

Use of Population Estimates as Control Totals for the American Community Survey

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Outline

- High level overview of weighting
- Use of control totals
- Source of controls by year
- Future

Highlevel Overview of Weighting

High-Level Overview of Weighting

- ACS surveys both housing units and people
- From the target population, we
 - Select sample using a variety of sampling rates
 - Collect data from respondents—subset of the sample units
- The ACS weighting assigns statistical weights (i.e., whole numbers) to each response for use in tabulation
 - For example, a house that is owner-occupied with a weight of 10 would be tabulated as though there are 10 houses in the population that are owner-occupied

Major Steps of Weighting Process

- Base weights to account for differential sampling rates
 - Different housing units have a different probability of being in sample
 - Sampling rates vary from ~0.5% (1-in-200) to 10% (1-in-10) per year
- Nonresponse adjustments
 - Account for those who did not respond to the survey
 - Can be difficult in extreme situations like the 2020 pandemic situation
- Coverage adjustment to mitigate for coverage deficiencies from
 - Sampling frame
 - Data collection

Use of Control Totals

Use of Control Totals

- Control totals are used to improve coverage of the survey estimates
- Ideally, they are independent of the survey frame
- Assumption is that for the geography and detailed used, the control totals are more accurate than the unadjusted survey totals

Use of Control Totals in the ACS

- Our source of control totals is the Population Estimate Program (PEP) for both housing units and population.
- ACS 1-year estimates are controlled to the July 1st PEP estimates for the same year.
- ACS 5-year estimates are controlled to the average of the July 1st estimates for each year in the 5-year period.
- For any given year, we always use the best estimates available.

Geographic Level and Detail of Controls

- State
 - Group quarters population by major type
- County
 - Total housing units
 - Total resident population by demographics
- Sub-county (county-place-minor civil division parts)
 - Total housing units
 - Total resident population (no demographics)
- Both county and sub-county areas are subject to grouping to meet defined size thresholds

More Detail on Use of Demographics

- Within county, define cells of race / Hispanic origin crossed by age/sex
- 6 race / Hispanic groups (stateside only, not in Puerto Rico)
 - Hispanic, regardless of race
 - Non-Hispanic, crossed by five major OMB race groups (multirace assigned single race for purposes of adjustment)
- 26 age / sex groups
 - Sex (2)
 - Age categories (13)
- $156 = 6 * 26$ initial weighting cells

Initial Control Cells (in Table Format)

Hispanic		Non-Hispanic White		Non-Hispanic Black		Non-Hispanic American Indian		Non-Hispanic Asian		Non-Hispanic NHPI	
M 0-4	F 0-4	M 0-4	F 0-4	M 0-4	F 0-4	M 0-4	F 0-4	M 0-4	F 0-4	M 0-4	F 0-4
M 5-14	F 5-14	M 5-14	F 5-14	M 5-14	F 5-14	M 5-14	F 5-14	M 5-14	F 5-14	M 5-14	F 5-14
M 15-17	F 15-17	M 15-17	F 15-17	M 15-17	F 15-17	M 15-17	F 15-17	M 15-17	F 15-17	M 15-17	F 15-17
M 18-19	F 18-19	M 18-19	F 18-19	M 18-19	F 18-19	M 18-19	F 18-19	M 18-19	F 18-19	M 18-19	F 18-19
M 20-24	F 20-24	M 20-24	F 20-24	M 20-24	F 20-24	M 20-24	F 20-24	M 20-24	F 20-24	M 20-24	F 20-24
...

Collapsing of Coverage Adjustment Cells

- Most counties we have to collapse some of those 156 initial cells
- We collapse cells if:
 - There are fewer than 10 sample respondents in the cell
 - The adjustments in that cell are too extreme (either small or large)
- Why?
 - Extreme adjustments can lead to large weights on a small number of cases.
 - Large weights would lead to estimates with larger margins of error and more “wonky” estimates.
- Collapsing cells balances the desire for finer cells to better mitigate coverage error while not leading to the negative impacts listed above.

Controlled Published Estimates

- Most of the boundaries defining the initial cells are not controlled.
- Items frequently controlled:
 - State
 - Group quarters population by institutional / non-institutional (sometimes major type)
 - County
 - Total resident population
 - Hispanic / non-Hispanic and sometimes age ranges, e.g., 18+, for larger counties
 - Subcounty
 - Total population for medium sized places or minor civil divisions
 - Puerto Rico municipios
 - Frequently broad age categories because only age/sex are controlled.

Source of Controls by Year

Types of Population Estimates

- There are two primary types of population estimates
- Postcensal estimates
 - Informed by previous census carried forward using administrative and other sources
 - Released annually
 - Versions are identified by “Vintage” followed by year: e.g., Vintage 2019
- Intercensal estimates
 - Informed by both previous and current census
 - Adjusts the final postcensal estimates for decade to match current census
 - Released once per decade

ACS Controls Away from a Decennial Year

- For years ending in 4, 5, ..., 9
 - ACS 1-year estimates are controlled to July 1st estimates for the same year using the latest vintage of population estimates.
 - ACS 5-year estimates are controlled to the average of the July 1st estimates for each year in the period, again using the same vintage.
- For example,
 - 2019 ACS 1-year is controlled to July 1, 2019 estimates Vintage 2019
 - 2015-2019 ACS 5-year is controlled to average July 1, 2015-2019 Vintage 2019
- Note, because of the vintage used, the 2019 ACS 5-year total population may differ than average of 2015, 2016, ..., 2019 ACS 1-year

ACS Controls in a Decennial Year

- *Planned use for year ending in 0:*
 - ACS 1-year would use an extrapolation of the April 1st census to a July 1st estimate
 - ACS 5-year would use average across the four intercensal estimates for years prior to the census and the extrapolated estimates for the census year.
- However, intercensal estimates were delayed due to delay in census files
- Implemented for 2020 ACS 1-year experimental and 5-year products
 - ACS 1-year experimental estimates used the July 1, 2020 estimates from the (2010 Census-based) Vintage 2020 postcensal estimates.
 - ACS 5-year used the average of July 1, 2016-2020 estimates from the (2010 Census-based) Vintage 2020 postcensal estimates.
- Key take-away: 2020 ACS controls were not informed by the 2020 Census.

ACS Controls Following a Decennial Year

- *Planned use for years ending in 1, 2, or 3:*
 - ACS 1-year would use the postcensal estimates as control totals.
 - ACS 5-year would use average across the intercensal estimates for years prior to the census and the postcensal estimates for the census year forward.
 - e.g., 2007, 2008, 2009 estimates from intercensals and 2010, 2011 Vintage 2011
- Implemented for 2021 and 2022 ACS 1-year and 5-year products
 - ACS 1-year used the Vintage 2021 and 2022 blended population estimates
 - ACS 5-year used the average across adjusted Vintage 2020 estimates for years prior to the census and the blended base estimates for 2020 forward.
- Key take-away: informed by 2010 census and blended base estimates

What Informs the Blended Base Estimates?

- The base for the current postcensal estimates is not just the census.
- At the national level
 - Total population comes from 2020 Census
 - Age and sex come from demographic analysis
 - Race and Hispanic come from Vintage 2020 postcensal estimates
- At the subnational level
 - Total population comes from 2020 Census
 - All demographics come from Vintage 2020 subject to national controls
- This basic model was used in 2021 and 2022.
- 2022 included increased information on GQ population from census.
- Key take-away: no demo. detail currently comes from the 2020 Census

What Are “Adjusted Vintage 2020” Estimates?

- Reiterate: the intercensal estimates are still not available
- We needed to create estimates for the years prior to 2020 to use in their place for the ACS 5-year that are consistent with the blended base estimates.
- The ACS program created a set of adjusted Vintage 2020 postcensal estimates:
 - Uses published methodology for creating the 2000-2010 intercensal estimates
 - Uses blended base estimate for July 1, 2020 as its end point instead of 2020 Census
 - As blended base uses more 2020 Census information, our adjusted Vintage 2020 estimates will incorporate that information
 - Only for internal use
- Key take-away: estimates for years prior to 2020 incorporate the same census information as the blended base and can support us for the 2023 ACS as well.

Future

Future Changes to Controls?

- The PEP continues to work to include more information from the 2020 Census into their blended base population estimates.
- Waiting results from Base Evaluation and Research Team (BERT).
- Results will inform future incorporation of census data
- Could see changes to methodology as early as Vintage 2023.
- Vintage 2023 methodology should be posted in December
- See blog link below

[census.gov/library/stories/2023/06/blended-base-methodology.html](https://www.census.gov/library/stories/2023/06/blended-base-methodology.html)

How to Keep Up to Date

- We have been releasing updated information regarding the controls in our user notes each year since 2020.
 - Population Controls for the 2020 ACS
[census.gov/programs-surveys/acs/technical-documentation/user-notes/2021-01.html](https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2021-01.html)
 - Population Controls for the 2021 ACS
[census.gov/programs-surveys/acs/technical-documentation/user-notes/2022-10.html](https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2022-10.html)
 - Population Controls for the 2022 ACS
[census.gov/programs-surveys/acs/technical-documentation/user-notes/2023-06.html](https://www.census.gov/programs-surveys/acs/technical-documentation/user-notes/2023-06.html)

Contact and Other Information

- Email: Mark.E.Asiala@census.gov
- Methodology (Chapter 11: Weighting) for more details:
[census.gov/programs-surveys/acs/methodology/design-and-methodology.html](https://www.census.gov/programs-surveys/acs/methodology/design-and-methodology.html)