

Population Dynamics & Composition

Population Growth
&
How to Calculate?



Objectives:

By end of lecture, student will be able to:

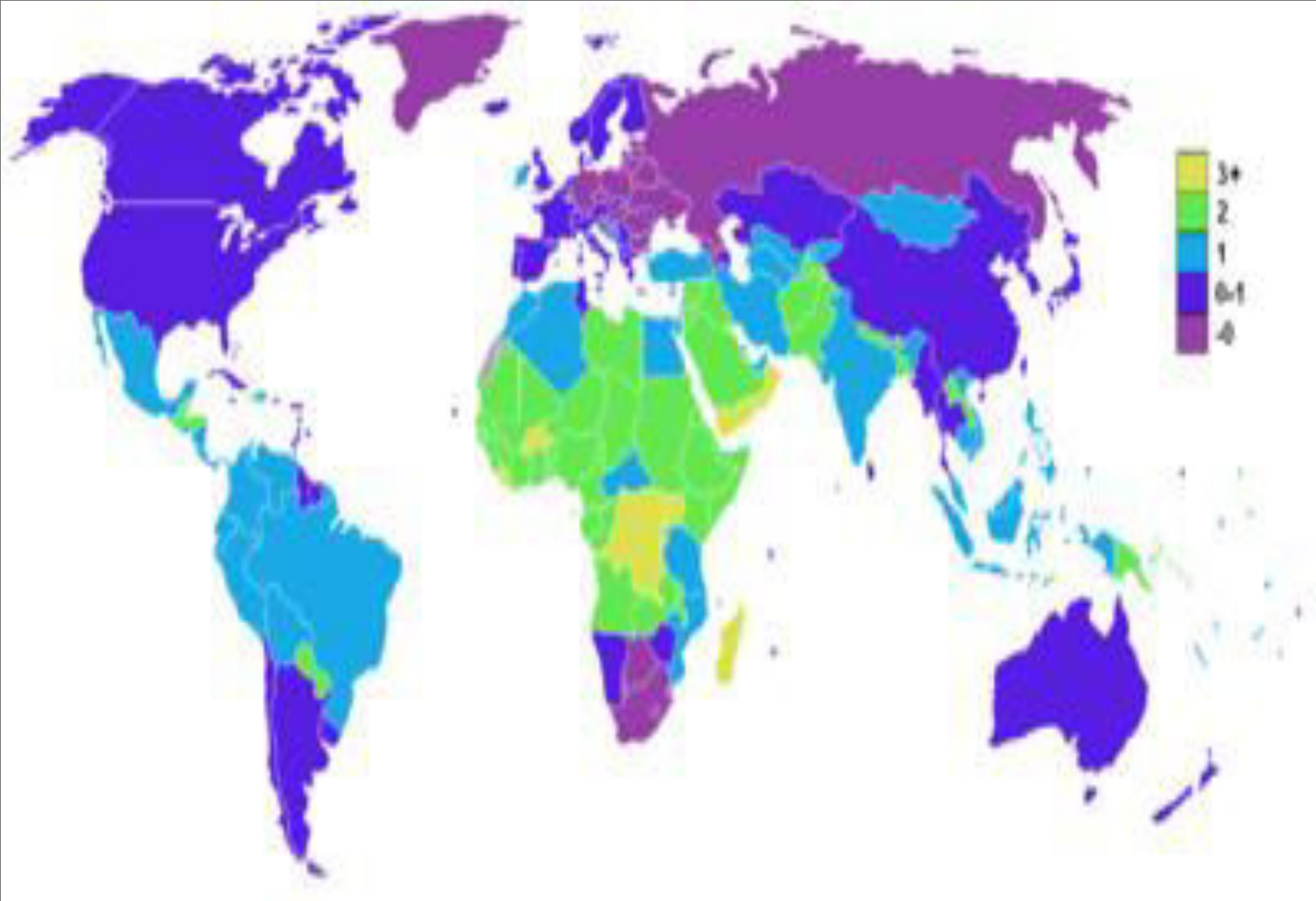
- Define population Growth rate, CDR, CBR
- Describe Growth Rate
- Calculate Population doubling time
- Describe population explosion & its implications
- Explain advantages of population control
- Social mobilization & Urbanization

○ As we discussed in Demographic Transition Model.....

○ The last one hundred years have seen a rapid increase in population due to medical advances and massive increase in agricultural productivity made possible by the Green Revolution.

-
- Now.....
 - Globally, the ***Growth Rate*** of the Human Population has been steadily declining since peaking in 1962 and 1963 at 2.20% per annum
 - In 2007 the growth rate was 1.19% per annum.

Global Growth rates



○ Growth remains

high

○ in the Middle East, South Asia, Southeast Asia, Latin America, and primarily in Sub-Saharan Africa

- Some countries experience **negative population growth**

especially in Eastern Europe (mainly due to low fertility rates and emigration).



- ◉ In Southern Africa, growth is **slowing** due to the high number of HIV-related deaths.

AIDS hits South Africa hardest

Adults and children estimated to be living with HIV/AIDS in 2007:



-
- Some Western Europe countries might also encounter **negative population growth**

Japan's population began decreasing



Population Growth

is the change in population over time, and can be quantified as the change in the number of individuals in a population using "per unit time" for measurement

Population growth rate (PGR)

is the fractional rate at which the number of individuals in a population increases.

Specifically, PGR ordinarily refers to the change in population over a unit time period, often expressed as a percentage of the number of individuals in the population at the beginning of that period.

This can be written as the formula:

Growth rate=

$$\frac{\text{Popul. at end of period} - \text{Population at begin of period}}{\text{Population at beginning of period}}$$

The above formula can be expanded to:

Growth rate = crude birth rate - crude death rate + net immigration rate, or

$$\Delta P/P = (B/P) - (D/P) + (I/P) - (E/P)$$

where, P is the total population, B is the number of births, D is the number of deaths, I is the number of immigrants, and E is the number of emigrants.

Population dynamics

The dynamics or changes in a population can be understood with the help of the basic demographic equation which is expressed as:

$$P_{t_1} = P_{t_0} + (B - D) + (IM - OM)$$

In other words, there are four ways in which the population of people in an area can increase during two time periods (t_0 and t_1)

Population Growth = Natural Increase + Net Migration

The Equation can also be expressed in terms of rates (by dividing each element by the mid-year population expressed per 1000)

Population growth rate however, is usually expressed in percentage which helps us calculate the rate at which the population of a country or a community is growing

Although migration has ceased to play important role in the growth of country's population at the community level, migration from rural areas to cities are still one of the major causes of population change

The principal of **Compound Growth Rate** is applied to calculate the effects of population growth at the rate of 1% per year, it will double in about 70 years. Therefore, a quick way to figure out how long it will take a population to double in size, is to divide 70 by the growth rate

$$P_{t1} = P_{t0} (1 + r)^t$$

Annual Population Growth

(Population compounded annually at rate r)

We want a relationship for the current year's population size and next year's

Let P_t denote the size of the population at time t
Let P_0 denote the initial population size

How big is the population one year in the future?

$$P_1 = P_0(1 + r)$$

Annual Population Growth

We can continue this process

$$P_1 = P_0(1 + r)$$

$$P_2 = P_1(1 + r) = P_0(1 + r)(1 + r) = P_0(1 + r)^2$$

.

.

.

$$P_t = P_0(1 + r)^t$$

Although the growth rate each year remains the same i.e. 3 % (or .03 per person), due to change in **the base population** each year, annual number of persons being added each year keeps on increasing from 600 in the first year to 675 in the fifth year .

Thus the population increase each year will be greater than the previous year, even though the rate of growth remains at 3 % annually.

In five years the over all increase will be 15.9 % [(23,185 – 20,000)] rather than 15 %
(annual growth rate of 3 % multiplied by 5)

While projecting a population, one may chose different growth scenario.

For example, the population of Pakistan as counted in 1998 Census was 132.8 million. To determine the population of Pakistan in 2005, by using the above formulae one can come up with different estimates as given below:

Depending on the growth rate during the last seven years, the 2005 population size will vary. Thus with,

- 2.0 % annual growth rate it will be 152.5 million
- 2.3 % annual growth rate it will be 155.7 million &
- 2.6 % annual growth rate it will be 158.9 million

Since the annual growth rate in 1998 was 2.6 % in 2005 it was 2 %, assuming an average growth rate of 2.3 % during the period will be more appropriate

Problem:

In 1950, the world's population was 2,555,982,611. With a growth rate of approximately 1.68%, what was the population in 1955?

$$P_t = P_0(1 + r)^t$$

Solution:

- ◎ $P_0 = 2,555,982,611$
- ◎ $r = 1.68\% = 0.0168$
- ◎ $t = 5$

- ◎ $P = P_0 (1 + 0.0168)^5$

- ◎ $P = 2,779,960,539.8$ will be population in 1955 (approx)

Population Doubling Time

The growth rate can be used to determine a country or region or even the planet's "**doubling time**" which tells us how long it will take for a country's current population to double. This length of time is determined by dividing the growth rate into 70. $(70/gr)$

The number 70 comes from the natural log of 2, which is .70

For example:

Given Canada's overall growth of 0.9% in the year 2006, we divide 70 by .9 (from the 0.9%) and yield a value of 77.7 years.

Thus, in 2083, if the current rate of growth remains constant, Canada's population will double from its current 33 million to 66 million.

Limitations of Doubling Time & Population Growth Rates

-
- ⦿ They can be used for short term projects effectively
 - ⦿ If applied for long term projections may give ridiculous readings as.....

- Many Asian and African countries have high growth rates.
- Afghanistan had growth rate of 4.8% for 2005, representing a doubling time of 14.5 years!
- If Afghanistan's growth rate remained the same (which is very unlikely and the country's projected growth rate for 2025 is a mere 2.3%), then the population of 30 million would become 60 million in 2020, 120 million in 2035, 280 million in 2049, 560 million in 2064, and 1.12 billion in 2078! This is a ridiculous expectation.
- As you can see, population growth percentages is better utilized for short term projections.

Excessive Growth and Decline

Population exceeding the carrying capacity of an area or environment is called overpopulation

It may be caused by growth in population or by reduction in capacity

Spikes in human population can cause problems such as pollution and traffic congestion, these might be resolved or worsened by technological and economic changes

Conversely, such areas may be considered "under populated" if the population is not large enough to maintain an economic system

-
- ⦿ Increased population growth generally represents problems for a country - it means increased need for food, infrastructure, and services. These are expenses that most high-growth countries have little ability to provide today, let alone if population rises dramatically.



Social Mobilization





-
- ◉ **Mobilization** is a military term
 - ◉ To mobilize= prepare forces for action

 - ◉ **Social mobilization is:**
 - ◉ An approach where the community participation is very essential
 - ◉ It uses deliberate participating processes to involve local institutions, local leaders, community groups and members to organize through concerted efforts towards a common purpose



Social Mobilization

- Social mobilization is the process of bringing together all possible inter-sectoral partners and allies to participate in development program
- To raise awareness of and demand for a particular program,
- To assist in the delivery of resources and services and
- To strengthen community participation for sustainability and self-reliance



Social mobilization

- Aims at **empowering** individuals and communities to identify their **needs**, their **rights**, and their **responsibilities**, change their **ideas** and beliefs and organize the human, material, financial and other **resources** required for **socioeconomic development**

[Disease control: the role of social mobilization: round table 2.](https://apps.who.int/iris/handle/10665/95745) available at:
[https://apps.who.int/iris/handle/10665/95745.](https://apps.who.int/iris/handle/10665/95745)



Social mobilization

Key actors include:

- Heads of state
- Government ministries
- The donor community,
- Civil society (including religious organizations, community-based organizations, non governmental organizations),
- Political and traditional leaders,
- Families and individuals at all levels, especially the global, national and district levels



Social mobilization

In the context of health,

- Social mobilization is viewed as one of the **tools of health promotion**
- It is an approach that provides individuals and groups with knowledge and skills, and
- **mediates** between different interest groups to create environments that support and promote health
- It is closely **linked to, and supports, other health development processes** such as service delivery, infrastructure and human resource development, preventive interventions and advocacy for health
- The critical contribution of social mobilization to health development is to **enhance the participation** of various actors, leading to increased knowledge of, control over, and ownership of, health interventions



Social mobilization

Types are:

1. **Mass mobilization**

- Very large scale
- Involves services of professional mass marketing firm

2. **Community mobilization**

- Usually involves a change agent organizing/mobilizing at the community level
- Often involves civil society organizations working at the grass root level/ school level



Social mobilization

- ◉ Advocacy, communication & social mobilization

CHINA



OCEAN

AUSTRALIA



Philippines

One of the many scenic views when passing by Mount Mantalingahan Protected Landscape in southern Palawan. Despite being a mighty, rugged mountain range that spans five municipalities, Mount Mantalingahan and the many biodiverse habitats and species within it have to contend with old and emerging threats to its environment. Photo by: USAID Protect Wildlife.

Empowering the local governments of five municipalities that straddle these forests and mountain range is a long-term and proven approach in addressing the threats to this conservation landscape



Example of Social mobilization

Mt. Mantalingahan Protected Landscape

- Protected area in Palawan (Presidential Proclamation 1815)
- 120,457 hectares encompassing five municipalities
- home to indigenous peoples

Social mobilization initiatives

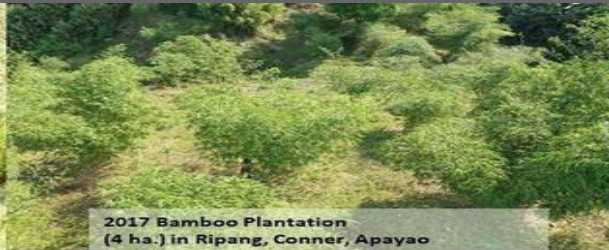
- community-led forest resource management
- organized forest guards and registered IP communities as POs
- sustainable livelihoods and income
- watershed management
- resource mobilization through capital endowment scheme
- integrated provision of social services
- adopts a top-to bottom (activist) approach
- community beneficiaries (mostly IPs)
- conservation program to secure ecosystems services

Key partners

- LGUs of Bataraza, Brooke's Point, S. Espanola, Quezon and Rizal
- Conservation International
- DENR-PENRO
- other NGOs, POs, religious groups, DepEd, etc.

Philippines

The National Greening Program (NGP) is a priority program that aims to **reduce poverty; promote food security, environmental stability, and biodiversity conservation; and enhance climate change mitigation and adaptation**



NATIONAL GREENING PROGRAM
Cordillera Administrative Region





Example of Social Mobilization

National Greening Program

- Executive Order 26 S. 2011
- nationwide forest rehabilitation
- 1.5 billion trees covering 1.5 million hectares for a period of six years from 2011 to 2016

Social mobilization process and incentive

- multi-sectoral participation
- volunteer engagement
- local employment generation
- pragmatic approach
- mass mobilization
- national program with the following mission: food security, poverty alleviation, environmental stability, biodiversity conservation, climate change mitigation and adaptation

Key partners

- DENR and 16 other government departments and institutions
- civil society: FPE, PTFCF
- More like thi



Social Mobilization: in Pakistan

Two current examples of social mobilization initiatives are:

1. The Livelihood Enhancement and Protection Project: Social Mobilization for the Poorest
2. The Social Mobilization Project for Human and Institutional Development and Revitalization

These projects provide the opportunity to extend existing interventions, assess refinements of processes, and test ideas. The results are fed back into the mainstream program



Social mobilization: in Pakistan

The Livelihood Enhancement and Protection Project

- It was designed to enable people who are among the poorest in their communities to establish and develop viable enterprises
- The project supports them at every 'link' in an entrepreneurial 'value chain'

Since the project is an effort to put new ideas into practice – i.e. reaching and supporting the very poor and vulnerable by giving them assets, information and training – it requires specialized social mobilization skills

- Many of the intended beneficiaries are not literate, are entering the market for the first time, have little work experience, and/or are working on the margins of the business world for meager returns.
- Members of these households also learned how to manage their assets and develop business plans

Another key function of the project is to promote the formation of Common Interest Groups by men and women entrepreneurs. Skill trainings for employment opportunities is a significant component of the project





Pakistan



National Rural Support Programme

Available at: <https://nrsp.org.pk/what-do-we-do/social-mobilization/>



WHAT DO WE DO

- Social Mobilization
- Microfinance and Enterprise Development**
- Physical Infrastructure and Technology Development
- Social Sector Services
- Human Resource Development
- Environment and Natural Resource Management
- Information Technology
- Social and Human Protection
- Gender and Development
- Monitoring, Evaluation and Research

SOCIAL MOBILIZATION

Social Mobilisation is at the heart of everything we do. The principles and practices of social mobilisation follow a time-honoured tradition established at the Aga Khan Rural Support Programme in the 1980s by the renowned development expert Shoaib Sultan Khan and followed in all of the RSPs across Pakistan. Wherever NRSP works, whether expanding its regular core programme, implementing donor-funded projects, or responding to disasters, the principles and practices of social mobilisation remain the same. These are: establishing mutual trust; understanding that there are mutual rights and responsibilities related to accountability and transparency; observing the principle of benefitting the community at large, rather than individuals, and ensuring that the poorest and most vulnerable people are included in the programming.

We work with rural men and women to release their potential abilities and skills so as to build their knowledge and enable them decide their own development priorities. We also help people to find the resources they need to meet their identified needs. The purpose is to break the cycle of poverty, both economic poverty and 'poverty of opportunity'. When community members come together for a common purpose – which is ultimately village wide socio-economic development – they are in a stronger position to bring about sustainable improvements in the quality of life.

The first step of our approach to addressing development problems is to organise people into local organisations known as Community Organisations that are then able to identify and address local issues. We refer to this process as Social Mobilisation. We assume that local people know best about local problems and that, in partnership with NRSP, they have the talents and willingness to plan and implement local development. Mobilised communities work as 'platforms' for local development, helping to bring together communities, knowledge and resources. Depending on the local norms the CO members may be all men, all women, or, as happens in some places, 'mixed' COs, having both men and women members. Once formed, each CO elects a President and a Manager. The NRSP staff and the CO members identify an Activist – an experienced local person who will take ideas forward – from amongst the CO



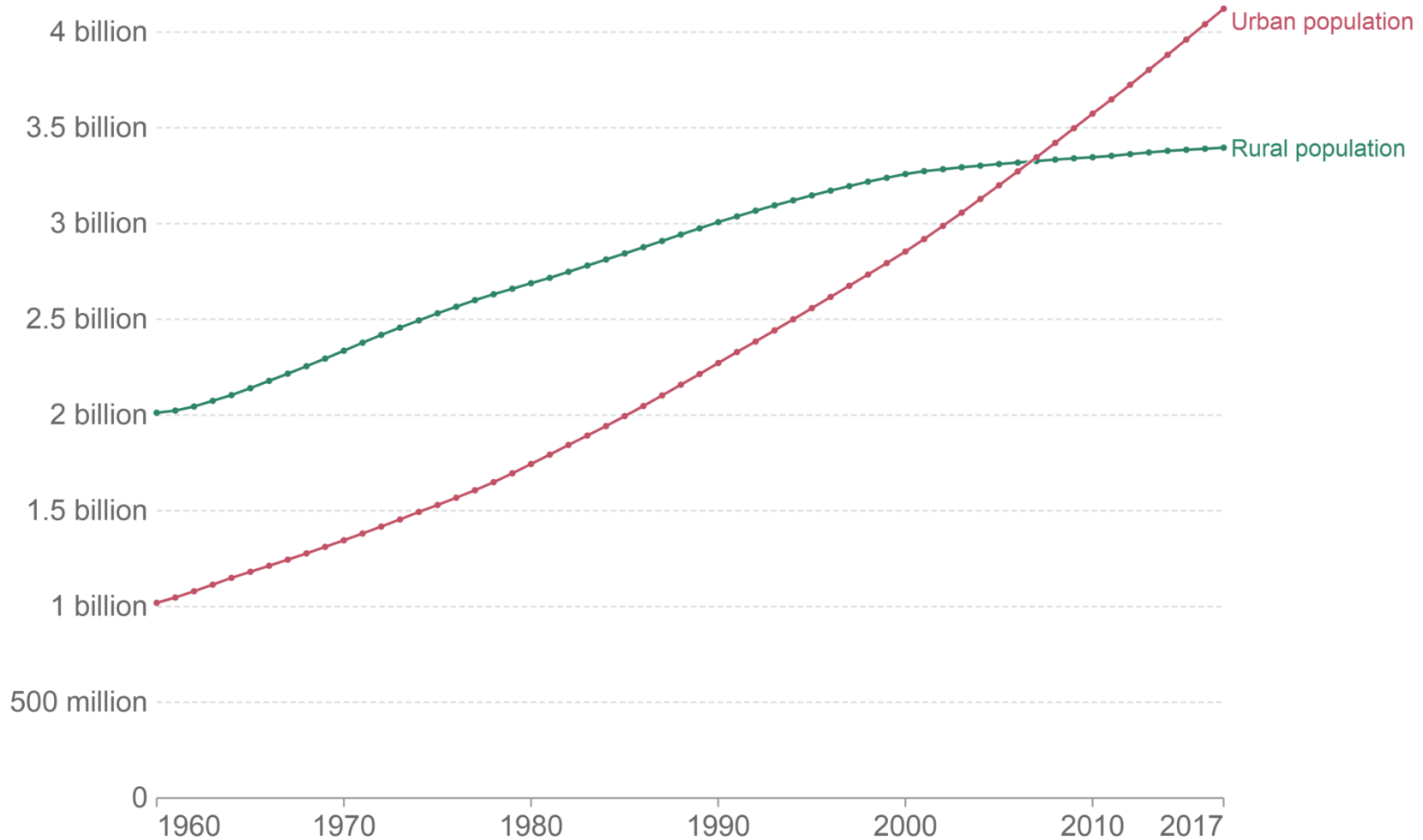
URBANIZATION !!





More than 4 billion people
– more than half of the
world – live in urban areas

Number of people living in urban and rural areas, World



Source: World Bank based on data from the UN Population Division

OurWorldInData.org/urbanization • CC BY

Note: Urban populations are defined based on the definition of urban areas by national statistical offices.

Rural - urban migration



Migration to towns and cities is very recent – mostly limited to the past 200 years

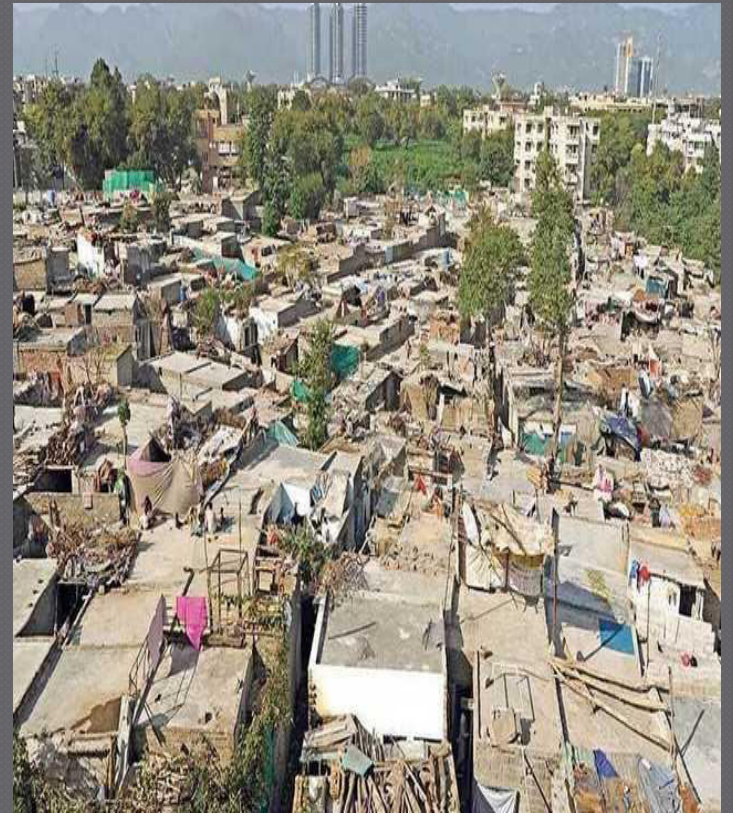
Populations urbanize as they get richer

Urban populations tend to have higher living standards

- In nearly all countries **electricity access** is higher in urban areas than in rural areas;
- Access to **improved sanitation** is higher in urban areas;
- Access to improved **drinking water** is higher in urban areas;
- Access to **clean fuels** for cooking and heating is higher in urban areas
- Child **malnutrition** is lower

Agricultural employment falls with urbanization

Just under 1-in-3 urban dwellers live in slum households



A slum household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, and durability of housing.

Urbanization

- Population shift from rural to urban areas, the corresponding decrease in the proportion of people living in rural areas, and the ways in which societies adapt to this change
- It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas

Trends

- It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will be urbanized
- That is equivalent to approximately 3 billion urbanites by 2050, much of which will occur in Africa and Asia
- United Nations has also recently projected that nearly all global population growth from 2017 to 2030 will be by cities, with about 1.1 billion new urbanites over the next 10 years

Main causes are:

1. **Modernization**
2. **Industrialization**, More people have been attracted to move from rural to urban areas on account of improved employment opportunities
3. **Commercialization**, Better commercial opportunities and returns compared to rural areas
4. **Sociological process of rationalization**, is the replacement of traditions, values, and emotions as motivators for behavior in society with concepts based on rationality and reason

Environmental Impact:

- ⦿ Urban areas can grow from increases in human populations or from migration into urban areas
- ⦿ Urbanization often results in **deforestation, habitat loss, and the extraction of freshwater from the environment**, which can decrease biodiversity and alter species ranges and interactions

◉ Economic impact

◉ Environmental impacts

- Urban heat island
- Water quality
- Food waste
- Habitat fragmentation

◉ Health and social impacts

- Nutrition
- Asthma
- Crime
- Physical activity
- Mental health

Social effects of urbanization

- ◉ Adverse effects on the structure of society as gigantic concentrations of people compete for limited resources
- ◉ Rapid housing construction leads to **overcrowding and slums, which experience major problems such as poverty, poor sanitation, unemployment and high crime rates**

Pakistan



Pakistan: Urbanization from 2011 to 2021

- Pakistan is one of the fastest urbanizing nations within South Asia with an average **annual growth rate of 2.7%**
- The share of urban population in Pakistan remained at around **37.44 %** in 2021
- Urbanization has positive impacts on technological innovation and economic progress. Cumulatively, **cities in Pakistan generate 55 percent of the GDP**
- Moreover, Pakistan generates 95 percent of its federal tax revenue from 10 major cities

References

- Urbanization.

<https://en.wikipedia.org/wiki/Urbanization#Suburbanization>

- [Pakistan - urbanization 2021 –](#)

[Statist](https://www.statista.com/statistics/455907/urbanization-in-pakistan) <https://www.statista.com/statistics/455907/urbanization-in-pakistan>

In next lecture

Fertility & Mortality