بسم الله الرحمن الرحيم

الحمد لله رب العالمين والصلاة والسلام على نبينا محمد خاتم الأنبياء وسيد المرسلين وعلى آله وصحبه أجمعين وبعد

Lecture Objectives

- Present the need for population studies (demography)
- Introduce the components of population dynamics (births, deaths, migration)
- Introduce the basics of fertility, mortality and morbidity and their measures
- Discuss determinants of fertility
- Describe population composition

- Describe types of population profiles
- Introduce basics of population change
- Introduce basics of population transition

Resources:

- Population Handbook, 4th International Edition, 2000.
- Jordan Population and Family Health Surveys for the years 1997, 2002,2007, 2012.
- Empowering women , developing society: female education in the MENA
- Population trends and challenges in the MENA region

Demography

Demography (*population studies*) is the study of human populations: their size, composition, and distribution as well as the causes and consequences of changes in these characteristics.

Three major factors determine the population dynamics of a population:

- Births (fertility)
- Deaths (mortality)
- Migration

If some groups within a population grow or decline faster than others, the composition of the whole is altered. These three factors determine the most basic characteristics of a population, as well as its demographic future.

Fertility

- **The number of births that occur to an individual or in a population**

- In 1998, fertility rates of national populations ranged from an average of 1.2 children per woman in Italy, Latvia , Spain, and several other European countries to 7.4 children per woman in the West African country of Niger.

- In US average was 2.0

- For the world it is 2.9

Fecundity

The physiological ability of individuals or couples to have children.

- Some are infecund due to disease or genetic dysfunction.

- Mothers could be infecund when they breastfeed.

- For individuals fecundity ranges between 0-30 children.

Factors accounting for fertility fecundity gaps

There are usually gaps between fertility and fecundity. What are the factors that may account for the gaps:

Cultural, economic, and health factors interfere with the process of human reproduction.

- **Cultural values** e.g. (Does the society value large or small families?)

Factors accounting for fertility fecundity gaps

- **Social roles**: (Is the wife primarily a childbearer or a childrearer ?)

- **Economic** (Do parents rely on children to look after them in old age?)

- **Health** (what is the prevalence of gonorrehea in a population), that will impair fecundity.

Intermediate determinants of fertility

- **Cultural and economic** factors affect fertility levels indirectly: **intermediate variables**

- They operate in different societies. The relative importance of the factors vary by society.

Intermediate factors affecting fertility

Fecundity:
- Ability to have intercourse
- Ability to conceive
- Ability to carry pregnancy to term

Sexual unions: % of women in union.
 This rate is affected by other demographic factors such as:
The formation and dissolution of unions (marriage, divorce…etc)
- Age at first marriage
- Time spent outside the union…etc
- Male mortality levels

Intermediate factors affecting fertility

Birth Control:

- Use of contraceptives

- Contraceptive sterilization

- Induced abortion

Proximate determinants of fertility

- **John Bonnagartes** demonstrated that 4 of these variables explain nearly all variation in fertility levels among population. These have a direct biological effect on fertility:

- **The proportion of women married or in a sexual union**

- **The % of women using contraception**

- **The proportion of women who are breastfeeding/ infecund**

- **The level of induced abortion**

Fertility Proximate determinants

- In US. and most developed countries *contraceptive use and abortion* are the most important proximate determinants. The **rate of contraceptive use** in US, Brazil, Australia, and few East and South East Asia have contraceptive use rates of >= 75%.

- The latest figure in Jordan is 42% for modern methods use(DHS report, 2012)

- **Spain** recorded **the lowest fertility rate** in a nation 1.15 births per woman of rep age. Basically due to 72% using contraceptives. **Russia** achieved low fertility rates due to having easier access to **abortion.**

Proximate determinants

- When contraceptive and abortion prevalence rates are low, the postpartum infecundity and marriage determinants are more important.

- **African countries**:

  women marry early and bring more children, but they breast feed for 2-3 years, thus prolonging the period of infecundity following childbirth.

Proximate determinants

- Others abstain as long as women are breast feeding.

- Polygamy and being away form home

- Sexually transmitted diseases affect fecundity.

Fertility Measurement
Birth Rate

- **The birth rate (also called the crude birth rate) indicates the number of live births per 1,000 population in a given year**

- **It is the most easily obtained and most common reported fertility measure**

Fertility Measurement
Crude Birth Rate

- *There were 24 births per 1,000 population in Kuwait in 1994 :*

Number of births (38,868) divided by the Total population (1,620,086) x K (1,000)= 24.0

- In Jordan it is 28.1 (DHS 2012).

- Around the world, birth rates vary widely.

- In Western Sahara's, a very high birth rate 47 per 1,000 in 1996, while

- Italy's it is very low, 9 per 1,000, also in 1996,

Fertility Measurement
General Fertility Rate

- **The general fertility rate GFR, (also called the fertility rate) ,is the number of live births per 1,000 women ages 15-49 in a given year.**

- The GFR is a somewhat more refined measure than the birth rate because it relates births to the age-sex group at risk of giving birth (usually defined as women ages 15-49).

General Fertility Rate

- Yemen's general fertility rate in the early 1990s was 238 live births per 1,000 women ages 15-49—one of the highest

  in the world.

- The Czech Republic's, it was very low at a rate of 34 per 1,000 women aged 15-49 in 1996.

Total Fertility Rate

- **The total fertility rate (TFR) is the average number of children that would be born to a woman by the time she ended childbearing if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year.**

- The TFR sums up, in a single number, the fertility of all women at a given point in time.

Total Fertility Rate (TRF)

- It is the average number of children in a family.

- Used to compare fertility among countries

- It tracks changes in fertility over time

- TFR in Jordan 3. 5(DHS report, 2012)

Total Fertility Rates, France, 1901-1995
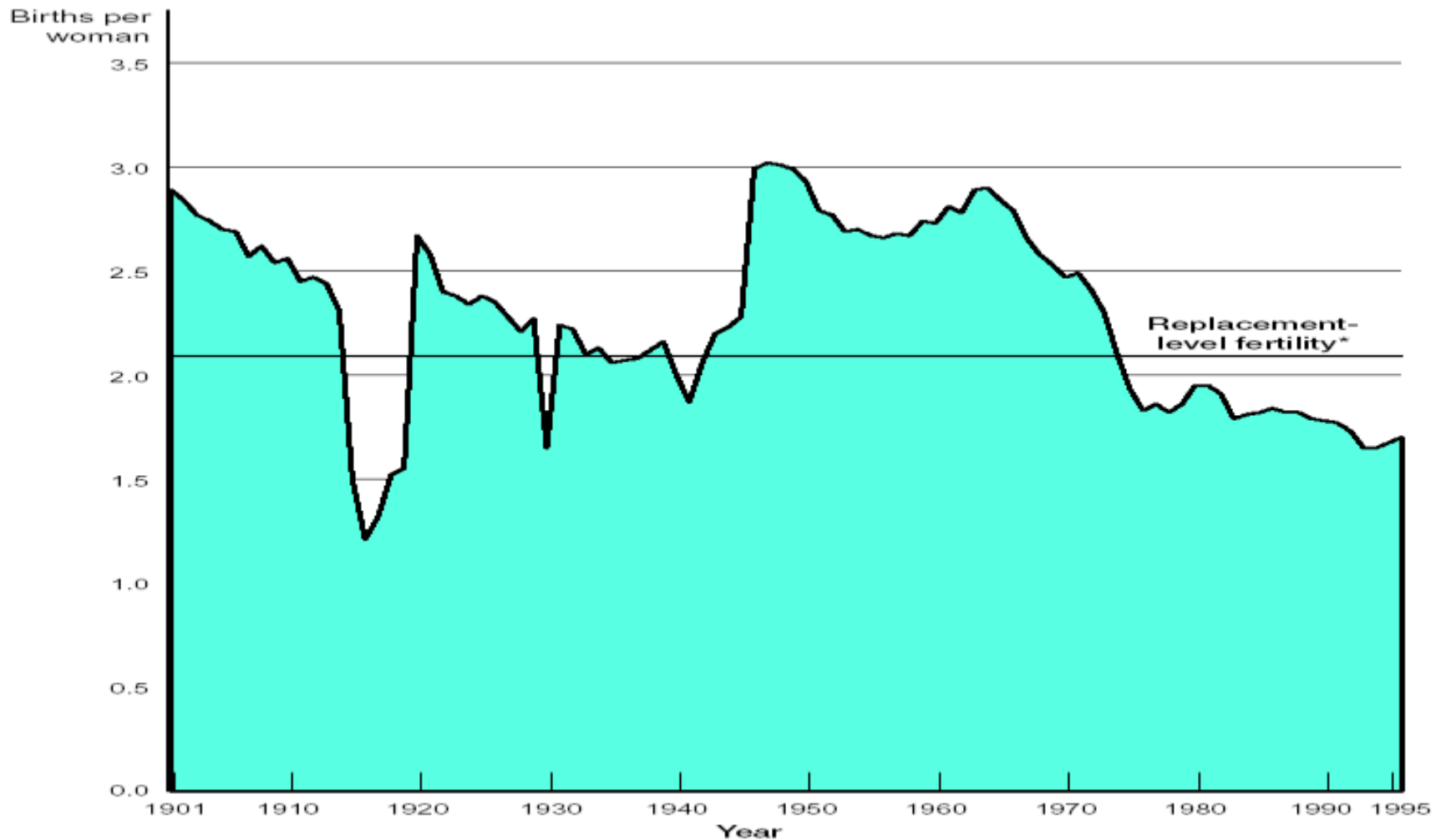
Replacement level fertility

- **The level of fertility at which a couple has only enough children to replace themselves, or about two children per couple.**

- This pop will eventually stop growing.

- It needs a TFR slightly higher than 2

- In US it is 2.1 because death rate is not too high

- In Sierra Leone , Repl. Level Fert. would be greater than 3 because death rate is too high.

Mortality

Death Rate

- **The death rate (also called the _crude death rate)_ is the number of deaths per 1,000 population in a given year.**

- In the early 1990s, the death rate in Turkey was 6.6 per 1,000 population.

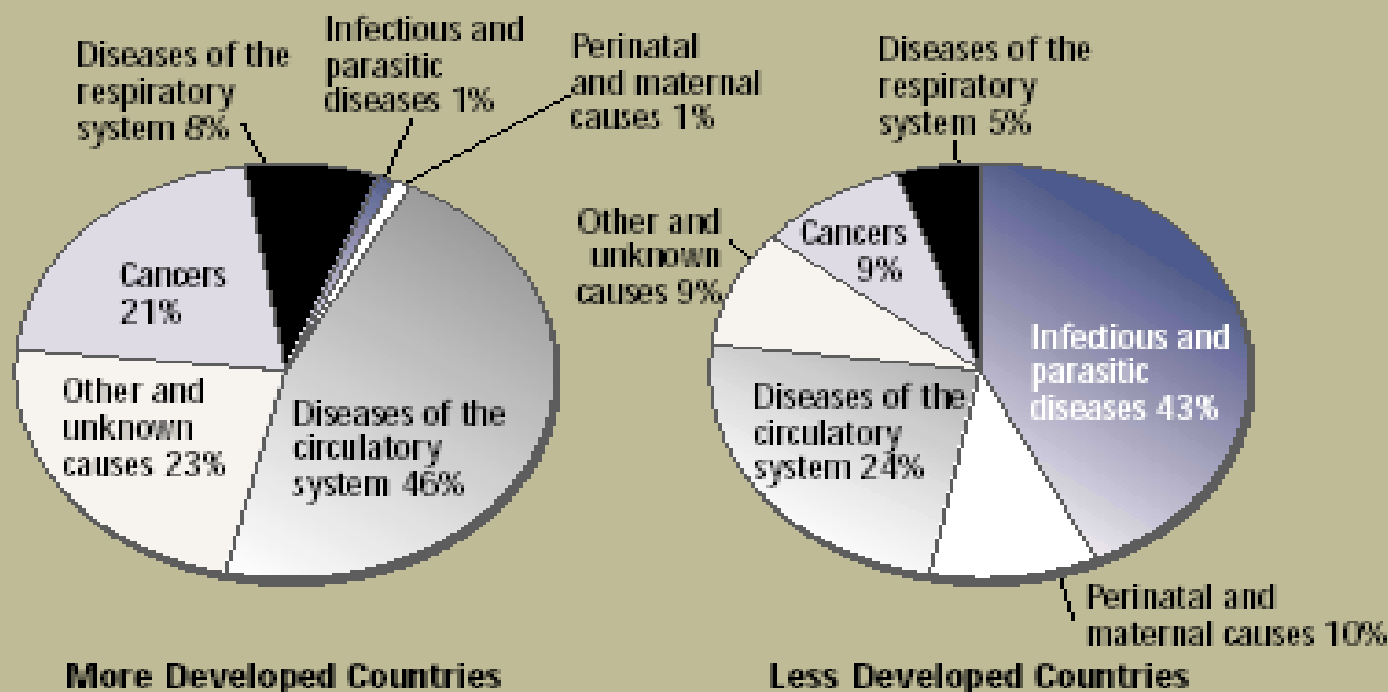   **Number of deaths (405,000)/ Total population   (61,644,000) x K (1,000) = 6.6**

- In the early 1990s, Guinea's death rate was 20 per 1,000 population, while Singapore's was 5 per 1,000.

Death rates

- Age-Specific death rate

- Cause-specific death rate

- Sex-specific death rate

Deaths from infectious and parasitic diseases
More developed and less developed countries, 1998

More Developed Countries

- Diseases of the respiratory system 8%
- Infectious and parasitic diseases 1%
- Perinatal and maternal causes 1%
- Cancers 21%
- Other and unknown causes 23%
- Diseases of the circulatory system 46%

Less Developed Countries

- Diseases of the respiratory system 5%
- Cancers 9%
- Other and unknown causes 9%
- Infectious and parasitic diseases 43%
- Diseases of the circulatory system 24%
- Perinatal and maternal causes 10%

Source: World Health Organization (WHO), *The World Health Report 1998.*

Death Rates by Age and Sex, Canada, 1945 and 1994
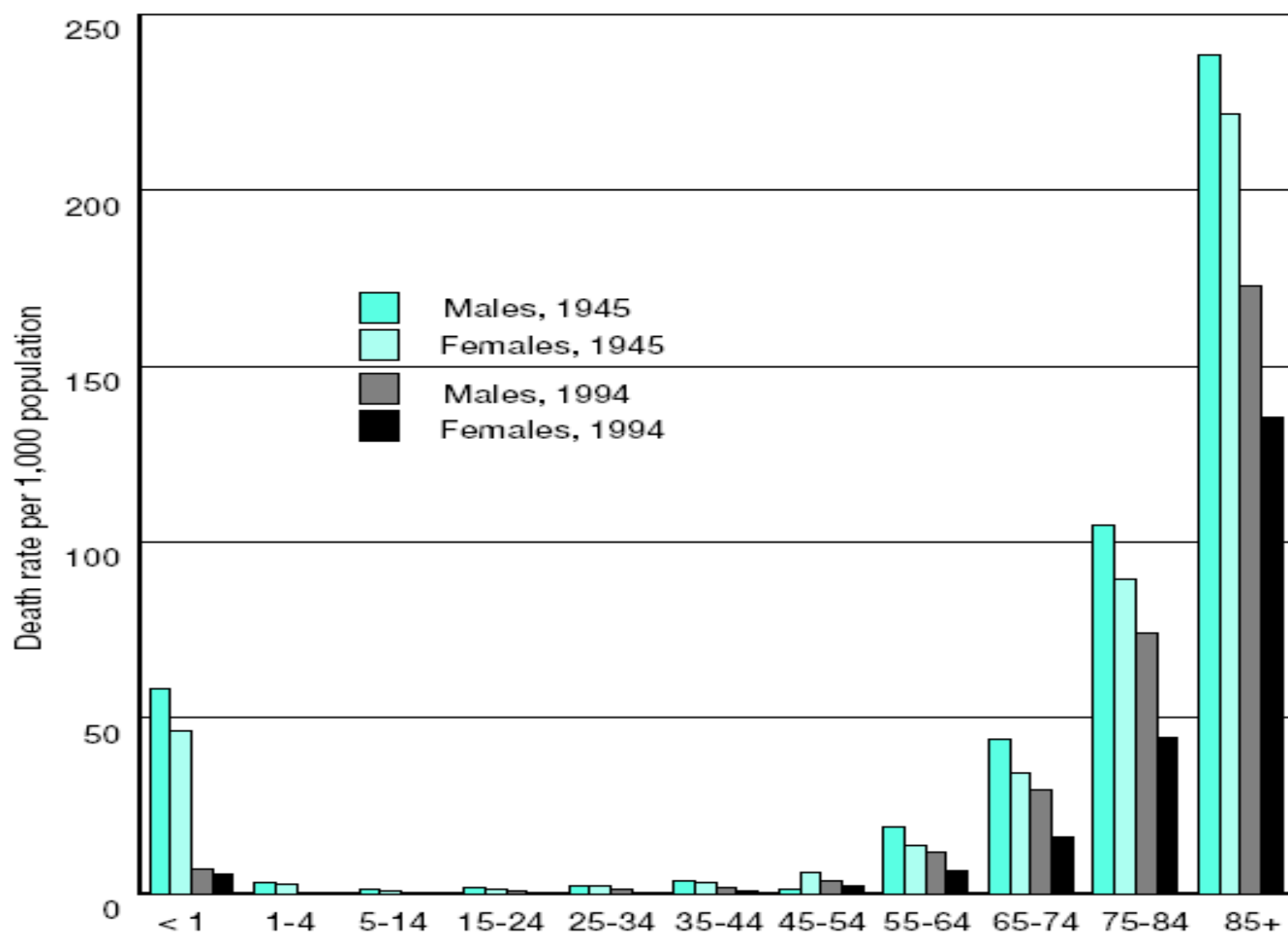
Infant Mortality Rate

- **The infant mortality rate is the number of deaths of infants under age 1 per 1,000 live births in a given year.**

- The infant mortality rate is considered a good indicator of the health status of a population.

There were 17 deaths of infants under age 1 per 1,000 live births in Venezuela in 1996.

- Number of deaths of infants under age 1 in a given year (10,016) / Total live births in that year (595,816) x K (1,000)= 16.8

In 1996, Sweden reported the world's lowest infant mortality rate, 3.5

- *per 1,000. A high national rate would be Malawi's, which was estimated at 140 per 1,000 in 1997.*

- *Latest figure about IMR in Jordan is 17/1000 live births (DHS /2012)*

Maternal Mortality Ratio

- The maternal mortality ratio is the number of women who die as a result of complications of pregnancy or childbearing in a given year per 100,000 live births in that year.

- Deaths due to complications of spontaneous or induced abortions are included.

- **a maternal death** is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Maternal Mortality Ratio

- This measure is sometimes referred to as the maternal mortality rate

- *There were 13 maternal deaths per 100,000 live births in Russia in 1994.*

- **Number of maternal deaths (185)x Total live births (1,408,159)x K (100,000)= 13.1**

- **In Jordan MMR 19.1 (**Maternal Mortality Study – Jordan 2007-2008- Higher Population Council, 2009)

Life Expectancy

- Life expectancy is an estimate of the *average* number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for the rest of his or her life.

- Life expectancy is a hypothetical measure because it is based on current death rates and actual death rates change over the course of a person's lifetime.

- Each person's life expectancy changes as he or she grows older and as mortality trends change.

Life Expectancy

- **If the age-specific death rates for 1996 remain unchanged, males in Brazil born in 1998 can expect to live 64.1 years on average; females can expect to live 70.6 years.**

- **Life expectancy for Jordanian 73 years.**

Population Composition
Age and Sex Composition

- Age and sex are the most basic characteristics of a population.

- Every population has a different age and sex composition— **the number and proportion of males and females in each age group—**

- This structure can have considerable impact on the population's social and economic situation, both present and future.

Population Composition
Age and Sex Composition

- Populations could be relatively young / developing countries, About 40 % less than 15 years e.g. Africa.. Jordan . Less than 4% are older groups.

- Relatively old populations (aging), developed countries, more than 10% over 65 years e.g. Europe/ Less than 25% of pop less than 15 years.

Age and Sex Composition

- Young and old populations have markedly different age compositions; as a consequence, they also have different proportions of the population in the labor force or in school, as well as different medical needs, consumer preferences, and even crime patterns.

Median Age

A population's age structure has a great deal to do with how that population lives.

- The **median age** is the age at which exactly half the population is older and half is younger.

- **Examples:**

  The median age of the Costa Rican population in
  1995 was 23 years.

   In 1995, the median age in Jordan, with a young population, was 18,

   While that in Sweden was 38, signifying an older population.
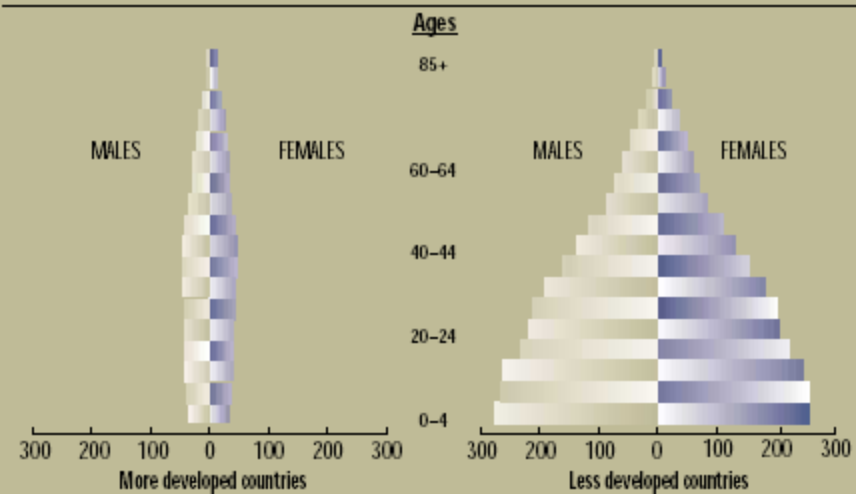 Median in Jordan 20,3 (2012)

Sex Ratio

- The sex ratio is **the ratio of males to females in a given population**,

- usually expressed as the number of males for every 100 females.

- The sex ratio at birth in most countries is about 105 or 106 males per 100 females.

- After birth, sex ratios vary because of different patterns of mortality and migration for males and females within the population.

Population Pyramid

- A population pyramid graphically displays a population's age and sex composition.

- Horizontal bars present the numbers or proportions of males and females in each age group.

- The sum of all the age-sex groups in the population pyramid equals 100 percent of the population.
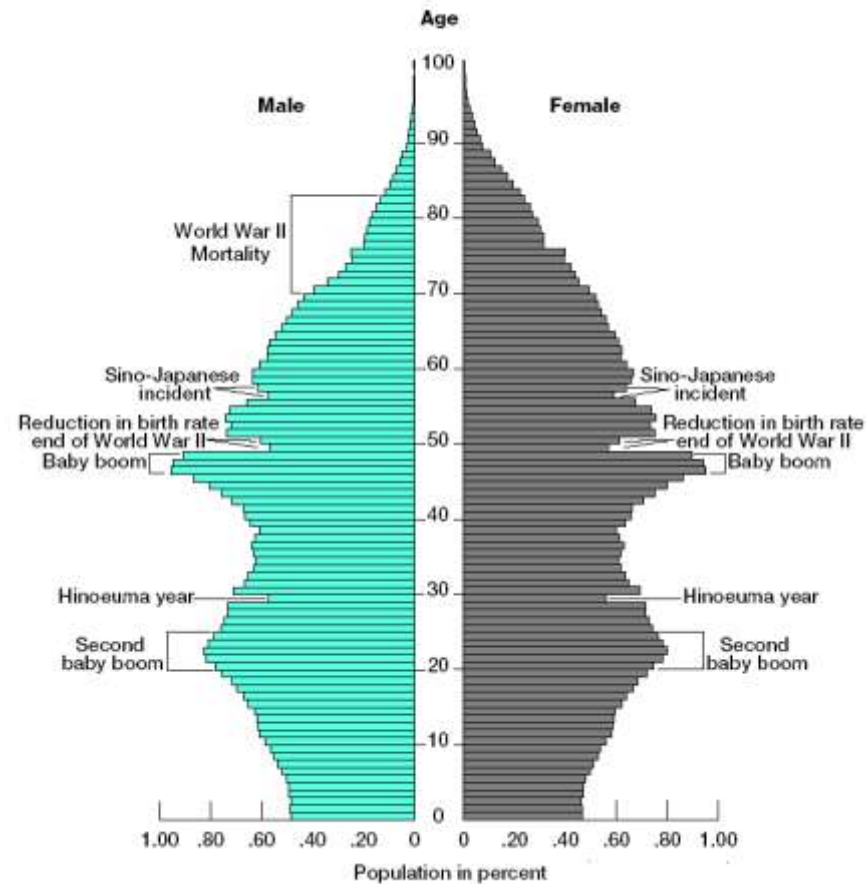
Age and sex distribution in more and less developed countries, 1998

in millions

Ages

MALES   FEMALES   85+   MALES   FEMALES

60–64

40–44

20–24

0–4

300 200 100 0 100 200 300   300 200 100 0 100 200 300

More developed countries   **Less developed countries**

Source: UN, *The Sex and Age Distribution of the World Populations: The 1998 Revision* (medium scenario).
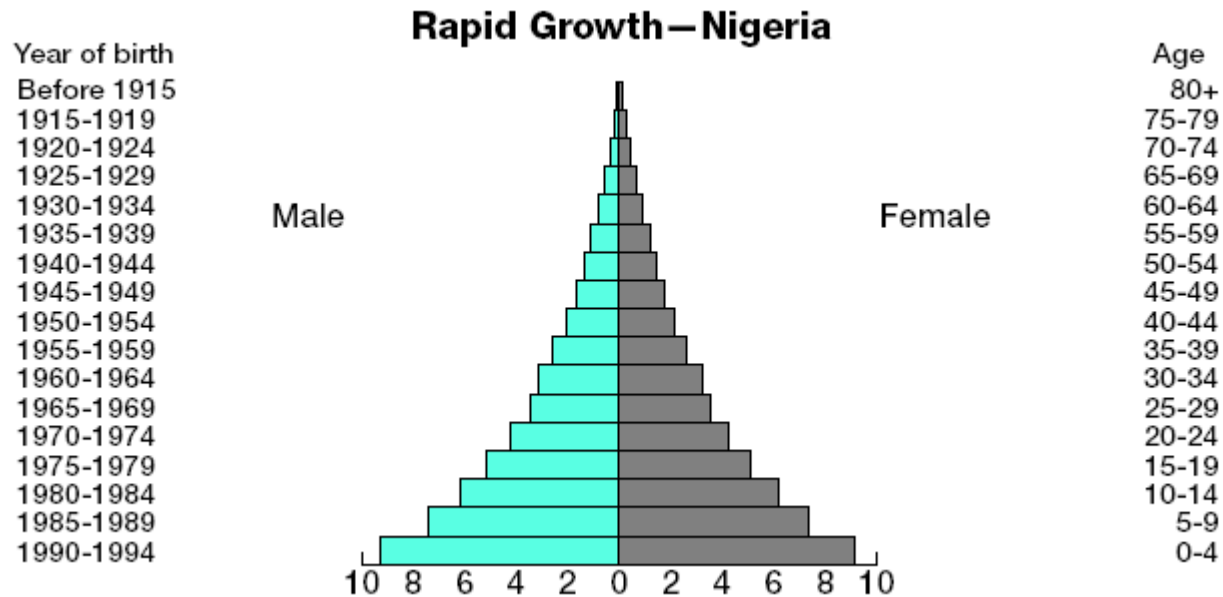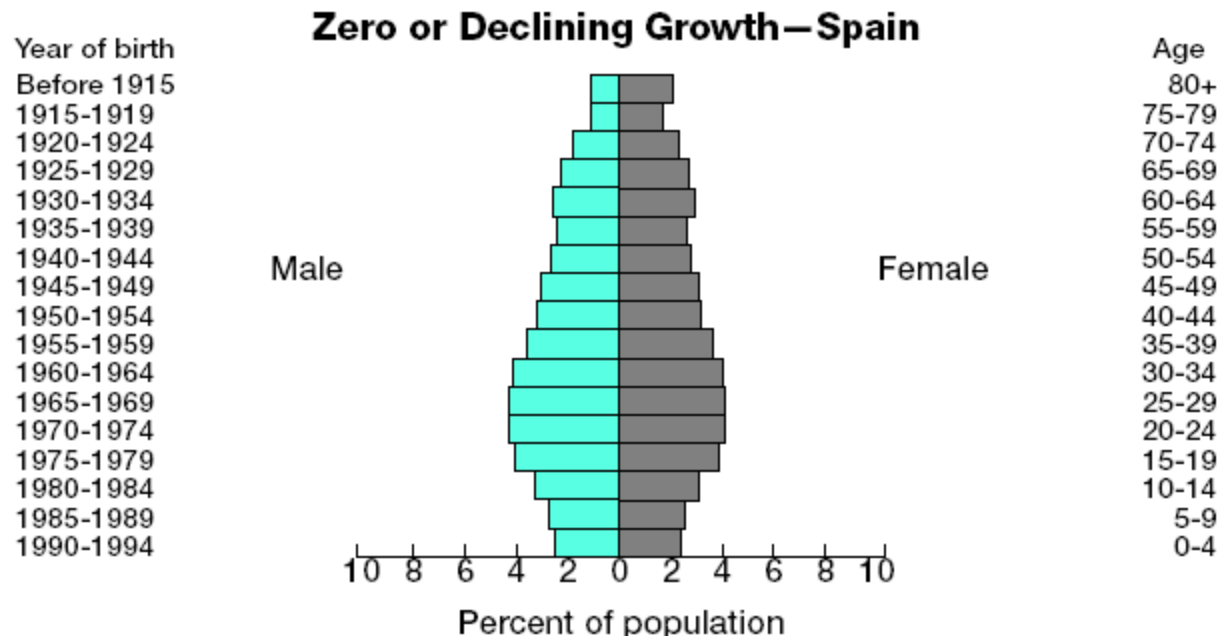
Japan's pop pyramid, 1995

Population profiles

- Populations of countries can differ markedly as a result of **past and current** patterns of **fertility, mortality, and migration.** However, they all tend to fall into three general profiles of age-sex composition.

1. **Rapid growth** is indicated by a pyramid with a large percentage of people in the younger ages.
2. **Slow growth** is reflected by a pyramid with a smaller proportion of the population in the younger ages.
3. **Zero growth or decreasing** populations are shown by roughly equal numbers of people in all age ranges, tapering off gradually at the older ages.
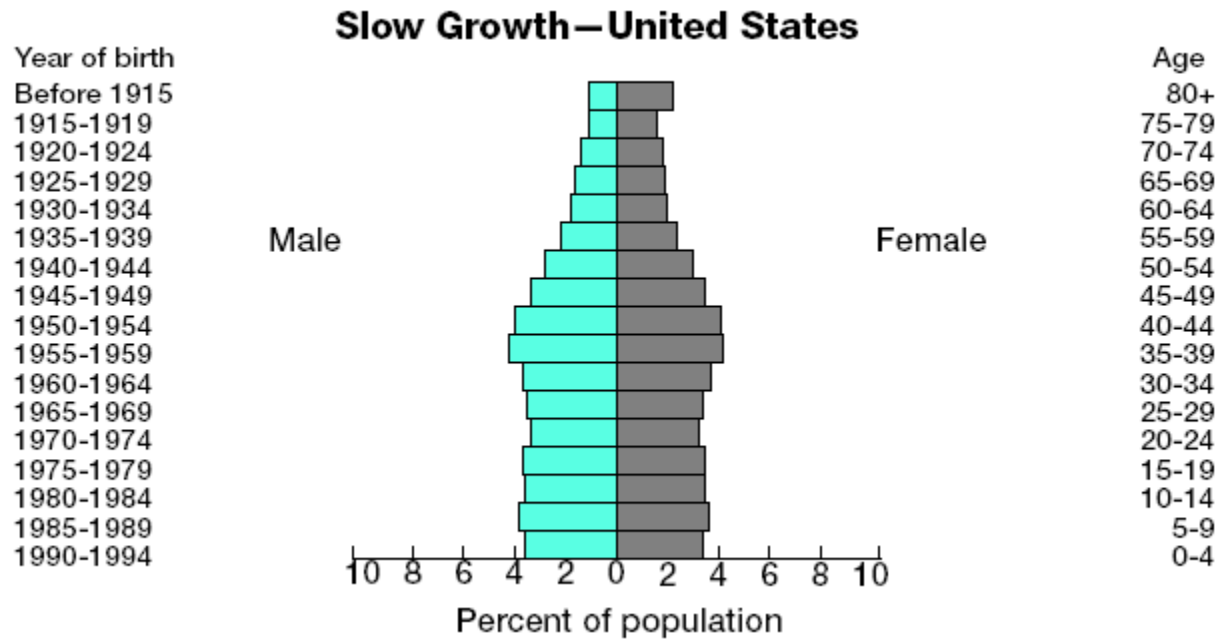
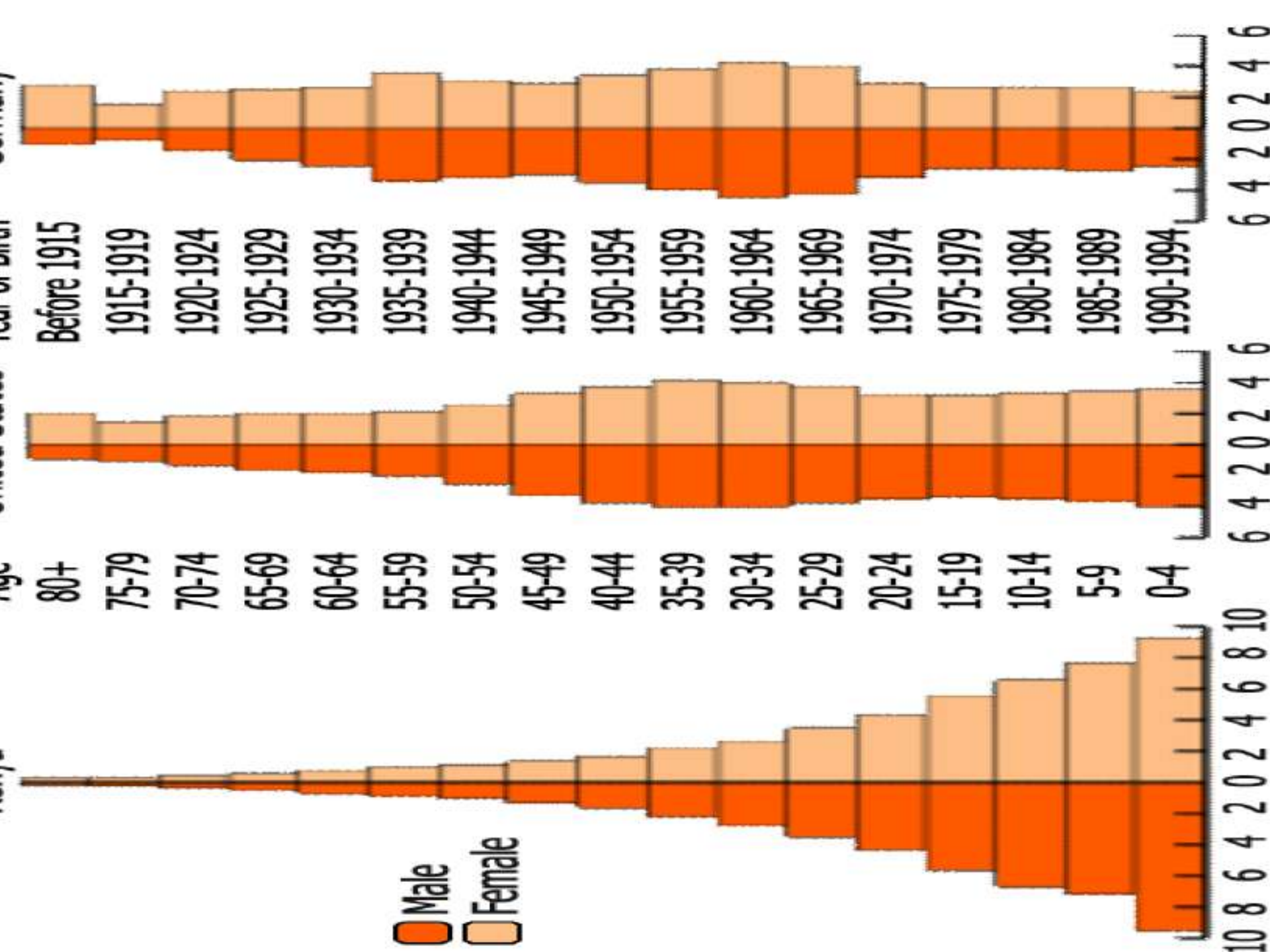# Age pattern of Nigeria population, 1995

Age pattern of Spain's population, 1995

Zero or Declining Growth—Spain

Year of birth		Age
Before 1915		80+
1915-1919		75-79
1920-1924		70-74
1925-1929		65-69
1930-1934		60-64
1935-1939		55-59
1940-1944	Male Female	50-54
1945-1949		45-49
1950-1954		40-44
1955-1959		35-39
1960-1964		30-34
1965-1969		25-29
1970-1974		20-24
1975-1979		15-19
1980-1984		10-14
1985-1989		5-9
1990-1994		0-4

10 8 6 4 2 0 2 4 6 8 10

Percent of population

Age pattern of US population, 1995

Population pyramids showing Year of Birth and Age distribution by Male and Female for three regions. X-axis labels show values 6 4 2 0 2 4 6 (left and middle panels) and 10 8 6 4 2 0 2 4 6 8 10 (bottom panel).

Year of Birth categories: Before 1915, 1915-1919, 1920-1924, 1925-1929, 1930-1934, 1935-1939, 1940-1944, 1945-1949, 1950-1954, 1955-1959, 1960-1964, 1965-1969, 1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994

Age categories: 80+, 75-79, 70-74, 65-69, 60-64, 55-59, 50-54, 45-49, 40-44, 35-39, 30-34, 25-29, 20-24, 15-19, 10-14, 5-9, 0-4

Legend: Male, Female

JPFHS 2007

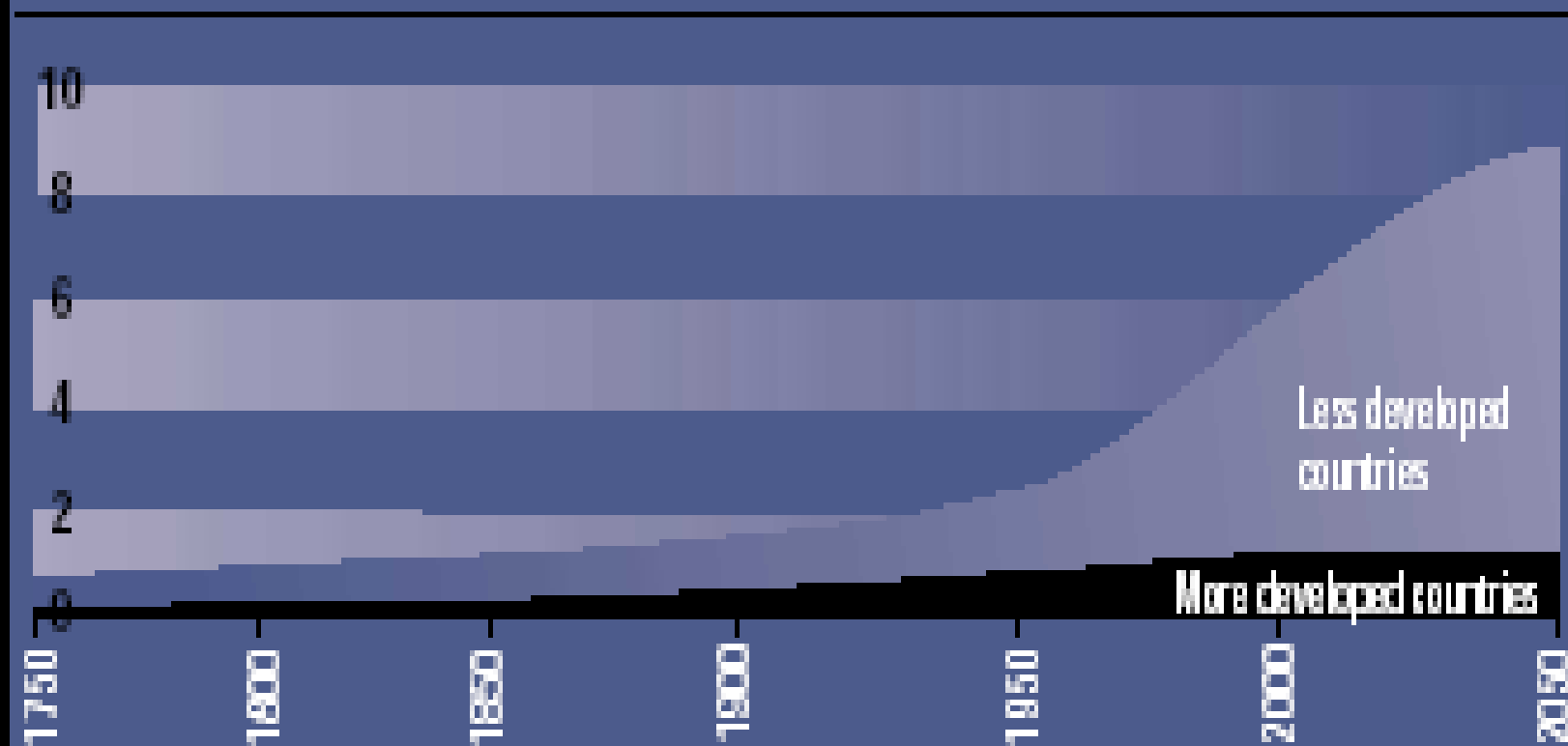

Figure 2.2 Population Pyramid
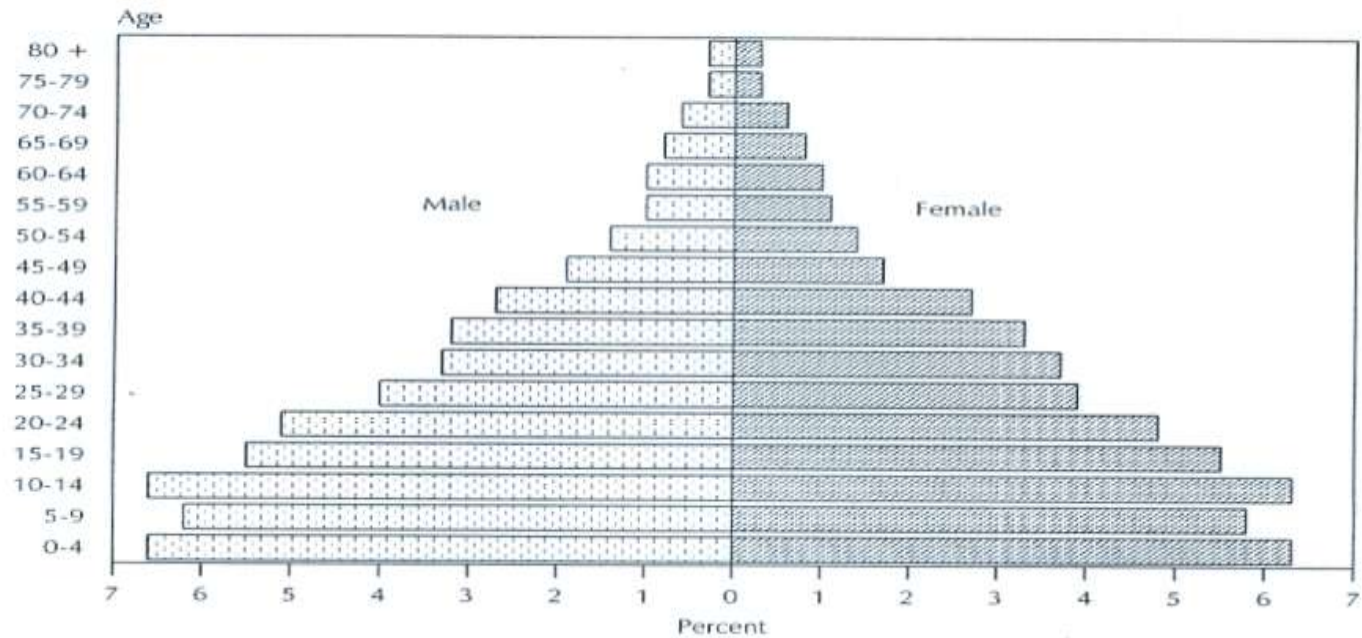
JPFHS 2007

Population change

- Population change has three components: births, deaths, and migration.

- As people are born, die, or move, their total numbers in an area change.

- During most of history, world population increased very slowly, but during the 20th century, this growth has accelerated.

Population growth in more developed and less developed countries, 1750 to 2050

Population, in billions

10

8

6

4

2

0

Less developed countries

More developed countries

1750 1800 1850 1900 1950 2000 2050

How do populations change?

- A change in **population size** over a given period of time equals **the number of people in the population at the beginning of the period** plus any **births that occur during the period**, minus any **deaths,** plus **net migration during the period.**

Calculating population change over time
P1+(B-D)+(I-E)= P2

Where P_2 is the population at the later date, P_1 is the population at the earlier date; B is births and D is deaths between the two dates; and I is immigration (or in-migration) and E is emigration (or out-migration) between the two dates.

Jan. 1996 population of Poland $+$ (1996 births $-$ 1996 deaths) $+$ (1996 immigration $-$ 1996 emigration) $=$ Jan. 1997 population of Poland

$38,609,400 + (428,200 - 385,500) + (8,200 - 21,000) = 38,639,300$

Rate of Natural Increase

- The rate of natural increase is the rate at which a population is increasing (or decreasing) in a given year due to a surplus (or deficit) of births over deaths, expressed as a percentage of the base population.

- Net migration is the number of immigrants minus emigrants.

Growth Rate

- The growth rate is the rate at which a population is increasing (or decreasing) in a given year due to natural increase and net migration, expressed as a percentage of the base population.
- The growth rate takes into account all components of population growth: births, deaths, and migration.
- **It equals (births – deaths)+_ net migration/ total population X K (100).**
- It should never be confused with the birth rate, but it sometimes is.

Population change

- The change in population size accounted for by more births in the population than deaths is referred to as "**natural increase.**"

- The term "**natural decrease**" refers to population decline resulting from more deaths than births.

Growth Rate

- *With an annual growth rate of 1.82 percent in 1996, the United Arab Emirates would require about 38 years to double its population.*

- *Uganda would take 24 years, at 2.9 percent.*
- *Belgium, at its present low annual growth rate of 0.5 percent, would take several centuries to double its population.*
- *Jordan :*
  » *Growth rate 2.2*
  » *Natural growth: 2.1 (2012)*

The Demographic Transition

- The demographic transition refers to the change that populations undergo from high rates of births and deaths to low rates of births and deaths.

- High levels of births and deaths kept most populations from growing rapidly throughout most of time.

The Demographic Transition

- The decline in mortality usually precedes the decline in fertility, resulting in population growth during the transition period.

Finland is a good example of a country that has passed through the four stages of the demographic transition.

Stage I
High birth rate, high death rate = little or no growth
Finland in 1785-1790)
Birth rate: 38 per 1,000
Death rate: 32 per 1,000
Rate of natural increase: 0.6 percent

Stage II
High birth rate, falling death rate = high growth
(Finland in 1825-1830)
Birth rate: 38 per 1,000
Death rate: 24 per 1,000
Rate of natural increase: 1.4 percent

Stage III
Declining birth rate, relatively low death rate = slowed growth
(Finland in 1910-1915)
Birth rate: 29 per 1,000
Death rate: 17 per 1,000
Rate of natural increase: 1.2 percent

Stage IV
Low birth rate, low death rate = very low population growth
(Finland in 1996)
Birth rate: 12 per 1,000
Death rate: 10 per 1,000
Rate of natural increase: 0.2 percent

There is a fifth stage to the demographic transition. When fertility

International Population Conferences

- 1974 Bucharest conference

- In 1984, 149 nations participated in the International Conference on Population, held in Mexico City.

- Representatives from over 180 countries and 1,200 nongovernmental agencies convened in Cairo, Egypt, for the United Nations International Conference on Population and Development (ICPD) in 1994.

Population policies

- National population commissions were formed in different countries
- They formulated national population policies and action plans
- One major component of the action plan deals with reproductive health
- Reproductive health in the context of population includes reproductive rights, sexuality, family planning, reproductive morbidity, violence against women, gender based differences, male involvement in reproductive health.