

Lesson 10

Looking Forward with a Recursive Model (Present to Past ... to Future)

Kristin's Story - Chapter 6

Kristin turned 31 years old in 2010. That year was a memorable year for her as she completed her educational program in health care. She became an aunt for the first time with the birth of her niece Adeline in 2012. Like many women her age, she also thought a lot about whether or not she wanted children. She remembers that at her high school reunion in 2010, several of her friends already had children. Several others were talking a lot about their future plans, including whether or not to get married, or whether or not to have children. Many of her friends were considering career and educational options, including moving to other areas of the country or world.

In 2011, Kristin met Raphine at a medical conference. Raphine is the same age as Kristin. He moved in 2011 to the United States from Kenya. He was accepted at a United States medical school to pursue his goal of becoming a doctor. His plan was to either become a United States citizen after completing his degree or move back to Kenya to practice medicine. He and Kristin planned a 3-week trip in 2015 to Kenya to see Raphine's village, however, a lack of money postponed those plans. They still hope to work out something, but they are not exactly sure when this might happen.

Lesson 10 – Problems

Handouts needed to complete the following problems:

Handout 1: *United States – 2015*

Handout 4: *United States Connected Age Groups*

1. Examine again the **Handout 1: *United States - 2015***. In what age group was Kristin and Raphine counted in 2015?
2. Would a summary of the United States population in 2010 include Raphine? Explain your answer.

For the following problems, use **Handout 4: United States Connected Age Groups**.

3. At the start of 2010, there were 20,189,589 people who were 0 to 4 years old. At the start of 2015, there were 20,481,130 people who were 5 to 9 years old. What is the connection of these two age groups?
4. At the start of 2010, there were 21,983,206 people 15 to 19 years old. In what age group will these people be counted at the start of 2015? How many people were counted in that age group?
5. Adeline was born in 2012. In what age group was Adeline counted in 2010? Explain your answer.
6. In what age group would Adeline be counted in 2015?

Examine the age groups that are described as connected age groups in **Handout 4**. This handout indicates a connection of the age group 0 – 4 in 2010 to the age group 5 – 9 in 2015. For the recursive model developed in the remaining lessons, these age groups are called **connected age groups**.

Observe that people like Adeline (or people born after the start of 2010) are counted in the 0 – 4 age group of 2015. Although born prior to 2015, the people counted in the 0 – 4 age group in 2015 have no connected age group to the 2010 age groups. This age group is very important in this model and will be addressed in Lesson 12.

For this recursive model, a ratio is formed of connected age groups. Column 3 represents the ratio of connected groups as a fraction. Column 4 derives a decimal from the fraction and identifies this decimal as a **population factor** for the connected age groups.

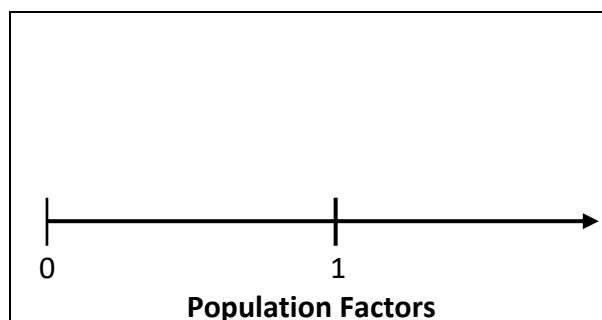
7. What is the ratio of the count of people 5 - 9 years old at the start of 2015 to the count of people 0 to 4 years old at the start of 2010?
8. The ratio is represented by a decimal in column 4, or 1.014 to the nearest thousandth. As stated in problem 7, this decimal is defined as the **population factor** for the connected age groups. This population factor is greater than 1 for this example. What does that tell you about the connected age groups?

9. During the 5 years summarized on the table, what is the approximate percent increase of people 5 - 9 years old in 2015 based on the count of people who were 0 – 4 years old in 2010? Is the percent increase also part of the population factor for these connected age groups? Explain.
10. What is the explanation for the growth in the connected age groups with a population factor greater than 1?
11. During the 5 years summarized on the table, what is the approximate percent of change of the count of people 55 – 59 years old in 2015 who were 50 – 54 years old in 2010?
12. What is the explanation of the changes in the connected age groups with a population factor less than 1?

Complete the calculations missing in **Handout 4**. After you have completed the handout, answer the following questions:

13. What is noticeable about the population factor for the connected age groups of 40 – 44 years old in 2010 to 45 - 49 years old in 2015 when compared to the population factors for younger connected age groups?
14. What happens to the population factors for connected age groups that count people 40 years old or older?

Any change in the count of people counted after the start of the year are a result of people moving into this country (immigrating), people leaving this country (emigrating), and dying. The following problems examine the collection of population factors for the United States.

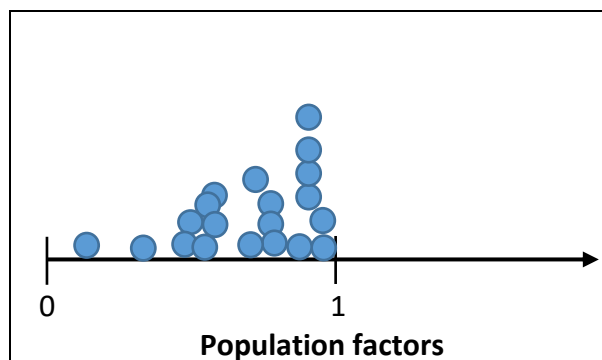


15. Place a dot for each of the population factors derived on **Handout 4** on the above Population Factors number line. (Stack dots if they are close to each other.)
16. Why is 1 considered an important value in interpreting a population factor? Explain your answer.
17. Is it possible for the population factor of connecting age groups be equal to 0? Explain your answer.
18. Changes in the count of people over a 5-year period are explained by **birth, death, immigration, and emigration** (people leaving a country). Use the value of the population factor to identify what changed the counts in the following Connected Age groups from 2010 to 2015. Identify the most dominant explanation for the changes in the connected age groups in the last column. (The first connecting age group is completed for you.)

Connected Age groups from 2010 to 2015	Population Factor for the connected age groups	What could explain the changes in the count of people in the connected age groups?	What was the dominant explanation of the change in the connected age groups?
0 – 4 to 5 – 9	1.014	Immigration, emigration, deaths	Immigration
20 – 24 to 25 – 29			
40 – 44 to 45 – 49			
85 – 89 to 90 – 94			
95 to 99 to 100+			

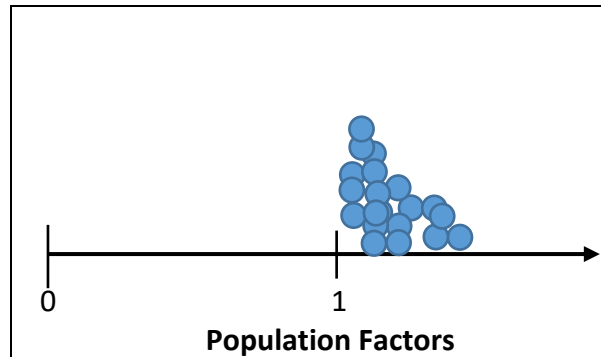
19. Summarize what a population factor indicates about the connected age groups.

20. Consider the following dot plot of the population factors of a fictitious country:



- What is the dominant explanation of change in the connecting age groups for a country represented by the above dot plot?
- Do you think it is possible for a country with the above population factors to have an increase in its total population during a 5-year period? Explain.

21. Consider the following dot plot of the population factors for another fictitious country:



- a. What is the dominant explanation of change in the connecting age groups for the above dot plot?
- b. Do you think it is possible for a country with the above population factors to have a decrease in its total population during a 5-year period? Explain.

How can the population factors be used to estimate future counts, or population projections? Applying the above population factors to the actual count of people in 2015 will start the recursive model.