CLARITAS DEMOGRAPHIC UPDATE 2018 METHODOLOGY

JUNE 2017

CONTENTS

INTRODUCTION

This methodology document covers the 2018 Claritas Demographic Update. Claritas has a proven track record as an industry leader producing quality data, and maintains this position by continually innovating and improving upon the methodology used for the annual demographic update. Claritas utilizes existing and new external data resources that can lead to increased value, and is continually looking to the future and to changes that may impact the demographic estimation process. One example of this has been the replacement of the census long form with the American Community Survey.

This document will outline the process for the development of the 2018 update. It includes household and population data covering more than 4,000 demographic variables from Census 2000, Census 2010, and the American Community Survey, as well as current year estimates and five-year projections.

EXPERIENCED LEADERSHIP

The Claritas Demographics team is headed by Sarah Burgoyne, from the graduate program in Applied Demography at Bowling Green State University. Sarah's experience with the Claritas Update builds on her leading role in demographic estimation for Nielsen television audience measurement. Working with Sarah is Ken Hodges, with 35 years of experience in applied demography and the Claritas Demographic Update. Both Sarah and Ken are prominent in the field, with professional involvements including the following:

Sarah Burgoyne

- Board Member, Association of Public Data Users
- Member, Population Association of America Committee on Applied Demography
- Member, Population Association of America 2018 Conference Program Committee

Ken Hodges

- Board Member, Council of Professional Associations on Federal Statistics
- Member, Population Association of America Committee on Population Statistics
- Member, American Community Survey Data Products Redesign Group

EVALUATION AND SUPPORT MATERIALS

The Claritas Demographic Update is supported by extensive research and evaluation, with results often documented in professional papers. In addition to this methodology document, papers describing the following topics are available:

- What Do Margins of Error Tell Us About Small Area ACS Data?
- Sequential Years of ACS 1-Year Data as Replacement for ACS 3-Year Data
- Improving the Accuracy of Block Group Data from the American Community Survey
- ACS Multi-Year Estimates as Proxies for Point in Time Data
- Evaluation of 2010 Estimates Against 2010 Census Results
- Evaluation of Claritas Master Address File Counts Against 2010 Census Results
- Comparison of 1996 Estimates and 2001 Projections from Alternative Suppliers
- Evaluation of Geometric Data Retrieval Methods

DEMOGRAPHIC UPDATE

The update is a shorthand term for the massive set of demographic estimates and projections produced for the Claritas Pop-Facts products. *Estimates* consist of data prepared for the current year, and *projections* (sometimes called forecasts) prepared for dates five years in the future.

The update is brought up to date for many geographic levels including national, state, county, census tract, and block group. Data is also available for commonly-used areas such as metropolitan areas, cities/towns, and ZIP Codes, and media areas such as Nielsen Designated Market Area (DMA) regions. Because it is produced for small areas, the update can be easily aggregated to custom geographic areas specified by the user.

The update begins with the estimation and projection of base counts, including total population, household population, group quarters population, households, family households, and housing units. Characteristics related to these base counts are then estimated. Population characteristics include age, sex, race, and Hispanic ethnicity. Households are estimated by age of householder and income. Owner-occupied housing units are estimated by value, and renter occupied units are estimated by contract rent.

CHANGES TO METHODOLOGY AND DATA SOURCES

Claritas is always exploring and testing ways to innovate and improve on estimation techniques, to adapt to a changing demographic landscape, and to take advantage of new resources. In recent updates, the following changes were implemented:

- The Claritas Demographic Update continues to implement new ACS data as available from the U.S. Census Bureau. The 2018 update makes use of data from the 2015 releases of ACS data. Specifically, the update incorporates one-year ACS data for 2015 and five-year data for 2011-2015.

- Since the 2010 update, the formerly ratio-adjusted data items have been significantly upgraded using control totals, which are based on the most recent one-year and five-year estimates from the ACS. The 2018 Claritas Demographic Update continues the use of control totals based on the one-year ACS data, and the use of five-year ACS data for these data items at the block-group level. In block groups where the ACS sample is thin, the ACS data is augmented through the addition of responses from nearby neighborhoods.
- In addition to the ratio-adjusted data items, the ACS data contributes to the estimates of household income, housing value, and contract rent.
- With the 2018 Demographics Update, Claritas has introduced recent trends in tax return data from Powerlytics, Inc. to improve our block-group level household income estimates.

TOP-DOWN VS. BOTTOM-UP METHODOLOGIES

Over the years, some descriptions of small-area estimation methods have emphasized a distinction between top-down and bottom-up methodologies. The distinction is overdone, as estimates produced with pure top-down or bottom-up methods are rare. A pure top-down method might produce estimates at the county level, and then distribute to tracts and block groups without reference to any post-census tract and block group data. This approach has obvious and severe limitations for small areas. On the other hand, a pure bottom-up method would use post-census block group data to produce estimates at that level, and then sum to all larger areas, without reference to independent estimates for larger areas such as cities, counties, and states. This approach has severe limitations for larger areas.

Claritas estimates combine the strengths of top-down and bottom-up methods. Post-census data for tracts and block groups drive the estimates at those levels, while post-census data for counties and states drive the estimates at those levels. The small area estimates are then adjusted to conform with the independent estimates for larger areas. This approach is designed to achieve maximum accuracy at all levels. Thus, it cannot be described as either top-down or bottom-up.

In a bottom-up approach, Claritas identifies growth trends using small area data sources such as USPS, new construction data, and the Claritas Master Address File (MAF). The MAF contains over 123 million occupied unit records and is informed by various household level sources such as Epsilon™, Valassis™, and Infogroup™.

Once the trends have been identified and estimates have been generated at the block-group level, a top-down approach is taken in applying controls that will prevent the generation of unrealistic estimates at larger geographic levels such as county or state. Claritas utilizes county level data provided annually by the Census Bureau and other federal agencies as control totals for the small area estimates.

TRENDING

To take full advantage of methodological refinements and new data resources, each set of updates begins not with the previous year's estimates, but with data from the most recent decennial census or ACS. For this reason, the difference between estimates for consecutive years is not an estimate of change from one year to the next. Change is estimated with reference to the previous census numbers – either from the decennial census or the ACS. It is not recommended to trend current year estimates from one year to the next. Changes in data values could be caused by differing methodologies, new data sources, and/or true change in data values.

ESTIMATION DATE

The target date for estimates and projections is January 1 of the relevant year.

VARIABLE CATEGORIES

The Claritas Demographic Update includes the categories and data items listed in the sections below.

Population & Race

- Base Count Population, Households, Housing Units, Families, Group Quarters
- Population by Age, Sex, Race, Ethnicity
- Population by Ancestry/Origin
- Population by Language Spoken
- Population by Marital Status
- Means and Medians

Housing & Household Composition

- Households by Age, Race, Ethnicity, and Tenure
- Owner Occupied Housing Units by Value
- Renter Occupied Housing Units by Rent
- Households by Size (number of persons) and Presence of Children
- Households by Sex of Unmarried Partners
- Housing Units by Year Built
- Housing Units by Number of Units
- Households by Year Householder Moved In
- Households by Vehicles Available
- Housing Units by Vacancy Status
- Means and Medians

Affluence & Education

- Households by Income, Age, Race and Ethnicity of Householder
- Effective Buying Income (EBI)
- Families by Poverty Status

- Population Educational Attainment by Sex and Ethnicity
- Population by Level of School Enrollment
- Means and Medians

Employment & Occupation

- Population by Employment Status and Sex
- Population by Transportation to Work
- Population by Travel Time to Work
- Population by Class of Worker
- Population by Industry and Occupation
- Means and Medians

GEOGRAPHY

The Claritas Demographic Update is prepared for a wide range of geographic areas, summarized below.

STANDARD MACRO GEOGRAPHIES	STANDARD MICRO GEOGRAPHIES	INDUSTRY GEOGRAPHIES
Country* [1]	Place [29K+]	Cable [9K+]
State* [51]	Tract* [72K+]	Wire Centers [19K+]
County* [3K+]	Block Group* [217K+]	Major & Basic Trading Area Wireless (MTA & BTA) [500 +]
Nielsen Designated Market Area (DMA) [200+]	Block* [10M+]	Metro/Rural Service Area for Wireless (RSA) [700+]
Combined Statistical Area (CSA) [100+]	Zip Code [30K+]	
Core-Based Statistical Area – Metropolitan/Micropolitan (CBSA) [900+]	Minor Civil Division (MCD) [Includes Census Civil Divisions (CCD)*] [35K+]	
Three-Digit Zip (TDZ) [800+]		

* Census geographies

DATA OVERVIEW

Base Counts

Base counts are the basic totals for population, households, family households, group quarters population, and housing units. At the national, state, and county geography levels, base count updates are based on estimates from the Census Bureau. At the block-group level, base count information is based on sources including trends in United States Postal Service (USPS) deliverable address counts, counts from the Claritas Master Address File, and Valassis counts of new housing units.

Population Characteristics

Population is estimated for the following demographic characteristics:

- Age
- Sex
- Race
- Hispanic ethnicity
- Age by Sex by Race by Hispanic ethnicity

Population by Age/Sex

Age/sex distribution is estimated using a modified cohort survival method, which ages population based on age/sex specific survival probabilities, and estimates births over the estimation period. Group quarters and other populations that do not age in place are not aged. The method is applied first for counties, estimating forward from the Census Bureau's most recent estimates of population by age/sex at that level. Following the completion of the county age/sex estimates, block group age/sex estimates were produced and controlled to the county estimates.

Population by Race/Ethnicity

Race by Hispanic ethnicity is estimated for 14 categories reflecting single classification race. Estimates are produced first for counties, building from the Census Bureau's most recent estimates of population by race and ethnicity at that level. Block group estimates of race/ethnicity then are produced based on 2000-2010 census trends, identified through the Claritas conversion of 2000 census race/Hispanic counts to the block groups defined for the 2010 census. The resulting estimates of Hispanic and Asian population are modified for selected areas where surname matches against consumer databases suggest greater increases since the census.

Household Characteristics

Households are estimated for the following characteristics:

- Household income
- Household size
- Age of householder
- Race and ethnicity
- Year householder moved into unit
- Household Income by age of householder

Household Income

Income estimates and projections reflect the census/ACS money income definition, and are produced for current dollar values. Rates of change in median income are estimated first, and then ACS income distributions are advanced to reflect the estimated rate of change. Median income targets at the national level are based on income estimates from the ACS and the Census Bureau's Current Population Survey. Income estimates at the county level reflect income change indicated by the Bureau of Economic Analysis (BEA) income estimates, income statistics from the Internal Revenue Service (IRS), and income estimates from the ACS.

Income change at the block-group level is estimated based on recent trends in income reported on IRS tax returns, and supplied by Powerlytics, combined with recent changes in median income in the ACS, and with reference to income change at the county level.

Distributions of ACS income are advanced to the estimated and projected target dates through a process that estimates the movement of households from one income category to the next based on the specific area's estimated rate of income growth. The national medians serve only as targets, not control totals, while the block group estimates are controlled to the county level.

Household Size

The distribution of households by size starts with Census 2010 distributions, and advances them to current year based on estimated change in persons per household (average household size). Iterative Proportional Fitting (IPF) is then used to provide consistency with previously estimated household totals and average household size. For more information about IPF, see the "Additional Terminology" section.

Income by Age of Householder

The income by age estimates are produced after those for population by age and households by income. The household by income estimates serve as totals for the income dimension, but persons by age estimates are converted to householders by age through the use of headship rates reflecting Census 2010 householder by age data. The households by income and householders by age estimates serve as income and age row and column totals for the estimated income by age table. Cell values (specific income by age categories) are estimated through Iterative Proportional Fitting of recent ACS income by age data to the estimated income and age totals. This process yields income by age values that not only sum to the income and age estimates, but also preserve the statistical relationship between income and age for each area as measured by the ACS.

Housing Unit Characteristics

Housing units are estimated for the following characteristics:

- Total number of owner-occupied and renter-occupied units
- Renter-occupied units by rent
- Value of owner-occupied units
- Year structure built

Housing Value

Housing value is estimated for all owner-occupied housing units. As with income, the method begins with the estimation of a rate of change, which is then used to advance recent ACS distributions to current year and projection year.

At the national level, target rates of change in value are based on change in value estimated by the ACS, as well as change in the House Price Index from the Federal Housing Finance Agency (FHFA) and the Case-Shiller house price index.

At the metropolitan area level, the FHFA data is combined with change in median sales price data from the National Association of Realtors (NAR) to estimate change. An additional data source contributing to estimated

change at the county level is that containing the most recent estimates of median home value from the ACS. Block group rates of change are estimated based on recent trends in ACS median value estimates, with reference to rates of change at the county level.

As with income, estimated rates of change are used to advance recent ACS distributions to current year and the five-year projection date. The national medians serve only as targets (not control totals) for the county estimates, while the block group estimates are controlled to the county level.

Rent

Contract rent is estimated for renter-occupied housing units. As with value, the method begins with the estimation of a rate of change, which is then used to advance recent ACS distributions to current year and projection year.

At the national level, target rates of change in rent are based on change in value estimated by the ACS. At the county level, rates of change are based on ACS trends combined with those from the Department of Housing and Urban Development's Fair Market Rent data series.

As with value, estimated rates of change are used to advance recent ACS distributions to current year and the five-year projection date. The national rates serve only as targets (not control totals) for the county estimates, while the block group estimates are controlled to the county level.

Ratio-Adjusted Tables

In addition to the demographic estimates and projections, past updates provided a series of detailed tables from the former Census long form that were ratio-adjusted to relevant current year totals. In recent updates, the formerly ratio-adjusted tables have been transitioned to build from five-year ACS data, and are controlled to ACS data for larger counties, as available.

Census Data Differences and Median Values

There are some instances where users may notice differences between the Claritas published census data and values as published by the U.S. Census Bureau.

For example, users may see differences in the Claritas published Census 2000 and Census 2010 data collections in two types of situations:

- Because it is not feasible for Claritas to calculate true median values, the Claritas Demographic Update makes use of calculations to estimate median values based data summarized for categories or ranges of variables, such as income. Category detail can differ by product, so users also may notice differing median values between Claritas Demographic products.
- Differences also may be observed due to varied geographic definitions. For example, because the update is now prepared for 2010 census geography, the 2000 census base counts will not always match those published on 2000 census data products.

BASE COUNTS

For this document, base counts include basic totals such as population, households (occupied housing units), family households (households with two or more related persons), group quarters population (persons in dormitories, military quarters, prisons, nursing homes, and other non-household living arrangements), and housing units (a house, apartment, or group of rooms intended to serve as separate living quarters).

Total U.S. Population

Total U.S. population is estimated using Census Bureau estimates of total United States resident population (all persons residing in the United States, regardless of citizenship). The 2018 estimate was a short projection beyond the Census Bureau's most recent post-2010 estimate (for July 2016). Total group quarters population is estimated in a similar manner, based on the Census Bureau's most recent estimates for group quarters population (in this case for July 2016).

Total estimated households are derived by subtracting the estimated group quarters population from the estimated total population to derive the total number of persons in households. This figure is then divided by the estimated average household size, or persons per household (PPH). Estimated average household size is based on change in PPH indicated by the Census Bureau's Current Population Survey and the ACS.

Five-year projections of the national base counts are produced by applying recent rates of change to the current year estimates described above. The Census Bureau produces national level projections of total population, but because they are produced infrequently, they serve only as a guideline for the population projections, not as control totals.

State

State population estimates are projections from the Census Bureau's most recent population estimates at the state level. (Census Bureau 2016 estimates were used for the 2018 update.) Household totals are estimated indirectly from the completed population estimates. Specifically, the Census Bureau's estimates of group quarters population are projected to 2018. This number is then subtracted from the estimated population to determine estimated household population. The result is divided by estimated average household size (based on intercensal trends) to determine estimated households.

County

County population estimates are based on the most recent Census Bureau county population estimates, in combination with county population estimates produced by selected states. The Census Bureau estimates (in this case for July 2016) lag 18 months behind the Claritas estimation date, so a series of long- and short-term projections is produced for the target date (in this case, January 1, 2018). The mean of these projections serves as the census-based county population estimate. Where state-produced estimates are available and contributed to increased detail in the past, these estimates also are projected to current year and averaged with the census-based estimates. The resulting estimates are then adjusted to conform with the state population estimates described above.

Group quarters population is estimated similarly based on the Census Bureau's county estimates of population in group quarters (in this case, Census Bureau estimates for July 2016). Estimated group quarters population is subtracted from estimated total population to produce estimates of persons in households. Then estimates of total households are derived by dividing estimated persons in households by estimated persons per household (PPH). The 2018 estimates of PPH are a conservative projection of intercensal trends.

Projections of county base counts to 2023 were based on moderated rates of change from 2010 census to the 2018 estimates. Persons in households and persons in group quarters were projected first, and summed to complete the projection of total population. The household projections were derived by dividing projected household population by projections of persons per household.

Block Group

The estimation of block group base counts starts with households, followed by the estimation of persons in households and persons in group quarters (which sum to total population). Housing units and family households are then derived from the estimates of total households.

The major data resources tracking change in households since the 2010 census are the following:

- Counts of active residential addresses from the U.S. Postal Service.
- Counts from the Claritas Master Address File (MAF).
- Valassis counts of new housing units.

Household estimates are the average of several alternatives. The first alternative, based on the 2000-2010 trend in total households, serves as a backup for areas where post-2010 data sources do not pass reliability checks. The other alternatives were based on change in USPS address counts, change in Claritas MAF counts, and the Claritas MAF count totals. Evaluations of the 2010 estimates confirmed the ability of Claritas MAF counts to improve estimates in rapid change areas, so the MAF-based estimates were given additional weight in such areas – and served as the household estimate in selected areas, such as those where Valassis indicated rapid and recent growth. The preliminary household estimates were controlled to the county household estimates described above.

Next, household population was estimated as a weighted average of the 2000-2010 census trend and the 2010-2018 estimated rate of change in households. Group quarters population was similarly estimated for 2018 as the average of estimates based on 2000-2010 change and the rate of change in households. The household population and group quarters population estimates were controlled to the county level, and summed to provide the final estimates of total population for 2018. In this method, persons per household (PPH) is a byproduct of the estimates of households and household population, so the values are checked relative to 2010 census values.

Estimates of housing units and family households were produced by applying 2010 census housing/household and family/household ratios to the 2018 estimates of total households. Adjustments were not made to the county housing and family household estimates, but the uncontrolled estimates were checked for consistency with independent estimates.

Estimates of housing units were produced by estimating the number of housing units gained or lost given the block group's estimated increase or decrease in total households. Total family households were estimated by

applying the 2010 census family/household ratios to the 2018 estimates of total households. The block group estimates of housing units and family households were summed to higher geographic levels without control totals. However, because they were derived from household estimates that were subject to top-down controls, the housing and family estimates benefit indirectly from the control total process.

Five-year projections of block group base counts are produced as nonlinear projections from the 2010 census counts through the current year estimates. Rapid rates of growth and decline are moderated into the future to reflect the assumption that extreme rates of net migration are unlikely to be sustained over long periods of time. Household population and group quarters population are projected first, and adjusted to the county control total projections. Projected household population and group quarters population are then summed to establish the projection of total population. Persons per household (PPH) is projected to the five-year projection date based on a conservative projection of the 2010 to 2018 estimated change in PPH. Household projections are then derived as the projection of household population divided by PPH. Housing units were projected based on estimates of units gained or lost through household growth/decline, and family households were projected by applying 2010 census family/household ratios to the five-year projections of total households.

ZIP Code Estimates and Projections

Estimates and projections for ZIP Codes are aggregations of estimates already prepared for block groups. As such, there is not a distinct ZIP Code methodology. However, it is important to understand the process used to build ZIP Code estimates as well as the complications involved in analyzing ZIP Code data.

ZIP Code demographic data is widely used, but involves complications not encountered with other geographic areas. ZIP Codes are defined by the USPS for the delivery of mail, not for the presentation of data. They lack definitive boundaries, and change frequently at the determination of postal officials. In addition, ZIP Codes do not conform to the boundaries of other geographies such as counties, cities, census tracts, or census blocks.

Further complicating the specification of ZIP Code demographics is the imperfect relationship between where people live and where they get their mail. Some people live in rural areas where there is no mail delivery and pick up their mail at a specified location such as a post office in a nearby town. The boundaries of such general delivery and P.O. Box ZIP Codes (there are about 5,000 of them) are not formally defined. Also, some urban residents elect to pick up some or all of their mail at a P.O. Box—perhaps near their place of work. They reside in one ZIP Code, but receive mail in another. Such ZIP Codes often consist exclusively of P.O. boxes at a post office in a nonresidential area. They have no definable boundaries, as the people receiving mail there may reside in neighborhoods scattered across a wide area.

Census Data for ZIP Codes

Contrary to common belief, ZIP Codes have not been a standard geography for the reporting of census data. The Census Bureau did release 1980 and 1990 census ZIP Code products, but these products were non-standard and not widely used. Beginning with the 2000 census, the Census Bureau has provided data for what it calls ZIP Code tabulation areas (ZCTAs). ZCTAs approximate ZIP Code areas based on the allocation of whole census blocks. The Census Bureau points out that ZCTAs are not ZIP Codes, and users need to understand that ZCTA data does not constitute official ZIP Code estimates. Furthermore, because the Census Bureau updates ZCTA definitions only infrequently, these definitions often are out of date.

ZIP Code Data from the Claritas Demographic Update

Claritas ZIP Code estimates and projections are aggregations of Claritas estimates for block groups. The process used is similar to that for retrieving data for circles and polygons. Census data, including estimates and projections, already exists for block groups, and is aggregated to the current roster of ZIP Codes reflecting current definitions. Data for all years (including Census 2000 and Census 2010) is aggregated the same way to maintain a consistent reference to current ZIP Code definitions.

All Claritas products provide spatial definition ZIP Code data. Spatial definition ZIP Codes are based on a block group-to-ZIP Code correspondence, which is updated one or more times each year. This correspondence is based on the location of block centroids (latitude/longitude points) within current ZIP Code boundaries estimated by TomTom®. If a block's centroid falls within a ZIP Code boundary, it is allocated to that ZIP Code. These block-to-ZIP Code allocations determine the block groups that are included in a given ZIP Code. For block groups allocated to more than one ZIP Code, percent inclusion factors determine the percent of the block group allocated to each ZIP Code. Inclusion factors are updated annually based on the most recent distribution of addresses on the Claritas Master Address File. For all spatial ZIP Codes, the resulting block group-to-ZIP Code relationship establishes a geographic definition that is used to aggregate block group data to current ZIP Codes.

Claritas products do not provide demographic data for rural P.O. Box or general delivery ZIP Codes. These ZIP Codes serve residents in rural areas where there is no mail delivery; residents pick up their mail at a central location such as a post office. Although included in the roster, these ZIP Codes have no clearly defined spatial dimension, and therefore have no demographic data associated with them. Instead, the data for these ZIP Codes is included in the spatially defined ZIP Code (or multiple ZIP Codes) covering the area near the post office. These are sometimes known as parent ZIP Codes.

It is not unusual to find spatial definition ZIP Code data that appears to be discrepant with deliverable address counts. For example, spatial definition data might indicate no data for a rural P.O. Box ZIP Code for which the post office reports 600 residential deliveries. Furthermore, spatial definition estimates for parent ZIP Codes are often higher than delivery counts since they also include the populations served by P.O. Box ZIP Codes.

Enhanced Aggregation of Estimates to ZIP Codes

ZIP Code correspondence files, which define how block group data are aggregated to ZIP Codes, are highly accurate following a census, but they often need updating in areas where post-census population change has been substantial. When this happens, ZIP Code population growth can be underestimated even when the relevant block group estimates reflect the growth. For example, growth that should have been allocated to ZIP Code A might be allocated to adjacent ZIP Code B, thus underestimating growth in ZIP Code A. To guard against such estimation errors, Claritas updates block group-to-ZIP Code correspondence files to reflect estimated redistribution of population at the census block level. This enhanced aggregation provides more up-to-date factors by which to identify the percent of block group growth in ZIP Code A versus ZIP Code B.

Note: This enhancement did not involve a change to the estimation method, but rather to the process used to aggregate block group estimates to ZIP Codes. For a more detailed discussion of how ZIP Code estimates are built, please see the previous section "Zip Code Estimates and Projections."

POPULATION CHARACTERISTICS

Population by Age/Sex

Population by age/sex composition is estimated and projected using cohort survival methods. Cohort survival is a major factor in changing age structures, and is driven by the reality that, for example, persons age 35 in 2010 who survive another five years, will be age 40 in 2015. Accordingly, a population with a large proportion of 35 year olds in 2010 can expect to have large proportions of 40 year olds in 2015. It is this process that has swelled the U.S. age structure at progressively older age categories as the baby boom generation (or birth cohort) has aged.

The Claritas cohort survival method is executed first at the county level, and then for block groups, with the block group estimates controlled to the county level results. To enhance consistency with Census Bureau estimates, the county estimates begin with the most recent Census Bureau county age/sex estimates. The 2018 county age/sex estimates were built from the Census Bureau's county age/sex estimates for July 2015, which were the most recent available at the time. Block group age/sex estimates start with age/sex distributions from the 2010 census.

At all levels, the method starts with five-year age/sex categories—separating persons in households from those in group quarters. Where census data do not provide full age/sex detail for household versus group quarters populations, Claritas estimates the detail required to execute the cohort survival method.

The cohort survival process is set into motion with the application of age/sex-specific five-year survival rates to the census age/sex data described above. Each round of cohort survival ages the population of each block group ahead five years. For example, the process projects the number of 30-34 year olds in a block group who will survive to become 35-39 years old by 2015 (and so on for all five-year age categories). The initial survival data from Census 2010 yields projections of age/sex composition for April 2015, which is short of the January 2018 estimation date. A second application of the survival rates ages the population to April 2020, and those results are interpolated to the January 1, 2018 estimation date.

Accounting for Births

As part of each round of cohort survival, the population less than age five is survived to age 5-9, so an estimate of births is required to fill the vacated 0-4 category. Births are estimated using the child/woman ratio—defined as the population age 0-4 divided by females age 15-44 (childbearing age).

The child/woman ratio is an indirect measure of fertility specific for each area, but more important, it is sensitive to projected changes in the number of women of child bearing age—itself a byproduct of the cohort survival process. An increase in the number of child bearing women will result in an increased number of births even if fertility rates (or child-woman ratios) remain constant. The child/woman ratios applied in the Claritas age/sex estimates and projections are derived from Census 2010, but modified slightly in some updates to increase consistency with national level Census Bureau projections of the population age 0-4.

Exceptions to Cohort Survival

The cohort survival process is at work in all areas, but in some areas, its effects on age composition are overridden by migration. In the absence of authoritative age-specific migration data for small areas, the Claritas method defaults to the assumption that the age/sex composition gained or lost through migration is similar to the area's "survived" population.

However, because of migration, the cohort survival process is often not applicable to populations living in group quarters facilities such as dormitories, military quarters, prisons, and nursing homes. These facilities have high turnover rates, resulting in age/sex compositions that tend to be stable as a reflection of the nature of the facility. For this reason, cohort survivals are applied only to the population living in households. Group quarters populations are estimated separately and their age/sex compositions held constant with those measured in the census.

Claritas also identifies segments of the household population (such as concentrations of college students in off-campus housing) for which cohort survival is not applicable. Concentrations of these "hidden group quarters" populations are identified through their distinctive imprint on small area age compositions, and are similarly exempted from the cohort survival process.

Five-Year Projections

Five-year projections of age/sex composition are produced with the same method used for the current year estimates. In the 2018 update, the 2018 estimates of population by age/sex were the starting point for five-year survivals to 2023. As with the current year estimates, age/sex projections are produced first for counties, then for block groups, with the block group projections controlled to the county results.

Population by Race and Ethnicity

There are no universally accepted definitions of race and Hispanic ethnicity. The Census Bureau currently defines "Hispanic or Latino" as an ethnicity, not a race. Race and Hispanic ethnicity are separate census questions, so in census tabulations, persons of Hispanic ethnicity can be of any race. Hispanics are included in each race category, and the race categories alone sum to total population.

The census allows persons to mark "one or more" boxes when responding to the race question. For example, one person might mark only the box for "Black or African American," while another might mark that box and also the box for "Asian." In reporting data on race, one option is to indicate the number of persons identifying with each race category and no others (race alone), while another option is to report the number of persons identifying with that race either by itself or along with other categories (race alone or in combination). Census data and Claritas estimates are reported for the "race alone" and "race alone or in combination" options.

For more information about Ethnic Classifications, see the "Additional Terminology" section.

Estimates and Projections of Race and Hispanic Ethnicity

Starting with "race alone" tabulations, estimates and projections of population by race and Hispanic ethnicity are produced first at the county level, and then for block groups, with the block group estimates and projections

controlled to the county level totals. The method focuses on percent distribution of race and ethnicity, which are applied to previously established estimates and projections of total population.

County-level estimates of race and Hispanic ethnicity are based on the most recent Census Bureau estimates of population by race and ethnicity at that level. The most recent Census Bureau county race and ethnicity estimates available for the 2018 update were those for July 2015. And because the Census Bureau estimates reflect a "modified" definition of race, the method uses rates of change in these estimates as a way to estimate the 2010 census race and ethnicity data forward to the current year.

Race/ethnicity estimates for block groups are based on 2000-2010 census trends in the percent of population in each race/ethnicity category. The method focuses on the percent of population in each category, and controls to both total population for the block group and population by race and ethnicity at the county level. Effective with the 2016 Update, the block group method also examines change in race/ethnicity composition based on change in consumer database surnames in the area. The names-based distributions are based on a file noting the race/ethnicity distribution of persons with specific surnames in the 2000 census applied to consumer database name/address records for two points in time. The trends are especially useful in identifying dramatic shifts in race/ethnic distribution.

Five-Year Projections

Five-year projections of race/ethnicity are produced with methods similar to those used for the current year estimates—projecting the current year estimates (of percent race/ethnicity) to the five-year projection date. Again, projections are made for percent race/ethnicity distributions, and applied to previously completed projections of population. Counties are projected first, followed by block groups, with adjustments maintaining consistency between geographic levels.

All-Inclusive Race

Estimates and projections for all-inclusive race/ethnicity (race alone or in combination) are produced as derivatives of the single-classification (race alone) estimates and projections. For each race/ethnicity category, the Census 2010 ratio of all-inclusive race/single-classification race is applied to the estimate or projection of single-classification race—with adjustments made in some areas to provide consistency with the number of persons estimated (or projected) to be of two or more races. Because the all-inclusive estimates and projections are derived from data already adjusted to county controls, the all-inclusive estimates and projections are produced only at the block-group level, and summed to higher levels.

Population by Age/Sex by Race/Ethnicity

Estimates and projections also are provided for the cross-tabulation of population by age/sex by race/ethnicity. These estimates start with the completed estimates of population by age/sex and population by race/ethnicity at the block-group level. Census-based seed values are adjusted to the age/sex and race/ethnicity estimates to produce estimates of the full cross-tabulation. Because the 2010 census did not provide age/sex by race/ethnicity detail at the block-group level, age/sex by race/ethnicity distributions for census tracts are used as "seed values" for component block groups. This application of Iterative Proportional Fitting (IPF) produces block-group estimates consistent with estimated age/sex and race/ethnicity, as well as the statistical

relationship between these characteristics observed for the census tract in Census 2010. The IPF is executed with age/sex data in the standard five-year age breaks and splits to single years of age are made as a final step.

HOUSEHOLD CHARACTERISTICS

Households by Income

All Claritas income estimates are expressed in current year dollars using the money income definition reported in the American Community Survey. The estimates and projections reflect household income, which includes the income earned by all persons living in a housing unit (i.e., all household members). In contrast to the ACS, which reports income earned in the 12 months prior to ACS response, Claritas income estimates are for the calendar year relevant to each set of estimates and projections. For example, the 2018 estimates reflect 2018 income for 2018 households.

The method starts by establishing ACS "launch distributions" – the distributions from which the income estimates are built. When income was reported by the census, the launch distributions all reflected the census year, but ACS data are not that simple. Depending on its population size, an area might have only five-year ACS data, or it might have new five-year data and one-year data. Always working with the most recent "vintage" of ACS data, the Claritas method combines the multiple years of ACS data where relevant, and establishes an effective launch date for the ACS data. For block groups where the ACS sample is especially small, the data also are enhanced with data from neighboring block groups in a process described in the "American Community Survey Enhanced Data" section.

Once the ACS launch distributions are established, rates of change in median household income are estimated for each area. Based on these rates of change, the ACS income launch distributions are advanced to current (or projection) year.

Rates of change are produced first at the county level, and then for block groups. Aggregate, average, and median income numbers were derived from the resulting income distributions.

Claritas standard household income ranges extend beyond the "$200,000 or more" category reported by ACS, to the following income ranges:

- $200,000 to $249,999
- $250,000 to $499,999
- $500,000 or more

The extended income categories were estimated for the ACS launch distributions, which are the starting point for the estimates and projections of income distribution. Pareto methods, which involve an assumption of exponential decay, were applied to the ACS launch distributions to estimate the number of households in each of the extended income categories. For more information about Pareto methods, see the "Additional Terminology" section.

Income Estimation Method

Income change at the national level is estimated based on national estimates of income change from the Current Population Survey (CPS) and the ACS. The CPS provides two measures: change in median household income reflected in the Annual Social and Economic Supplement, and a more timely measure of change in median family income released each month. The final estimates reflect an average of estimates based on these sources, projected to current year to reflect recent income change.

County income rates of change are based on recent rates of change in ACS income estimates, as well as rates of change in income data from the Bureau of Economic Analysis (BEA) and Internal Revenue Service (IRS). The final estimated rates of change reflect the average of rates based on IRS, BEA, and ACS data. These rates are modified, as needed, to produce estimated county income distributions that conform with the target median income estimate at the national level.

Income change at the block-group level is estimated based on recent change in ACS median income estimates, enhanced to compensate for small samples, and projected to reflect the time from launch date to estimation date. And effective with the 2018 Update, income trends from IRS tax returns provided by Powerlytics also contribute to the block group rates of change. The ACS and IRS-based rates are averaged with relevant county rates to establish estimated rates of change in median income for block groups.

At both the county and block-group levels, the estimated rates of income change are used to advance, or shift, the ACS launch distributions of households by income forward to current year. This procedure involves the estimation of the number of households advancing from one income category to another—based on the area's estimated rate of income change.

The county level distributions are estimated first, followed by the block group distributions, and the block group distributions are adjusted to conform with the final county distributions.

Five-Year Projections

Five-year projections of income are produced with a similar process. Rates of growth or decline based on change from ACS launch medians to current year estimated median income are used to advance the current year income distributions to the five-year projection date. As with the current year estimates, the five-year projections are produced first at the county level, and then for block groups, with the block group distributions adjusted to conform with the county level results.

Household Effective Buying Income

Effective Buying Income (EBI) reflects income after taxes. Because EBI is not provided by the ACS, the estimates are computed as derivatives of household income, based on the correspondence between before-tax and after-tax income identified for each state from the Census Bureau's Current Population Survey (CPS). For each state, three-year combinations of CPS data identify the mean before-tax income of households within the income in ranges estimated for the Claritas Demographic Update. The CPS also identifies mean income for these same households after deductions for federal income taxes, state taxes, FICA, annual property taxes, and federal retirement payroll deductions. Where relevant, earned income credits were added to refine the measure of after-tax income.

The CPS data provides before-tax to after-tax income rates of change specific to households with before-tax income in selected income ranges—and specific to each state. These rates of change are applied to the current year-estimated and five-year-projected distributions of households by before-tax income (the standard Claritas income estimates and projections) to estimate the movement of households to lower income ranges after deductions for taxes. The resulting distribution of households by after-tax income provides the basis for computing mean, median, and aggregate EBI.

Income by Age of Householder

The cross-tabulation of household income by age of householder is valuable because income and life cycle stage, when combined, are so strongly associated with consumer needs and behavior. The Claritas income by age updates are produced after the estimates of population by age and households by income have been completed. The data constitutes a 128-cell table defined by 16 categories of household income and 8 categories of householder age. The row and column totals from these tables (the income and age totals) are commonly referred to as the marginal totals.

The estimates of households by income serve as the income marginals, but population by age estimates must be converted to householder by age for use as the age marginals. For each area estimated, 2010 census data is used to determine age-specific headship rates, or the percent of persons in specific age categories who are householders. These headship rates are then applied to estimated population by age to produce estimated householders by age. A final adjustment to total households provides consistency with that critical base count.

With the income and age (row and column) marginal totals estimated, the final step is to estimate the full cross-tabulation of income by age of householder. In other words, values must be determined for each of the 128 income by age categories, or cells. Block group level income by age cell values from the most recent ACS provide the initial input (or seed values). Because the ACS provides only four categories of householders by age, CPS separation factors are applied to expand to the eight age-of-householder categories in the estimated table. The ACS distributions also are enhanced in block groups with small numbers of ACS responses.

Within each age category, ACS income distributions are advanced to reflect the block group's (previously) estimated rate of income growth. This adjustment expresses ACS income by age distribution in current dollar values. The resulting table is then adjusted to conform with both the income and age of householder totals estimated for current year. These adjustments are accomplished through Iterative Proportional Fitting, which adjusts the ACS table to conform simultaneously with the household income and householder by age estimates, while preserving the block group specific statistical relationship between income and age reflected in ACS income by age data.

Five-year projections are produced using similar methods. Projected households by income serve as the income marginal totals, and Census 2010 headship rates again are used to convert projected population by age to projected householders by age. The income by age table is then advanced to projection year dollar values, and iteratively adjusted to the projected income and age marginal totals.

Income by Race and Ethnicity of Householder

Estimates and projections of households by the race and ethnicity of the householder are produced by applying the estimated/projected rates of change in income for each area to the income distribution for each race/ethnicity group in the area. The rates of change are used to project each distribution forward to the current (or projected) year, and the resulting distributions are adjusted to conform with the householder by race/ethnicity estimates and projections described below.

Householders by Race and Ethnicity

Estimates and projections of householders by (single assignment) race and Hispanic ethnicity are based on the estimates and projections of population by race/ethnicity.

For each block group, the Census 2010 ratio of householders by race/ethnicity to population by race/ethnicity is identified, and applied to the current year estimate of population by race/ethnicity. This ratio indicates the percent of persons in each race/ethnicity category who were householders in Census 2010. The final ratio is modified somewhat through the adjustment of householders by race to total households for each area, and it is the final current year ratio that is applied to the five-year projections.

Households by Size

Working at the block-group level, estimates of households by size (number of persons) are produced for the following categories:

- 1 person
- 2 persons
- 3 persons
- 4 persons
- 5 persons
- 6 persons
- 7 or more persons

The distribution of households by size from Census 2010 serves as the base from which the current year estimates are derived. The 2010 distribution is advanced to current year based on estimated change in persons per household (average household size). Iterative Proportional Fitting (IPF) is then used to provide consistency with estimated household totals and average household size.

Projections of households by size are based on the Census 2010 and current year estimated distribution of households by size. The current year distribution is shifted to reflect the growth or decline in average household size during the projection interval. IPF is then used to provide consistency with projected household totals and average household size.

Households by Year Moved into Unit

Survival probabilities for "Year Moved In" are computed from 2010 and 2013 one-year ACS data (in this case reflecting the loss of residents of specific lengths of residence). These national level probabilities are applied to the most recent ACS distribution of households by "Year Moved In" to establish estimated and projected distributions. Households in excess of those surviving (staying in place) to longer lengths of residence are estimated to have moved in during the most recent time period launch date. Thus, areas with rapid household growth will show the greatest concentrations of new movers.

The method is executed at the block-group level, and summed to larger areas.

HOUSING UNIT CHARACTERISTICS

Housing Value

Housing value (often referred to as home value) is estimated and projected for all owner-occupied housing units, and is based on the ACS measure, which reflects census respondents' estimates of how much their dwellings would sell for, or the asking price of units currently for sale. Median value is estimated and projected, as is the distribution of units among the 26 categories of value reported by the ACS.

The total number of owner-occupied housing units is estimated by applying Census 2010 ownership percentages to the completed estimate of total occupied housing units for all block groups. The results are adjusted to county level census-based estimates of owner and renter-occupied housing.

Housing value estimates are produced first at county level (with adjustments to the national estimate of median value), and next at block-group level, with the block group results adjusted to conform with the county level estimates.

The basic rate of change in value is estimated first, and is used to advance the ACS launch distribution of units by value to reflect this rate of change. At the national level, the rate of change in home value is estimated based on change in the House Price Index data from the Federal Housing Finance Agency (FHFA), the Case-Shiller Home Price Index, median sales price data from the National Association of Realtors, as well as home value estimates from the ACS.

County rates of change in home value are derived from two sources at the metropolitan area level. The first is data indicating the change in median sales price from the National Association of Realtors (NAR). Changes in sales price reflect only units sold during the time in question, but are strongly associated with overall change in home value. The second source is change in the FHFA House Price Index. The ACS contributes trends in median home value directly at the county level.

Housing value change at the block-group level is estimated based on recent change in ACS median value estimates, enhanced to compensate for small samples, and projected to reflect the time from launch date to estimation date. Until post-census trends from consumer database estimates are once again available, the ACS-based rates are averaged with relevant county rates to establish estimated rates of change in median value for block groups.

Five-Year Projections

Five-year projections of value are based on rates of change derived from change in median value from ACS launch data to the current year estimate.

For each area, the estimated rate of change is used to advance the current year estimated distribution to the five-year projection date. Projections are produced first at county level (with rates adjusted to improve consistency with the national median value projection), then at block-group level, with the block group results adjusted to conform with the county level estimates.

Contract Rent

Contract rent is estimated and projected for all renter-occupied housing units, and is based on the ACS measure, which reflects the monthly rent agreed to or contracted for. Median rent is estimated and projected, as is the distribution of units among the 25 categories of rent reported by the ACS. Units that are renter-occupied without payment of rent are classified as "No cash rent", and these units are not considered when calculating the median.

The total number of renter-occupied housing units is estimated by applying Census 2010 ownership percentages to the completed estimate of total occupied housing units for all block groups. The results are adjusted to county level census-based estimates of owner and renter-occupied housing.

Rent estimates are produced first at county level (with adjustments for consistency with the national estimate of median rent), and next at block-group level, with the block group results adjusted to conform with the county level estimates.

The basic rate of change in rent is estimated first, and is used to advance the ACS launch distribution of units by rent to reflect this rate of change. At the national level, the rate of change in rent is estimated based on trends in ACS estimates. County rates of change in rent are derived from trends in ACS rent data, and trends in the Department of Housing and Urban Development's Fair Market Rent data.

Rates of change at the block-group level are estimated based on recent change in ACS median rent estimates, enhanced to compensate for small samples, and projected to reflect the time from launch date to estimation date. The block group rates also are averaged with relevant county rates to enhance consistency with market trends.

Five-Year Projections

Five-year projections of contract rent are based on rates of change derived from change in rent from ACS launch data to the current year estimate.

For each area, the estimated rate of change is used to advance the current year estimated distribution to the five-year projection date. Projections are produced first at county level (with rates adjusted to improve consistency with the national median rent projection), then at block-group level, with the block group results adjusted to conform with the county level estimates.

Housing Units by Year Built

Estimates and projections of housing units by year built start with the most recent ACS launch distributions. These distributions are advanced to current year (and five-year) targets based on housing loss patterns exhibited between ACS 2010 and ACS 2013 data. For example, the number of units built between 1960 and 1969 surviving in 2013 is lower than the number of such units surviving in 2010, and suggests a survival probability for units of that age. The method establishes a set of such probabilities at the national level, and applies them to ACS launch housing data to generate the current year estimates and five-year projections. In most areas, surviving units are fewer than total units (estimated separately), and the excess units are assigned to the most recent year built period. Thus, areas with rapid housing growth will show the greatest concentrations of new housing.

The method is executed at the block-group level, with results summed to higher geographic levels.

AMERICAN COMMUNITY SURVEY ENHANCED DATA

The ratio-adjusted data items (once referred to as "smoothed" data) are now based on ACS data at the block-group level. These items formerly reflected static block-group level decennial census data ratio-adjusted to current year base counts, but now they benefit from annual ACS estimates with controls at county level – thus giving them an important element of update.

For block groups where the ACS sample is small (and ACS data is at risk of substantial error), Claritas produces enhanced distributions. The enhanced distribution blends the ACS distribution for the block group in question with the distribution of neighboring block groups – thus drawing from a larger number of ACS responses.

Note that this approach to enhancing ACS block group data is also applied to ACS data contributing to estimates including household income, housing value, and rent.

The list of ratio-adjusted ACS data items is as follows. Note that a few, such as Hispanic by specific origin, have ACS data only at tract level, and thus are not eligible for the block group based ACS enhancements.

- Hispanic or Latino population by specific origin
- Asian population by category of Asian
- Persons by ancestry
- Households by household size, household type, and presence of own children
- Households with unmarried-partners by sex of partner
- Households by presence of persons under 18 years and household type
- Persons 5+ by language spoken at home
- Population by age, language, and ability to speak English
- Hispanic population age 5+ by ability to speak English
- Persons 15+ by sex and marital status
- Working population 16+ by means of transportation to work
- Working population 16+ by travel time to work
- Population 25+ by educational attainment
- Hispanic or Latino population 25+ by educational attainment
- Population 3+ by type of school and enrollment level
- Persons 16+ by sex and employment status

- Employed civilian population 16+ by industry
- Employed civilian population 16+ by occupation
- Employed civilian population 16+ by class of worker
- Families by poverty status, family type, and presence of related children under age 18
- Housing units by units in structure
- Households by tenure, ethnicity and race
- Owner-occupied housing units by mortgage status
- Vacant housing units by vacancy status
- Occupied housing units by tenure and vehicles available

With the implementation of the ACS-Enhanced data development method, there may be situations where data values from independently built ACS-Enhanced tables are not consistent with each other. Because these tables are built independently of each other, the inconsistencies inherent in the independent Census ACS tables are occasionally propagated within our demographic updates.

ADDITIONAL TERMINOLOGY

2000 Census Data

Claritas products continue to provide data from the 2000 census, but the 2000 data have been converted to 2010 census geography. The 2000 census was the last to provide long form data – data now provided by the ACS. Because the 2000 long form data (from SF3) are weighted sample data, their population and household totals often differ by modest amounts from the complete count totals reported by SF1. For example, a census tract with 1,200 SF1 households might have SF3 tables summing to 1,206 or 1,197 households. Differences of this type also are observed in the 2000 census data converted to 2010 geography.

Adjustment Techniques

The adjustment process is essential to the production of estimates that use input data at various geographic levels, and are consistent across all levels of geography. The Claritas updates are geographically consistent, meaning that for each data item, block group data always sums to tract totals, which always sums in turn to county, state, and national totals. Adjustment techniques also assure that characteristic distributions sum to base count totals (e.g., households by income always sums to total households). The simultaneous adjustment of characteristics to higher level control totals and to total persons or households within each smaller area is achieved with Iterative Proportional Fitting (IPF). The basic techniques are described below.

Ratio Adjustment

Ratio adjustment is used to bring small area data into conformity with large area totals. For example, if preliminary block group population estimates sum to a tract total of 552, but the independent tract estimate is 561, the preliminary block group estimates are adjusted upward by 1.63% (561/552) to achieve the target tract total. Similar adjustments are made to bring preliminary distributions (such as age and race) into conformity with population totals for each geographic unit.

Iterative Proportional Fitting

IPF methods are an elaborate form of ratio-adjustment, and are used when estimates must be adjusted to conform simultaneously to two sets of marginal control totals—often referred to as the dimensions of a two-dimensional table. Income by age of householder is a good example. The estimates must sum to both households by income and householders by age.

IPF methods begin with a table with target row and column totals, referred to as the row and column marginal totals. For example, one might have 12 categories of households by income as the row totals and 11 categories of householders by age as the column totals established for a 132 cell (12 by 11) table. The objective is to produce estimates for the table's 132 cells that sum to both the row and column marginals.

The execution of IPF methods requires initial or seed cell values. In the case of income by age of householder, seed values are obtained from the census. This matrix of cell values reflects an intricate set of probabilities defining the relationship between income and age—as measured for the specific geography in the census. However, these census figures sum to neither estimated households by income nor estimated householders by age.

Iterative Proportional Fitting achieves this conformity through a series of ratio adjustments to the row and column marginal totals. Each round (or iteration) of row and column adjustments brings the seed values closer to conformity with the marginal totals. The number of iterations required varies by area, but the values eventually converge on a result that sums, within rounding error, to the marginal totals. The resulting estimates not only sum to the desired marginal totals, but preserve the statistical relationship between the two variables (income and age) measured for the area by the census.

Ethnic Classifications

The race definitions used by Census 2010 and Claritas estimates include the following basic categories:

- White
- Black or African American
- American Indian and Alaska Native
- Asian
- Native Hawaiian and Other Pacific Islander
- Some other race

However, because the current race standards permit respondents to mark one **or more** race categories, there are actually 63 categories—the six basic races plus 57 possible combinations of two or more races. When cross-tabulated by Hispanic/non-Hispanic, there are 126 race-by-Hispanic categories.

Short of presenting data for all 63 race categories, there are two basic tabulation options—single classification and all-inclusive.

Single Classification

The single classification option includes the following categories:

- White alone
- Black or African American alone
- American Indian and Alaska Native alone
- Asian alone
- Native Hawaiian and Other Pacific Islander alone
- Some other race alone
- Two or more races

This option identifies the number of persons marking each race category by itself, and then provides a seventh category identifying the number marking two or more races. The tabulation is similar to those used prior to Census 2000, and sums to total population. However, it provides no information about the race of persons in the "two or more" category, so it is not possible to determine the total number of persons identifying with a given race.

All-inclusive Classification

The total number of persons marking a given race category is revealed by the following all-inclusive categories:

- White alone or in combination
- Black or African American alone or in combination
- American Indian and Alaska Native alone or in combination
- Asian alone or in combination
- Native Hawaiian and Other Pacific Islander alone or in combination
- Some other race alone or in combination

This option identifies the total number of persons marking each race category—either by itself or as part of a combination of two or more races. However, because persons marking two or more races are counted two or more times, the table sums to totals larger than total population.

Extended Income and Pareto Interpolation

Income tabulations from the ACS top out at the "$200,000 or more" category. However, higher income breaks are important in affluent areas, so Claritas has extended ACS income distributions to include categories of "$200,000 to $249,999", "$250,000 to $499,999", and "$500,000 and over."

Vilfredo Pareto (1848-1923) is credited for creating a method used to approximate the upper end of an income distribution. Pareto's distribution is an exponential decay curve. The Pareto distribution is typically used to extend income ranges for very large areas, such as whole countries, where income distributions are smooth. The application of Pareto methods for small areas, where distributions can be irregular, requires some care.

The Pareto extensions are applied to the ACS income data. Estimated and projected income for the extended categories was produced with standard methods applied to the extended ACS data.

Inflation and Income

A common question is how the effect of inflation is accounted for in the Claritas income estimates. Inflation, as commonly measured by the Consumer Price Index, reflects changing prices, and a corresponding change in the value of a dollar. For example, items that would have cost $100 in 1983, would have cost about $147 by 1993—a 47% inflation in prices. Thus, $100 was not the same in 1993 as it was in 1983.

Inflation is not a measure of income change, but the two are related. Some income sources (such as Social Security and some union contracts) are indexed by inflation, and workers typically require and demand more pay to cover the increased costs of living. Although income tends to follow inflation, it does not move at the same rate. There are periods when income growth outpaces inflation, and periods when it lags behind. These income changes relative to inflation are referred to as real income growth.

The Claritas income estimates and projections are expressed in current dollar values, which reflect how many dollars are being received at the relevant year. As such, they reflect both real income growth (or decline) and the change due to the effect of inflation. Rather than estimating the effects separately, Claritas measures the combined or net effect through input sources (such as the Bureau of Economic Analysis income estimates, IRS income data, and ACS income estimates), all of which reflect income change in current dollars. The inflation effect in these data sources is implicitly incorporated into the Claritas estimates. Note that accounting for inflation in this manner is different from controlling for inflation, which requires removing the effect of inflation, to produce estimates in constant dollar values.

KNOWN DISCREPENCY

For standard five-year age breaks (0 to 4, 5 to 9, and so on), the estimates of population by age/sex are consistent with the estimates of population by age/sex summed across race/Hispanic categories. However, users might find differences for single years of age or age ranges other than the standard five–year categories. For example, the estimate of males age 60 to 62 might be different from the estimate of males age 60 to 62 summed across all race/Hispanic categories.

The differences trace to the fact that the estimates of population by age/sex and population by age/sex/race/ethnicity are produced for the standard five-year categories, and then split to single years of age. The split of age/sex to single year categories is enhanced by applying separate split factors for persons in households and those living in group quarters of various types. For example, the percent of persons age 20 to 24 who are age 20 can be different in areas with large college dormitory populations compared to those with persons living in households. The enhancement is applied to the estimates of total population by age/sex, where the method separates by household versus group quarters population. However, the enhancement is not feasible for the estimates of population by age/sex/race/ethnicity, which are not produced separately for persons in households and group quarters, so single year data from this tabulation can differ.

CONTACT INFORMATION

For more information regarding the Claritas Demographic Update, please contact your account team or the Claritas Solution Center between 9:00 a.m. and 8:00 p.m. (Monday through Friday, EST) at 800.866.6511 or visit www.claritas.com.