Population and Migration Visualization Project

Project 3 | Team 8

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What are relationships between the population density of a country and its migration trends?

Methodology

- CSV: Kaggle - Population and Migration Density from the World Bank 1960-2018

- The World Migration Report

  ➢ 10 countries with the highest number of emigrants

Photo by Neelakshi Singh on Unsplash

Ethical Considerations

➢ The World Bank terms of use allow for copying, distributing, adapting, displaying or including their data for commercial and noncommercial use at no cost under a Creative Commons Attribution 4.0 International License.

➢ Certain agreements are expected, including:

    ✓ Clear attribution to World Bank and particular dataset name or source (if known).

Methodology

- Libraries/Tools/Resources
  a. Transformation:
     CSV → JSON + GeoJSON
  b. Leafletjs
     i. HTML
     ii. CSS
  c. Charts.js

- MongoDB via Jupyter
  Notebook

Image generated using OpenAI's DALL-E, 2025.

Product 1: Leaflet Map
Hannah M.

Data

- Country data for 10 countries identified in the World Migration Report as having the highest migration numbers in 2020:
  - net migration rate
  - population density
- Geographic coordinates for each country's polygon

Map Layers

1. **Migration markers** that display country name and net migration rates by year.

2. Population density
   a. allows a user to select a year from a **dropdown menu**
   b. **Choropleth** to show a country's population density
   c. a **popup** shows country name, year, and density per sq/km.

Product 2: Chart.js Line Graph

Nathaniel T.

-Data is deployed into graphs using chart.js and a universal country key.

-To access run deployment from Index2 referencing the logicv5.js file.

-Country key allows user to populate all graphs simultaneously.

Migration and Population Visualization

Explore data trends in migration, population, and density over the years.
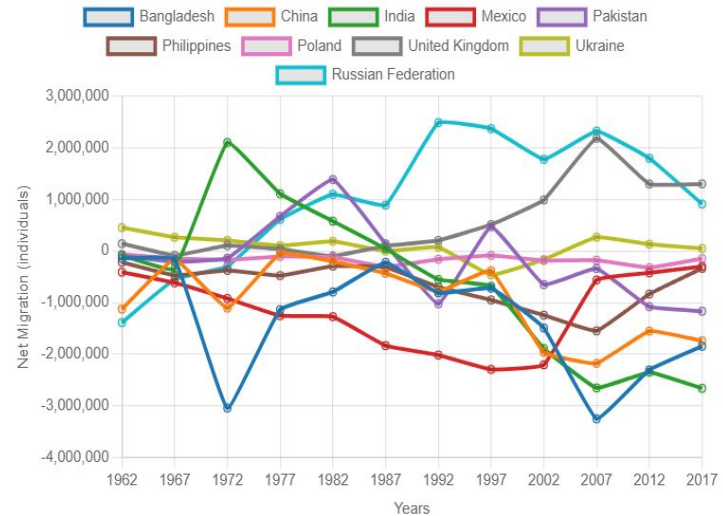
Universal Country Key

Bangladesh   China   India   Mexico   Pakistan   Philippines   Poland   United Kingdom   Ukraine   Russian Federation

Net Migration

- 1972 saw negative net migration in Bangladesh with positive net migration in India.

- High Net Migration in India, Russia, Pakistan, and the United Kingdom.

- Low Net Migration in India, Mexico, Bangladesh, China, Philippines.

- Negative net migration in Mexico prior to 2007. After 2007 relatively neutral.
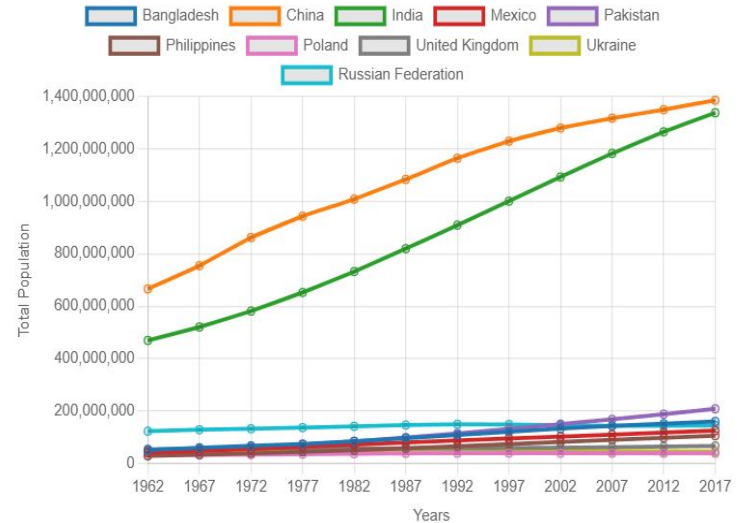

Net Migration (1962-2017)
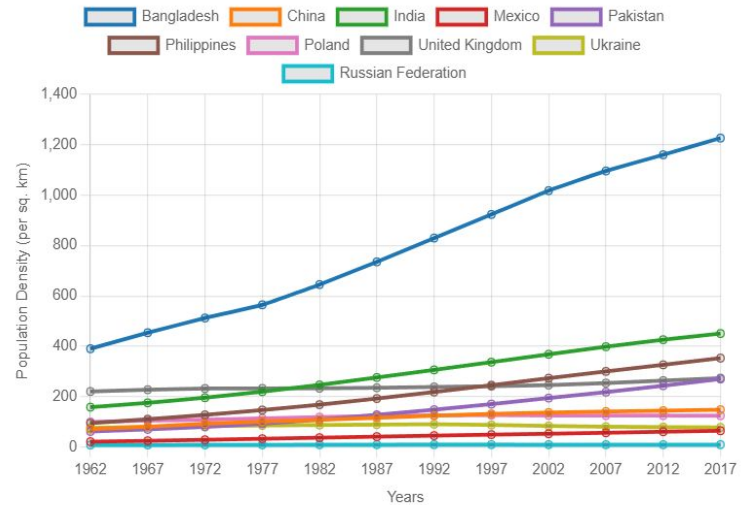
Total Population

- Total Population is highest in China and India

Population Density

- Increasing most rapidly in Bangladesh
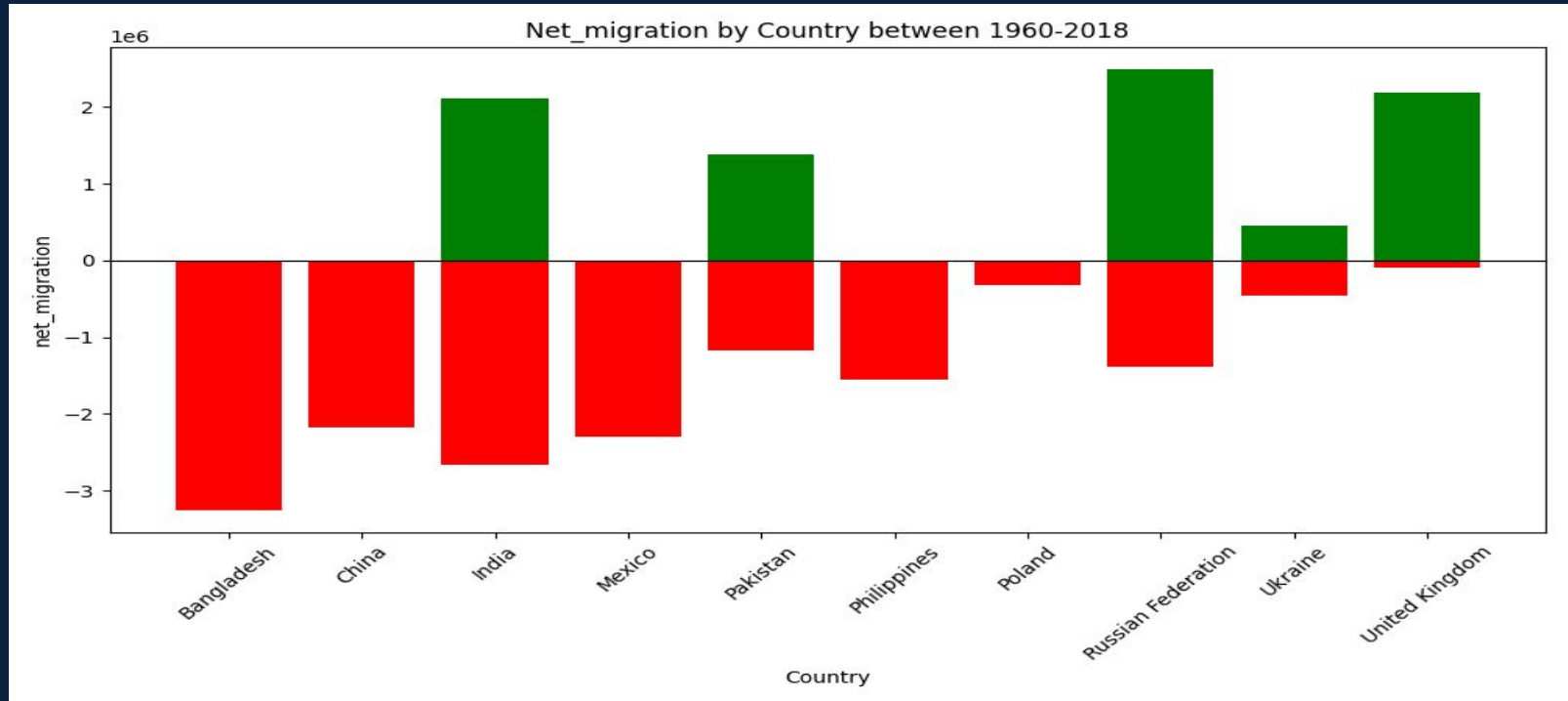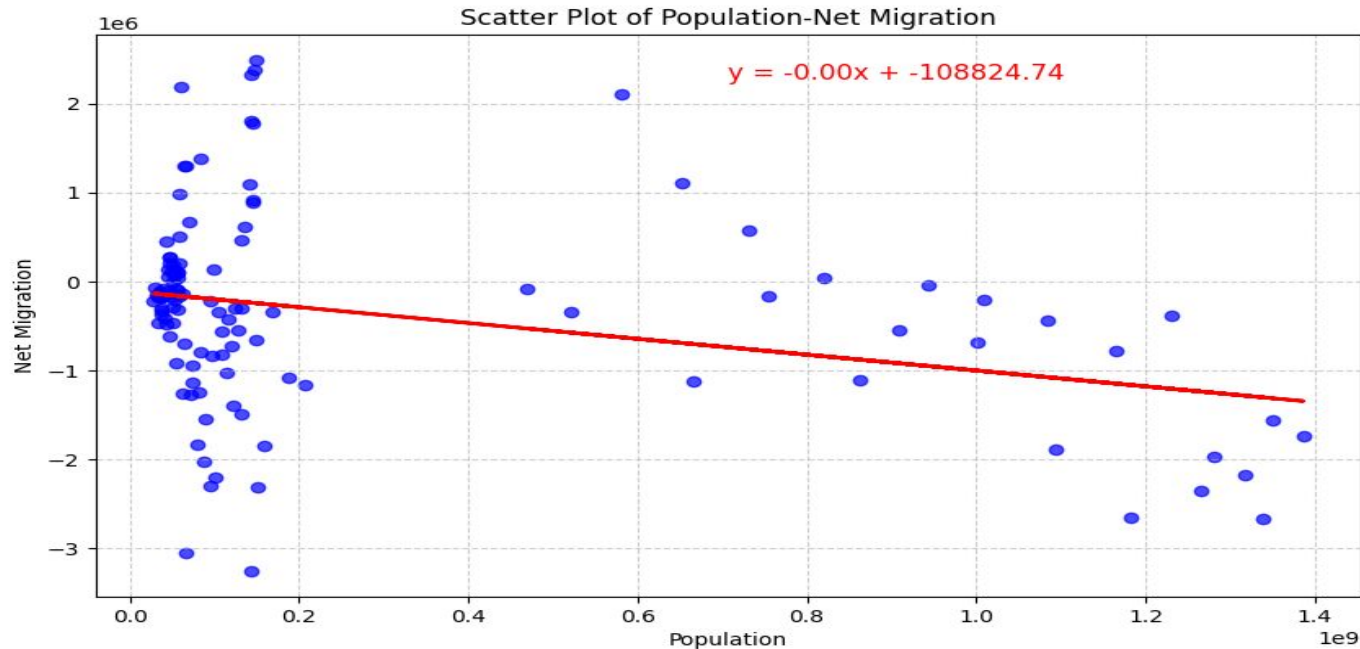- Also on the uptrend in India, Philippines, and Pakistan.

Analysis

- **Bangladesh**
  - High population density that is continuing to increase (due to geographic constraints)
  - Negative net migration
- Highest net migration historically
  - **India** - 1972
  - **Pakistan** - 1982
  - **UK** - 2007
- **Poland** has stable population density AND stable net migration rates.
- **Weak correlation for population density and negative net migration.**
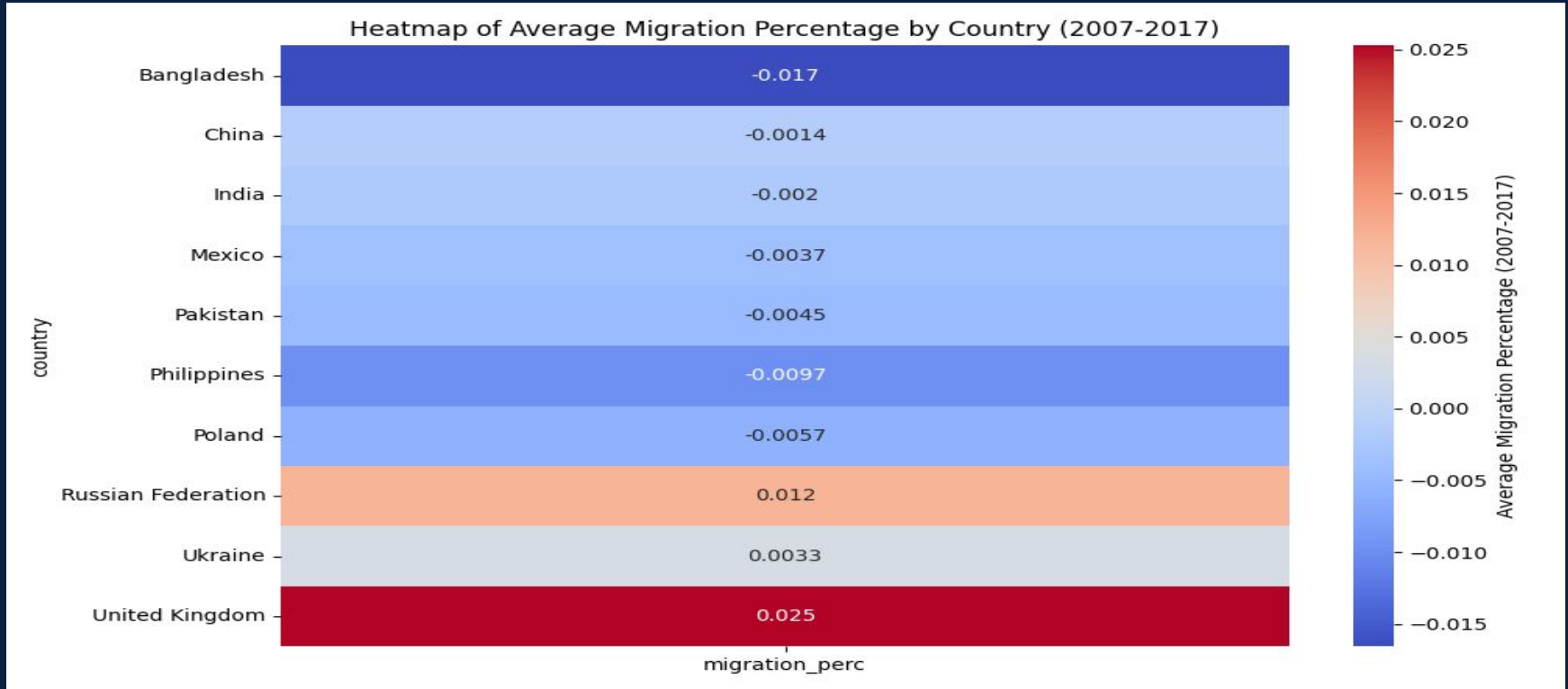
Product 3: Python Analysis

Net migration by Country Between 1960-2018

Scatter Plots Between Net Migration and Population (Correlation is -0.3121 r<0)

Heatmap of Migration Percentage by Country for 2017

Heatmap of Average Migration Percentage by Country (2007-2017)

country	migration_perc
Bangladesh	-0.017
China	-0.0014
India	-0.002
Mexico	-0.0037
Pakistan	-0.0045
Philippines	-0.0097
Poland	-0.0057
Russian Federation	0.012
Ukraine	0.0033
United Kingdom	0.025

Average Migration Percentage (2007-2017)

Why do people migrate?

Conclusion

This **net migration analysis** highlights:

- **Economic and political factors** influence migration trends.
- **Developed countries** (**United Kingdom, Russia**) see **higher inflows** of migrants.
- **Developing countries** (**Bangladesh, Mexico, Pakistan**) experience **more outmigration** due to job-seeking and economic reasons.
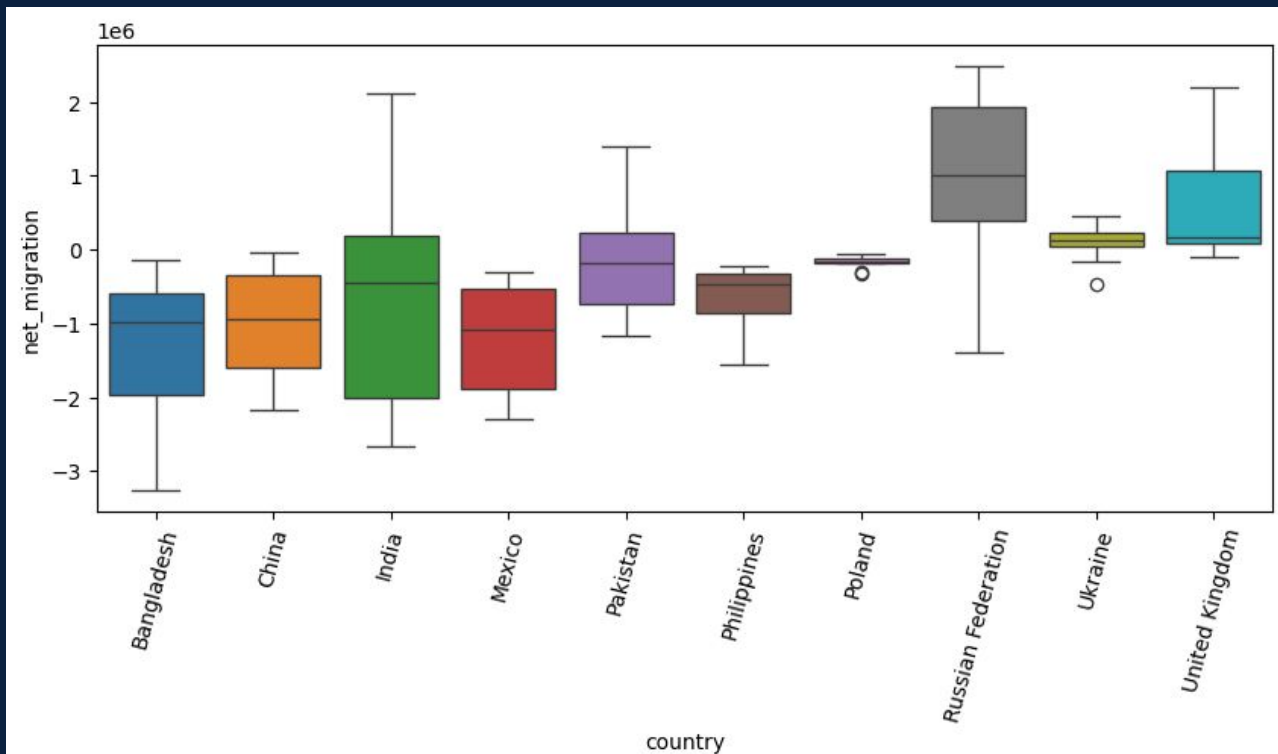
   Regional Trends

- **European countries (UK, Russia, Poland, Ukraine)** show **mixed migration trends**.
  - The **UK and Russia gain migrants**.
  - **Poland and Ukraine** have relatively smaller shifts, but Poland leans towards **negative migration**.
- **South Asian and Southeast Asian countries (Bangladesh, India, Pakistan, Philippines)** tend to **lose migrants**.

People migrate for many reasons, including
➔ Work
➔ Family
➔ Education
➔ Cultural/Political
➔ Wars
➔ To escape conflict
➔ Persecution
➔ Climate change
➔ Global events
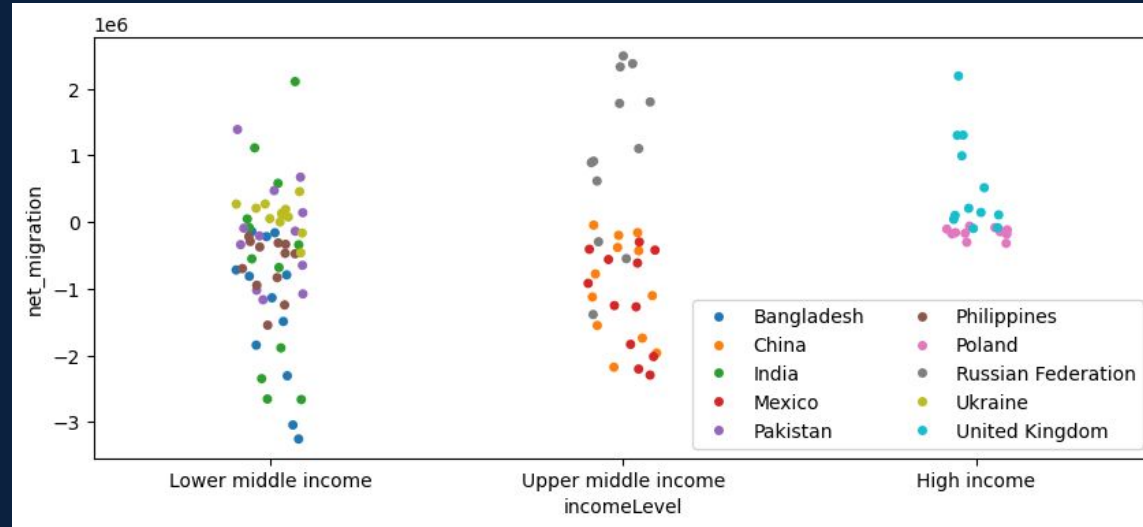
Product 4: Seaborn Boxplots

Brian B.

Net Migration by Top Country

Net Migration by Income Level

- Correlation of .20 with p-value of 6.9x10^-22
- Shows connection between migration and hope for better pay by moving from a country of lower income to higher income.
- Net migration appears to be varied likely due to some migrating in from lower income areas and some moving out to areas of higher income.
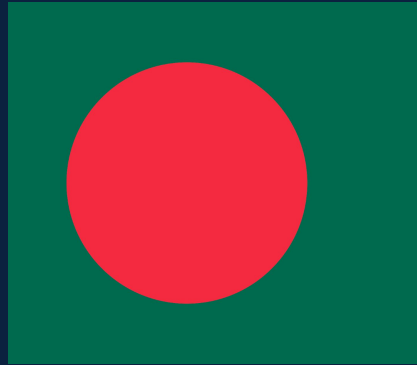
Three Stories

UK, 2007

In 2004, "when eight Eastern European countries joined the European Union in May 2004, the United Kingdom...Ireland and Sweden, **allowed nationals from these new Member States to work without any restrictions...** The booming UK economy proved an attractive destination for many...citizens."

Bangladesh, 1972

This was a politically tumultuous year as Bangladesh had recently declared independence from Pakistan.

High population density that is continuing to increase (likely due to **geographic constraints**)

Mexico

- 1985 - Earthquake in Mexico City kills thousands and makes many more homeless.

- 1994 - Chiapas Rebellion

- 2007 - Tabasco state flood; ~500,000 are made homeless

Thank you!
Any questions?