Urban Economics
Lecture 3

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Demographic Statistics

International Census

National Census

Major Statistics

- Population and Housing Census
- Gender Statistics
- Labor Statistics

Population and Housing Census

International Census ➡ (UN) World Population and Housing Census

National Census ➡ HIECS (Household Income, Expenditure, and Consumption Survey)

(UN) World Population and Housing Census

- It was approved by the **UN Statistical Commission** and adopted by the **UN Economic and Social Council.**
- The Programme recognizes population and housing censuses as:

(1) One of the primary sources of data needed for **formulating**, **implementing** and **monitoring** policies aimed at:

- Inclusive socioeconomic development
- Local economic development
- Environmental sustainability.

(2) An important source for supplying **disaggregated data** needed for the measurement of progress of the 2030 Agenda for Sustainable Development, especially in the context of **assessing the situation of people** by **income**, **sex**, **age**, **race**, **ethnicity**, **migratory status**, **disability** and **geographic location**, or other characteristics.

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Demographic Statistics

1 Total Population

- Total population is based on the de facto definition of population, which counts **all residents** regardless of legal status or citizenship-except for refugees not permanently settled in the country of asylum, who are generally considered part of the **population** of their country

2 Population In Urban Agglomerations

- Population in urban agglomerations is the percentage of a country's population living in **metropolitan areas** that had a population of more than one million people.

3 Male Population Ages 60 and Above

- Male population above 60 as a percentage of the total male population.

Demographic Statistics

4 Population Density

- **Population** density is midyear **population** divided by land area in square kilometers. Land area is a country's **total area**, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones (EEZ). In most cases the definition of inland water bodies includes major rivers and lakes.

5 Population Growth (Annual %)

- Annual **population** growth rate for year t is the exponential rate of growth of midyear **population** from year t-1 to t, expressed as a percentage .

Demographic Statistics

6 Population Density

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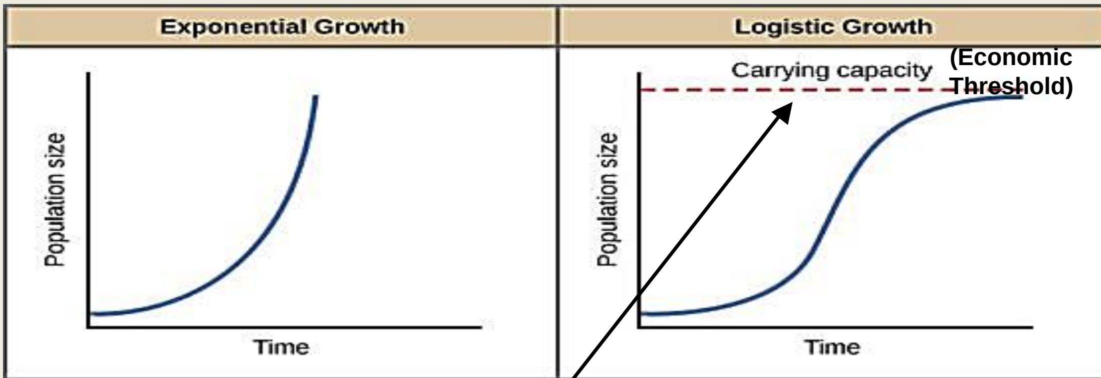
Population Dynamics:
Exponential growth & Logistic growth

- In **exponential growth**, a population growth rate stays the same regardless of population size, making the population grow faster and faster as it gets larger.
- In nature, populations may grow exponentially for some period, but they will ultimately be limited by resource availability.
- Exponential growth produces a **J-shaped curve**,

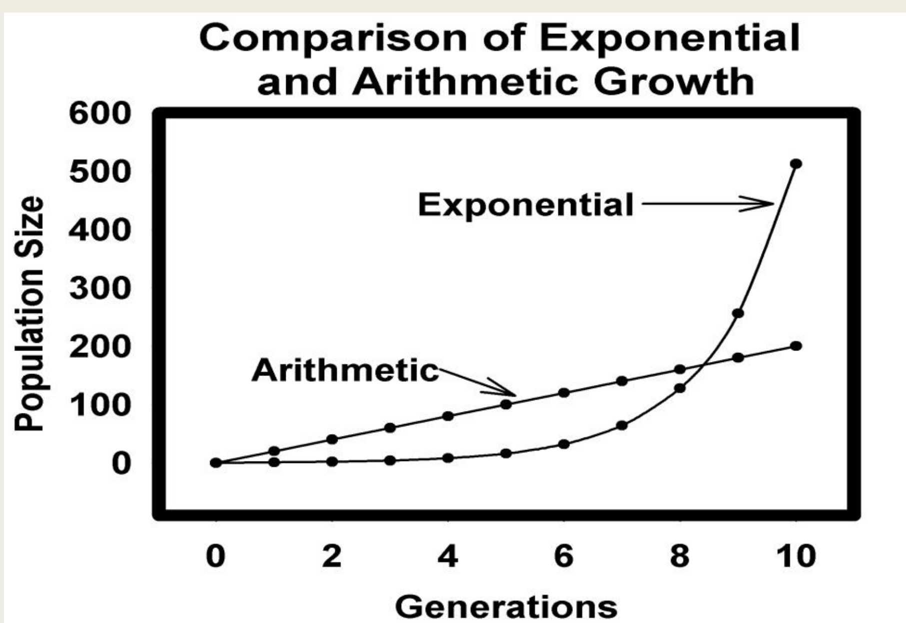
- **In logistic growth,** a population growth rate gets smaller and smaller as population size approaches a maximum imposed by limited resources in the environment, known as the carrying capacity.
- logistic growth produces an **S-shaped curve**.



Carrying capacity for a species or populations relies on the amount of **available resources**, **population size** and the **resources** each individual in the population **consumes**.

Carrying capacity is the maximum number of a species, including humans, an environment can support indefinitely.

when the number of individuals gets large enough, resources start to get used up, slowing the growth rate.



Population will:

01

Grow when resources are in surplus,

02

Decline when resources are scarce,

03

stabilize when the population is at the maximum level that can be sustained.

A general equation for the **population growth rate**

the Malthusian parameter.

- $Population\ growth\ rate = \frac{dN}{d\,t} = R\ N$

change in number of individuals in a population over time

N: population size,

T: time,

R: is the per capita net rate of increase

The population will change with time.

How quickly the population grows per individual already in the population.

If we assume no movement of individuals into or out of the population, r is just a function of birth and death rates.

- where **R = (r − m)**, k is the so-called **"net growth rate"**, i.e birth rate minus mortality rate.
- $\boldsymbol{r}$ = per capita birth rate = $\dfrac{\text{number births per year}}{\text{population size}}$
- $\boldsymbol{m}$ = per capita mortality rate= $\dfrac{\text{number deaths per year}}{\text{population size}}$

Thus,

The rate of change of **N** will be due to births, $\boldsymbol{r}$, (that increase N) and deaths, $\boldsymbol{m}$, (that decrease it).

$$\boxed{\text{Rate of change of N} = \text{Rate births} - \text{Rate deaths}}$$

Notes:

- the total number of births into the population in year t is **rN**, and the total number of deaths out of the population in year t is **mN**.
- The rate of change of the population as a whole is given by the derivative dN/dt.
- Then:

$$\boxed{\frac{dN}{dt} = rN - mN = (r - m)N = RN}$$

- The population will grow provided R > 0 which happens when r − m > 0 i.e. when the per capita birth rate, r exceeds the per capita mortality rate m.
- If R < 0, or (r < m) then more people die on average than are born, so that the population will shrink.

- The equation above is very general, and we can make more **specific forms** of it to describe two different kinds of growth models: **exponential** and **logistic**.
- When the *per capita* net rate of increase (R) takes the same positive value regardless of the population size, then we get **exponential growth**.
- When the *per capita* net rate of increase (R) decreases as the population increases towards a maximum limit, then we get **logistic growth**.

$$\frac{dN}{d\,t} = R\,N$$

- **Exponential Growth**
- Per capita growth rate (r) doesn't change even if population gets very large.
- $\frac{dN}{d\,t} = R_{max}\,N$

- **Logistic Growth**
- Per capita growth rate (r) gets smaller as population approaches its max. size.
- $\frac{dN}{d\,t} = R_{max}\left(\frac{K-N}{K}\right)N$

$\mathbf{K-N}$: tells us how many more individuals can be added to the population before it hits carrying capacity.

$\left(\frac{\mathbf{K-N}}{\mathbf{K}}\right)$**:** the fraction of the carrying capacity that has not yet been "used up." The more carrying capacity that has been used up, the more the $\left(\frac{\mathbf{K-N}}{\mathbf{K}}\right)$ term will reduce the growth rate.

Notes:

- When the population is tiny, N is very small compared to K.
- Then $\left(\frac{K-N}{K}\right)$ term becomes approximately $\left(\frac{K}{K}\right)$, or 1 , giving us back the exponential equation. this explains why the population grows near-exponentially at first, but levels off more and more as it approaches K.

Thank you