Population Geography Class 1.2

Last time

- What is population geography? (and how it’s similar/different from demography)
- Course objectives and evaluation
- How a population changes:

  Fertility – Mortality +/- Migration
Objectives for Today:

1. Explain the difference between crude and specific rates.

2. Define, calculate, and apply key measures in Demography: CDR, CBR, life expectancy, RNI, population growth rate, doubling of population

3. Understand how mortality is linked to population growth historically and implications for regional and global population growth in the near future

4. Relate Population Momentum & Age and Gender Structure to Population Change
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Demographic/Mortality terms & Mortality transition

Today’s Agenda

1. Terms, concepts, & calculations of CDR, CBR, RNI, population doubling, and THE MEANING OF LIFE expectancy.

2. Introducing…The Mortality Transition & historical shifts in population

3. Population Pyramids: What do they mean?

3. Wrap-up
RATE vs RATIO

What’s the difference?

Is a rate a ratio?
...All rates are ratios

Rate: A comparison of 2 measurements with different units (often with time in the denominator).
  -e.g. miles/hour
  -But: could also be CBR = births/1000 people

Rate of increase:
  -Percent increase in a rate
  -e.g. a car traveling at 25 mph then travels at 50mph, a 100% increase.
  -e.g. a CDR of 20 decreases to 10, a 50% decrease.

Ratio: A comparison of numbers with the same units
  -e.g., sex ratio= men/women (are these the same units?…what if they’re eunichs!)
Crude Birth Rate (CBR): Births/1000 individuals in a year

Crude Death Rate (CDR): Deaths/1000 individuals in a year

- Crude rates may be misleading:
  - e.g., CDR, US (8.3) vs. Mexico (4.7)
  - What’s going on here?
  - Are tortillas the elixir of youth??
Life Expectancy at Birth

Life Expectancy (Eo) =
Average # years of life for people born in a given year based on current age-specific death rates (e.g. death rates for people at each year of age)

• Poorest LDCs $E_o < 50$ (Southern Africa-35!)
• Sweden, Canada $E_o = \sim 80$ (US 78)
Rate of Natural Increase

Rate of Natural Increase (RNI) =
CBR - CDR (No Migration)

CBR > CDR = ↑ population

RNI usually expressed as % e.g., 2% = 2/100 = 20/1000

RNI ≠ population growth if migration significant
RNI U.S. vs. Mexico

Mexico
CBR (21.4), CDR (4.7)
RNI = 16.7/1000 or 1.67%
yet...annual population growth rate of %1.2

US
CBR (14.1), CDR (8.3)
RNI=5.8/1000 or 0.58%
yet...annual population growth rate at nearly %1.0 –v. close to Mexico’s!

Why?
+ net migration of 3.4 migrants/1000
vs. Mexico – net migration of 4.2/1000
Putting it all together
(accounting for migration)

Population Growth Rate

CBR – CDR +/- Net Migration Rate

------------------------------------------

1,000
At first there is only one lily pad in the pond, but the next day it doubles, and thereafter each of its descendants doubles. The pond completely fills up with lily pads in 30 days. When is the pond exactly half full? - Old French riddle
Not just lily pads: What else grows like this?

1. In a matter of seconds…
2. At a decadal scale…
Population Doubling Time

Doubling Times and the Rule-of-70

The **Rule-of-70** provides a simple way to calculate the approximate number of years it takes for the level of a variable growing at a constant rate to double. This rule states that the approximate number of years $n$ for a variable growing at the constant growth rate of $R$ percent, to double is

$$n = \frac{70}{R}.$$
Examples

• CD rates: e.g., 3% annually

• S&P 500 average gains historically: e.g., 7% annually

• Late 90’s NASDAQ: 30% annually

• World’s population growth until 10,000 years ago: The rate was 0.0005% annually (What happened 10,000 years ago?)

• World’s population growth today: 1.2% annually
Human Population Growth Over Time

So is the *rate* of growth of the global population increasing?
1 Million Years of Population Growth: Deevey’s Logarithmic Growth Curve

World Population Growth
1750–2150

Demographic Transition

THE DEMOGRAPHIC TRANSITION MODEL

STAGE ONE (Pre-Modern)
STAGE TWO (Urbanizing/Industrializing)
STAGE THREE (Mature Industrial)
STAGE FOUR (Post Industrial)

CBR, CDR RATE PER 1000

TOTAL POPULATION

YEAR

Source: K. Montgomery, Department of Geography and Geology, University of Wisconsin.
http://www.uwmc.uwc.edu/geography/Demotrans/demtran.htm
Transition
Population Momentum

Source: U.S. Census Bureau, International Data Base.
Population composition measures + concepts

- **Sex Ratio = \#males/100 females**
- 105 at birth naturally

Saudi Arabia 122

China 116! (at birth, 2004 UN report)

Germany 96 (at birth 106)

Russia 87
Population composition measures + concepts

• Age Structure (key to understanding population momentum)

• Fertility most important, also mortality and migration

• Median age (Africa teens; US mid 30s)
Population composition measures + concepts

Dependency Ratio

\[ \left( \frac{P_{(<15)} + P_{(>65)}}{P_{(15-65)}} \right) \times 100 \]

- What is the consequence of a rapid Demographic Transition on the Dependency Ratio?
Population Pyramid for Kenya
Expanding

Source: U.S. Census Bureau, International Data Base.
Population Pyramid for Mexico

Source: U.S. Census Bureau, International Data Base.
Population Pyramid for United States

United States: 2004

Source: U.S. Census Bureau, International Data Base.
Population Pyramid for Denmark

Contracting

Source: U.S. Census Bureau, International Data Base.
Review:

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With whom do we visit with next class....
The Grim Reaper!!!!