METHOD

Students participate in an interactive story discussing how improvements in medicine, food and agriculture, and public health and sanitation during the Industrial Revolution contributed to population growth. They then create a poster capturing a “demographic moment in time” for different points in history.

INTRODUCTION

Human population has grown exponentially over the past 200 years due to advancements in medicine, food and agriculture, and public health and sanitation. Understanding how these technological and social innovations improved quality of life by reducing mortality is critical to a complete understanding of demographic history. The impact of these advancements can be seen in the global population pyramids, which depict the configuration of a population as impacted by 80 years of economic, political, and natural events and also help predict future population trends.

Parts 1, 2 and 3 are in-class activities.

MATERIALS

- Website: www.WorldPopulationHistory.org
- Timeline Exploration Guide
- Student Reading Cards
- Student Worksheet
- Population Pyramid graph paper
- Chart paper
- Colored pens/pencils
- Rulers
- Calculators
- Exit ticket

CONCEPT

Global population has grown exponentially since the Industrial Revolution. Advances in medicine, food and agriculture, and public health and sanitation have led to a global decline in the death rate and have been the primary drivers behind population growth in the 20th and 21st centuries.

OBJECTIVES

Students will be able to:
- Explain the trajectory of human population growth from 1 CE to the present.
- Identify at least three scientific advances in medicine, food and agriculture, and public health and sanitation that contributed to population growth during the Industrial Revolution.
- Analyze population pyramids and make correlations between the population shapes and historical trends for a given time period.

SUBJECTS

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

SKILLS

Classifying historic events, identifying trends, calculating percentages, creating and interpreting graphs, making predictions
Part 1
Introducing World Population History

Procedure:
1. Have students respond in writing to three true/false statements and justify their choices. Call on a few students to share their responses.
   a. Human population growth has remained constant throughout human history.
   b. A rising birth rate is the only contributing factor to population growth.
   c. Demographers can use current demographic data to make predictions about how population size will change in the future.

2. As a class, watch World Population, a 5-minute video showing the history of human population growth from 1 CE to the present and projected growth to 2050. The video streams from the website, www.WorldPopulationHistory.org.

3. Have students share their initial reactions. Refer back to the first true/false statement – Population growth has remained constant over time. Ask if any students would change their answers from true to false and have them elaborate.

4. Explain to students that human population has increased exponentially over the past 200 years. Prior to the Industrial Revolution, growth was slow and relatively steady because the birth and death rate were proportional. As the death rate declined, human population grew. Ask students to hypothesize what caused a decline in death rate during the Industrial Revolution.

Part 2
Understanding Why We’ve Grown

Now that students understand how population changed over time, they will explore why population exploded in the 1800-1900s.

Preparation, before class:
Cut out the Student Reading cards and review the Timeline Exploration Guide. Familiarize yourself with the timeline on www.WorldPopulationHistory.org.

Procedure:
Distribute the Student Reading cards to 12 students to read the cards when prompted. Follow the Timeline Exploration Guide, stopping at the listed milestones and discussing their significance in greater detail.

Part 3

Students take a closer look at the last 60 years of population history by working in small groups to construct posters showcasing a demographic moment in time. You may want to have a sample poster ready to serve as a student exemplar.

Preparation, before class:
Make a sample poster that includes the population pyramid for 1950 (see page 3) as well as five historic events, from the WorldPopulationHistory.org within the date range 1943-1957.

Procedure:
Steps 1 and 2 are intended for a class that needs a refresher on how to construct and interpret population pyramids. If your class has already mastered this skill, skip to step 3.

1. Model how to construct a population pyramid using the global population for 1950 (provided below).
2. Display the “World Population Pyramid – 1950” and discuss the shape of the graph. Review the three primary shapes: triangle, rectangle and inverted triangle. A triangular shape means the population is growing, a rectangular shape means the population is stable, and an inverted triangular shape means the population is shrinking.

3. Divide students into groups of 2-3 and assign each group one of the following years: 1955, 1970, 1985, 2000, and 2015. Note: Larger classes will have multiple groups assigned to each year. On chart paper, each group will create a poster showing a “demographic moment in time” that includes a population pyramid for their given year and key demographic events from surrounding years.

4. Using the data for their assigned year on the Student Worksheet, students calculate the percentages for each age/sex cohort. Then, each group draws a population pyramid on the Population Pyramid graph paper. See Completed Population Pyramids.

5. Using the timeline on WorldPopulationHistory.org groups should add at least five historic events to their poster. Each event should include the name of the event, the year(s), and a brief description. Students should limit their research on the interactive timeline to the date ranges below. The group(s) working on the 2015 poster may include predicted events.

<table>
<thead>
<tr>
<th>Year (pyramid)</th>
<th>Date Range (on timeline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955</td>
<td>1948-1962</td>
</tr>
<tr>
<td>1970</td>
<td>1963-1977</td>
</tr>
<tr>
<td>1985</td>
<td>1978-1992</td>
</tr>
<tr>
<td>2015</td>
<td>2008-2022</td>
</tr>
</tbody>
</table>

6. Once the posters are complete, have students display them around the room in order by year. Instruct the students to complete a gallery walk, making note of any interesting trends they observe for each time period, as well as the following:
   a. General shape of each graph
   b. How graphs change over time
   c. Important historical markers
   d. Connections between the identified markers and population growth

7. Have students share their observations from the gallery walk and as a class, go through the Discussion Questions.
Discussion Questions:

1. Can you tell which year has the most people by looking at the graph alone?

No, the graphs display percentages not population numbers.

2. In 1955, the youngest cohorts (0-15) represented 35.6 percent of the total population. Today they represent 26.1 percent of the total population. Does this mean that there are fewer children ages 0-15 today than there were in 1950?

No, there are actually more children ages 0-15 today than there were in 1950. It is important to note that the percentages are proportional to the total population. To find out if there are more children between the ages of 0 and 15 in 2015 than there were in 1955, we must reference the data sheet. When we do, we can see that children ages 0-15 in 2015 significantly outnumber their 1955 cohorts.

3. What does the shrinking percentage of youths mean in terms of our projected population growth?

It means that a smaller percentage of the population will enter their reproductive years compared to previous generations. Using trends in global total fertility rate (the average number of children a woman will have in her lifetime), we can predict what effect these cohorts will have on the shape of future pyramids. When fertility is high (average number of children per woman exceeds 2), the base of the pyramid will grow; when fertility is low (average number of children per woman is lower than or equal to 2), the base of the pyramid will shrink or stay the same.

4. In 1955, the oldest cohorts (>65) represented 5.1 percent of the total population. Today, adults over 65 years old represent 8.1 percent of the total population. Are there any challenges to caring for a growing aging population?

Yes. Possible answers include: increased expenditures on healthcare, greater need for nursing homes and hospitals, and a growing need for doctors and nurses.

5. Looking at the five pyramids, which year appears to have the slowest rate of population growth?

2015. The bottom of the graph is closer to a rectangle than a pyramid and starts to show a more uniform population size across cohorts. The slower rate of growth can be attributed to declining fertility rates. Total fertility was 5 children per woman between 1950 and 1955. Today (2010-2015), it is 2.5 children per woman. Women are having fewer children. And their children, based on current UN projections, are also expected to have fewer children.

6. Based on the changing shapes of the graphs, how do we expect the global population to grow in the future?

Population will continue to grow, but at a slower rate than in the past. Currently, the UN projects population to level off between 10 and 12.5 billion by the year 2100. It is important to note that, while population growth is slowing, the sheer magnitude of our numbers (over 7.3 billion in 2015) will have considerable impacts on our environment, policy, economies, and culture.

7. Based on the 2015 graph, how would we expect the population pyramid to look in 2030? In 2050?

The graph should continue to become more rectangular in shape.

8. Ask students to recall the advances in medicine, food and agriculture, and public health and sanitation made during the Industrial Revolution and their impact on population growth. Are we still advancing in those fields today? Can you identify any evidence on the timeline of advances in more recent years?

Possible answers include: Medicine: the birth control pill, malaria eradication efforts, the polio vaccine, the eradication of smallpox, and the discovery of the HIV virus. Food and Agriculture: the Green Revolution and the introduction of genetically modified organisms (GMOs) in food. Public Health and Sanitation: The United Nations Millennium Development goal for safe drinking water.
9. Looking at the historical markers on your poster, do any of them fall outside the categories of medicine, food and agriculture, and public health and sanitation? If so, how are these events related to population? Do they have a positive or negative impact on the planet?

Yes, many historical markers fall outside of medicine, food and agriculture, and public health and sanitation. Possible answers include: environmental issues, social milestones, political events, and wars. Impact will vary depending on the event, and many will have both positive and negative impacts. For example, the Green Revolution led to an increase in global crop production, but it also popularized industrial farming, which elevates the demand for fertilizers, GMOs, and pesticides.

10. Looking specifically at the 2015 poster, are the markers mostly negative or positive? If negative, what might need to happen to mitigate these challenges and how might population play a role?

Answers will vary. If many of the selected answers are negative explore solutions related to consumption, sustainable management of resources, and the role of girls’ education in economic development.

**ASSessment**

Monitor students’ involvement in the various class discussions covering the World Population Video and the guided timeline exploration. Collect the completed posters, assessing each based on the accuracy of the pyramid and the appropriateness of the historic milestones, and monitor students involvement in the gallery walk and class discussion of the posters.

You may also use the provided four question exit ticket.

**Exit Ticket Answers:**
1.) c
2.) b
3.) Answers will vary
4.) Student responses should link improvements in sanitation and public health to lowering the spread of infectious or bacterial diseases.

Extra Credit) d