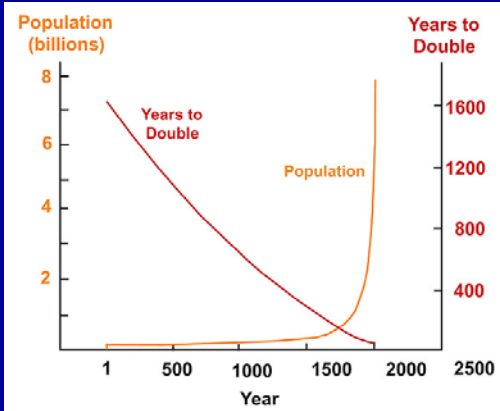


Lecture 14 World Population



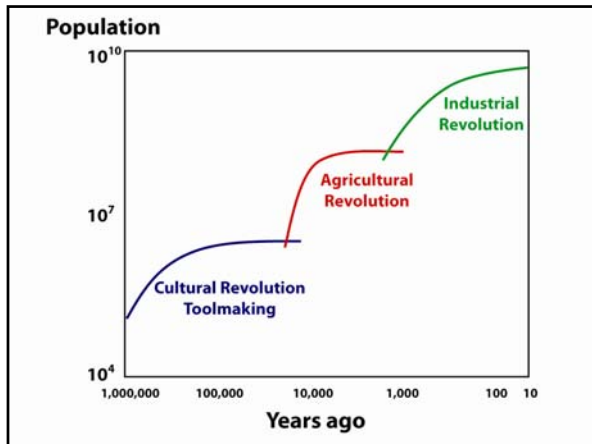
World population is in a state of very rapid increase.
This may be expressed in various ways.
On an arithmetic scale population appears to be in an explosive stage.



However if we plot human population on a log scale there appears to be 3 phases brought about by levels of historical development:

- Tool Making
- The Agricultural Revolution
- The Industrial Revolution

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Two Views on Populations:

Alarmists


- Population bomb
- Mass starvation (Paddock, 1975 wrote *Famine 1979*)
- Major world issue, the only real issue
- Disappearance of world surpluses

Technocrats

- Science and technology will find the way
- Famines are decreasing
- People are better fed than ever before
- World food supply shows the same graph as world population

Population Dynamics

The Malthusian doctrine is named after Thomas Malthus (1766–1834), an English clergyman who pointed out that human population is determined by biological factors.



Growth is determined by:

- Biological capacity of woman to bear children
- Natural length of life
- Ecological factors that
 - Produce food
 - Determine fertility
 - Determine mortality

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Malthusian Doctrine

Malthus noted that food production increases arithmetically (e.g. 1, 2, 3, 4) while human population increases geometrically (e.g. 1, 2, 4, 8).

Since human population is determined ultimately by the food supply, Malthus thought population would be brought in balance only by famine and pestilence.

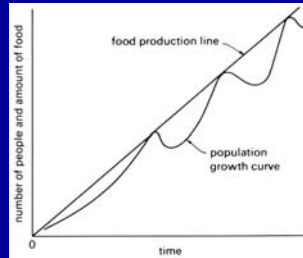


Diagram of Malthus's theory of population growth.

Malthus also noted that population growth could be limited by:

- Restraint (delayed marriage)
- Vice (prostitution)

Malthus never foresaw the tremendous growth of food with modern agriculture due to new lands and the scientific revolution.

Malthusian predictions have not yet come to past.

Sociological Explanation of Population Growth

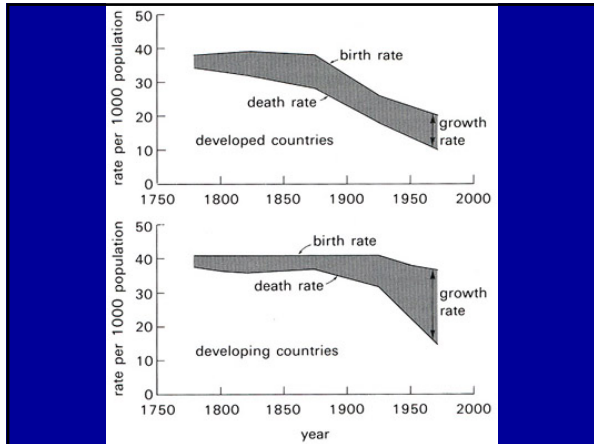
Demographic transition is the change from a low population growth rate based on high or medieval birth and high death rates to a low population growth rate based on low (modern) birth and death rates.

However, in this transition, death rate starts to drop faster than birth rate which leads to an explosive population increase.

Birth rate, usually listed as the number of live births per 1000 population.

In 1875 birth rate was in the high 30s; in 1930 the birth rate declined to between 15 and 20 (1.5–2.0%).

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The Present Situation

World population of 6 billion is expected to increase to 12 billion in 2100.

Present food production has kept up but there is a disequilibrium between various countries.

Population Increase

Year	Population (billions)	No. years to double
1	0.25 ?	1,650 ?
1650	0.50	200
1850	1.1	80
1930	2.0	45
1975	4.0	35
2010	8.0	?

Urban Population Growth, 1950–2025

Countries	Urban population (%)		
	1950	1990	2025
Developing	17	34	57
Developed	54	73	84
World Total	29	43	61

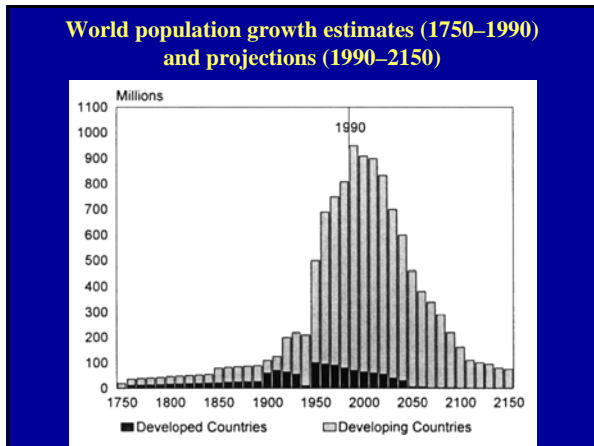
World Population Growth, 1990–2100

Countries	Population (billions)			Increase (%)
	1990	2025	2100	1990–2100
Developing	4.08	7.07	10.20	150
Developed	1.21	1.40	1.50	24
World Total	5.30	8.47	11.70	121

The Future

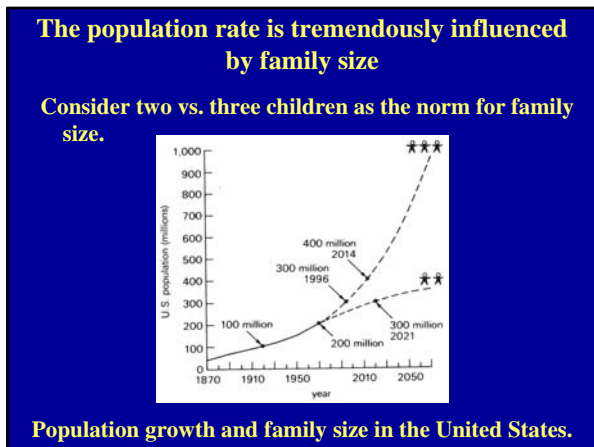
Population pressures will vary with location.
Low birth rates in Europe & US.
Population stabilizing in China.
India population increasing rapidly.
Africa unstable due to AIDS, political instability, warfare.
Surpluses will continue to be a problem in Europe and America but weather is a wild card.

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The natural rate depends on social and cultural customs as well as natural forces:

- Age of marriage
- Religion and law
- Income and economic forces
- Value of women
- Emancipation of women
- Public health
- Contraception policy and information
- Urban living
- Cost of education
- Economic advantage of children in work force (children considered old-age insurance)



Population growth and family size in the United States.

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All nations seem to be moving through demographic transformation but at different rates.

The relationship between population and food is complex.

With high death and high birth rate, 75% of income is spent on food leading to pressure of population on food supply.

With low death and low birth rate 25% of income is spent on food leading to pressure of food supplies on population.

The growth of food demand is based on population growth and exports.

During intermediate stages of demographic transformation the situation is complex.

With economic development there is an increase in income and a rise in food demand.

However, as death rates decline more rapidly than birth rates the population increases rapidly and there is a shortage of food.

The situation only stabilizes as birth rate drops with development.

Different terms are used to define rich and poor countries.

Poor countries have been called Less Developed Countries (LDC) or euphemistically, as Developing Countries.

Rich countries are called developed countries (DC).

For LDC (poor countries) the rate of crop production has been behind domestic needs.

Most LDCs have become net importers of food.

In most developed countries crop production exceeds domestic needs and there are problems of surpluses and low market prices so that governments provide subsidies to agriculture.

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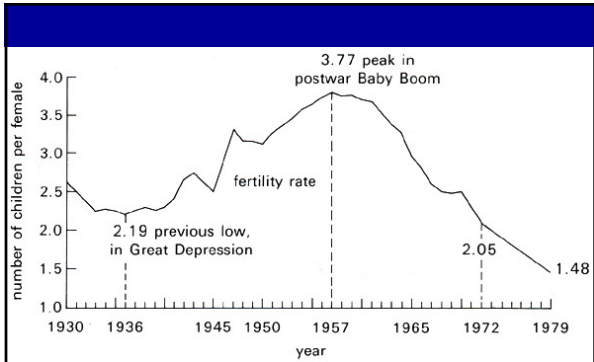
Population Control

Reduction of birth rate varies by:
Religious beliefs
Attitude towards large family
Attitudes towards contraception and abortion
Value of women

Birth rate has shown great changes from 1930 to today in the United States.

Actual population is a function of the birth and death rate, average length of life, immigration and emigration policies.

All nations seem to be moving through a demographic transformation but at different rates.



Fluctuation in the US fertility rate, 1930–1979

Food Demand

During the intermediate stages of the demographic transition the situation is complex.

With advancing income there usually is a rise in food needs due to increased income (and increased demand for meat) but lowered death rate rapidly increases the population.

Death rate declines more rapidly than birth rate due to increased sanitation and medical services.

For LDC (poor countries) the rate of crop production typically lags behind domestic needs, especially in Africa.

Most African nations have become net importers of food.

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There have been changes due to the green revolution, the introduction of technology and new high yielding cultivars of wheat and rice.

The problem is to increase food and to limit population.

Medical science tends to increase population faster through mortality control than to decrease population through birth control.

Increasing food supply by food aid can have a detrimental effect on the local agricultural economy.

Because of social problems in large cities, most governments have a policy of "cheap food" to prevent instability which has a negative effect on agriculture.

Population Policy

Dual needs

Technological, social, and economic development to improve life (decrease death rate) and to increase food production.

Demographic policy to induce a decline in birth rate to replacement values.

These policies often conflict.

Ethical Problems (What is the right thing to do?)

Many religious groups and particularly the Roman Catholic church have an official position on the means by which fertility can be regulated.

The Catholic position has been somewhat modified.

For example there is no direct opposition to population control but rather the means by which this is brought about.

Their position is against any "unnatural contravention of the natural act of procreation in marriage."

This is a medieval theological concept developed by St. Augustine (354–430).

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The church is against “unnatural” contraceptive devices but permits continence or the rhythm system (“Vatican” roulette) and is utterly opposed to abortion.

For the same reason the Church is opposed to artificial insemination to produce life.

Yet the Church insists on a celibate policy for clergy, and religious orders of women (nuns) and men (monks).

Note that the Russian and Greek Orthodox Church have married clergy (but not bishops).

(St. Paul considered celibacy superior to marriage, but noting that “*it is better to marry than to burn with passion.*” Many of the apostles were married.)

The present controversy between “Right to Life” and “Freedom of Choice” has made this topic of abortion one of the most divisive and politically explosive present day issues. The issue is now difficult to discuss on a rational basis without offending deeply held beliefs.

For some the position has centered around the question of when life begins and the proposition that killing of life at any form is an abomination.

Biologically, the life cycle has no beginning or end.

The gametes, which have all of the potential of the mature organism, are produced prodigiously (more so in males than females) and have little individual value.

Fertilization is a stage that initiates the potential of human life and the zygote goes through various stages but must be attached to the uterus to complete development.

Birth leads to another stage involving nurture and care until sexual development which completes the cycle.

The genetic value of the mature organism is over when it no longer contributes to procreation or nurture.

Clearly the biological position is greatly different from the religious position which has been developed from a different perspective.

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All of us differ on the proper way to regulate population concomitant with life in an organized society.

Consider the following ways that population may be regulated:

1. Direct regulation of population through adult killing.

Consider the response of Inuit (Eskimo) culture to shortages of food in the winter, which imperil all, by putting old people out in the snow.

Consider euthanasia policy, or attitudes toward drafting young people for warfare.

2. Infanticide.

The concept seems abhorrent but consider the appropriate response to children with gross abnormalities (such as lack of a brain).

Most feel that heroic efforts to prolong such life is unnecessary but there is a problem of what constitutes heroic efforts (e.g. use of feeding tubes) and what necessitates killing.

3. Abortion (Consider response at different states (implantation, trimester I, II, and III; RU486)

4. Contraception

5. Continnence

6. Imposition of sterility

7. Regulation of marriage age

8. Prostitution

9. Polygamy

Current Social Factors that Affect Population

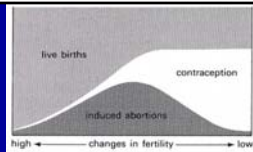
- Rising value of female labor
- Reduced economic value of children
- Child labor
- Insurance factors (retirement policy)
- Cost of birthing and upbringing
- Increasing cost of education
- Urbanization
- Increasing necessity for education (affecting marriage age)

Population Programs

(Taiwan, Japan, China, United States, India)

- Contraception
- Abortion
- Sterilization
- Information
- Tax policy

The transition to lower fertility: interrelation of births, contraceptive practice, and abortion



The pattern of induced abortion during the demographic transition seems fairly constant and relatively uninfluenced by abortion law. In most instances, the transition to lower fertility rates involves an initial increase in the incidence of abortion and creates pressure for liberalization of abortion laws. If modern contraceptives are made widely available at the same time that abortion is legalized, countries undergoing this demographic transition can avoid long term dependence on abortion as the primary method of birth prevention. However, if family planning education and service programs receive minimal public support, abortion may continue to account for an abnormally large share of births avoided long after lower birth rates have been achieved.

Impact of World Population

- Food production capacity
- Fertility control and human freedom
- Racial aspect of population
- Consequences of an aging population
- Labor problems

Interrelationships of Population & Development

1. Birth rate and death rate
2. Economic levels, industrialization, and social stability.
High population density in urban areas encourages policy of low food prices, a disincentive to agriculture.
3. Food production and food demand.
An increase in protein intake increases food demand even if quantity remains the same.

4. National policy
There are a number of anomalies.
In Ethiopia, beans were exported during famine to increase foreign exchange to obtain weapons.
Increased protein demand in the Russian Federation will increase starvation in Africa by raising the price of grain.
5. Famine and world instability
