Teacher Notes
Population Pyramids in China

Overview
Students review (or learn, if necessary) how to construct a population pyramid. They then interpret population pyramids for China over time (1950-2050), in order to think about the population structure of a country and how it can change through time. The third step is to add a geographic dimension by trying to match population pyramids with descriptions of communities in three different regions of China.

Learner outcomes and standards
After doing this activity, a student will be able to:

1) Construct and interpret a population pyramid  (Standard 1: use maps and other geographic representations, tools, and technologies to acquire, process, and report information).

2) Describe both temporal and spatial differences in China's population structures  
   (Standard 9: characteristics, distribution, and migration of human populations).

3) Explain relationships between pyramid shapes and levels of development in China 
   (Standard 12: processes, patterns, and functions of human settlement; 
   Standard 18: applying geography to interpret the present and plan for the future).

This activity fits a unit on world geography, the geography of Asia of China, population studies, modern history, or international relations; its use of graphs is an example of applied mathematics.

Resources

Time: One to three 45-minute class periods, depending how many CD units are used, how many optional Response Sheets are done, and whether each student does every part.

CD units on Population Pyramids, Coast and Interior (comparing an inland village with part of Shanghai), Tea (a well-known tea-growing farm becomes an international exporter), Three Gorges (a large hydroelectric dam on the Yangtze), Trends in Food Production (comparing China, India, and East Africa)

Classroom procedures
1. Ask students to describe the population of their home neighborhood. For example:
   - Does it have many children, senior citizens, young singles, etc.? Are families large or small?
   - What kinds of businesses and public services are available in your community?

2. Ask students to describe what they think communities are like in China.
   - Are families in China larger or smaller or about the same size as in the U.S.?
   - Do families get larger or smaller as countries get richer?
   - Is China a developed or developing country? (Note the Glossary for definitions.)

3. Use the multimedia presentation of worksheet to explain how to construct a population graph

4. Hand out Response Sheet R3 and have students answer or discuss these questions.

5. If desired, have students, individually or in groups, do the optional Response Sheets.
Alternative introductions

Use the CD units on Coast and Interior (comparing an inland village with part of Shanghai), or Trends in Food Production (comparing China, India, and East Africa) to pose questions about population policy. The Shanghai comparison notes past efforts of the Chinese government to restrict migration. The Food Trends unit provides a graphic illustration of some benefits of lower population growth rates.

Key to Response Sheet R1

Population pyramid for China in 2000

1. Why do you think this pyramid is different from the one for 1950?

China's population pyramid for 2000 looks very different from its 1950 pyramid. In general, the shape of a pyramid is a result of an interaction among fertility (birth rates), mortality (death rates), and migration (in the case of China since 1950, migration has had an insignificant effect, which is one reason why we chose this country as the “laboratory” where students learn how to read these graphs). The shape of a pyramid can also reflect historical events (such as wars or disease epidemics), socio-economic factors, and political policies that affected population. For example, in 1979, China established a “One-Child Policy” to reduce the rate of population growth. China’s population for 2000 shows a large bulge in the 25-34 age cohorts, which represents the high birth rates over 25 years ago (prior to 1975). Under age 25, the numbers are sharply reduced. This may be an effect of the one-child policy. But other factors are probably also responsible for the reduction in fertility, such as urbanization, education, and health care – factors that both promote and result from economic development.
How would you describe this shape? Why do you think it looks this way?

*The projected population pyramid for 2050 has a radically different shape than the pyramid for 1950. More a rectangle than a pyramid, this is the classic shape of the pyramid for highly developed countries. In general, each age cohort is roughly the same size as its parents’ group, which means that birth rates are roughly at the replacement level – each woman has about 2 children, and the population stays roughly the same size.*

*In the younger age groups, males slightly outnumber females; in the older groups, however, females outnumber males, an indication of the longer life expectancy that females have in nearly every country. The large population above age 65 is an indication that nutrition and health care have surpassed world averages, which in turn allow people to live a long time.*

*Before closing this part of the Activity, remind students that the data they used to make this population graph are projections based upon current trends; it is certainly possible that future events – wars, diseases, or changes in food production – could change these projections.*
Examine all three population pyramids for China: 1950, 2000, and projected for 2050. Think about how they are different. Based on what you observe, answer these questions:

1. Which of the three population graphs looks most like a pyramid? What does that mean about birth rates (hint: compare each age group with the group about 20 years older).
   
   1950 – each age group is significantly larger than its parents’ group.

2. Some people describe the general shape of China’s population graph for the year 2000 as a rectangular box with a triangular “roof.” The top of the “wall” and the bottom of the “roof” is the largest age group in China’s population. What is that age group?

   30-34 – the last group of children that greatly outnumbered their parents

3. What do you think might be the reason for the change from “wall” (box shape) to “roof” (triangle or pyramid shape) described in question 2?

   The large 25-34 age-cohorts reflect the last years of high birth rates prior to the start of rapid industrialization and the establishment of the "One-Child Policy." Birth rates after about 1980 are much lower, and therefore the bars for younger cohorts are not much longer than the bars for their parents.

4. Look carefully at the population graph from the year 2000. Generally speaking, are there more males or females in the younger age groups? What do you think might be a reason for the differences you notice?

   More males than females, which is perhaps an indication of the use of abortion in order to have sons rather than daughters; this is not as clear in the national pyramid as in pyramids for various regions on the CD or Response Sheet 4.

5. How would you describe the general shape of the predicted population graph for 2050? Is it more like a pyramid, a box with a roof, a box, a diamond, or some other shape?

   A box – this is the classic shape of the pyramid for highly developed countries. In general, each age cohort is roughly the same size as its parents, which means that birth rates are roughly at the replacement level – each women has about 2 children, and the population stays roughly the same size.

6. Are there more males or females in the older age groups of the predicted population in 2050? What do you think might be a reason for the differences you notice?

   More females, an indication of longer life expectancy of females. The large population above age 65 suggests that nutrition and health care are above world averages, which allows people to live a long time.

7. What do you think these three population graphs say about China’s population growth? (Do you think the rate of growth is likely to increase or decrease in the future?)

   The population is likely to remain about the same size; see #5 above.
1. **The population of Yiwu is shown by pyramid B.**

From age 15 and older, the pyramid for Yiwu has the classic triangular shape of a developing region, with a wide base that indicates a high birth rate. The length of the bars clearly shows that the average woman who is now in her 40s probably had four or more children who are now in their 20s. The three youngest age-groups (those under the age of 14) reflect a substantial reduction in birth rates, most likely a consequence of the "One-Child Policy." This response, however, was slower and less sharp than in, say, Shanghai. Indeed, the Chinese government has had less success with its population control policies in the rural interior and western regions than in the more developed urban, eastern and coastal regions. Moreover, Xinjiang is one of the least developed parts of China, so one would expect to find a pyramid that is closer to the classic shape of a developing region.

2. **The population of Baoshan is shown by pyramid C.**

Baoshan is an urban, industrial area within the Shanghai metropolitan zone. The notable bulge between age 20 and 40 could reflect the high birth rates prior to the government's enforcement of the "One-Child Policy." It also may indicate the in-migration of workers from rural areas. The fact that men outnumber women by about 3 to 2 in this age group is probably a consequence of the kind of industry in this county – heavy. The relatively narrow base of the pyramid up to age 20 is an indication of small families, which are characteristic of urban populations.

3. **The population of Dongguan is shown by pyramid A.**

The population of Dongguan has some of the same characteristics as that of Baoshan, Shanghai, except that the bulge in the 15-29 age cohorts is even more exaggerated. Most striking is the extremely high number of young women ages 15-29. This is a reflection of the fact that Dongguan lies in a Special Economic Zone (SEZ) set up to produce products for export. Young women are recruited from other parts of the country to work in these factories. Manufacturers believe that women are better than men at assembling very small, intricate goods such as computer chips and electronic items (see the CD unit on Export Zones in Indonesia and Activity S for more about these factory zones).

Discussion about these three population graphs should include four main points:

1) Reading a population graph is less about measuring the length of individual bars and more about trying to grasp the implications of the general shape as a whole.

2) Relatively small areas can have pyramids with a more distinctive shape than those of entire countries, because aspects of local history or economy are less likely to be “averaged out” or “diluted.”

3) Parts of China already have population profiles that resemble highly developed countries, whereas other regions still have the classic triangular pyramids of developing areas.

4) Population graphs can tell us much more than just whether parents are having more, roughly the same, or fewer children. Aspects of local economies, previous wars, or migration patterns all leave their “footprints” in the general shape of a population pyramid.
Key to Optional Response Sheet R5 – some “B-countries”

1. **The population of Bangladesh is shown by pyramid B.**
   From age 10 and older, this graph has the classic triangular shape of a developing region, with a wide base that indicates a high birth rate. In the last decade, however, the country has begun a rapid industrialization (note how many products in stores are made here), with a sharp decline in birth rates.

2. **The population of Belgium is shown by pyramid D.**
   A large number of very old people (especially females) is one indication of a highly developed country, with a low death rate and long life expectancy.

3. **The population of Bulgaria is shown by pyramid A.**
   The population of Bulgaria has not grown very much in fifty years, a common feature of the Eastern European countries that were satellites of the Soviet Union. Indeed, the recent birth rate would eventually lead to population decline, because the average woman in her 20s is having fewer than two children (the lowest bar on each side of the graph).

4. **The population of Burundi is shown by pyramid C.**
   This pyramid has the classic triangular shape of a developing region, with a wide base that indicates a high birth rate, and a small number of old people, which suggests a high death rate.

Key to Optional Response Sheet R6 – some “U-countries”

1. **The population of Uganda is shown by pyramid D.**
   This pyramid has the classic triangular shape of a developing region, with a wide base that indicates a high birth rate, and a small number of old people, which suggests a high death rate.

2. **The population of the United States is shown by pyramid B.**
   A large number of very old people (especially females) is one indication of a highly developed country, with a low death rate and long life expectancy. The bulges around ages 35-45 are the result of the so-called “baby boom,” as soldiers returning from World War II got married and began to start families.

3. **The population of Uruguay is shown by pyramid A.**
   This small country has a rectangular shape, with a relatively low birth rate and a long life expectancy. Unlike the United States, it does not have noticeable bulges in specific age groups, an indication of the absence of wars, famines, or disease epidemics in its past century.

4. **The population of Uzbekistan is shown by pyramid C.**
   From age 10 and older, this graph has the classic triangular shape of a developing region, with a wide base that indicates a high birth rate. In the last decade, however, the birth rates of this country have declined sharply, which is probably a consequence of the economic troubles that occurred after the breakup of the former Soviet Union.
Extension and Enrichment

Have students select a small set of countries to represent a continuum from least to most developed. They can use GNP per capita as the criterion for development. A good source for the GNP per capita data is the *World Population Data Sheet*, published annually by the Population Reference Bureau, Inc., Washington, D.C. Then, students should find the age-sex cohort data for these countries so they can make the population pyramids. The United Nations is one good source for these cohort data; at the time this was written, the Census Bureau had a web site that allows students to view the population pyramid for nearly any country in the world:

www.census.gov/ipc/www/idbpyr.html

Have students learn more about China and its people by conducting information searches in the library and/or on the Internet. Here are some useful sites found by entering the country name plus the words “data” “statistics” or “images” into an internet search engine:

www.chinanews.org/
sedac.ciesin.org/china
citas.csde.washington.edu/
www.stats.gov.cn/english/index.htm
www.cbw.com/china.html
www.cernet.edu.cn/china/index.html
www.asiaphoto.com/jenny/

Concluding the Activity

One obvious conclusion is that China appears to be well on its way to becoming a highly developed country – something that is evident in its population profile and should also be obvious if one examines the kinds of products that Chinese people are now selling to the rest of the world. The governmental population policies and other means used to achieve that goal, however, could be the subject for a lengthy debate, which could easily extend this lesson into an international comparison that could fruitfully fill several weeks.

Students should also realize that China is a huge country, and that any generalization is bound to have many local and regional exceptions.
Population Pyramids
Glossary of key terms

**age-sex cohort**: within a population, the males or females within a specified age range

**birth rate**: the number of births in a year for each 1,000 people in a population.

**census**: the practice of counting a population and its characteristics; most modern governments conduct a census every few years

**cohort**: a specific age group, such as 5-9; population graphs may use cohorts of different sizes, depending on the availability of data and the purpose of the graph

**death rate**: the number of deaths in a year for each 1,000 people in a population

**demographic characteristics**: birth rates, death rates, and other features of populations

**demographic transition**: changes that occur in a country's population when it changes from a rural, agricultural society into an urban, industrial society

**demography**: the study of human populations, population structure, and population movement; the word “demographic” means “about a population”

**dependency ratio**: a measure of how many very young and very old people are in a population, compared to those of working age

**developed countries**: sometimes called more developed countries (MDCs), these are the more wealthy, industrialized countries

**developing countries**: sometimes called less developed countries (LDCs), these are the poorer, less industrialized countries

**development**: general condition or wealth of a country or region; the improvement of education, economic productivity, and health care leading to an increase in the well-being, or quality of life, of the people. A relative term, there is no simple dividing line between developed and developing countries; instead countries are arrayed along a continuum from least to most developed (see the CD units on Correlation and Quality of Life)

**population density**: a measure of how crowded an area is; calculated by dividing the population of a place by its area (see the CD units on Population in Bolivia and Urban Gardens in Bangladesh)

**population pyramid**: a graph that portrays a country's population structure

**population structure**: age-sex composition of a population; often shown with a pyramid

**uneven development**: the uneven distribution of wealth, such that some countries and regions within countries are rich and some are poor

**United Nations**: an international organization formed after World War II to replace the League of Nations; considered the most important international forum

**working population**: portion of the population that is of working age; often estimated as the population between the ages of 20 and 60