

Development in Motion



Introduction:

Understanding a large amount of data from different countries can be overwhelming for students. However, through the use of interactive graphs on www.GapMinder.org, students will be able to see the information in a different light. Dr. Hans Rosling, a physician and professor at the Karolinska Institut in Stockholm, Sweden, developed the “trendalyzer” software with his son and daughter-in-law to show statistics in a dynamic display with the intention of promoting facts about development around the world. The free software is now owned by Google.

For this activity, students examine some of the factors related to a country’s economic development, but there are many ways the data sets can be used to follow and analyze trends, making *Gapminder* indispensable for global studies. Variables influenced by the United Nations Millennium Development Goals (MDGs) are given to help students view the connection between population trends and social, environmental, and economic trends throughout the world over time.

Materials:

Student Worksheet

Computer with Internet and Adobe Flash software (available to download free at www.adobe.com)

Projector

Procedure:

1. Go to the website: www.GapMinder.org and click on the *Gapminder World* tab to load the software. View as full screen. *You may want to go through the “How to Use” portion of the site (located centrally above the graph) before showing this to your students. Or just watch one of Dr. Rosling’s videos.*
2. Project the site onto a screen for the class to see.
3. Explain to the students that each bubble represents a country and the bubble’s size indicates its relative population. The color of the country bubble corresponds to its geographic region (see world map in upper right corner). They will watch the bubbles move over a 212-year time period.
4. Slow the speed of the animation to better follow the bubbles (the speed control is located to the right of the play button).

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Concept:

Graphic representations of world statistical trends can help illustrate changes in quality of life around the globe.

Objectives:

Students will be able to:

- Construct dynamic graphs using current data and the “trendalyzer” software.
- Become acquainted with indicators of the U.N. Millennium Development Goals.
- Make connections between two quality of life indicators for several countries.
- Interpret data as a means to research historical periods.
- Identify geographical regions.

Subjects:

Civics/Government, Economics, Geography, Health, History, Social Studies, Women’s Studies

Skills:

Graphing, analyzing and interpreting data, critical thinking

Method:

Using the “trendalyzer” program from www.GapMinder.org, students construct and interpret dynamic graphs and discuss differences in life expectancy, fertility rates, health, economics, and total population among several different countries.



5. You can change the x- and y-axis to compare various statistics by clicking on the axis' title and selecting from the drop-down menu.

Part 1: Wealth and Health of Nations

1. Initially you'll see the graph for Wealth and Health of Nations. Press "Play" on the graph to show the students the comparison of life expectancy vs. income in different nations. In this graph, many countries had a low life expectancy and low incomes in 1800 but end with a much higher life expectancy and higher income by 2012.
2. Replay the graph and ask the students what they think is happening to certain geographical regions at different points in history. You can pause the graph to focus on specific historical events (e.g. World War I - 1914-1918; Influenza epidemic of 1918; World War II - 1939-1945) and scroll over color-coded regions at the top right to highlight them.

Discussion Questions:

1. What bubbles surprised you with their movement?
2. Why do you think the bubbles moved towards a higher income and life expectancy as time passed?

There are many reasons for this – education, medical discoveries, agricultural technologies, etc.

3. Which countries had consistently high incomes? (*European and North American countries*) Which had consistently low incomes? (*Sub-Saharan African countries*)
4. Has life expectancy in Sub-Saharan African countries increased?

Yes, but they still have a relatively lower life expectancy than other countries.

Part 2: Family Size Matters

Now that students have some familiarity with *Gapminder*, distribute the Student Worksheet and have them complete the first section (Family Size Matters). They will need to make the data selections and answer questions to gauge their understanding of how family size varies among countries and how it correlates to development indicators.

Part 3: Meeting the Millennium Development Goals

In 2000, the United Nations convened a Millennium Summit to set goals for improving the lives of the world's poor. These Millennium Development Goals (MDGs) form a blueprint agreed to by all of the world's countries and all of the world's leading development institutions. Many of the goals set significant targets to achieve by 2015.



1. Introduce students to the MDGs. You can find a copy of the MDG indicators at <http://unstats.un.org/unsd/mdg>.
2. Show students how they can examine some of the MDG connections, using the *Gapminder* program, by clicking on “Open graph menu” at the top left. (ex. HIV, Child Mortality, and Carbon Dioxide Emissions). Have them complete the next section of their Student Worksheet (Meeting the Millennium Development Goals).

Part 4: You Choose

With *Gapminder's* large and expanding database, there are innumerable ways that students can examine relationships between different data sets and trace the progress of different countries over time.

Have students complete the “You Choose” assignment on the Student Worksheet in which they track the progress of three countries they select from different income levels. The chart on the worksheet is provided to help them organize their data. Their summaries and connections should be written up in paragraph form on a separate piece of paper.

Resources:

1. CIA Factbook <https://www.cia.gov/library/publications/the-world-factbook/>
2. Population Reference Bureau Datasheet, www.prb.org/
3. UN Millennium Development Goals, www.un.org/millenniumgoals/



Name: _____

Date: _____

Development in Motion Student Worksheet - Family Size Matters

Your teacher has introduced you to the *Gapminder* program at www.GapMinder.org, showing the comparisons of life expectancy and income in different countries over the past 212 years. Now it's your turn to test out the software and see what you can learn about different factors that contribute to a country's development.

- A. Go to the website: www.GapMinder.org and load *Gapminder World*. Initially you'll see the graph for *Wealth and Health of Nations*.
- B. Change the graph to compare Population Total on the y-axis (*vertical*) and Children per Woman (total fertility) on the x-axis (*horizontal*). Play the graph as is. You may want to watch it several times to help you answer the questions below.

If you're having problems using the program, you may want to go through the "How to Use" portion of the site (located centrally above the graph).

1. How many children do women worldwide have in the beginning of the animation, around 1800 (give a range)? _____
2. How many children do women worldwide have at the end of the animation, around 2012 (give a range)? _____
3. In which geographic region do women tend to have the most children? the fewest? (*Tip: Scroll over geographic regions at the top right to help identify the bubbles.*)

4. Knowing that our population is almost seven billion and growing, which countries are currently contributing the most to this number? (*Tip: Scroll over the bubbles that are at or above 200 million at the end of the animation.*)

5. Why do China and India have such a high population in 2012 based on the two indicators chosen? (*Tip: You may want to click on only China's and India's bubbles and play it again.*)



6. Family size in the U.S. zigzagged during the twentieth century. What accounts for that? (*Tip: You may want to deselect all, then click on the U.S. bubble and play it again starting from 1900. The 'Deselect all' option is located under the list of countries on the right.*)

7. While it is easy to generalize about standards of living in the different geographical regions, there is certainly a great deal of variety that makes up an average. Set the graph up to compare pairs of countries in the same geographical region (Mexico and Guatemala; Iran and Yemen; Niger and South Africa) with respect to fertility. What do you observe?

8. What factors might determine how many children, on average, women have in different countries of the world?

Can you find indicators in the data sets to test your hypotheses? If so, what are they and why do you think they influence family size?



Name: _____

Date: _____

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Student Worksheet - Meeting the Millennium Development Goals

In 2000, the United Nations convened a Millennium Summit to set goals for improving the lives of the world's poor. These Millennium Development Goals (MDGs) form a blueprint agreed to by all of the world's countries and all of the world's leading development institutions. Many of the goals set significant targets to achieve by 2015. You can find a copy of the MDG indicators at <http://unstats.un.org/unsd/mdg>.

1. MDG #4 is **reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.**

Find the data and set up the graph to help you determine whether child mortality rates have been falling since 1990. In 2012, what was the range of child mortality rates worldwide?

What was it in 1990? _____

What is your overall observation of the changes in child mortality worldwide during that time? Are there many countries that probably won't meet this goal?

2. MDG #7 is **to ensure environmental sustainability.** *Gapminder World* includes data relating to carbon dioxide (CO₂) emissions. Using the data and graphs, find out which country currently emits the most tons of CO₂ total.

Which country emits the most tons of CO₂ per person? _____

3. Part of MDG #7 includes **halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.** Change the graph to use data on "Improved Water Source, overall" (look in the Infrastructure menu). Does it appear that many of the poorest countries are on target to meet this goal? Why or why not?



Name: _____

Date: _____

Development in Motion Student Worksheet - You Choose

With the x-axis showing Income per person, select three countries - one low income, one middle income, and one high income (ex. Burundi, Colombia, and Denmark). Then select 5-10 indicators on which to track those countries' progress. The indicators can be as varied as cell phone use and forest cover to school enrollment and nutrition. Summarize your findings for each country in the chart; then write up, in paragraph form, the connections you see between indicators.

Indicator	Country _____	Country _____	Country _____



Development in Motion Student Worksheet Answers

Family Size Matters

1. How many children do women worldwide have in the beginning of the animation, 1800 (give a range)?
(4-8)
2. How many children do women worldwide have at the end of the animation, 2012 (give a range)?
(anywhere from 1-7.6)
3. In which geographical region do women tend to have the most children? (*Sub-Saharan Africa*)
The fewest? (*Europe and Central Asia; Americas*)
4. Knowing that our population is over 7 billion and growing, which countries are currently contributing the most to this number?
(*China, India, U.S., Indonesia, Brazil, Russia, Bangladesh, Pakistan, Nigeria*)
5. Why do China and India have such a high population in 2012 based on the two indicators chosen?
(*Because in 1800 China and India already had larger population totals than the other countries. Combining high total population with high fertility until the 1970s led to very high populations of over a billion each.*)
6. Family size in the U.S. zigzagged during the twentieth century. What accounts for that?
(*During the "baby boom" after WWII (1946-1964), there was a high fertility rate.*)
7. While it is easy to generalize about standards of living in the different geographical regions, there is certainly a great deal of variety that makes up an average. What do you observe looking at the fertility trends among these pairs of countries (Mexico and Guatemala; Iran and Yemen; Niger and South Africa)?
(*Over the past 40 years, Mexico's fertility rate has dropped considerably from 6.8 to 2.2, while Guatemala's has only dropped to 3.8. The Mexican government used successful social marketing campaigns over those years to encourage smaller families, while also making contraceptives widely available. Iran is an even more dramatic example of how government initiatives can lower fertility. Between 1980 and 2012, fertility dropped from 6.5 to 1.9 as family planning classes were mandated for marrying couples and modern contraceptives were made widely available. Both South Africa and Niger had close to 6.5 children per family on average in 1800, while by 2012, South Africa's fertility rate was down to 2.4 but Niger's had increased to 7.6. Consider that during this same time period South Africa's per capita GDP rose to \$9,657 and Niger's only reached \$707.*)



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Student Worksheet Answers, cont.

8. What factors might determine how many children, on average, women have in different countries of the world?

(Possible answers may include: age at first marriage for women, education level and literacy, infant mortality rates, life expectancy, health, urbanization, poverty, and agricultural work as percentage of labor force. In cultures that discourage girls from completing their educations, women tend to marry younger, work in subsistence agriculture, and have more children to help with the field and domestic work. Also, in areas where healthcare and sanitation are poor, life expectancy is lower, infant mortality is higher and couples may have more children, unsure of their survival. In countries where women are highly educated and enjoy greater gender equality in work and society, they may choose to have fewer children. Smaller families are more often found in more developed countries, although there are exceptions to this rule.)

Meeting the Millennium Development Goals

1. MDG #4 is reduce by two-thirds, between 1990 and 2015, the under-five mortality rate. Find the data and set up the graph to help you determine whether child mortality rates have been falling since 1990. In 2012, what was the range of child mortality rates worldwide?

(2.2 per 1,000 in Luxembourg to 182 per 1,000 in Sierra Leone) What was it in 1990? (6.3 per 1,000 in Japan to 326 per 1,000 in Niger)

What is your overall observation of the changes in child mortality worldwide during that time? Are there many countries that probably won't meet this goal?

(While the child mortality rates went down overall, there are still many countries, primarily in Sub-Saharan Africa where the child mortality rate is still between 100 and 200 per 1,000. This is the equivalent of 10 to 20 percent of all children born in those countries.)

2. MDG #7 is to ensure environmental sustainability. *Gapminder World* includes data relating to carbon dioxide (CO₂) emissions. Using the data and graphs, find out which country currently emits the most tons of CO₂ total. (*China*) Which country emits the most tons of CO₂ per person? (*United Arab Emirates*)

3. Part of MDG #7 includes halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. Change the graph to use data on "Improved Water Source, overall" (look in the Infrastructure menu). Does it appear that many of the poorest countries are on target to meet this goal? Why or why not?

(While progress has been made, there are still many countries where 50 percent or more of the population lacks access to a safe water supply.)