NIH | **NATIONAL CANCER INSTITUTE**
Surveillance, Epidemiology, and End Results Program

Population Estimates Used in NCI's SEER*Stat Software

(https://seer.cancer.gov)
The county population estimates implemented in the NCI SEER*Stat software for the calculation of cancer incidence and mortality rates are available for download (see Download U.S. Population Data (https://seer.cancer.govdownload.html)). They represent a modification of the intercensal and Vintage 2019 annual time series of July 1 county population estimates by age, sex, race and Hispanic origin produced by the U.S. Census Bureau's Population Estimates Program (https://seer.cancer.govhttps://www.census.gov /programs-surveys/popest.html), in collaboration with the National Center for Health Statistics, and with support from the NCI through an interagency agreement.

The population estimates incorporate intercensal (for July 1, 2000-2009) and new Vintage 2019 (for July 1, 2010-2019) bridged race estimates that are derived from the original multiple race categories in the 2000 and 2010 Censuses. The bridged race estimates and a description of the methodology used to develop them appear on the National Center for Health Statistics Web site (https://seer.cancer.govhttps://www.cdc.gov/nchs/nvss/bridged_race.htm).

A modification that the NCI has made to the Census Bureau estimates only affects population estimates for the state of Hawaii. Based on concerns that the native Hawaiian population has been vastly undercounted in previous censuses, the Epidemiology Program of the Hawaii Cancer Research Center (http://www.uhcancercenter.org/) has recommended an adjustment to the populations for their state. The "Hawaii-adjustment" to the Census Bureau's estimates has the net result of reducing the estimated white population and increasing the estimated Asian and Pacific Islander population for the state. The estimates for the total population, black population, and American Indian and Alaska Native populations in Hawaii are not modified.

Two sets of population estimates are available for 2005: the standard set based on July 1 populations and a set that has been adjusted for the population shifts due to hurricanes Katrina (August 29) and Rita (September 24). For 62 counties and parishes in Alabama, Mississippi, Louisiana, and Texas, the Census Bureau has provided total population estimates for January 1, 2006 (see Special Processing Procedures for the Areas Affected by Hurricanes Katrina and Rita (https://seer.cancer.govhttps://www.census.gov /programs-surveys/popest.html)) and estimates by age, sex, and race category for July 1 2006. These data sets were used to develop time-weighted average populations for the 62 counties/parishes in 2005. These estimates are lower than the July 1, 2005 values for counties/parishes that had direct hurricane impact and higher for counties/parishes that were destinations for the people displaced by the hurricanes. Additional information on Hurricanes Katrina and Rita is available from the Census Bureau (https://seer.cancer.govhttps://www.census.gov/econ/www/Katrina.htm).

A modification was also made to the 1969-1989 Census Bureau estimates in order to meet requirements for age-adjustment according to the year 2000 U.S. standard population. The methodology used to develop population estimates for two new age groups (less than one year-olds and one to four year-olds) for the 1969-1989 estimates is described below.

1990–2019 NCI SEER*Stat Population Estimates

The July 1, 2010-2019 bridged race vintage 2019 population estimates were downloaded from the National Center for Health Statistics (NCHS) Web site (https://seer.cancer.govhttps://www.cdc.gov/nchs/nvss/bridged_race.htm). Previous annual estimates, back to and including the year 2010, were revised. This is because the Census Bureau, in addition to developing estimates for a new year, routinely revises the estimates for prior years back through the census base year. This file contains populations by year, county, race, Hispanic origin, sex and age. The race groups included in the census estimates are White, Black, American Indian/Alaska

Natives and Asian/Pacific Islander. The age groups consisted of the following 86 categories: <1, 1, 2, 3, …84, and 85+. These estimates were used along with the 1990-2009 estimates previously obtained from the Census Bureau. In the 2000 and 2010 censuses, the American Indian and Alaska Native categories were combined. In 1990, these were three separate categories American Indian, Eskimo, and Aleut. The 2000 and 2010 version allowed American Indians and Alaska Natives to write-in their tribal affiliation. In 1990, there was a write-in only for American Indians. It is assumed that the same people were captured by the different definitions. The methodology implemented by the Census Bureau to develop these county estimates is described on the Census Bureau's web site (https://seer.cancer.govhttps://www.census.gov/programs-surveys/popest.html).

The following steps were taken to create the 2000-2019 population records:

- One record was created by year, county, race, Hispanic origin, and sex with 86 variables containing the age-specific populations
- Census Federal Information Processing Standards (FIPS) county codes were collapsed to match the county list that is used by the NCI (Appendix 1).
- Adjustments to the Census Bureau's populations for the state of Hawaii were made using the 2000 Census SF1 and 2010 Census SF1 files. The proportion of the White Alone population estimate to the total population was calculated for the SF1 data for 2000 and 2010 by county, sex and age. Using the proportion for 2000 and 2010, proportions for 2001-09 were interpolated and 2011-2019 were extrapolated. The proportion was applied to the total population from the Census Bureau to produce the Hawaii-adjusted White population. Additional racial/ethnic populations for Hawaii were developed in the following manner:
    - Hispanic White = Hawaii-adjusted White X (Census Hispanic White/Census White)
    - Non-Hispanic White = Hawaii-adjusted White - New Hispanic White
    - Hispanic Nonwhite = (Census Total - Hawaii-adjusted White) X (Census Hispanic Nonwhite/Census Nonwhite)
    - Non-Hispanic Asian/Pacific Islander = Hawaii-adjusted Hispanic Nonwhite - (Census Non-Hispanic Black + Census Non-Hispanic American Indian and Alaska Native)
    - Hispanic Asian/Pacific Islander = Census Total - (Hawaii-adjusted White + Census Black + Census American Indian and Alaska Native + Hawaii adjusted Non-Hispanic Asian/Pacific Islander)
- The adjusted Hawaii data were merged with the other county level data.
- The individual age populations were summed into the 19 age groups.
- One record was created by year, county, race, Hispanic origin, sex and age group.

The 2000-2019 estimates received from the Census Bureau included population estimates for Broomfield County in Colorado, which was created in November, 2001 from parts of Adams, Boulder, Jefferson, and Weld counties. To be consistent with the way numerator data are reported (i.e., mortality and incidence) in 2000 and 2001, however, we derived estimates for the original four Colorado counties (Adams, Boulder, Jefferson and Weld) that existed prior to the creation of Broomfield County. An earlier series of Census Bureau estimates that did not include Broomfield County were used to derive the 2000 and 2001 estimates. The following steps were taken:

- One record was created from the 2000-2009 data for 2000 and 2001 by year, race, Hispanic origin, age and sex with variables containing the total population for Adams, Boulder, Broomfield, Jefferson, and Weld counties.
- One record was created from the older 2000-2001 data by race, Hispanic origin, age and sex with variables containing the populations for the individual and sum of the counties for Adams, Boulder, Jefferson and Weld counties. Proportions were calculated for each of the 4 counties to the total of the 4 counties by race, Hispanic origin, age, and sex.
- The proportions calculated above for each of the 4 counties were applied to the current total population estimates for the 5 counties in 2000-2001.
- One record was created by year, county, race, Hispanic origin, sex and age.
- Single year of age records were summed over to get the 19 age groups.

- The population estimates received from Census for the 5 counties were replaced by the 4 county derived estimates.

The 2000-2019 estimates received from the Census Bureau included population estimates for new counties in Alaska established in June 2008. Petersburg Census Area, Wrangell City and Borough, Prince of Wales-Hyder Census Area, Ketchikan Gateway Borough were derived from Wrangell-Petersburg Census Area, Prince of Wales-Outer Ketchikan Census Area and Ketchikan Gateway Borough. To be consistent with the way numerator data are reported (i.e., mortality and incidence) estimates were derived for the original three Alaska counties that existed prior to the creation of the new counties. The vintage 2008 series of Census Bureau estimates are the last estimates to have the original three counties and were used to derive the estimates. The estimates for 2014-2019 are still based on the new counties. The following steps were taken:

- One record was created from the 2000-2013 data by year, race, Hispanic origin, age and sex with variables containing the total population for Petersburg Census Area, Wrangell City and Borough, Prince of Wales-Hyder Census Area, and Ketchikan Gateway Borough.
- One record was created from the older 2000-2008 data by year, race, Hispanic origin, age and sex with variables containing the populations for the individual and sum of the counties for Wrangell-Petersburg Census Area, Prince of Wales-Outer Ketchikan Census Area and Ketchikan Gateway Borough counties. Proportions were calculated for each of the 3 counties to the total of the 3 counties by race, Hispanic origin, age and sex.
- The proportions calculated above for each of the 3 counties were applied to the current total population estimates for the 4 counties in 2000-2008. The proportions calculated for 2008 were also applied to the 2009-2013 data.
- One record was created by year, county, race, Hispanic origin, sex and age.
- The population estimates received from census for the 4 counties were replaced by the 3 county derived estimates.

The following steps were taken to adjust the 2005 populations for hurricanes Katrina and Rita:

- For each to the 62 affected counties and parishes, a daily population estimate was created. For the days prior to the hurricane landfall (August 29 for Katrina and September 24 for Rita), a linear model was used based on the July 1, 2004 and July 1, 2005 population estimates.
- For the days after the hurricane, we developed an estimate of the January 1, 2006 population by age, sex, and race category. This estimate was generated by applying a county/parish-wide adjustment based on the January 1, 2006 population estimates to the detailed July 1, 2006 population estimates by age, sex, and race category.
- For the overall 2005 population, we summed the daily estimates and divided by the number of days.
- For population denominators with cancer data, it is usually assumed that the address at diagnosis is the individual's permanent address. By using the January 1, 2006 population estimates for all of the post-hurricane period, we assume that the current address was used for people who could not return home by January 1, 2006.
- Since these adjustments were made for just 62 counties, the resulting total U.S. population is lower than the July 1 total U.S. population. The difference represents people displaced by the hurricanes who went to other parts of the U.S. A separate dummy state has been introduced that represents these people. It is labeled "Hurricane Katrina/Rita Evacuees - Populations Only - 2005" and is included by default in rate calculations over the total U.S.

The following steps were taken to create the 1990-1999 population records:

- One record was created by year, county, race, Hispanic origin, and sex with 19 variables containing the age-specific populations.
- Census Federal Information Processing Standards (FIPS) county codes were collapsed to match the county list that is used by the NCI (Appendix 1).
- Adjustments to the Census Bureau's populations for the state of Hawaii were made in collaboration with investigators at the Hawaii Cancer Research Center using population data they provided. The proportion of the White population estimate to the total (all racial/ethnic groups combined) population was calculated from the Hawaii Cancer Research Center's populations for

1990-99 by year, sex, and age group. The proportion was applied to the total (all racial/ethnic groups combined) population estimate from the Census Bureau to produce the Hawaii-adjusted White population. Additional race/ethnic populations for Hawaii were developed the same as described above in 2000-05.

- The adjusted Hawaii data were merged with the other county level data.

- One record was created by year, county, race, Hispanic origin, sex and age group.

1969–1989 NCI SEER*Stat Population Estimates

The July 1, 1969-1989 population estimates were taken from the NCI standard 200 format files (i.e., the same population estimates which have been available through SEER*Stat). These population estimates were already modified according to the Hawaii Cancer Research Center data. The methodology for developing the 1969-1989 Hawaii population estimates was comparable to that described in the previous section for the 1990-1999 population estimates.

Single year of age population estimates were obtained from a private vendor (Woods and Poole Economics, Inc., 2001 Regional Database, Copyright January 2001; estimated July 1 population by race, sex and single year of age based on 1990 Census and post-censal Census Bureau estimates). The following steps were taken to create the <1 and 1-4 year old age groups for the SEER*Stat population estimates:

- The Woods & Poole single year of age populations for zero to four year olds were used by year (1970-1989), state/county, race (White, Black, Other) and sex (male, female). To be consistent with the county codes used by the NCI (Appendix 1), various counties available in the Woods & Poole data needed to be combined or recoded (Appendix 2). There were also several counties, mainly in Virginia, that are not combined in the NCI data that are combined in the Woods & Poole data. For these NCI counties, the combined county Woods & Pool data was used for each of the individual NCI counties (Appendix 3).

- The proportion of less than one year-olds in the zero to four year-old age group was calculated by year, state/county, race (White, Black, Other) and sex from the Woods & Poole data.

- Using the current 1969-1989 population NCI estimates, estimates for 'Other' race were calculated by subtracting the Black estimates from the Nonwhite by year, state/county and sex. The Nonwhite estimates were dropped at this point leaving races White, Black and Other.

- The proportions from the Woods & Poole data were applied to the zero to four year-old age group by year, state/county, race (White, Black, Other) and sex. The proportions for 1970 were used for 1969. Populations for the one to four year-old age groups were calculated by subtracting the new less than one year-old populations from the zero to four year-old populations.

- Populations for Nonwhite were create by summing the estimates for Blacks and Other by years, state/county, age group (<1, 1-4) and sex. The populations for Other race were dropped at this point.

- Populations for the two new age groups (<1, 1-4) were merged with the 1969-1989 population data. The zero to four year-old age group was dropped.

Appendix 1. Listing of counties combined/recoded in the 1969–2019 NCI population data

Combined Counties

State	Years	NCI County	FIPS County Code
Alaska	1969-1989	900	All Counties
Alaska	1990-1993	010	013 Aleutians East Borough 016 Aleutians West Borough

State	Years	NCI County	FIPS County Code
Alaska	1990-1993	910	070 Dillingham Census Area 164 Lake and Peninsula Borough
Alaska	1990-1993	231	232 Skagway-Hoonan-Angoon Census Area 282 Yakutat City and Borough
Alaska	2000-2013	232	105 Hoonah-Angoon Census Area 230 Skagway Municipality
Arizona	1990-1993	910	012 La Paz County 027 Yuma County
Hawaii	1969-1999	900	All Counties
Montana	All	031	031 Gallatin 113 Yellowstone National Park
New Mexico	1969-1981	910	006 Cibola County 061 Valencia County
New York	1969-1979	910	005 Bronx County 047 Kings County 061 New York County 081 Queens County 085 Richmond County
Virginia	1969-1981	910	153 Prince William County 683 Manassas City 685 Manassas Park City
	1969-1981	911	095 James City County 199 York County 735 Poquoson City 830 Williamsburg City
	1969-1979	913	089 Henry County 690 Martinsville City
	1969-1979	914	165 Rockingham County 660 Harrisonburg City
	1969-1979	915	177 Spotsylvania County 179 Stafford County 630 Fredericksburg City
	1980+	005	005 Alleghany County 560 Clifton Forge City
	1969-1979	916	005 Alleghany County 560 Clifton Forge City 580 Covington City

State	Years	NCI County	FIPS County Code
	All	917	019 Bedford County 515 Bedford City
	1969-1979	918	013 Arlington County 059 Fairfax County 510 Alexandria City 600 Fairfax City 610 Falls Church City
	All	083	083 Halifax County 780 South Boston City

Recoded Counties

State	Years	NCI County	FIPS County Code
Alaska	2010-2019	270	158 Kusilvak Census Area
Colorado	1969-2001	911	001 Adams County
Colorado	1969-2001	912	013 Boulder County
Colorado	1969-2001	913	059 Jefferson County
Colorado	1969-2001	914	123 Weld
Florida	1969-1989	086	025 Miami Dade County
Missouri	1969-1979	186	193 St Genevieve County
South Dakota	2010-2019	113	102 Oglala Lakota County

Appendix 2. Listing of Woods & Poole counties combined/recoded to match NCI county codes.

Combined Counties

State	Woods & Poole	NCI County Code	
New York	5+47+61+81+85 (1970-79 Only)	910	Bronx County + Kings County + New York County + Queens County + Richmond County
Virginia	931+958 (1970-81 Only)	911	James City County + York County + Poquoson City + Williamsburg City
	179+951 (1970-79 Only)	915	Spotsylvania County + Stafford County + Fredericksburg City

State	Woods & Poole	NCI County Code	
	919+13+510 (1970-79 Only)	918	Arlington County + Fairfax County + Alexandria City + Fairfax City + Falls Church City

Recoded Counties

State	Woods & Poole	NCI County Code
Alaska	000	900 All Counties
Arizona	027	910 La Paz County + Yuma County

Appendix 3. Listing of counties that are collapsed in the Woods & Poole population data.

The data for these combined counties were output once for each of the individual NCI county codes

State	Woods & Poole	NCI County Code
New Mexico	061	006 Cibola County 061 Valencia County
Virginia	179	179 Stafford (1980-89 only) 915 Spotsylvania County + Stafford County + Fredericksburg City (1969-79)
	901	003 Albemarle County 540 Charlottesville City
	903	005 Alleghany County with Clifton Forge City (1980-89 only) 580 Covington City (1980-89 only) 916 Alleghany County with Clifton Forge City + Covington City (1969-79 only)
	907	015 Augusta County 790 Staunton City 820 Waynesboro City
	909	019 Bedford County (1980-89 only) 515 Bedford City (1980-89 only) 917 Bedford County + Bedford City (1969-79 only)
	911	031 Campbell County 680 Lynchburg City
	913	035 Carroll County 640 Galax City
	918	053 Dinwiddie County 570 Colonial Heights City 730 Petersburg City

State	Woods & Poole	NCI County Code
	919	059 Fairfax County (1980-89 only) 600 Fairfax City (1980-89 only) 610 Falls Church City (1980-89 only) 918 Arlington County + Fairfax County + Alexandria City + Fairfax City + Falls Church City (1969-79 only)
	921	069 Frederick County 840 Winchester City
	923	081 Greensville County 595 Emporia City
	929	089 Henry County (1980-89 only) 690 Martinsville City (1980-89 only) 913 Henry County + Martinsville City (1969-79 only)
	931	095 James City County (1982-89 only) 830 Williamsburg City (1982-89 only) 911 James City County + York County + Poquoson City + Williamsburg City (1969-1981)
	933	121 Montgomery County 750 Radford City
	939	143 Pittsylvania County 590 Danville City
	941	149 Prince George County 670 Hopewell City
	942	153 Prince William County (1982-89 only) 683 Manassas City (1982-89 only) 685 Manassas Park City (1982-89 only) 910 Prince William County + Manassas City + Manassas Park City (1970-81 only)
	944	161 Roanoke County 775 Salem City
	945	163 Rockbridge County 530 Buena Vista City 678 Lexington City
	947	165 Rockingham County (1980-89 only) 660 Harrisonburg City (1980-89 only) 914 Rockingham County + Harrisonburg City (1969-79)
	949	175 Southampton County 620 Franklin City
	951	177 Spotsylvania County (1980-89 only) 630 Fredericksburg City (1980-89 only) 915 Spotsylvania County + Stafford County + Fredericksburg City (1969-79)

State	Woods & Poole	NCI County Code
	953	191 Washington County 520 Bristol City
	955	195 Wise County 720 Norton City
	958	199 York County (1982-89 only) 735 Poquoson City (1982-89 only) 911 James City County + York County + Poquoson City + Williamsburg City (1970-1981)
Wisconsin	901	078 Menominee County 115 Shawano County