

# Food For Thought

## Student Activity

### Method:

Acting as the residents of five major regions of the world, students compare various statistics that affect people's health, happiness, and well-being.

### Introduction:

This activity is designed to demonstrate how differences in population and resource use in five regions of the world combine to impact the quality of life for the people who live in each area. Population demographics, land use patterns, energy consumption and wealth are the issues that will be explored to heighten students' global perspective.

### Procedures:

#### Preparation, the night before:

1. Measure out the yarn or string for each region according to the chart below. Use a different color yarn for each region, or, if you only have one color, make a tag to label each piece with the name of the region whose perimeter it will represent.
2. Count out the number of individually wrapped candies required for each region and bag them. Make labels for them according to the chart, and tape the appropriate label to each bag. Do the same for the matches.
3. Read through all the discussion questions and make notes to yourself about links to local, national and international current events; seeing such ties between the activity and the real world will dramatically enhance the meaning the students glean from the exercise. As much as possible, you'll want to encourage them to make observations, critically evaluate the demographics, and hypothesize on possible causal relationships between the statistics. Your students will likely start a discussion of these issues themselves, but if they don't, the discussion questions will help to stimulate and/or direct class discussion. Because of the large amount of information in each section, it's best to discuss each group of statistics while they're fresh in the students' minds, rather than saving all discussion for the end.

#### Set up, just before class period begins:

1. Arrange the yarn on the floor to represent the regions and tape it in place.
2. Hide the bags of candies and matches in a larger, opaque bag. Place the bag within easy reach of where you'll be standing as you lead the activity.



### Concept:

This simulation demonstrates the inequitable distribution of population and resources among the different regions of the world, and goes on to study the social effects of these inequities.

### Objectives:

Students will be able to:

- State at least two factors that might be used to determine the relative well-being of a country or region.
- Identify at least two potential impacts of inequitable resource distribution.
- Draw connections between population growth rate and wealth, and between wealth and energy use.

### Subjects:

Civics/Government, Economics, Family and Consumer Sciences, Geography, History, Mathematics, Science, Social Studies

### Skills:

Interpreting and analyzing demographic data, role playing, applying academic knowledge to real world events, drawing conclusions.

### Materials:

Yarn or string (5 colors)  
Masking tape  
Ambassador's cards (provided in activity script)  
Labels for energy consumption and wealth  
Transparent tape  
92 individually wrapped candies (Hershey's Chocolate Kisses™ work well)  
103 matches (or birthday candles)  
10 sandwich bags

*Note: This activity is well suited for a class size group as well as a much larger group like an entire grade or your school. For a more visual experience, take a look at the Possible Additions section at the end of the activity. Ideas for props to use through the sections are provided.*

| Region Information Chart  |                        |                      |                        |                      |                      |
|---|------------------------|----------------------|------------------------|----------------------|----------------------|
|   | North America          | Latin America        | Europe                 | Africa               | Asia                 |
| 2015 Population in Millions <sup>1</sup>                                  | 357                    | 630                  | 742                    | 1,171                | 4,397                |
| Population Distribution   | 5%                     | 9%                   | 10%                    | 16%                  | 60%                  |
| Sample yarn lengths (in ft)<br>with 25 participants                       | 25                     | 25                   | 27                     | 30                   | 31                   |
| with 50 participants  | 36                     | 36                   | 38                     | 42                   | 44                   |
| with 100 participants   | 50                     | 50                   | 54                     | 60                   | 62                   |
| with 200 participants   | 71                     | 71                   | 77                     | 85                   | 88                   |
| Region's Percent of World Land Area <sup>2</sup>                          | 14%                    | 15%                  | 17%                    | 23%                  | 24%                  |
| Percent of Region's Land That Is Arable <sup>3</sup>                      | 11%                    | 8%                   | 12%                    | 8%                   | 15%                  |
| Per Capita Energy Consumption <sup>4</sup><br>(1 Match = 1 Barrel of Oil) | 53 matches             | 10 matches           | 27 matches             | 3 matches            | 10 matches           |
| Per Capita GDP <sup>5</sup><br>1 Candy = \$1,000                          | \$54,736<br>55 candies | \$6,693<br>7 candies | \$21,913<br>22 candies | \$1,917<br>2 candies | \$5,993<br>6 candies |

### Introducing the Activity:

- While students are still seated, read or paraphrase the following introduction:  
*All societies need and use natural resources such as land and energy, but the ways in which various societies use these things can differ greatly. For example, a small population may use an enormous amount of farmland or gasoline compared to the amounts used by other, much larger populations. This creates 'have' and 'have not' societies with potential for human discomfort and social conflict. The simulation we're about to do is going to demonstrate how this happens.*
- Appoint five students to be the "ambassadors" for the world regions. Give them their information cards and direct them to their regions.
- Populate the regions with the rest of the students, according to the chart. Given the length of the demonstration, you may wish to have students sit, rather than stand, in their regions.  
**Note:** You may want to create a "United Nations Advisory Committee" with a small group of students. Instruct the Committee to pay close attention, as you will be asking them for their opinions as a neutral party later in the activity. They should be thinking in terms of whether the inequities in each region's share of population/food/income are problems, and if so, what policies could lead to solutions.
- Identify each region by name for the class.  
**Note:** The regions in this simulation are those defined by the United Nations and, therefore, Mexico is included in Latin America and Russia is part of Europe. The sixth world region, Oceania, is not included because its population is so small relative to the others that it cannot be accurately represented.
- Explain that the dimensions of their regions are to scale, and the number of students within each region is proportional to its actual population; the idea is to show relative population density in each area.

## Facilitating the Activity:

For each of the sections that follow - Population Demographics, Quality of Life, Land Use Patterns and Energy Consumption and Wealth - use this basic procedure:

1. Go over the definition of terms in the section. You may want to have these written on a PowerPoint slide or whiteboard.
2. Go over the world statistics for the section.
3. Offer any supplemental information provided.
4. For the first three sections (Population Demographics, Quality of Life, and Land Use Patterns) call on the ambassadors, one at a time, to read their regions' respective statistics. A sequence that works well is: North America, Latin America, Europe, Africa, Asia.

In the last section (Energy Consumption and Wealth), you will be distributing the bags of matches and individually wrapped candies. It makes a more dramatic impression to start with the region whose amount is the smallest and continue in ascending order to the region whose share is largest. Referring to the labels on the bags, have the ambassador read each region's quantity of the resource aloud.

5. Go over discussion questions.

## Population Demographics

### I. Definitions: Terms A-E

- A. Population:** The number of people living in a region.<sup>6</sup>
- B. Birth Rate:** The number of births per 1,000 people per year.<sup>7</sup>
- C. Death Rate:** The number of deaths per 1,000 people per year.<sup>8</sup>
- D. Rate of Natural Increase:** Growth caused by having more births than deaths in a year (does not include immigration or emigration).<sup>9</sup>
- E. Doubling Time:** The number of years it will take a population to double in size if it maintains its current growth rate.

### II. World Population Demographics

- a. The 2015 world population is 7.3 billion.<sup>10</sup>
- b. The birth rate is 20 per 1,000.<sup>11</sup>
- c. The death rate is 8 per 1,000.<sup>12</sup>
- d. The world's annual growth rate is 1.2%.<sup>13</sup>
- e. At this rate the world's population would double to 14.6 billion in 58 years.

### III. Supplemental Information

Regarding population growth rates:

- A population grows whenever its birth rate is higher than its death rate.
- The growth rate is determined by the size of the difference between the birth and death rates. The closer these rates are, the lower the growth rate.
- Where birth and death rates are equal, the population's growth rate is zero.
- The world's current birth rate is almost two and a half times its death rate.

### IV. Ambassadors Read Statistics A-E from Their Cards

### V. Discussion Questions

1. What will it mean to have our population double? What else will we need to have twice as much of to provide for all those people?

*We'll need twice as much of everything people need to live:*

- food
- land to grow the crops
- roads
- schools
- hospitals
- shelter
- clean water
- energy to heat our homes, cook our food...

2. Asia's doubling time is 64 years. If we returned in 64 years and did this exercise again, would we be able to fit twice as many people into Asia's space?

## Quality of Life

### I. Definitions: Terms F-K

**F. Literacy Rate:** The ability of an individual to read and write, with understanding, a simple short statement related to his/her everyday life.<sup>14</sup>

**G. Total Fertility Rate:** The average number of children a woman will have in her lifetime.<sup>15</sup>

**H. Infant Mortality Rate:** The yearly number of children who die before reaching the age of one year per 1,000 live births.<sup>16</sup>

**I. Life Expectancy:** The average number of years a person born today could expect to live under current death rates.<sup>17</sup>

**J. Access to Improved Sanitation:** Percentage of population with access to improved sanitation facilities that hygienically separate sewage from human contact.<sup>18</sup>

**K. Nurses and Midwives:** The total number of people for every one nurse or midwife by region.<sup>19</sup>

### II. Worldwide Quality of Life

**f.** Of the world's adult population (15+), 90 percent of males and 82 percent of females are literate.<sup>20</sup>

**g.** The world's women bear an average of 2.5 children.<sup>21</sup>

**h.** The world infant mortality rate is 37 per 1,000.<sup>22</sup>

**i.** The average human life expectancy at birth is 71 years.<sup>23</sup>

**j.** Only 82 percent of the world's urban population and 51 percent rural population have access to improved sanitation.<sup>24</sup>

**k.** On average, there is 1 nurse or midwife per 182 people in the world.<sup>25</sup>

### III. Supplemental Information

Disease rates are also indicators of a region's quality of life. Worldwide, 0.8 percent of the 15-49 year old population live with HIV/AIDS. In sub-Saharan Africa, 3.6 percent of the 15-49 year old population is infected with HIV/AIDS.<sup>26</sup> This significantly affects the labor force and child care in the region.

### IV. Ambassadors Read Statistics F-K from Their Cards

### V. Discussion Questions

1. Can you see any connection between Africa's unusually high infant mortality rate of 59 per 1,000 (almost 1 in 17), and its high total fertility rate of 4.7 children per woman?

*When people know each of their children has almost a 6 percent chance of not surviving to adulthood, they will have more children to increase the likelihood that some will survive. This is especially crucial for people living in societies where there is no social security and no retirement plans, where the elderly are entirely dependent on their children for care and financial support.*

2. Infant mortality rates are consistently lower where girls have access to higher education. Is this coincidental, or is there a correlation here? What abilities and/or knowledge do educated people have that might be useful to them as parents?

*Literacy (including reading and basic math): Parents with these abilities can:*

- *read directions, such as appear on over-the-counter medicines and infant formula.*
- *educate themselves about any subject, including child development and care.*
- *get better jobs and earn more money.*

*Health/Biology: Exposure to these subjects makes people more aware of how to take good care of themselves and their children. They understand the importance of:*

- *good nutrition*
- *medical care, especially perinatal care*

3. What do indicators like a high infant mortality rate and short life expectancy say about the quality of life in a region? What are some possible causes?

*Possibilities include:*

- *Food that's insufficient in quantity or nutritional value*
- *Lack of clean water*
- *Low quality medical care or none at all*
- *Exposure to high levels of pollution*
- *War or political violence*

## Land Use Patterns

### I. Definitions: Terms L and M

**L. Urban Population:** Percentage of the total population living in areas termed urban by that country (typically towns of 2,000 or more or in national or provincial capitals).<sup>27</sup>

**M. Arable Land:** Farmland; land capable of growing crops.<sup>28</sup>

### II. Worldwide Land Use Patterns

- l.** 53 percent of the world's population (about 3.9 billion people) now live in urban areas.<sup>29</sup>
- m.** There are 0.5 acres of arable land per person on Earth.<sup>30</sup>

### III. Supplemental Information

Regarding Urbanization:

- The rate of urbanization is changing rapidly, as more and more people move to cities world-wide.
- In the developing world, about 48 percent of the population lives in urban areas. While urbanization has traditionally been associated with increased industrialization and employment opportunities, many megacities in developing countries lack a strong economic foundation upon which to base growth. As the population grows, the economic, social, and environmental problems in these cities will grow as well.
- In the developed world, especially North America, most of the current population shift involves people moving away from concentrated urban centers to sprawling suburban and metropolitan regions, or to small and intermediate-size cities.<sup>31</sup>

Regarding Arable Land:

- The lowest authoritative estimate of the minimum amount of arable land required to feed one person without intensive use of synthetic fertilizers is 0.17 acres.<sup>32</sup> (This doesn't include crops for textiles or cash crops needed for income.)

### IV. Ambassadors Read Statistics L and M from Their Cards

### V. Discussion Questions

1. How will population growth affect the amount of arable land available per person?

*When people share a limited resource such as arable land, each person's share of that resource becomes smaller in direct proportion to the number of additional people using it.*

2. What would it mean for a country to have its amount of arable land per capita fall below the minimum required to grow enough food to sustain its population?  
*Such a country would become dependent on imported foods, making it vulnerable to price hikes and shortages.*

3. What do you think usually causes people to move to cities?  
*The shift of jobs from agriculture to industry and services - leading to a concentration of economic opportunities in urban areas.*

4. What are some possible positive and negative effects of having such large proportions of countries' populations shifting to urban areas?

**Positive Effects:**

*More green space is left open for:*

- *other species to inhabit.*
- *potential farmland.*
- *trees and other plants to continue producing the oxygen we all need.*

*Well-planned cities can offer people:*

- *more job opportunities.*
- *better public services and living conditions.*

**Negative Effects:**

*When a city's population grows very rapidly, two major effects are likely:*

*Higher rates of unemployment and poverty:*

- *occur when more people come looking for work than there are opportunities available.*
- *can happen in spite of economic growth.*

*Greater environmental problems:*

- *infrastructure facilities and services can't expand quickly enough to keep up with increased demand.*
- *streets become congested, levels of pollution rise, sanitation systems are overwhelmed, and residents' health and general quality of life decline sharply.*

## **Energy Consumption and Wealth**

### **I. Definitions**

**L. Energy Consumption:** The total amount of energy used by each region per year divided by the number of people living in that region (includes industrial use).<sup>33</sup>

**M. Gross Domestic Product:** A commonly used measure of a nation's wealth, determined from the annual profits generated within a region by all goods and services exchanged that year.<sup>34</sup>

### **II. Symbolism of Props**

**Regarding the matches:**

- While energy is generated in many ways, including wood, coal, natural gas and nuclear power, in this activity, all these sources have been combined and are expressed in terms of barrels of oil.
- The matches represent the average amount of energy consumed by each citizen of each region in the course of a year.
- Each match = 1 barrel of oil. One barrel contains 42 gallons.

**Regarding the individually wrapped candies:**

- The candies represent the amount each person would get per year if his/her region's annual GDP were divided equally among all its citizens, expressed here in U.S. currency.
- Each candy = \$1,000.

**III. Distribute Bags to Ambassadors**

- Start with the region with the smallest amount and work up to the region with the largest amount.
- Hold each bag up high so the whole class can see it.
- From the labels, have the ambassador read his/her region's quantity aloud.

**IV. Instruct Ambassadors to Distribute the Candy Among Their Citizens**

- Expect and allow students to migrate and ask for aid.
- Assist them in making connections between their reactions to the simulation and real-world phenomena.

**V. Discussion Questions**

1. What would it be like in this room if we lit all these matches?
2. Who would have to breathe all that smoke? Would only the citizens of North America be breathing the pollution generated by their 53 matches?
3. What do the people in our Asian and African regions think about the fact that the North Americans have a bag bulging with wealth, when they have so little?
4. How could/do people from regions with less wealth and opportunity get access to those things?
5. What does the North American Ambassador think about the uneven distribution of wealth? What does he/she want to do about it?
6. How will the wealthier regions decide if and where they will offer foreign aid? What, if any, conditions will you impose on nations receiving your help? Will you trust the countries receiving money from you to put it to good use, or will you attempt to control what is done with it?
7. How will the less densely populated regions decide from which countries they will accept immigrants? What, if any, conditions will you impose on people seeking permission to immigrate? Will you accept only very well-educated people, or will you base your decision on need - giving preference to those with the least opportunity in their home countries? Or those suffering political persecution? Or refugees from war-torn nations? Or would it be based solely on numbers, first-come, first-served?
8. In the process of eating the candies, which region generated the most empty wrappers? Do you think this is an accurate representation of how much garbage each region creates as a function of its wealth and consumption?

## Endnotes

- <sup>1, 6-13, 15-18, 21-23, 27</sup> Population Reference Bureau, "2015 World Population Data Sheet." PRB, Washington, DC. [www.prb.org](http://www.prb.org)
- <sup>2, 3, 28, 30</sup> Statistics Division of the Food and Agriculture Organization of the United Nations. *FAO Statistical Yearbook 2015*, FAO 2015 [www.fao.org](http://www.fao.org) (2013 data)
- <sup>4, 33</sup> Energy Information Agency, U.S. Department of Energy, *Total International Energy Consumption*, 2012. [www.eia.gov](http://www.eia.gov)
- <sup>5, 34</sup> International Monetary Fund, *World Economic Outlook October 2015*. International Monetary Fund, 2016. [www.imf.org](http://www.imf.org)
- <sup>19, 25</sup> World Health Organization, Global Health Observatory Data Repository, *Aggregated Data: Absolute numbers by country, number of nursing/midwife personnel, 2001-2013*.
- <sup>14, 20</sup> Central Intelligence Agency, *The World Factbook 2015*. [www.cia.gov/library/publications/the-world-factbook/geos/xx.html](http://www.cia.gov/library/publications/the-world-factbook/geos/xx.html)
- <sup>24</sup> World Health Organization/United Nations Children's Fund, *WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation*. [www.wssinfo.org/data-estimates/tables/](http://www.wssinfo.org/data-estimates/tables/)
- <sup>26, 29</sup> The World Bank. *World Development Indicators*. [www.data.worldbank.org/indicator](http://www.data.worldbank.org/indicator)
- <sup>31</sup> Roberts, Leslie, Ed., *World Resources 1996-97*. The World Resources Institute, The United Nations Environment Programme, The United Nations Development Programme, and The World Bank. Oxford University Press, New York, 1996.
- <sup>32</sup> Engelman, Robert, and Pamela LeRoy. *Conserving Land: Population and Sustainable Food Production*. Population Action International, Washington, DC, 1995. p. 9.

## Possible Additions:

The following props can be used to create a visual representation of other statistics as they are being discussed. Hold up whole props alongside a region's prop to show the differences between 100 percent and the reality (i.e. hold up a whole paper towel roll alongside each regions representative paper towel urban population from whole roll.)

|  | North America  | Latin America   | Europe             | Africa                    | Asia            |
|--|----------------|-----------------|--------------------|---------------------------|-----------------|
| <b>Access to improved sanitation</b><br>- Clear bucket of water filled to represent different percentages of improved sanitation | full bucket    | 4/5 full bucket | nearly full bucket | less than 1/3 full bucket | 3/5 full bucket |
| <b>Nursing and midwifery personnel by region</b><br>- Band-aids to represent nurses and midwives per region population           | 4.5 band-aids  | 2 band-aids     | 4 band-aids        | .5 band-aid               | 1 band-aid      |
| <b>Urban population</b><br>- Hold up paper towel roll* cut to size to represent percentage of urban population from roll         | 81%<br>(9 in)  | 80%<br>(8.5 in) | 73%<br>(7.75 in)   | 40%<br>(4.5 in)           | 47%<br>(5 in)   |
| <b>Arable Land</b><br>- Sheet of green paper representing acres of arable land per person  | 1 & 1/2 sheets | 2/3 sheet       | 1 sheet            | 1/2 sheet                 | 2/5 sheet       |

\*Most paper towel roll tubes are approximately 11 inches long.



## North American Ambassador Card

I am the North American Ambassador. Here are some statistics that shape my region of the world:

- A. North America's population is estimated at: 357 million
- B. Our birth rate is: 12 per 1,000
- C. Our death rate is: 8 per 1,000
- D. Our annual growth rate due to natural increase is: 0.4%
- E. At this rate our population will double in: 175 years
- F. Of the adult population 15+, 97% of the males and 96% of the females are literate.
- G. North American women bear an average of: 1.8 children
- H. Our infant mortality rate is: 6 per 1,000
- I. Our life expectancy at birth is: 79 years
- J. 100% of our urban and 99% of our rural population has access to improved sanitation facilities.
- K. On average, there is 1 midwife or nurse per 110 people.
- L. The percentage of our people living in urban areas is: 81%
- M. Acres of arable land available per person: 1.5 acres

## Latin American Ambassador Card

I am the Latin American Ambassador. Here are some statistics that shape my region of the world.

- A. Latin America's population is estimated at: 630 million
- B. Our birth rate is: 18 per 1,000
- C. Our death rate is: 6 per 1,000
- D. Our annual growth rate due to natural increase is: 1.2%
- E. At this rate our population will double in: 58 years
- F. Of the adult population 15+, 93% of the males and 93% of the females are literate.
- G. Latin American women bear an average of: 2.1 children
- H. Our infant mortality rate is: 17 per 1,000
- I. Our life expectancy at birth is: 75 years
- J. 83% of our urban and 61% of our rural population has access to improved sanitation facilities.
- K. On average, there is 1 midwife or nurse per 282 people.
- L. The percentage of our people living in urban areas is: 80%
- M. Acres of arable land available per person: 0.6 acres

## European Ambassador Card

I am the European Ambassador. Here are some statistics that shape my region of the world:

- A. Europe's population is estimated at: 742 million
- B. Our birth rate is: 11 per 1,000
- C. Our death rate is: 11 per 1,000
- D. Our annual growth rate due to natural increase is: 0%
- E. At this rate our population will not double.
- F. Of the adult population 15+, 99% of the males and 99% of the females are literate.
- G. European women bear an average of: 1.4 children
- H. Our infant mortality rate is: 6 per 1,000
- I. Our life expectancy at birth is: 78 years
- J. 94% of our urban and 88% of our rural population has access to improved sanitation facilities.
- K. On average, there is 1 midwife or nurse per 121 people.
- L. The percentage of our people living in urban areas is: 73%
- M. Acres of arable land available per person: 0.9 acre

## **African Ambassador Card**

I am the African Ambassador. Here are some statistics that shape my region of the world:

- A. Africa's population is estimated at: 1.2 billion
- B. Our birth rate is: 36 per 1,000
- C. Our death rate is: 10 per 1,000
- D. Our annual growth rate due to natural increase is: 2.6%
- E. At this rate our population will double in: 27 years
- F. Of the adult population 15+, 71% of the males and 55% of the females are literate.
- G. African women bear an average of: 4.7 children
- H. Our infant mortality is: 59 per 1,000
- I. Our life expectancy at birth is: 60 years
- J. 54% of our urban and 31% of our rural population has access to improved sanitation facilities.
- K. On average, there is 1 midwife or nurse per 884 people.
- L. The percentage of our people living in urban areas is: 40%
- M. Acres of arable land available per person: 0.5 acres

## **Asian Ambassador Card**

I am the Asian Ambassador. Here are some statistics that shape my region of the world:

- A. Asia's population is estimated at: 4.4 billion
- B. Our birth rate is: 18 per 1,000
- C. Our death rate is: 7 per 1,000
- D. Our annual growth rate due to natural increase is: 1.1%
- E. At this rate our population will double in: 64 years
- F. Of the adult population 15+, 89% of the males and 79% of the females are literate.
- G. Asian women bear an average of: 2.2 children
- H. Our infant mortality rate is: 33 per 1,000
- I. Our life expectancy at birth is: 72 years
- J. 77% of our urban and 45% of our rural population has access to improved sanitation facilities.
- K. On average, there is 1 midwife or nurse per 489 people.
- L. The percentage of our people living in urban areas is: 47%
- M. Acres of arable land available per person: 0.3 acres