

- 1 **The Human Population: Growth, Demography, and Carrying Capacity**
Chapter 12
- 2 **Natural Rate of Increase**
- 3 **Factors Affecting Human Population Size**
 - **Population change equation**
 - **Population change = (births + immigration) – (deaths + emigration)**
 - **Zero population growth (ZPG)**
 - **Crude birth rate (BR)**
 - **Crude death rate (DR)**
- 4 **Demographers**
 - **Document current population size**
 - **Model population growth**
 - **Crude birth rate: number of live births per 1K people in population in specified year**
 - **Crude death rate: number of deaths per 1K people in population in specified year**
- 5 **Birth/Death Rates for Population Groups**
- 6 **Birth/death rates for some countries**
- 7 **Exponential population growth**
 - **Is still occurring; the rate has slowed**
 - **The base is larger-nearly doubled in the last 40 years**
 - **Natural increase is down to 1.28% (was 2.2%)**
- 8 **Average Annual Increase in the World's population**
- 9 **10 most populous countries**
- 10 **Fertility Rates**
 - **Replacement level fertility**
 - **Total fertility rate (TFR)**
- 11 **Fertility Rates**
 - **Replacement level fertility: the number of children that a couple must bear to replace themselves; currently 2.1 (2.5) due to deaths of females before maturity**
 - **Total fertility rate: estimate of the average number of children a woman will have during her childbearing years currently 2.8 (3.1)**
- 12 **Population projections by region**

- 13 **Decline in TFR**
- 14 **Factors Affecting BR & TFR**
- US BRs and TFRs
- 15 **UN World Population Projection**
- 16 **TFR for US**
- 17 **Birth rates in US**
- 18 **Increase in US population**
- 1.7 million more births than deaths (60% growth)
 - ~1M immigrants and refugees
 - 300K illegal immigrants
 - (ecological footprint!!!!!!)
- 19 **Demographic transition**
- Shift from high birth rates to low birth rates during industrialization
 - Education and working outside the home are 2 of most effective ways to reduce birth rate (reduce family size)
 - Preindustrial stage, transitional stage, industrial stage, postindustrial stage
- 20 **postindustrial stage**
- Birth rate further declines
 - Zero population growth
- 21 **industrial stage**
- Birth rate drops and approaches the death rate as modernization becomes widespread
 - Population growth continues more slowly
- 22 **Preindustrial stage**
- Little population growth due to harsh living conditions
 - High birth rate and high death rate
- 23 **Transitional stage**
- Food production rises
 - Health care improves
 - Death rates drop
 - Birth rates remain high
 - Population grows rapidly

- 24 **Developing countries backtracking with demographic transition**
- **Rapid population growth will outstrip economic growth and swamp local life-support systems**
 - **Revert to stage one of the demographic transition**
 - **Don't have enough skilled workers to produce high tech products for market**
 - **Lack the capital and resources needed for economic development**
 - **Don't have enough economic assistance from developed countries**
- 25 **Factors affecting Birth Rates and Fertility Rates**
- **Importance of children as part of the labor force**
 - **Urbanization**
 - **Cost of raising and educating children**
 - **Educational and employment opportunities for women**
 - **Infant mortality rate**
 - **Average age at marriage (birth 1st child)**
 - **Availability of private and public pension systems**
 - **Availability of legal abortions**
 - **Availability of reliable birth control methods**
 - **Religious beliefs, traditions, and cultural norms**
- 26 **Factors Affecting DR**
- **Life expectancy**
 - **Infant mortality rate (IMR)**
- 27 **Factors Affecting Death Rate**
- **Increased food supplies and distribution**
 - **Better nutrition**
 - **Improvements in medical and public health technology**
 - **Improved sanitation and personal hygiene**
 - **Safer water supplies**
- 28 **Health Indicators**
- **Life expectancy**
 - **Increased from 48 to 67 yrs (76 in dev and 65 in undev) in Africa, <55 yrs**
 - **Infant mortality rate (indicates quality of life) under nutrition, poor nutrition, >infectious disease**
- 29 **Developed Countries**
- **Infant mortality dropped from 20 to 7/1K live births**
- 30 **Developing Countries**
- **Infant mortality dropped from 118 to 60/1K live births**
- 31 **Age Structure Diagrams**
- **Proportion of the population of each sex at each age level**
 - **Plot percentages or population numbers in 3 age categories:**

prereproductive (0-14~), reproductive (14~44), and postreproductive

- 32 **US has highest rate of infant mortality among developed countries**
- Inadequate health care for poor women during pregnancy and for their babies
 - Drug addiction among pregnant women
 - The highest birth rate among teenagers (low birth rates, inadequate prenatal and postnatal care, unprepared for parental responsibilities- inadequate education as parent)
- 33 **Age Structure pyramids**
- 34 **Age Structure pyramids**
- 35 **Developed Countries**
- 36 **Developing Countries**
- 37 **In 2002 30% of world's population was <15yr old**
- 1.9 billion are entering their reproductive years
 - This will continue global population growth
 - Possibly stemmed by effective program to reduce birth rate
 - OR sharp rise in death rates????
- 38 **Comparison of demographic indicators**
- 39 **Age structure pyramids can be used for economic projections**
- Baby boomers pass the laws that could alter taxes for a smaller tax base, demand for goods based on their needs, delay retirement (also forced by baby bust generation, but preventing baby bust gen from getting jobs)
 - Echo boom (gen Y or millennials) will be the largest generation ever and will take over that position now occupied by the baby boom generation
- 40 **Sharp population decline**
- Result in greatest proportion of the population elderly consuming the costliest services (medical care, SocSec)
 - Labor shortages
- 41 **Tracking baby boom generation**
- 42 **Age Structure w elderly baby boom**
- 43 **# Workers supporting ea beneficiary of Soc Sec 1945-2075**
- 44 **Population decline from increased death rates**
- Starvation, malnutrition, epidemics (AIDS, tuberculosis, ...)

- **Drop in life expectancy**
- **Loss of productive workers and trained personnel**
- **Rise in orphans**
- **Drop in food production**

45

46 **Restoration of economic progress**

- **Debt relief**
- **Incentives to encourage investment**
- **Financial assistance for education and health care**
- **Providing teachers, health-care workers, and social workers for support of population**

47 **Effect of migration**

- **Immigration: movement into an area**
- **Emmigration: movement out of an area**
- **Few countries allow large annual increases in population from immigration**
- **International migration from developing to developed is tiny 1%**
- **Migration from rural to urban areas alters population dynamics and flow of resources**

48 **Legal Immigration to US**

49 **Immigration to the US**

- **In 2000, about 1 million immigrants gained asylum in US (850K legal)**
- **They live in CA, IL, FL, NY, NJ, and TX (90%)**
- **Tax burden for states**
- **Overall pay more taxes than consume in services and work cheap, so lower prices**
- **1820-1860 immigrants from Europe**
- **Now from Latin America and Asia**
- **US becoming magnet for poor? Reduce immigration? Or, allow immigration-occupy jobs and create jobs no one else will take?**

50 **Global Aging**

51 **Can the world provide an adequate standard of living for 3.1 billion people MORE without causing widespread environmental damage?**

- **What is optimum sustainable population?**

52 **Optimist's View**

- **The earth is not over populated.**
- **Average life span is increasing**
- **The world can support billions of people**

- **People are the world's most valuable resource because they can problem solve**
- **People are consumers and as such will fuel the economy**

53 **Pessimist's View**

- **The quality of life for too many is poor-there is too much poverty and disease**
- **If we don't lower birth rate, we are raising death rate by default**
- **We are consuming nonrenewable resources unsustainably**
- **Environmental degradation will result in less resources to support the population**
- **Economies will falter w reduced labor forces and less consumption due to poverty and lack of resources**

54 **Carrying Capacity**

- $\frac{dN}{dT} = rN$ and $\frac{dN}{dT} = rN\left(\frac{K-n}{K}\right)$

55 **Limits to growth**

56 **Resource Consumption/Production**

57 **Reducing world population**

- **Family planning: birth spacing, birth control, prenatal health care and pediatric health care**

58 **Family planning**

- **Increase the number of married women using modern contraceptives**
- **Responsible for reducing TFR in developing countries**
- **Reduces number of legal/illegal abortions**
- **Decreases death rate from child birth**
- **In many countries there is insufficient access to family planning services**
- **Teens and unmarried women do not usually have access**
- **Men have to become responsible for raising their children**

59 **Estimated global use of contraceptives**

60 **Typical workday for rural African woman**

- **Most are poor; most are uneducated**
- **Don't have legal rights; can't own property**
- **Educated women usually have less children**
- **That would require social change**

61 **Comparison of demographic data for India and China**

62 **Lesson from India and China**

- **Curb population growth before there is mass starvation**
- **Even if there is adequate food supplies, there will still be starvation and malnutrition due to poverty**

- **Large populations result in environmental degradation**