

Chapter 6

Population Growth

Population is constantly changing due to births, deaths, aging, and the migration of people with different social and cultural characteristics. Monitoring the growth and loss of population and the changes in the characteristics of the population is a major focus of demographic research.

Reporting change, however, is not just a matter of reporting the absolute change in the number of persons. It is often more important to know how many persons were gained or lost relative to the total number that were there initially. This is usually expressed as a percentage increase or decrease. It often reveals a very different result than is obtained from comparing absolute numbers.

Very commonly, smaller places experience the greatest percentages of change. Such change has a relatively greater impact in smaller places because of it. However, sometimes places are so small that percentages become misleading. For example, the highest percentage of American Indians in Los Angeles County in 1980 by far was in a tract with 12.5% of its population American Indian. A closer examination of this data revealed that there were only eight people in the tract, one of whom reported himself as American Indian. Thus, it is usually advisable to also report the absolute number of persons when reporting percentages. Of course, politicians lobbying for government support and urban promoters will use whichever figure best suits their needs when discussing change.

A. Describing Population Change

Table 9a below illustrates several expressions of population change between 1980, 1990 and 2000 for California counties. If one were to rank the counties by the gain in the numbers of Mexican origin persons from 1980 to 1990 (first column), Los Angeles County gained nearly four times more Mexican origin people than the next county and nearly three times more in the following decade. However, for most of these counties the numbers in the 1990s showed a drop from the 1980s. In 1990 Los Angeles County claimed nearly a third of all Mexican origin persons who came to the State of California and in 2000 it claimed less than a quarter. Nearly half of the Mexican origin population increase in the entire United States occurred in California during the 1980s, but this declined to about a third in the 1990s.

Table 9b ranks the counties by percentage increase in the number of Mexican origin persons during the 1980s. Here a very different set of counties emerges. When ordered by number, urban counties show the most growth; but when ordered by percentage increase,

mostly rural counties in the Sierra foothills, the eastern San Joaquin Valley and the northern mountain areas show the greatest gain. These counties had relatively few Mexicans, but they underwent the greatest percentage increase in Mexican origin persons relative to the number of Mexican origin persons that were there initially. In the following decade the number of resident Mexicans was greater and so the new arrivals did not have quite the same impact on the same counties. Also, the focus of increase shifted more to counties surrounding San Francisco Bay that are not shown in this table.

Table 9c shows the shift in the percentage of the total population that is Mexican origin between 1980 and 1990. Colusa County, for example, has had an increase of 12.8 percentage points in the total population that is Mexican origin. Those counties showing the greatest increase in the percentage Mexican are mostly agricultural counties. Mexican origin persons have had the greatest increase in the percentage of the total population there. In the 1990s the change in the percent Mexican was still positive, but the change in percent was less than in the previous decade..

**Table 8a. Greatest Mexican Population Changes in California Counties
1980 – 1990 - 2000**

Areaname	Change in Number of Mexicans 80-90	Change in Number of Mexicans 90-00
UNITED STATES	4,817,306	7,144,773
CALIFORNIA	2,481,530	2,336,930
Los Angeles	876,226	514,814
Orange	242,346	237,678
San Diego	210,778	189,739
San Bernardino	179,345	210,614
Riverside	159,812	193,637
Santa Clara	77,011	69,640
Fresno	76,104	85,040
Ventura	57,001	54,295
Kern	55,754	75,833
Tulare	44,431	49,985

**Table 8b. Percent Change in Mexican Population in California Counties
1980 – 1990 - 2000**

Areaname	% Mexican Change 80_90	% Mexican Change 90_00
UNITED STATES	55.5	52.9
CALIFORNIA	68.2	38.2
Amador	320.1	13.5
Mono	205.3	105.9
El Dorado	177.7	64.7
Tehama	169.1	70.3
Del Norte	154.4	58.9
Lassen	148.9	69.9
Nevada	146.9	71.9
Mendocino	146.3	72.4
Riverside	144.9	71.6
Modoc	139.7	48.7

Table 8c. Change in Percentage Points for Mexican Population in California Counties, 1980 – 1990 - 2000

Areaname	%Tot Mex90 - %Tot Mex 80	%Tot Mex00 - %Tot Mex 90
UNITED STATES	1.6	1.9
CALIFORNIA	5.2	4.4
Colusa	12.8	11.1
Imperial	9.4	2.0
Tulare	8.3	8.0
Glenn	8.2	7.9
Orange	7.7	5.3
Santa Barbara	7.7	5.9
Madera	7.4	6.0
Monterey	7.3	10.7
Kings	7.1	6.7
Merced	6.8	9.7

B. The Effect of Migration and Residential Mobility on Population Change

The Demographic Equation

Population change is often described with three important components: births, deaths, and migration. The basic equation showing the interrelationship of these components with total population change over a specific time is referred to as the *Demographic Equation*.

$$\text{Pop Change} = \text{Births} - \text{Deaths} + \text{In-migrants} - \text{Out-migrants}$$

The excess of births over deaths is called *natural increase* and the difference between in-migration and out-migration is called *net migration*. Distinguishing between natural increase and net migration provides important information on the forces behind population changes in any state or county.

The Demographic Equation provides a mechanism for estimating population between the decennial censuses. A number of agencies such as the California Department of Finance estimate population annually between the censuses. To estimate the state population they use the Drivers' License Address Change method which takes into account births, deaths, and other data distinctive to three age groupings. For the youngest age group, the Department of Finance uses changes in school enrollment by grades and for the people age 65 and older the agency uses changes in Medicare enrollment. Estimating the population ages 15 to 64 is done by measuring changes in drivers license addresses that have been adjusted with tax return data and immigration data. Substituting actual California state values for the period of 1990 to 2000 into the Demographic Equation:

Table 9. Population Change in California, 1990 - 2000

Pop. Change 90-2000	1990 Population	Births	Deaths	Net Migration
4,111,627	29,760,021	5,610,282	2,212,297	713,642

The 2000 population of California was 33,871,648. An interesting sidelight in this Department of Finance data are the values reported for net immigration (1,750,114) and net domestic migration (-1,230,892). This indicates that California had a large outmigration to other states during this seven-year period. The table shows that natural increase accounted for almost 3.4 million of the total population in California during these ten years. In contrast, net migration accounted for only 17 percent of California's growth.

Births and Deaths

The contribution of births or deaths to the population change is often expressed as a rate per 1000 persons. The Crude Birth Rate of any area (and the Crude Death Rate) are the number of births (or deaths) in a year multiplied by 1000 and divided by the total population of that area. Often the mid-year population is estimated for the denominator by averaging the beginning and ending populations. For the California data above we can compute an average Crude Birth Rate and Crude Death Rate over the ten year period:

$$\begin{aligned} 5,610,232 \text{ births} / 10 * 1000 / ((33,871,648 + 29,760,021) / 2) &= 17.6 \text{ births} / 1000 \text{ persons per year} \\ 2,212,297 \text{ deaths} / 10 * 1000 / ((32,957,000 + 29,944,000) / 2) &= 7.0 \text{ deaths} / 1000 \text{ persons per year} \end{aligned}$$

The birth rate may be further modified to take into account the fact that usually only women between ages 15 and 44 bear children. Using only this population yields the *General Fertility Rate* within a population.

These rates, however, do not take into account differences in the age structure of populations. This is a minor problem in interpreting Crude Birth Rates, but differences in age structure between countries has a very large effect on Crude Death Rates. The problem is overcome by calculating age-specific fertility rates (which can be combined to produce a *Total Fertility Rate*) and age-specific mortality rates (such as the Infant Mortality Rate and Life Expectancy).

Migration and Local Residential Mobility

Geographical mobility can include travel and seasonal circulations such as those of "snowbirds" or farm workers. However, most research focuses on residential moves that result in a change of permanent address. People move for a variety of reasons including the desire for better jobs, schools, and housing, being closer to relatives, or for living in a more attractive environment, perhaps near recreation.

There are two types of moves: *migration* and *local residential mobility*. These types differ according to the distance of the moves. Moves that are far enough to disrupt one's employment and social networks constitute migrations. Shorter moves, often to a

different house in the same part of a city, are considered local residential mobility. In the United States, researchers usually consider a change of address or residence beyond the current county of residence to be a *migration* whereas movement within a county is considered *local residential mobility*. Local mobility shifts are typically driven by changing housing needs.

A problem with census data is that it measures movement only during discrete time periods such as the last five years. People indicate only their residence five years earlier even though they may have made several moves during that period.

Like birth and death, migration may also be expressed as a rate. California, for example, had a net migration rate during the 1990-2000 period of 24.0 persons per thousand.

$$713,642 * 1000 / 29,944,000 = 24.0 \text{ persons per 1000}$$

(If the direction of the net migration had been out of California, the rate would have been negative.)

The Census Bureau creates several tabulations which are useful for exploring dimensions of migration. Table 10 below (derived from STF3, P21) indicates citizenship for persons in California. One would expect that over time immigrants would be assimilated into the larger population through naturalization. About 26% of the State's population in 2000 was born outside the United States. These are, by definition, immigrants. Of these, nearly 61% remained non citizens as of 2000.

Table 10. Citizenship California, 2000

	U.S. Born	For. Born Naturalized	For. Born Non Citizen
Persons	25,007,393	3,473,266	5,390,989
Percent of Population	73.8%	10.3%	15.9%

Table 11 presents the region of birth for the California population (SF3, P21). This dimension of migration indicates lifetime shifts. Many of the people lived in several states before coming to California, but they did eventually live here in 2000. About 50% of the state's population was born in California. About 14% of the population was born in the South or Midwest while over 26% were born outside the United States.

Table 11. Country of Birth in California, 2000

	Born in State of Residence	Born in NE U.S.	Born in Midwest U.S.	Born in South U.S.	Born in West U.S.	Born Outside U.S.
Persons	17,019,097	1,612,380	2,489,648	2,087,408	1,425,187	8,864,255
Percent of Population	50.2%	4.8%	7.4%	6.2%	4.2%	26.2%

Table 12, tabulated for persons aged 5 and older, presents shifts that have occurred between a person's residence in 1995 and 2000 (SF3, P24). Over 50% of California's population aged 5 and older were living in the same house both years. Over 81% were living in the same county, and 91% were living in the same state five years earlier.

Table 12. Residence in 1995 for California Residents in 2000

Living in Same House	Living in Diff. House Same County	Living in Different County Same State	Living in NE U.S.	Living in Midwest U.S.
15,757,539	9,714,481	3,087,987	251,506	267,664
50.2%	30.9%	9.8%	0.8%	0.9%
Living in South U.S.	Living in West U.S.	Living Outside U.S.		
419,140	510,654	1,389,723		
1.3%	1.6%	4.4%		

The U.S. Census has other tables that provide further information on migration and mobility of the population. However, it is not possible here to probe all the possible dimensions of migration and mobility. For even more detail, SF4 provides ethnic and age categories for migration and mobility data.

C. The Challenge of Analyzing Change

Analyzing demographic changes becomes particularly challenging when comparing census data from different decades and especially for areas smaller than counties. This is due to the changes that occur in the census itself that must be resolved so that differences reflect changes in the population rather than in the ways that data were collected. For example, in Census 2000 people were allowed to check more than one race whereas in earlier censuses they were forced to pick a single race. Thus, calculations of the change in numbers within race groups between Census 2000 and earlier censuses are much less certain.

There are many less obvious differences that occur in the questions such as the decision to include or exclude persons who responded "Other." Even the way that non-respondents are processed by the Bureau of the Census can have an impact on counts. For example, in 1990 many non-responding persons were classified Black Hispanic and assigned to areas where there were none.

In addition, decennial changes to the geographic boundaries used to report the census can impact total counts. Some of these are obvious as when a county or city is created or deleted, but other changes are less obvious such as repositioning an area in the alphabetical sequence of areas or making changes to an area's boundary. Census tract boundaries are supposed to be stable, but many shifts of boundaries occur anyway.

Fortunately, the Bureau of the Census is thorough in discussing the process used to define and tabulate data into categories and it often provides a discussion of comparability with the earlier census. However, you must consult the appendices in the documentation that contain definitions of the variable that you plan to use in your research. This occasionally results in having to recombine detailed categories in one of the census decades so that a variable becomes comparable in two census periods.

For geographic data, the Bureau provides equivalency tables that can be helpful in pinpointing where discrepancies are likely to occur.

D. Exercises

Ex 11. Population Growth

Ex 12. Population Demographic Equation