CBR-Crude Birth Rate-is the total number of live births in a year for every 1,000 people alive in the society. A CBR of 20 means that for every 1,000 people in a country, 20 babies are born over a 1 year period.

CDR—Crude Death Rate, is the to9tal number of deaths in a year for every 1,000 people alive in the society. CDR is expressed as the annual number of deaths per 1,000 people.

NIR--Natural increase rate is the percentage by which a population grows in a year. It is computed by subtracting CDR from CBR, after first converting the two measures from numbers per 1,000 to percentages (numbers per 100). Thus if the CBR is 20 and the CDR is 5 (both per 1,000) then the NIR is 15 per 1,000 or 1.5%. **Immigration not a factor**

The world NIR during the early 21st century has been 1.2, meaning that the population of the world had been growing each year by 1.2%.

The world NIR is lower today than its all-time peak of 2.2% in 1963, and it has declined sharply since the 1990's. However, the NIR during the second half of the 20th century was high by historical standards.

About 80 million people are being added to the population of the world annually. This is a decline from the historic high of 87 million in 1989. The number of people added each year has dropped much more slowly than the NIR because the population base is much higher now than in the past.

Doubling time—the number of years needed to double a population, assuming a constant rate of natural increase

At the early 21st century rate of 1.2% per year, world population would double in about 54 years.

Should the same NIR continue through the 21st century, global population in the year 2100 would reach 24 billion.

When the NIR was 2.2% back in 1963 doubling time was 35 years. Had that ratio continued into the 21st century Earth's population would be nearly 10 billion instead of the nearly 7 billion in 2010.

More than 95% of the NIR is clustered in LDC's. The NIR exceeds 2.0% in most countries of sub-Saharan Africa and the Middle East, whereas it is negative in Europe , meaning that in the absence of immigrants, population is actually declining.

About 1/3 of the world's population growth during the past decade has been in South Asia, ¼ in sub-Saharan Africa, and the remainder divided about equally among East Asia, Southeast Asia, Latin America and the Middle East.

Regional differences in NIR's mean that most of the world's additional people live in the countries that are least able to maintain them

<u>Fertility</u>

Total fertility rate—(TFR)—the average number of children a woman will have throughout her childbearing years, (roughly 15-49).

TFR used to predict future society where CBR provides picture n a given year.

TFR for the world today is 2.6, TFR exceeds 6.0 in sub –Saharan Africa, compared to less than 1.9% in most European countries.

<u>Mortality</u>

Infant mortality rate (IMR)—the annual number of death of infants under 1 year of age, compared with total live births. The IMR is usually expressed as the number of deaths among infants per 1,000 births.

**The IMR is highest in sub-Saharan Africa, whereas the lowest rates are in Europe, the IMR approaches 100 in sub-Saharan Africa, meaning that nearly 10% of all babies in the region die before reaching their first birthday!

Life expectancy—at birth measures the average number of years a newborn infant can expect to live at current mortality levels

<u>Development</u> –The process of improving the material conditions of people through diffusion of knowledge and technology

More developed country—(MDC)—also known as a relatively developed country or simply as a developed country,

Less developed country—(LDC) many analysts prefer the term developing country or emerging country,

<u>Stages of Demographic Transition Model</u>

<u>Stage I: Low Growth</u>

- CDR and CBR very high, NIR very low or zero
- Agricultural revolution starts changing population but still unpredictable
- Most of human history was spent in stage 1
- Every nation has moved out of stage 1

<u>Stage II: High Growth</u>

- Late 18th century and early 19th century
- CDR plummets while CBR remains roughly the same as stage 1
- NIR is very high and population grows rapidly
- Countries entered after 1750 as a result of the Industrial Revolution

- Medical revolution—late 20th century push of countries in Africa, Asia and Latin America due to medical technology invented in Europe and North America diffused to LDC's in Africa, Asia and Latin America

Stage III: Moderate Growth

- CBR drops sharply from stage II levels
- CDR also drops but at a much slower rate
- Population continues to grow, but NIR is lower in stage 3
- Most countries in Asia and Latin America have moved to stage 3, while most African countries remain in stage 2
- More people living in cities, infant mortality rate goes up

Stage IV: Low Growth

- CBR declines to the point where it equals the CDR and the NIR approaches zero
- Zero population growth (ZPG)=CBR is slightly higher than CDR because some females die before reaching childbearing years and the number of females in their childbearing years can vary. TFR is equal to 2.1, not counting immigration

Population Pyramid—a bar graph used to display a country's population by age and gender, males usually on the left, females on the right, age increments every 5 years.

Dependency ratio—the number of people who are too young or too old to work compared to the number of people in their productive years.

The larger the number of dependents, the greater the financial burden on those who are working to support those who cannot

Three groups for dependency ration

1. 0-14 years old (normally classified as dependents)
2. 15-64 years old
3. 65 and older (normally classified as dependents)

Nearly ½ of all people living in countries in stage 2 are dependents, consequently the dependency ratio is 1:1, whereas in stage 4 countries the ratio is 1:2 (one dependent for every two workers)

Young dependents outnumber elderly ones by 10:1 in stage 2 countries, but the numbers of young and elderly dependents are roughly equal in stage 4 countries.

- More than 40% of the people are under age 15 in sub-Saharan Africa, compared to 20% or less n Europe and North America

- Result=large percentage of children in sub-Saharan countries strains the ability of these relatively poor countries to provide needed services such as schools, hospitals and day care centers
- When children reach the age of leaving school, jobs must be found for them, but the government must continue to allocate scarce resources to meet the needs of the still growing number of young people.

As countries pass through the stages the percentage of elderly people increases, because of the lower percentage of young people produced by declining CBR's. For example people over 65 comprise 16% of the population in Europe compared to 3% in sub-Saharan Africa.

- The "graying" of the population places a burden on European and North American governments to meet the needs of an older population.
- More than ¼ of all government expenditures in the U.S., Canada, Japan and many European countries go to Social Security, health care and other programs for the older population.
- Result=because of the larger percentage of older people, countries in stages 3 and 4 have higher CDR's than do stage 2 countries.

Sex Ratio—the number of males per hundred females in the population

- Generally slightly more males than females are born, but males have higher death rates
- The ratio of men to women is about 93:100 (93 men for each 100 women in Europe, 97:100 in the North America)
- In LDC's the ratio is 103:100 (Why?)
- In the U.S. males under age 15 exceed females 105:100, woman start outnumbering men at about age 40, and they comprise 58% of the population over age 65

The four stage transition model is characterized by two big breaks with the past:

1. The sudden drop in the death rate that comes from technological innovation; this has been accomplished everywhere.
2. The sudden drop in the birth rate that comes from changing social customs; this has yet to be achieved in many countries.

Thomas Malthus—*An Essay on the Principle of Population:* the population was growing much more rapidly than Earth's food supply because population increased geometrically, whereas food supply increased arithmetically.

- Contemporary Neo-Malthusians-view remain influential today
   1. Matlhus failed to anticipate that relatively poor countries would have the most rapid population growth because of transfer of medical technology, but not wealth, from MDC's. As a result, the gap between population growth and resources is wider in some countries than even Malthus anticipated.

2. The world population growth is outstripping a wide variety of resources, not just food production. The belief is that wars and civil violence will increase in the coming years because of scarcities of food as well as clean air, arable farmland and fuel.

Malthus's Critics—(AKA the Hatfield of AP Geography)

- Earth supply of resources is not fixed but is expanding
- A steady flow of new technology can offset scarcity of minerals and arable land by using existing resources more efficiently and substituting new resources for scarce ones
- Larger population growth could actually stimulate economic growth and therefore, production of more food
- Population growth could generate more customers and more ideas for improving technology
- Poverty, hunger, and other social welfare problems associated with lack of economic development are a result of unjust social and economic institutions, not population growth!!

Declining Birth Rates

- The NIR can decline for only two reasons—lower birth rates or higher death rates. Few people wish to see the NIR decline because of an increase in death rates.
- The CBR has declined rapidly since 1990 from 27 to 21 in the world as a whole and from 31 to 23 in LDC's. Two strategies have been successful in reducing birth rates:
    1. Improve local economic conditions—a wealthier community has more money to spend on education and health care programs that would promote lower birth rates.
    2. The importance of rapidly diffusing modern contraceptive methods

World Health Threats—In some countries of sub-Saharan Africa, lower NIR's have also resulted from higher CDR's especially through the diffusion of AIDS

- Epidemiologic transition—focuses on distinctive causes of death in each stage of the demographic transition model
- The term epidemiologic transition comes from epidemiology, which is the branch of medical science concerned with the incidence, distribution, and control of diseases that are prevalent among a population at a special time and are produced by some special causes not generally present in the affected locality.

    Epidemiologic Transition: Stages 1 and 2

    1. Stage 1 has been called the stage of pestilence and famine
        a. Infectious and parasitic diseases were principal causes of human deaths, along with accidents and attacks by animals and other humans
        b. Black Plague(1347-1350)—wiped out ½ of Europe's population
    2. Stage 2 has been called the stage of receding pandemics
        a. Pandemic—is a disease that occurs over a wide geographic area and affects a very high proportion of the population.

b.
c. Improved sanitation, nutrition, and medicine during the Industrial Revolution reduced the spread of infectious diseases
d. Cholera example in the textbook
3. Stage 3 has been called the stage of degenerative and human created diseases, it is characterized by a decrease in deaths from infectious diseases and an increase in chronic disorders associated with aging.
    a. Two especially important chronic disorders in stage 3 are cardiovascular diseases, such as heart attacks and various forms of cancer.
    b. Example decline in polio cases in the US, 14,000 in 1954 to 167 in 1965 to 0 in the entire Western Hemisphere during the 1990's
4. Stage 4 has been called the stage of delayed degenerative diseases
    a. The major causes of death, cardiovascular diseases and cancers linger, but the life expectancy of older people is extended through medical advances.
5. Stage 5??? Has been called the reemergence of infectious and parasitic diseases
    a. Three reasons help to explain the possible emergence: 1. Evolution of infectious diseases, 2. Poverty, 3. Improved travel.

AIDS—(acquired immunodeficiency syndrome)—25 million people died of AIDS as of 2007 and 33 million were living with HIV.

- 90% of people living with HIV come from LDC's
- 22 million people infected with HIV in sub-Saharan Arica in 2007, 5 million in Asia, 2 million each in Eastern Europe and Latin America and 1 million each in North America and Western Europe.