Lesson #7 & Lesson #8
Population Attributes

Limits to Growth
- Biotic Potential
- Limiting Factors

Biotic potential
- Number of offspring (live births, eggs, laid, seeds, or spores in plants) that species may produce under ideal conditions.
The intrinsic rate of increase
- Rate at which population would grow if it had unlimited resources (never the case).
- Species can have a high rate or a low rate.

Environmental Resistance
- All factors (biotic & abiotic) that limit the growth of population.

Carrying capacity
- Maximum population of a species that a given habitat will support.
Population Growth Curves

**S – curve**
(logistic curve)

• Natural mechanisms come into play and cause the population to level off and continue in equilibrium.

**J-curve**
(exponential growth)

• Caused by the absence of natural enemies & abundance of food.
Human Population

What is the world’s current population?
• a. 5.87 billion
• b. 6.5 billion
• c. 7.0 billion
• d. 6.9 billion

Answer: ?

What about the USA?
• a. 400,200,000
• b. 298,500,000
• c. 350,000,500
• d. 200,500,000

Answer: ?

What is the current world growth rate?

- a. < 1 percent
- b. 1.2 percent – 1.3 percent
- c. 4 percent – 5 percent

Answer: ?

Fastest Growing Countries

- India (adds 20 million annually)
- China
- Pakistan
- Nigeria
- Bangladesh
- Indonesia

What do we mean by growth rate?

Basic idea:
- Population change = (births + immigration) – (deaths + emigration)
Crude Birth Rate
- The number of live births per 1000 people in a population in a given year.
- Crude = basically saying that this number takes into account the entire population (old, young, male, female)

Crude Death Rate
- The number of deaths per 1000 people in a population in a given year.

Infant Mortality Rate
- The number of babies out of every 1000 born that die before their first birthday.
- Developing countries have greatly improved but still 22,000 infants die per day.

<table>
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<th>Region</th>
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<td>Africa</td>
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Natural Growth Rate

- Annual rate of increase
- Rate of natural increase
- NGR = birth rate – death rate \times \frac{100}{1000} \\
  - NGR = \frac{birth rate – death rate \times 100}{10}

Growth Rate

- Includes net migration (immigration – emigration)
- GR = BR – DR + net migration \times \frac{100}{1000} \\
  - GR = \frac{BR – DR + net migration}{10} \\
  - \text{http://www.census.gov/ipc/www/idbprint.html}

What is ZPG?

- Zero population growth = stable population
- ZPG = births – deaths + migration = 0

- Do you feel that this can be achieved world wide?
Replacement Level Fertility

• The number of children a couple must bear to replace themselves.

Total Fertility Rate (TFR)

• Estimate of the average number of children a woman will have in her lifetime. (between the ages of 15 – 44 years old)

Factors that affect birth rates and fertility rates

These factors are for both developed and developing countries.
Factors affecting Birth Rates & Fertility Rates

- Importance of children in the labor force.
- Urbanization – people living in cities have access to family planning.
- Cost of raising & education children.
- Educational & employment opportunities for women.
- Infant mortality rate (lower = less births)

Factors affecting Birth Rates & Fertility Rates

- Average age of marriage.
- Availability of pensions – eliminates need for children to support parents.
- Availability of birth control.
- Religious and/or cultural beliefs.
- Laws (i.e. China)

Population Age Structures

- Bar graph showing the number or proportion of people (males & females) at each age for a given population.
Population Profiles

- http://www.census.gov/ipc/www/idbpyr.html

Demographic Transition

- Definition: As countries become industrialized, first their death rates and then their birth rates decline.

Social Modernization

- Ways to help developing countries to lower their population growth rate.
  - 1. Education
  - 2. Family Planning
  - 3. Improving Health
  - 4. Employment Opportunities
  - 5. Improve Resource Management
Modern Family Planning Movement
One major example

China’s Family Planning Program

China
- 1970 – Gov’t made efforts to bring pop. growth under control. Birth rate = 5.7
- By 2000 – birth rate = 1.8
- Married couples have access to free sterilization, contraceptives, and abortion.
- Paramedics ensure access even to rural areas.

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Benefits of one child

- Extra food
- Larger pensions
- Better housing
- Free medical care
- Salary bonuses
- Free school tuition for that child
- Preferential treatment in employment

China

- If a couple has more than one in urban areas they lose all benefits. Two are allowed in rural areas.
- 81% of married women in China are using modern contraceptives.

Food Production & Population
Causes of Hunger
• Uneven distribution
• Poverty

Ways to increase food production
• Aquaculture
  – Farm raised fish & shellfish
• Green Revolution
• Gene Revolution
  – Genetically modified foods