METHOD

Students explore regional fertility and mortality trends over time and factors that influence them. Then they research a country to place it within the demographic transition model and make cross-country comparisons within each DTM stage.

INTRODUCTION

As human populations have developed and grown over time, there has been a steady increase in life expectancy and global population. In fact, starting in the 1900s humans experienced a dramatic drop in death rates and increase in life expectancy, which is largely attributed to factors such as new technologies in agriculture and production, advances in health and sanitation, and lower infant mortality. However, there are drastic differences globally in the quality of life indicators that impact fertility rates and life expectancy. As the global population is projected to be greater than 10 billion by 2100, we need to understand what factors impact lower fertility rates and increased life expectancy.

MATERIALS

Part 1
- Student Worksheet
- Computer/projector with internet access

Part 2
- Region Cards

Part 3
- Demographic Transition Model graphic (provided)
- Computer/projector with internet access

Part 4
- Assignment Sheet (provided)
- Flip chart paper

PART 1: FERTILITY AND MORTALITY TRENDS OVER TIME

PROCEDURE

Between 1950 and today, population growth and quality of life have changed throughout the world. But these changes have occurred at different rates and at different times, and future changes will also not be uniform.

CONCEPT

We live in a demographically divided world with large disparities in population growth rates and the quality of life indicators that impact those growth rates.

OBJECTIVES

Students will be able to:
- Explore historic fertility and life expectancy trends using online data.
- Compare regions of the world according to fertility and mortality indicators.
- Identify the stages and describe the structure of the demographic transition model (DTM).
- Conduct research to identify and explain a country's stage within the DTM.

SUBJECTS

AP Human Geography, AP Environmental Science, World History (General and AP)

SKILLS

Classifying historic events, identifying trends, interpreting and analyzing data, comparing and evaluating data, understanding cause and effect, researching, synthesizing research, defending a position

1. Define:

    Fertility rate: The average number of children a woman will have in her lifetime.

    Life expectancy: The average number of years a person born today could expect to live under current death rates. Your own life expectancy changes as you grow older, and as you face different risks.

2. Divide students into small groups to cover the six regions of the world (Africa, Asia, Europe, Latin America, Northern America, and Oceania) and direct each group to www.WorldPopulationHistory.org.

3. Distribute the Student Worksheet and review the directions.

4. Give students time to complete the Worksheet for their region. When all groups are finished, ask each group to present its findings to the class.

PART 2: FERTILITY AND MORTALITY INDICATORS

Many factors impact the number of children a woman will bear and an individual's life expectancy. These quality of life indicators are complex and differ, significantly in some cases, in different regions of the world.

PROCEDURE

1. Before class, cut out the six Region Cards and in large print, write the name of each region on the back of its card.

2. Choose one representative from each of the six groups from Part 1 (Africa, Asia, Europe, Latin America, Northern America, and Oceania).

3. Give each representative their Region Card and ask that that they hold it so the class can see the region name. Explain that the statistics being discussed represent averages for each region. As they observed on the overlay maps at www.WorldPopulationHistory.org, there are significant variations among the statistics within regions.

4. Have representatives line up in order of fertility rate (lowest to highest) so that students have a baseline view of the current regional averages. Give students a few seconds to record the order on their own paper.

5. The Region Cards list four factors that impact fertility rates.

    Average years of schooling for girls: Average number of completed years of education for women by the age of 25

    Infant mortality rate: Infant deaths per 1,000 births

    Adolescent birth rate: Births per 1,000 females ages 15-19

    Percentage of female contraceptive use: Percentage of married females ages 15-49 using any method, modern or traditional, of contraception

6. For each factor, conduct the following:

    a. Discuss what the factor is and how it impacts fertility rate.

    b. Have students arrange themselves from the lowest to the highest numeric statistic from the Region Cards.

7. Project the Fertility Rates Overlay for the current year from www.WorldPopulationHistory.org and go over Fertility Rate Discussion Questions below.

8. Have representatives line up one last time based on the Life Expectancy (lowest to highest) and have students note the order.

9. Project the Life Expectancy Overlay for the current year from www.WorldPopulationHistory.org.

10. Ask representatives to return to their regional groups and have the groups brainstorm factors that impact life expectancy. After a few minutes, invite students to list their ideas on the board. (Possible factors include: access to healthcare; infant mortality; access to nutrition; improved sanitation; clean water; control of infectious diseases; workplace safety)

FERTILITY RATE DISCUSSION QUESTIONS

1. How did the order of the regions change for each of the four indicators on the Region Card?

   Overall, the higher income regions of the world (Europe, Northern America, Oceania) have higher levels of education for women, lower teen birth rates, higher availability of birth control and health care, and lower infant mortality rates. Lower- and middle-income countries in Africa, Asia, and Latin America are where we see fewer years of education for women, higher teen birth rates, less availability of family planning, and higher infant mortality rates.

2. Did regions stay in the same order for each of the four factors?

   No, the order does not remain the same.

3. Can you think of any problems with exploring data in this way?

   Looking at the ordering of regions, rather than their statistical values, might skew our perception of factors' similarities or differences between regions. For example, the order alone doesn't show how similar the infant mortality rate is between Latin America and Oceania, nor does it show how much lower life expectancy is in Africa than the next region in order.

4. The Region Cards and our volunteers showed us four factors that influence fertility rates. Can you think of others?

   Answers may include: the need for children in the labor force; the cost of raising children; access to health care/level of health care; availability of employment for women; availability of legal abortions; religious beliefs, traditions, or cultural norms.

5. Which regions of the world have high levels of variation in fertility rates?

   The most apparent region is Africa, which has fertility rates that range from 2 to 7+. Countries in Western and Middle Africa have some of the highest fertility rates in the region, whereas the higher income countries in the south (Botswana, Namibia, and South Africa) and in the north (Morocco, Tunisia, and Egypt) have lower fertility rates.

   In Asia, we see low fertility rates in East Asia and higher rates in countries with ongoing conflicts, such as Afghanistan.

PART 3: THE DEMOGRAPHIC TRANSITION MODEL

If your students have a firm grasp of the **demographic transition model (DTM)**, you can skip Part 3.

PROCEDURE

1. Display www.gapminder.org/fw/world-health-chart. Gapminder is a free site that uses the latest statistical data to create interactive, graphical representations of data over time. Click on "Full Screen Version" then project and play the upper-most video, which shows an animated graph of income and life expectancy over time.

2. Change the axes on the graph by clicking on the axis title and using the search bar to select Crude Death Rate (y axis) and Crude Birth Rate (x axis).

3. Define:

   Death Rate: Annual deaths per 1,000.

   Birth Rate: Annual births per 1,000.

   Note: Birth rate is not the same as fertility rate, which has previously been discussed.

4. Play the video and as the bubbles move, ask students what regional variations they see in birth and death rate?

   Overall, the death rates decline over time, which means people are living longer and healthier lives. However, there are differences in birth rate depending on the region of the world. The higher income nations have the lowest birth rates, whereas the lowest income countries have the highest birth rates.

5. Move the cursor over several bubbles and ask students to identify what is happening in each country. Find the United States and look at the birth and death rates. Compare countries from opposite parts of the graph. For example, compare Niger or Chad which are at the right end of the graph (highest birth rate and higher than average death rate) to Singapore or South Korea which are at the bottom left (low birth rate and lower than average death rate).

6. Project the Demographic Transition Model graphic and briefly review that the DTM uses the birth rate and death rate to categorize countries into stages of development. The five stages include:
   - Stage 1: High Fluctuating. Birth and death rate are both very high.
   - Stage 2: Early Expanding. Birth rate remains high. Death rate is falling. Population steadily rises.
   - Stage 3: Late Expanding. Birth rate begins to fall. Death rate continues to fall. Population still rising.
   - Stage 4: Low Stationary. Both birth and death rate are low. Population is now beginning to steady or plateau.
   - Stage 5: Low Declining: Birth date falls below death rate. Population begins to decrease.

7. Go over Discussion Questions.

DISCUSSION QUESTIONS

1. What is the main trend in this model?

   As countries' birth rates and death rates decline they advance in the stages of the DTM.

2. Can you see any limitations of the model?

The model assumes that in time all countries pass through the same stages. However, due to political unrest and economic stressors it seems that some countries, especially in sub-Saharan Africa, might not become industrialized in the same manner as many of today's developed countries.

The timescale of the model is also now different for rapidly developing regions of the world, such as Hong Kong and Malaysia, because they develop much faster than early industrialized countries.

PART 4: UNDERSTANDING REGIONAL VARIATION & COMPLEXITY OF THE DTM

While it can be a useful tool, the demographic transition model does have limitations. Consider that it divides all the countries of the world, home to more than 8 billion people, within just four groups. As such, within each group, or stage, there is variation in regards to quality of life, future challenges, and much more.

PROCEDURE

1. Assign students a country from the following list but don't reveal their DTM stages. Go over the questions on the Assignment Sheet and have students complete it as homework.

Stage 2	Stage 3	Stage 4	Stage 5
Afghanistan	*India*	*Brazil*	*Germany*
Guatemala	*Peru*	*China*	*Japan*
Niger	*South Africa*	*United States*	

2. Hang four pieces of flip chart paper around the room, each labeled with one stage of the DTM (Stage 2, Stage 3, Stage 4, and Stage 5). Ask students to stand at the chart paper representing where their country fits into the DTM. Do a quick check to ensure that the correct countries are in each group. If any students are standing in the incorrect stage, correct misconceptions and allow them to reconsider their choice.

3. Within the DTM groups, give students time to discuss their findings and determine whether there are any trends in their research. What quality of life indicators are similar? What is different? Are they located close to each other geographically?

4. Students record their findings on their flip chart paper.

5. Provide students with sticky notes and ask them to complete a gallery walk to each stage's flip chart paper as a small group. They should write any questions or additional observations on sticky notes and attach them to the appropriate chart paper.

6. Lead the class in a discussion about their observations. What trends do we notice in each of the stages of the DTM? Did anything surprise you? How will improving the quality of life in countries in Stage 2 and 3 lead to reduced birth rates? Knowing what you learned from research, do you feel that the demographic transition model works today?

ASSESSMENT

Completed Student Worksheets can be used as an assessment. Additionally, assess how well each student prepared for the DTM class discussion. Did they find relevant information to answer the questions on the Student Assignment sheet? Were they able to justify their country's DTM stage and compare/contrast it with other countries in the stage?

FOLLOW-UP ACTIVITY

Watch the video Global Population Growth, Box by Box by Hans Rosling.

DEMOGRAPHICALLY DIVIDED WORLD | STUDENT WORKSHEET

Name: _____ **Date:** _____ **Region**: _____

First, to observe overall patterns or trends in your assigned region:

1. Open www.WorldPopulationHistory.org and click on "Explore the Map." Deselect the Population Dots so that you can see the colors of the overlay more clearly (select Map Features, click Population Dots so it is no longer highlighted blue).
2. Enable the Fertility Overlay on your map (select Overlays, click Fertility Rates). At the lower right, press play to watch how the statistics in your region change from 1950 onwards.
3. Complete the column for Fertility Rate in the chart below.
4. Repeat steps #2 and #3 for Life Expectancy.

Answer the following questions in the chart below.

A. Identify changes between this year, and the data from 25 years prior. (Not applicable for 1950.)
B. Is there variability in this data between countries in the region? Identify examples.

	Fertility Rates	Life Expectancy Rates
1950	A) n/a B)	A) n/a B)
1975	A) B)	A) B)

2000	A) B)	A) B)
2025	A) B)	A) B)
2050	A) B)	A) B)

What overall observations can you make about fertility rates in this region? Were there any identifiable trends or patterns? Brainstorm possible reasons for the fertility statistics in this region and the trends/patterns you identified.

What overall observations can you make about life expectancy in this region? Were there any identifiable trends or patterns? Brainstorm possible reasons for the life expectancy statistics in this region and the trends/patterns you identified.

What do the projected statistics for 2050 suggest for the future of this region?

AFRICA

Fertility rate: 4.1

Average years of schooling for girls: 5.3
Infant mortality rate: 44
Adolescent birth rate: 83
Percentage of female contraceptive use: 37

Life expectancy: 64

EUROPE

Fertility rate: 1.4

Average years of schooling for girls: 12.3
Infant mortality rate: 4
Adolescent birth rate: 8
Percentage of female contraceptive use: 71

Life expectancy : 79

ASIA

Fertility rate: 1.8

Average years of schooling for girls: 7.3
Infant mortality rate: 21
Adolescent birth rate: 21
Percentage of female contraceptive use: 68

Life expectancy: 74

LATIN AMERICA

Fertility rate: 1.7

Average years of schooling for girls: 9.1
Infant mortality rate: 14
Adolescent birth rate: 49
Percentage of female contraceptive use: 75

Life expectancy: 76

NORTHERN AMERICA

Fertility rate: 1.6

Average years of schooling for girls: 14.0
Infant mortality rate: 6
Adolescent birth rate: 12
Percentage of female contraceptive use: 74

Life expectancy: 78

OCEANIA

Fertility rate: 2.0

Average years of schooling for girls: 10.8
Infant mortality rate: 15
Adolescent birth rate: 24
Percentage of female contraceptive use: 59

Life expectancy: 78

Data Sources:

Total fertility rate: Population Reference Bureau (2024).
Average years of schooling for girls: United Nations Development Program, Human Development Report (2023 data).
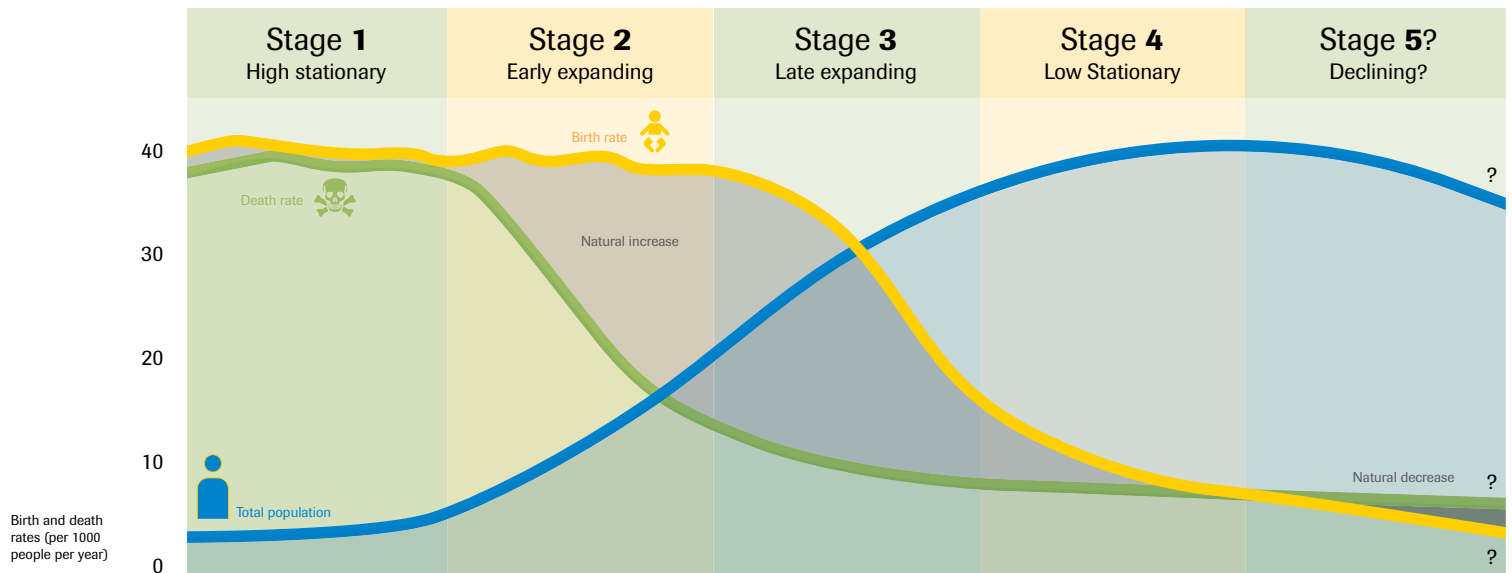Infant mortality rate: Population Reference Bureau (2024).
Adolescent birth rate: United Nations Population Division.
Percentage of female contraceptive use: Population Reference Bureau (2024).
Life expectancy: Population Reference Bureau (2024).

The Demographic Transition Model

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5?
High stationary	Early expanding	Late expanding	Low Stationary	Declining?

Birth rate

Death rate

Natural increase

40

30

20

10

0

Total population

Natural decrease

?

?

?

Birth and death rates (per 1000 people per year)

DEMOGRAPHICALLY DIVIDED WORLD | ASSIGNMENT SHEET

Conduct research on your assigned country using www.WorldPopulationHistory.org and other research sources. Consider the quality of life indicators discussed in class (years of education for girls, infant mortality rate, etc.) and choose three to look into further. Answer the following questions:

- Quality of life indicators

  - What is the rate of each for your country?
  - Does it seem like these indicators relate to each other?
  - Have these indicators changed recently? If yes, are they increasing or decreasing and is that a positive or negative change?

- In what stage of the demographic transition model do you think your country fits?

- How have fertility rates changed in your country from 1950 to present?

- What is the population of your country? Is it densely populated?

- What challenges might your country face in the future?