



Projected Population of the  
State of North Carolina and Its Counties  
July 1, 2025 – July 1, 2060  
Vintage 2025  
Including Historical Estimates for  
July 1, 2010 – July 1, 2024

*Technical Document*

January 15, 2026

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## North Carolina Population Projections: Vintage 2025

### Overview

On January 15, 2026, the North Carolina Office of State Budget and Management (OSBM) released updated population projections for the state and its counties. These projections show expected population by **age, sex, race, and Hispanic origin** and are referred to as the **Vintage 2025 population projections**.

To create these projections, OSBM uses historical [population estimates](#) to model past trends and extend them into the future.<sup>1</sup> The most recent population estimates (Vintage 2024) covered **July 1, 2020**, through **July 1, 2024**. Using those estimates and earlier data, OSBM projected population for the state and counties for **July 1, 2025**, through **2060**.

Because projections rely on assumptions about future trends in fertility, mortality, and migration, the results shown in these population projections may differ from population projections produced in previous years. In addition, uncertainty increases with each year beyond 2024, so users should interpret longer term forecasts with caution.

OSBM provides four different data files that include:

1. **Sex and Single Years of Age:** Estimates and projections of the population for each year by sex and single years of age;
2. **Sex, Race, Age Groups:** Estimates and projections of the population for each year and by sex, 5 categories of race (*American Indian or Alaska Native, Asian or Pacific Islander, Black, White, and Other*), and broad age groups;
3. **Hispanic Origin by Race:** Estimates and projections of the population for each year from 2010 through 2060 by sex, Hispanic origin (*Hispanic and non-Hispanic*) and race (*White and non-White*).
4. **Hispanic Origin/Race by Sex and Age:** Estimates and projections of the population for each year from 2010 through 2060 by sex, 5-year age groups, and Hispanic origin/race combinations (*Hispanic, Non-Hispanic White, and Non-Hispanic Non-White*)

This document provides an overview of the methods and assumptions used to produce these population projections.

### Limitations

These projections assume that historical trends in births, deaths, and migration will continue. This is generally reasonable because population changes occur gradually unless disrupted by major events like economic shocks or natural disasters. For this reason, these projections serve as a **baseline for planning and resource allocation**.

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<sup>1</sup> See <https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/county-population-estimates> for information about the population estimates.

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However, the future is never certain. Users should understand:

- All projections include some level of uncertainty.
- Uncertainty grows the farther into the future the projection goes.
- Smaller populations—such as rural counties or demographic subgroups—have greater uncertainty.

Historically, state-level projections have been fairly accurate. For example, the population projections produced in 2013 were only **1.7% higher than the actual 2020 Census count**. But given economic hardships of the Great Recession, some rural counties were overestimated compared to Census results.

### Race and Ethnicity Assumptions

The U.S. Census Bureau has improved how it collects and codes race and ethnicity data to better reflect diversity. While these changes are positive, they make it harder to compare older data with newer data. For these projections:

- We assumed the race/ethnic characteristics reported in the 2020 Census reflect the population.
- We adjusted reporting for individuals identifying with two or more races using an approximation of the US Census Bureau’s logic for the Modified, Age, Race, Sex (MARS) datafile produced for the 2010 census as outlined later in this document.
- We used age characteristics from the Census Bureau’s **2020 blended base** as reported in their Vintage 2024 population estimates which combines data from the 2020 Census, demographic analysis, and post-enumeration surveys. This helps correct for undercounted groups, such as children under age five.

Because of these updates:

- **Do not compare detailed race, ethnicity, sex, or age characteristics from previous vintages to these projections.** Differences in methodology mean they are not directly comparable.

## Methodology

### Understanding Population Change: The Demographic Balancing Equation

Population change is driven by two main components:

- **Natural Change:** The difference between births and deaths. A natural increase occurs when births exceed deaths.
- **Net Migration:** The difference between people moving in and out of an area. Migration includes both international and domestic moves. At the county level, any permanent move from one county to another is considered migration.

Counties grow when births exceed deaths and in-migration exceeds out-migration—or when

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one component's positive change offsets the other's negative change. This demographic equation helps demographers estimate and project population trends.<sup>2</sup>

## Projection Model

The current population projection model consist of two main components:

1. **Forecast Model**

Projects total population and population by major race and Hispanic origin groups using time-series forecasting.

2. **Cohort-Component Method**

Projects changes in age characteristics within each sex and race group.

First, the total household population was projected for each of the 100 counties in North Carolina using time-series forecasting models that pattern future population change based upon historical trends. For each county, OSBM selected a forecast model that most accurately projected the 2010 through 2024 estimates, Mean Absolute Percentage Error (MAPE) as the accuracy measurement. OSBM then added the group quarters population to the projected household population for each county to obtain the projected total population for each county for each year from 2025 through 2060. County totals were then summed up to produce statewide projections. These initial population projections were then adjusted to account for changes in immigration policy (see net migration section).

After preparing projections of the total population for all counties and the state, OSBM prepared the population of each sex and race group and each sex and Hispanic origin group combination using time-series forecast models. We then controlled the resulting projections by sex, race, and Hispanic origin to the projections of the total population for each county. We then summed these sex, race, and Hispanic origin population projections for each county and year to obtain the sex, race, and Hispanic origin population projections for the state.

## Cohort-Component

### *Race/Sex/Age characteristics*

OSBM used a cohort-component technique to project the age characteristics of each sex and race combination. Estimated survival rates for each age, sex and race combination are based

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<sup>2</sup> Steve H. Murdock and David R. Ellis, *Applied Demography: An Introduction to Basic Concepts, Methods, and Data* (Boulder, CO: Westview Press, 1992); Steve H. Murdock et al., *Demographics: A Guide to Methods and Data Sources for Media, Business, and Government* (Boulder, CO: Paradigm Publishers, 2006); Jacob S. Siegel, *Applied Demography: Applications to Business, Government, Law, and Public Policy* (United States of America: Academic Press, 2002); Stanley K. Smith, Jeff Tayman, and David A. Swanson, *State and Local Population Projections : Methodology and Analysis, The Plenum Series on Demographic Methods and Population Analysis* (New York: Kluwer Academic/Plenum Publishers, 2002); Bryan, Thomas. 2004. "Population Estimates." Pp. 523–60 in *The Methods and Materials of Demography*, edited by J. S. Siegel and D. A. Swanson. Amsterdam: Elsevier.

on data from the 2010 and 2020 censuses.<sup>3</sup> We adjusted survival rates based upon actual reported deaths by age, sex, and race between 2010 and 2024, and assumed that these adjusted rates continue through the projection horizon. OSBM applied these survival rates to the population for each group at the beginning of each period to project the survived population for the subsequent year (the population assuming no net migration). We derived estimated net migration by subtracting the survived population for the following year from the population as projected by the time-series forecasting models (described in the previous section).

OSBM adjusted this total net migration for each county for each year for age specific rates of net migration by using net migration trends by age from 2010-2020. The resulting net migration by age for each sex and race group was added to the survived population, yielding the final projected population by age; the process was repeated for the next period.

We prepared an initial model with the derived measures of total net migration based upon forecasted trends. The final step was to add the population at the youngest age by applying the most recent race specific birth rates for the female population age 10 to 49. Statewide fertility rates by race were calculated based upon actual births over the last three years (2022-2024). These statewide rates were then adjusted to reflect five-year historical trends in births for each county. The adjusted fertility rates were then applied to the female population age 10 to 49 by race for each county and repeated for each projected year.

## Data

### Base population

The most fundamental part of any population projection are the historical data from which the projections are derived. The Vintage 2024 certified and revised county population estimates produced by OSBM and released in September 2025 were used to project future populations.<sup>4</sup> The decennial censuses serve as a basis for the population estimates and projections this office produces, especially the 2000 and 2010 decennial censuses. Population totals by race for each county were used to benchmark the July 1, 2020, population estimate and revise the 2010 through 2019 population estimates.

OSBM obtained 2000 and 2010 decennial census population by race, sex, and single years of age from 0-99 and a combined age group for population age 100+ from the US Census Bureau's 2000 and 2010 Modified Age, Race, and Sex (MARS) file. The race categories used in these projections include: *American Indian or Alaska Native, Asian or Pacific Islander, Black, White, and Other*. We report Hispanic origin (*Hispanic or non-Hispanic*) separately in these projections and we further categorize Hispanic origin by race: *White or non-White*.

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<sup>3</sup> Detailed age characteristics from the 2020 Census were not yet available.

<sup>4</sup> *Certified Estimates of the Total Population of North Carolina Counties for July 1, 2023, and Revised Estimates of the Total Population and Population by Age, Sex, Race, and Hispanic Origin of North Carolina Counties for 2010 through 2022.*

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OSBM prepared an 2020 approximate MARS file by using the same logic as that used for the 2010 MARS file. The logic is as follows:

1. All persons reporting a single identified race are coded as that race (e.g. *Black Alone = Black*);
2. All persons reporting three or more races are coded as *Other*;
3. All persons reporting two identified races are coded as *Other* (e.g. *White & Black = Other*);
4. All persons reporting as an identified race & *Some Other Race (SOR)* are re-coded as the identified race (e.g. *Asian & SOR = Asian or Pacific Islander*);
5. Finally, the *SOR Alone* category was apportioned to a race category based upon allocations used in the 2010 MARS data. The allocations were as follows: (*American Indian or Alaska Native: 6%; Asian or Pacific Islander: 2%; Black: 8%; and White: 82%, Other: 2%*).<sup>5</sup>

We prepared an initial set of estimates and projections using the 2010 Census MARS data and then controlled to the 2020 Census modified values as described above. We further adjusted the characteristic data using the age characteristics from the 2020 Base in the US Census Bureau's Vintage 2024 population estimates.

#### Vital Statistics

The North Carolina State Center for Health Statistics provided vital statistics data for the years 2000 through 2024, which include recorded births and deaths by county of residence. OSBM used the data to calculate mortality and fertility rates and derive estimates of net migration for counties for the 2010 to 2020 period. Because the birth data rely on the race/ethnicity of the mother to assign race/ethnic characteristics of the child, multi-racial births are likely under-reported. For this reason, we adjusted the race characteristics of children at birth to age 1 (age 0) proportionally based upon estimates from the American Community Survey.

#### Group Quarters

Every year, OSBM obtains group quarters population counts for hundreds of facilities within the state from various federal and state agencies, as well as through an annual survey of municipalities and counties. These group quarters include college and university dormitories, state and federal prisons, military quarters, and nursing homes, among other facilities. Because demographic change for group quarters population do not follow the same pattern as the general population, it is necessary to account for this population by excluding it from the general projection model and then adding it back to obtain the final projections of the total population. For the purposes of producing population projections, OSBM assumed that the group quarters population for each county for all future years remained the same as it was in

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<sup>5</sup> Persons of Hispanic ethnicity can be of any race.

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2024.<sup>6</sup> A private prison in Hertford County closed in May 2021. Thus, the projections for Hertford County were adjusted to account for the loss of that prison population.

### Assumptions

Both population estimates and population projections rely on historical data that are symptomatic of population change to approximate historical or future populations. For these population projections, we assumed that patterns of change in total population and rates of fertility and mortality continue through 2060.

#### Total Population Change

As described above, the forecast model uses historical data to project total population and total population by sex, race, and Hispanic origin through 2060.

#### Fertility

Prior to the pandemic, the precipitous decline in fertility rates that began during the Great Recession halted, remaining stable but significantly lower than rates observed in the 1990s and early 2000s. At the peak in 2007, there were 69.6 births to women aged 15 to 44. This rate dropped to 58.4 by 2018.<sup>7</sup> These population projections assume fertility rates remain constant through the projection period and use a three-year (2022, 2023, and 2024) average of age- and race-specific fertility rates. The projections also assume a constant distribution of births into male and female for each race group through the projection period equal to the average of the corresponding fractions for calendar years 2014 through 2024.

North Carolina began to experience the impacts of the pandemic in March 2020. The effects on fertility began to show by the end of 2020. Statistics on births showed a decline in the number of births in the final months of 2020 when compared to previous years. Other states and countries showed similar trends. In 2020, births were about 3% below that of 2019. The number of births recovered to pre-pandemic levels in 2021 and 2022.

#### Mortality

OSBM prepared an unabridged life table<sup>8</sup> for 2019. Except for 2020 through 2022, survival rates obtained from this life table were assumed to remain constant through the projection period with adjustments to the survival rates based upon actual deaths that occurred through 2023. In January 2022, the 20,000<sup>th</sup> COVID death was recorded. A review of the data show trends consistent with those seen in other states and countries – that deaths from all causes were more for 2020 and 2021 than what we would have expected given the state’s

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<sup>6</sup>This is based partly on information provided by major sources of groups quarters populations, including prisons (North Carolina Sentencing and Policy Advisory Commission), military installations, and college and universities.

<sup>7</sup> Joyce Martin et al., “Births: Final Data for 2007,” National Vital Statistics Reports (Hyattsville, MD: National Center for Health Statistics, 2010); Joyce Martin et al., “Births: Final Data for 2018,” National Vital Statistics Reports (Hyattsville, MD: National Center for Health Statistics, 2019).

<sup>8</sup> An unabridged life table shows the probabilities of someone dying for each age. These probabilities are converted to survival rates to estimate the population living in the following year.

population age structure but have returned back to pre-COVID trends during the last few years.

### Net Migration

As previously outlined, the forecast model uses historical data to project total population and total population by sex and race through 2060. Net migration was then derived from a residual between the forecast model and the cohort-component model. The resulting derived measure of total net migration provided a reasonable assumption about future levels of net migration based upon recent trends. However, given recent changes in policy at the federal level, these initial projections were adjusted to account for decrease in international migration. According to the US Census Bureau's Vintage 2024 population estimates, net international migration increased its share of total population growth from 9% between 2020 and 2021 to 42% between 2023 and 2024, with a significant proportion of that growth from the surge in humanitarian immigration that occurred following the pandemic.<sup>9</sup> Policies to curb this surge began under the previous federal administration and expanded greatly in the current. Thus, overall net migration was adjusted for the state after reviewing the Congressional Budget Office's September Demographic Outlook, that projected the population for the nation based upon historical trends and federal policy changes, and by comparing the US Census Bureau's Vintage 2023, which didn't account for the surge, and Vintage 2024 population estimates, which did. This adjustment was applied to future years. The state level adjustments were distributed to county projections according to each county's historical proportion of the state's net international migration.<sup>1011</sup>

### Adjustments

#### Institutional Effects

When a large institution – such as a college or prison – is located within a county, its population characteristics can lead to errors in the county's projected population characteristics if the institutional population is not properly accounted for. Many counties may have a relatively large young adult population solely because one of these institutions is present. For instance, college students are likely to move elsewhere once they graduate. For this reason, OSBM modified the population projections to account for change in certain institutions, such as colleges, universities, military installations, and, to a lesser extent, prisons and some state hospitals. There are twelve counties in North Carolina with age structures significantly affected by institutions. These counties and the major institution types that affect them are: Avery (prisons and college), Craven (military), Cumberland (military), Durham (university), Jackson (university), Madison (university), New Hanover (university), Onslow

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<sup>9</sup> Gross, Mark, Jacqueline Lamas, Yeris H. Mayol-Garcia and Eric Jensen, December 2024, "[Improved Method Better Estimates Net International Migration Increase](#)," Washington, DC, US Census Bureau.

<sup>10</sup> Congressional Budget Office, September 2025, "[An Update to the Demographic Outlook, 2025 to 2055](#)"

<sup>11</sup> US Census Bureau, Population and Housing Unit Estimates, "[County Population Totals: 2020-2024](#)"



(military), Orange (university), Pasquotank (university and prisons), Pitt (university), and Watauga (university). OSBM adjusted the projections to account for institutional populations and assumed that the institutional population would stay constant at 2024 levels.

#### Projection Controls

OSBM controlled the initial set of population projections for total population from 2020 through 2024 to the independently derived estimates of the total population for counties. The projections were controlled to the revised estimates for 2020 through 2024 and for the certified estimates for 2024.

Then, we controlled the estimates and projections of the population by race, sex, and Hispanic origin of each county to the estimates and projections of the total population of each county for the estimation/projection period (2025 through 2060).

#### Projections of Hispanic Origin/Race Population by Age and Sex

OSBM began with the US Census Bureau's Vintage 2020 population estimates by Hispanic origin, race, age, and sex. While these estimates were produced prior to the 2020 Census, they provide a means of tracing age specific trends over time which were used to produce preliminary projections of the population by Hispanic origin/race, sex, and age. These preliminary population projections were then controlled to the OSBM projections of population by Hispanic origin, broad race groups, and sex, and the total population by age and sex.

#### Population Groups

For these population projections, the population were divided into three major race/ethnic groups: Hispanic (of any race), Non-Hispanic White, and Non-Hispanic Non-White. The Non-Hispanic White population is the largest population in the state and for most counties in North Carolina. The Hispanic population is present in most counties at a size large enough to provide estimates and projections by age. The Non-Hispanic Non-White population includes Black, American Indian, Asian/Pacific Islander, and multi-racial populations. Each of these race groups are sufficiently large for some counties but not all counties – making it difficult to provide accurate estimates cross tabulated by Hispanic origin and age. Thus, in this dataset, these population groups were combined. These populations are reported separately in the race, age, and sex population estimates/projections data file (not divided by Hispanic origin) described in the previous sections.

#### Preliminary Population Projections

First, OSBM prepared preliminary population projections for the population by 5-year age groups (from 0 to 85+) for 5-year intervals from 2025 through 2060. These were produced

using the Hamilton-Perry method of population projections.<sup>12</sup> The Hamilton-Perry method of population projections uses information from prior censuses or population estimates to track age groups over time and project age groups forward. This is done by applying cohort-change ratios to each age group for a time previous to the projected year (typically 5- or 10-year intervals). The projections for each age groups are calculated as follows:

$$P_x^{2025} = P_{x-5}^{2020} X (P_x^{2020} / P_{x-5}^{2015})$$

Where,

$$P_x^{2025} = \text{Population of age group } x \text{ in 2025}$$

$$P_{x-5}^{2020} = \text{Population of age group } x - 5 \text{ years in 2020}$$

$$P_x^{2020} = \text{Population of age group } x \text{ in 2020}$$

$$P_{x-5}^{2015} = \text{Population of age group } x - 5 \text{ years in 2015}$$

Whereas traditional cohort-component models model change using separate calculations and assumptions about net migration and natural change, the Hamilton-Perry method measures only the total change. For instance, a population age 25-29 in 2020 would change as a result of both deaths and migration into and out of the area of people in the same cohort during the five-year period since 2015 – a group that would have been age 20-24 in 2015. A cohort-change ratio greater than 1 would indicate net migration into an area above deaths to the cohort, while a ratio less than 1 would indicate net migration out of an area and/or deaths that exceed net in-migration for the cohort. These cohort-change ratios were calculated for 5-year age groups through age 85. The ratio for the oldest age group (85+) was calculated slightly differently to account for the terminal age group. The ratio for 85+ was calculated as follows:

$$P_{85+}^{2025} = (P_{85+}^{2020} + P_{80-84}^{2020}) X (P_{85+}^{2020} / (P_{85+}^{2015} + P_{80-84}^{2015}))$$

We projected the population for the youngest age group (age 0-4) by using child/woman ratios calculated as follows:

$$P_{0-4}^{2025} = FP_{15-44}^{2025} X (P_{0-4}^{2020} / FP_{15-44}^{2020})$$

Where,

$$FP_{15-44}^{2020} = \text{Female Population age 15 – 44 in 2020}$$

$$P_{0-4}^{2020} = \text{Population age 0 – 4 in 2020}$$

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<sup>12</sup> Hamilton, C. Horace and Josef Perry (1962). "A Short Method for Projecting Population by Age from One Decennial Census to Another," *Social Forces*, Vol. 41(2): 163-170. Swanson, David A., Alan Schlottmann, and Bob Schmidt. 2010. "Forecasting the Population of Census Tracts by Age and Sex: An Example of the Hamilton-Perry Method in Action." *Population Research and Policy Review* 29(1):47–63. doi: 10.2307/40608415.

$FP_{15-44}^{2025} = \text{Female Population age 15 – 44 in 2025}$

$P_{0-4}^{2025} = \text{Population age 0 – 4 in 2025}$

The cohort-change ratios and child-woman ratios calculated for 2015 to 2020 were used for projecting the population in five-year intervals through 2060. These ratios and projection were prepared for the three Hispanic origin/race categories and for males and females. In a few counties, cohort-change ratios were modified by substituting ratios from other population groups. In all such cases, these modifications involved small population groups within certain counties.

The five-year interval projections were then extended to one-year interval projections using interpolation. These preliminary projections by 5-year age groups for three categories of Hispanic origin/race and sex were then controlled to the population projections by age and sex and the population projections by Hispanic origin and race (as described in previous sections).