EST101: Intro to Census Bureau Population Estimates

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Webinar for the Tennessee State Data Center
November 29, 2022

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Overview

- About the Population Estimates and Projections Program (PEP)
- General PEP concepts
- Postcensal estimates production overview
  - Methods
  - Input data
  - Estimates products
- Questions and Discussion

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About PEP

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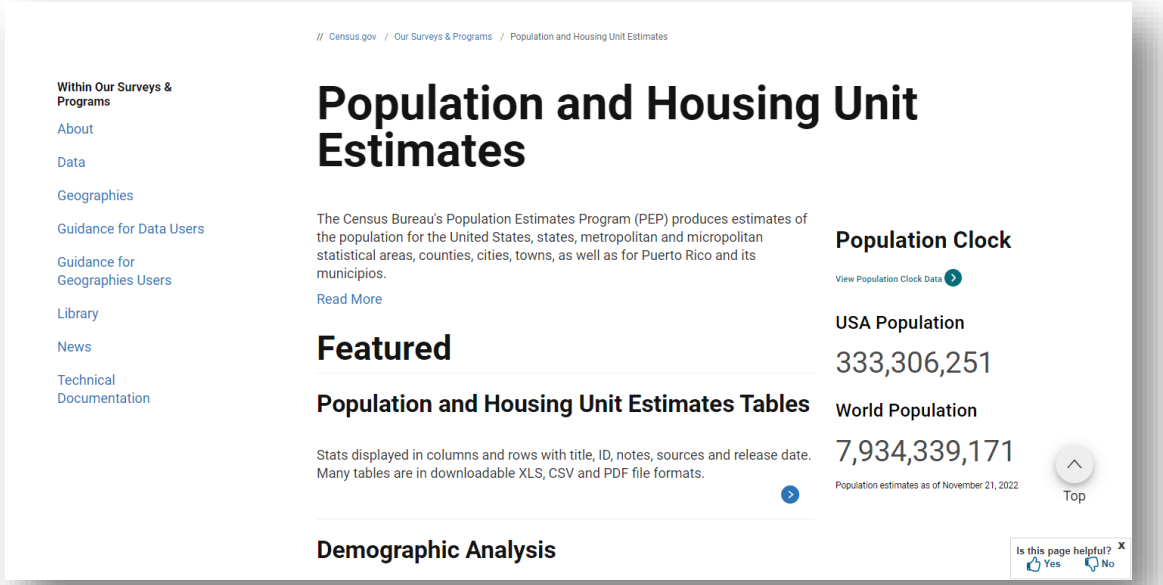
The Population Estimates Program

- The PEP disseminates official measures of population and housing units between decennial censuses
- Mandated by federal law
- Use cases include:
  - Distribution of billons of dollars in federal funding
  - Population controls and denominators
  - Academic and business research
  - Program planning in the public and private sectors
- Time series are released annually featuring data for the date of the last census through the current year
  - Current estimates series from April 1, 2020 to July 1, 2021
  - Data out to July 1, 2022 will be released beginning next month



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Schedule

- Every year, we re-estimate the entire timeseries starting at the last Census date and adding an additional year to the timeseries
- We release data on a rolling basis each year
  - **December**: National and state-level total population, components of change, and voting age population
  - **March**: Total population and components of change for counties (and usually metropolitan/micropolitan areas)
  - **April**: National population by age and sex
  - **May**: City and town total population and nation/state/county-level housing units
  - **June**: Nation/state/county-level population by age, sex, race, and Hispanic origin

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General Concepts

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General PEP Concepts

- Types of PEP products
- Estimates versus projections
- Census versus estimates base
- Modified race
- Concept of vintages
- Primitive geography
- Order of estimates production

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Types of PEP Data Products

Product	Start Point	End Point	Characteristics
Postcensal estimates	Date of latest census	Current year	Official estimates between census years; based on the most recent census, using administrative records to estimate current population
Intercensal estimates	Date of previous census	Date of latest census	Adjusted postcensal estimates to be consistent with two separate censuses; designed to be used as a timeseries with other decades of intercensal estimates
Evaluation estimates	Date of previous census	July of latest census year	Research series; Created after there is a new census and used to investigate differences between the estimated population on April 1st and the enumerated population
Demographic Analysis (DA) estimates	N/A	Date of the latest census	An estimate of the latest census date based primarily on administrative records, which is independent of any census; one of official benchmarks used by the Census Bureau to measure coverage in the latest decennial census
Population projections	Current year	Approx. +50 years from current year	Released in intervals that span several years; based on the most recent postcensal estimates and projects forward using various methods

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Estimates versus Projections

Estimates	Projections
• Recent or current time periods • Administrative data used to estimate recent and current components of change • No variation in trends • Produced annually for all levels of estimates geography	• Future time periods • Administrative data used to project future trends in components of change • Varying assumptions about future trends • Produced intermittently for nation only

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Census versus Estimates Base

Census	Estimates Base
• Enumerated population in geographic boundaries that existed on April 1 • No corrections or updates	• Enumerated (or estimated) population re-tabulated into current geographic boundaries • Includes corrections and updates via Count Question Resolution and other administrative programs

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Modified Race

- Decennial census race categories include “Some Other Race” (SOR)
  - Administrative data used in estimates production do not include SOR category
  - Census SOR responses must be imputed to one or more single race categories for use in estimates production
- Census 2000 and 2010 Census data were imputed in the same basic manner, producing *IMPRACE*
- Currently researching updates/improvements to the SOR imputation process for future vintages

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Concept of Vintages

- Produced as a time series starting from the latest decennial census date
- Revised every year to include geographic updates, latest administrative records, latest methods, and an additional year of time
- Each new vintage supersedes all prior vintages

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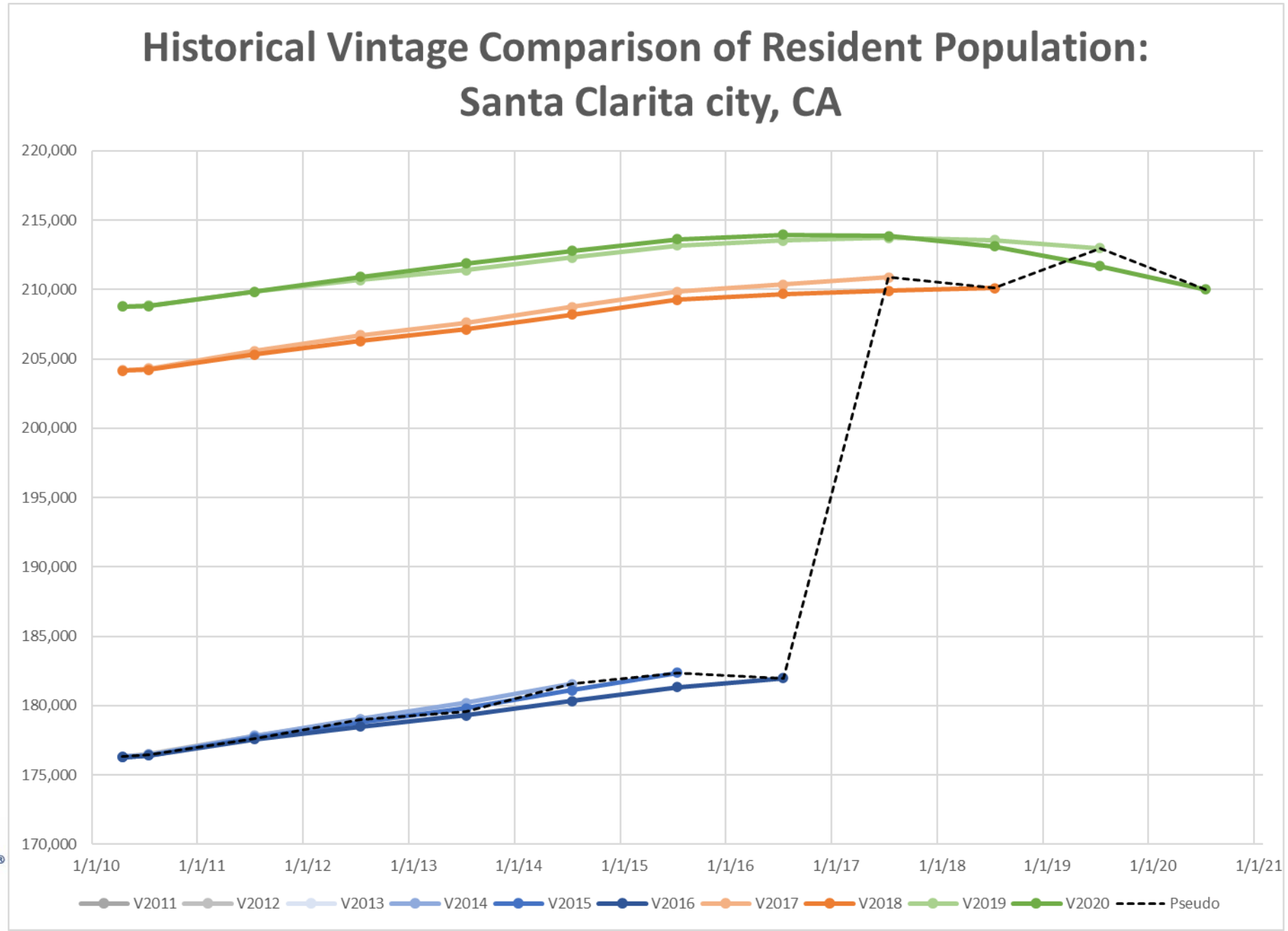
Historical Vintage Comparison of Resident Population: Santa Clarita city, CA



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Primitive Geography

- Subcounty estimates geography
- Mutually exclusive and exhaustive geographic areas
- Lowest level of estimates geography required to aggregate to counties
- Varies by state and county

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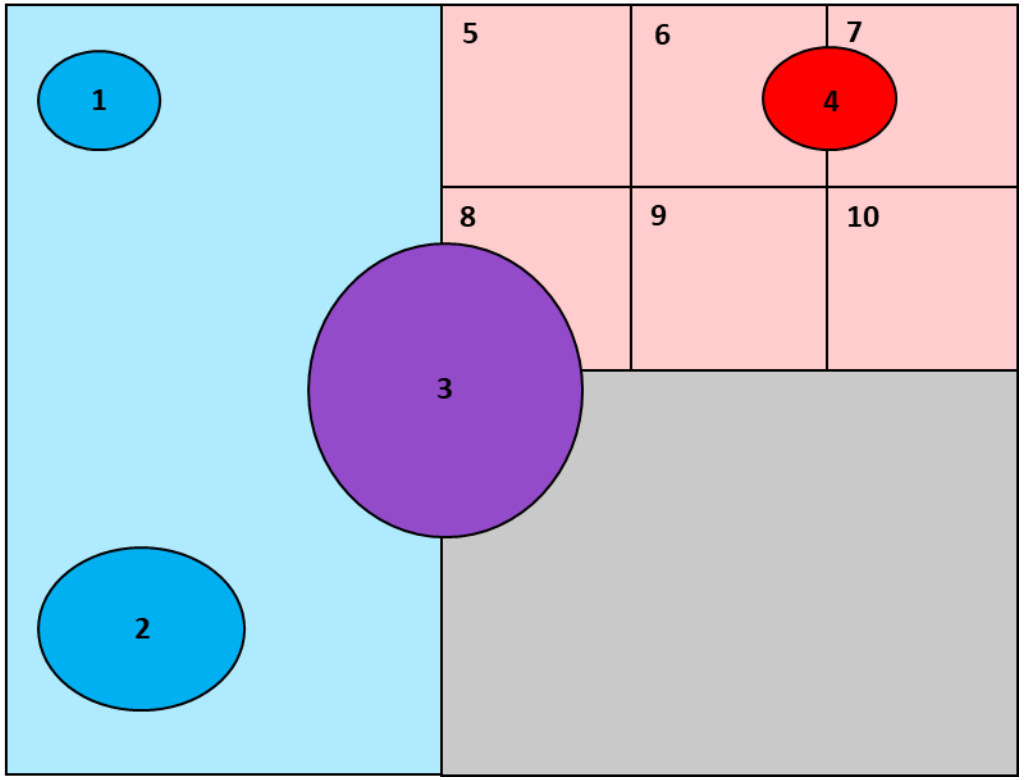
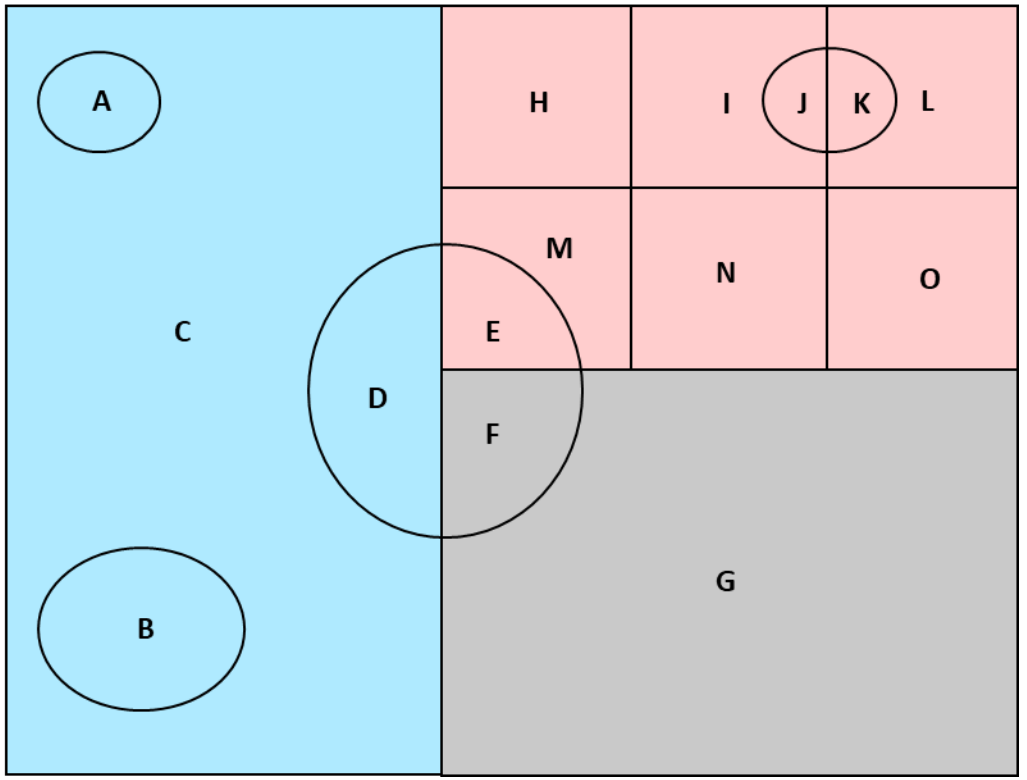
Overlapping Subcounty Geography



Primitive Subcounty Geography



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Estimates Production

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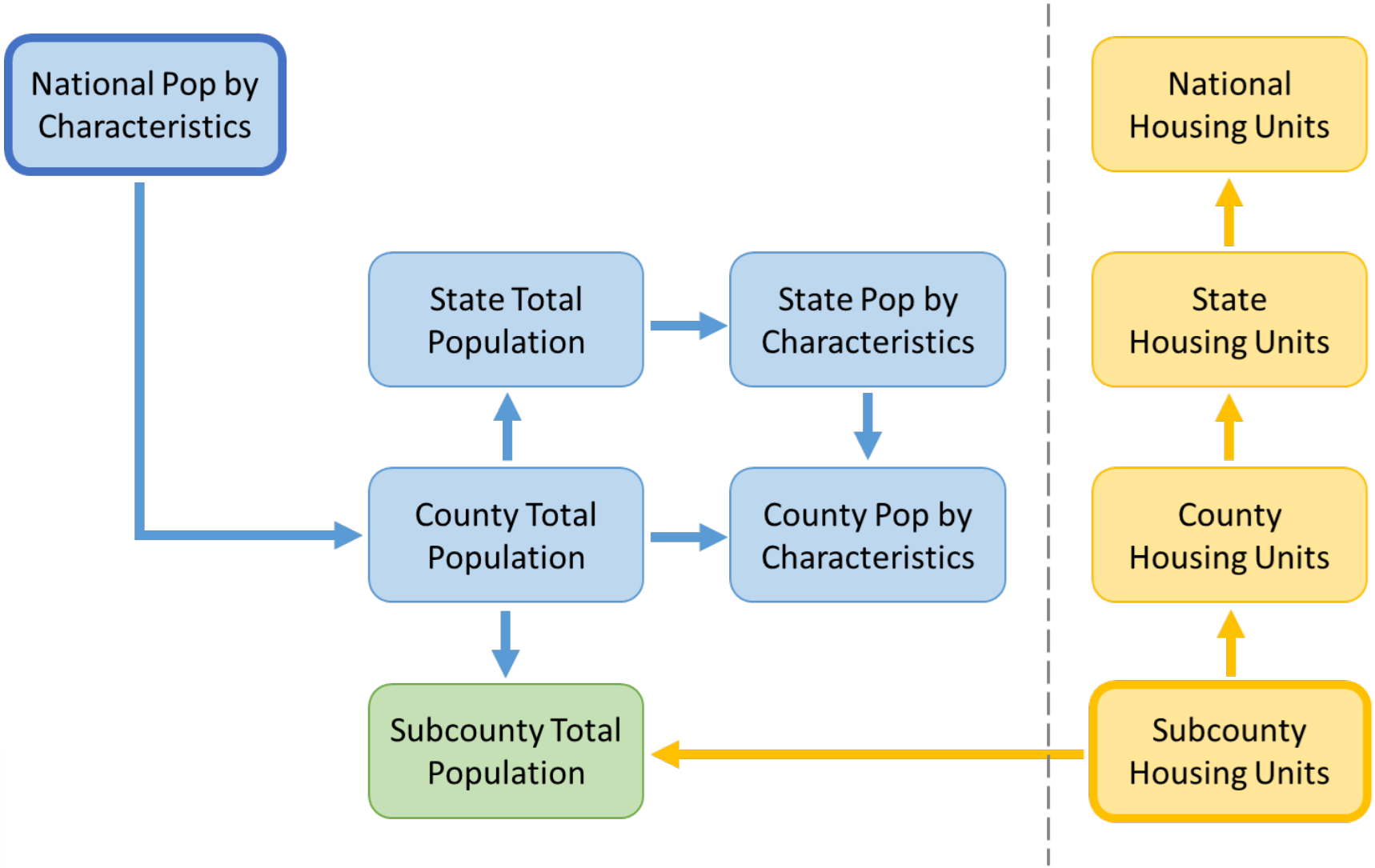
Order of Estimates Production



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Order of Estimates Production

- Estimates for larger populations are generally more reliable than estimates for smaller populations
  - Geographic level
  - Characteristics detail
- Customer requirements
  - Timing
  - Characteristics detail

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Postcensal Estimates Production Overview

- Cohort-component method
  - Population
    - Components of change input data
    - Estimates products
  - Housing units
    - Components of change input data
- Distributive housing unit method
  - Subcounty population estimates
    - Input data

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Population Estimates:

Cohort-Component Method

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Population Estimates:

Base Population

- Inputs
  - Decennial census population including CQR updates and retabulated into current geographic boundaries
- Method
  - Before 2020 Census:
    - No additional processing done by E&P
  - After 2020 Census:
    - Limited 2020 Census data are “blended” with V2020 April 1, 2020 estimates and 2020 Demographic Analysis estimates
    - Subcounty population in current boundaries includes differentially private noise
- Creation of the Base Evaluation and Research Team (BERT)

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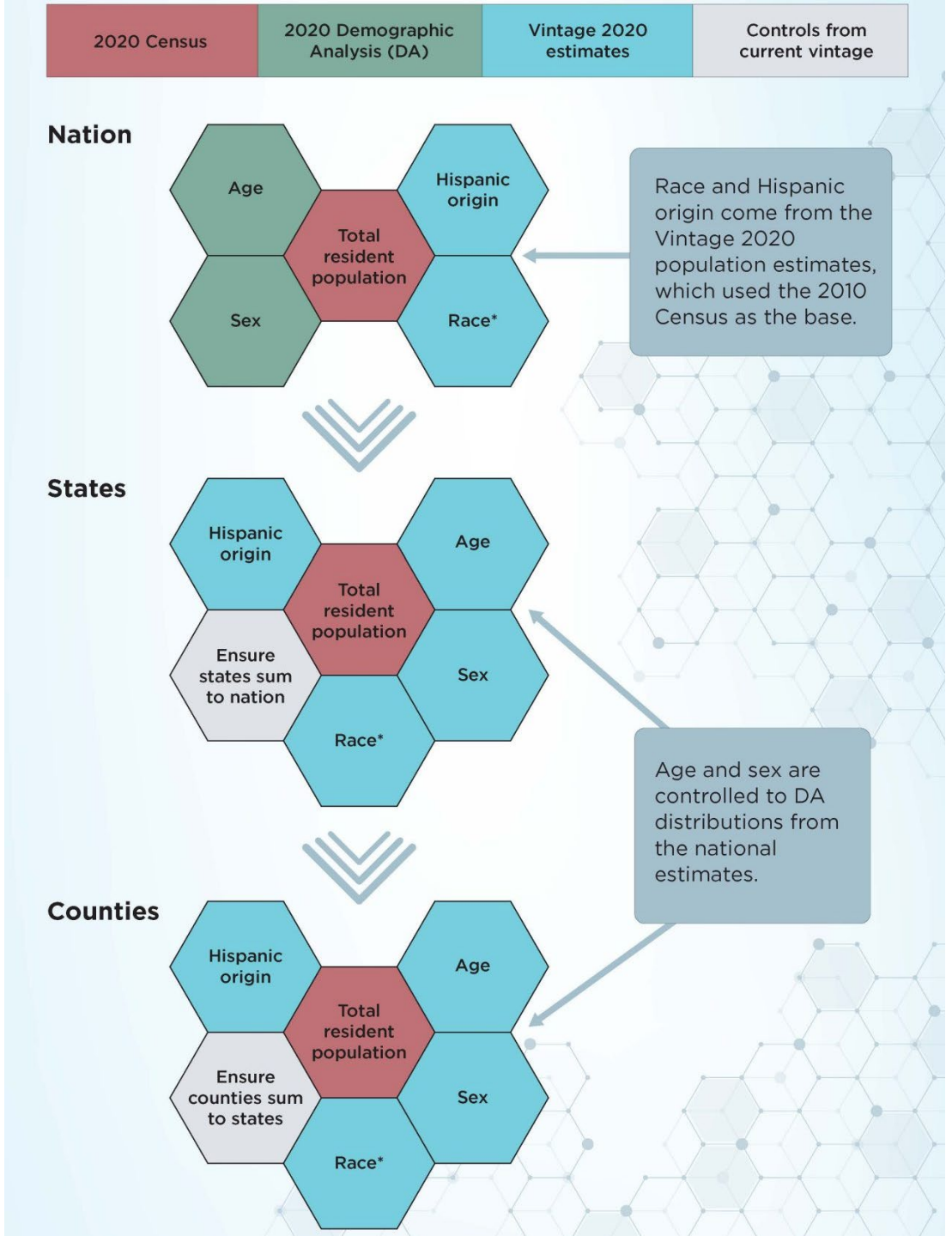

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Population Estimates:

Births and Deaths

- Inputs
  - Vital records from National Center for Health Statistics (NCHS) – final data lagged 2 years
  - FSCPE state partners – final data lagged 1 year – help push forward an extra year
- Method
  - Convert NCHS race detail from 1977 OMB categories to 1997 OMB categories
  - For births, assign race and Hispanic origin to the child using mother's and father's race and Hispanic origin
  - Tabulate NCHS birth and death data to nation, states, and counties by age, sex, race, and Hispanic origin
  - Reconcile NCHS tabulated data with FSCPE county-level total births and deaths
  - Project estimated births and deaths out to vintage year

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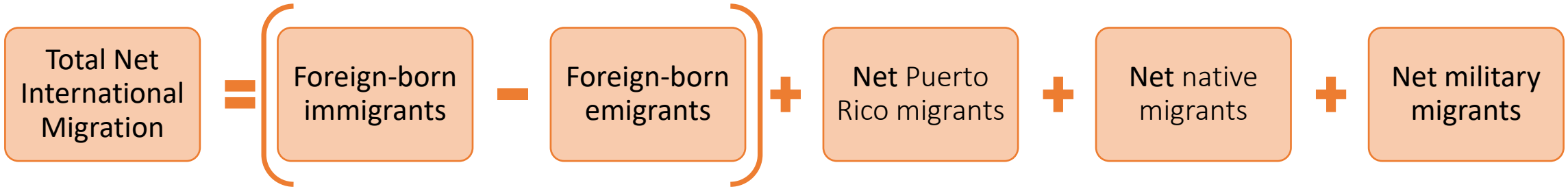
Population Estimates:

Net International Migration



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Population Estimates:

Net International Migration

- Inputs
  - American Community Survey (ACS)
  - Puerto Rico Community Survey (PRCS)
  - NCHS Hispanic life tables
  - Population registers and censuses from approximately 80 countries
  - Defense Manpower Data Center (DMDC)
- Methods
  - Vary by sub-component (e.g. DMDC is used to measure military movement, and NCHS Hispanic life tables are used in calculating foreign-born emigration)
  - Vary by geographic level (e.g. larger populations enable different uses of the ACS)

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Population Estimates:

Net Domestic Migration

- Inputs
  - Internal Revenue Service (IRS)
  - Centers for Medicare and Medicaid Services (CMS)
  - Demographic Characteristics File (DCF)
- Method
  - Match individuals from IRS and CMS to DCF to assign demographic characteristics
  - Match individuals across two years of data and assess county-level migration status
  - Aggregate in-migrants, out-migrants, and non-migrants to calculate county-specific migration rates
  - Multiple rates by population at risk of migrating to estimate net migrants

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Population Estimates:

Group Quarters Population

- Inputs
  - Estimates base GQ population by GQ facility type and age, sex, race, and Hispanic origin
  - Facility-level GQ population time series from FSCPE, which allows for change since the last census to be measured
- Method
  - Aggregate facility-level GQ population to primitive subcounty geography by facility type
  - Calculate primitive-level GQ population annual change by type
  - Apply change to GQ base population to make annual estimates
  - Aggregate primitive GQ estimates to nation, states, and counties and apply base population characteristics distribution to totals within type

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Population Estimates:

National Population by Characteristics

- Quarterly resident population estimates produced using cohort-component method
  - By quarter-year of age (0-403+), sex, race (31 groups), and Hispanic origin
- Intervening months produced by combination of monthly components of change and interpolation
- Additional population universes produced by addition or subtraction
  - Resident + Armed Forces overseas = resident pop + overseas military pop
  - Household = resident pop – GQ pop
  - Civilian = resident pop – resident military pop
  - Civilian noninstitutionalized (CNI) = civilian pop – institutionalized GQ pop

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Population Estimates:

State and County Total Population

- Annual county household population estimates produced using the component of change method
  - Three age groups: ages 0-17, 18-64, and 65 years and older
- Resident population = household pop + GQ pop
- States produced by aggregating counties
- Residual component
  - Domestic migration produced from net rates (with GQ pop change added in) doesn’t naturally net to zero at the national level and must be adjusted
  - Residual component is result of that adjustment

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Population Estimates:

State Population by Characteristics

- Annual household population estimates produced using the cohort-component method
  - By single years of age (0-84, 85+), sex, race (6 groups), and Hispanic origin
- Resident population = household pop + GQ population
- Two or more races population distributed to individual multi-race categories using base population multi-race distribution
- For CPS controls:
  - Monthly estimates produced by interpolation
  - Short-term projection
  - Civilian and CNI populations produced by subtraction

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Population Estimates:

County Population by Characteristics

- Annual household population estimates produced using the cohort-component method
  - By single years of age (0-84, 85+), sex, race (6 groups), and Hispanic origin
- Resident population = household pop + GQ population
- Two or more races population distributed to individual multi-race categories using base population multi-race distribution
- “College fix”
  - Special adjustment for counties with unique college age distribution
  - To prevent spurious “aging” of the college population peak over time

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Housing Unit Estimates:

Component of Change Method

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Housing Unit Estimates:

- Annual primitive-level housing unit estimates produced using component of change method
- All higher-levels of geography produced by aggregating primitive areas
- 2020 Census housing unit counts are invariant for all estimates geographic levels
- Two phases of production
  - Preliminary estimates: produced from Census Bureau sources for all years and FSCPE-submitted data from prior vintage
  - Final estimates: preliminary inputs with updated FSCPE submissions

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Housing Unit Estimates:

Components of Change by Source

E&P Data

- Building permits
  - Multiplied by completion rates
- Non-permitted housing builds
- Mobile home shipments
- Housing loss
- Disaster loss

FSCPE Data

- Updates to any E&P components
  - Except completion rates
- Certificates of occupancy
  - Replacing building permits and completion rates
- Conversions
  - Residential to non-residential and vice versa

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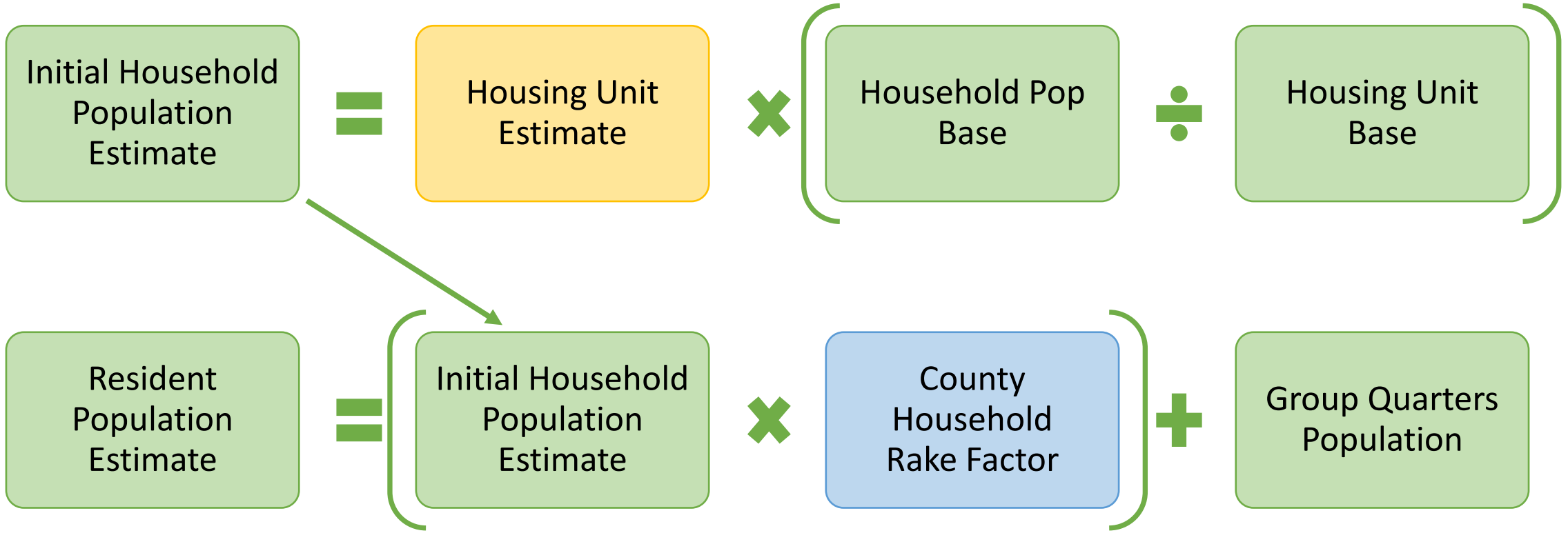
Subcounty Population Estimates:

Distributive Housing Unit Method



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Subcounty Population Estimates

- Annual primitive household population estimates produced using the distributive housing unit method
  - Implied persons per housing unit from estimates base
  - County household rake factor
    - $\text{Rake} = \frac{\text{County Total HHpop}}{\sum(\text{County Primitive HHpop})}$
- Resident population = household pop + GQ population
- All subcounty geographic levels produced by aggregating primitive areas
- Challenges and Special Censuses

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E&P Contact Information

Coordination, Dissemination, and Outreach Branch

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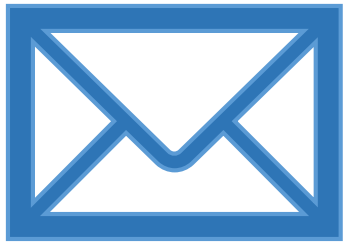

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Questions and Discussion

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