

AREC 345: Global Poverty & Economic Development

Lecture 3:

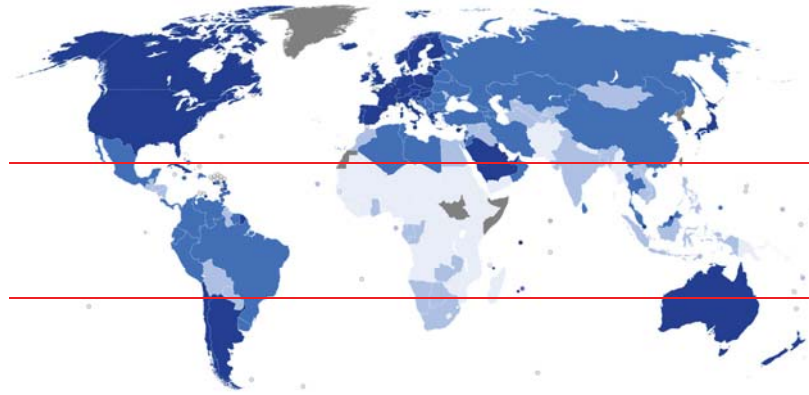
Does Geography Explain African Underdevelopment?

Professor: Pamela Jakiela

Department of Agricultural and Resource Economics
University of Maryland, College Park

Does Geography Explain Underdevelopment?

Tropical Geography



Tropics:

*“At the root of Africa’s poverty
lies its **extraordinarily disadvantageous geography**,
which has helped to shape its societies
and its interactions with the rest of the world...*

*As consequences of its **climate, soils, topography, and disease ecology**,
Africa suffers from chronically low productivity (esp. food production),
high disease burdens, and very low levels of international trade.”*

— Bloom and Sachs (1998)

*“On a map of the world in terms of product or income per head,
the rich countries lie in the temperate zones,
particularly in the northern hemisphere;
the poor countries, in the tropics and semitropics.”*

— David Landes (1998)

*“You will find in the climates of the north,
peoples with few vices, many virtues, sincerity, and truthfulness.
Approach the south, you will think you are leaving morality itself,
the passions become more vivacious and multiply crimes...
The heat can be so excessive that the body is totally without force.
The resignation passes to the spirit
and leads people to be without curiosity,
nor the desire for noble enterprise.”*

— Montesquieu (1748)

Fact: Incomes Are Lower in Tropical Countries

PPP-adjusted GDP per capita in 2010:

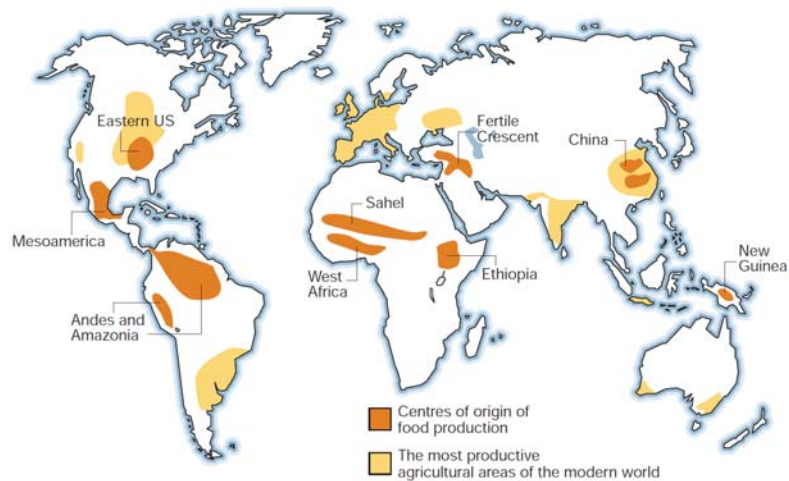
- In tropical economies: \$7,625
- In non-tropical economies: \$24,592
- In tropical Africa: \$3,129
- In non-tropical Africa: \$16,611

Fact:

Question: why might being tropical cause slower development?

- **Answer:**

Fact: Agriculture Is Less Productive in the Tropics



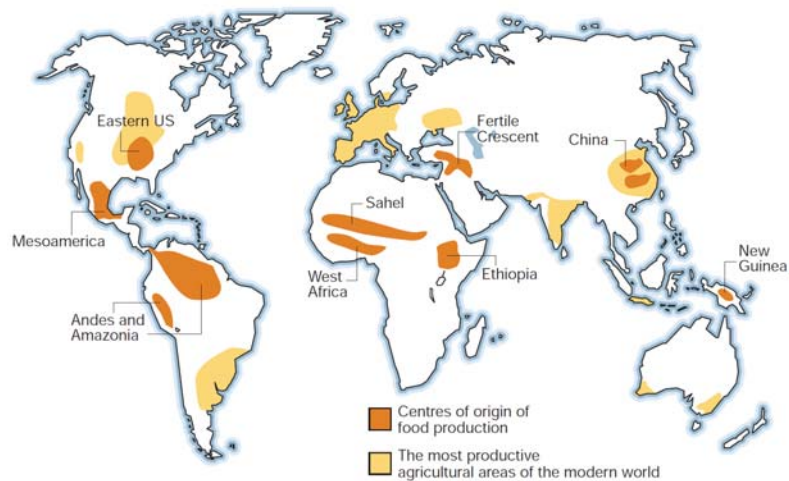
Source: Diamond (*Nature*, 2002)

Fact: Agriculture Is Less Productive in the Tropics

Climatic and ecological factors explaining low agricultural productivity:

- Higher temperatures at sea level
 - ⇒ Plant photosynthesis less productive
- About twelve hours of daylight year round
 - ⇒ Many crops less productive than in temperate summers
- Prevalence of rain forests
 - ⇒ Nutrients held in plant matter, not soil; lost with deforestation
- Precipitation patterns (monsoon vs. dry season)
 - ⇒ Rain falls in short, intense bursts

Plant, Animal Domestication Depended on Luck



Source: Diamond (*Nature*, 2002)

Plant, Animal Domestication Depended on Luck

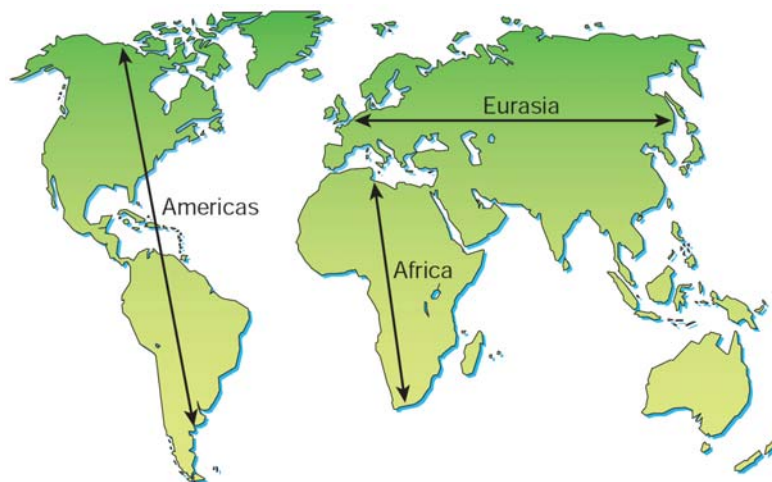


Source: Diamond (*Nature*, 2002)

Wild ancestors of plants, animals that were domesticated differ from species that weren't; those suitable for domestication were quite rare

- Zebras are close relatives of horses, but with incredibly good peripheral vision that prevented humans from capturing them
- Almonds are closely related to acorns, but the mutation that makes them edible is not passed from one generation to the next in acorns

Plant, Animal Domestication Depended on Luck



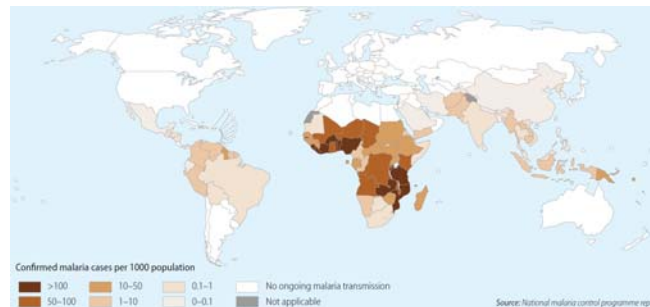
Source: Diamond (*Nature*, 2002)

Tropical Diseases

Diseases are often specific to ecological or climatic environments

- Tropics: no freezing, except at high altitudes
 - ⇒ Diseases such as malaria, schistosomiasis can survive, and are difficult to eradicate; but are not present in temperate regions
- Africa may be a uniquely challenging disease environment
 - ▶ Humans evolved there, and so did diseases that attack humans
- Many temperate diseases have been eradicated

Tropical Diseases: Malaria

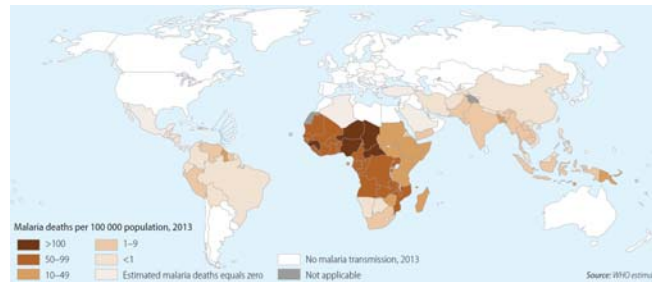


Source: World Malaria Report 2014

Malaria is a disease that infects humans through a mosquito vector

- Most dangerous variants confined to tropics, esp. tropical Africa

Tropical Diseases: Malaria



Source: World Malaria Report 2014

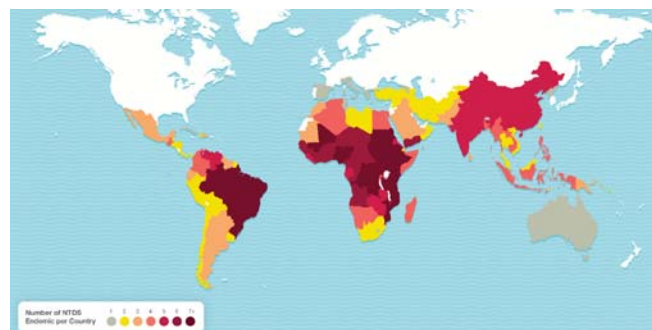
In 2013, there were 198 million cases of malaria and 584 thousand deaths

- 163 million cases and 528 thousand deaths were in Africa
- 78 percent of the deaths were children under 5 years of age

Neglected Tropical Diseases

Neglected tropical diseases such as dengue and sleeping sickness kill more than 500 thousand people per year, mostly in the tropics

The most common NTDs (e.g. **soil-transmitted helminths**) are not fatal, but can lower productivity through their debilitating effects



Does Geography Matter?

Testing the Geography/Endowments Hypothesis

Null hypothesis (H_0):

- H_0 : geography doesn't impact current economic development

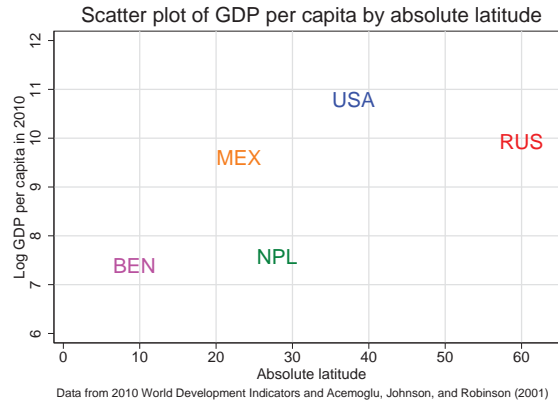
Variables:

Variable	Mean	S.D.	Median	Min.	Max.	Obs.
GDP per capita in 2010	16,326.20	18,663.14	9,781.28	619.63	124,785	156
Log GDP per capita in 2010	9.04	1.26	9.19	6.43	11.73	156
Absolute latitude	26.49	17.13	24.00	0	65	161
Africa	0.28	0.45	0	0	1	161
South Asia	0.04	0.20	0	0	1	161

Q: what is the relationship between latitude and income per capita?

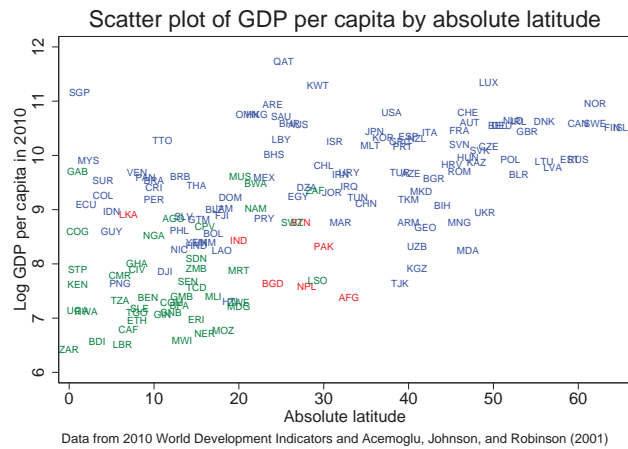
Testing the Geography/Endowments Hypothesis

A **scatter plot**: a graph that displays the values of (typically) two variables as a system of Cartesian coordinates



Testing the Geography/Endowments Hypothesis

Q: what is the relationship between latitude and income per capita?

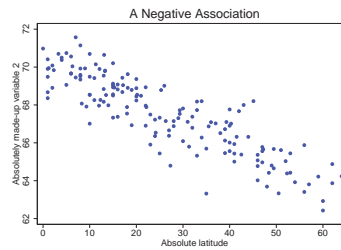
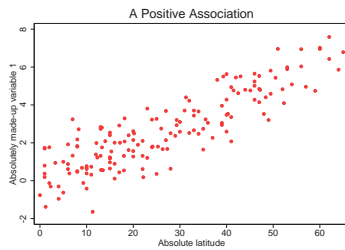


Testing the Geography/Endowments Hypothesis

Q: what is the relationship between latitude and income per capita?

Other ways of asking the same question:

- On average, do countries that are further from the equator (i.e. those with higher absolute latitudes) have higher incomes?
- Is there a **positive association** between latitude and income?



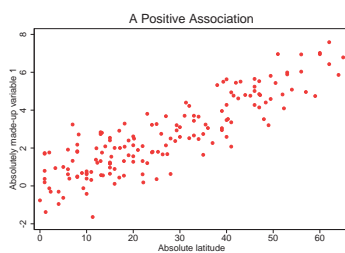
AREC 345: Global Poverty & Economic Development

Lecture 3: Does Geography Explain African Underdevelopment?, Slide 24

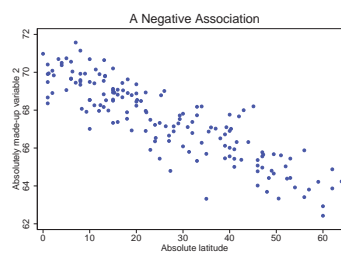
Testing the Geography/Endowments Hypothesis

The **correlation coefficient** is

- Correlation = 1 indicates a strong, positive association
- Correlation = 0 indicates no association
- Correlation = -1 implies strong, negative association



correlation = 0.872

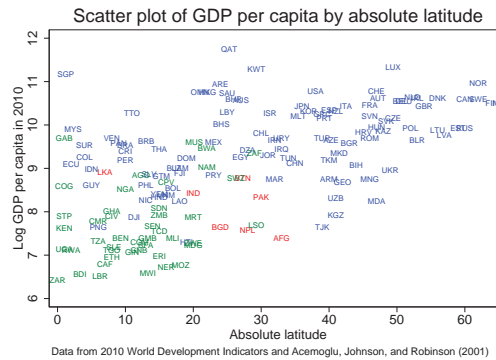


correlation = -0.875

AREC 345: Global Poverty & Economic Development

Lecture 3: Does Geography Explain African Underdevelopment?, Slide 25

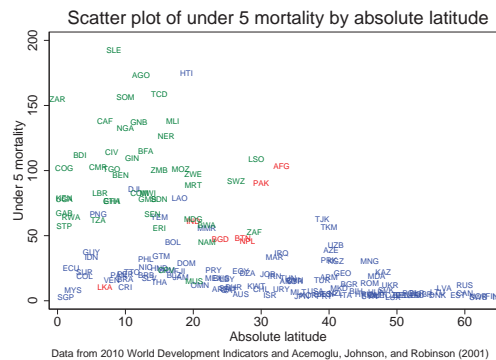
Testing the Geography/Endowments Hypothesis



Q: What is the correlation between income and latitude?

A:

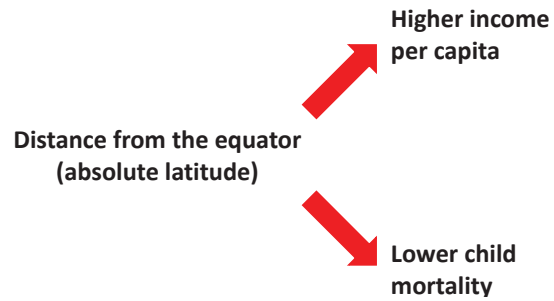
Testing the Geography/Endowments Hypothesis



Q: What is the correlation between child mortality and latitude?

A:

Testing the Geography/Endowments Hypothesis



Unanswered questions:

- How much higher is income in temperate countries?
- How much of the variation in income is explained by geography?
- Does tropical geography *cause* underdevelopment?

Study Guide: Key Terms

- tropics
- malaria
- neglected tropical diseases
- soil-transmitted helminths
- null hypothesis
- scatter plot
- positive association
- correlation