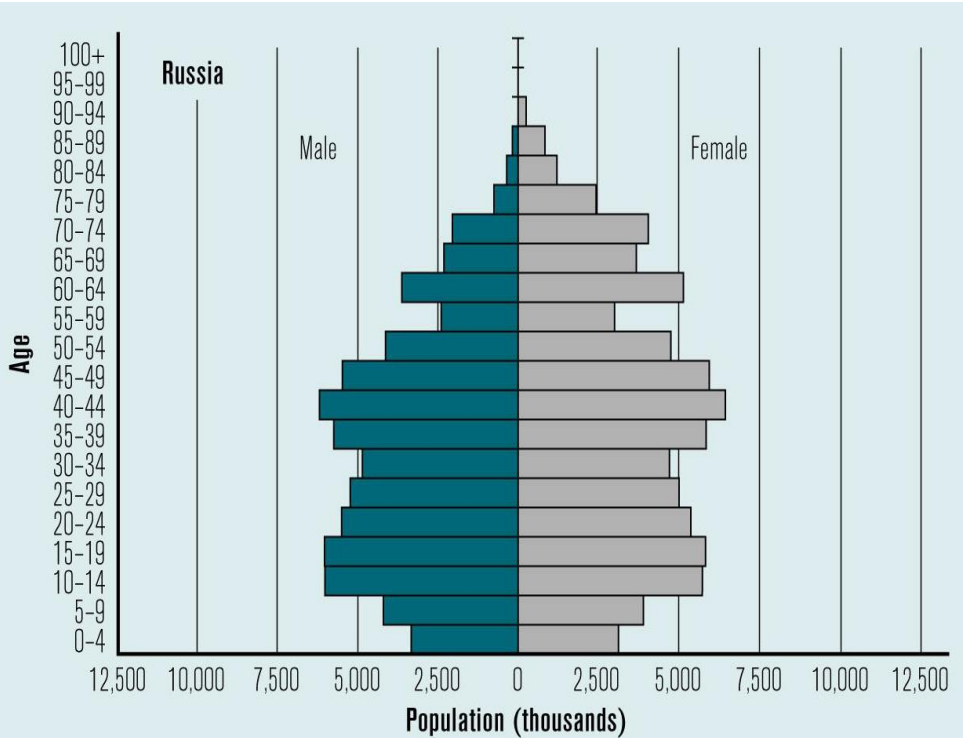
Population Growth, Age Structure, and Dependency Ratios

Nigeria



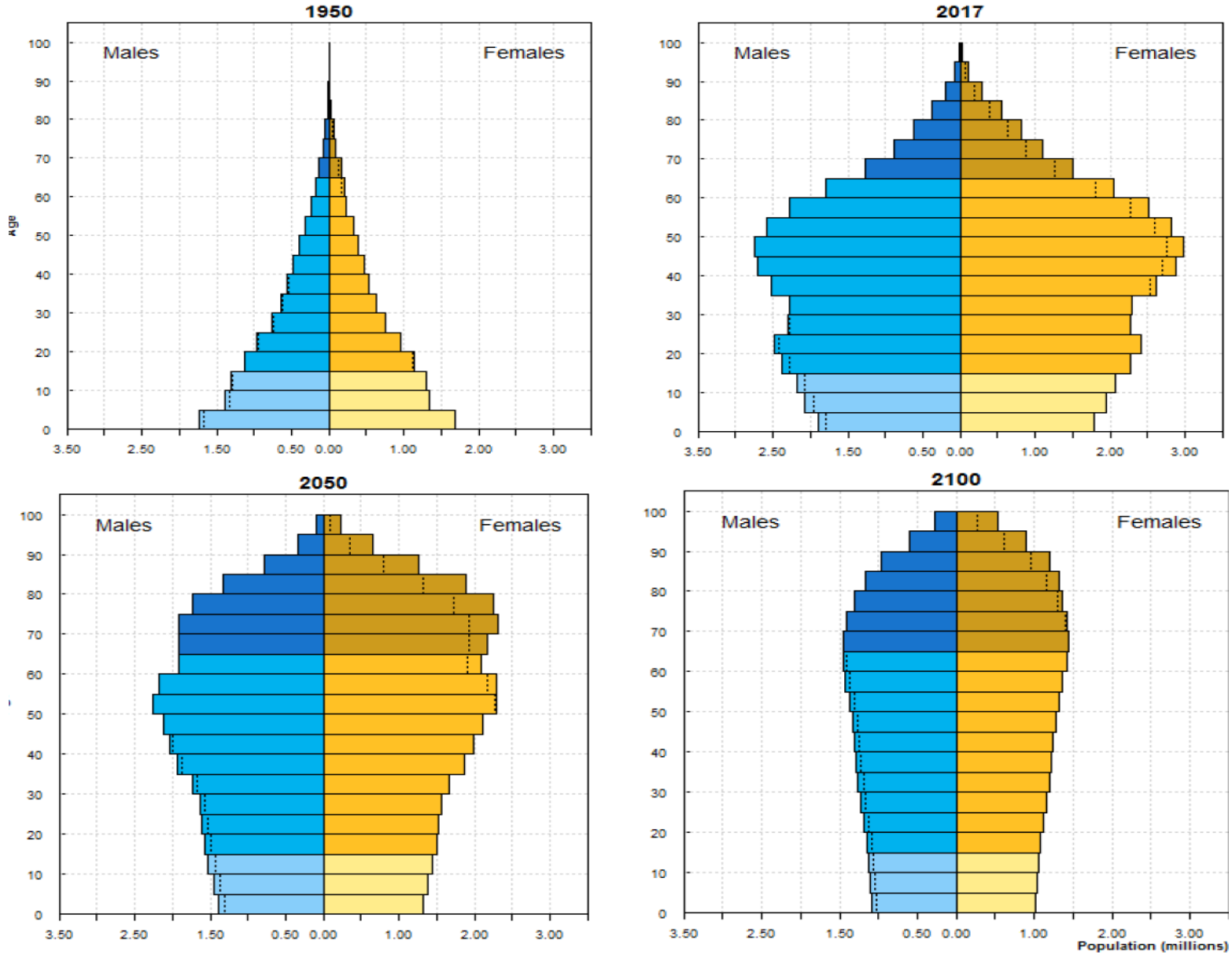
Pop growth = 2.1
TFR = 5.7
Youth dependency ratio = 0.87

Russia



Pop growth = -0.35
TFR = 1.5
Youth dependency ratio = 0.21

Thai Population Projection



Population and Productivity

- Population optimists – view population growth as having the potential to increase factor productivity.
- Why?
  1. A larger population can yield economies of scale in production and consumption.
  2. There's some evidence that population pressures can induce technological change.
  3. Julian Simon - a larger population contains more entrepreneurs and other creators, who can make major contribution to solving the problems of humanity.

Population and Market Failures

- Population revisionists (or population neutralists) – there is no one size that fits all on population matters.
- Revisionists argue that the problem has to do with market failures where costs and benefits of households reproductive behavior are not fully borne by them.
- The fundamental problem is *not too many people*, but *the lack of well defined property rights*.
  - "The tragedy of commons" – pop growth can destroy a common resource.
  - If population grows too quickly, there can be congestion of government services.
  - Pay attention to a failure in the market for contraception
- Population revisionists also focus on other dimensions of human welfare, e.g. income distribution.

Population Policy

- Reducing birth rates is one solution to lower population growth. But How?
- Family planning or broad-based socioeconomic development
  - *Educating girls*
  - All policies that *promote economic development* → more education, better health, higher per capita income → lower fertility
  - Family Planning Programs: Use of persuasion and education to influence couples to have less children, or reduce *unwanted births*
- Authoritarian approaches
  - Chinese one child policy campaign in 1979
    - Dramatic decline in fertility
    - Rapidly ageing population in the next decades
    - Growing imbalance between the number of males and females

EDUCATION

Topics

- Trends and Pattern
- Education As An Investment
- Education and Economic Growth

Trends and Patterns

Some concepts:

- ***Gross enrollment rates***: the total number of children enrolled in a given school category divided by the number of children of the age group for that level of schooling (e.g. relevant age group for primary school is 6-11 years)
- ***Net enrollment rates***: enrollments of only those of the relevant age group
- *Grade survival rates*: how many children actually complete a certain grade level → school dropout
- *Education attainment*: the highest level (or degree) of education that an individual has completed.

Changes in Schooling, Gross Enrollment Rates by Regions, 1970-2000

REGION	PRIMARY		SECONDARY		TERTIARY	
	1970	2000	1970	2000	1970	2000
East Asia and Pacific	89.4	111.4	23.8	66.4	1.1	14.4
Europe and Central Asia	99.3[a]	99.5	86.2[a]	85.6	30.9[a]	46.0
Latin America and Caribbean	107.2	124.7	27.6	84.8	6.2	22.6
Middle East and North Africa	70.1	95.6	23.5	70.3	4.4	20.7[b]
South Asia	70.6	94.8	23.0	48.0	4.2	10.0
Sub-Saharan Africa	51.0	81.7	6.3	25.7[b]	0.8	3.6[b]
High income	100.0	101.9	75.0	106.0	26.2	61.1

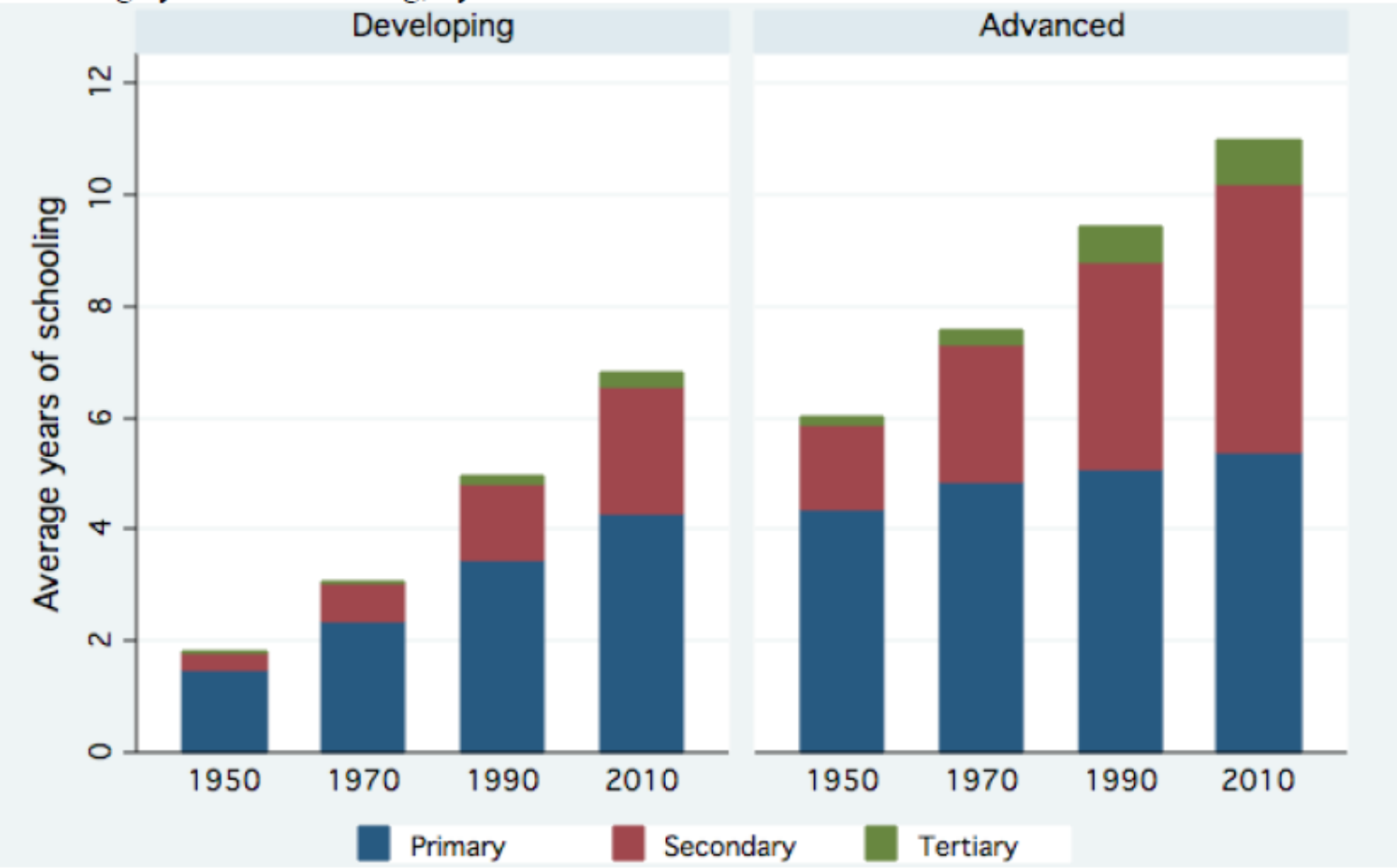
[a]Due to insufficient data for 1970, the values for Europe and Central Asia refer to 1980.

[b]Values refer to the late 1990s.

Source: World Bank, *World Development Indicators Online.*

Education Attainment of Population Age over 15

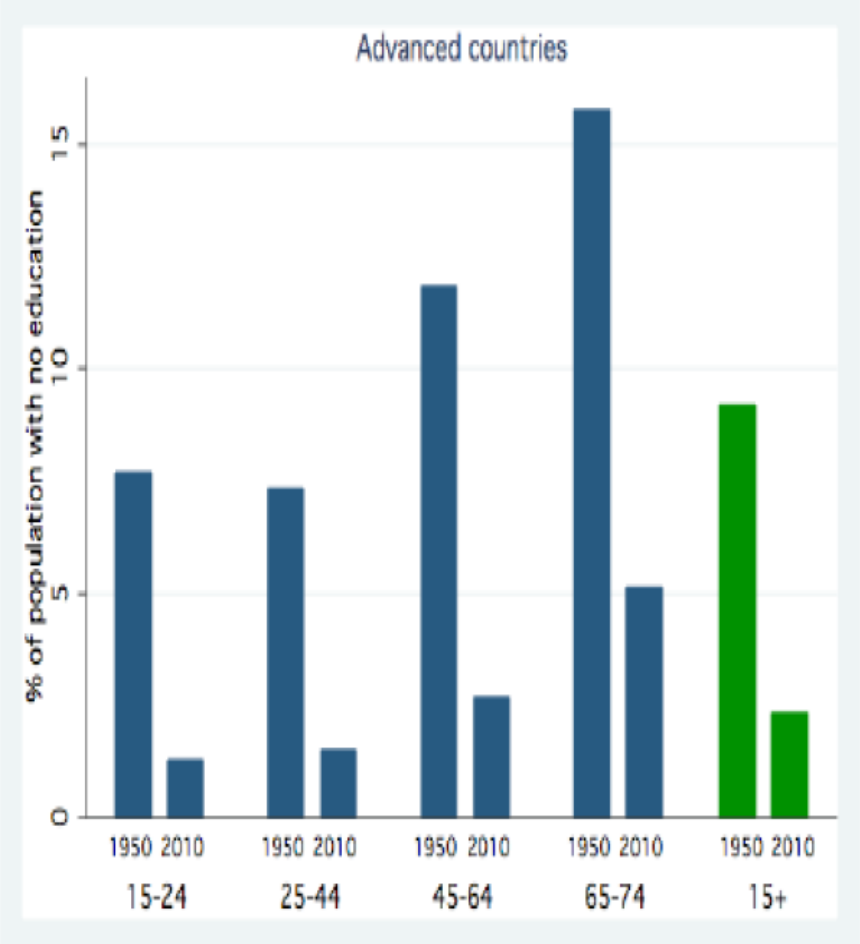
a. Average years of schooling, by educational level

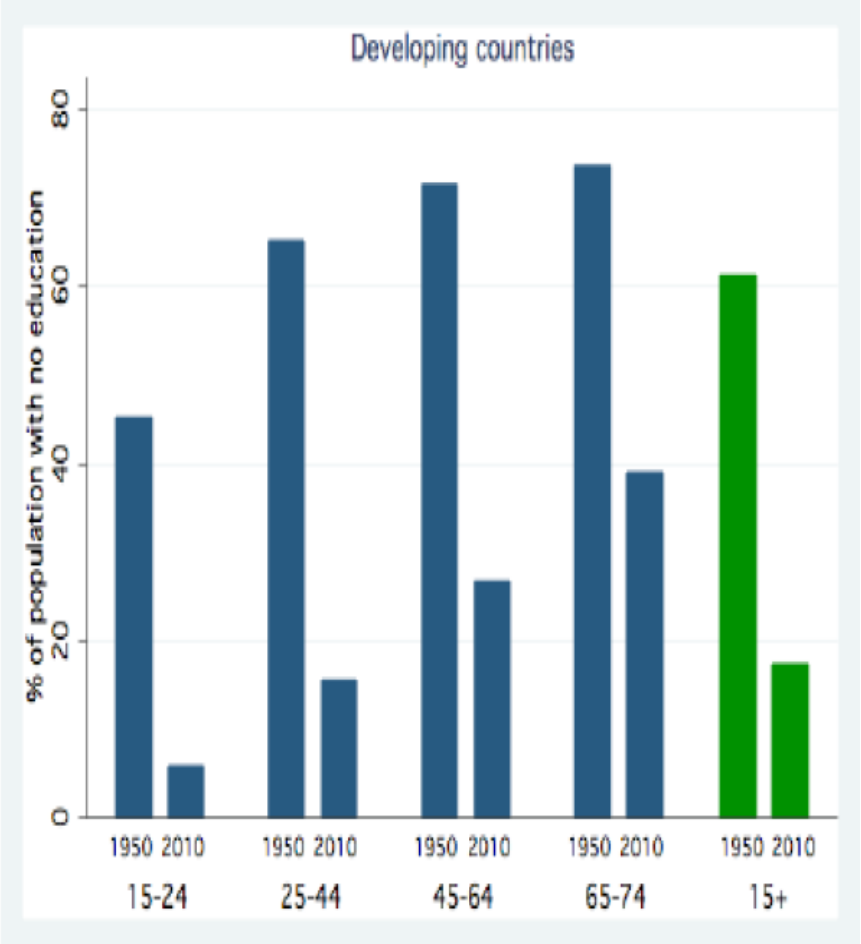


Note: Advanced countries = Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, USA, United Kingdom.

Source: http://www.nber.org/papers/w15902

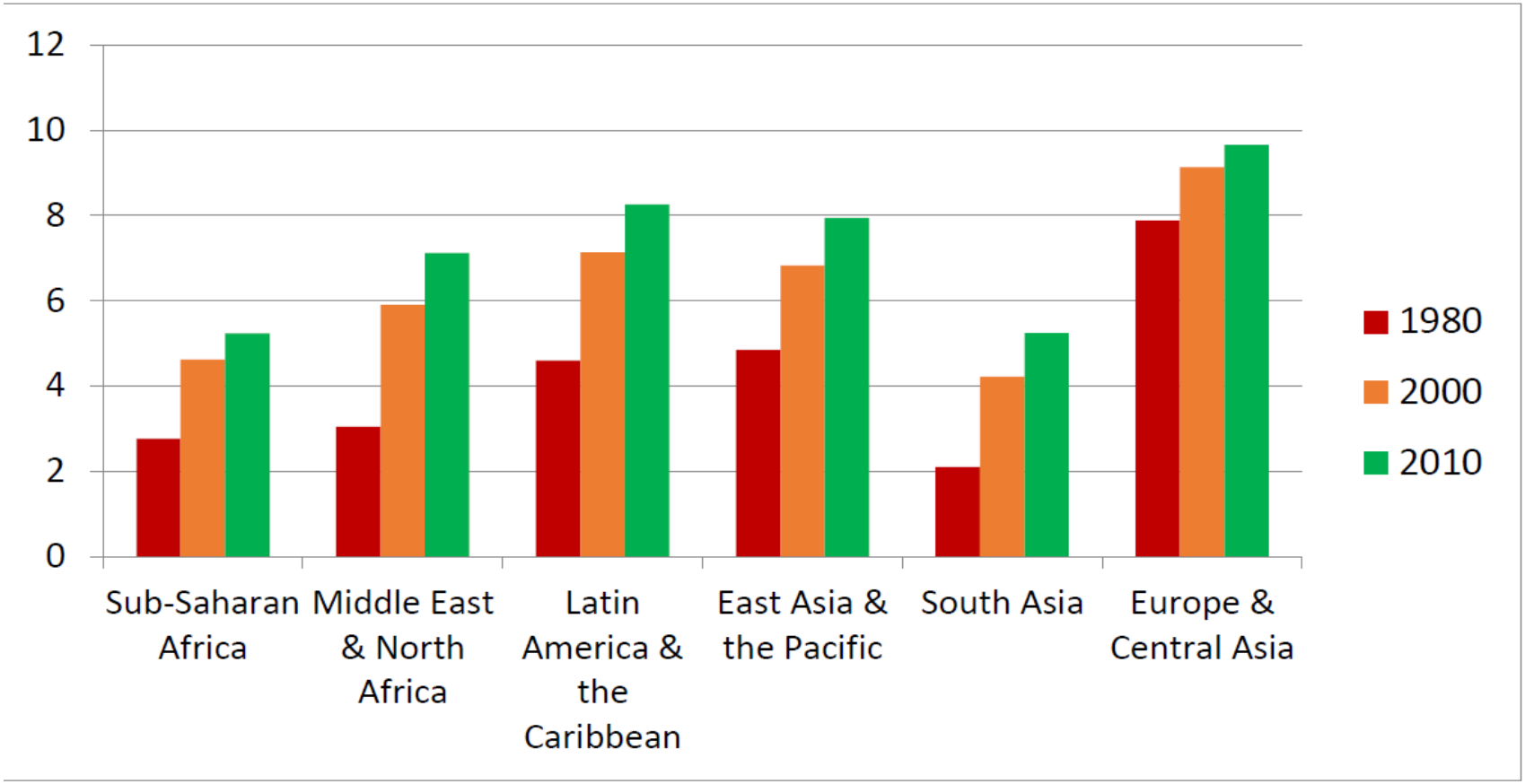
Proportion of Population with No Education





Source: http://www.nber.org/papers/w15902

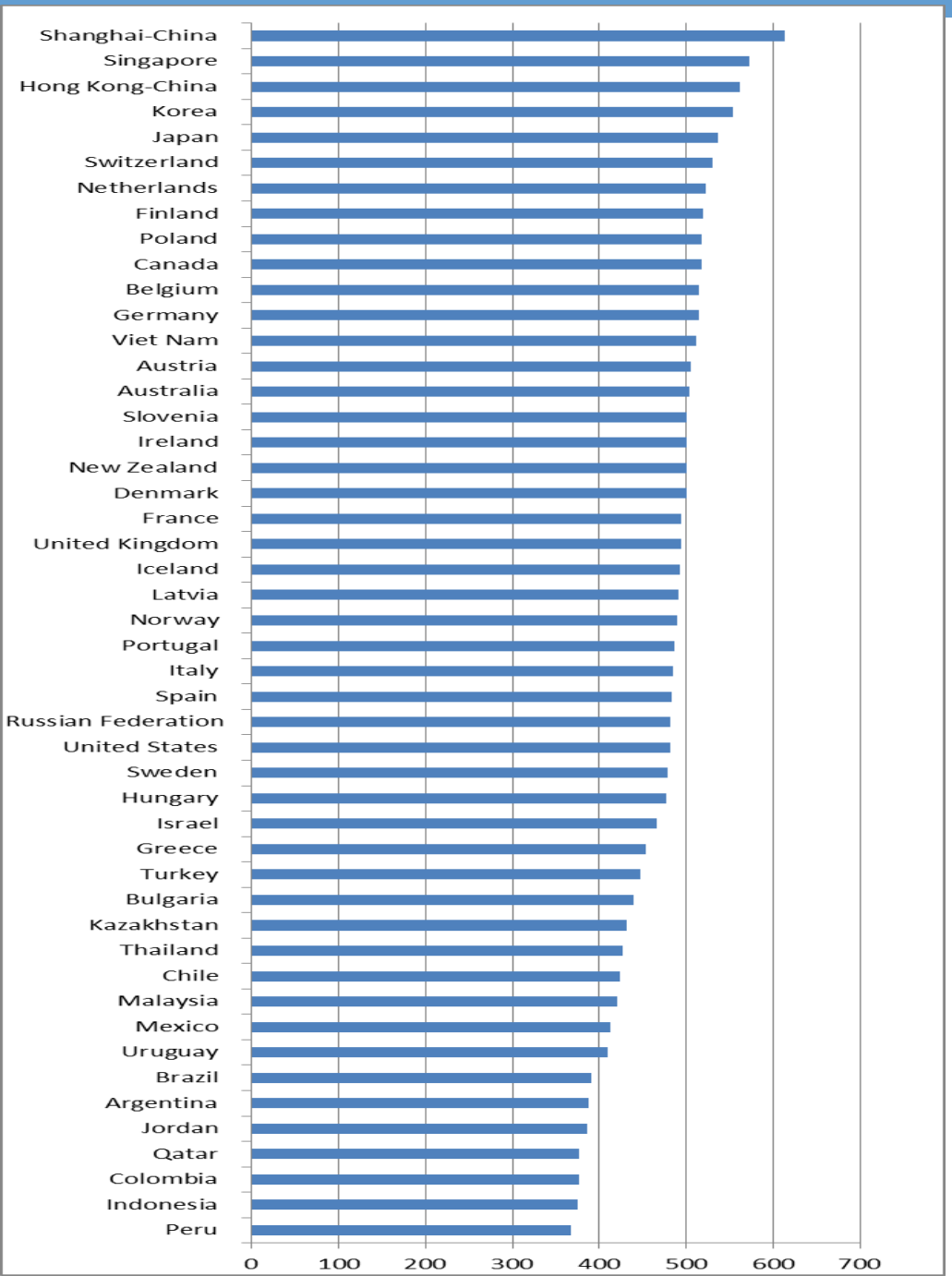
Average Years of Schooling for People Age 15+



Source: World Development Indicators

Schooling versus Education

- *Schooling is only a means to an end, but the real goal is education.* – skills individuals acquire from time spent studying and learning.
- One source of information on learning outcomes is the Programme for International Student Assessment (**PISA**).
- There is a gap between rich and poor nations in educational quality.
- Problems in developing countries may have more to do with quality (which could result from expanding quantity)
  - Too many unqualified teachers, absenteeism among students and teachers, insufficient teaching resources



Learning Outcomes: 2012 PISA Math Score of Students age 15 years

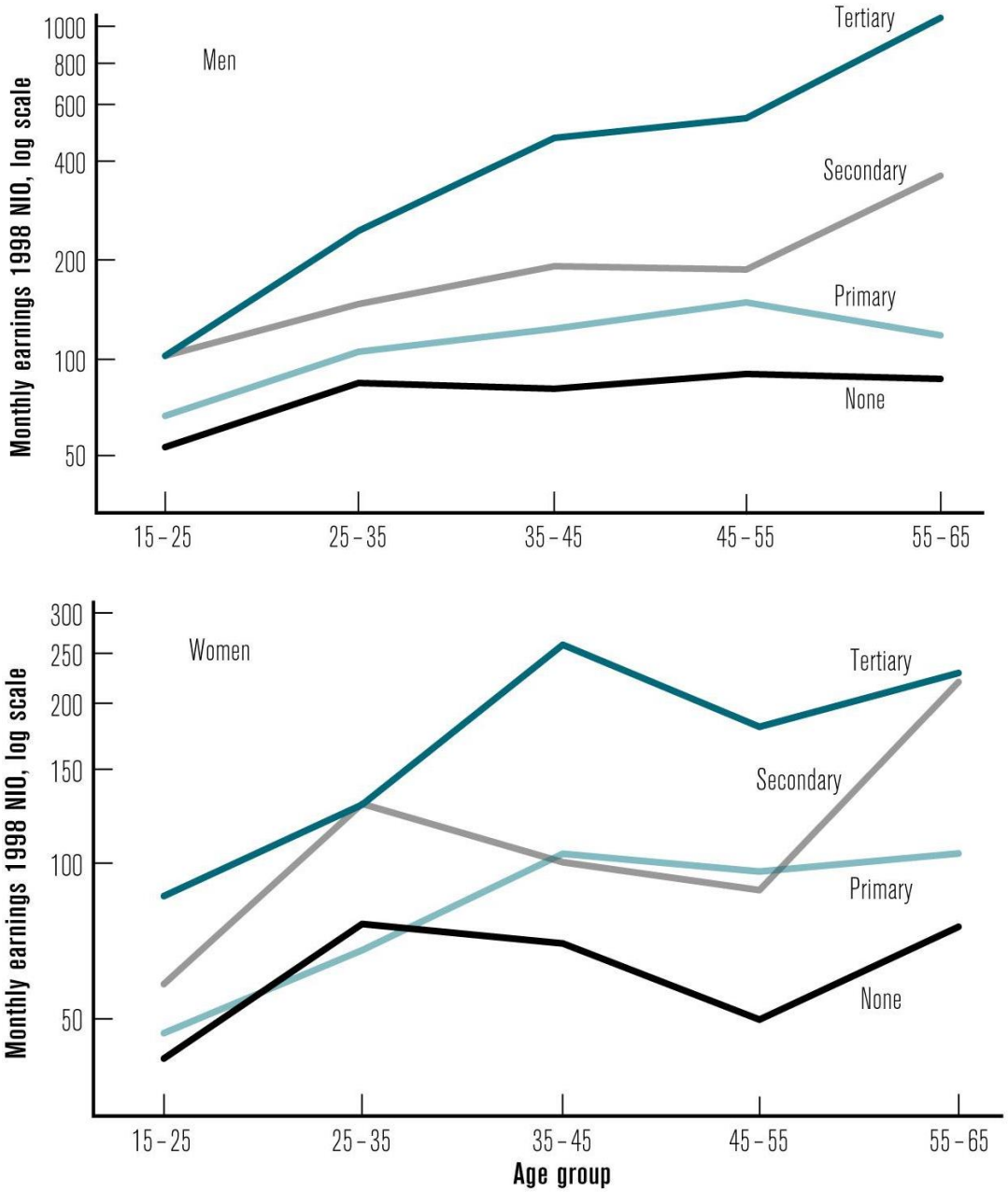
Sample question:

"Three-fifths of the students in a class are girls. If 5 girls and 5 boys are added, which statement is true?"

a. There are more girls than boys.
b. There are the same number of girls as boys.
c. There are more boys than girls.
d. You cannot tell whether there are more boys or girls from the information provided.

Education As An Investment

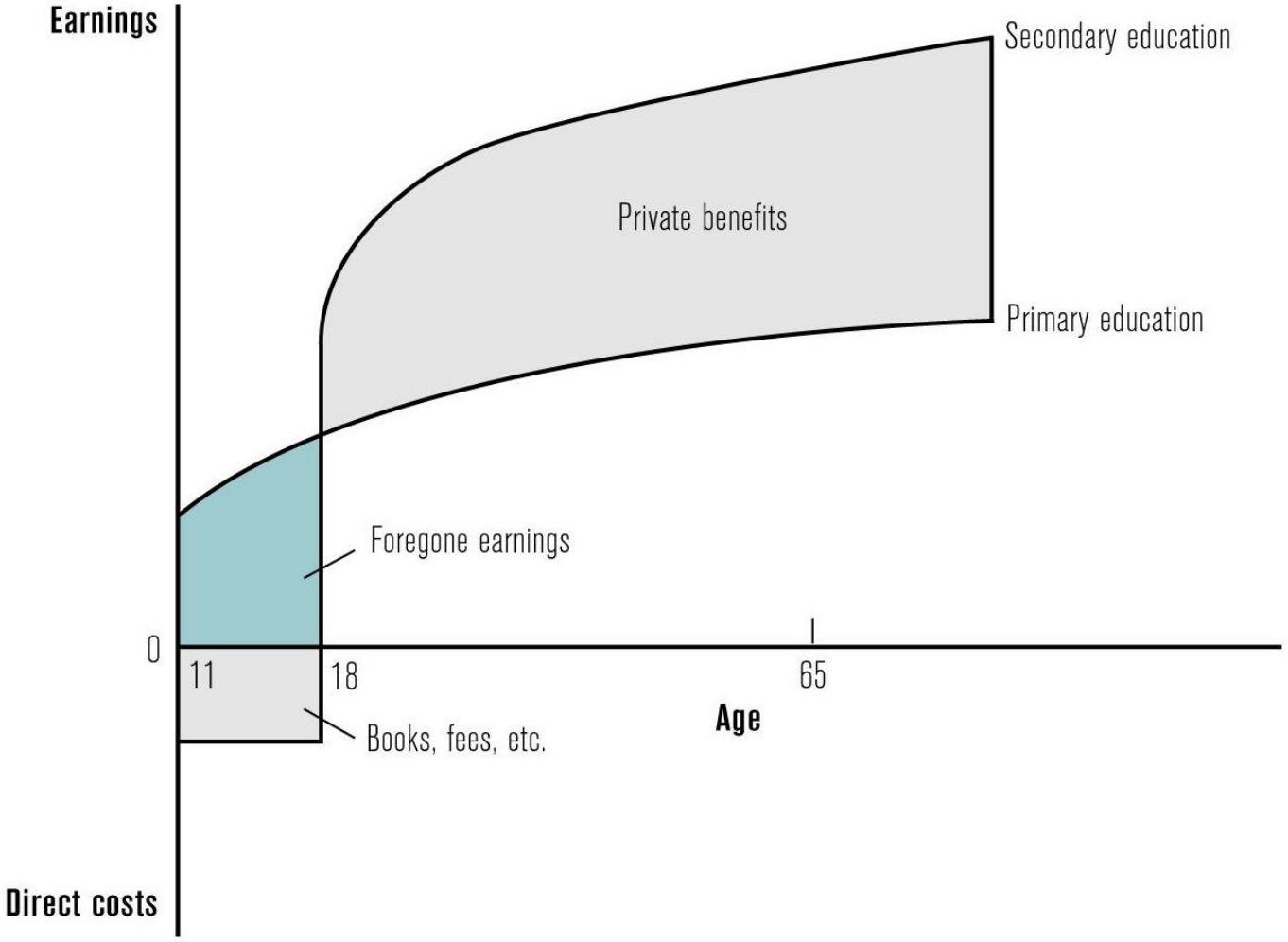
- Education is an investment.
- Schooling produces human capital.
- It is expected that investments in human capital will yield a positive return *(i.e. more educated are more productive and better compensated).*
- General tendency:
  - Earning rises with educational levels; those with more education tend to have *higher age-earnings* profiles.
  - At every education level, women tend to earn less than men. Why?



Age Earnings Profiles

by Age, Education, and Gender in Nicaragua, 1998

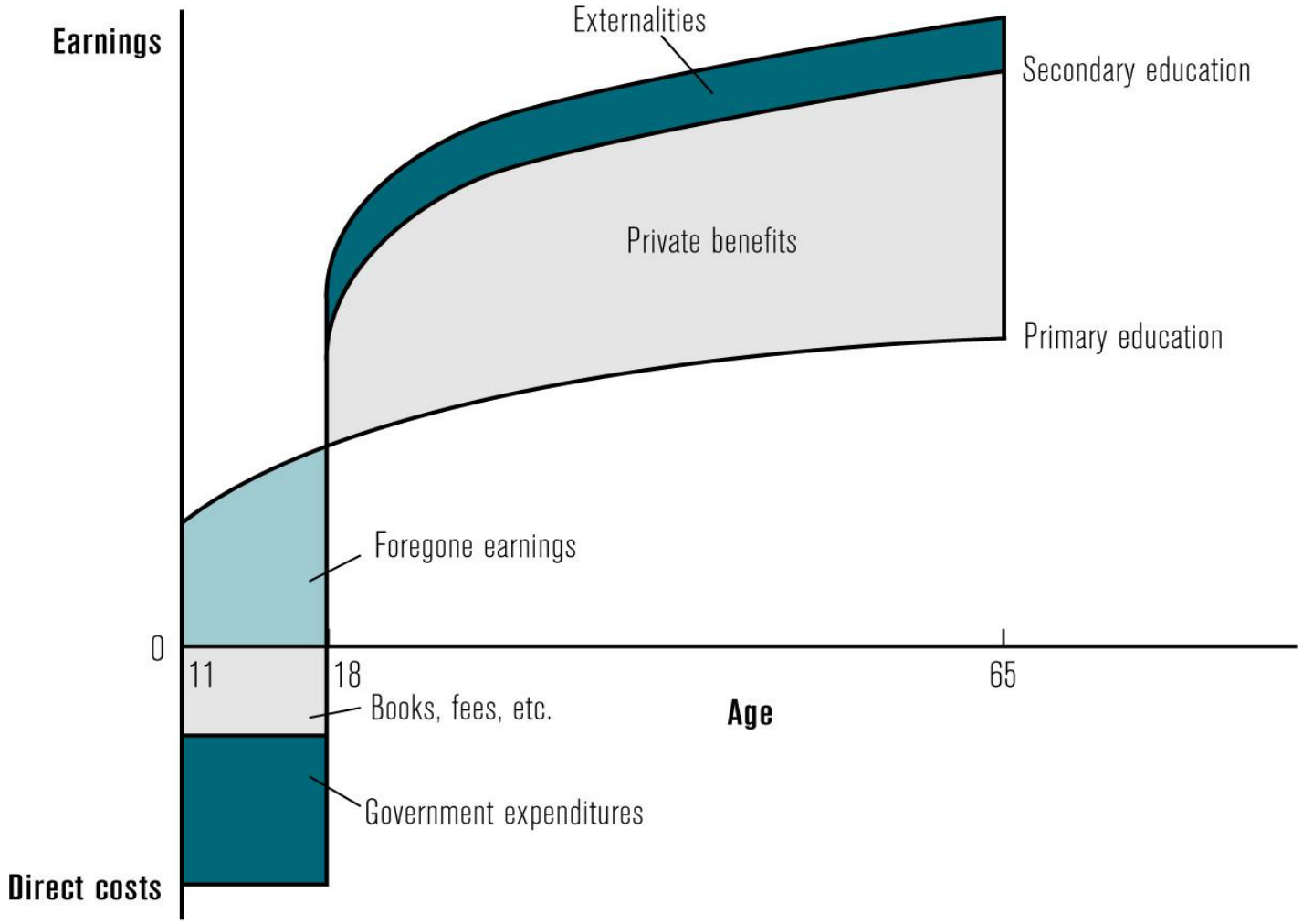
Determinants of Private Returns to Schooling



External Benefits of Education

- Education is also a social investment. So, there's a social return to schooling.
  - *Costs*: other costs borne by the society (e.g. payment for free primary school, construction of schools, etc.)
  - *Benefits*: schooling produces ***positive externalities*** – benefits that accrue to members of society above and beyond the benefits to the individual who receives the education
    - What are examples these positive externalities? Could they contribute to development?
- The privates sector or markets will under produce education if left to themselves.
- The fact that education has positive externalities justifies public provision or subsidy of education.

Determinants of Social Returns to Schooling



Returns to Schooling by Level and Country Income Group

INCOME CATEGORY	PRIVATE RATE OF RETURN			"SOCIAL" RATE OF RETURN		
	PRIMARY	SECONDARY	TERTIARY	PRIMARY	SECONDARY	TERTIARY
Low income	25.8	19.9	26.0	21.3	15.7	11.2
Middle income	27.4	18.0	19.3	18.8	12.9	11.3
High income	N.A.	12.2	12.4	N.A.	10.3	9.5

Notes: These estimates of "social" rates of return account for only government expenditures on schooling and do not include estimates of any positive externalities resulting from schooling.

Given the small number of workers in high-income nations with only primary educations, most studies of high-income nations do not provide estimated rates of return to primary education.

Source: G. Psacharopoulus and H. Patrinos, "Returns to Investment in Education: A Further Update," *Education Economics* 12, no. 2 (August 2004).

Q1. why are "social" rate of return smaller than private rate of return?

Q2. why the rate of return on primary education greater than that of secondary education?

PUZZLES

- Microeconomic puzzle: schooling in many developing countries often produces little in the way of learning, but there still is an association between schooling and earnings and rate of returns to education. Why?
- Macroeconomic puzzle: there has been a rapid growth in schooling throughout the world (and convergence in schooling), but there has been a divergence in per capita income.
  - Schooling is not the only factor that affects economic growth.
  - In bad environment, those with more education may engage in rent seeking and other activities that are “socially dysfunctional”.
  - Other explanations?

Education and Economic Growth (1)

- There is a bi-directional between education and economic growth.

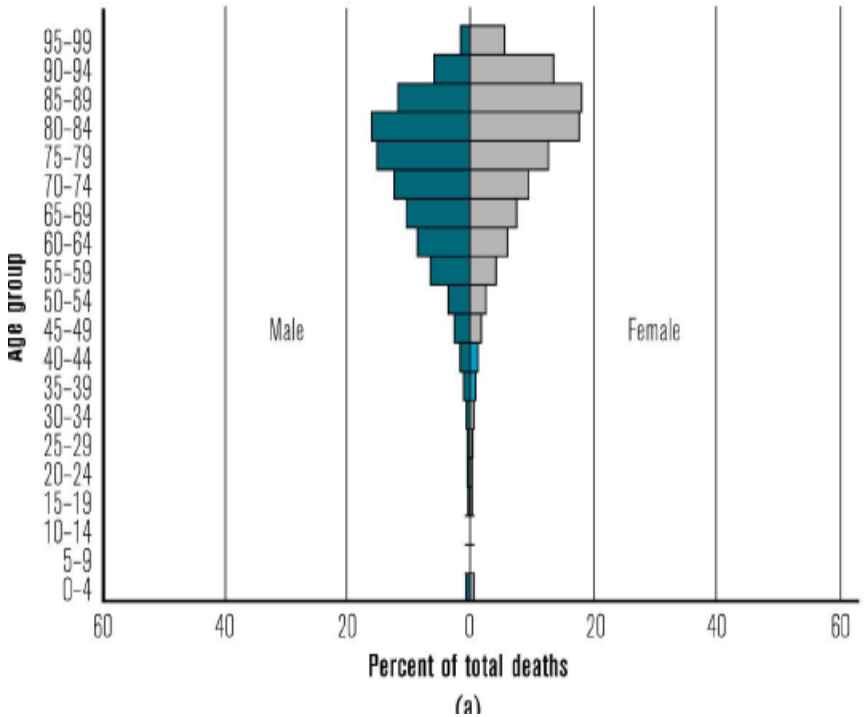
- Education may stimulate economic growth through several channels:
  - Education is an investment in human capital.
    - May subject to diminishing return
  - Investment in education may generate positive externalities.
    - Explain long-run economic growth
  - Education provides human capital needed for R&D activities.
    - Schumpeterian's assumption of "creative destruction"

Education and Economic Growth (2)

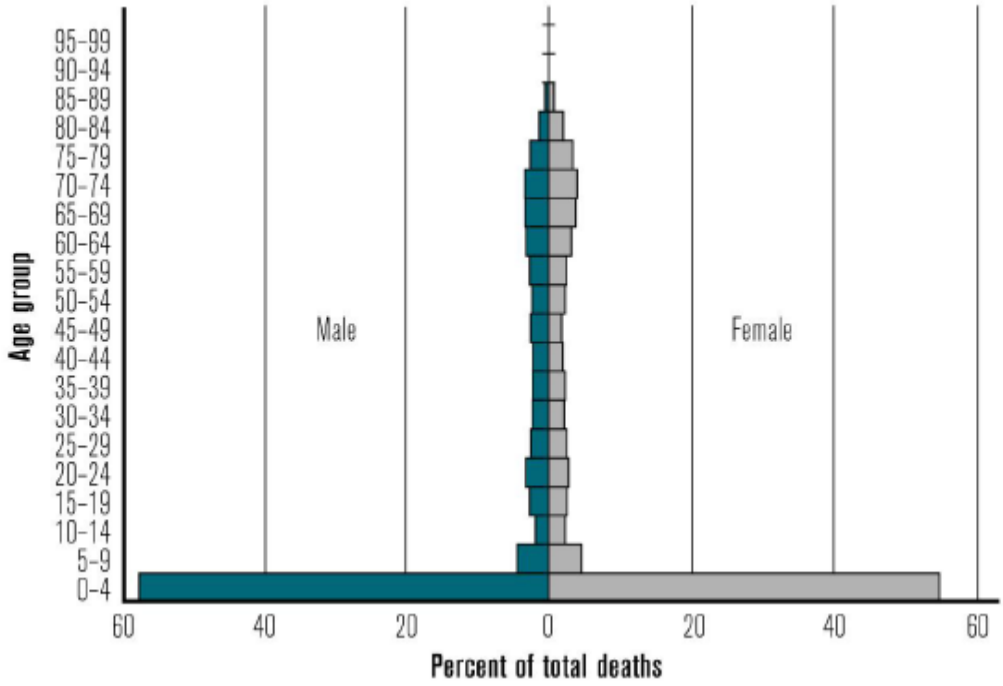
- Economic growth can affect education through:
  - Economic growth will reduce the incidence of “child labor”
  - Possibility to reverse the “brain drain” problem
    - The best policy is to change the faulty institution and unattractive conditions that lead highly educated people to leave their home countries

HEALTH

Distribution of Age and Deaths, 2005



Denmark



Sierra Leone

Poor health outcomes are correlated with income levels, but which causes which?

Health Measures

- **Mortality** measures deaths in a population
  - Ex: Under-five mortality rate is the probability (in terms of 'per 1000 live births') that a child born dies before reaching age five
- **Morbidity** measures rates of disease and illness.
  - Ex: Prevalence of HIV-infected cases
- **Life expectancy** is the average number of years that the person is expected to live.
- **Health-adjusted life expectancy (HALE)** is a measure of life expectancy that takes into account disability-impaired living.

Transition in Global Health

- All regions of the world experienced gains in life expectancy since 1960, but some countries in Sub-Saharan Africa saw declines since the 1990s due to HIV/AIDS.
- In many developing countries, life expectancy has risen and fertility has fallen.
  - Lower youth dependency ratio, but higher elderly dependency ratio
- "Epidemiological transition": (i) age of pestilence and famine, (ii) the age of receding pandemics, (iii) the age of degenerative and human-made diseases
- In the 20th century, there has been a major shift in causes of death and disability from infectious disease to non-communicable disease. (but Covid-19 outbreak questions this statement!)

Health, Income, and Growth

- The relationship between health and income growth is bidirectional.
  - Higher income and growth means more resources available in the economy, so individuals can spend more on goods and services that directly or indirectly improve health.
  - Improved health leads to faster economic growth, higher incomes, and reduced poverty.

Discussion: Should we promote health or economic growth first?

Income and Health

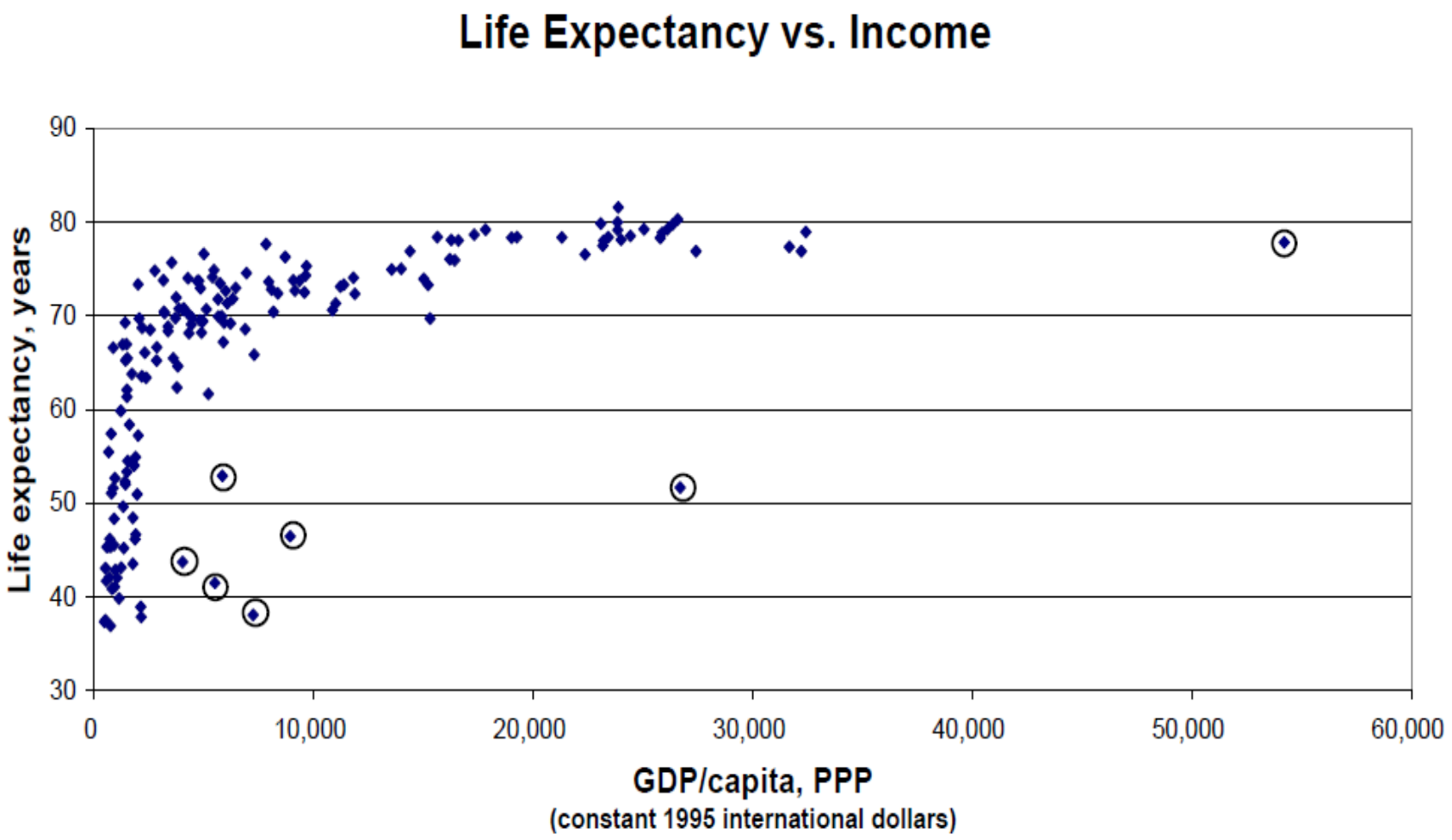
- As income rises, there is greater ability to build public health clinics and hospitals, trains more doctors and nurses, and pay for public health services (e.g. immunization campaign).
- Prichett & Lawrence's article "Wealthier Is Healthier" suggests that improvements in income, holding other factors constant, lower child mortality and increase life expectancy.
- Caution: there's no evidence that economic growth will improve health *without deliberate public action*.
  - So, the problem might be "lack of information" or "weak belief" (Banerjee & Duflo).
  - Examples: Use of ORT and bed nets

Health and Productivity

- Q: How does better health lead to economic growth?
  - Productivity gains and increased investment
  - Healthier workers are not only more productive, but also loses fewer workdays due to illness.
  - Better health means less opportunity costs for care-takers in the household
- A family member's health can affect children's education.
  - No need to rely on child labor
  - Child's health has a direct effect on his/her own schooling.
  - There's evidence that childhood health can affect labor productivity later in life.

Epidemics and Economics (Bloom & Canning, 2006)

- The paper discusses the links between income and infectious disease epidemics, and how such links are affected by changing global circumstances.
- Health and wealth
  - Wealth as a determinant of health – improving economic conditions can lead to better health, but not always the case.
  - Health as a determinant of wealth:
    - Health affects income via education.
    - Good health boosts labor productivity.
    - Good health promotes saving and investment.
    - Health improvements will have both transitional and permanent effects on country's population age structure, and potential impacts on economic development.
    - Health scares may deter both investors and tourists from a country (e.g. SARS).

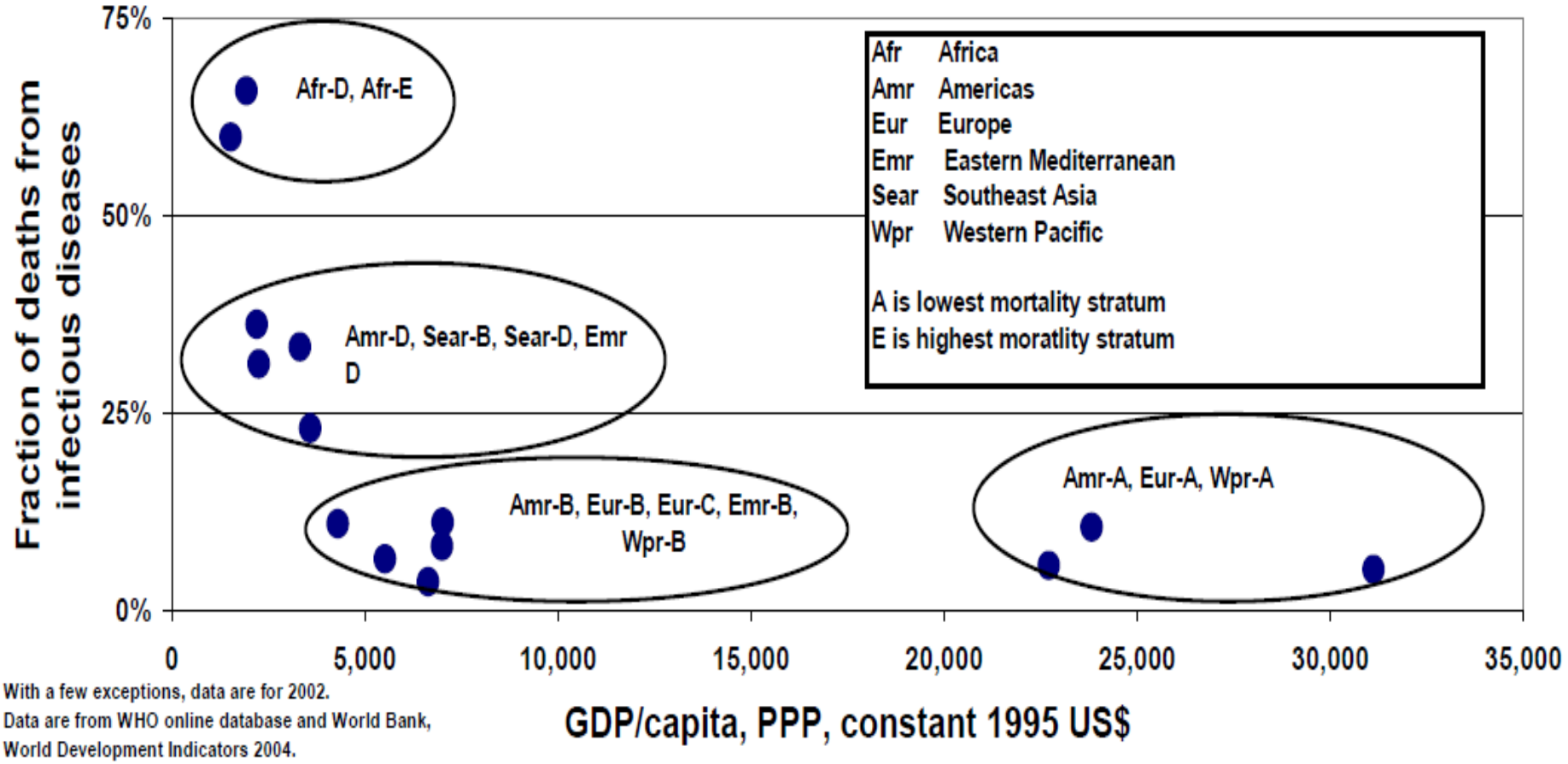


Source: World Bank. *World Development Indicators 2004.*
Data are for 2002 or latest available year.
Note: The circled outliers, from lowest to highest income, are Swaziland, Namibia, Gabon, Botswana, South Africa, Equatorial Guinea, and Luxembourg.

Bloom & Canning (Cont'd)

- Epidemics, pandemics, and economic prosperity
  - Epidemics are most likely to arise and persist under conditions created by poverty:
    - Poor sanitation
    - Crowded living conditions
    - Weak bodies
    - Weak health care systems
  - Wealth enables people to safeguard themselves against or mitigate the effects of risk factors.
  - The share of deaths from infectious diseases is much higher in poor countries than in rich countries.
  - The economic impact of epidemics also depends on how long it lasts.
  - Also, when considering the value of human life, epidemics are extremely costly.

GDP/Capita vs. % of Deaths Caused by Infectious Diseases, By WHO Region and Mortality Stratum



With a few exceptions, data are for 2002.
Data are from WHO online database and World Bank, World Development Indicators 2004.

Bloom & Canning (Cont'd)

- The challenge of epidemics:
  - The forces of globalization helps the spread of epidemics (via international trade, travel, migration, etc.).
  - Global climate change may be affecting the spread of malaria.
  - Epidemics create panic.
  - Policy responses need to be fast and flexible.