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Utah Population Committee Estimates Methodology: Estimates for 2020 and Beyond

The Utah Population Committee (UPC) produces annual state and county population estimates for Utah and its counties. This document describes the methodology for the postcensal population estimates produced by the UPC following the release of the state and county level 2020 Census results. This work is used in many different capacities by local Utah entities, serves as inputs to the Kem C. Gardner Policy Institute Long-Range Planning Projections, and county level controls for the Kem C. Gardner Policy Institute Subcounty population estimates.[1][2]

The Population Division of the U.S. Census Bureau produces similar annual estimates for all states and counties using nationally available data sets and uniform methods.[3] The advantage of their work is that comparisons may be made between estimates for counties and states nationally. However, these methods do not incorporate a contextual understanding of local events, conditions, and data. Consequently, most states, including Utah, support independent research programs to track local changes and to produce their own set of estimates.

The initial approach of UPC was to maintain theoretical and technical continuity with that of its predecessor, the Utah Population Estimates Committee (UPEC), which has a long and rich history in Utah of developing and producing state and county level population estimates.

Since UPC's emergence in 2015, there have been methodological changes and updates to account for annual changes in data availability, demographic patterns, and unusual events (i.e. COVID-19). The following sections detail the UPC estimation methods and data used in an ideal year with no unusual data issues or events. However, many years require some judgement calls and methodology adjustments to accommodate issues and data challenges.

Estimation Methods

UPC averages the results of three methods, the IRS Exemption Method, Housing Unit Method, and School Enrollment Method, to produce population estimates for each county.[4] The state total population estimate is the sum of these county totals. The three methods are each detailed below. The estimates are produced for July 1 of each year. Other variables include births, deaths, natural increase, and net migration and are measured for July 1 fiscal year periods.

Standard Residual Estimation Method

County population estimates for July 1 are derived by computing fiscal year changes in symptomatic data and applying these to the previous year population. Fiscal year natural increase (births minus deaths) is subtracted from the updated population estimate to derive net migration as the residual. Two (IRS and Housing Unit) of the three estimation methods use this method of population estimation.

$$NM = (P_t - P_{t-1}) - (B - D)$$

where   NM = Net Migration (for the fiscal year from t–1 to t)
P = Population (stock variable at a point in time)
B = Births (total for the fiscal year from t–1 to t)
D = Deaths (total for the fiscal year from t–1 to t)
t = Time

Cohort Estimation Method

This method estimates net migration instead of the current population estimate and uses equation 3 below to calculate the population estimate. The School Enrollment Method uses the cohort approach in three steps using the following equations:

1. *Implied student migration* $_{(t-1 \text{ to } t)}$ =

$$\left[\left(\frac{\text{School Enrollment}}{\text{Grades } 2-9_t} \right) - \left(\frac{\text{School Enrollment}}{\text{Grades } 1-8_{t-1}} \right) \right] \times .9998$$

2. *Net Migration* $_{(t-1 \text{ to } t)}$ =

$$\frac{P_{t-1}}{(\text{School Enrollment Grades } 1-8_{t-1})} \times \frac{\text{Implied Student}}{\text{Migration }_{(t-1 \text{ to } t)}}$$

3. $P_t = P_{t-1} + (B - D) + \text{Met Migration }_{t-1 \text{ to } t}$

where   P = Population (stock variable at a point in time)
B = Births (total for the fiscal year from t–1 to t)
D = Deaths (total for the fiscal year from t–1 to t)
t = Time

Natural Increase

Natural increase is calculated by subtracting the number of deaths from the number of births for the July 1 fiscal year. The Department of Health and Human Services provides the UPC with updated residence adjusted vital records by county.

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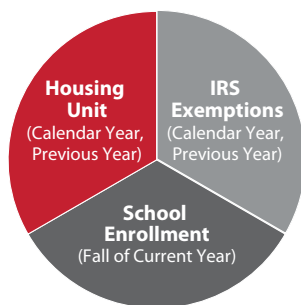## Additional Details for Each Method

School Enrollment Method

The Utah State Board of Education (USBE) provides UPC with updated annual enrollment counts from each county. Their selection criterion consists of state residency, enrolled in public local education or charter schools, enrolled on October 1st, at least one day of enrollment in regular or special education programs, enrolled in a grade level from kindergarten to 12th grade, students attending the state sponsored deaf and blind schools, and foreign exchange students.

The School Enrollment Method uses aged and survived changes in school enrollment as an indicator of net migration. This method compares a county's survived enrollment (calculated by applying a survival rate of 99.98% to the enrollment count) in grades 1 to 8 for the year prior to the estimate year, to enrollment in grades 2 to 9 for the estimate year. The difference between these two enrollment totals is taken to be net student migration for the county. Total net migration from the school enrollment method for the county is then derived by multiplying the county's student migration estimate by the county specific total population to student ratio. This ratio is defined as the total population estimate of the county for the prior year divided by the same year's enrollment in grades 1 to 8.
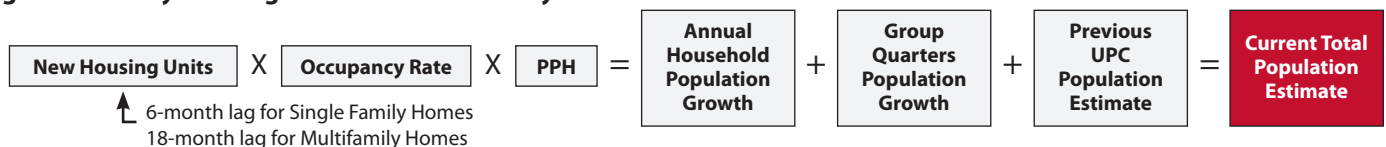
IRS Exemption Method

The Utah State Tax Commission provides UPC with data containing the annual counts of the number of tax returns and exemptions filed by county. This method uses the growth in filings and exemptions as reported on tax returns filed with the IRS as an indicator of population change. The data is lagged by one year, so the current population estimate uses a growth rate from the sum of exemptions from two years prior, and the sum of exemptions from the year prior to the current year (i.e., 2022

IRS method uses 2021 and 2020 calendar year exemptions to generate growth rate). The growth rate in exemptions is then applied to the previous fiscal year population to estimate the current fiscal year population.

Housing Unit Method

The Housing Unit Method (HUM) is intuitive, well-vetted, and widely used for sub-national population estimates. The method incorporates housing and demographic data to produce total population estimates. New housing unit construction ultimately translates to population growth.

The HUM uses the Census Bureau enumeration of population and housing units as the 2020 estimate base. Ivory Boyer building permit data (the same data source for the Housing Stock Method) is converted into annual new housing units using assumptions about completion rates and construction lag times. See Table 1 for detailed information about data and assumptions in the HUM. Then, the method applies assumptions about occupancy rates and average household size (PPH) to estimate the number of people living in these new units (see Figure 2). 2020 census data is used for the demographic and occupancy characteristics of completed housing units and as the baseline inventory of 2020 housing stock.

This differs from the Housing Stock method (previously used), which strictly converted new permits to constructed and occupied housing units in 6 months and then applied the percentage growth in permits to the percentage growth in population.

Figure 1: UPC Estimation Methods

Table 1: Key Assumptions of the UPC County Housing Unit Method

Assumption	Description
Time of Construction and Occupancy Lag	Using Ivory-Boyer permit data, all single-family home units are assumed to be completed 6 months after permitting, whereas all multifamily units have a completion time of 18 months.
Household Size (persons per occupied housing unit)	Average household size, or persons per household, data come from the 2020 census and are assumed to stay constant over the estimates period. Calculated using household population divided by the number of occupied housing units.
Occupancy	The model applies county occupancy rates for newly constructed units to estimate occupied housing units. The data come from the 2020 Census and are assumed to stay constant over the estimates period.
Group Quarters	The group quarters population is assumed to stay constant at the Census 2020 levels unless our group quarters reporting indicates major group quarters changes.

Figure 2: County Housing Unit Method Summary

New Housing Units (6-month lag for Single Family Homes, 18-month lag for Multifamily Homes) X Occupancy Rate X PPH = Annual Household Population Growth + Group Quarters Population Growth + Previous UPC Population Estimate = Current Total Population Estimate

A Note on the 2020 Estimates:

In order to produce July 1st 2020 estimates from the April 1st, 2020 Census data, certain adjustments were made to estimate the amount of growth in a quarter of the year:

Natural Increase was estimated using the monthly birth and death records from April 1st through June 30th, 2020.

In the School Enrollment Method, we used a quarter of the amount of the implied student migration numbers to adjust the estimated net migration.

In the IRS Method, the growth rate was derived from only a quarter of the absolute difference between the previous and current year's numbers.

The Housing Unit Method used the enumerated Census April 1, 2020 housing unit numbers and updated the housing stock with building permit information from October 1, 2019 to December 31, 2019.

Endnotes

1 https://gardner.utah.edu/demographics/population-projections/
2 https://gardner.utah.edu/demographics/salt-lake-and-utah-county-subcounty-estimates-2010-2019/
3 https://www.census.gov/programs-surveys/popest.html
4 Previous estimates before 2020 used The Church of Jesus Christ of Latter-day Saints membership data to implement a fourth method. Starting in 2021, the LDS church revoked access to membership data to most outside entities, resulting in the loss of this data and method moving forward.