

## LESSON 12:

# WHAT DO THOSE POPULATION PYRAMIDS MEAN?

### **Introduction:**

This lesson builds upon statistical information from sources outside the Deai kit to help students understand the fact that Japan is experiencing a significant demographic transition. Like many other countries, Japan has a rapidly aging society. Students build social science skills by learning key demographic concepts and interpreting population pyramids from several time periods. They decide whether the family sizes of the seven Japanese high school students are typical for contemporary Japanese families. Finally, they forecast possible effects of the demographic changes they have identified and propose governmental policies that could counter negative effects. By taking part in the lesson activities, students gain insights into how societal change impacts individual lives and why understanding statistical data is an important life skill.

### **Organizing Questions:**

What can we learn about society and the individual?  
What can we learn about tradition and change?

**Objectives:** At the conclusion of this lesson, students will be better able to:

1. Correctly use terms for basic demographic and geographic concepts: *birth rate*, *death rate*, *population growth rate*, *life expectancy*, and *fertility rate*.
2. Compare birth rate data about Japanese society as a whole with the families of the Japanese high school students.
3. Interpret population data represented in a population pyramid.
4. Forecast possible social impacts of the population trends they have identified.
5. Propose governmental policies to address any negative social impacts they forecast.

**Time Required:** 2 class periods plus homework

### **Materials:**

Handout 12-1, "Population Pyramids for Japan, 1960-2040," duplicated as transparencies or a handout for all students

## **Procedure:**

### **Day 1**

1. To introduce the lesson, explain that the class will be examining very important population trends in contemporary Japan. These trends have implications for all aspects of life in Japan. To understand the trends and their significance, students will need to understand some terms used by geographers and demographers (people who study the characteristics of human populations, such as size, growth, and density).
2. Introduce the following terms:
  - *birth rate*: the ratio of live births to total population of a given area, often expressed as births per 1,000 people per year
  - *death rate*: the ratio of deaths to total population, also expressed per 1,000 people per year
  - *population growth rate*: the rate at which a population grows per year
  - *life expectancy*: the average number of years that an individual is expected to live
3. Verify that students understand the terms by asking questions or by giving examples and asking them to restate the examples in another way.
  - If a town has 1,000 people and has a population growth rate of 2 percent, what will the population be in a year? (1,020)
  - What does it mean to say that people born in Japan currently have the highest life expectancies in the world? (*On average, they live longer than people in any other country. Even though that is the national average, individuals might have long or short lives.*)
4. Introduce one more term that will be a useful tool for discussing population: *total fertility rate*. It is the average number of babies born to women during their reproductive years. Ask students the following questions:
  - What impact on a country's population would you expect if the fertility rate were 3? (*Population would rise, unless an increase in deaths occurred, because each two parents would have three children.*)
  - What if the total fertility rate was 1? (*Population would eventually fall.*)
  - Would a fertility rate of 2 result in a stable population? (*The answer to the third question is a little tricky—2.1 is generally considered to be a replacement rate, due to other factors affecting the size of a population.*)
5. Explain to students that the fertility rate in Japan has been rapidly decreasing; it was 1.32 in 2002 and then fell to a new low of 1.29 in 2003. Ask them to predict the impact of this fertility rate on Japan's total population. (*Population will decline if the fertility rate does not rise.*) As of 2004, the Japanese government predicted that the population of Japan will peak in 2006 at 127,730,000 and then begin to decline.

6. Tell the class that they will compare this trend in the total population to the size of the families of the seven Japanese high school students. Give them the following information about the total number of children in each student's family, including the student who is profiled:

Mizushima Yu:	2
Oishi Kanta:	6
Sakai Michi:	2
Tamaki Shun'ichi:	5
Yoshida Kojiro:	3
Yamamoto Takayuki:	2
Yoo Yoo Jin:	3

- Do the families of these young people reflect typical Japanese family size? (*The answer is definitely not, although these family sizes were closer to typical two decades ago when the seven Japanese high school students were born.*)
  - What is the fertility rate for the mothers of the seven Japanese high school students? (*By totaling the number of children and dividing by 7 mothers, students will find that the average is 3.57, compared to the current Japanese average of 1.29.*)
7. Explain that a basic tool of demographers when they study and present population data is a visual representation called a population pyramid. Project the 1960 pyramid provided on Handout 12-1 with an overhead projector or distribute it as a handout. Draw students' attention to the key characteristics. A population pyramid is essentially a double bar graph that shows the total population of a country, divided with men on the left and women on the right, given in age brackets (typically 5 or 10 years per bar), with the youngest bracket at the bottom. The scale at the bottom generally shows the numbers of people, although it could show the percentages of the total population.
8. Ask students to respond to basic questions about population pyramids, based on the 1960 example in Handout 12-2.
- What does the lowest bar represent? (*The number of people who are four years old or younger*)
  - What is the difference between the bars on the left and those on the right? (*Bars on the left show the male population; bars on the right show females.*)
  - How would you figure out the number of people in Japan in 1960 who were between the ages of 10 and 14? (*Add the right and the left bars in the third bar from the bottom together*) What is that total? (*Approximately 11 million*)
  - Which age group has the fewest people? (*80 and above*)
  - Does this shape look like a pyramid? (*Students will probably notice that the ages from 10 upward fall into a pyramid shape but that the base is narrower.*)

Tell students that they will next compare different years and will return to the issue of the narrow base.

9. Optional Activity: If time allows, ask the students what factors might contribute to the shape of the pyramids. (The rest of this lesson focuses on the effects of the trends illustrated in the pyramids, rather than on the factors that cause those trends.) Factors such as changing life expectancy, changing birth rates, or large-scale immigration or emigration cause the shape to change. Another cause of variations in the pyramid shape was World War II: note that in the 1960 pyramid, there are fewer men than women in the 40 to 44 age group. This is the age group that was in its early 20s—and thus serving in the military in large numbers—during the war years.
10. Project or distribute the Japanese population pyramids from 1960, 1980, 2000, 2020, and 2040. Ask students to describe the changes they notice.
  - Find the longest bars in the 1960 pyramid. This age group, people who were born between 1946 and 1950, is unusually large. There was a similar post-war baby boom in the United States. Note that this unusually large age group can be followed from pyramid to pyramid as they age.
  - Can you tell from these pyramids if people are now living longer? (*Looking at the top bars shows that there are now more people in the oldest age group.*)
11. To check comprehension, ask students to write three simple statements that are based on information from the population pyramids. For example, “In 2040 Japan is expected to have millions fewer children in the youngest age group than it did in 1960, 1980, or 2000” or “Life expectancy in Japan has been increasing for 40 years.” Remind the students that predictions are accurate only if present trends continue in the future.
12. Ask students to read and discuss the statements written by one or two other students. Any that are controversial can be discussed by the whole class or corrected by the teacher.
13. As a class, brainstorm the possible social effects of the Japanese population trends students have identified from the population pyramids and the fertility rate. If it is hard for them to imagine these effects, start with such questions as: Are your grandparents’ spending habits different than yours? or If one young couple has two children and another has no children, how do their lives differ? List the possible social effects on the board. (*Students may forecast that there will be fewer young people to care for the elderly, businesses may need to hire workers from some other country that has available labor, land may be cheaper because there will be fewer people competing to buy it, families will be smaller, etc.*) If students create a list of forecasts that are either all negative or all positive, propose some alternatives so students can reflect on the complexity of this issue. If students do not consider all of the following aspects of the impact of an aging population, ask them to consider: consumer spending patterns, housing, health care, taxes, and size of the work force compared to the numbers of retirees.
14. To investigate whether any of the trends that the students have forecast for Japan are already taking place, assign students to find one article each online or in print from news media or government sources. (See **Sources** on next page for Internet sites with articles about population-related issues in Japan.) As homework, have students write a brief summary of the key points in their article

about some aspect of social change in Japan that they believe to be related to the demographic trends represented in the population pyramids. They should identify the trend or trends that relate to the change. For example, public concern about pensions for the elderly relates to the rising life expectancy and to the decreasing birth rate, since people are living longer but have fewer young relatives to care for them.

## **Day 2**

1. Ask students to briefly report out their findings about social change in Japan, using their articles to verify, refute, or expand the predictions the class made. They will find that many current articles document the changes in Japanese society that are already resulting from the rapid aging of the population.
2. Divide the class into small groups to brainstorm what policies students would recommend to the government of Japan to address problems they identified in the previous class. They should be ready to identify both the potential problem and realistic steps the government could take to address that problem. Encourage them to use the terminology they learned in this lesson. For example, in discussing concerns that the pension system might not have enough money because of increasing life expectancies, they could recommend that the government increase taxes. What could a government do to encourage young people to get married and have children?
3. Students will probably find it difficult to imagine what a government can realistically do to affect population trends. Close the lesson by reminding students of the complexity of population issues. Government policies have an impact on individual behavior, but many other factors also affect people's choices.

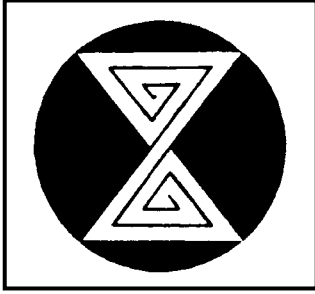
### ***Extension and Enrichment:***

If students have web access, broaden the lesson by assigning each student to gather data for a population pyramid for one country other than Japan. Pyramids for any country can be obtained from the U.S. Census Bureau site at [www.census.gov/ipc/www/idbpyr.html](http://www.census.gov/ipc/www/idbpyr.html). Ask students to compare their country with Japan. They will find that many other developed countries, although not the United States, are experiencing similar trends. One of the reasons that the population of the United States is increasing is immigration into the country.

### ***Sources:***

Population websites such as the U.S. Census Bureau population pyramid information ([www.census.gov/ipc/www/idbpyr.html](http://www.census.gov/ipc/www/idbpyr.html)) and the Population Reference Bureau ([www.prb.org/](http://www.prb.org/)).

Sources of government publications and news articles about population-related issues in Japan such as Japan Access ([web-jpn.org/factsheet/](http://web-jpn.org/factsheet/)), Japan Times ([www.japantimes.co.jp/](http://www.japantimes.co.jp/)), the Japan Brief posted on various Japanese government websites including that of the Embassy of Japan in Denmark ([www.dk.emb-japan.go.jp/](http://www.dk.emb-japan.go.jp/)), or articles available via the National Clearinghouse for US-Japan Studies ([www.indiana.edu/~japan/](http://www.indiana.edu/~japan/)). Many official Japanese governmental statistics can be accessed in English ([portal.stat.go.jp/](http://portal.stat.go.jp/)).

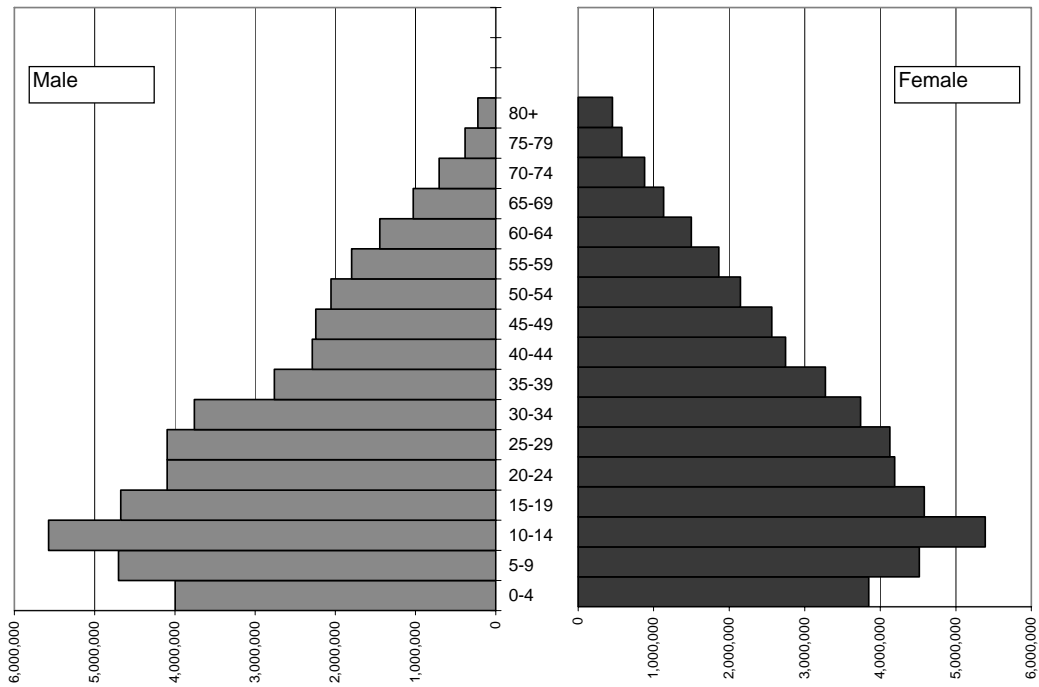


Handout 12-1

# Population Pyramids for Japan, 1960-2040

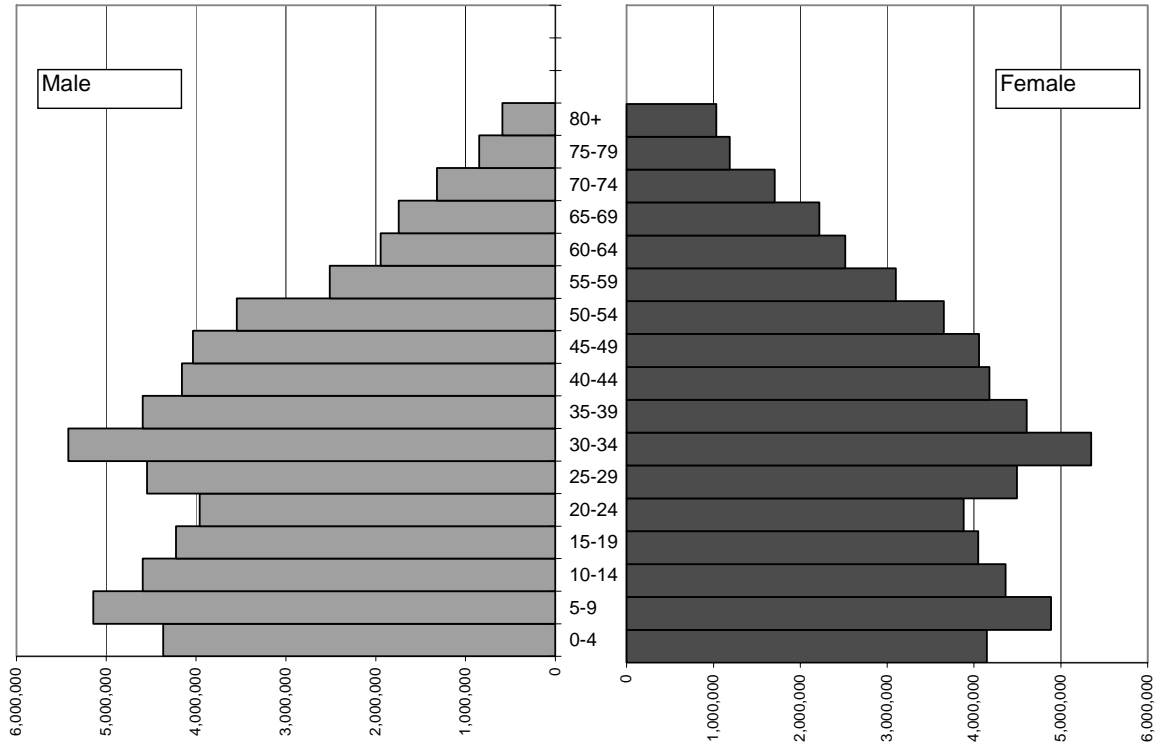
## Population Pyramid, Japan 1960

### Population by Age and Gender



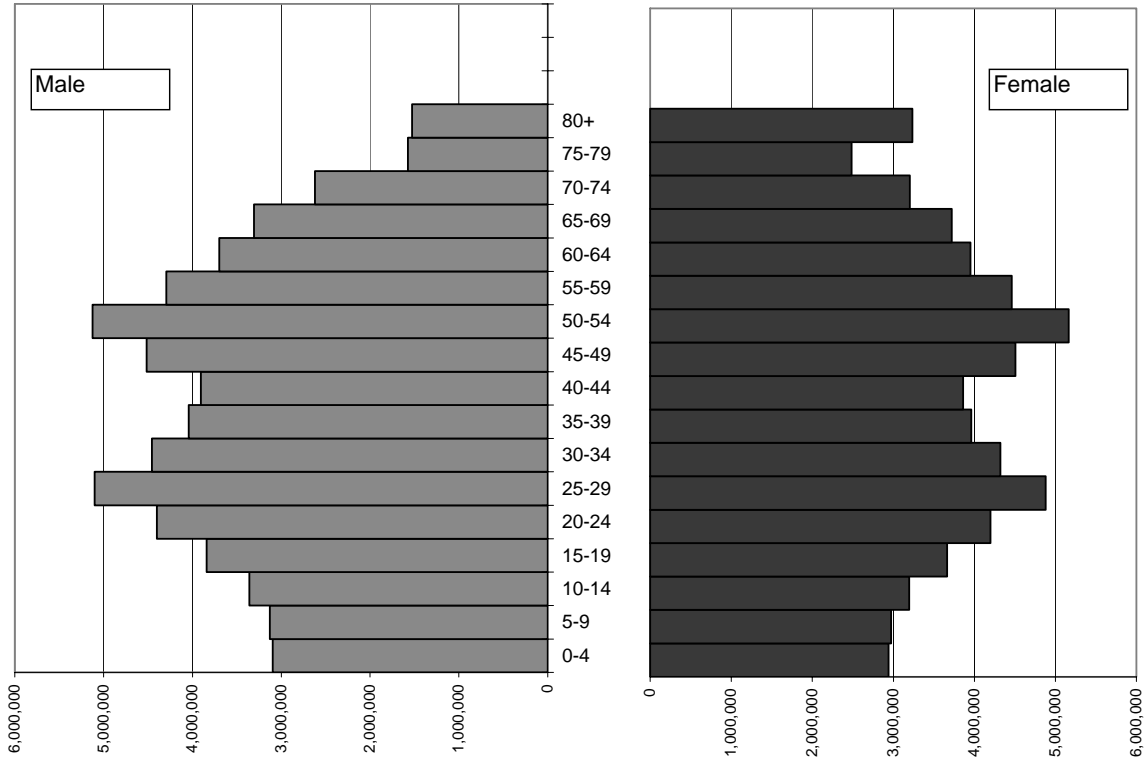
# Population Pyramid, Japan 1980

## Population by Age and Gender



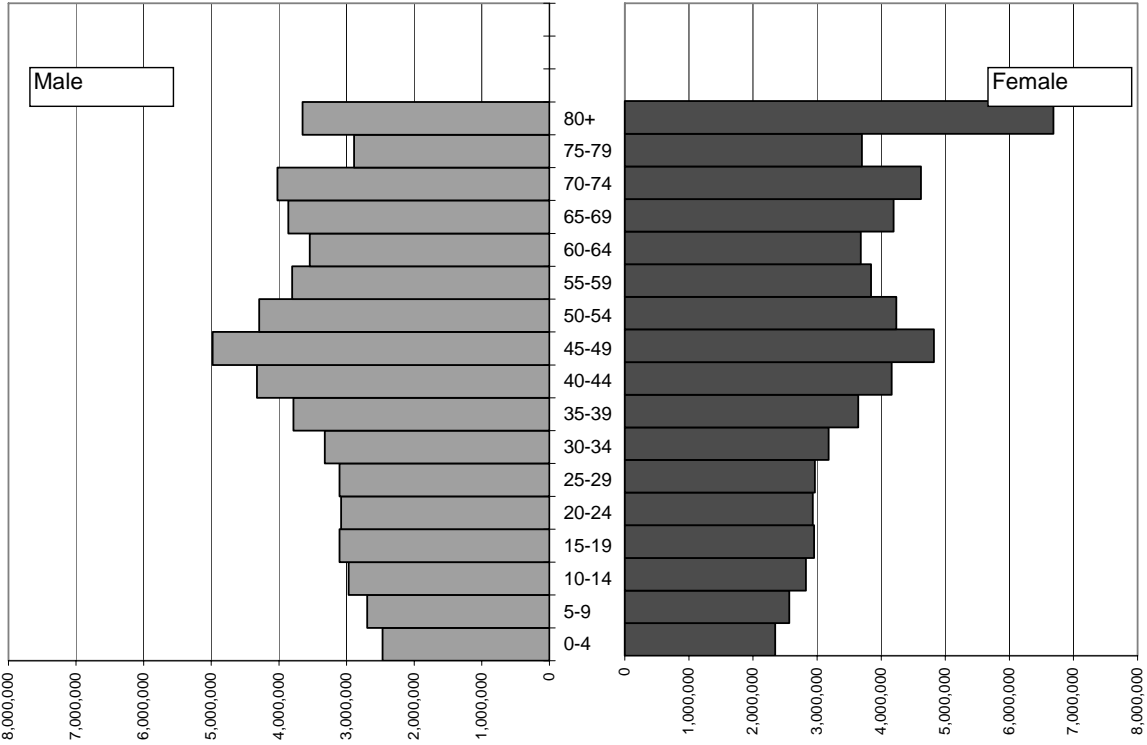
# Population Pyramid, Japan 2000

## Population by Age and Gender



# Population Pyramid, Japan 2020

## Population by Age and Gender



# Population Pyramid, Japan 2040

## Population by Age and Gender

