

County Population Projections 2014-2065 for Arkansas:

Time Series Extrapolations

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Overview

This is the third installment in a series of population projections for the counties of Arkansas using a time series extrapolation methodology. In the first installment made in 2004, population projections by county were developed for the 2005-2030 period. The projections utilized July 1st population estimates from the 1980-2004 period.¹ These projections and their corresponding confidence intervals became the basis for the County Charts of Time Series, 1980-2030 displayed at the Demographic Research website.² A second installment of county population projections was developed after the 2010 Census using revised mid-year population estimates. The 2001-2009 annual county population estimates based on the 2000 Census were replaced with new mid-year intercensal estimates derived from 2010 Census enumeration.³ In addition the new mid-year 2010 county population estimates were used for the 2010 enumeration. With these population revisions, it became possible to evaluate the forecast accuracy of the projections made in 2004 for the 2001-2010 period. A paper summarizing the findings from this evaluation and the forecast errors is available at the Demographic Research website.⁴ The County Charts were also revised to incorporate the new intercensal estimates with

¹ Hamilton, G.L. *Arkansas 2005-2030 County and State Population Projections: Time Series Extrapolations*, Institute for Economic Advancement University of Arkansas at Little Rock, April 19, 2005. Available at:

http://www.aiea.ualr.edu/images/rokdownloads/DemoRes/population/expo_proj_doc_05_30.pdf

² Available at: <http://iea.ualr.edu/population-estimates-a-projections/34-data-and-economic-research/demographic-research/518-county-charts-of-time-series-1980-2030.html>

³ *Intercensal Estimates of the Resident Population for Counties of Arkansas: April 1, 2000 to July 1, 2010* (CO-EST00INT-01-05). U.S. Census Bureau, Population Division.

⁴ Gregory L. Hamilton, Alison Wiley, and Kevin Koonce. *Post Evaluation of the Arkansas 2005-2030 County Projections Using 2010 Census Data*. Institute for Economic Advancement University of Arkansas at Little Rock, September 2013. Available at:

2004-2030 population projections. The revisions are available at the Demographic Research website.⁵

In this third installment, county population projections are updated using the enumeration from 2010 Census 2010 and the current 2011-2013 mid-year population estimates.⁶ To accommodate long term planners, the projection horizon has been extended to fifty year period (2015-2065). This note provides the documentation to support those population projections.

Methodology

A trend population projection extrapolates historic population trends into the future. The underlying assumption is that the historic values of the population determine the future values of that population. There are several ways to extrapolate population trends, and after experimentation with several of these techniques, a weighted average smoothing method was selected and used to make these population projections. In particular, projections reported here are based on a Holt's exponential smoothing method.

The Holt method like all trend extrapolation methods suffers several shortcomings. The basic assumption underlying these methods is that future population changes and their dynamics are like the past. Thus, the projections provide no information about the different components of population growth, and they have no theoretical content with regard to the explanations for population change. What they do provide is a mathematical method to predict future populations and those predications reduce uncertainty about the future.

The 50-year length this projection period introduced some new complexities that were not an issue in the earlier shorter term projections. For several of the smaller counties that currently have a declining population, using a 50-year forecast horizon meant their projected populations approached zero in the latter years of the forecast. In reality, a zero population for a county is highly unlikely and such a projection is unrealistic. A simple technique to eliminate this possibility was to use natural logarithmic values of the population in the projections and then to convert the natural logarithmic projections back to their original values.

<http://iea.ualr.edu/population-estimates-a-projections.html>

⁵ <http://iea.ualr.edu/population-estimates-a-projections/34-data-and-economic-research/demographic-research/518-county-charts-of-time-series-1980-2030.html>

⁶ *Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2013 2013 Population Estimate.* U.S. Census Bureau, Population Division.

The new population projections for the 2014-2065 reported on the Demographic Research website are based on the Holt's exponential smoothing technique. Again as in the first installment, the population projections by county provide the basis for the charts displayed on the website. If these projections obtain the level of accuracy as the previous projections installments, then approximately 83% of the county population projection should fall within the confidence interval, 11% will grow slower than projected, and 7% will grow faster than projected.

Description of the Chart's Time Series

The population and projections charts plot five different time series. These include:

History: the 1980-2013 population estimates from the 1980, 1990, 2000, and 2010 Census' mid-year and intercensal estimates. The 2011-2013 are the Census' current annual population estimates.

Fitted Values: the annual population estimates derived from the Holt's exponential smoothing method.

Point forecasts: are the population projections that were forecasted using the Holt's exponential smoothing technique.

Lower and Upper Confidence Limits: Together the lower and upper limits form a 95% confidence interval about the point forecast values. The confidence interval indicates that 95 out of 100 times the population projections will be expected to fall within the interval.

Data Sources

Intercensal Estimates of Resident Population and of States and Counties. U.S. Bureau of the Census, Population Estimates and Population Distribution Branches, Washington, DC 20233, March 1992.

Population Division, Interim State Population Projections, 2005, U.S. Census Bureau. Annual Estimates of the Population for Counties of Arkansas April, 2000 to July 1, 2004, Population Division, U.S. Census Bureau, April 14, 2005.

County Population Estimates and Demographic Components of Population Change: Annual Time Series, July 1, 1990 to July 1, 1999. Population Estimates Program, Population Division, U.S. Census Bureau, Washington, DC 20233, March 9, 2000.

Intercensal Estimate (2000-2010), Resident Population for Arkansas Counties: April 1, 2000 to July 1, 2010. <http://www.iea.ualr.edu/population-estimates-a-projections.html>

Annual Resident Population Estimates, Estimated Components of Resident Population Change, and Rates of the Components of Resident Population Change for States and Counties: April 1, 2010 to July 1, 2013, U.S. Census Bureau, Population Division, March 2014