Methods for the Alaska Population Estimates (Vintage 2020)

Alaska Department of Labor and Workforce Development,
Research and Analysis Section

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Introduction

The Alaska Department of Labor and Workforce Development, Research and Analysis Section (AKDOL), prepares annual, July 1, post-census population estimates for all boroughs, census areas, cities, census designated places (CDP's), census tracts, and special areas in the state. The estimates are used for a wide range of purposes, including research and planning, the distribution of resources by public and private agencies, and the updating of population projections.

The population estimates begin with data from the last decennial census (e.g. Census 2010 for the 2020 estimates), to which adjustments for known errors in the census and post-census changes in geography are made. For each year following the last census, administrative data that can be used as indicators of population change are brought in or revised to create the latest series, or "vintage," of post-census population estimates. Indicator data that AKDOL uses include Permanent Fund Dividend (PFD) applications, data from military and group quarters surveys and research, and a state total household population estimate from the U.S. Census Bureau. After release of data from the subsequent decennial census (e.g. Census 2010 for the 2001-2009 estimates), final adjustments are made for the intercensal years.

Total Population Estimates for the State, Boroughs, Census Areas, Cities, CDPs, and Census Tracts

AKDOL uses a census ratio method ([1]) with PFD applications to create estimates of the non-group quarters[1], non-military population. First, physical addresses from PFD applications are standardized and geographically coded (geocoded) by borough, census area, city, CDP, and census tract. Applicants who are identified as living on a military base, in a GQ facility, or are uniform military in an off-base household, are then subtracted from the PFD counts, and ratios of the non-military, non-GQ census counts to the census-year non-military, non-GQ PFD applicants are calculated and carried forward to make initial population estimates.

Step 1:

$$[\text{2010 Census NMGQ}]_c \,/\, [\text{2010 PFD NMGQ}]_c * [\text{2020 PFD NMGQ}]_c = [\text{2020 Initial Estimate NMGQ}]_c$$

2010 Census NMGQ = 2010 Census population, less military and GQ population, by area of residence ($_c$).

2010 PFD NMGQ = 2010 PFD applicants, less military and GQ applicants, by area of residence.

[1] Group quarters (GQ) are shared living areas such as prisons, dorms and barracks.

2020 PFD NMGQ = 2020 PFD applicants, less military and GQ applicants, by area of residence.

2020 Initial Estimate NMGQ = 2020 initial estimate of non-military, non-GQ population, by area of residence.

The initial non-military, non-GQ estimates are then adjusted to sum to the U.S. Census Bureau's state non-GQ, non-military population estimate (administrative records-based) for the current year.

Step 2:

$$[\text{2020 Initial Estimate NMGQ}]_c \,/\, \text{Sum}([\text{2020 Initial Estimate NMGQ}]_c) * [\text{2020 State NMGQ}] = [\text{2020 Final Estimate NMGQ}]_c$$

2020 State NMGQ = Census Bureau's state population estimate less group quarters and military.

Sum([2020 Initial Estimate NMGQ]$_c$) = Sum of the initial non-group quarters, non-military estimates for each area in the state.

2020 Final Estimate NMGQ = 2020 final estimate of non-military, non-GQ population, by area of residence.

After calculating the final non-group quarters, non-military population estimate, the military and group quarters populations are updated directly based on the last decennial census and change in annual counts from AKDOL surveys, research and the PFD. Group quarters and military population estimates by area are added to the non-group quarters, non-military population to create the final population estimates.

Step 3:

$$[\text{2020 Final Estimate NMGQ}]_c + [\text{2020 Estimate GQ}]_c + [\text{2020 Estimate Military}]_c = [\text{2020 Final Estimate}]_c$$

2020 Estimate GQ = 2020 group quarters population estimate by area.

2020 Estimate Military = 2020 on base population estimate plus off base uniform by area.

Total Population Estimates for Other Areas

AKDOL prepares annual total population estimates for areas including Alaska Native Village Statistical Areas (ANVSA's), Alaska Native Regional Corporations (ANRC's), and Alaska school districts. Population estimates for these areas are based on proportional adjustments that utilize annual population estimates for boroughs, census areas, cities, CDP's, and census tracts, along with census data on census blocks (the smallest areas tabulated in the 2010 Census).

Step 1: Divide the special area into its parts that overlap different cities, CDP's, and census tracts.

Step 2:

$$[\text{2010 Census Special Area Part}]_s \,/\, [\text{2010 Census}]_c * [\text{2020 Estimate}]_c = [\text{2020 Estimate Special Area Part}]_s$$

2010 Census Special Area Part = 2010 Census total population count for the part of the city, CDP, and census tract that the special area ($_s$) part overlaps.

2010 Census = 2010 Census total population count for the whole of the city, CDP, and census tract ($_c$) that the special area part overlaps.

2020 Estimate = 2020 total population estimate for the whole of the city, CDP, and census tract that the special area part overlaps.

2020 Estimate Special Area Part = 2020 estimate for the special area part.

Step 3:

$$\textbf{Sum([2020 Estimate Area Part]}_s\textbf{) = [2020 Estimate Special Area]}_s$$

2020 Estimate Special Area Part = 2020 estimate for the part of the city, CDP, and census tract, that the special area ($_s$) part overlaps.

2020 Estimate Special Area = 2020 estimate for the special area.

Population Estimates by Age and Sex for the State, Boroughs, and Census Areas

AKDOL prepares annual population estimates by age and sex for the state and each of Alaska's boroughs and census areas. These estimates are based on ratios of census counts by age and sex to census-year PFD applicants by age and sex, and proportional adjustments to total population estimates.

Step 1:

$$\textbf{[2010 Census]}_{c,a}\textbf{ / [2010 PFD]}_{c,a}\textbf{ * [2020 PFD]}_{c,a}\textbf{ = [2020 Initial Estimate]}_{c,a}$$

2010 Census = 2010 Census population count by age and sex ($_a$), and borough or census area ($_c$).

2010 PFD = 2010 PFD applicants by age and sex, and borough or census area.

2020 PFD = 2020 PFD applicants by age and sex, and borough or census area.

2020 Initial Estimate = 2020 initial estimate by age and sex, and borough or census area.

Step 2:

$$\textbf{[2020 Initial Estimate]}_{c,a}\textbf{ / [2020 Initial Estimate]}_c\textbf{ * [2020 Final Estimate]}_c\textbf{ = [2020 Final Estimate]}_{c,a}$$

2020 Initial Estimate = 2020 initial estimate by age and sex ($_a$), and borough or census area ($_c$).

2020 Final Estimate = 2020 final estimate by age and sex, and borough or census area.
Where "$_c$" is noted alone, the estimate is by borough or census area, where "$_{c,a}$" is noted, the estimate is by age and sex, *and* borough or census area.

Population Estimates by Age and Sex for Cities and CDPs of 1,000 or More People

AKDOL prepares annual population estimates by age and sex for cities and CDPs with population of 1,000 or more in the last estimate year. These estimates are based on ratios of census counts by age and sex to census-year PFD applicants by age and sex, and proportional adjustments to total population estimates.

Step 1:

$$[\text{2010 Census}]_{p,a} / [\text{2010 PFD}]_{p,a} * [\text{2020 PFD}]_{p,a} = [\text{2020 Initial Estimate}]_{p,a}$$

2010 Census = 2010 Census population count by age and sex ($_a$), and place ($_p$).

2010 PFD = 2010 PFD applicants by age and sex, and place.

2020 PFD = 2020 PFD applicants by age and sex, and place.

2020 Initial Estimate = 2020 initial estimate by age and sex, and place.

Step 2:

$$[\text{2020 Initial Estimate}]_{p,a} / [\text{2020 Initial Estimate}]_{p} * [\text{2020 Final Estimate}]_{p} = [\text{2020 Final Estimate}]_{p,a}$$

2020 Initial Estimate = 2020 initial estimate by age and sex ($_a$), and place ($_p$).

2020 Final Estimate = 2020 final estimate by age and sex, and place.

Where "$_p$" is noted alone, the estimate is by place, where "$_{p,a}$" is noted, the estimate is by age and sex, *and* place.

Population Estimates by Race and Hispanic Origin for the State, Boroughs, and Census Areas

Race and Hispanic origin characteristics are added to the age by sex and borough or census area estimates through a combination of data from AKDOL, the U.S. Census Bureau ([2]), and the National Center for Health Statistics (NCHS) ([3]). Separate tabulations are prepared for three race categorizations: (1) race alone, (2) race alone or in combination with one or more other races, and (3) "bridged" race[2]. The race "alone," and race "alone or in combination" estimates are available on the AKDOL Website. The "bridged" race estimates are available upon request.

To prepare data for the race "alone" categories, as well as Hispanic origin, data by age, sex, borough or census area, race, and Hispanic origin from the U.S. Census Bureau are proportionally adjusted to match the AKDOL-developed population estimates by age, sex, and borough or census area.

[2] Bridged race estimates are race estimates that adjust data from surveys which allow reporting of more than one race group (the 2000 and 2010 Censuses, for example) such that each respondent is assigned a single race. Single-race tabulations are in keeping with data from other sources, including the Alaska Bureau of Vital Statistics.

Step 1:

$$[\text{2019 USCB Alone}]_{c,a,r} / [\text{2019 USCB Alone}]_{c,a} * [\text{2019 Estimate}]_{c,a} = [\text{2019 Initial Alone}]_{c,a,r}$$

2019 USCB Alone = 2019 U.S. Census Bureau estimates by race alone and Hispanic origin ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 Estimate = 2019 AKDOL estimate by age and sex, and borough or census area.

2019 Initial Alone = 2019 initial estimate by race alone and Hispanic origin ($_r$), age and sex ($_a$), and borough or census area ($_c$).

Further review and modification is then done to ensure the race estimates are internally consistent.

To prepare data for the race "alone or in combination" categories, ratios of Census Bureau race "alone or in combination" to race "alone," by age, sex, and borough or census area, are calculated, and applied to the AKDOL race alone estimates.

Step 1:

$$[\text{2019 USCB AIC}]_{c,a,r} / [\text{2019 USCB Alone}]_{c,a,r} * [\text{2019 AKDOL Alone}]_{c,a,r} = [\text{2019 AKDOL Initial AIC}]_{c,a,r}$$

2019 USCB AIC = 2019 U.S. Census Bureau estimates by race alone or in combination($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 USCB Alone = 2019 U.S. Census Bureau estimates by race alone ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 AKDOL Alone = 2019 AKDOL estimates by race alone ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 AKDOL Initial AIC = 2019 AKDOL estimates by race alone or in combination ($_r$), age and sex ($_a$), and borough or census area ($_c$).

Further review and modification is done to ensure the race estimates are internally consistent, and consistent with race alone for the multi-race population.

To prepare data for the "bridged" race categories, ratios of Census Bureau race "alone" to NCHS "bridged" race by age, sex, and borough or census area, are calculated and applied to respective AKDOL data, and combined with ratios of Census Bureau race "alone or in combination" to NCHS "bridged" race by age, sex, and borough or census area, applied to respective AKDOL data.

Step 1:

$$([\text{2019 USCB Alone}]_{c,a,r} / [\text{2019 NCHS Bridged}]_{c,a,r} * [\text{2019 AKDOL Alone}]_{c,a,r} + [\text{2019 USCB AIC}]_{c,a,r} / [\text{2019 NCHS Bridged}]_{c,a,r} * \text{2019 AKDOL AIC}]_{c,a,r}) / 2 = [\text{2019 AKDOL Initial Bridged}]_{c,a,r}$$

2019 NCHS Bridged = 2019 NCHS estimates by bridged race ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 USCB Alone = 2019 U.S. Census Bureau estimates by race alone ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 USCB AIC = 2019 U.S. Census Bureau estimates by race alone or in combination($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 AKDOL Alone = 2019 AKDOL estimates by race alone ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 AKDOL AIC = 2019 AKDOL estimates by race alone or in combination ($_r$), age and sex ($_a$), and borough or census area ($_c$).

2019 AKDOL Initial Bridged = 2019 AKDOL estimates by bridged race ($_r$), age and sex ($_a$), and borough or census area ($_c$).

Further review and modification is done to ensure the estimates are internally consistent, and consistent with race "alone" and race "alone or in combination" estimates.

References

[1] Swanson, D. and Siegel, J. (2004). *The Methods and Materials of Demography, Second Edition*. Elsevier Science and Technology Books.

[2] United States Census Bureau. Vintage 2019 Population Estimates by Race. Released June 2019. Available from: https://www.census.gov/programs-surveys/popest.html as of July 2020.

[3] National Center for Health Statistics. Vintage 2019 Bridged-Race Postcensal Population Estimates. Prepared under a collaborative arrangement with the U.S. Census Bureau; released June 2020. Available from: http://www.cdc.gov/nchs/nvss/bridged_race.htm as of July 2020.