MP 472

Understanding Community Demographics

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
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Understanding population size, distribution, composition and the processes driving the stability or change in population is crucial in the development and implementation of programs that serve the local community. Demographic analysis is a prerequisite to all parts of the planning process. Information concerning the structure and dynamics of local populations is key to identifying and anticipating problems and community needs, establishing short- and long-range program goals, developing action plans, identifying fiscal and human resources and evaluating the impact of the given effort.

Two brief examples point to the importance of demographic analysis in Arkansas. The northwest part of the state is experiencing population growth, and this growth is creating demands for land that has historically been used for agricultural purposes. For those engaged in agriculture, this urban/rural interface has created challenges that require careful and thoughtful planning. A second example is change in the ethnic composition of many communities within the state. The recent in-migration of Hispanics into communities within the state is changing the demographic landscape in many ways, and one of the most pressing ways is the "younging" of the population in many communities. The influx of Hispanics with school-age children is creating substantial pressure on local school districts. (See MP470, *Growth and Change in Arkansas' Hispanic Population*, for more discussion on this topic.). The purpose of this publication is to provide an introduction to the analysis of population composition and processes within and among communities. Included is a review of data sources for demographic analysis and a few suggestions on how these data might be used.

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Definition(s) of Demography

The study of population originates within the academic specialty of demography and represents an area of formal training within numerous universities.

Formal demography is defined as the precise mathematical measurement of the three demographic processes: fertility, mortality and migration.

Social demography is concerned with the determinants and consequences of population size, distribution and composition and of the demographic processes of fertility, mortality and migration that determine them (Murdock and Ellis 1991: 4).

Applied demography extends social demography in that it is directed toward the production, dissemination and analysis of demographic and closely related socio-economic information for quite specific purposes of planning and reporting the study of population size, spatial distribution and composition (Rives and Serow 1984: 9).

Population Structure and Population Processes

The above definitions point to two key parts inherent in understanding local population: **population structure** and **population processes**. A local area's population size, geographic distribution and composition are considered structural characteristics. Fertility, mortality and migration are demographic processes. Each of these is considered in turn.

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Structural Characteristics

The structure of a population refers to its size, geospatial distribution and composition. Any population grouping (community, county, state or nation) can be easily described along these dimensions and compared to other similarly bounded populations. When considering the size of a population, it is important to understand the boundaries under consideration, which are directly related to the geospatial distribution.

Table 1. Population Structure and Examples of Measures

Characteristic	Measure
Size	Absolute growth and decline
	Relative growth and decline
Distribution	Density of settlement (population per square mile)
	Rural/urban metropolitan/micropolitan/ nonmetropolitan residence
Composition	Age (median age, population pyramids, dependency ratios)
	Sex/gender (male-to-female ratios)
	Race and ethnicity (absolute and relative growth and decline)
	Household types (family and nonfamily household by gender of head of household; presence or absence of children; single-parent household)

Size

The size of a population and changes in the size have direct implications for a vast array of issues ranging from availability of state and federal funding to social needs. It is important to understand that changes in population can be measured in absolute and relative growth or decline. Absolute change is change in the actual number of individuals gained or lost in a time period. These absolute changes are exceedingly important in understanding the needs and demands of a local population for services and infrastructure. However, absolute numbers are not as effective for comparing the position of one area in relation to another area. Relative change is concerned with percentage change and is often more helpful in making comparisons between communities.

Population Distribution

Population distribution focuses on the geospatial location of the population. Populations are subdivided along an array of units such as regions, states, counties and communities. Growth or decline in a given analytic unit or the physical relocation of individuals between units (for example, rural to urban migration) can have a profound impact on any given place.

Population Composition

One way such changes can impact a place is by altering the population composition. Composition is the distribution of one or more traits or attributes of individuals within a population. Traits such as age, gender, race and ethnic origin, household structure (single-parent families, etc.) can provide important information in local planning. A close look at population composition allows fairly precise description of the population for comparison with other populations; it also represents an inventory of human resources within a community. Clearly, the composition of a population profoundly impacts the social structure of a community in ways far beyond that of population size. Composition also influences the other key component of demographic concepts and measures, that being **demographic processes**.

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Demographic Processes

The demographic processes of fertility, mortality and migration are also key elements in understanding a local population.

Table 2. Demographic Processes

Process	Measure
Fertility	Crude birth rate, general fertility rate
	Age specific birth rate (such as teen births)
Mortality	Crude death rate, infant (neonatal and post neonatal) mortality, age-specific mortality, cause-specific mortality
Migration	in-out migration, age-specific migration, race-specific migration

The three demographic processes are both causes and consequences of population size, distribution and composition. These processes are the three components of population change and make up the variables in the Components of Change equation:

$$P_{time2} = P_{time1} + births - deaths + (in\text{-}migration - out\text{-}migration)$$

Where:

P_{time2} and P_{time1} refer to the populations at the chosen time points between which change is being considered, and births, deaths and in/out migrations are the levels of the processes that occur in the given time period in the place under consideration. The net of the first two components of the equation (births – deaths) is often referred to as **natural increase or decrease**. The result of the calculation of in-migration and out-migration is **net migration** and can be either positive or negative.

In a somewhat broader sense, fertility is defined as the reproductive history of a woman, a man, a couple or a group such as a community. The fertility rate can vary dramatically across population groups and is determined by several factors. These factors include levels of fecundity (the physiological ability to bear children), structural characteristics such as age and other proximate determinants (Davis and Blake 1956). Examples of other proximate determinants would be time spent in and out of sexual unions or the availability and use of birth control (contraceptives, sterilization and abortion).

The three demographic processes – fertility, mortality and migration – are both causes and consequences of population size, distribution and composition.

Mortality is the measure of the incidence of deaths within the population and is also profoundly impacted by the composition of the population. For example, the age structure of the population will have a great influence on its mortality rate. Communities with relatively old populations (such as retirement communities) will experience more deaths than younger populations. That said, it is important to recognize that risk of death in the first year of life is also substantial and varies among populations. The infant mortality rate (number of deaths among infants under age 1 per 1,000 live births) is often used as a measure of a population's quality of life or well-being.

Another structural characteristic of populations that impacts the mortality of a population is the male/female ratio. Women have lower death rates than men at every point in the life course. Race and ethnicity are other structural factors that bear consideration when assessing a population's mortality experience. Racial minorities often have higher mortality rates due largely to economic disadvantage. For example, African-Americans have consistently had higher death rates and thus lower life expectancy than whites. However, Hispanics generally have lower mortality rates than non-Hispanics, and the key measure of infant mortality is closer to that of whites than that of blacks.

Migration is the incidence of movement by individuals, families or groups seeking to make permanent changes of residence (Siegel and Swanson 2004). International migration involving crossing national boundaries is referred to as immigration. Migration adds or subtracts to a given area's population and generally has its most noticeable influence on small areas. It can also occur at different rates such as the rapid in-migration of Hispanics to the U.S. or the relatively slow out-migration of youths from rural communities. It is a selective process in that it is tied to the life cycle, with greatest chances of migration occurring at major life events such as graduations, marriages and retirements. Thus, migration can have very noticeable effects on the structure of a population. Among other things, over time migration can alter a community's size, age, sex, ethnic and racial profile.

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Data Sources

One of the most important sources of demographic data is the Census of Population that has been conducted every ten years since 1790. In the more recent decades of the Census, there were two versions of the questions being asked of the population. A short version attempted to include 100 percent of the U.S. population and was designed to provide information on age, sex, race, Hispanic or Latino origin, household relationship and tenure (whether home is rented or owned). A much more extensive version of the survey was sent to approximately one out of six households and, as can be seen in Table 3, asked a much broader set of questions.

Table 3. 2000 Census Long Form Content

Population

Social Characteristics

- Marital status
- Place of birth, citizenship and year of entry
- School enrollment and educational attainment
- Ancestry
- Residence 5 years ago (migration)
- Language spoken at home and ability to speak English
- Veteran status
- Disability
- Grandparents as caregivers

Economic Characteristics

- Labor force status
- Place of work and journey to work
- Occupation, industry and class of worker
- Work status in 1999
- Income in 1999

Housing

Physical Characteristics

- Units in structure
- Year structure built
- Number of rooms and number of bedrooms
- Year moved into residence
- Plumbing and kitchen facilities
- Telephone service
- Vehicles available
- Heating fuel
- Farm residence

Financial Characteristics

- Value of home or monthly rent paid
- Utilities, mortgage, taxes, insurance and fuel costs

Source: U.S. Bureau of the Census, *Census 2000 Basics*. Issued September 2002.

Population Characteristics

The Census Bureau makes data available at different geographic levels including blocks, block groups, census tracts and counties. As a general rule, the smaller the unit of analysis, the less data are available. However, the core demographic data of the short form are available at all levels. These data are made available through the U.S. Census Bureau's web site as well as a number of other secondary sources. Each state has a Census State Data Center (CSDC) that is responsible for compiling and disseminating Census materials within the given state. The contact information for the Arkansas CSDC is

Arkansas Census State Data Center
2801 South University Avenue
Little Rock, AR 72204
Phone: 501-569-8530
FAX: 501-569-8538

Web site:
http://www.aiea.ualr.edu/census/default.html

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Vital Statistics

States, territories, local areas and the federal government participate in the National Registration System that serves to provide data on births, deaths, fetal deaths, marriages and divorces. The completeness of the coverage of births, deaths and fetal deaths is virtually 100 percent across the country. Marriage and divorce records are not available for all jurisdictional areas in the United States. Vital registries exist in each state, often in the state department of health.

Arkansas Department of Health
4815 West Markham
Little Rock, AR 72205
Phone: 501-661-2000

Web site:
http://www.healthyarkansas.com/data/data.html

Some Basic Demographic Calculations

Sex Ratio (generally expressed as number of males per 100 females)
[Number of males / Number of females] x 100

Age Dependency Ratio
[(Population under 15 + population over 64) / Population ages 15-64] x 100

Crude Birth Rate
[Number of births / Total population] x 1,000

General Fertility Rate
[Number of births / Number of females ages 15-49] x 1,000

Crude Death Rate
[Number of deaths / Total population] x 1,000

Age-Specific Death Rate
[Deaths between specific ages (e.g., 40-50) / Total population in that age range (e.g., 40-50)] x 1,000

Cause Specific Death Rate (usually expressed per 100,000)
[Deaths from a specific cause (e.g., cancer) / Total population] x 100,000

Infant Mortality Rate
[Deaths of infants under age 1 in a given year / Total live births in that year] x 1,000

Neonatal Infant Mortality Rate
[Deaths of infants ages 0-28 days in a given year / Total live births in that year] x 1,000

Post Neonatal Infant Mortality Rate
[Deaths of infants ages 29-364 days in a given year / Total live births in that year] x 1,000

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