# DEMOGRAPHICS & DISEASE

ANTH 306/Medical Anthropology

Demographics & disease

- **In the past 10,000 years human *cultural evolution* has demonstrated 3 features:**

  1. Increase in *sociocultural complexity*.

  2. Increase in *energy flow*.

  3. Increase in *population size & density*.

- Each has made significant impacts upon health & disease.

Demographics & disease

- Demography
  - Study of population.
- Examines patterns of
  - **Birth**
  - **Death**
  - **Migration**
- *Demographic anthropology* usually concentrates more on small scale communities as well as examining population in longer time frame: prehistory & history.
- Health status, causes of illness, patterns of fertility and mortality.
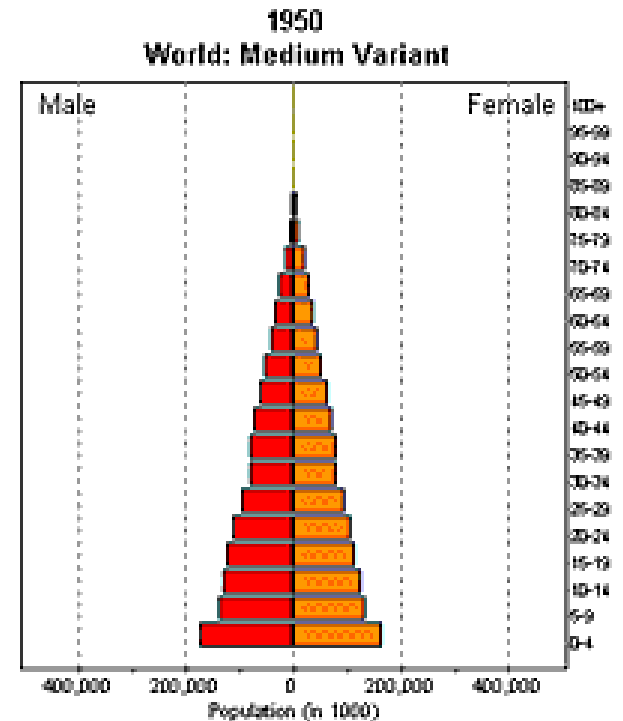
A population pyramid shows the distribution of a population by age and sex.

Anthropological demography*

- Uses anthropological theory & methods to provide better understanding of demographic phenomena in current & past populations.
- Combines *complementary elements* of demography & anthropology.
  - demography more statistically oriented & mainly concerned with dynamic forces defining population size & structure & their variation across time & space.
  - socio-cultural anthropology more interpretative & focuses on social organization shaping production & reproduction of human populations.
- Main theoretical concepts:
  - *Culture*
  - *Gender*
  - *Political economy.*
- Empirical research approach includes mix of *quantitative & qualitative* methodologies applied to *case studies*.
- *Ethnographic fieldwork and participant observation* are central as is an interpretative reading of secondary data & historical material.

Demographics & disease
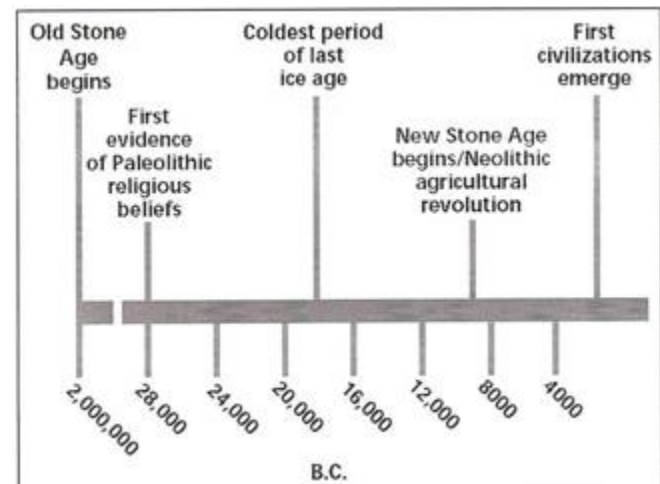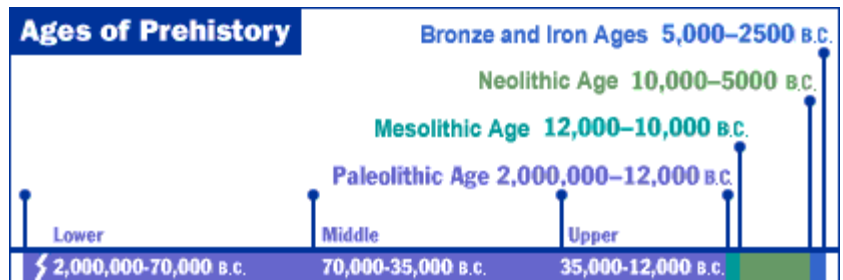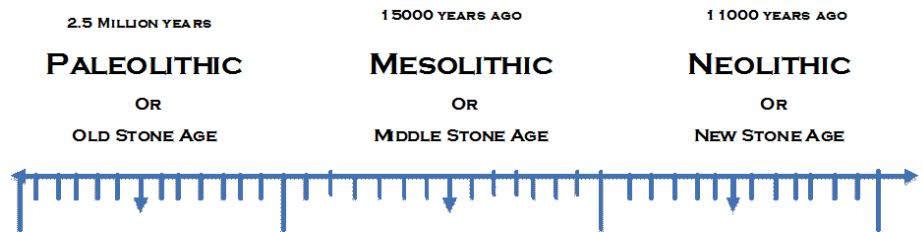
- **Common formulae/statisics:**
  - **Natality:** # births per 1000 population. per year.
  - **Mortality:** # deaths per 1000 population per year.
  - **Infant mortality rate:** # deaths (<1 yr) per 1000 population per year.
  - **Total fertility rate:** # children born on average to women in their reproductive years.
  - **Life expectancy** is *supposedly* indicative of quality of life.
    - Can mask considerable disparity in variation based upon factors such as gender, geography, socioeconomic class, etc.

Paleolithic – Old stone age

- Hunting & gathering or foraging
- What humans did for a long time.
- Primary sources of mortality probably included:
  - Infectious diseases
  - Accidents
  - Homicide.

TIME LINE OF STONE AGE

2.5 MILLION YEARS	15000 YEARS AGO	11000 YEARS AGO
PALEOLITHIC	**MESOLITHIC**	**NEOLITHIC**
OR	OR	OR
OLD STONE AGE	MIDDLE STONE AGE	NEW STONE AGE

Ages of Prehistory

Bronze and Iron Ages 5,000–2500 B.C.

Neolithic Age 10,000–5000 B.C.

Mesolithic Age 12,000–10,000 B.C.

Paleolithic Age 2,000,000–12,000 B.C.

Lower	Middle	Upper
2,000,000-70,000 B.C.	70,000-35,000 B.C.	35,000-12,000 B.C.

Old Stone Age begins

First evidence of Paleolithic religious beliefs

Coldest period of last ice age

New Stone Age begins/Neolithic agricultural revolution

First civilizations emerge

2,000,000 28,000 24,000 20,000 16,000 12,000 8000 4000

B.C.

Paleolithic – Old Stone Age

- Low pop growth rates of .04% per year.
- Limited fertility span for most women: 10-15 years.
- Children were an economic burden.
- Low fertility rates maintained by cultural practices:
  - Post partum sexual taboos.
  - Prolonged breastfeeding of children.
 - Infanticide

Neolithic – New Stone Age

- Began +/- 10,000 years ago.
- Different centers
  - Near East
  - India
  - China
  - West Africa
  - Oceania
  - Mesoamerica
  - Peru.
- Domestication of plants & animals.
- Shift from food collection to food production.
- Nomadic to sedentary settlement patterns.

Centers of origin of food production.
Recreated from Jared Diamond
Guns, Germs, and Steel (1997)
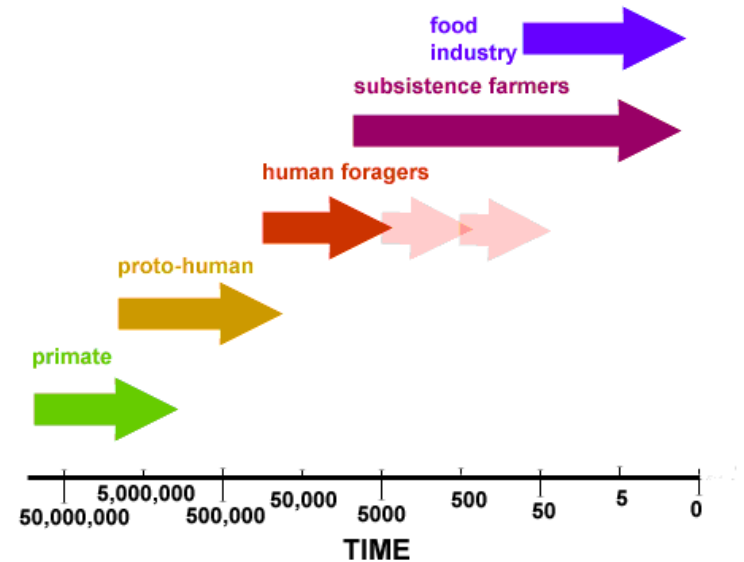
Neolithic – New Stone Age

- *Sedentary settlement* led to increasing *concentration of population*.

- Closer *proximity to domesticated animals* and uninvited pests (rats, roaches, mosquitoes).

- *Sanitation* – how to dispose of waste products?

- *Epidemics* – mobility no longer a viable option.

- *Dietary shift*
  - less overall dietary diversity
  - more starch & less protein.
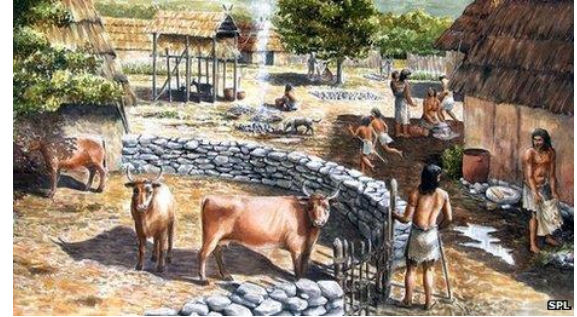
Paleopathology

- Study of disease in prehistoric populations.

- *Bioarchaeology*
  - links study of environment & material culture with evidence from associated skeletal remains.

- Gives time depth to study of ecology & health.
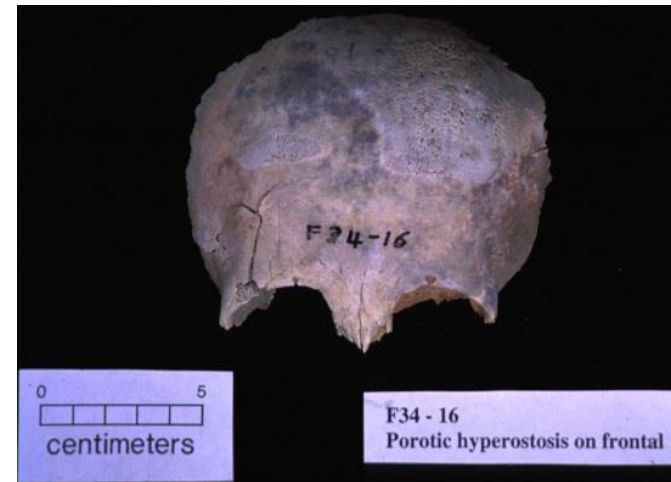
Porotic hypertosis cranial bones and are indicative of iron deficiency anemia.

Harris lines show up in long bones and are indicative of arrested growth and recovery.

Enamel hypoplasias thinning of tooth enamel indicative of growth disruption due to inadequate nutrition or infectious disease.

Why was transition to farming & sedentary life so bad for health?

1. **Reliance on starchy crops**

    - Hunter-gatherers enjoyed a varied diet.

    - Early farmers obtained most food from 1 or 2 starchy crops
        - Maize/corn in New World.
        - Wheat or rice in Old World.

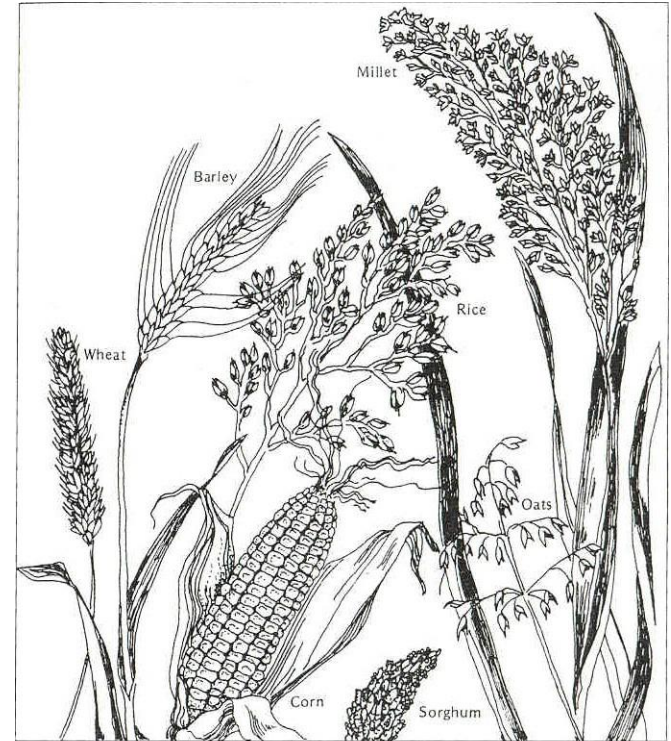   - More calories came but at price – fewer proteins, vitamins, & minerals.

Figure 5.4 Major cereal grains.

Why was transition to farming & sedentary life so bad for health?

2. **Reliance on small number of crops**

- Dependence on limited # of major crops meant serious risk of starvation if 1 or more failed for whatever reason.

3. **Increasing density of settlement**

- With transition to farming, people became sedentary.

- Eventually led to larger, denser settlements than before – towns & cities – along with major sanitation problems.

- Spread of infectious & parasitic diseases was a consequence.

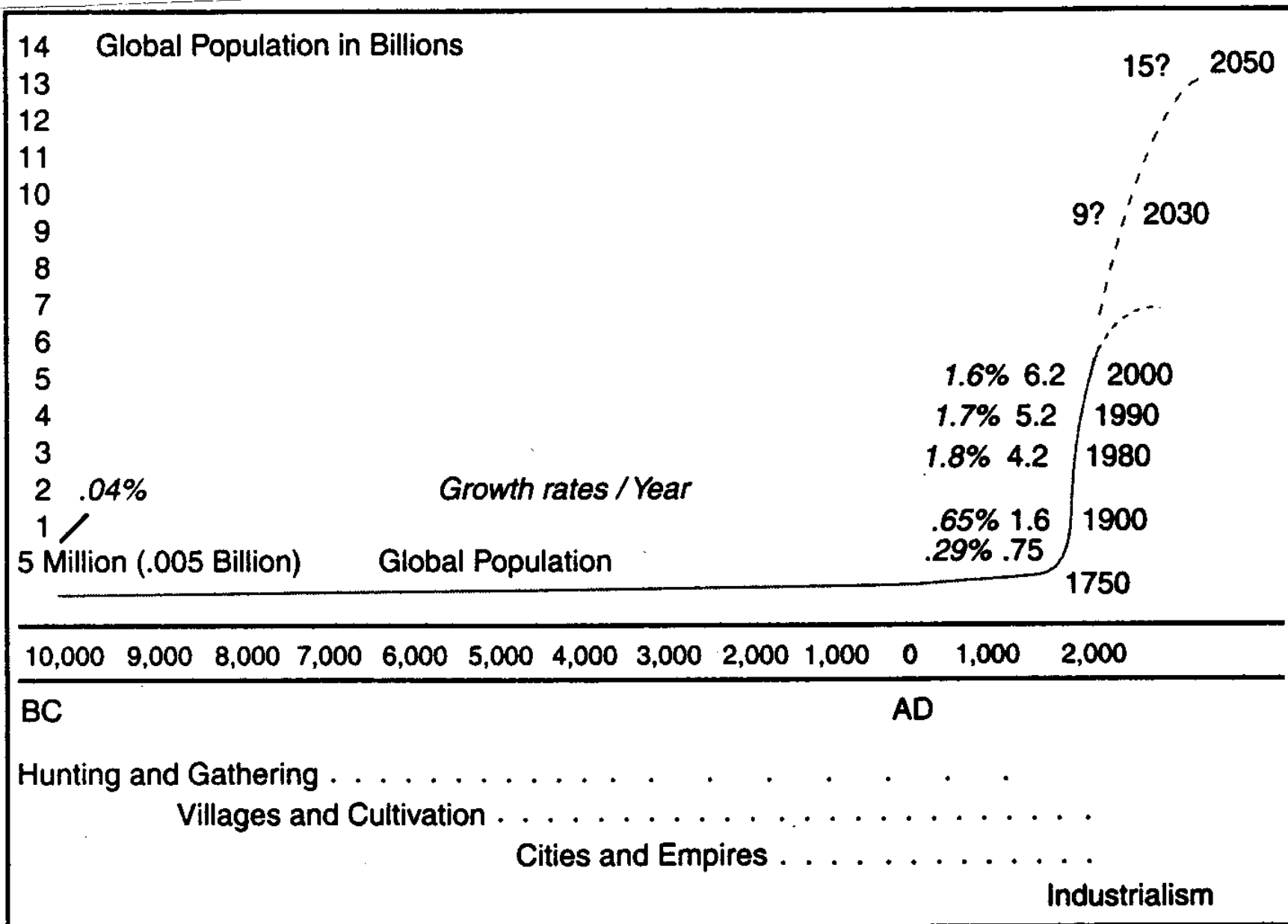- Disease epidemics much less likely among nomadic hunter-gatherers.

Figure 4.1 Global population in long-term historical and evolutionary perspective.

Preindustrial cities

- More people brought into face-to-face contact and created 2 problems:
  - Supplying growing numbers of people with food & water.
  - Removal of wastes.
- Example: Teotihuacan (150BC-750 AD)
  - High infant mortality rates (41% of skeletons).
  - Low life expectancy @ birth (20 yrs)
  - Pop. could only maintained by migration from rural areas.
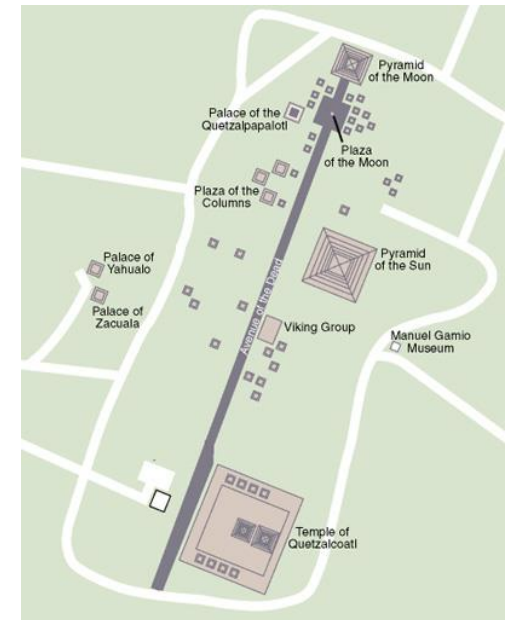
Early Industrial Cities

- Pop. of Europe doubled between 1750 & 1850.

- Infectious diseases still major cause of death:
  - Smallpox
  - Plague
  - TB
  - Typhus

- Child health declined
  - Poor nutrition
  - Shorter stature than rural pops.
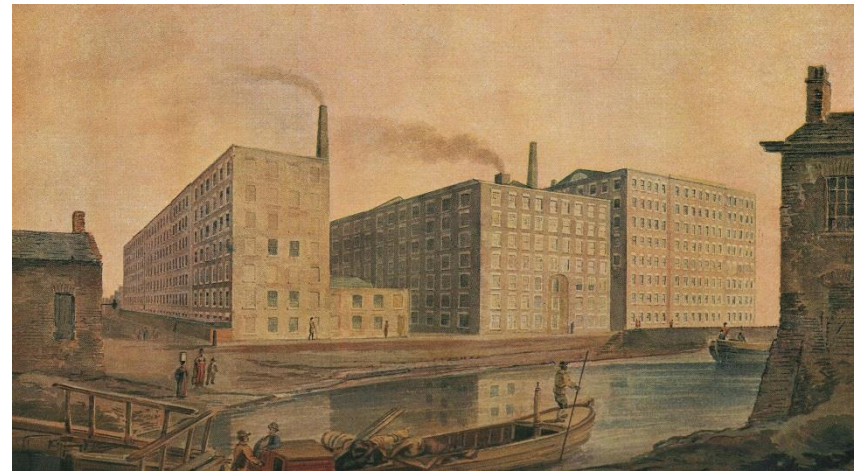
Demographic transition model

- European mortality patterns begin to change mid 19th century.

- Sharp drop in death from infectious diseases.

- Rapid pop growth followed as birth rates exceeded death rates.

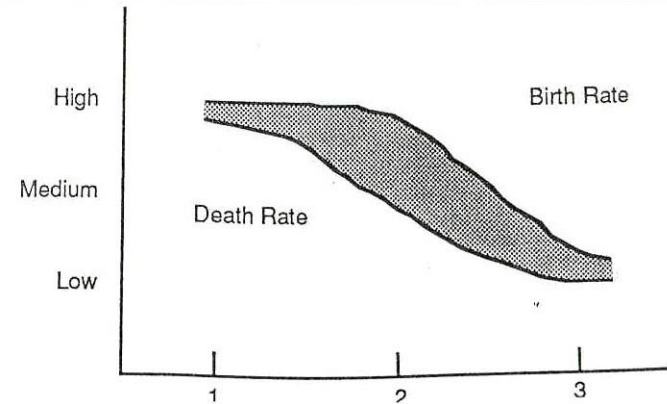- After period of time birth rates also dropped.

FIGURE 4.10   In this hypothetical population undergoing demographic transition, at Time 1 both the death rate and the birth rate are high. At Time 2, the death rate has fallen but the birth rate remains high. At Time 3, both the birth rate and death rate are low. The shaded area indicates the excess of births over deaths, causing rapid population growth.
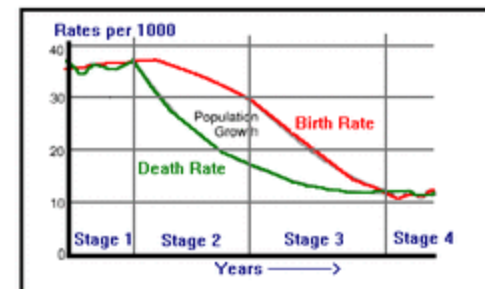
Demographic transition model

- Intended to explain changes in pop. structure over time
  - Stage 1: High fertility & high mortality
  - Stage 2: High fertility & low mortality.
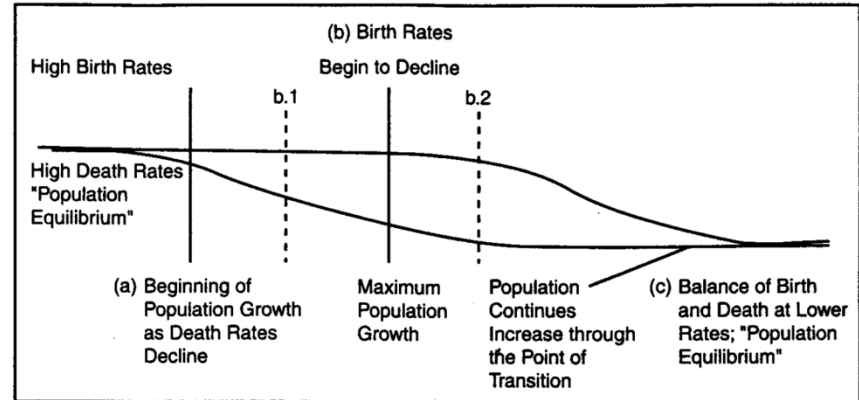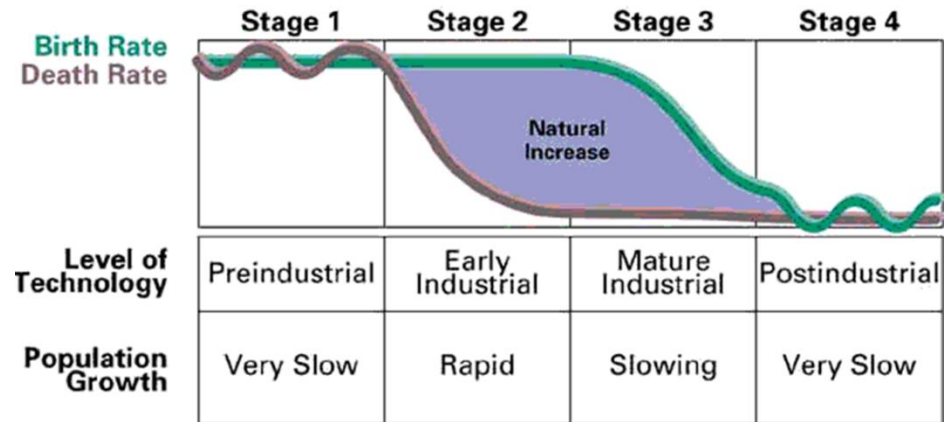 - Stage 3: Low fertility & low mortality

	Stage 1	Stage 2	Stage 3	Stage 4
Birth Rate / Death Rate		Natural Increase		
Level of Technology	Preindustrial	Early Industrial	Mature Industrial	Postindustrial
Population Growth	Very Slow	Rapid	Slowing	Very Slow

(b) Birth Rates Begin to Decline

High Birth Rates

b.1   b.2

High Death Rates "Population Equilibrium"

(a) Beginning of Population Growth as Death Rates Decline

Maximum Population Growth

Population Continues Increase through the Point of Transition

(c) Balance of Birth and Death at Lower Rates; "Population Equilibrium"

Figure 4.4 Outline of demographic transition that began with Western industrialized societies and has now reached its second phase in East Asian societies as well; sub-Saharan African societies are entering the phase of maximum growth of the transition.
Source: Drawing by Author.

Demographic transition model

- Causes of mortality decline in stage 2 not due to medical advances.
  - Due instead to improvements in social & economic conditions – clean water, sewage disposal, better housing.
- Causes of fertility decline in stage 3 not so much due to reproductive technology but economic disincentives to raising numerous children in industrial society.

Epidemiological transition

- Examines/explains changes in causes of mortality.
- Contagious/infectious diseases – killed many more people in past.
- Now in addition to remaining threat of such infectious epidemics, we have higher incidences of *cardiovascular and degenerative diseases:*
  - Diabetes
  - Arteriosclerosis
  - Hypertension
  - Heart attack
  - Strokes
  - Cancer.
- Environmental risks – carcinogens, toxic/radioactive waste.

The Epidemiologic Transition
Abdel R. Omran

- Five propositions:

1. Mortality is fundamental factor in population dynamics.

2. Long term shift occurs in mortality & disease patterns – pandemics of infection are gradually displaced by degenerative & man-made diseases as chief form of morbidity & primary cause of death.

   Three major successive stages of the epidemiologic transition:

   1. Age of pestilence and famine
   2. Age of receding pandemics
   3. Age of degenerative and man-made diseases.

The 4 stages of the health transition

	Phases	Socio-economic development	Life expec-tancy	Change in broad disease categories	Change within broad disease categories (proportionate mortality)
1*	Age of pestilence (infection) and famine	+	~30	Infections Nutritional deficiencies	CVD: 5-10% related to nutrition/infection (e.g. RHD, Chagas)
2*	Age of receding pandemics	++ (developing countries)	30-50	Improved sanitation : ↓ infections, ↑ diet (salt), ↑ aging	CVD: 10-35% Hypertensive heart disease, stroke. sequels of RHD and CHF
3*	Age of degenerative and man-made diseases	+++ (countries in transition)	50-55	↑ aging, ↑ lifestyles related to high SES (diet, activity, addiction)	CVD: 35-65%. Obesity, dyslipidemias, HBP, smoking → CHD, stroke, often at early age ; PVD (first in ↑ SES)
4**	Age of delayed degenerative diseases	++++ (western countries)	~70	↓ reduced risk behaviors in the population (prevention and health promotion) and ↑ new treatments	CVD <50% (delayed ↓ total CVD due to aging population & ↑ prevalence due to better treatment)

CVD = cardiovascular disease

The Epidemiologic Transition
Abdel R. Omran

3. During epidemiologic transition most profound changes in health & disease patterns occur among children & young women.

4. Shifts in health & disease patterns that characterize epidemiologic transition are closely associated with demographic and socioeconomic transitions that constitute the modernization complex.

5. Peculiar variations in pattern, pace, determinants, & consequences of population change differentiate 3 basic models of the epidemiologic transition:

   - classical or western model
   - accelerated model
   - delayed model

Population

[**Hans Rosling on global population growth**](#)

- The world's population will grow to 9 billion over next 50 years.

- Only by raising living standards of poorest can we check population growth.

- This is the paradoxical answer that Hans Rosling unveils at TED@Cannes using colorful new data display technology (you'll see).