

Documentation

Cohort-Component Population Projections for Arkansas By
County, Race, Age, and Gender
2005-2030



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The cohort-component population projections on this website are by age, gender, and race for Arkansas and its 75 counties. The projections are in five-year cycles starting in the base year 2000 and ending in 2030. Currently, only a single projection series (Series S) is reported. In the future, several different population scenarios will be reported including Series A, Series B, and Series C. The reason for different projection scenarios is due to the differences in the assumptions concerning the underlying mortality, fertility, and net migration rates over the projection period.

It is useful to distinguish between population projections and forecasts. As cited by Swanson and McGehee (1993) in the Institute's 1990 projections:

Projections are used to refer to the class of numbers representing future population that are determined by mathematically transforming numbers of existing or historical data related to the population. By definition there may be an infinite number of projections for a given population since the transformation algorithms and their parameters may be infinitely variable. A "forecast" differs from a "projection" because of the role of judgment involved in making the selection of a single projection as the best representation of the future.

All forecasts are projections but not all projections are forecasts. A forecast makes a judgment about what is the best reflection of future events and can be proven right or wrong by those future events. A projection is a mathematical model that can only be wrong if there is a mathematical error in the calculations. A projection shows what the future would be like if a particular set of assumptions hold true into the future, and therefore, can only be judged by the merits of the assumptions.

Population Projection Methodology

Population projections based on a cohort-component method must satisfy the following demographic balancing identity:

$$P_t = P_b + (\text{Births} - \text{Deaths}) + (\text{Immigrants} - \text{Out migrants}).$$

That is, a population at time t , P_t , must equal to the base population at an earlier time, P_b , plus the change in the population over the time period due to births, deaths, immigrants, and out migrants.

Base Population

The base population for each projection series is the Census 2000 of the U.S. Bureau of the Census. Since the census enumeration is based on the “usual place of residency,” these projections are also defined on that basis too.

Fertility and Mortality

Fertility and mortality statistics were obtained from the Annual Report of the Arkansas Department. Fertility rates are age-specific birth rates calculated by dividing the average annual number of births from 1998 to 2000 by the number of females in an age group. Age-specific birth rates were computed by age, race, and for each county for women between the ages of 10 and 54.

Mortality data used in each projection scenario represent a continuation of the 1998-2000 age-race-gender mortality rates. Detailed information about the development of the survivorship probabilities that shows probability of surviving from one age-cohort to another can be found in Hamilton (2003).

Different projections scenarios were created by assuming different sets of fertility and survival rates. In one set of projections, county race-specific rates were applied to each county, and in another set of projections, state race-specific rates were applied to all counties. The rates were assumed continue at their initial rate throughout the projection period.

Migration Patterns

A survival-rate method suggested by Shryock, H., J and Siegel (1980) was used to estimate different age-race-gender specific migration rates based on the historical trends over the 1980-2000 period. Two migration series were produced using this technique. For Series S and Series A, net migration rates were computed for each county using the most recent migration trends from 1990 to 2000. For Series B net migration rates were based on 1980 to 2000 migration trends.

Selection of Population Projection

It is unlikely that future population changes will mirror the population projection presented in these series. Variations in the actual fertility, mortality, or migration rates from those assumed in the projection will cause actual population to differ from the projected population. These variations and differences maybe the consequence of unforeseen changes in economic, social and demographic conditions and events.

Series A applied the state age-race-gender fertility and mortality rates to each county. The net migration rates computed from the 1990-2000 migration patterns represent the most recent trends for Arkansas and its counties.

Series S applied a county age-race-gender fertility and mortality rates to each county whenever it was deemed possible. For a number of counties and races, the rates were found to be unreliable because of the small populations. When this occurred that state rate was substituted for the county rate. The net migration rates were computed from the 1900-2000 period.

Series S_n like Series S applied a county age-race-gender fertility and mortality rates to each county whenever the population was of sufficient size; otherwise, a state rate was substituted for the county rate. However, the net migration rates were set to zero. In this way the population projection shows population change solely due to natural change from the inter play of mortality and fertility.

Series B will apply the state age-race-gender fertility and mortality rates to each county. The net migration rates computed from the 1980-2000 migration patterns represent the 20 year historic trend for Arkansas and its counties rates.

Series C will apply the state age-race-gender specific fertility and mortality rate to each county, but assumes zero net migration rates. Like Series S_n, this series shows what happens to population change solely from the nature forces of mortality and fertility.

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