

Methodology for School-Age Population Estimates for School Divisions

BACKGROUND

The *Code of Virginia* states: “the sales and use tax revenue generated by a one percent sales and use tax shall be distributed among the counties and cities of this Commonwealth.... The net revenue so distributable among the counties and cities shall be apportioned and distributed upon the basis of the latest yearly estimate of the population of cities and counties ages five to 19, provided by the Weldon Cooper Center for Public Service of the University of Virginia.”

This document describes the process and methodology for developing estimates of the school-age (5-19) population as of July 1 of the current year (t). These estimates are updated annually.

METHODOLOGY

In most circumstances, estimates of the 5-19 population in each school division can be derived by multiplying the 5-19 population proportion of each school division (obtained from the U.S. Census Bureau) by the official total population estimate for each division produced by the Weldon Cooper Center (which are evaluated to be more accurate than the Census estimates of total population):

Cooper Center Estimate of 5 to 19 year olds in each school division =

$$\frac{\text{Census Estimate of 5 to 19 year olds on July 1 of year (t)}}{\text{Census Estimate of Total Population on July 1 of year (t)}} * \text{Cooper Center Estimate of Total Population on July 1 of year (t)}$$

However, due to requirements in the *Code of Virginia*, the methodology used to produce the official school-age population estimates is not as simple as the formula above. Specifically, to comply with the *Code*, estimates of 5-17-year-olds must be derived separately from estimates of 18-19-year-olds, for reasons explained below.

The *Code of Virginia* requires that 5-19-year-old individuals be counted in the school division where their parents/guardians reside (including individuals who are confined in a correctional institution or are living independently at college or in the military).

In Census Bureau and Weldon Cooper Center population estimates, individuals ages 5-17 are counted as stipulated in the *Code*, with the exception of individuals in correctional institutions. Therefore, estimates of individuals in this age range can be calculated using a formula similar to the one shown previously:

$$\text{Cooper Center Estimate of 5 to 17 year olds in each school division} = \left(\frac{\text{Census Estimate of 5 to 17 year olds on July 1 of year } (t)}{\text{Census Estimate of Total Population on July 1 of year } (t)} * \text{Cooper Center Estimate of Total Population on July 1 of year } (t) \right) \pm \text{Adjustments for Correctional Facilities} \dots (1)$$

The Cooper Center estimate of the 5-17 population in each division is derived by first multiplying the 5-17 population proportion of each division (obtained from the U.S. Census Bureau) by the official total population estimate for each division (produced by the Weldon Cooper Center). Then, to correctly account for individuals in correctional facilities, this calculation is adjusted using administrative record data from the Departments of Corrections (DOC) and Juvenile Justice (DJJ). These agencies provide individual-level administrative records showing the permanent residence address and temporary/facility address of each confined person in this age group. Such individuals are subtracted from their temporary address locality and added to their permanent address locality so that they are accounted for in the school division in which their parents/guardians legally reside.

While these computations are sufficient for estimating 5-17-year-olds, estimating the 18-19-year-old population requires a different approach, because some 18-19-year-old individuals have left their home locality to attend college or serve in the military. Accurate, reliable, individual-level administrative records showing the permanent residence and temporary/facility address of each individual attending college or in the military are not available; therefore, Cooper Center researchers are unable to compute the 18-19 population estimate using the methodology shown previously for the 5-17 population. Instead, the Cooper Center has developed a method to estimate this population without relying on college and military administrative records data.

To achieve compliance with the *Code of Virginia*, estimates of the 18-19-year-old population on July 1 of the current year (t) are produced by first gathering estimates of these individuals from two years earlier (t-2), when they were ages 16-17 and accounted for in the division where their parents/guardians reside. Cooper Center researchers then apply a cohort-change ratio (CCR) to project that 16-17-year-old population forward two years to current year (t), resulting in an estimate of 18-19-year-olds in the current year (and accounted for in the proper school division). This cohort-change ratio allows the Cooper Center to incorporate changes in the size of the 16-17-year-old population over the two-year time period. The result of these calculations is then adjusted using DOC and DJJ data to account for individuals confined to correctional institutions in the proper division.

The formulas used for these computations are:

Cooper Center Estimate of 18 to 19 year olds in each school division =

$$\left(\frac{\text{Census Estimate of 16 to 17 year olds on July 1 of year } (t-2)}{\text{Census Estimate of Total Population on July 1 of year } (t)} * \text{CCR} * \text{Cooper Center Estimate of Total Population on July 1 of year } (t) \right) \pm \text{Adjustments for Correctional Facilities} \dots (2)$$

where

$$\text{CCR} = \text{Cohort Change Ratio} = \frac{\text{Census Estimate of 18 to 19 year olds on July 1 of year } (t)}{\text{Census Estimate of 16 to 17 year olds on July 1 of year } (t-2)} \dots (3)$$

$$\approx \frac{\text{Census Estimate of 16 to 17 year olds on July 1 of year } (t)}{\text{Census Estimate of 14 to 15 year olds on July 1 of year } (t-2)} \dots (4)$$

Note that there are two equations shown for the cohort-change ratio. The true cohort-change ratio, shown in equation (3), cannot be used because it contains the unknown 18-19-year-old estimate we are seeking; therefore, an approximation of the true cohort-change ratio is used instead. This approximation, shown in equation (4), is the ratio of the 16-17-year-old population in (t) to the 14-15-year-old population in (t-2). The approximated cohort-change ratio is that of a group very close in age to the population of interest and is assumed to be a good substitute for the true cohort-change ratio.

After the estimates of 5-17- and 18-19-year-olds are calculated, they are summed to yield an estimate of the 5-19-year-olds in each Virginia school division on July 1 of the current year (t).

Finally, the number of special education students ages 2-4 and 20-21, as reported by school divisions to the Department of Education on December 1 of the current year (t), are added to the Cooper Center estimates of 5-19-year-olds, to yield the total estimate that will be used to allocate sales tax revenue.

APPENDIX: HOW THIS METHODOLOGY COMPLIES WITH CODE OF VIRGINIA REQUIREMENTS

The methodology for July 1 of current year (t) estimates complies with *Code of Virginia* requirements for specific groups in the following ways:

College students

College students, the vast majority of whom are 18 and older, are included in raw Census Bureau and Cooper Center population estimates at the on- or off-campus residence where they live and sleep most of the time, but the *Code of Virginia* requires that they be accounted for in their parent/guardian's school division. Compliance with this requirement is achieved by gathering estimates of these individuals when they were ages 16-17 (in year (t-2) - at a time when they were less mobile, likely to be living with their parent/guardian, and accounted for in the proper school division), and projecting that population forward two years by applying an age-specific cohort-change ratio. The limitation of this methodology is that college students ages 17 and under who are living away from home will not be accounted for in the parent/guardian's school division. The Cooper Center believes that the effects of this limitation are minimal due to the small number of college attendees who are under eighteen.

Military Personnel

Military personnel, the vast majority of whom are 18 and older, are included in raw Census Bureau and Cooper Center population estimates at their military barracks or their on-/off-base residence where they live and sleep most of the time, but the *Code of Virginia* requires that they be accounted for in their parent/guardian's school division. Compliance with this requirement is achieved by gathering estimates of these individuals when they were ages 16-17 (in year (t-2) - at a time when they were less mobile, likely to be living with their parent/guardian, and accounted for in the proper school division), and projecting that population forward two years by applying an age-specific cohort-change ratio. The limitation of this methodology is that military personnel ages 17 and under who are living away from home will not be accounted for in the parent/guardian's school division. The Cooper Center believes that the effects of this limitation are minimal due to the small number of military personnel who are under eighteen.

Individuals confined to correctional facilities

Individuals residing in correctional facilities are included in raw population estimates at the facility location regardless of their age, but the *Code of Virginia* requires that they be accounted for in their parent/guardian's school division. Compliance with this requirement is met by estimating the 5-19-year-old population using the formulas outlined previously. Individuals can be in and out of these facilities at a wide range of ages, so the methodology includes an adjustment based on administrative record data from the Departments of Corrections and Juvenile Justice. The adjustments allow Cooper Center researchers to subtract these individuals from the facility school division and assign them to the parent/guardian's school division.