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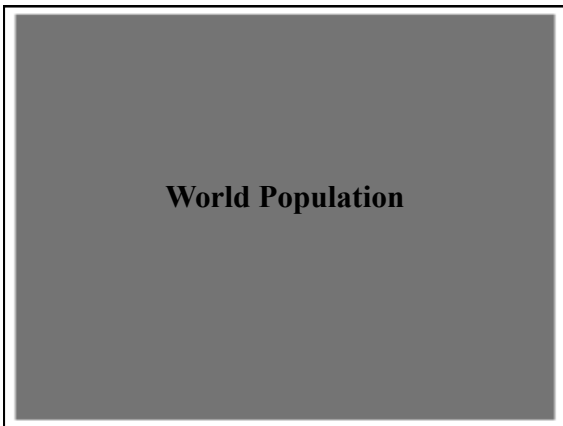
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**World Population Numbers**

- In 1999 the world's population reached 6,000 billion (now 7.3 billion)
- 360,187 people are estimated to be born every day (140,348 die). 250 are born each minute (103 die).

An illustration showing a group of diverse people of various ethnicities and ages standing on a globe. The globe is depicted as a wireframe sphere with green continents. The people are standing on the Americas side of the globe.

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### Worldometer

■ <http://www.worldometers.info/world-population/>

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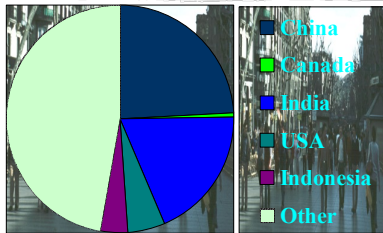
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### World Population Distribution



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### World Population Distribution

19.2% of population is from China  
17.5% from India  
Next is 4.5% from the U.S.  
Canada is 37<sup>th</sup> at .49%

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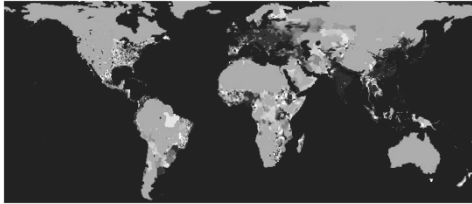
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### World Population Distribution II



Where we live - global population densities.  
Density is indicated by the intensity of colour.

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### World Population

- When human population was small, our impact on world systems was fairly insignificant.
- Population numbers now have tremendous implications for the planet in terms of resource use, pollution and impact on the physical landscape.
- The effects on a per capita basis are greatest in the more developed countries.

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### Demography

- Is the statistical study of human populations
- Causes and consequences of population change
- Decisions are made based on these findings (number of schools, classrooms, etc) businesses (family size, income, consumer habits for marketing)

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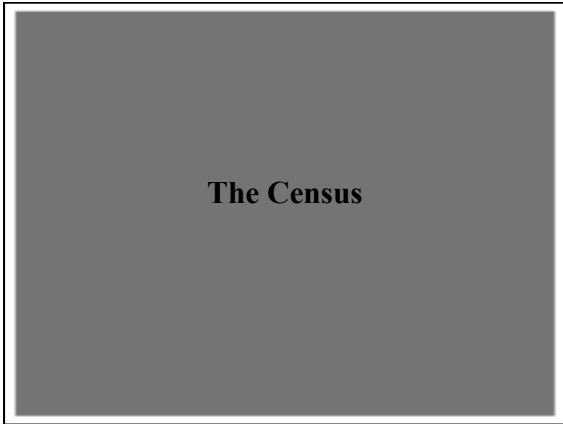
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### The Census

- Population study depends on accurate counts. Fortunately, nearly every country attempts to do this regularly.
- This count is called a census and it is conducted every 10 years. In Canada we count numbers every 5 years.
- Countries gather considerable information about their people, including demographic and social characteristics.



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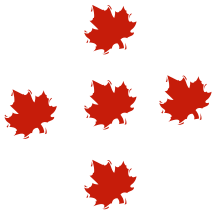
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### The Census II

- Canadian data is made available through Statistics Canada
- <http://www.statcan.gc.ca/start-debut-eng.html>



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## The Census III

- Economic & population data is made available to those who wish it.
- Businesses and governments find this data invaluable.



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## The Census IV

- Businesses use census data to determine particular markets and identify sources of labour.
- Governments use census data to plan the delivery of services, plan taxation measures, and to allocate political representation by population.



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## The Census V

Canada's population in April 2015 was around  
**35,749,600**

British Columbia's population in 2011 was about  
**4,400,057**

Greater Vancouver's population was about  
**2,313,318**

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## Vital Statistics

■ Between each census, governments continue to monitor demographic information, keeping track of

- Births
- Deaths
- Immigration
- Emigration



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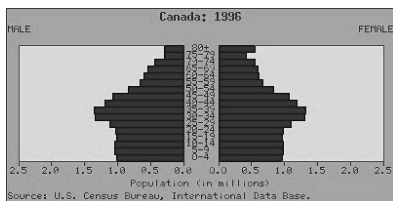
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## Population Pyramids

## Population Pyramids

■ One of the most useful ways of showing population structure is through an age-sex graph called a population pyramid.



Canada's population structure at the last census.

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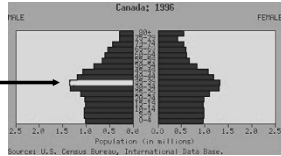
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## Population Pyramids II

- Population Pyramids are really two sets of bar graphs, side by side.
- Each bar represents a cohort - a group fitting within a specific age range.

The yellow bar represents the % of Canada's population that is male, between ages 35-39




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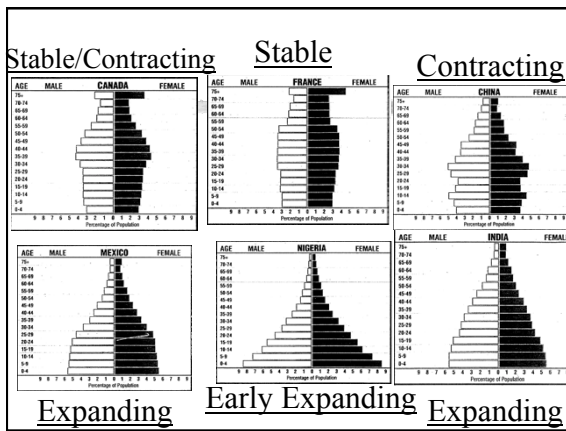
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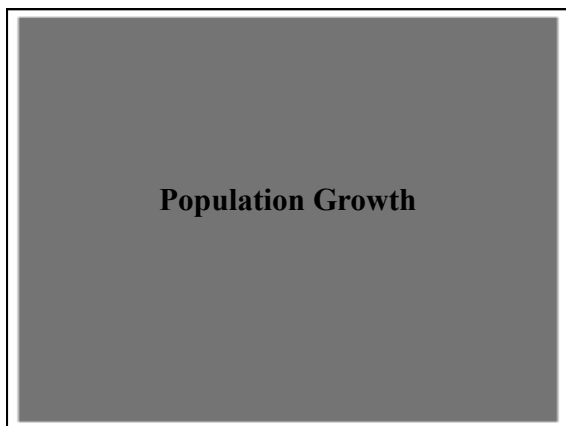
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## Birth/Fertility Rates

- Birth rates give the number of live births per thousand of population in a year.

$$\frac{\text{Total live births}}{\text{Total population}} \times 1,000$$

- The general fertility rate measures births relative to thousands of women between 15 and 44.

$$\frac{\text{Total live births}}{\text{Total women between 15-44}} \times 1,000$$




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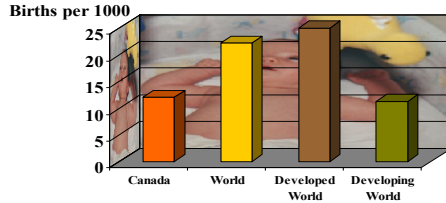
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## Birth Rates

- Birth rates vary enormously from country to country.

1998 Birth Rates




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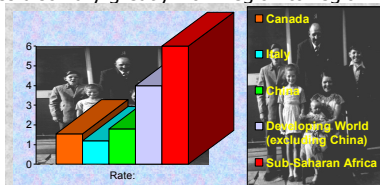
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## Fertility Rates

- The total fertility rate measures how many children an average woman in a particular country has.
- Replacement rates for a population is usually cited as 2.1.
- Rates also vary greatly from region to region.




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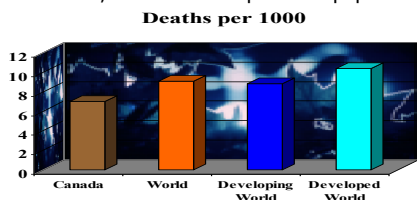
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## Mortality Rates

- Births give only one part of the story.
- Population numbers must also consider deaths.
- Like births, it is calculated per 1000 population.




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## Mortality Rates II

- Reasons for mortality must also be considered.
- A rate may be high because of high infant mortality or because of a large percentage of older people in the population.

Death Rate:

$$\frac{\text{Total deaths}}{\text{Total population}} \times 1000$$

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## Age Specific Death Rate

- A more meaningful comparison of death rates between countries takes into account the age structures of respective populations.

Age Specific Death Rates

$$\frac{\text{Total deaths of people aged 5-9}}{\text{Total number of people aged 5-9}} \times 1000$$

or

$$\frac{\text{Total deaths of people aged 65-69}}{\text{Total number of people aged 65-69}} \times 1000$$

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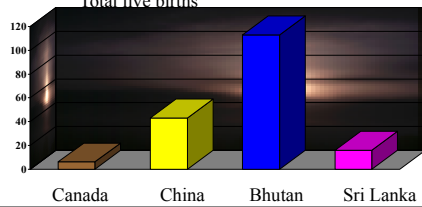
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## Infant Mortality Rate

- One of the most meaningful comparative mortality measures is infant mortality, deaths between birth and one year of age.

Total deaths of infants under 1 year  
Total live births X 1000



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## Causes of Mortality

- In pre-industrial societies, mortality particularly targeted the very young.
- The age specific death rates for those under 10 and over 35 were markedly higher than for those between these ages.



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## Causes of Mortality II

- In the industrial and post-industrial worlds, the chief causes of death are degenerative diseases.
- Improved hygiene and sanitation has reduced the incidence of typhoid and cholera.
- Advances in health care through vaccination programmes and the use of antibiotics has reduced the impact of a wide range of diseases.

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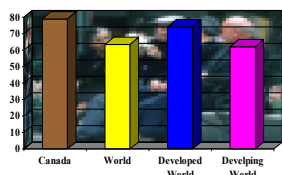
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## Life Expectancy

- Another useful comparative measure is life expectancy.
- This indicates how long the average person in a country might be expected to live from the time of birth.




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## Doubling Time

- The difference between the birth rate and the death rate has huge implications for population growth or shrinkage.
- The following equation can be used to estimate the number of years it will take for a population to double.
- This uses the “rule of 70”, which takes this figure as representing a generation’s lifetime.

$$\frac{70}{\% \text{ rate of growth of population}} = \text{years for population to double}$$

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## Doubling Time II

- Marked differences exist between countries in terms of doubling times.
- Some developed countries have shrinking populations.
- Some of the least developed countries have frighteningly short doubling times.

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### **Doubling Time III**

- Immigration & emigration should also be considered.
- If a population is “closed” there is little to no in or out migration.
- Some countries have significant movement and are described as “open”.

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### **The Population Equation**

Use the following equation to calculate population change over time.

$$P2 = P1 + (B - D) + (IM - OM)$$

- P1 is the starting population size.
- P2 is the size after a particular length of time.
- B is the number of births between P1 & P2.
- D is the number of deaths between P1 & P2.
- IM is the number of in-migrants in the time period.
- OM is the number of out-migrants in the time period.

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### **Theories of Population Growth**

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## Thomas Malthus



Thomas Malthus  
1766-1834

- Thomas Malthus is often regarded as the father of demography, the study of population.
- Malthus looked at the rate of population growth and concluded that food production could not possibly increase fast enough to be sufficient.

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## Thomas Malthus - II



- From his assessment of population growth, he concluded that, if allowed to grow unchecked, populations rose at a **geometrical rate**.

(1, 2, 4, 8, 16, 32, 64, 128, 512, etc.)

- He believed food production only increased arithmetically.

(1, 2, 3, 4, 5, 6, 7, 8, 9, etc.)

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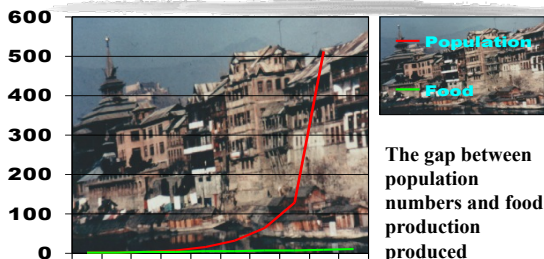
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## Thomas Malthus - III



The gap between population numbers and food production produced "misery".

The shape created by the population line is referred to as the "J-curve."

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### Thomas Malthus - IV



■ Population could not continue to grow in such circumstances. Natural checks prevented this from happening. Malthus classified these as two types:

Positive checks - factors increasing mortality: war, famine & pestilence.

Preventive checks - factors reducing fertility: moral restraint, contraception & abortion.

■ Malthus concluded that moral restraint was necessary to avoid misery.

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### Thomas Malthus - V



■ Malthus' theory, which he published in his ***Essay on the Principle of Population*** in 1798 and in five further editions up to 1826, has been considered essential reading ever since by those interested in population.

■ His pessimistic conclusions have been supported and challenged by virtually every generation since his time.

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### Karl Marx



■ Better known for his political and economic theories, Marx also came up with a "law of population".

■ Marx rejected Malthus' belief in natural laws controlling population.

■ He believed that capitalism created population growth in order to create a vast pool of cheap labour.

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## William Catton

- In his book *Overshoot: The Ecological Basis of Revolutions*, Catton links population with the carrying capacity of ecosystems.
- A given region has a particular number of people that it can support without causing environmental damage.

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## William Catton - II

- The basic carrying capacity of an area can be exceeded -- but at the cost of drawing down available reserves, with huge implications for the future.
- Catton argues that the West began to do precisely this in the 16th and 17th centuries and has continued to do so ever since, in the mistaken belief that the earth's bounty is limitless -- what Catton calls "the cornucopian myth."

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## William Catton - III

- Modernity has, according to Catton, bred a delusional belief in the inherent ability of man to find technological solutions to his problems.
- In addition, population growth has been so rapid as to require rapid adoption of new technologies without allowing us enough time to adequately assess their impact.

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## William Catton - IV

- Man has, in his estimation, “overshot” the world’s carrying capacity.
- We have lived beyond our means and must, at some point, pay the price.
- Catton expects economic collapse and, consequently, a devastating rise in mortality.
- He sees a new equilibrium coming about after this catastrophe, but, because we have borrowed from the future, this level will be very much lower than it was before we embarked on our profligate ways.

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## Esther Boserup

- While Malthus and Catton are pessimistic, Esther Boserup is optimistic.
  - Her basic premise is that extra people do more work and bring more thought to bear on human problems.
  - Mankind’s limitless inventiveness is brought to bear, solving problems as they arise.

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## The Demographic Transition

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### The Demographic Transition Model

- Declining fertility was noted in many countries in the period after World War I. The Demographic Transition Model notes this change, but does not explain it.
- It notes that populations arrive at a balance and adjust to changing conditions in short time frames.
- Many do not believe that catastrophe is inevitable. They see man as quite able to foresee potential disasters and to make the necessary adaptations to avoid them.

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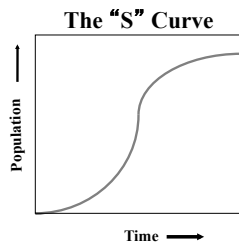
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### Demographic Transition Model



- The demographic transition model notes that development resulted in rapid population growth, but that developed societies reacted to this reduction in fertility.
- The characteristic "S" curve indicates that population growth has stopped.

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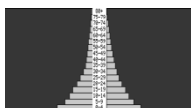
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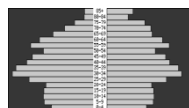
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### Demographic Transition Model II

- A glance at the differences in population pyramids between less developed and more developed countries clearly shows this demographic shift.



Mali, 1998  
(Less Developed)



Germany 1998  
(Developed)

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### Demographic Transition Model III

- The high birth rate/high mortality rate balance of primitive societies is lost as development brings improvement in health and sanitation, which reduces mortality. This is particularly true in the late 20th century.
- Population rises as a result.
- Fertility declines as people reduce the size of their families.
- Eventually a population balance re-establishes itself and **Zero Population Growth** is achieved.

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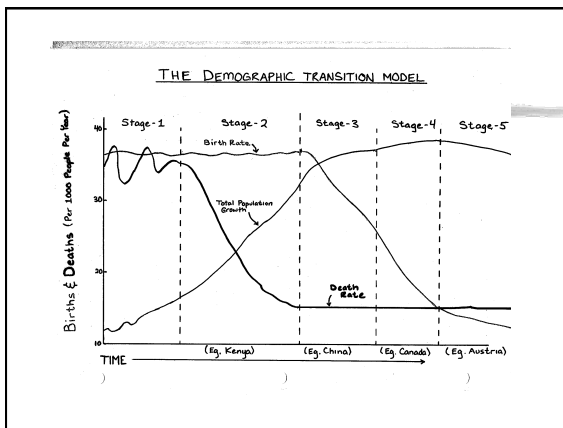
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### Demographic Transition Model IV

- No entire countries are at the **primitive stage** (stage 1) in the model today, though some very remote tribal people within a country might exist at this level.



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### Demographic Transition Model V



- Nations at stage 2 and 3 are developing countries.
- They often have population growth rates of 2-3% per year.
- Age structures include a large number of young people.

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### Demographic Transition Model VI

- Nations at stage 4 are developed.
- Economic stability has been achieved.
- A high cost of living and the prolonged period of dependency for youths make large families impractical.



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### Urbanization

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### Urbanization

- Another aspect of development is the increasing size and importance of cities.
- Urban dominance in the developed world became apparent in the first half of the 20th century.
- The second half of this century has seen tremendous growth in the cities of the developing world.
- Humanity has become a largely urban species and the trend strengthens with every passing year.

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### Urbanization II

- |                                   |  |
|-----------------------------------|--|
| ■ World's largest cities in 1900: | ■ World's largest cities in 2015 (projected) |
| London 6.4 million                | Tokyo 28.7 million                           |
| New York 4.2 million              | Bombay 27.4 million                          |
| Paris 3.3 million                 | Lagos 24.4 million                           |
| Berlin 2.4 million                | Shanghai 23.4 million                        |
| Chicago 1.7 million               | Jakarta 21.2 million                         |

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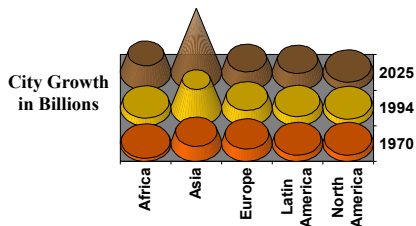
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### Urbanization III

- By 2005 it is predicted that, for the first time, a majority of people will live in cities.



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### Urbanization IV

- Urban growth rates are much faster than population growth rates as a whole.
- In developing countries the overall rate is 1.9%, but the urban growth rate for cities is around 3.5%.
- *The World Resources Institute* estimates that for every 1% increase in national population brings a 1.7% growth in urban population.

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### Urbanization V



- In the developing world city growth places tremendous pressure on urban infrastructure.
- Water and air quality are stressed.
- Open spaces are encroached upon.
- High rates of unemployment, homelessness and crime are an understandable outcome.

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### Urbanization VI

- Despite the huge problems faced by the inhabitants of slums, shantytowns, barrios and favelas, there is still great optimism.
- Cities, with their size and complexity, offer a wide range of opportunities unavailable in rural economies.



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# Why are cities where they are?

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## Why are Cities Where they are?? (Factors affecting population density)

- Population Density: The number of people living in a particular area of space (Often measured in terms of how many people per square kilometer)
- Ex. In 2010 Canada had an average population density of 3.41 people per square km
  - Number of people in Canada by the number of square kms
  - $\frac{34,048,000 \text{ People}}{9,984,679 \text{ km}} = 3.41 \text{ people per square km}$
- Vs. Japan
  - $\frac{128,842,000}{3,77,835} = 341 \text{ people per square km}$

WOW!! This means that on average in every square km in Canada there is only 3.41 people while in Japan there is an average of 341 people per sq km – 100 times more!




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## Why are Cities Where they are?? (Factors affecting population density)

- What can change:
  - Regarding the 2 equations we saw, can you see the two variables that affect a country's population density?
  - If you said the # of people and the amount of land in a country you are correct!
  - What would happen to a country's average population density if you:
    - Increased the number of people in the same amount of land?
      - Average population density would increase
    - Increased (somehow) the amount of land for the same number of people?
      - Average population density would decrease

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## Why are Cities Where they are?? (Factors affecting population density)

- Where do people actually live?
- Of course, people are not spread out evenly across any country
- There are areas with more people per km squared = distribution of people across any country
- Do people choose where to live randomly?
  - No.

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## Accessibility

- Accessibility
  - How easy an area is to get to and from
    - Eg. Isolated areas that are difficult to reach are often less populated than areas that are easily reached



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## Climate

- The most common weather conditions in a certain area (temperature, precipitation, wind, sunshine etc)
  - Eg. Areas with temperate or moderate climates (not too hot or too cold) are often more heavily populated



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## Landscape

■ Refers to the physical terrain in a certain area (mountainous, hilly, flat plains etc.)

■ Eg. Often, areas that are more flat and suitable for building are more heavily populated than areas consisting of severe landscape obstacles



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## Resources

■ Any items that can be converted into money; assets

■ Eg. Many cities are located where they are because of the availability of resources to help people earn a living. Copper mining, lumber & fishing are all resources that will draw in more people to an area.

■ Until they run out of course...



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## Other examples

■ Soils (farming)

■ Vegetation

■ Water

■ Unless...



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**Writing a Report**

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**Assignment**

- You will now choose a country and put together a population report which must include the following:
  - Current population with % of total world population **SHOW YOUR WORK**
  - Population pyramid of your country comparing it to the population pyramid of another country (should be different types) – this will include a one-paragraph discussion about these differences
  - Birth Rate, Fertility Rate, Mortality Rate, life expectancy, doubling time
  - Location on the Demographic transition model (one-paragraph explanation of the stage and examples)
  - 3 factors affecting population distribution (connection between population and influencing factors)

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