

## Understanding Population Pyramids Using Population Pyramids to Describe a Metropolitan Area

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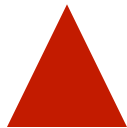
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### Introduction

When I first started teaching geography I would tell my students there were three basic shapes for population pyramids: a) a pyramid shape: indicating a developing nation with high birth rates, b) a box shape: indicating a developed nation with a more uniform population distribution, and c) a modified box shape (like a glass or cup) that is smallest at the bottom indicating the country is experiencing negative growth.

a. Developing

Rapid Growth



b. Developed

Slow Growth



c. Developed

Negative Growth



I would explain this is a very simplistic way to look at countries, and I would show examples where the population pyramids show wars, women with longer life expectancies, an influx of male workers, etc.

However, when using population pyramids at a larger scale, e.g., city, zip code, census tract, etc., the shapes vary greatly. By analyzing the graphs students are able to determine why neighborhoods look so different. The students gain a greater understanding of metropolitan living: Who lives where and why? What is different about a graph in a wealthy neighborhood compared to a poor neighborhood? Why does this graph look more like a developing nation, and this graph looks like a Christmas tree? Using population

pyramids at this scale takes the analysis of these population graphs into a completely different direction. The shapes of the graphs are very unusual in many areas due to many factors: security, good schools, access to shopping, bedroom communities, etc. Students will really come to know that life in the metropolitan areas is very different depending on where you live in the “big city.”

## Objectives

- The student will learn to read and analyze population pyramids, sometimes called age-sex graphs.
- The student will learn to construct population pyramids either in Microsoft Excel and /or on graph paper.
- The student will use PowerPoint and GoogleEarth to create a presentation that describes / analyzes a specific zip code and its population pyramid.
- The student will write a an analysis paper for a specific zip code’s population pyramid.

## National Geography Standards

*9 - The Characteristics, Distribution, and Migration of Human Population on Earth’s Surface*

*10 - The Characteristics, Distribution, and Complexity of Earth’s Cultural Mosaics*

## Grade Level

9-12 (with modifications, it can be used for Middle School)

## Cross Curricular

- History: looking at the Germany, Iceland, and Italy Population Pyramids
- Economics: analyzing the social and economic statistics for a zip code
- Demographics / Sociology: analyzing the ethnic and religious make-up for a zip code
- Computer Skills: using Microsoft Excel, PowerPoint, and GoogleEarth

- English Writing Skills: writing out an analysis
- Speech with Oral Presentations

## Time

Three to four 55 minute class periods (can be adjusted to 1 or 2 days depending on the academic and computer skill level of the students and the students access to computers.)

*Day 1:* Introduction and Analysis of Population Pyramids.

*Day 2:* Using Microsoft Excel to create Population Pyramids and analysis of population pyramids at a local scale, e.g., Shelby County Zip Codes.

*Day 3:* Researching a zip code and using GoogleEarth and Microsoft PowerPoint to create an 8-slide PowerPoint.

All handouts, powerpoints, etc. can be found at the following:  
[http://houstonhs.scsk12.org/~robinsonm/Mr.\\_Robinsons\\_Web\\_Site\\_at\\_Houston\\_High\\_School/Population\\_Pyramids.html](http://houstonhs.scsk12.org/~robinsonm/Mr._Robinsons_Web_Site_at_Houston_High_School/Population_Pyramids.html)

## Materials Needed / Handouts

- *Introducing and Constructing Population Pyramids.ppt* PowerPoint for directions on reading and constructing
- *How to Use MS Excel to Make an Age-Sex Graph.pdf* from prb.org
- *Constructing 8 Population Pyramids.pdf* Handout
- *Selected Population Pyramids in the USA.pdf* Handout and PowerPoint
- *Selected Population Pyramids in Shelby County.pdf* Handout and PowerPoint
- *Statistical Analysis.pdf* Handout
- Zip Code Statistics for possible assignments:  
Shelby County, Knox County, and King County, WA (list only)

## Lesson Outline

### *Day 1*

- Introduce population pyramids by using the *Introducing and Constructing Population Pyramids.ppt* powerpoint.
- Explain to the students the difference between rapid growth, slow growth, and negative growth.
- Ask the students what would be the consequences for rapid growth and negative growth. Possible answers would be:
  - Rapid Growth: over-population, famine, dependency ratio for those under the age of 15 increases, etc.
  - Negative Growth: dependency ratio for those over the age of 65 increases, worker shortage, loss of population, etc.
- Discuss what is being shown on the Germany Population Pyramid. Explain how wars can be seen on a population pyramid and explain how the female population is much greater during periods of war.
- Show how Iceland's population will change from 2000 to 2025 and to 2050. Ask the students what type of growth Iceland is experiencing and discuss the pros and cons for Iceland's population change.
- Have the students analyze Italy's population pyramid and discuss their answers. Then, show how Italy's population is changing from 2000 to 2050 and have students discuss why population pyramids with negative growth are in highly developed regions.
  - Possible answers: expensive to have large families, women in the workforce (gender equality), marriages occurring later in life, etc.
- Have the students discuss how the Townsend, Tennessee, population pyramid is different from Italy's and Iceland's. It looks as if it is also experiencing negative growth.
  - Answer: Townsend, TN, is a retirement community. Older people move to Townsend to live after they retire.

- Discuss how population pyramids at different scales will look differently depending on a variety of reasons, e.g., retirement communities, work primarily for men, college towns, ethnic and social makeup, etc.
- Show how the population pyramids for the USA, Alaska, and the Aleutians East Borough are different because they are at different scales. Have students speculate why there would be so many more men than women in the Aleutians East Borough.
  - Answer: it is primarily a fishing region where most jobs are held by men.
- Have the students complete the *Selected Population Pyramids in the United States.pdf* handout. Use the *Selected Population Pyramids in the United States* PowerPoint to go over the answers with the students.
  - Hints to help students discover the answers:
    1. Northampton, MA (Smith College, an all girls college)
    2. Manhattan, NYC (wealthy downtown, few large families)
    3. Ann Arbor, MI (University of Michigan)
    4. Buffalo county, SD (Crow Creek Indian Reservation, one of the poorest counties in the United States)
    5. Springfield, IL (average American city)
    6. Leavenworth, KS (United States Penitentiary)
    7. Fort Bragg, NC (United States Army Fort)
    8. Punta Gorda, FL (retirement community)
- Conclude the lesson by having students complete the *Constructing 8 Population Pyramids.pdf* handout. Do the Bahrain population pyramid in class and assign the remaining population pyramids as homework. (For middle school you may want to assign fewer graphs and/or do more than one example in class. For high school you may want to have the students write out a short analysis for each of the population pyramids explaining the population distribution.)

*Day 2*

- Today's lesson would need to be held in a computer lab or with a classroom mobile computer cart.
- In preparation for today's lesson each computer the student is using would need to have the following completed from prb.org:
  - 1. The Population Pyramid Chart Template added to Microsoft Excel (use *Template.xls* or download from the prb.org web site).
  - 2. The Blank Population Pyramid PowerPoint Document on the computer's desktop (use *Blank pyramid.xls* or download from the prb.org web site).
    - Directions for both of these are on the handout, *How to Use MS Excel to Make an Age-Sex Graph - Population Reference Bureau.pdf*.
    - *All of this takes time, and it should be completed before the students come to class. Do not have the students try to do this, because it will take up the majority of the class period just to download the file and add the template.*
- Start the lesson by going over the student's homework from the previous day's lesson. Have the students discuss the population distribution for each of the graphs. This is a great review of all that was learned from the previous day.
- Using the *Introducing and Constructing Population Pyramids.ppt* powerpoint show the students how to find age-sex statistics on the Census Bureau web site. Tell the students that they will be using this information to create their own population pyramids in Microsoft Excel.
- Distribute to each student the direction handout, *How to Use MS Excel to Make an Age-Sex Graph.pdf* which has the directions from prb.org on how to create a population pyramid in Microsoft Excel.
- Distribute to each student the zip code(s) they will be responsible for: a) finding statistics from census.gov and b) creating a population pyramid graph in Microsoft Excel.
  - I have zip codes for the following: Shelby County, TN, Knoxville, TN, and King County, WA. The statistics are already provided for Shelby and

Knox Counties. You can also use any statistics that you wish, but it needs to be statistics in an metropolitan area.

- If you do not want the students to use the Census Bureau web site, then print out the statistics for the students to use when creating the population pyramid in Microsoft Excel.

- If you do not have access to Microsoft Excel, then you can have the students complete the graph(s) on the blank population pyramid graph sheet (see *Population Pyramid Blank Graph.pdf*).

- Using the *Introducing and Constructing Population Pyramids.ppt* powerpoint show the students how to create a population pyramid using Microsoft Excel. (For high school you may want to have the student construct up to 3 and do analysis for only one.)

- Once the population pyramid(s) is constructed have the students print the population pyramid(s) and turn in at the end of class. Have the students save the Population Pyramid as a pdf file for the next day's lesson using PowerPoint.

- Handout the *Selected Population Pyramids in Shelby County.pdf* as a homework assignment.

- *Selected Population Pyramids in Shelby County* Hints:

- a. Germantown - wealthy suburban area

- b. Bartlett - older suburban area

- c. East Memphis - one of the older wealthiest residential areas

- d. Downtown Memphis - few families, correctional center

- e. University of Memphis - residential area with large numbers of university students

- f. South Memphis - one of the poorest areas in Memphis

*Day 3 / 4 (may take more than one day to complete)*

- Today's lesson would need to be held in a computer lab or with a classroom mobile computer cart. The students will need to use the same computer they had the previous day because they have the population pyramid

saved on the computer's desktop as a PDF file. The students can use any computer if they were able to save the PDF file to a flash drive.

- This day's lesson is researching and using Microsoft PowerPoint on the computers. If the students do not know how to use PowerPoint, then they can work on the research and write out an analysis for the zip code they created in the previous day's lesson.
- Start the day's lesson by going over the homework from the previous day. Use the *Selected Shelby County Population Pyramids.ppt* to go over the assignment in class.
- Using the *Introducing and Constructing Population Pyramids.ppt* powerpoint show the students how to find statistical information on at least two web sites: a) city-data.com and b) census.gov.
- Demonstrate how to use Yahoo/ Google Earth maps to find aerial photographs for the zip code. If you have Macintosh computers show the students how to take a screen shot for use in the powerpoint.
- Handout to the students the *Population Pyramid Analysis.pdf* handout and tell them to fill out the handout on their zip code using the two web sites discussed in class and any additional web sites, e.g., the city's web site, the county's web site, etc.
- Show the students the example powerpoint saved as a PDF: *Cordova.pdf*
- Have the students open up Microsoft PowerPoint and have them create 8 pages. The following should be on each page:
  - 1. A Title Page
  - 2. The Population Pyramid created during the previous day's lesson. The students will drag the pdf copy from the computer's desktop to this page of the PowerPoint.
  - 3. A Table showing the vital statistics for the zip code.
  - 4. Pictures from Yahoo or Google Earth for the zip code
  - 5. Pictures from Yahoo or Google Earth for the zip code
  - 6. Pictures from the zip code
  - 7. Pictures from the zip code
  - 8. Concluding slide that helps put the zip code in perspective.



- Once the powerpoint is completed have the students save the powerpoint to a flash drive and turn in at the end of class, or you can have the students save the powerpoint as a PDF file (see example *Cordova.pdf*). The PDF files would be easy to post on a teacher's web site for parents and other students to view. The students will also turn in their *Population Pyramid Analysis* handout.

### *After Day 3 / 4*

- Display Zip Codes on the classroom wall and discuss the differences, see *Pyramids Displayed.JPG*. In this example Shelby County is outlined using tape on the wall of the classroom, and the population pyramids are placed where they are actually located within the county.

- Have the students look at the population pyramids displayed on the wall and have them answer questions about the distribution of people in Shelby County. For example:

- 1. Why does Germantown and Collierville have very few people in their twenties living in their cities? Why does the population pyramid look like a Christmas tree?

- *Answer:* It is too expensive for many people in their twenties to live. This area is an area where people move to in their 30's and 40's to send their children to the schools in Collierville and Germantown.

- 2. Why does downtown Memphis have so few children? Why does it have so many men in their 30's?

- *Answer:* There is a prison at 201 Poplar Avenue in downtown.

- 3. Why does East Memphis have a very stable population?

- *Answer:* This is an older established upper middle class neighborhood with several retirement homes, which typically have more women than men (since women on average live longer).

- Have the students present their zip code powerpoint to the class. The presentations should focus on why the population pyramids look the way they do, e.g., Germantown's population pyramid shaped like a Christmas tree. The presentations are between 3-5 minutes.

## Internet Resources

Census Bureau *www.census.gov*

City-Data *www.city-data.com*

Google Earth (download) or Yahoo Maps

Population Reference Bureau (downloads) *prb.org*

## Evaluation

Students construct 8 population pyramids for different countries.

Students construct (1-3) population pyramids in Excel or on graph paper.

Students complete an analysis for each population pyramid(s) constructed.

Students create a PowerPoint describing one of the population pyramids constructed.

Students analyze the wall map displaying the population pyramids.

**All materials can be found at:**

[http://houstonhs.scsk12.org/~robinsonm/Mr.\\_Robinsons\\_Web\\_Site\\_at\\_Houston\\_High\\_School/Population\\_Pyramids.html](http://houstonhs.scsk12.org/~robinsonm/Mr._Robinsons_Web_Site_at_Houston_High_School/Population_Pyramids.html)