Carl Vinson
Institute of Government
UNIVERSITY OF GEORGIA

State of Georgia Population Projections October 2020

Carl Vinson Institute of Government
Applied Demography Program

A Report Prepared for the Governor's Office of Planning and Budget

State of Georgia

Population Projections

2020 Series

Carl Vinson Institute of Government Applied Demography Program

Contents

1 Introduction

Like many aspects of public policy in 2020, the current set of Population Projections for the State of Georgia must be understood in context. The global COVID-19 pandemic and the steep economic recession that ensued are likely to impact demographic patterns in both expected and unanticipated ways. Note also that the data for the calculation of demographic rates, which are the primary inputs into any cohort component model, were drawn from the five-year period prior to the year 2020. Analysts at the Carl Vinson Institute of Government developed rates for this round of projections by averaging demographic indicators from 2015 to 2019. While the rates have mostly shaken off the repercussions of the Great Recession on fertility, mortality, and migration, they do not yet reflect the disruptions of the year 2020. This methodology statement, in addition to summarizing recent demographic trends, will detail efforts in our modeling strategy to account for these contemporaneous and unquantified trends, as well as present considerations for future population projections.

The State of Georgia and the office of its governor, in order to effectively plan and deliver services to both present and future populations, maintains an active demography program. This program informs policy and planning, helps direct funding allocations, and supports empirical policy analysis. Local governments and other stakeholders rely on the state's program to manage the economic, social, political, and environmental consequences of population growth and demographic change. Private-sector actors also utilize demographic data in wide-ranging ways, including to guide significant investment decisions. State-level demography programs vary considerably in the US, but they all generally involve the preparation of population estimates or projections or both at various geographic levels, and the calculation of such population indicators as fertility rates, life expectancy, and migration patterns. In Georgia, the Governor's Office of Planning and Budget is responsible for preparing, maintaining, and furnishing official demographic data for the state (O.C.G.A. § 45-12-171). This document describes the most recent iteration of state population projections, completed in October of 2020, to provide a foundation for assessing future planning and budgeting.

1.1 COVID-19

On March 11, 2020, the World Health Organization officially classified the novel SARS-CoV-2 outbreak as a global pandemic. US states and municipalities responded soon thereafter with a variety of public health measures, including stay-at-home orders and business closures, sharply reducing economic activity. The National Bureau of Economic Research declared that the US economy entered into recession the same month [1]. The three components of population change were all directly affected: Mortality rose due to COVID-19 fatalities; fertility decisions were almost certainly postponed [2]; and migration flows were dramatically interrupted by restrictions at borders and cessation of travel. Secondary effects of the economic recession will have additional consequences for mortality, fertility, and migration, and these will depend on the depth and duration of the economic downturn.

1.1.1 Mortality

The most evident demographic outcome of COVID-19 will be a higher mortality rate, as the virus often presents with grave complications and can be lethal. In the first 10 months of 2020, the Centers for Disease Control and Prevention (CDC) ascribed more than 225,000 deaths (8,000 in Georgia) to coronavirus infections and their sequelae, and US mortality equated to roughly 112% of expected deaths during that period [3]. These are “excess deaths” compared with what mortality rates and age structure would have predicted. By definition, such deaths are not captured by standard projection techniques, which estimate deaths on the basis of empirical mortality patterns. Moreover, the CDC assessment of excess deaths indicates that the mortality burden of COVID-19 may be 50% higher than the number officially attributed to coronavirus cases, due to COVID-19 deaths being misclassified or to indirect fatalities. The challenge of modeling COVID-19 given the unexpected and uncertain nature of its mortality is further complicated by the unpredictability of vaccine approval and public adoption. Our model attempts to account for COVID-19 mortality by generating a random shock that increases the death rate for three years, with the main effects front-loaded in the first year.

1.1.2 Fertility

Researchers have estimated that, similarly to the Spanish flu pandemic in the early 20th century, birth rates will decline by roughly 15% in the immediate term [2, 4]. As an additional wrinkle, many of the births in 2020 will not reflect the influence of the pandemic, given the nine-month gestation period. Whereas fertility rates historically tend to rebound after 18 months and at times overshoot previous levels to “catch up” after epidemic crises, the magnitude of employment loss distinguishes the present COVID-19 scourge. Family financial uncertainty, such as joblessness, is correlated with lower birthrates. Prior studies have estimated that each 1% increase in a state’s unemployment rate is associated with a 1% to 2% decline in the general fertility rate [5]. Because Georgia’s fertility patterns failed to rebound from the decline of the Great Recession, it is uncertain to what extent either the postponement of fertility decisions in the wake of widespread disease or the reduction in overall childbearing associated with economic distress will impact current fertility trends. We have approached this question conservatively, estimating a statistical penalty of 5% to 10% in births, which we also apply using a random shock approach over three years.

1.1.3 Migration

Migration rates, already the most elusive of the three components to measure, are the projection input with the highest amount of uncertainty associated with the global pandemic. Immigration and US domestic migration were curtailed by the closure of borders, cessation of flights, evaporation of job openings, and alterations in life plans driven by concern for personal safety. They were also indirectly impacted by the economic fallout from public health measures. During the Great Recession, accompanied by unusually punishing conditions in housing markets, US interstate migration declined [6]. In the present cycle, however, mortgage lock has been replaced by the spectre of widespread evictions, which could prompt short- and even long-distance moves. In addition, anecdotal and media reports suggest that, amid health fears and telecommuting changes, people are relocating en masse from dense and high-cost urban areas to less-dense, lower-cost geographies. In fact, Georgia may be a prime destination for this type of migration. These reports may be deceptive: At least one analysis revealed a 28% surge in temporary address change requests in the first six months of 2020, while permanent change filings were up less than 2% [7]. It seems clear that foreign and domestic migration have been and will be disrupted by COVID-19, but the effect on projections will only become clearer in next year's projections series, when better data are available.

1.2 Recent Trends

Recent data affirm the trends we identified in our previous round of projections. The downward pressure on the total fertility rate following the Great Recession continued in 2019, defying assumptions that it would stabilize amid lower unemployment and robust wage growth. In the wake of COVID-19, rather than see a bottoming-out of this downward trend, we expect to see a crash. As such, Georgia will continue to see fewer births than necessary to replenish the population going forward, generally referred to in demography as sub-replacement fertility rates. We assume this will persist throughout the projection horizon.

Along with fewer births, the state faces a rapidly aging Baby Boomer generation and concordant rising mortality. Higher numbers of deaths translate to a lower pace of natural increase, or births minus deaths, and thus a lower rate of population growth. More than half of Georgia's counties, 82 of 159, experienced natural decrease on average during the 2015–2019 period. In three of the five years, the non-Hispanic White population registered a negative natural change. With climbing mortality and lower fertility, natural increase will continue to soften going forward.

The declining contribution of natural change to the population size underscores Georgia's reliance on migration to drive numerical increase. Prior to our 2019 launch year, the state maintained its decades-long ability to attract interstate and foreign migrants at a healthy clip. In 2013, net domestic migration for the state as a whole was negative, but in the 2015–2019 period, it rose to become the state's most important source of population growth, outstripping both foreign immigration and natural increase.

In large part because of the younger age structures of minority populations, the state will continue to shift toward racial and ethnic diversification. Georgia is projected to become a majority-minority state by 2029.

The boom in youthful nontraditional minority populations comes as a timely remedy to the aging population, renewing the workforce and staving off the prospect of population decline.

1.3 Future Uncertainty

The onset of the COVID-19 pandemic comes against a backdrop of major changes in US demographic patterns. In the 2017 series of population projections from the US Census Bureau, flagging fertility and immigration rates led to a major downward revision in births compared with the forecast made in the 2008 series. That year, 2008, is significant because it marked the beginning of a sharp decline in both US birth rates and the number of Mexico-born residents in the US. Overall, downward revisions to the number of babies born and immigrant arrivals equate to an estimated 50 million fewer US residents in 2050 in the 2017 projection series versus the 2008 series. In terms of COVID-19, in September 2020 the Congressional Budget Office released a revision to its July 2019 population projections, including effects of the pandemic in its assumptions, and reduced its outlook for 2050 by 2.6% [8]. Our population projection for Georgia is also lower with the fertility and mortality shocks applied: down 1.5% in 2065 to 15,440,470.

In the next round of projections, the Carl Vinson Institute of Government will have access to 2020 data on births, deaths, and net migration. Moreover, we will have a much better idea of what shape the economic recession and recovery will take. It is likely that some projections may change substantially, particularly for the sparsely populated rural counties, many of which have been heavily impacted by COVID-19.

2 Methodology

Faculty and staff at the University of Georgia's Carl Vinson Institute of Government Applied Demography Program produced projections for the resident population for Georgia and each of its 159 counties for the Georgia Governor's Office of Planning and Budget (OPB).

Stochastic models incorporate the inherent uncertainty of demographic processes while at the same time providing mechanisms to apply expert knowledge to estimate the future direction of underlying trends. The Institute of Government utilized a hybrid stochastic cohort-component model (CCM) for these projections. As in the previous round of projections, we found that our base model, which uses five-year age categories and five-year projection steps, performed better for some geographies than our single-year model.

Component rates for fertility, mortality, and migration were calculated using data from the 2015–2019 time frame. These rates were applied to the launch population, constructed from 2019 US Census Bureau estimates, and a future population was projected forward one step (one year or five years, depending on the selected model). In a CCM, this is iterated throughout the projection horizon. In order to approximate the changing nature of demographic processes, the rates progress throughout the projection horizon via either jittering or a random walk. Rates may rise or fall within limits defined by informed assumptions, with an auto-regressive component to establish continuity. Thousands of simulations are conducted, and the median scenario becomes the population projection. Using expert knowledge, the model was tuned to reflect various simulation strategies for changes in fertility, mortality, and migration, and upper and lower confidence bounds were estimated.

These projections, like all projections, involve the use of certain assumptions about future events that may or may not occur. Users of these projections should be aware that although the projections have been prepared using established and validated methodologies, input from subject matter experts, and with extensive attempts to account for existing demographic patterns, they may not accurately project the future population of the State of Georgia or of particular counties in the state. These projections should be used only with full awareness of inherent limitations of population projections in general and with specific familiarity with the procedures and assumptions delineated in this methodology statement.

The current projections consist of future count estimates of the resident population of Georgia and of all counties in Georgia for single years through 2065. The population is detailed by 18 five-year age cohorts, 0–4, 5–9, 10–14, 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, and 85 and older, for males and females, in each of four race/ethnic groups: non-Hispanic Whites, non-Hispanic Blacks, Hispanics of all races, and non-Hispanic Other. The latter category groups individuals who self-identify as Asian, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or multiracial. This methodology statement details the steps involved in preparing the projections, including the bases and the underlying assumptions.

2.1 Cohort Component

The Institute of Government employed a cohort-component technique to project forward the Georgia population. The cohort-component method is among the most widely used techniques in the United States for producing population estimates and projections. Rather than modeling population size, each component of population change — fertility, mortality, and migration — is modeled separately. The rates interact. For example, the future fertility rates are applied to the female population, after that population is survived forward on the basis of mortality rates. Current trends in birth rates, death rates, and net migration rates are calculated and applied to a base population via the demographic balancing equation:

$$P_{t_2} = P_{t_1} + B_{t_1-t_2} - D_{t_1-t_2} + M_{t_1-t_2},$$

where:

P_{t_2} = the population at some future date $t_1 - t_2$ years hence,

P_{t_1} = the population in the base year t_1,

$B_{t_1-t_2}$ = the number of births that occur during the interval $t_1 - t_2$,

$D_{t_1-t_2}$ = the number of deaths that occur during the interval $t_1 - t_2$,

$M_{t_1-t_2}$ = the net of migration that takes place during the interval $t_1 - t_2$.

When several cohorts are used, P_{t_2} may be seen as:

$$P_{t_2} = \sum_{i=1}^{n} P_{c_i t_2},$$

where:

P_{t_2} is as in the equation above,

$P_{c_i t_2}$ = population of a given cohort at time t_2, and

$P_{c_i t_2} = P_{c_i t_1-t_2} + B_{c_i t_1-t_2} - D_{c_i t_1-t_2} + M_{c_i t_1-t_2}$,

where all terms are as noted above but are specific to given cohorts c_i.

2.2 Resident Population

The resident population includes all persons who dwell primarily in Georgia. The population is composed of persons for whom Georgia is their "usual place of residence." These include persons in a variety of living quarters such as single-family housing units, multi-unit structures such as duplexes and apartment buildings, nursing homes, military barracks, college residence halls, and correctional facilities. Seasonal and temporary residents are not included.

The following summary describes the stages of development of the projections and the methodologies employed.

2.3 Projection Methodology

To develop an appropriate adaptation of the cohort component approach, four major steps were completed:

1. A baseline set of cohorts for the projection area or areas of interest for the baseline time period was selected.

2. Appropriate baseline migration, survival, and fertility measures for each cohort for the baseline time period were determined.

3. A method for projecting trends in fertility, survival, and migration rates over the projection period was determined.

4. A computational procedure was selected for applying the rates to the baseline cohorts to project the population for the period of interest.

2.3.1 Baseline Cohorts

Population data for the launch year of 2019 and for the denominator of component rates for 2015 to 2019 come from the the Georgia Department of Public Health (DPH), which utilizes estimates by the US Census Bureau. Statistics on births and deaths are drawn from Georgia public health vital records, which provide demographic detail on race, age, and sex at the county level for state residents for each year dating back to 1994.

Special populations, also known as group quarters, such as those living in college dormitories, military barracks, or prisons, were based on the recorded count in the 2010 Decennial Census, survived forward to the launch year through an age-sex-race/ethnicity-based ratio technique, assuming that all age-sex-race/ethnic groups maintained the same proportion in the group quarters and were only affected by overall population growth. Group quarter populations were also allowed to vary randomly to capture events such as the opening or closure of a group living facility, but this did not affect the household projections.

The baseline cohorts are composed of four mutually exclusive groups derived from Census race and ethnic classifications: non-Hispanic White alone, non-Hispanic Black or African American alone, Hispanics of any race, and persons in all other non-Hispanic race groups are categorized as non-Hispanic Other.

2.3.2 Cohort Component Rates

Fertility

Baseline age-race/ethnicity-specific fertility rates were computed for each county in Georgia and then used to compile total fertility rates for each county race/ethnic group. The numerators for the rates were the average birth counts recorded by the Georgia DPH in the 2015–2019 period, whereas the denominators equate to the female household population in 2015 to 2019 in each age group from 15 to 44. Because some populations were sparse for age-sex-race/ethnicity categories in certain counties, we found rates to be unstable. In such cases, we tied them to regional and neighboring-county rates. Low TFR rates were allowed to trend toward the replacement rate TFR of 2.1 after a period of time.

Mortality

Baseline age-sex-race/ethnicity-specific mortality rates were computed for every county in Georgia. The numerators for the rates were the deaths by age-sex-race/ethnic group in each county, as recorded by DPH. The denominator equated to the total baseline population described above. From these mortality rates, we constructed life tables with standard survival rates and life expectancy. In our projection model, we adjusted future life expectancy targets higher, in line with those projected by the US Census Bureau, gradually increasing projection survival rates above the baseline computed rates. The Institute of Government model uses a dynamic approach to mortality, trending life expectancy higher for all race/ethnic groups and sexes, and assuming that they will approximate convergence across the projection horizon.

Migration

In the base model, net migration rates were computed using a residual methodology for the household population for each sex-age-race/ethnic group in each county. In our extended migration approach, we used Internal Revenue Service county-to-county migration data to estimate a five-year average along with a standard deviation for the inflow and outflow rates for each county. We then used the residual method using Georgia DPH data to create an estimated population change measure for migration for age-race-sex categories for each county. We then proportionally allocated this age-race-sex structure against the inflow and outflow rates. We simulated different migration scenarios by letting migration rates either jitter or random walk forward. Each county race group was controlled to both the regional commission and neighboring counties to stabilize small-population geographies, where zero cells in the matrices created unstable rates. These numbers should not be perceived as base rates, but rather are increased bounds for the randomly sampled error that constitutes the stochastic projection.

2.4 Projection Method

Our projection method relies on a bottom-up approach: County populations were projected and summed to produce a state projection. That projection was then cross-validated with other sources, including independent projections, neighboring-state projections, and simple autoregressive integrated moving average methods.

The cohort-component rates described above were applied to a survival matrix. In each progression, the group quarters population was removed from the resident population to produce a household population, which was survived forward using cohort-component rates, with migration added to the total. The group quarters population was survived separately based on a ratio method, and added back into the population at the end of each step. We derived the group quarters numbers from state administrative records. We applied a modified college fix methodology to counties with large special populations — student, military, incarcerated people or migrant detainees — removing a fraction of the household population and treating it as living in group quarters [12]. This entire process was repeated every one or five years from 2019 to 2069. This entire model was iterated thousands of times to produce the most probable median projection scenario.

2.5 Limitations

Although the cohort-component model has been exhaustively used and tested throughout the years, it is not infallible. In empirical studies, researchers have noted that the range of error grows substantially the further out in time the projection is. One prominent issue is that smaller-level geographies are inherently difficult to assess in terms of demographic rates, particularly when populations are subdivided by age, sex, and race/ethnic categories. This effect is magnified in areas with sparse populations. Georgia, hence, presents a special challenge due to its large number of relatively small counties, many of which have small populations. Generating accurate birth and death rates may be compromised by even a small number of births or deaths that are recorded with error or in a separate geography due to the cross-county mobility of residents. Migration flows are notoriously difficult to capture at the county level, and this problem is also exacerbated in counties with sparser populations. A second issue is that the selection of 2015–2019 population counts are determined by Census Bureau estimates. Despite a reasonable track record at the state level, in less populous rural counties the estimation program has tended to record larger errors. Finally, although relying upon five-year trends to generate 50-year projections is not uncommon, it is possible that certain temporal population tendencies will be incorporated into the overall model that in fact were only a "blip" in terms of longer-range trends. To address the shortcomings inherent in any population projections, as well as the issues specific to Georgia's unusual geographical structure, efforts were made to evaluate the results in light of expert knowledge and, where possible, to modify the model assumptions to mitigate unusual patterns. Significantly, the serious effects of COVID-19 are not reflected in our input data, despite efforts to account for changes to fertility and mortality in our modeling strategy.

Bibliography

References

[1] Business Cycle Dating Committee Announcement. June 8, 2020. NBER. Retrieved November 19, 2020, from https://www.nber.org/news/business-cycle-dating-committee-announcement-june-8-2020

[2] COVID-19 and the Future of US Fertility: What Can We Learn from Google? IZA: Institute of Labor Economics. (n.d.). Retrieved October 20, 2020, from https://www.iza.org/publications/dp/13776/covid-19-and-the-future-of-us-fertility-what-can-we-learn-from-google

[3] Provisional Death Counts for Coronavirus Disease 2019 (COVID-19). (2020, November 19). https://www.cdc.gov/nchs/nvss/vsrr/covid19/index.htm

[4] Levine, M. S. K. and P. B. (2020, June 15). Half a Million Fewer Children? The Coming COVID Baby Bust. Brookings. https://www.brookings.edu/research/half-a-million-fewer-children-the-coming-covid-baby-bust/

[5] Schaller, J. (2016). Booms, Busts, and Fertility Testing the Becker Model Using Gender-specific Labor Demand. Journal of Human Resources, 51(1), 1–29.

[6] Brian L. Levy, Ten Mouw, Anthony D. Perez. Why Did People Move During the Great Recession? The Role of Economics in Migration Decisions. RSF. 2017 Apr; 3(3):100-125. doi: 10.7758/rsf.2017.3.3.05. Epub 2017 May 10. PMID: 28547003; PMCID: PMC5439978.

[7] Cynthia P. Bowman. Coronavirus Moving Study: People Left Big Cities, Temporary Moves Spiked In First 6 Months of COVID-19 Pandemic. (2020, October 12). MYMOVE. https://www.mymove.com/moving/covid-19/coronavirus-moving-trends/

[8] Congressional Budget Office — The 2019 Long-Term Budget Outlook. (2019, June 25). https://www.cbo.gov/publication/55331

[9] Vespa, Jonathan, David M. Armstrong, and Lauren Medina, "Demographic Turning Points for the United States: Population Projections for 2020 to 2060," Current Population Reports, P25-1144, US Census Bureau, Washington, DC, 2018.

[10] Georgia Department of Public Health, Office of Health Indicators for Planning. 2019. OASIS: Online Analytical Statistical Information System. Retrieved from: https://oasis.state.ga.us/oasis/,

[11] Yowell, Tiffany, and Jason Devine. 2019. "Evaluating Current and Alternative Methods to Produce 2010 County Population Estimates," Population Division US Census Bureau Working Paper No. 100 US Census Bureau, Washington, DC, 2019.

[12] Ortman, Jennifer M., Larry D. Sink, and Heather King. 2014, October. "The 'College Fix': Overcoming Issues in the Age Distribution of Population in College Counties." Population Division, US Census Bureau.