Connecticut
Registration Report
for
Vital Events
Occurring in 2019

State of Connecticut
Department of Public Health

Manisha Juthani, MD, Commissioner

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2019 Population Health Highlights: Connecticut Mortality

The 2018 *Connecticut Registration Report* introduced Population Health Highlights, a *Report* section summarizing trends and disparities for important population health indicators in the State.[1] While 2018 Population Health Highlights focused on birth and perinatal health outcomes, 2019 Population Health Highlights now turn to mortality (death) statistics for Connecticut residents.

Mortality statistics are fundamental components of public health monitoring and surveillance because they "provide a snapshot of current health problems, suggest persistent patterns of risk in specific communities, and show trends in specific cause of death over time."[2] In previously published mortality reports, DPH provides background and methods on mortality statistics and monitoring.[2,3] Below, *Mortality Key Concepts* briefly revisits these fundamentals to aid review of the Population Health Highlights published in this year's *Report*.

While the deaths reported in this 2019 *Report* predate the COVID-19 pandemic,[4] the mortality statistics presented in this year's Population Health Highlights provide context for future evaluations of the impact of COVID-19 on Connecticut mortality.

Mortality Key Concepts

Cause-of-death classification refers to the assignment of the many individual causes-of-death to a classification system. When a death certificate is completed, the medical certifier (usually physician or medical examiner) provides a written statement describing the cause of death and other factors or circumstances that contributed to death. These written cause-of-death statements are then converted to cause-of-death codes using the International Classification of Diseases, 10th Revision (ICD-10).[5] ICD-10 is a classification system developed by the World Health Organization (WHO) to facilitate international comparison of mortality statistics.[6]

Leading Causes of Death (LCODs) represent the most frequent causes of death for a particular year. The top five LCODs represent the cause-of-death classifications that have the highest total number of deaths in rank order. In the U.S., leading causes of death are typically reported using the National Center for Health Statistics' "List of 113 Selected Causes of Death" which groups the ICD-10 codes into broader classifications for public health surveillance.[7] Although death certificates often report multiple causes-of-death, only the cause-of-death identified as the *underlying* (primary) COD is used for ranking leading causes.

Crude Mortality Rate **(CMR)** is the rate of all deaths in a population without age-adjustment.

Age-Specific Mortality Rate **(ASMR)** is the rate of deaths in a specified age-group, typically 5- or 10-year age groups.

Age-adjusted Mortality Rate **(AAMR)** is a measure of the risk of death relative to a standard population. Since risk of death increases with age, populations with differing age structures will have different rates of death. To minimize the effects of differing age structures, the individual ASMRs are age-standardized and then summed together to provide a single index value for mortality risk, known as the AAMR. It is important to remember that crude and age-specific rates are the actual rates of death or disease in the population while AAMRs are used specifically for comparison between population groups. Thus, AAMRs are used in this *Report's* Population Health Highlights to support analysis of LCODs over time and between geographic and demographic groups. A more complete list of Connecticut AAMRs by 74 causes-of-death is published separately from this *Report*.[10]

Race and Ethnicity collection standards specify that a person's racial and ethnic identity be self-reported. As the deceased individual (or *decedent*) is unable to self-report his or her own race and ethnicity on a death certificate, the information is provided by an informant, such as family or the decedent's long-term care facility. Informant-reported race and ethnicity may differ from what the decedent self-reported on population surveys (e.g., Decennial Census). Such differences have minimal impact on calculated rates for most races and ethnicities; however, informant reporting has been shown to under-represent non-Hispanic American Indian and Alaskan Native (AIAN) decedents and consequently underestimate non-Hispanic AIAN mortality rates.[12,13]

Introduction

The *Registration Report* is a statistical summary of vital events for the State of Connecticut. The State Office of Vital Records at the Connecticut Department of Public Health (DPH) maintains the statewide vital event registries for births, deaths, fetal deaths, and marriages. The series has a long history with annual *Reports* beginning in 1848 and with only one year lost in 1852. Although the narrative portion of the *Registration Report* is not created for 1999 through 2009 or for 2016 and 2017, *Report* Tables have been produced annually and are available online. The *Registration Report* supports the broad mission of DPH to protect and improve the health and safety of all residents of Connecticut by providing detailed annual data to facilitate public health surveillance, research, program development, and evaluation.

This introduction provides general guidance for using and interpreting the vital statistics data included in this *Report*. Recent updates to the *Registration Report* contents and structure are summarized in the 2018 Registration Report and specific details on preparation methodology as well as other important resources for interpretation and use are provided as appendices with each annual *Report*.

Completeness of Registration

The State of Connecticut has a town-based civil registration system. Vital events are statutorily required to be registered with the town in which the event occurred. A copy of that event certificate is also shared with the individual's town of residence.

Registered vital event records are subject to updates and corrections over time. This occurs as legal changes are made to the certificates or as data elements are corrected for statistical purposes. CT DPH strives to publish annual reports based on final, cleaned data; however, record modifications sometimes occur after an annual *Registration Report* is published. As a result, data used in production of this annual *Registration Report* may differ slightly from future *Reports* and other tabulations which use the latest version of the record in each registry.

Connecticut's electronic birth registration system (EBRS), active since 2002, collects the birth registry information using a web-based data collection system which allows birth facilities and towns with home births to file births and all towns to register records electronically rather than using a paper-based registration process. Use of the EBRS ensures that the state's registration of births that occurred in-state is essentially complete. In 2019, the remaining three event registries (fetal death, death, and marriage) were paper-based which requires the certifier of the vital event to initiate a paper certificate. For deaths and fetal deaths, the funeral director receives the paper certificate from the certifier and completes the registration process with the town clerk in the town of occurrence. A copy of the certificate is then provided to the individual's town of residence and a copy is provided to CT DPH for entry into the corresponding statewide registry. For marriages, the certifier files the marriage license with the town of occurrence and the town sends a copy to CT DPH for entry into the marriage registry. Due to the paper-based process, some certificates for deaths, fetal deaths, and marriages that occur in Connecticut each year may not be reported to CT DPH and therefore are not entered into the registry systems for inclusion in this *Report*. Planned implementations of electronic registration systems for deaths, fetal deaths, and marriages will resolve under-reporting of in-state occurrences.

The statistics presented in the *Registration Report* reflect not only vital events that occur in Connecticut, but also those involving Connecticut residents that occur in other states. The Connecticut Vital Records Office is part of a national association through which our state reciprocates with every state and territory in the U.S. to exchange copies of birth and death records. Events to Connecticut residents that occur in other states and events to residents of other states that occur in Connecticut are exchanged to allow each state to perform complete statistical reporting for state residents. Connecticut does not exchange fetal death or marriage records and therefore reporting of these events for Connecticut residents is known to be incomplete.

Geographic Levels

Summary statistics are reported at the state level for all Connecticut residents. Selected *Report* Tables also provide

summary statistics by county, Local Health Districts (LHDs) that are comprised of two or more towns, and Connecticut's 169 towns. Summations for LHDs enable local health agencies to better understand and serve their resident populations. The composition of the respective health districts reflects membership as of July 1 of the *Registration Report* year (see listing and map in **Appendix II**).

Rates, Percentages, and Ratios

Rates, percentages, and ratios, alongside case counts, form the foundation of the *Registration Report* Tables and Population Health Highlights. The term "rate" is used broadly throughout the *Report* to refer both to true epidemiological rates, which measure the frequency of an event per population per unit of time, as well as percentages, which are ratios of a part of a whole and do not depend on unit of time for calculation.[8,9] Rates and percentages are calculated using the equations given in **Appendix III**.

Caution should be used in drawing conclusions based on rates calculated from small numbers of events, as described in **Appendix V**. The term "unknown" as used in this *Report* includes both "missing" responses (no code entered) and responses coded as "unknown." Percentages based on data do not include records with unknown or missing values for the health outcome of interest in the denominator. Disparity Ratios are calculated as rates within one population group (the numerator) divided by the rate in a reference population group (the denominator) and highlight health inequities as the magnitude of a health outcome or risk factor in one population relative to another.

Population Estimation Methodology

Population estimates are used to calculate rates of births, deaths, fetal deaths, and marriages. The U.S. Census Bureau's Population Estimates Program issues annual population estimates for July 1 of each year by age, sex, race, and ethnicity for Connecticut and its 8 counties and for total population without demographics for Connecticut's 169 towns.

Reporting of Race and Ethnicity

Data from vital records that were collected using the 2003 Revisions of the vital event certificates reflect the current 1997 federal standards for collection of ethnicity separate from race and to allow multiple races to be reported.[11] For Connecticut, births from 2016 to present, deaths from 2005 to present, and fetal deaths from 2018 to present allow for reporting of multiple races (see **Appendix IV**). Data collected using the 1989 revision follow the 1977 federal standard allowing only a single race to be reported.[11]

The *Registration Report* provides rates and analyses for specific racial and ethnic groups using mutually exclusive combinations of race and ethnicity. Statistical tabulations by race in the *Registration Reports* reflect single race categorization[13,14] to allow for consistency in reporting over time (across revisions) and to allow for their inclusion in tabulations for which a population denominator is needed.[15] Additional Hispanic origin categories are collected on the vital event certificates and are therefore available in the vital event registries for analyses, however annual population estimates for those Hispanic subgroups are not available from the U.S. Census Bureau's annual estimates for Connecticut.

For population-based rates that require use of the U.S. Census Bureau's annual population estimates as the rate denominator, race/ethnicity combinations are limited to non-Hispanic White, non-Hispanic Black, non-Hispanic American Indian/Alaskan Native, non-Hispanic Asian (includes Native Hawaiian and Other Pacific Islander) and Hispanic of any race. For proportion-based rates, the categories are non-Hispanic White, non-Hispanic Black, non-Hispanic Asian (includes Native Hawaiian and Other Pacific Islander), non-Hispanic Other (includes race not otherwise categorized), and Hispanic (includes all races) as well as two Hispanic subgroups: Puerto Rican (includes all races) and Other Hispanic (includes Mexican, Cuban, or Other Hispanic for all races).

Infant's demographics

For birth statistics, the race, ethnicity, and residence of the infant is assumed to be that of the mother in accordance with national standards for vital statistics.[16] For infant deaths, the race, ethnicity, and residence reflect the information reported on the death certificate by the family. For statistics reported using the linked birth-infant death records, the race, ethnicity, and residence reflect the birth record which is that of the mother.[17]

Same-Sex Marriages

Same-sex marriages in Connecticut became possible on November 11, 2008. Information about same-sex marriages is included in this *Report*.

Divorces

Dissolutions of Marriage, also known as divorces, are handled by the Connecticut Superior Court system. As no divorce registry is maintained, divorce statistics are not included in this *Report*.

Comparability of Cause-of-Death Data

The International Classification of Diseases (ICD) is designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics. The ICD defines the universe of diseases, disorders, injuries, and other related health conditions, listed in a comprehensive, hierarchical fashion that allows easier analysis of health information across entities, systems, regions, and countries as well as across different time periods.

The single selected cause for tabulation of mortality statistics is called the underlying cause of death, and the other reported causes are the non-underlying causes of death. The underlying cause-of-death is defined by the WHO as "the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury." Underlying cause-of-death is selected from the conditions entered by the physician on the cause of death section of the death certificate. When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD, and associated selection rules and modifications (https://wonder.cdc.gov/wonder/help/mcd.html).

The ICD system for classifying cause of death is revised occasionally to reflect changes in medical practices and new medical knowledge. The *Registration Report* uses the tenth revision of the ICD (known as the ICD-10) which was implemented in the death and fetal death registries in 1999.

The National Center for Health Statistics (NCHS), the Federal agency responsible for use of the ICD in the U.S., has also developed a clinical modification of the classification for morbidity purposes. While the ICD-10 is used to code and classify mortality data from death certificates, the ICD-10-CM is used to classify morbidity with more detail for use in hospital care and related reimbursement purposes. The two systems (ICD-10 and ICD-10-CM) are similar but not interchangeable.

Availability on the Internet

Full *Reports* (1992-1998 and 2010-2015), *Report* Tables (1998-2018), and methods summaries (1999-2006) are available on the internet at the following web site: *http://www.ct.gov/dph/RegistrationReport.* Online versions reflect corrections which are noted in the Errata.

For Further Information

Definitions of the technical terms used in this document are given in the *Glossary* in **Appendix III**. For questions about this *Registration Report*, please contact the Health Statistics and Surveillance Section of the State of Connecticut Department of Public Health.

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Population Health Highlights

ALL-CAUSE MORTALITY

Mortality surveillance is fundamental to public health as tracking mortality rates facilitates the prevention and control of diseases that lead to death. Mortality data are used for immediate public health action (e.g., opioid crisis, COVID-19 pandemic), program planning and evaluation (e.g., Million Hearts® 2022), and policy changes (e.g., regulation of tobacco sales, marketing, and use) – all of which seek to maximize the length and quality of the lives of our people.[18] All-cause mortality covers all deaths in a population, regardless of the cause of death.

Key Takeaways

- Connecticut ranked 5th lowest for all-cause mortality among U.S. states in 2019.
- All-cause mortality in both CT and the United States has plateaued after decades of decline.
- Mortality among Hispanic and non-Hispanic Black residents trended lower between 2005 and 2019.

State-National Comparisons and Trends over Time

In 2019, 31,774 residents of Connecticut died and the age-adjusted mortality rate (AAMR) for the total population was 649.0 deaths per 100,000 people. Although the number of deaths in 2019 was 1.6% higher than 2018, the 2019 AAMR was not statistically different than the 2018 AAMR of 644.4 deaths per 100,000 people. Connecticut's 2019 AAMR was lower than the national AAMR of 715.2 for 2019 and ranked 5th lowest among states for all-cause mortality.[19]

Mortality trends between 2005 and 2019 were assessed for both Connecticut and the U.S. All-cause mortality rates in Connecticut declined from 2005 to 2012 for all residents (1.22% per year) and males (1.25% per year) and then plateaued thereafter (Figs. 1, 2). Mortality rates for females declined more moderately at 0.60% per year but the trend extended from 2005 to 2019. For all years 2005 through 2019, female mortality was lower than male mortality.

U.S. mortality declined by 1.75% per year between 2005 and 2010 and by 0.32% per year from 2010 to 2019 (Fig. 1).[19] Mortality among U.S. males declined by 1.71% annually but only from 2005 to 2011 (Fig. 2). Among U.S. females, the AAMRs fell from 2005 to 2009 by 1.91% per year and then from 2009 to 2019 by 0.49% per year. Across the 2005-2019 period, annual mortality rates for each sex in Connecticut were lower than the corresponding sex-specific rates in the U.S.

The all-cause AAMR for non-Hispanic White residents decreased from 2005 to 2012 at 1.05% annually but was stable thereafter. Morality rates among non-Hispanic Black and Hispanic residents trended downward across the 14-year period from 2005 to 2019 (1.05% and 0.42% per year, respectively) while non-Hispanic Asian residents did not show stable changes (Fig. 3).

Recent 5-year Demographic Comparisons

Recent five-year (2015-2019) mortality rates differed for all Connecticut demographic groups compared. The AAMR for males (774.6) was higher than the AAMR for females (547.7) and the disparity ratio of 1.41 indicates a 41% increased risk of younger death for males compared to females (Table 1). Among the racial and ethnic groups assessed, all-cause AAMR was highest for non-Hispanic Black (726.3) residents, followed by non-Hispanic White (658.9), then Hispanic (511.0), then non-Hispanic Asian (330.8), and lastly non-Hispanic American Indian or Alaska Native[ǂ] (293.7) residents. Disparity ratios indicate that among all deaths in 2020, non-Hispanic Black residents had a 10% increased risk of death compared to non-Hispanic White residents while Hispanic, non-Hispanic Asian, and non-Hispanic American Indian or Alaska Native residents had a lower risk of death (22%, 50%, and 55%, respectively) than non-Hispanic White residents.

Health Promotion and Prevention

Multiple factors contribute to the recent flattening of all-cause mortality rate trends. Research has shown that lack of improvement in cardiovascular disease mortality rates had the largest effect on stalling all-cause mortality declines while increases in drug- and alcohol-related deaths and suicide contributed to a lesser extent.[20,21] Increasing mortality rates among working-age (25-64 years) adults in the U.S., a phenomenon not found in 16 other high-income countries, is an underlying driver and indicative of the United States' ongoing public health crises, such as substance abuse, mental health, obesity, diabetes, and heart disease.[20]

For more information about health promotion and activities to prevent deaths in Connecticut, visit our Resources page.

[ǂ] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual All-cause Mortality Rates, U.S. and Connecticut, 2005-2019

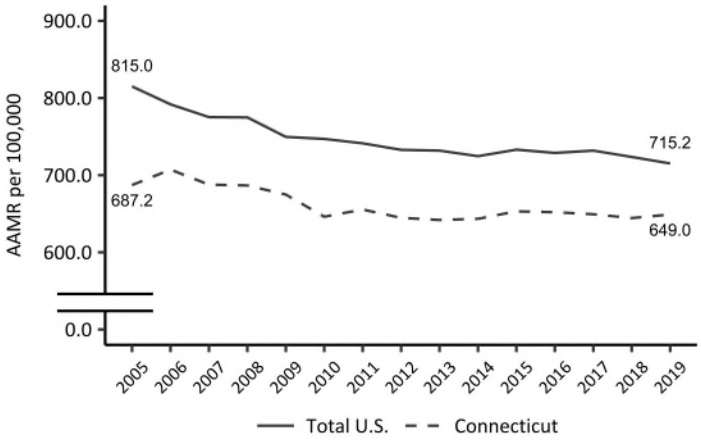


Figure 2: Annual All-cause Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

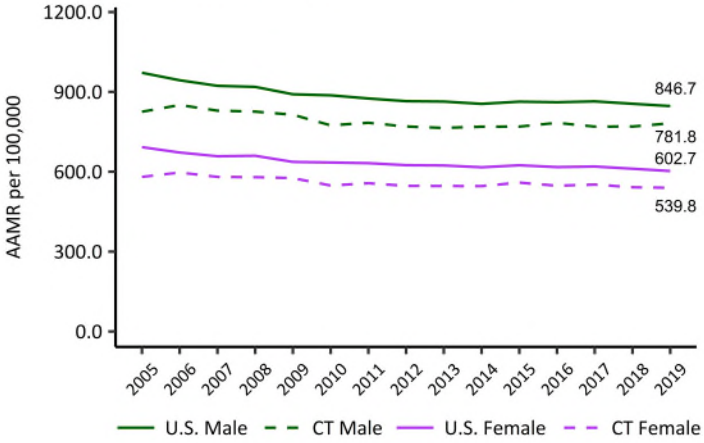


Figure 3: Annual All-cause Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

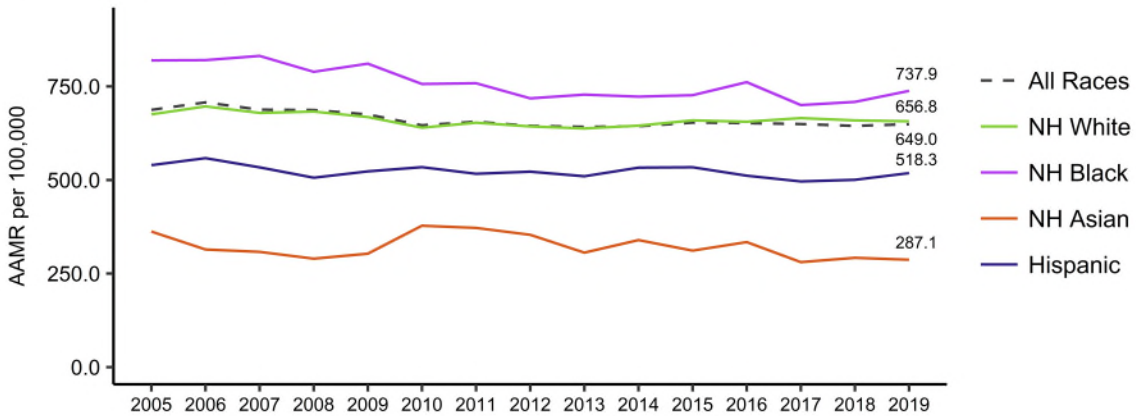


Figure 4: All-cause Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

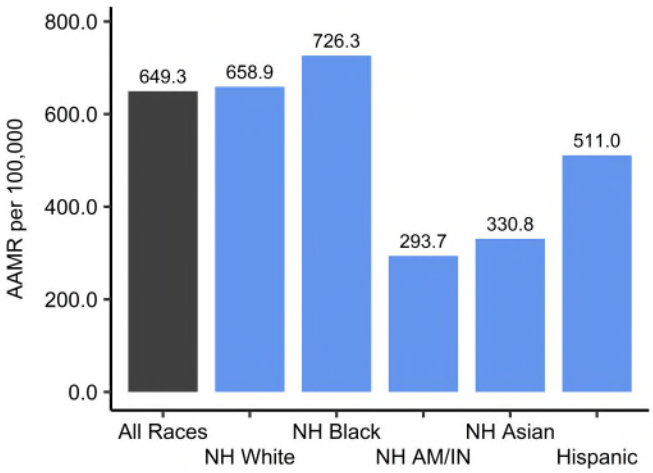


Table 1: Accident Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	Accident AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	56.5	Ref	
NH Black	43.6	0.77*	(0.711, 0.834)
NH AM/IN	34.0	0.60*	(0.478, 0.753)
NH Asian	16.0	0.28*	(0.229, 0.342)
Hispanic	42.3	0.75*	(0.694, 0.811)
Sex			
Female	29.0	Ref	
Male	74.0	2.55*	(2.412, 2.696)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

HEART DISEASE MORTALITY

Heart Disease was the leading cause of death in Connecticut and the United States in 2019.[22,23] Heart disease includes blockage of arteries supplying the heart (ischemic heart disease), arrhythmias, leaky heart valves, rupture of a heart vessel, congestive heart failure, and other disorders. Smoking, diet, and exercise are modifiable risk factors that relate causally to diabetes, obesity, elevated blood cholesterol, and hypertension – all of which increase heart disease risk.[24] Environment contributes to heart disease through psychosocial stressors, air pollution, and limiting nutritious food choices and physical activity opportunities.[25,26]

Key Takeaways

- Heart disease remains the leading cause of death in CT for 2019 with an AAMR of 140.4 deaths per 100,000 people.
- Males in CT were 60% more likely to die from heart disease than females for the five-year period 2015-2019.
- Heart disease mortality is highest among NH Black and NH White residents in CT.

State-National Comparisons and Trends over Time

In 2019, 7,351 Connecticut residents died from heart disease, comprising 23.1% of all state deaths. Over half of these deaths were due to ischemic heart disease. Connecticut's 2019 age-adjusted mortality rate (AAMR) for heart disease was 143.0 deaths per 100,000 people which was lower than the national AAMR of 161.5. Connecticut ranked 12th lowest among states for heart disease mortality in 2019.[19,27]

Mortality from heart disease fell in Connecticut from 2005 to 2013 by 2.1% annually (2.0% for males 2005-2013, 2.3% for females 2005-2014) but plateaued thereafter (Fig 1, 2). For all years 2005 through 2019, female mortality for heart disease in Connecticut was lower than male mortality. Nationally, heart disease mortality fell by 3.5% per year (3.3% for males, 4.0% for females) from 2005 to 2011 and by 0.8% per year (0.7% for males, 1.0% for females) from 2011 to 2019 (Figs. 1, 2). From 2005 to 2019, annual heart disease mortality rates for each sex in Connecticut were lower than the corresponding sex-specific rates in the U.S.[19]

Heart disease mortality rates trended lower among Hispanic (1.8% annually), non-Hispanic Black (1.5% annually), and non-Hispanic White (1.5% annually) residents between 2005 and 2019 (Fig. 3) while non-Hispanic Asian residents did not show stable declines.

Recent 5-year Demographic Comparisons

Based on the most recent five-year (2015-2019) AAMRs, mortality due to heart disease differed for males and females and between racial and ethnic groups. Males in Connecticut were 60% more likely to die from heart disease than females (Table 1). Non-Hispanic Black (158.9) residents had the highest AAMR among the race-ethnicity groups, followed by non-Hispanic White (144.4) residents, then Hispanic (99.8) residents. AAMRs for non-Hispanic American Indian or Alaska Native[ŧ] (73.3) and non-Hispanic Asian (72.3) residents were lower than the other groups but did not differ from each other. Disparity ratios based on these five-year rates show that non-Hispanic Black residents were 10% more likely to die from stroke than non-Hispanic White residents while Hispanic, non-Hispanic Asian, and non-Hispanic American Indian or Alaska Native residents were less likely to do so (31%, 50%, and 49% less likely, respectively; Table 1).

Health Promotion and Prevention

Between the 1960's and early 2010's, heart disease mortality declined steadily due to reductions in key cardiovascular disease risk factors (e.g., total cholesterol, systolic blood pressure, smoking prevalence, and physical inactivity) and advances in medical treatment (e.g., hypertension treatment/control, use of statins to lower cholesterol).[28] The recent stagnation in rates seen in both the U.S. and Connecticut is attributed to continued high rates of uncontrolled blood pressure and increasing prevalence of diabetes and obesity, particularly among younger adults ages 25 to 64.[28-31] Million Hearts® 2022 is a national initiative to prevent 1 million heart attacks and strokes within 5 years through implementation of a small set of evidence-based priorities and focusing on priority populations, including Black people with high blood pressure and adults aged 35 to 64 for whom heart disease mortality is on the rise.[32,33]

For more information about health promotion and activities to prevent heart disease deaths in Connecticut, visit our Resources page.

[ŧ] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual Heart Disease Mortality Rates, U.S. and Connecticut, 2005-2019

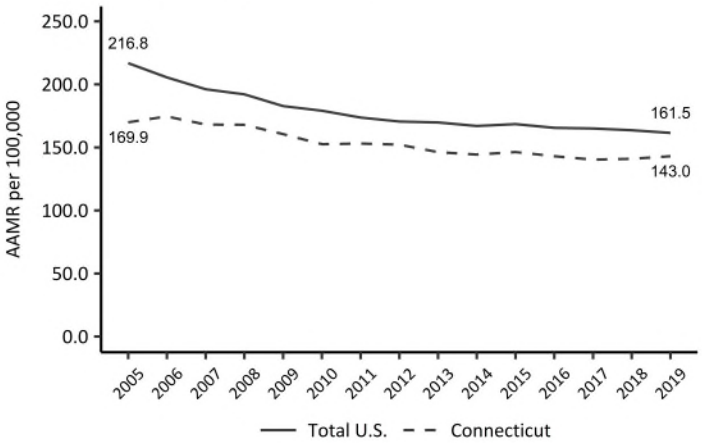


Figure 2: Annual Heart Disease Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

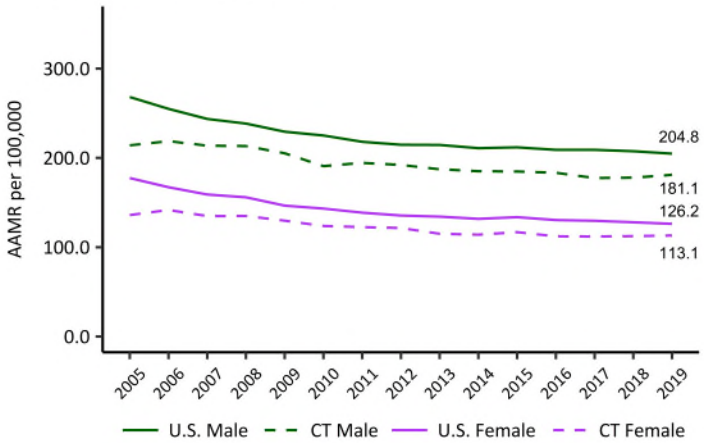


Figure 3: Annual Heart Disease Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

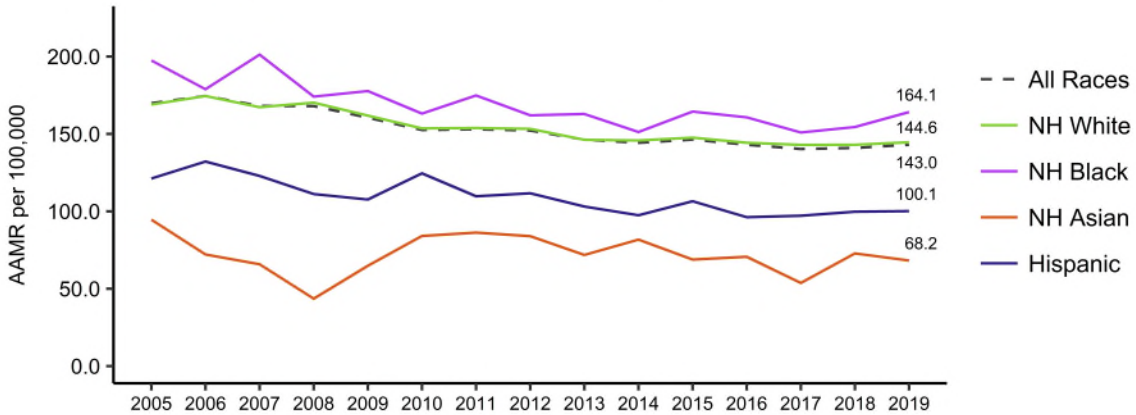


Figure 4: Heart Disease Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

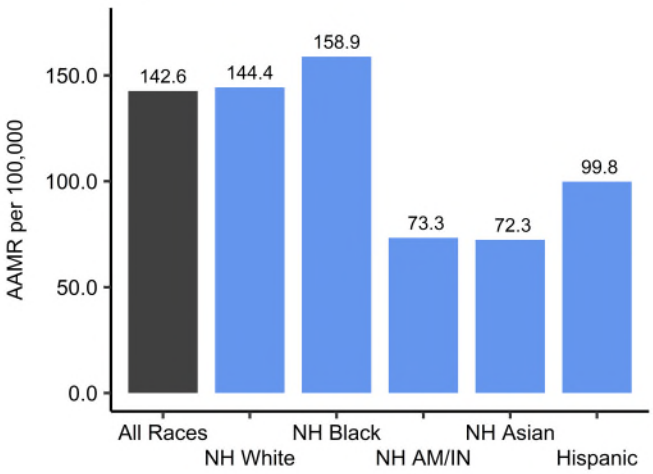


Table 1: Heart Disease Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	Heart Disease AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	144.4	Ref	
NH Black	158.9	1.10*	(1.065, 1.136)
NH AM/IN	73.3	0.51*	(0.451, 0.577)
NH Asian	72.3	0.50*	(0.466, 0.536)
Hispanic	99.8	0.69*	(0.660, 0.721)
Sex			
Female	113.2	Ref	
Male	180.8	1.60*	(1.567, 1.633)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

MALIGNANT NEOPLASMS (CANCER) MORTALITY

Cancer was the 2nd leading cause of death in Connecticut and the United States in 2019.[19,22,23] Malignant neoplasms, also known as cancer, are abnormal masses of cells that reproduce quickly and can spread to other parts of the body such as skin, muscle, bone, nerves, blood, and organ. Cancers of the lung, colon and rectum, pancreas, breast, and prostate are among the most common causes of cancer death.[23,34]

Key Takeaways

- Cancer mortality in CT continues to decline overall and separately for males and females.
- For 2015-2019, males were 37% more likely to die from cancer than females.
- NH Black and NH White residents continue to have the highest cancer mortality rates.

State-National Comparisons and Trends over Time

In 2019, cancer caused 6,487 deaths in Connecticut which represents 20% of all deaths. The age-adjusted mortality rate (AAMR) was 131.7 deaths per 100,000 population which is lower than the national rate of 146.2 deaths per 100,000.[19] Connecticut has exceeded the Healthy People 2020 objective of 161.4 since 2010 and ranked 7th lowest among states for cancer mortality in 2019. [19,35,36]

Between 2005 and 2019, Connecticut's cancer AAMR fell by an average of 2.1% per year (Fig. 1) for a total 14-year reduction of 25%. Males declined 2.3% annually and females declined 2.1% annually (Fig. 2). Cancer mortality rates for the U.S. fell by 1.6% per year during the same period with a total 14-year reduction of 21% (Fig. 1). U.S. male and U.S. female rates declined by 1.9% and 1.5% annually, respectively (Fig. 1). For all years 2005 to 2019, Connecticut's mortality rates for cancer overall and by sex were lower than the corresponding U.S. AAMRs.[19]

Cancer mortality rates trended lower from 2005 to 2019 for each major race and ethnicity group in Connecticut (Fig. 3). Non-Hispanic Asian residents declined by 3.5% per year. Non-Hispanic Black residents declined by 2.2% per year. Non-Hispanic White residents declined by 2.0% per year. Hispanic residents declined by 1.0% per year.

Recent 5-year Demographic Comparisons

Demographic comparisons for the most recent five years (2015-2019) show differences in cancer mortality among Connecticut's residents. During this period, the AAMR for males was 164.6 deaths per 100,000 population versus 120.1 for females and disparity ratios show that males were 37% more likely to die from cancer than females (Fig. 4). Among the racial and ethnic groups assessed, non-Hispanic Black (153.2) residents had the highest cancer mortality rate, followed by non-Hispanic White (141.8) residents, and then Hispanic (100.0) residents. Non-Hispanic Asian (72.9) and non-Hispanic American Indian or Alaska Native[ŧ] (65.2) residents had the lowest rates but did not differ statistically from one another. Disparity ratios show that non-Hispanic Black residents were 8% more likely to die from cancer than non-Hispanic White residents while Hispanic, non-Hispanic Asian, and non-Hispanic American Indian or Alaska Native residents were each less likely to die from cancer than non-Hispanic White residents (Table 1).

Health Promotion and Prevention

National cancer mortality has shown steady declines over the past 14 years and Connecticut's mortality rates consistently remain better than U.S. rates. According to the National Cancer Institute, national declines in overall cancer mortality are the result of fewer cancer deaths, particularly among the most common cancers such as lung, breast, and colon and rectum.[37] Declines in cancer mortality are attributed to various factors. Reductions in smoking prevalence and advances in treatment have reduced the number of cases and deaths from lung cancer.[37,38] Improvements in cancer screening tests, particularly colonoscopy, have saved lives by finding cancer earlier when it was more treatable.[37,39] New, more effective medical care and therapies have reduced the death rates due to melanomas even though the number of new cases is increasing.[37] Together, these cancer prevention measures are making an impact. Nonetheless, mortality for some types of cancer has worsened (e.g., pancreatic cancer) and disparities in cancer mortality by sex and race and ethnicity persist.[37]

For more information about health promotion and activities to prevent cancer deaths in Connecticut, visit our Resources page.

[ŧ] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual Cancer Mortality Rates, U.S. and Connecticut, 2005-2019

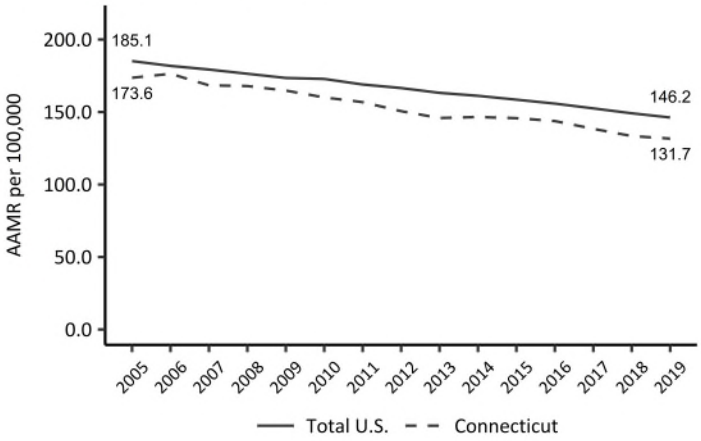


Figure 2: Annual Cancer Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

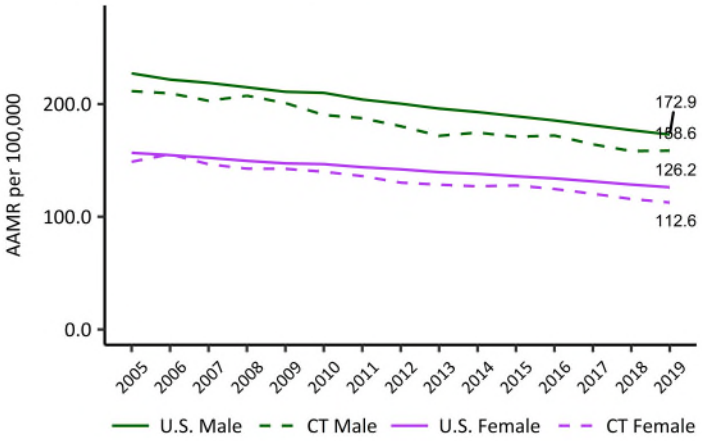


Figure 3: Annual Cancer Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

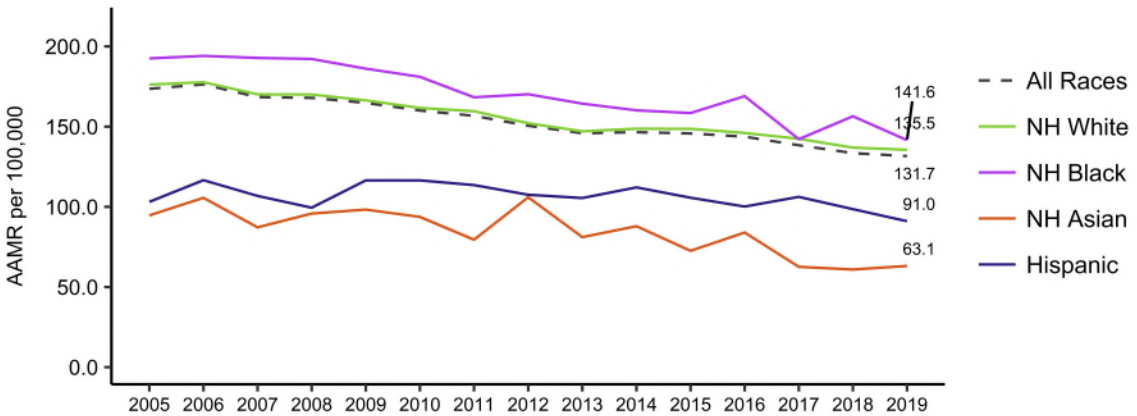


Figure 4: Cancer Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

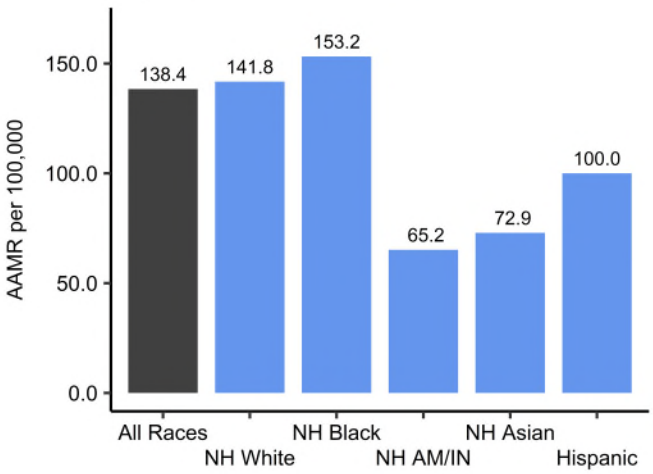


Table 1: Cancer Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	Cancer AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	141.8	Ref	
NH Black	153.2	1.08*	(1.045, 1.116)
NH AM/IN	65.2	0.46*	(0.403, 0.525)
NH Asian	72.9	0.51*	(0.477, 0.545)
Hispanic	100.0	0.71*	(0.680, 0.742)
Sex			
Female	120.1	Ref	
Male	164.6	1.37*	(1.341, 1.399)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

ACCIDENT (UNINTENTIONAL INJURY) MORTALITY

Accidents were the 3rd leading cause of death in Connecticut and the United States in 2019.[22,40,41] Accidental deaths are those caused by unintentional injury (without intent of harm or death) and include poisonings (most commonly, opioid drug overdoses), falls, motor vehicle accidents, and drownings.[40,42] While referred to as accidents, deaths due to unintentional injuries are preventable.

Key Takeaways

- The unintentional injury mortality rate for CT reached a new high of 56.4 deaths per 100,000 residents in 2019.
- The five-year (2015-2019) mortality rate for males was more than double that of females in CT.
- NH White residents have the highest rate of unintentional injury death among the major racial and ethnic groups.

State-National Comparisons and Trends over Time

In 2019, Connecticut had 2,203 deaths due to unintentional injury which represented 6.9% of all resident deaths that year. The age-adjusted mortality rate (AAMR) for unintentional injury among Connecticut residents reached 56.4 deaths per 100,000 residents in 2019 due to an average annual increase of 6.8% between 2010 and 2019. These increases in Connecticut caused the state's mortality rate to surpass the U.S. rate in 2015 (Fig. 1). In the U.S., between 2005 and 2019, unintentional injury mortality rates increased between 2013 and 2017 at 6.4% per year. Both the Connecticut and national unintentional injury AAMRs for 2019 were higher (worse) than the Healthy People 2020 objective target of an AAMR of 36.4.[43]

Connecticut's male and female populations had differing trend patterns of unintentional injury mortality between 2005 and 2019. For females, AAMRs increased at rate of 3.7% annually across the 14-year period. For males, an initial period of no change was followed by 7.5% yearly growth from 2011 to 2019 (Fig. 2). Sex-specific rates for the U.S. were similar to the overall US trends for which each sex increased only from 2013 to 2017 (7.0% for males, 5.0% for females).

Across the 14-year period from 2005 to 2019, annual unintentional injury mortality rates began their upward trend in the early 2010s for several racial and ethnic groups in Connecticut. Rates among Hispanic residents increased from 2012 to 2019 at 8.7% per year. Among non-Hispanic Black residents, rates increased from 2014 to 2019 by 13.1% per year. Rates among non-Hispanic White residents increased from 2012 to 2016 at 11.8% per year with potential for continued rise after 2016. Rates among non-Hispanic Asians did not show a consistent pattern of change between 2005 and 2019 (Fig. 3).

Recent 5-year Demographic Comparisons

Connecticut's five-year (2015-2019) unintentional injury mortality risk differed by sex and by racial and ethnic group. Disparity ratios show that males were 2.6 times more likely to die from an unintentional injury than females (Table 1). Non-Hispanic Black, Hispanic, non-Hispanic American Indian or Alaska Native[ǂ], and non-Hispanic Asian residents were each less likely to die from an unintentional injury than non-Hispanic White residents (Table 1). Unintentional injury mortality rates were highest for non-Hispanic White (56.5) residents, followed by non-Hispanic Black (43.6) and Hispanic (42.3) residents whose rates were similar. Rates for non-Hispanic American Indian or Alaska Native (34.0) residents were lower than the previous three racial and ethnic groups while the non-Hispanic Asian AAMR (16.0) was lowest of all (Fig. 3).

Health Promotion and Prevention

Unintentional injury mortality in Connecticut has been on the rise for almost a decade and has overtaken cancer and heart disease to be the leading cause of death in many demographic groups.[22,40,44-46] Drug overdose deaths remain the primary driver of Connecticut's rising trend in unintentional deaths, although deaths from unintentional falls have contributed to a lesser extent.[47] Prevention efforts at national and local levels focus on increasing access to care and support services for those experiencing mental health or substance use disorders, reducing the stigma of help-seeking, expanding access to harm reduction strategies, increasing the availability of naloxone for reversing opioid overdoses, and changes in prescribing practices to minimize drug use and initiation.[48-50]

For more information about health promotion and activities to prevent unintentional injury deaths in Connecticut, visit our Resources page.

[ǂ] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual Accident Mortality Rates, U.S. and Connecticut, 2005-2019

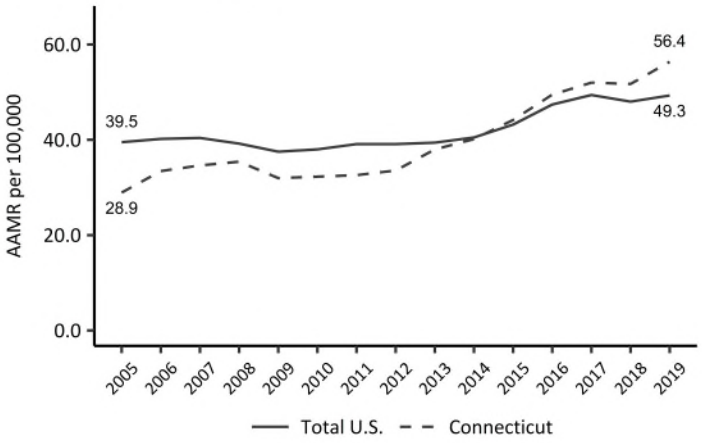


Figure 2: Annual Accident Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

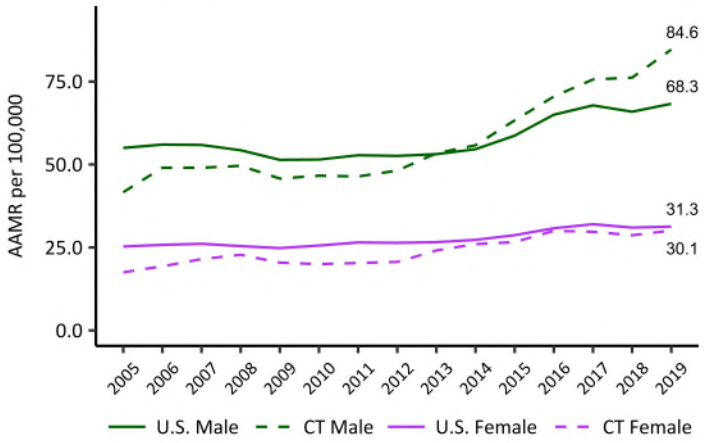


Figure 3: Annual Accident Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

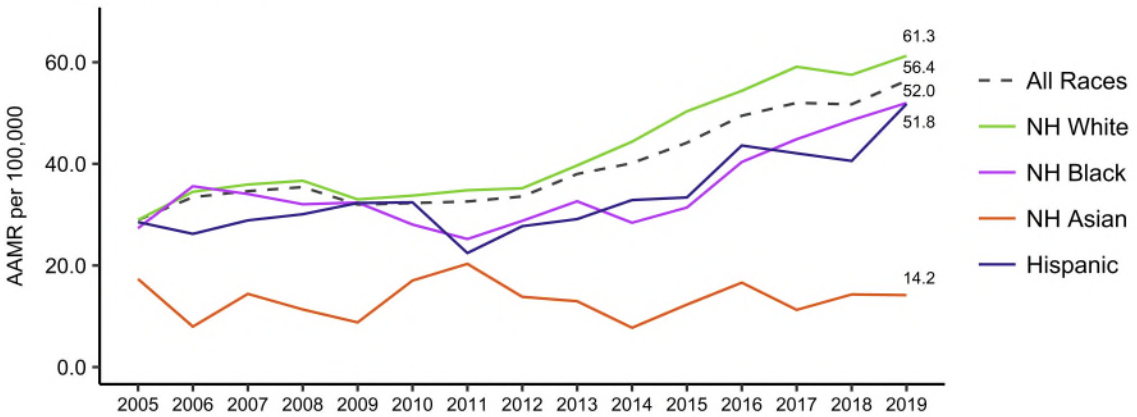


Figure 4: Accident Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

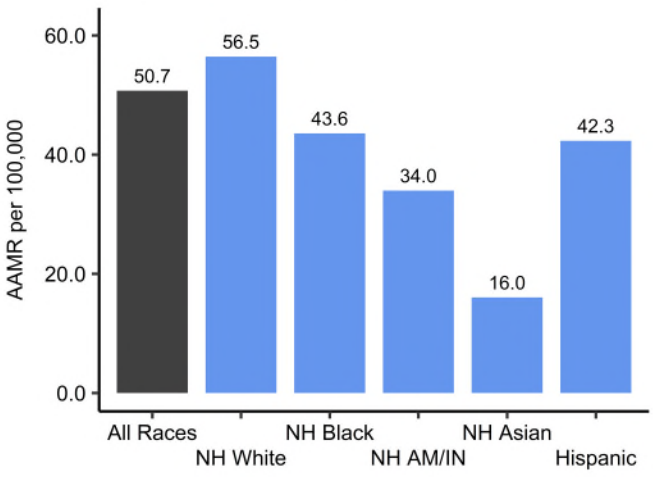


Table 1: Accident Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	Accident AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	56.5	Ref	
NH Black	43.6	0.77*	(0.711, 0.834)
NH AM/IN	34.0	0.60*	(0.478, 0.753)
NH Asian	16.0	0.28*	(0.229, 0.342)
Hispanic	42.3	0.75*	(0.694, 0.811)
Sex			
Female	29.0	Ref	
Male	74.0	2.55*	(2.412, 2.696)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

CHRONIC LOWER RESPIRATORY DISEASES MORTALITY

Chronic lower respiratory diseases (CLRD) were the 4th leading cause of death in Connecticut and the United States in 2019.[22,23] These diseases are characterized by chronic lung inflammation which causes obstructed airflow. Within CLRD, chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema, accounts for nearly all deaths in this category although acute bronchitis, asthma, and bronchiectasis deaths are also included.[51] COPD is typically caused by long-term exposure to irritating gases or particulate matter. In the United States, cigarette smoking is the leading cause of COPD, although about 1 in 4 persons with COPD have never smoked.[52] Air pollution in the home and workplace, respiratory infections, and genetic factors are additional risk factors.[51,53-57] People with COPD are at increased risk of developing heart disease, lung cancer, and a variety of other conditions.[58-60]

Key Takeaways

- The CLRD mortality rate in 2019 was 27.9 deaths per 100,000 population, which was lower than the U.S. rate of 38.2.
- The statewide CLRD mortality rate declined by 21% between 2005 to 2019.
- Long-term declines were found among Hispanic and NH White residents but not among NH Black or NH Asian residents.

State-National Comparisons and Trends over Time

During 2019, 1,397 Connecticut residents died from CLRD which represented 4.4% of all state deaths that year. The 2019 age-adjusted mortality rate (AAMR) was 27.9 deaths per 100,000 people and is lower than the U.S. AAMR of 38.2.[22,23] Between 2005 and 2019, Connecticut's CLRD mortality declined by 1.6% per year for a total reduction of 21% over the 14-year period (Fig. 1). During that same period, the national AAMR fell by 0.6% per year (Fig. 1) for a total reduction of 13%. Connecticut ranked 5th lowest among states for CLRD AAMR in 2019.[61]

Between 2005 and 2019, Connecticut's CLRD mortality rates for each sex showed long-term declines; male CLRD rates fell by 2.2% per year and female rates fell by 1.1% per year. The more rapid decline in AAMRs among males narrowed the relatively small difference between their rates over the past 14 years. In 2019, the AAMRs between males (29.5) and females (26.9) in Connecticut did not differ statistically (Fig. 2). Over the same 14 years, U.S. male AAMRs had sharper declines than female AAMRs (1.3% and 0.2% annually, respectively) narrowing the U.S. sex-specific rate differences as well.[19]

The overall pattern of declining rates in Connecticut between 2005 and 2019 was evident for Hispanic and non-Hispanic White residents, who declined by 2.4% and 1.4% per year, respectively. Non-Hispanic Black and non-Hispanic Asian resident rates did not show a consistent pattern of change over time (Fig. 3).

Recent 5-year Demographic Comparisons

The five-year (2015-2019) aggregate AAMRs for CLRD show differences by sex and by racial and ethnic group. Males (30.7 per 100,000) were 8% more likely than females (28.4) to die from CLRD for the 2015-2019 period (Table 1). Non-Hispanic White residents (31.0) had the highest AAMR of the major racial and ethnic groups while non-Hispanic Black residents (24.0) had the second highest AAMR. The rate for Hispanic residents (15.8) was higher than the rate for non-Hispanic Asian residents (7.5) while the rate for non-Hispanic American Indian or Alaska Native[ł] residents (12.2) did not statistically differ from either the Hispanic or non-Hispanic Asian resident AAMRs. Compared to non-Hispanic White residents, each of the other major racial and ethnic groups in Connecticut had a lower risk for death from CLRD (Fig. 4).

Health Promotion and Prevention

Declines in CLRD mortality rates between 2005 and 2019 in both Connecticut and the U.S. are consistent with long-term declines in cigarette smoking.[62] While substantial gains have been made, CLRD remains the 4th leading cause of death in the U.S. Public health programs and policies continue to focus on tobacco-use prevention and cessation, including vaping which has increased among youths,[63] and reducing exposure to indoor and outdoor air pollutants.[64] Treatment interventions focus on slowing progression of COPD after diagnosis.[65]

For more information about health promotion and activities to prevent CLRD deaths in Connecticut, visit our Resources page.

[ł] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual CLRD Mortality Rates, U.S. and Connecticut, 2005-2019

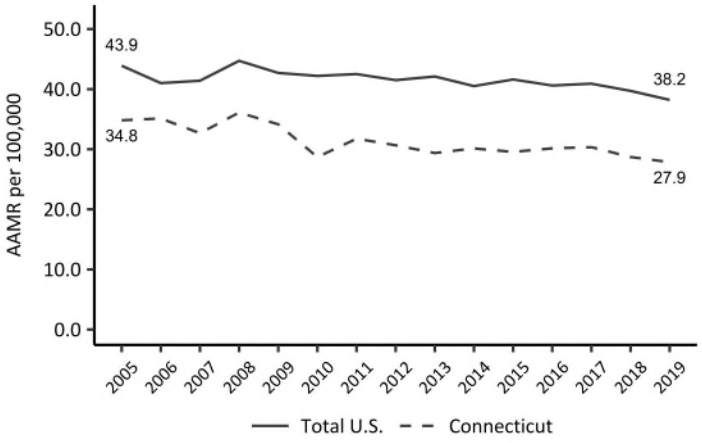


Figure 2: Annual CLRD Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

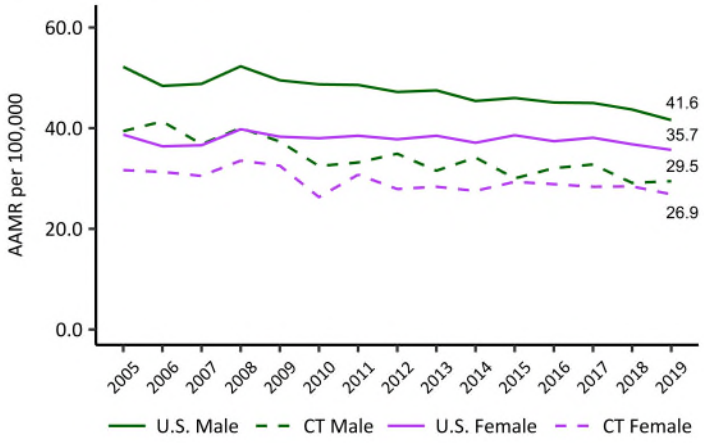


Figure 3: Annual CLRD Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

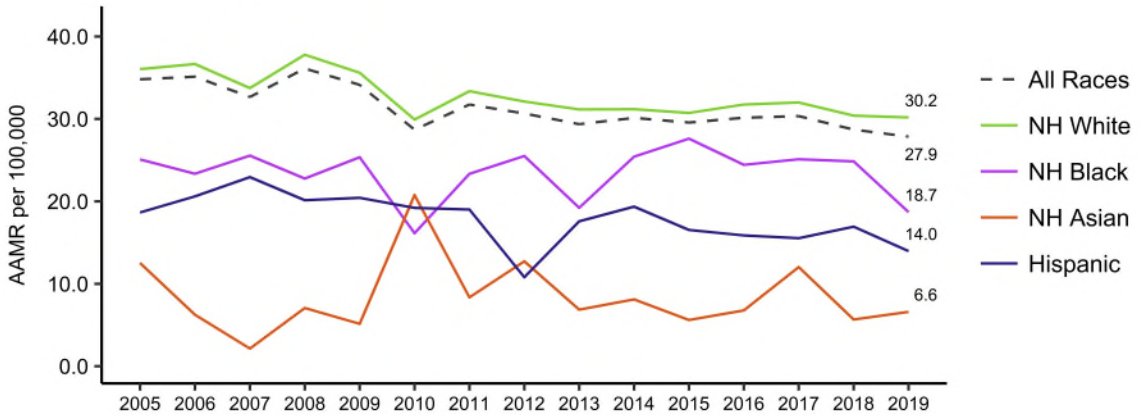


Figure 4: CLRD Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

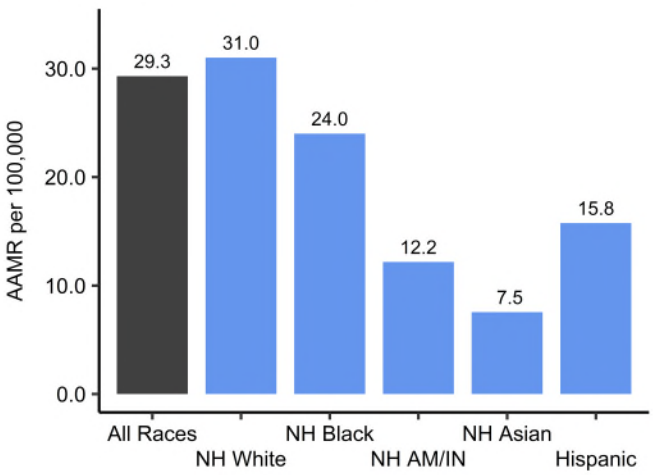


Table 1: CLRD Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	CLRD AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	31.0	Ref	
NH Black	24.0	0.77*	(0.678, 0.874)
NH AM/IN	12.2	0.39*	(0.244, 0.622)
NH Asian	7.5	0.24*	(0.164, 0.351)
Hispanic	15.8	0.51*	(0.429, 0.607)
Sex			
Female	28.4	Ref	
Male	30.7	1.08*	(1.010, 1.155)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

CEREBROVASCULAR DISEASE (STROKE) MORTALITY

Cerebrovascular disease, also known as stroke, was the 5th leading cause of death in Connecticut and the US in 2019.[23,66] Stroke includes both ischemic (lack of blood) and hemorrhagic (brain bleed) subtypes. Pre-existing conditions that increase a person's risk for stroke include having a previous stroke or transient ischemic attack ("mini-stroke"), high blood pressure, high cholesterol, heart diseases, diabetes, and sickle cell disease.[67] Behavioral risk factors for stroke include those behaviors that lead to the pre-existing conditions: unhealthy diet, physical inactivity, obesity, tobacco use, and too much alcohol.[67] Stroke mortality also increases with age and the chance of having a stroke about doubles every 10 years after age 55.[67,68]

Key Takeaways

- After decades of decline, stroke mortality rates in both CT and the United States have plateaued.
- Rates for NH Black and Hispanic residents continue long-term declines while those for NH White plateaued in 2012.
- NH Black residents were 28% more likely to die from stroke than NH White or Hispanic residents during 2015-2019.

State-National Comparisons and Trends over Time

In 2019, 1,371 Connecticut residents died from stroke which represents 4.3% of all deaths in the state. Connecticut's age-adjusted mortality rate (AAMR) was 26.6 deaths per 100,000 population in 2019 and was lower than the national rate of 37.0.[19] Connecticut has been lower (better) than the Healthy People 2020 target of 34.8 for stroke mortality since 2007.[69] Connecticut ranked 2nd lowest among states for stroke AAMR in 2019.[19]

The trends in stroke mortality from 2005 to 2019 show that Connecticut, the U.S., males, and females each experienced decline in the first half of the 14-year period but plateaued thereafter. For Connecticut residents, stroke AAMRs fell by 3.9% per year for both sexes (2005-2012), 5.3% per year for males (2005-2011), and 3.0% per year for females (2005-2014; Figs 1, 2). Connecticut males and females did not differ in their AAMRs for stroke for any year between 2005 and 2019. In the U.S., AAMRs fell by 3.6% annually for both sexes (2005-2012), 4.1% annually for U.S. males (2005-2011), and 3.5% annually for U.S. females (2005-2012).[19] For all years from 2005 to 2019, Connecticut's AAMRs for stroke overall and by sex were lower than U.S. rates.

Connecticut's trends by race and ethnicity varied. Stroke AAMRs for non-Hispanic Black and Hispanic residents trended downward during 2005-2019 (2.6% and 2.1% per year, respectively) while non-Hispanic Asian did not show stable changes. Rates for non-Hispanic White residents mirrored those of Connecticut overall, falling 4.0% per year from 2005 to 2012 and then remaining stable thereafter (Fig. 3).

Recent 5-year Demographic Comparisons

For the most recent five-year period (2015-2019), Connecticut males and females had the same risk for stroke mortality (Table 1), yet Connecticut's racial and ethnic subgroups did not. Non-Hispanic Black residents (33.7) had the highest AAMR, followed by non-Hispanic White (26.3) and Hispanic (26.2) residents who did not differ from one another (Fig. 4). Non-Hispanic Asian residents (20.4) were lower than the previous three racial-ethnic groups while non-Hispanic American Indian or Alaska Native[ł] residents (6.6) were lowest of all. Disparity ratios based on these five-year rates show that non-Hispanic Black residents were 28% more likely to die from stroke than non-Hispanic White residents while non-Hispanic Asian and non-Hispanic American Indian or Alaska Native residents were less likely to do so (22% and 75% less likely, respectively; Table 1). No differences in mortality risk between Hispanic and non-Hispanic White residents were found.

Health Promotion and Prevention

As a circulatory disease, stroke shares many of the same risk factors and prevention efforts as heart disease. The Million Hearts® 2022 is national initiative to prevent 1 million heart attacks and strokes within 5 years.[32] The 2022 initiative focuses on reducing sodium intake and tobacco use (including e-cigarettes), increasing physical activity, and increasing the number of patients who receive effective health care strategies, such as controlling high blood pressure, statin therapy, and cardiac rehabilitation.

For more information about health promotion and activities to prevent stroke deaths in Connecticut, visit our Resources page.

[ł] See caution in methods section about underreporting of American Indian or Alaska Native on death certificates.

Figure 1: Annual Stroke Mortality Rates, U.S. and Connecticut, 2005-2019

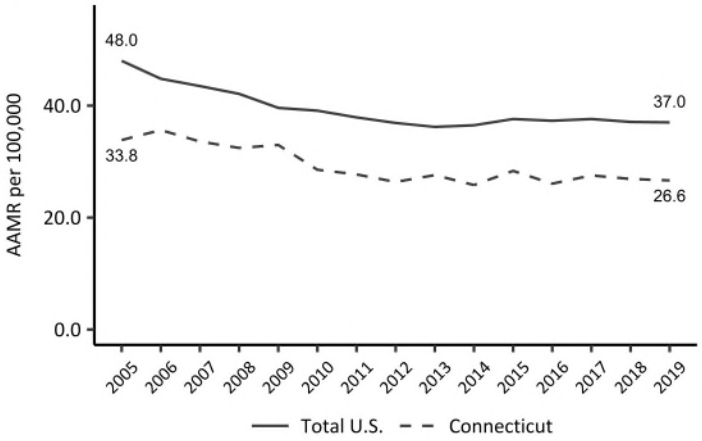


Figure 2: Annual Stroke Mortality Rates by Sex, U.S. and Connecticut, 2005-2019

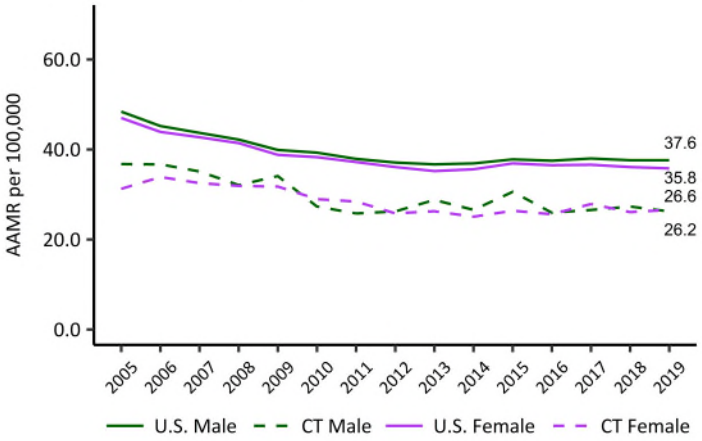


Figure 3: Annual Stroke Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

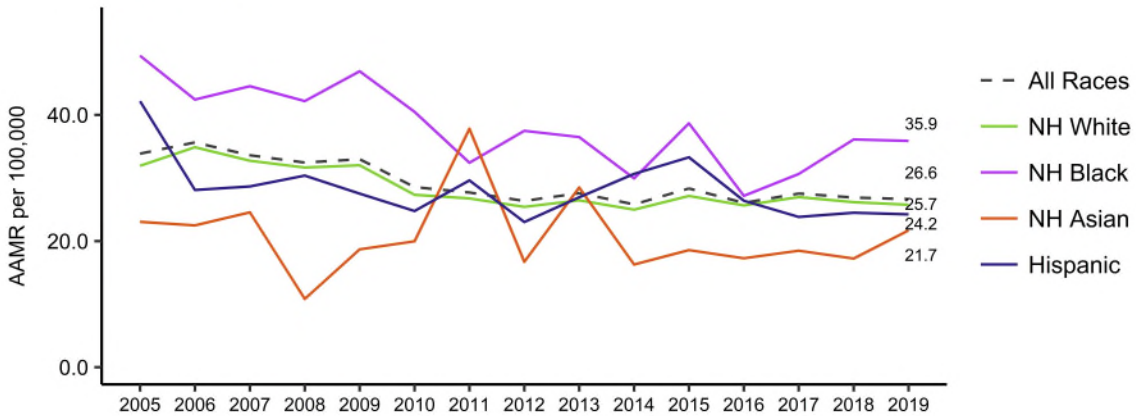


Figure 4: Stroke Mortality Rates by Race and Ethnicity, Connecticut, 2015-2019

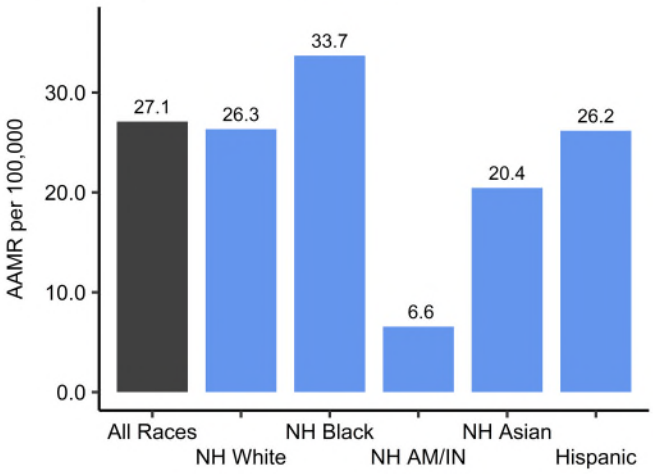


Table 1: Stroke Mortality Rate Disparity Ratios by Race and Ethnicity, Connecticut, 2015-2019

Characteristic	Stroke AAMR	Disparity Ratios	95% Confidence Limit‡
Race and Ethnicity			
NH White	26.3	Ref	
NH Black	33.7	1.28*	(1.150, 1.424)
NH AM/IN	6.6	0.25*	(0.118, 0.527)
NH Asian	20.4	0.78*	(0.648, 0.939)
Hispanic	26.2	0.99	(0.872, 1.125)
Sex			
Female	26.5	Ref	
Male	27.3	1.03	(0.959, 1.106)

‡Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.

NEONATAL MORTALITY

The first 28 days of an infant's life define the neonatal stage. During this critical period, the risk of death for the infant is at its highest compared to the latter period of an infant's life as well as through the rest of childhood until early adulthood. In 2019, two-thirds of infant deaths in the United States and Connecticut occurred during the neonatal period.[23] Neonatal mortality is a widely used indicator of population health and welfare as it reflects the general state of maternal health.[70] The leading causes of neonatal mortality nationally include "short gestation (prematurity) and low birthweight", "maternal complications", and "congenital malformations".[22]

Key Takeaways

- CT reached a historic low of 3.0 neonatal deaths per 1,000 births in 2019, continuing years of decline in neonatal IMR.
- Lower neonatal mortality in CT as compared with the U.S. in recent years is consistent with long-term progress in reducing neonatal mortality in CT.
- For 2015-2019, the leading cause of death for neonates in both CT and the U.S. remains preterm birth and low birthweight.

State-National Comparisons and Trends over Time

In 2019, Connecticut's neonatal mortality rate was 3.0 deaths per 1,000 births, which represents 104 neonatal deaths, and was below the U.S. rate of 3.7 deaths per 1,000 births (Fig. 1).[23] Across the 15-year period of 2005 to 2019, the U.S neonatal mortality rate declined at 2.1% annually from 2005 to 2010 and 1.0% annually from 2010 to 2019. For the same period, the Connecticut neonatal mortality rate declined at 3.1% per year from 2005 to 2019. Although Connecticut was initially higher than the national rate, our state's downward trend between 2007 and 2019 has brought Connecticut's rate below the national rate in recent years. Both the Connecticut and U.S. neonatal mortality rates were below the Healthy People 2020 national target of 4.1 deaths per 1,000 births.[43]

Between 2005 and 2019, declines in neonatal infant mortality rates varied among racial and ethnic groups in Connecticut. Neonatal infant mortality rates among non-Hispanic Black residents and Other Hispanic residents each declined at 3.5% and 3.6% per year, respectively, across the 15-year period (Fig. 2). Rates among non-Hispanic White residents declined over the 15-year period by 0.8%. Rates for Puerto Rican infants showed no overall pattern of change (Fig. 2).

Leading Causes of Death

Over the five-year period from 2015 to 2019, 593 infants in Connecticut died during their neonatal period which was an average of 119 deaths per year. The leading cause of death for neonates in this period was "disorders related to short gestation and low birthweight", which represented an average of 32 neonatal deaths per year. This cause was also top ranked among neonatal death causes at the national level for the same five-year period and the neonatal death rate associated with it was comparable between Connecticut and the U.S (Fig. 3). "Maternal complications" was the second leading cause with an average of 17 neonatal deaths per year, followed closely by "congenital malformations" (birth defects) as the third leading cause of death with an average of 16 neonatal deaths per year. The three other leading causes of neonatal mortality, "complications of the placenta", "respiratory distress", and "bacterial sepsis", resulted in an average of 7, 5, and 4 neonatal deaths per year, respectively, and were also comparable to U.S. rates.

Health Promotion and Prevention

Improvements in medical care of high-risk infants, predominately among very low birth weight births, accounted for most of the declines in U.S. neonatal mortality between 2008 and 2017.[71] To further reduce neonatal infant mortalities in the U.S., current national initiatives support programs and policies that use evidence-based strategies, quality improvement practices for perinatal care, and collaborative learning in the following areas: safe sleep, smoking cessation, preconception and inter-conception health, social determinants of health, preterm and early term births, and risk-appropriate perinatal care.[72,73] Many programs and initiatives that came out Connecticut's Collaborative Improvement and Innovation Network (CoIIN) project address improving preconception and interconception health which serves to reduce neonatal mortality.[74,75]

For more information about health promotion and activities to prevent neonatal deaths in Connecticut, visit our Resources page.

Figure 1: Annual Neonatal Mortality Rates, U.S. and Connecticut, 2005-2019

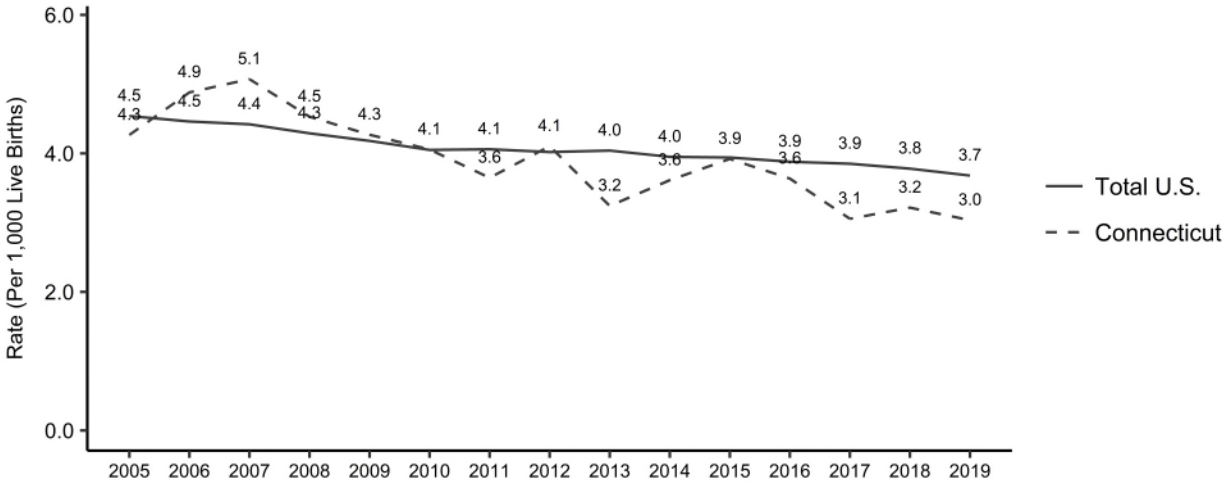


Figure 2: Annual Neonatal Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

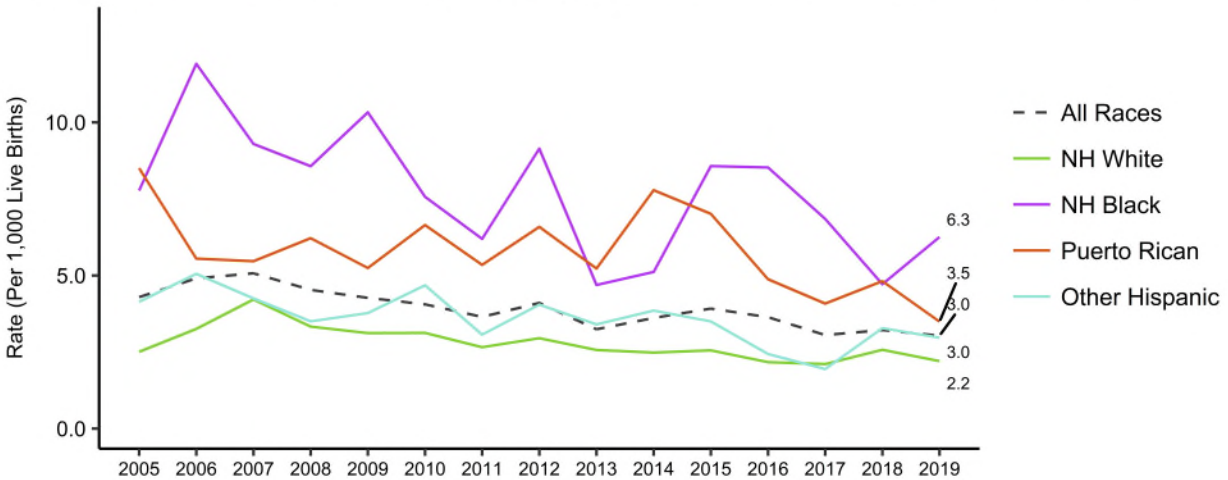
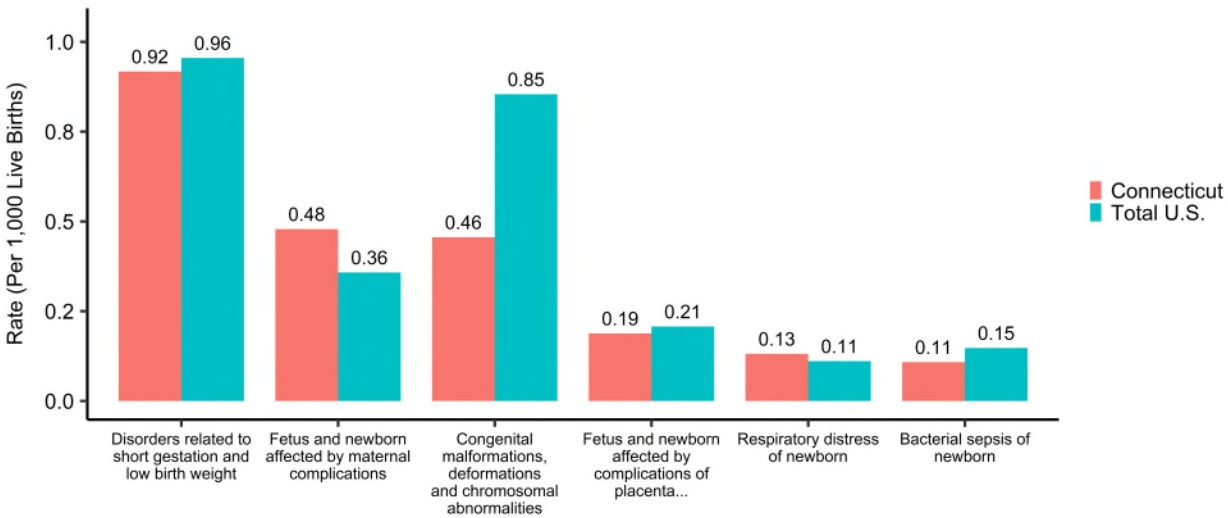


Figure 3: Leading Causes of Neonatal Mortality Rates, U.S. and Connecticut, 2015-2019



POST-NEONATAL MORTALITY

Infant deaths that occur among children between the ages of 28 days and 364 days are classified as post-neonatal deaths. While two-thirds of infant deaths occur during the first 27 days (neonatal period) of life, risk of death during the post-neonatal period remains prominent as it represents a third of infant deaths in both Connecticut and the United States.[22,23] National leading causes of post-neonatal mortality include "birth defects (congenital malformations, deformations, and chromosomal abnormalities)", "sudden infant death syndrome", and "accidents (unintentional injuries)".[22]

Key Takeaways

- The post-neonatal IMR for CT was 1.5 deaths per 1,000 births in 2019.
- From 2005 to 2019, the post-neonatal IMR for CT has remained relatively unchanged, both statewide and among individual racial and ethnic groups.
- "Birth defects" was the leading cause of post-neonatal death in CT for the five-year period 2015-2019.

State-National Comparisons and Trends over Time

In 2019, Connecticut's post-neonatal mortality rate was 1.5 deaths per 1,000 births, which represents 50 post-neonatal deaths, and was below the U.S. rate of 1.9 (Fig. 1).[23] During the 15-year period from 2005 to 2019, Connecticut's rate did not show a consistent pattern of change. The U.S. rate declined by 4.3% per year from 2008 to 2012 and remained stable from 2012 to 2019 (Fig. 1). Both the Connecticut and the U.S. post-neonatal mortality rates for 2019 are below the Healthy People 2020 national target of 2.0 deaths per 1,000 births.[43]

Consistent with the state's overall lack of change across time, rates of post-neonatal mortality among the racial and ethnic groups showed no consistent pattern of increase or decrease across the 15-year period (Fig. 2).

Leading Causes of Death Comparisons

The leading causes of post-neonatal death in Connecticut for the five-year period 2015-2019 were, in rank order, "birth defects", "sudden infant death syndrome", and "accidents". "Birth defects" caused an average of 9 post-neonatal deaths per year, followed by "sudden infant death syndrome" with an average of 8 deaths per year, and then "accidents" with an average of 5 deaths per year (Fig. 3).[23] On the national level, those three causes were also top ranked during the same five-year period of 2015-2019.[19]

Comparison of post-neonatal mortality rates between Connecticut and the U.S. show that mortality rates for "birth defects", the leading cause of death, were comparable and the rates for "sudden infant death syndrome" and "accidents" were lower in Connecticut. (Fig. 3).

Health Promotion and Prevention

Current initiatives and educational campaigns in the U.S. to reduce infant mortality during the first full year of life focus on reducing the risk of birth defects and sudden infant death syndrome. Access to folic acid for expectant mothers, which helps prevent fetal malformations of the spine and brain, is increasing with the establishment of the March of Dimes National Folic Acid awareness week.[76,77] Timely maternal vaccination has also been recognized by the National Conference of State Legislatures (NCSL) to help protect pregnant women against infections and viruses that cause birth defects.[76] National initiatives issued by the American Academy of Pediatrics (AAP), which include safe sleep, breastfeeding, smoking cessation, and alcohol and drug prevention during the pregnancy period, are set in place to help reduce the risk of sudden infant deaths.[78]

For more information about health promotion and activities to prevent post-neonatal deaths in Connecticut, visit our Resources page.

Figure 1: Annual Post-neonatal Mortality Rates, U.S. and Connecticut, 2005-2019

Figure 2: Annual Post-neonatal Mortality Rates by Race and Ethnicity, Connecticut, 2005-2019

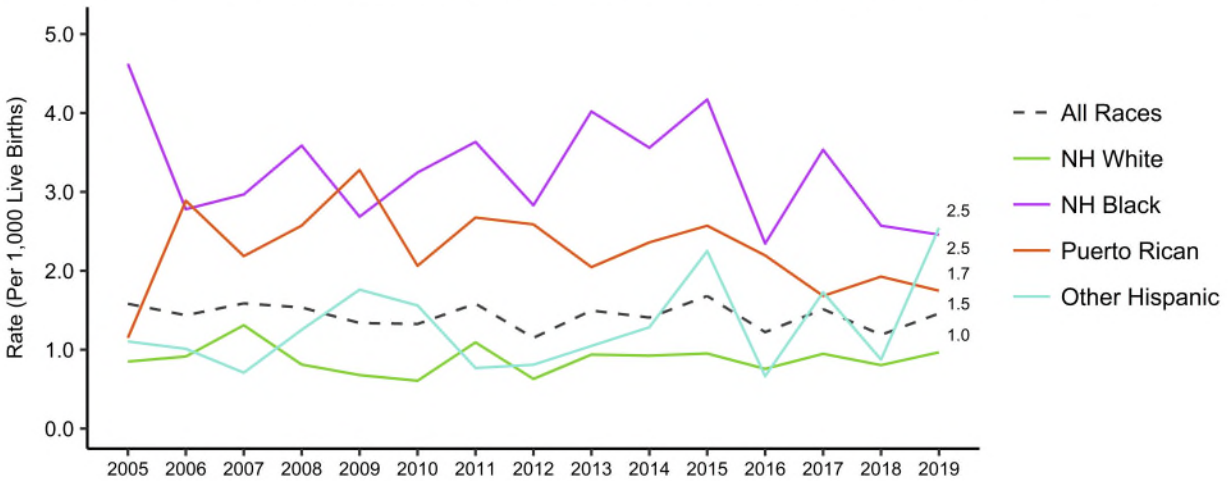
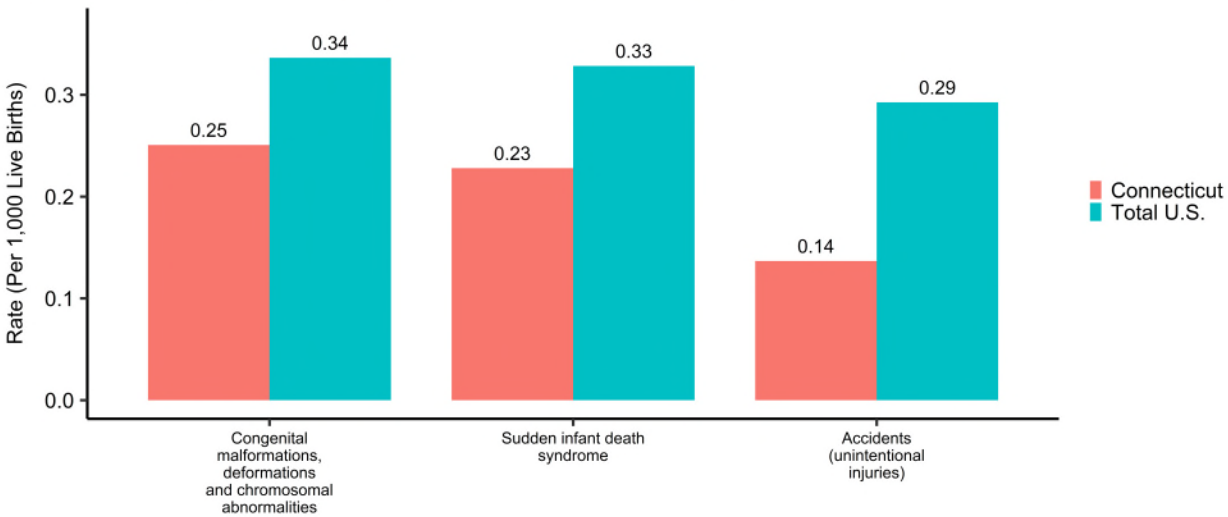


Figure 3: Leading Causes of Post-neonatal Mortality Rates, U.S. and Connecticut, 2015-2019



Appendices

APPENDIX I
CONNECTICUT HEALTH PROMOTION AND PREVENTION RESOURCES

The Connecticut Department of Public Health's (CT DPH) Chronic Disease programs work to collectively address the more than 2 million Connecticut residents that suffer from one or more chronic diseases. Chronic disease programs work collaboratively within the Department and with partners to make healthy choices, easier choices. CT DPH works to lessen the burden of chronic diseases and their risk factors through multiple CDC cooperative agreements and grants.

***Change the Script* Campaign**

Change the Script is a statewide public awareness campaign to help communities address the prescription drug and opioid misuse crisis. The CT DPH, in collaboration with the Connecticut Department of Mental Health and Addiction Services (DMHAS), Department of Consumer Protection (DCP), and Department of Children and Families (DCF) has launched an educational campaign for state residents that helps to increase awareness of the dangers of opioid and prescription drug misuse while focusing on decreasing the stigma of addiction and promoting life-saving measures such as naloxone and treatment. The campaign materials available for use include social media messages, PSAs (radio and TV), billboards, posters, and brochures. http://www.ct.gov/dmhas/cwp/view.asp?a=2912&q=599902

Naloxone + Opioid Response App (NORA)

The **N**aloxone + **O**pioid **R**esponse **A**pp (**NORA**) is a free interactive educational tool that will expand the understanding of what naloxone is and reinforce initial training given when a person fills their prescription for it. The app provides resources for people interested in learning about opioids, information on recognizing the signs of an opioid overdose and how to respond, explains the protections offered by the Good Samaritan Law, provides information on proper storage and disposal, connects people with other resources to prevent overdose, and helps people find treatment and recovery supports. http://www.norasaves.com/

Family Navigator Program at the Connecticut Office of the Chief Medical Examiner

The Family Navigator Program at the Connecticut Office of the Chief Medical Examiner conducts confidential next-of-kin interviews on certified overdose deaths and is an integral part of the Overdose Fatality Review. A key aspect of the interview is to provide resources for support to the bereaved interviewee after losing someone to an overdose. A next-of-kin interview coupled with other data sources expand and deepen understanding of the life experiences of the decedent and identify factors that contributed to the overdose death. Information gathered is reviewed by members of the multidisciplinary Overdose Fatality Review to inform community-specific prevention strategies, implement evidence-based interventions, and mobilize communities to prevent future overdose and overdose death.

Medication for Opioid Use Disorders in the Connecticut Department of Correction

The Connecticut Department of Correction (CT DOC) currently serves approximately 680 inmate-patients daily with opioid use disorder medications and psycho-behavioral counseling. There are 10 facilities across the state that offer these services for inmate-patients across the continuum of care. This means they can access treatment upon entering CT DOC, for maintenance treatment, or before releasing back into the community. CT DOC is working hard to meet inmate-patients where they are at in their recovery by offering all three FDA approved medications for opioid use disorder and providing maintenance and induction treatment options in 10 of our facilities.

Sexual Violence Prevention Program

The CT DPH Sexual Violence Prevention program receives funding from the Centers for Disease Control and Prevention to build Connecticut's capacity to prevent and eliminate sexual violence victimization, perpetration, and to ensure safe and

healthy communities. The Sexual Violence Prevention program also receives federal and state funds to provide rape crisis and intervention services to sexual assault victims and their families, through the Connecticut Alliance to End Sexual Violence (formerly CONNSACS), who subcontracts with 9 Rape Crisis Centers to provide these services.

Connecticut Violent Death Reporting System (CTVDRS)

In 2014, the Centers for Disease Control and Prevention awarded funds to the CT DPH to establish the Connecticut Violent Death Reporting System (CTVDRS). Since 2015, the CT DPH has collected data for the CTVDRS on violent deaths, which include suicides, homicides, deaths from legal intervention, terrorism, deaths of undetermined intent, and accidental firearm deaths. The major sources of data for the CTVDRS are medical examiner reports, death certificates, and law enforcement reports that include Supplementary Homicide Reports from the Department of Emergency Services and Public Protection. Data gleaned from these reports include demographics and circumstances of each violent death. With these data, the CTVDRS and its key stakeholders target violence prevention efforts.

Suicide Prevention

The CT DPH provides education and awareness to the general public and vulnerable populations about available mental health promotion and suicide prevention resources. Connecticut has an active group of agency and community-based organization representatives, advocates, and concerned citizens that are members of the CT Suicide Advisory Board (CTSAB) and meets monthly. Mental health and suicide prevention programs and services recommended by the CTSAB are aligned with the statewide CT Suicide Prevention (SP) Plan and with the Centers for Disease Control and Prevention's Suicide Prevention Technical Package (2018). CT DPH provides suicide-related morbidity and mortality data to stakeholders and makes recommendations on evidence-based prevention, intervention, and response strategies.

Traffic and Motor Vehicle Injury Prevention Program

Transportation Safety is a CT DPH inter-office and CT inter-agency collaboration guided by the CDC, Safe States Alliance, National Highway Transportation Safety Administration, and under CT Public Act 21-28, the newly formed Vision Zero Council. Motor Vehicle Injury Prevention and Transportation Safety has a focus on injury prevention for child passengers, teens & older drivers, impaired drivers, distracted drivers, pedestrians, bicyclists, motorcyclists, transit users, and those on tribal roads.

Fall Prevention Program

Falls are the leading cause of injury-related death for Connecticut residents aged 65 years and over and the fourth leading cause for all ages. Falls can cause serious injuries such as head trauma and fractures that require emergency treatment or hospitalization. In addition, older adults may require a year or more to recover from these injuries and may never be able to return to their homes. The CT DPH partners with local health departments and community agencies to promote fall risk assessment and reduction strategies in a variety of settings and recommend physical activity and exercise; balance training; medication review and management; vision, hearing, and foot care; and home/environment modification to reduce the physical, emotional, and economic costs associated with falls.

Traumatic Brain Injury Prevention Program

The CT DPH collaborates with community partners on strategies to provide communication, education, and training for the public about leading causes of and prevention measures for traumatic brain injury (TBI). Strategies include educating the public and providers about the effects of TBI including the long term effects associated with head injury; educating the public and providers that concussions are brain injuries and recognizing the signs, symptoms and appropriate treatment for concussions; developing and distributing standardized protocol for post-concussion management; and expanding partnerships with community agencies serving underserved populations and persons with or at risk of TBI, especially youth, older adults, and veterans.

Improving the Health of Americans Through Prevention and Management of Diabetes, Heart Disease, and Stroke (CDC-1815)

CT DPH implements evidence-based strategies working with healthcare organizations, clinicians, pharmacists, and community health workers (CHWs) that aim to prevent type 2 diabetes and manage diabetes, hypertension, and high cholesterol. The strategies include increased participation in national lifestyle change to prevent type 2 diabetes and diabetes self-management programs, increased identification, treatment, and management of chronic diseases, and promoting the use of CHWs in this work. Connecticut Cardiovascular Diseases and Diabetes Webpage: https://www.ct.gov/mysmartheart

Connecticut Well-Integrated Screening and Evaluation for Women Across the Nation (WISEWOMAN) Program

CT DPH's WISEWOMAN Program is a Centers for Disease Control and Prevention (CDC)-sponsored program designed to help 40–64-year-old women reduce their risk for heart disease and promote a heart-healthy lifestyle. The Connecticut WISEWOMAN Program offers free healthy and supportive Lifestyle Programs for Connecticut Early Detection and Prevention Program (CEDPP) participants, such as Health Coaching, Wellness Wins, Self-Monitored Blood Pressure, and the Diabetes Prevention Program. The WISEWOMAN program incorporates cardiovascular diseases screening and intervention services into the healthcare delivery system of the current CT DPH Breast and Cervical Cancer Early Detection Program contracted health care provider sites. Connecticut WISEWOMAN Program Webpage: https://bit.ly/3B4uWWT

State Physical Activity and Nutrition Program (SPAN-1807)

SPAN is a CDC-funded program that implements evidence-based strategies at state and local levels to improve breastfeeding support, nutrition and physical activity. SPAN strategies include implementing food service guidelines in worksites and in community settings to increase the availability of healthy foods and collaborating with partners to connect sidewalks, paths, bicycle routes, public transit with homes, early care and education, schools, worksites, parks, or recreation centers through implementing master plans and land use interventions. SPAN interventions also address breastfeeding by increasing continuity of care, community support, and compliance with workplace lactation accommodation laws.

Tobacco Prevention and Control Program

CDC's Office on Smoking and Health's (OSH) National and State Tobacco Control Program (NTCP) provides funds to states to achieve four goals: 1) eliminate exposure to secondhand smoke; 2) promote quitting tobacco use among adults and youth; 3) prevent tobacco use initiation among youth and young adults; and 4) identify and eliminate tobacco-related disparities. Connecticut Tobacco Control Program Webpage: Tobacco Use Prevention Control Program (ct.gov)

Comprehensive Cancer Control Program (CCCP)

The Comprehensive Cancer Program (CCP) uses CDC funds to support the CT Cancer Partnership, a statewide coalition, to create and support policies and strategies that help prevent and treat cancer and support cancer survivors. The CCP also collaborates with other cancer and chronic disease programs to provide support for cancer screening and prevention activities as well as provides funds to support cancer survivors in living their best quality of life through healthy lifestyle choices and community support conversations.

Connecticut Breast and Cervical Cancer Early Detection Program (CBCCEDP)

The Connecticut Breast and Cervical Cancer Early Detection Program (CBCCEDP) is a State and Federally funded comprehensive screening program available throughout Connecticut for medically underserved women. The primary objective of the program is to significantly increase the number of women who receive breast and cervical cancer screening, diagnostic, and treatment referral services. For those who qualify, all services are offered free of charge through the Connecticut Department of Public Health's contracted health care providers located statewide.

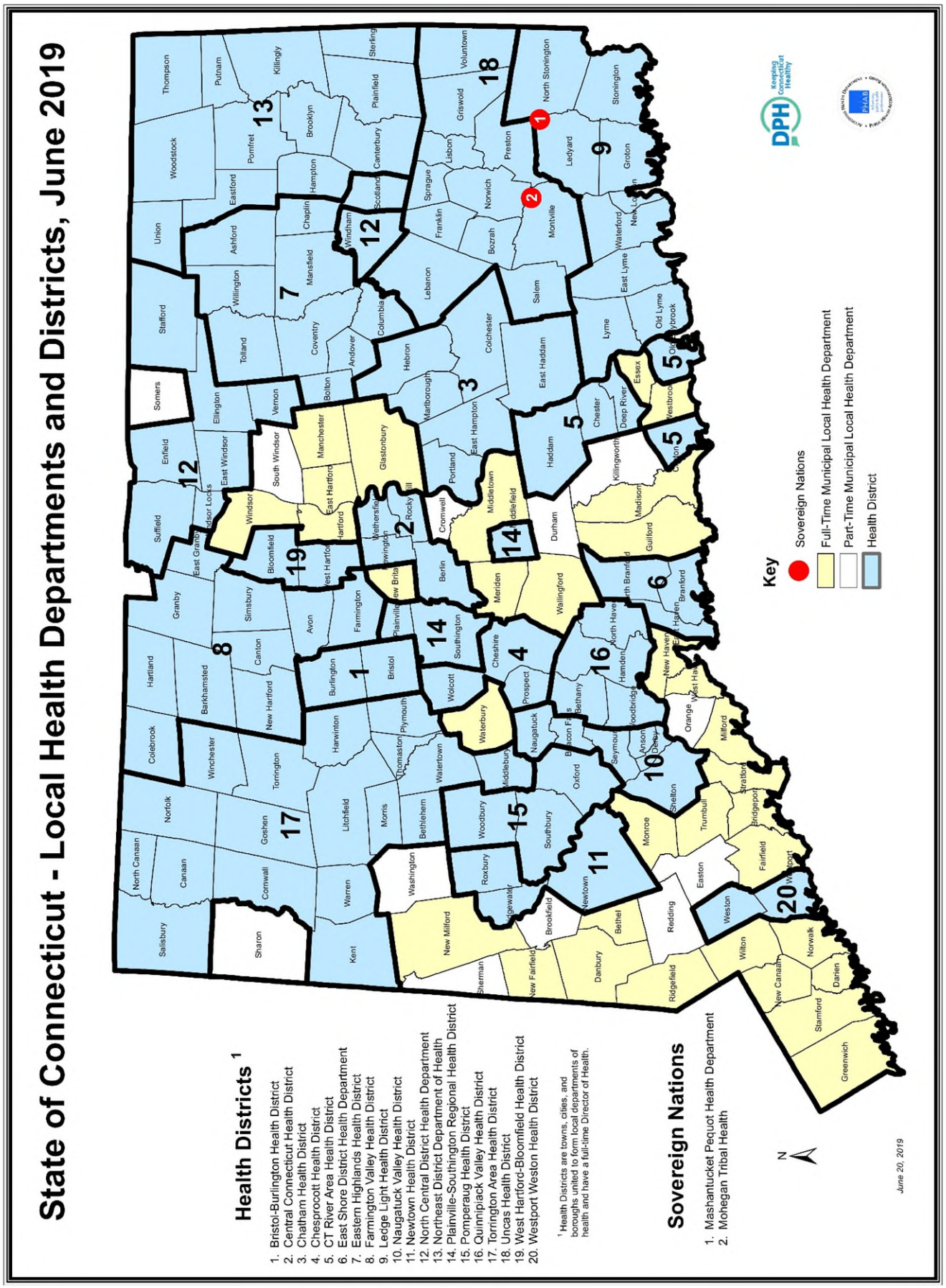
Connecticut Colorectal Cancer Control Program (CRCCP)

The purpose of Connecticut Colorectal Cancer Control Program (CRCCP) is to increase colorectal cancer screening rates among people between 45 and 75 years of age by implementing evidence-based interventions described in the Guide to

Community Preventive Services (the Community Guide) and other supporting strategies in partnership with health systems and by providing follow-up services in the form of diagnostic colonoscopies for a limited number of program-eligible people. This federally funded program requires award recipients to partner with health systems serving high-need populations to implement evidence-based interventions known to be effective in increasing colorectal cancer screening. This approach allows Connecticut to implement targeted activities on a feasible scale and collect data to measure the program's impact.

APPENDIX II
HEALTH DISTRICT CONSTITUENT TOWNS

Health District	District Number	Constituent Towns
Bristol-Burlington	1	Bristol, Burlington
Connecticut River Area	2	Clinton, Old Saybrook, Deep River, Haddam, Chester, Killingworth
Central Connecticut	3	Berlin, Newington, Rocky Hill, Wethersfield
Chatham	4	Colchester, East Haddam, East Hampton, Hebron, Marlborough, Portland
Chesprocott	5	Cheshire, Prospect, Wolcott
East Shore	6	Branford, East Haven, North Branford
Eastern Highlands	7	Andover, Ashford, Bolton, Chaplin, Columbia, Coventry, Mansfield, Scotland, Tolland, Willington
Farmington Valley	8	Avon, Barkhamsted, Canton, Colebrook, East Granby, Farmington, Granby, Hartland, New Hartford, Simsbury
Ledge Light	9	East Lyme, Old Lyme, Groton, Ledyard, Lyme, New London, Waterford, Stonington, North Stonington
Naugatuck Valley	10	Ansonia, Beacon Falls, Derby, Naugatuck, Seymour, Shelton
Newtown	11	Bridgewater, Newtown, Roxbury
North Central	12	East Windsor, Ellington, Enfield, Stafford, Suffield, Vernon, Windsor Locks, Windham
Northeast	13	Brooklyn, Canterbury, Danielson, Eastford, Hampton, Killingly, Plainfield, Pomfret, Putnam, Sterling, Thompson, Union, Woodstock
Plainville-Southington Regional	14	Plainville, Southington, Middlefield
Pomperaug	15	Oxford, Southbury, Woodbury
Quinnipiack Valley	16	Hamden, North Haven, Woodbridge, Bethany
Torrington Area	17	Bantam, Bethlehem, Cornwall, Goshen, Harwinton, Kent, Litchfield, Morris, Norfolk, North Canaan, Plymouth, Salisbury, Thomaston, Torrington, Warren, Watertown, Winchester, Canaan, Middlebury
Uncas	19	Bozrah, Griswold, Lisbon, Jewett City, Lebanon, Montville, Norwich, Sprague, Salem, Voluntown, Franklin, Preston
West Hartford-Bloomfield	20	Bloomfield, West Hartford
Westport/Weston	21	Weston, Westport, Easton


State of Connecticut - Local Health Departments and Districts, June 2019
Health Districts [1]
1. Bristol-Burlington Health District
2. Central Connecticut Health District
3. Chatham Health District
4. Chesprocott Health District
5. CT River Area Health District
6. East Shore District Health Department
7. Eastern Highlands Health District
8. Farmington Valley Health District
9. Ledge Light Health District
10. Naugatuck Valley Health District
11. Newtown Health District
12. North Central District Health Department
13. Northeast District Department of Health
14. Plainville-Southington Regional Health District
15. Pomperaug Health District
16. Quinnipiack Valley Health District
17. Torrington Area Health District
18. Uncas Health District
19. West Hartford-Bloomfield Health District
20. Westport Weston Health District
[1] Health Districts are towns, cities, and boroughs united to form local departments of health and have a full-time Director of Health.
Sovereign Nations
1. Mashantucket Pequot Health Department
2. Mohegan Tribal Health
Key
Sovereign Nations
Full-Time Municipal Local Health Department
Part-Time Municipal Local Health Department
Health District
N
June 20, 2019

APPENDIX III
GLOSSARY and RATE DEFINITIONS

While Connecticut strives to remain consistent with general public health definitions, some terms and rates defined here are specific for Connecticut's reporting.

BIRTH RATE – Number of live births occurring among the population of a given geographical area during a given year, per 1,000 mid-year total population of the given geographical area during the same year. For fertility rates, see FERTILITY. *Note that live birth rates do not include all pregnancies. Fetal deaths, induced terminations, and early miscarriages are not included.*

- Crude birth rate - The crude birth rate is the number of live births occurring among the population of a given geographical area during a given year, per 1,000 mid-year total population of the given geographical area during the same year.

$$\left(\frac{\text{Number of resident live births}}{\text{Total resident population}} \right) \times 1{,}000$$

- Age-specific birth rate - The number of live births to women in a specific age group per 1,000 females in the population in the same age group.

$$\left(\frac{\text{Number of resident live births in age group}}{\text{Total resident population in age group}} \right) \times 1{,}000$$

BIRTH INTERVAL - Elapsed time between a mother's deliveries.

- Birth-to-Conception Interval (BTC) - Time interval between the delivery of the last live birth the delivery of the current live birth.
- Inter-pregnancy Interval (IPI) – Time interval between the delivery of the last pregnancy outcome (live birth, still birth, miscarriage) and the conception (based on date of last menstrual period) of the current pregnancy. The value of the inter-pregnancy interval calculation is that it avoids confounding by length of the subsequent pregnancy.

BIRTH WEIGHT - Weight of the baby (live born or stillborn) at delivery, usually measured during the first hour of life.

- Low birth weight (LBW) - Birth weight of less than 2,500 grams (approximately 5 lbs., 8 oz.).
- Low Birthweight Rate – The number of live births weighing less than 2,500 grams among of all live births in a given year multiplied by 100.

$$\left(\frac{\text{Number of live births weighing less than 2,500 g}}{\text{Number of live births}} \right) \times 100$$

- Very low birth weight (VLBW) - Birth weight of less than 1,500 grams (approx. 3 lbs., 5 oz.).

BODY MASS INDEX (BMI) - A person's weight in kilograms divided by the square of height in meters. A high BMI can be an indicator of high body fatness.

BREASTFED - Infants reported as having received breastmilk or colostrum from the mother prior to discharge (at any time between delivery and discharge).

CAUSE OF DEATH – Causes of death refers to all diseases, morbid conditions, or injuries that either resulted in or contributed to death, and the circumstances of the accident or violence that produced any such injuries. Symptoms or modes of dying, such as heart failure or asthenia, are not considered to be causes of death for statistical purposes. Classification of cause is determined based on the international rules and sequential procedure set forth by the National Center for Health Statistics and the World Health Organization (International Classification of Disease, Tenth Revision).

- Underlying cause - The disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury. Sometimes referred to as primary or principal cause. The underlying cause of death is the one to be adopted as the cause for tabulation of mortality statistics.

- Contributory cause - A significant condition that unfavorably influences the course of the morbid process and thus contributes to the fatal outcome but is not related to the disease or condition directly causing death.

- Multiple causes – All causes of death which includes the underlying cause as well as other immediate cause(s) of death and other intermediate and contributory conditions entered by the certifying physician.

- ICD-10 – International Classification of Disease, Tenth Revision

CERTIFIER OF CAUSE OF DEATH - A certifier of cause of death is a person authorized by law (the physician who attended the deceased in his/her last illness; or the coroner for deaths of persons who were not attended during the last illness by a physician, or for unnatural deaths due to violence or accident) who issues a certificate, on the prescribed form, stating to the best of his/her knowledge and belief, the cause of death and other facts related to the event for submission to the local registrar.

CERTIFIED NURSE MIDWIFE (CNM) - a registered nurse with additional training as a midwife who delivers infants and provides prenatal and postpartum care, newborn care, and some routine care (such as gynecological exams) of women.

CESAREAN DELIVERY - A cesarean section, sometimes called c-section, is a surgical procedure in which incisions are made through a woman's abdomen and uterus to deliver her baby.

- Primary Cesarean Delivery – Cesarean delivery by a woman who has not had a previous cesarean delivery.

- Repeat Cesarean Delivery – Cesarean delivery by a woman who has had a previous cesarean delivery.

- Vaginal Birth After Cesarean (VBAC) – Vaginal delivery by a woman who has had a previous cesarean delivery.

- Trial of Labor - Permitting labor to continue long enough to assess a woman's chances of a successful vaginal birth.

- Low Risk Cesarean Delivery - Cesarean delivery among term (37 or more completed weeks), singleton (one fetus), vertex (headfirst) births to women giving birth for the first time.

DEATH RATE - The number of deaths in a given period divided by the population exposed to risk of death in that period. Typically, rates are expressed annually using the population at the mid-year.

- Crude Mortality Rate (CMR) – Also known as the Crude Death Rate, it is the number of deaths per 100,000 population in a given year. The death rate is called “crude” as it does not include any adjustments for demographics or other factors. This rate should not be used for making comparisons between different populations when the age, race, and sex distributions of the populations are different.

- Age-specific Mortality Rate (ASR) - The number of deaths in a specific age group per 100,000 population in the same age group. Rates for persons under 1 year of age are an exception for which rates are calculated per 1,000 live births.

- Age-adjusted Mortality Rate (AAMR) - A value which indicates the risk of dying relative to a standard population. Age-adjusted rates are computed by applying age-specific rates in a population of interest to a standardized age distribution to eliminate differences in observed rates that result from age differences in population composition. Since the effect of age has been removed, these rates are called "age-adjusted" rates. It is important to remember that crude and age-specific rates are the actual rates of death or disease in the population while age-adjusted rates are only useful for comparisons to other populations.

EDUCATIONAL ATTAINMENT – The highest degree or level of school completed at the time of the event.

ETHNICITY - See “Hispanic/Latino ethnicity.”

FERTILITY – The ability for an individual to reproduce through normal sexual activity.

- Total Fertility Rate - Estimation of the number of births that a hypothetical group of 1,000 women would have over their lifetimes based on age-specific birth rates in a given year.

$$\left(\frac{\text{Sum of age specific fertility rates} * (\text{age interval of women})}{1{,}000} \right)$$

- General Fertility Rate – The number of live births per 1,000 women aged 15-44 in a given year.

$$\left(\frac{\text{Number of resident live births}}{\text{Female population (Ages } 15-44)} \right) \times 1{,}000$$

- Age-specific Fertility Rate – The number of births to women of a specified age or age group per 1,000 women in that age group in a given year.

$$\left(\frac{\text{Number of resident live births per age group}}{\text{Female population per age group}} \right) \times 1{,}000$$

FETAL DEATH – Fetal death refers to fetal demise at 20 or more completed weeks of gestation. Counts reflect only in-state occurrences to Connecticut residents.

- Fetal mortality rate: The number of fetal deaths per 1,000 live births plus fetal deaths. The fetal death rate refers to the number of fetal deaths occurring among the population of a given geographical area during a given year per 1,000 total births (live births plus fetal deaths).

$$\left(\frac{\text{Number of fetal deaths}}{\text{Number of live births} + \text{Number of fetal deaths}} \right) \times 1{,}000$$

GESTATIONAL AGE - The obstetric estimate of the infant’s gestation at delivery in completed weeks.

- Preterm Delivery - A live birth or fetal death that occurs before the completion of the 37th week of gestation.

- Preterm rate – The number of live births born preterm among all live births in a given year multiplied by 100%.

$$\left(\frac{\text{Number of live births born} < 37 \text{ completed weeks gestation}}{\text{Number of live births}} \right) \times 100\%$$

- Term Delivery - A live birth or fetal death with delivery at 37 completed weeks or greater.

LOCAL HEALTH DISTRICT (LHD) - A local governmental entity consisting of two or more towns that is responsible for the public health of its constituent towns. See Appendix II for a listing of the health districts in existence in Connecticut as of July 1 of the current reporting year.

HISPANIC/LATINO ETHNICITY: Refers to people whose origins are from Spain, the Spanish speaking countries of Central America, South America, and the Caribbean, or persons of Hispanic/Latino origin identifying themselves as Spanish, Spanish-American, Hispanic/Latino, Hispano, Latino, and so on. For vital events, "Hispanic, Latino/a, or Spanish origin" refers to a person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin – regardless of race.

INFANT DEATH - Death occurring within the year of life.

- Infant mortality rate (IMR): The number of infant deaths per 1,000 live births in a given year.

$$\left(\frac{\text{Number of infant deaths}}{\text{Number of live births}} \right) \times 1{,}000$$

- Neonatal deaths - Deaths occurring within the first 27 days of life.
- Neo-natal mortality rate - The number of deaths during the first 27 completed days of life occurring among the live births in a given year per 1,000 live births.
- Post-neonatal deaths – Deaths those occurring from 28-365 days of life.
- Post-neonatal mortality rate - The number of deaths occurring from 28-365 days of life occur-ring among the live births in a given year per 1,000 live births.

INFANT SEX – Biological sex as identified at time of birth.

INITIATION OF PRENATAL CARE – The first time a mother sees a provider for care of her pregnancy.

- Early Prenatal Care – Initiation of prenatal care during the first trimester.
- Late or No Prenatal Care – Initiation of prenatal care during the third trimester or not at all.
- Early Prenatal Care Initiation Rate - The number of pregnant women initiating prenatal care in the first trimester among all women delivering a live birth in given year multiplied by 100%

$$\left(\frac{\text{Number of live births to women initiating prenatal care during first trimester}}{\text{Number of women delivering live births}} \right) \times 100\%$$

LINKED BIRTH-INFANT DEATH - Infant deaths that have been successfully linked to the birth record thereby allowing information from the birth record, such as maternal and perinatal characteristics, to be used in the analysis of the infant death.

LIVE BIRTH ORDER - The number of children born alive to the same mother inclusive of the current birth (first born, second born, third born, etc.).

LIVE BIRTH - The complete expulsion or extraction from the mother of a product of conception, regardless of the duration of pregnancy; after such separation, the product shows signs of life (e.g., heartbeat, pulsation of the umbilical cord, or movement of voluntary muscles) that is more than transient or fleeting.

- Live birth rate – see BIRTH RATES

NATIVITY – Classification of a person based on their country of birth.

OCCURRENT - Place of occurrence represents the geographic area in which the event occurred regardless of the place of residence of the individual.

PATERNITY STATUS – Paternity is the legal identification of the father of a child. If parents are married at the time a child is born, the law presumes that the husband is the father of the child. If the parents are not married, then paternity needs to be established through a legal process. By establishing paternity, the father's name will be added to the child's birth certificate, and he will gain legal rights to his child, as well as responsibilities for supporting the child.

- Acknowledgement of Paternity (AOP) -- If a mother is not married at the time a child is born and has not been married at any time between conception and the birth of the child, no father will be named on the birth certificate unless both parents complete an Acknowledgement of Paternity (AOP) or unless ordered by a court of competent jurisdiction. The AOP form is a sworn statement voluntarily completed by the parents at the hospital at the time the child is born, or sometimes at a later date, that affirms that the named father is the biological father. An AOP has the same force and effect as a court ordered judgment of paternity. Once the AOP is completed and processed, the father's name is included on the child's birth certificate.

PAYER FOR DELIVERY – Payer or source of payment for the delivery of the infant(s).

PLURALITY - The number of siblings delivered in a single pregnancy; commonly expressed as singleton or multiple. A singleton pregnancy results in a single delivery, while a multiple pregnancy results in twins, triplets, or higher order deliveries.

- Singleton delivery - One live birth or fetal death is delivered during a pregnancy.

- Multiple delivery - More than one (twins, triplets, or higher) live birth or fetal death is delivered in the same pregnancy and may include mixed outcomes (live births and fetal deaths).

POPULATION ESTIMATES – Annual population estimates are published by the U.S. Census Bureau's Population Estimates Program (PEP). These estimates by age, sex, race, and ethnicity are used as the denominators for the calculation of population-based indicators, such as fertility rates, death rates, and teen birth rates.

- Vintage – Refers to the year that the annual population estimates are published. The *Registration Reports* use the original vintage (i.e., first published) of the population estimates for all rate calculations.

PRETERM – See Gestational Age

RACE - A population of individuals who identify themselves from a common history, nationality, or geographical place. When responses in the "race" line item on vital records are associated with the definition of Hispanic/Latino origin, they are re-coded to "white race," as described in the National Center for Health Statistics instruction manuals for coding vital records. Individuals identifying themselves as either "White," "Black/African American," or "Other" race can be of any ethnic group. See also "Hispanic/Latino ethnicity."

RELATIVE STANDARD ERROR (RSE) – Measures statistical reliability of an estimated rate. It is calculated as a percentage formulation of the ratio of the standard error of an estimate to the estimate itself.

$$\left(\frac{\text{Standard Error of Rate Estimate}}{\text{Rate Estimate}} \right) \times 100\%$$

RESIDENT – Place of residence represents the geographic area in which the address reported as the place of residence at the time of the event is located.

TEEN BIRTH: A live birth delivery in a woman under 20 years of age on the date of delivery.

- Teen birth rate - The number of live births to women in aged 15-19 years per 1,000 females in the population in the same age group. *Note that live birth rates do not include all pregnancies. Fetal deaths, induced terminations, and early miscarriages are not included. The teen birth rate is not the same as the teen pregnancy rate.*

$$\left(\frac{\text{Number of births to females aged } 15-19}{\text{Female population aged } 15-19} \right) \times 1000$$

TIMING OF PRENATAL CARE – See Initiation of Prenatal Care

TRIAL OF LABOR - see Cesarean Delivery

TRIMESTEROF PREGNANCY - One-third of the total gestation period of a full-term pregnancy, or 13 weeks per trimester. The “third trimester” classification comprises pregnancies of 27 or more weeks gestation. The weekly count begins on the first day of the last menstrual period.

UNDERLYING CAUSE OF DEATH - See cause of death.

VINTAGE - See population estimates

WIC – Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) that provides federal grants to states for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk.

APPENDIX IV
COLLECTION of HISPANIC ORIGIN and RACE

Race and ethnicity as collected from the parents on the Connecticut Birth Certificate:

Race and Hispanic Ethnicity: Race and ethnicity are self-identification data items in which respondents choose the race or races with which they most closely identify and indicate whether or not they are of **Hispanic, Latino/a, or Spanish** origin. Race and ethnicity are considered separate and distinct identities.

Please complete both items.

Definition of Hispanic, Latino/a, or Spanish Origin: Hispanic origin can be viewed as the heritage, nationality group, lineage, or country of birth of the person or the person's parents or ancestors before their arrival in the United States. People who identify their origin as Hispanic, Latino, or Spanish may be any race.

- "**Hispanic, Latino/a, or Spanish origin**" refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin – *regardless of race*.

3b. Is the Mother Spanish/Hispanic/Latina?

- ❑ No, not Spanish/Hispanic/Latina
- ❑ Yes, Mexican, Mexican American, Chicana
- ❑ Yes, Puerto Rican
- ❑ Yes, Cuban
- ❑ Yes, other Spanish/Hispanic/Latina: _____
  (e.g. Spaniard, Salvadoran, Dominican, Columbian)

Definition of Race Categories:
A person may indicate self-identification with two or more races by selecting multiple race categories.

- "**White**" refers to a person having origins in any of the original peoples of Europe, the Middle East, or North Africa. It includes people who indicate their race(s) as "White" or report entries such as Irish, German, Italian, Lebanese, Arab, Moroccan, or Caucasian.
- "**Black or African American**" refers to a person having origins in any of the Black racial groups of Africa. It includes people who indicate their race(s) as "Black, African American, or Negro"; or report entries such as African American, Kenyan, Nigerian, or Haitian.
- "**American Indian and Alaska Native**" refers to a person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment.
- "**Asian**" refers to a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
- "**Native Hawaiian and Other Pacific Islander**" refers to a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

3c. Mother's Race: Please check one or more races to indicate what she considers herself to be.

- ❑ White
- ❑ Black or African American
- ❑ American Indian or Alaska Native: _____
  (name of enrolled or principal tribe)

Asian
- ❑ Asian Indian
- ❑ Chinese
- ❑ Filipino
- ❑ Japanese
- ❑ Korean
- ❑ Vietnamese
- ❑ Other Asian: _____
  (e.g., Thai, Cambodian, Malaysian)

Pacific Islander
- ❑ Native Hawaiian
- ❑ Guamanian or Chamorro
- ❑ Samoan
- ❑ Other Pacific Islander: _____

- ❑ Other Race: _____

Race and ethnicity as collected from the informant on the Connecticut Death Certificate:

ITEM 51 Decedent of Hispanic Origin

Check "No" or check "Yes" box that best corresponds with the decedent's ethnic Spanish identity as given by the informant. Note that "Hispanic" is not a race and item 52 must also be completed. "Hispanic" refers to people whose origins are from Spain, Mexico, or the Spanish-speaking Caribbean Islands or countries of Central or South America. Origin includes ancestry, nationality and lineage. Although the prompts include the major Hispanic groups, other groups may be specified under 'other'. "Other" may also be used for decedents of multiple Hispanic origin (e.g., Mexican-Puerto-Rican).

51. DECEDENT OF HISPANIC ORIGIN?

☐ No, Not Spanish/Hispanic/Latino
☐ Yes, Mexican, Mexican American, Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, other Spanish/Hispanic/Latino
(specify)_____

ITEM 52 Decedent's Race

Check one or more races to indicate what the decedent considered himself or herself to be. American Indian & Alaska Native refer only to those native to North America & does not include Asian Indian. Please specify the name of enrolled or principal tribe (e.g., Navajo, Cheyenne, etc.) for the American Indian or Alaska Native. For Asians check Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or specify other Asian group; for Pacific Islanders check Guamanian or Chamorro, Samoan, or specify other Pacific Island group. If decedent was of mixed race, enter each race (e.g., Samoan-Chinese-Filipino or White, American Indian).

52. DECEDENT'S RACE

☐ White ☐ Black or African American ☐ Asian Indian
☐ American Indian or Alaska Native (Name of the enrolled or principal tribe) _____
☐ Chinese ☐ Filipino ☐ Japanese ☐ Korean ☐ Vietnamese
☐ Other Asian (specify)_____ ☐ Native Hawaiian ☐ Guamanian or Chamorro
☐ Samoan ☐ Other Pacific Islander (specify)_____
☐ Other (specify)_____

APPENDIX V
CONNECTICUT CERTIFICATE OF DEATH

CERTIFICATE OF DEATH

1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last) | 2. SEX ☐ Male ☐ Female | 3. ACTUAL OR PRESUMED DATE OF DEATH (MM/DD/YYYY) (Spell Month) | 4. ACTUAL OR PRESUMED TIME OF DEATH ☐ AM ☐ PM

5. AGE LAST BIRTHDAY | 6. UNDER 1 YEAR Mo. Days | UNDER 1 DAY Hours Min. | 7. DATE OF BIRTH (MM/DD/YYYY) | 8. BIRTHPLACE (City, State or Foreign Country)

9. RESIDENCE (State) | 10. RESIDENCE (County) | 11. RESIDENCE (City or Town) | 12. RESIDENCE (Street and No.) | 13. APT. NO.

14. ZIP CODE | 15. EVER IN US ARMED FORCES? ☐ Yes ☐ No | 16. MARITAL STATUS AT TIME OF DEATH: ☐ Married ☐ Married but separated ☐ Widowed ☐ Divorced ☐ Never Married ☐ Unknown | 17. SURVIVING SPOUSE'S NAME (Give full name prior to first marriage)

18. FATHER'S NAME (First, Middle, Last) | 19. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)

20. INFORMANT'S NAME | 21. INFORMANT'S RELATIONSHIP TO DECEDENT | 22. MAILING ADDRESS (Street and Number, City, State, Zip Code)

23. IF DEATH OCCURRED IN A HOSPITAL: ☐ Inpatient ☐ ER/outpatient ☐ Dead on Arrival | 24. IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: ☐ Hospice Facility ☐ Nursing Home ☐ Decedent's Home ☐ Other (specify)_____ | 25. FACILITY NAME (If not institution, give street & number)

26. CITY OR TOWN OF DEATH ZIP CODE | 27. COUNTY OF DEATH | 28. METHOD OF DISPOSITION: ☐ Burial ☐ Cremation ☐ Donation ☐ Entombment ☐ Removal from State ☐ Other (specify)_____

29. DISPOSITION (Name of cemetery, crematory, other place) | 30. LOCATION (city/town, state) | 31. DATE (MM/DD/YYYY) | 32. WAS BODY EMBALMED? ☐ Yes* ☐ No; *If yes, Name of Embalmer

33. FUNERAL FACILITY - Name and Address (street, town, state, zip) | 34. SIGNATURE OF FUNERAL DIRECTOR OR EMBALMER | 35. LICENSE NUMBER OF SIGNEE IN BOX 34

36. DATE PRONOUNCED DEAD (MM/DD/YYYY) | 37. TIME PRONOUNCED | 38. PRONOUNCER'S NAME AND DEGREE OR TITLE (Print) | 39. PRONOUNCER'S SIGNATURE | 40. DATE SIGNED

41. WAS MEDICAL EXAMINER CONTACTED? ☐ Yes ☐ No | 42. WAS AN AUTOPSY PERFORMED? ☐ Yes ☐ No | 43. WERE THE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? ☐ Yes ☐ No

CAUSE OF DEATH

44. **PART I.** Enter the chain of events - diseases, injuries, or complications-that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. **DO NOT ABBREVIATE.** Enter only one cause on a line. Add additional lines if necessary.

		APPROXIMATE INTERVAL ONSET TO DEATH
IMMEDIATE CAUSE (Final disease or condition resulting in death) ---------->	(a)	
Sequentially list conditions, if any, leading to the cause listed on line (a). Enter the **UNDERLYING CAUSE** (disease or injury that initiated the events resulting in death) **LAST**	Due to (or as a consequence of): (b)	
	Due to (or as a consequence of): (c)	
	Due to (or as a consequence of): (d)	

45. **PART II.** Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I.

46. IF FEMALE: ☐ Not pregnant within past year ☐ Pregnant at time of death ☐ Not pregnant, but pregnant within 42 days of death ☐ Not pregnant, but pregnant 43 days to 1 year before death ☐ Unknown if pregnant within the past year

47. DID TOBACCO USE CONTRIBUTE TO DEATH? ☐ Yes ☐ Probably ☐ No ☐ Unknown

48. CERTIFIER (Check only one box) ☐ Certifying practitioner - I am the attending practitioner or a practitioner acting on behalf of the attending practitioner and to the best of my knowledge death occurred due to the cause(s) and manner stated. ☐ Pronouncing & Certifying Practitioner - I am the attending practitioner or a practitioner acting on behalf of the attending practitioner and to the best of my knowledge, death occurred at the time, date and place, and due to the cause(s) stated.

Certifier Name (Type or Print) | Certifier Signature | Title of Certifier | Date Certified

49. MAILING - CERTIFIER (Street) (City or Town) (State) (Zip)

THIS CERTIFICATE WAS RECEIVED FOR RECORD ON: | BY REGISTRAR

50. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death.
☐ 8th grade or less ☐ 9th - 12th grade, no diploma ☐ High School Graduate/GED ☐ Some college credit, but no degree ☐ Associate degree ☐ Bachelor's degree ☐ Master's degree ☐ Doctorate or Professional degree ☐ Unknown ☐ Not available

51. DECEDENT OF HISPANIC ORIGIN?
☐ No, Not Spanish/Hispanic/Latino ☐ Yes, Mexican, Mexican American, Chicano ☐ Yes, Puerto Rican ☐ Yes, Cuban ☐ Yes, other Spanish/Hispanic/Latino (specify)_____

52. DECEDENT'S RACE
☐ White ☐ Black or African American ☐ Asian Indian ☐ American Indian or Alaska Native (Name of the enrolled or principal tribe) _____ ☐ Chinese ☐ Filipino ☐ Japanese ☐ Korean ☐ Vietnamese ☐ Other Asian (specify)_____ ☐ Native Hawaiian ☐ Guamanian or Chamorro ☐ Samoan ☐ Other Pacific Islander (specify)_____ ☐ Other (specify)_____

53. DECEDENT'S USUAL OCCUPATION | 54. KIND OF BUSINESS/INDUSTRY | 55. SOCIAL SECURITY NUMBER

APPENDIX VI
SMALL NUMBERS

Risk of identity disclosure is a known concern when reporting health outcomes in tabular format for small geographies or small population groups. The publication of small numbers within health outcome tables creates the potential for disclosure of personally identifiable information or protected health information, either through evaluation of the tables in isolation or through subsequent linkage with other datasets that contain additional identifying information.[79-82]

Release of rates and proportions with low statistical reliability is another concern associated with publication of sparse data for small geographies or population groups. Statistical reliability refers to the consistency, or stability, of a rate. The statistical reliability of a rate decreases as the number of disease events and the size of the population in which those events occurred decreases. Publication of rates based on small numbers may lead to misinterpretation or misuse of the data.[83-85]

A tradeoff exists between presenting data at the highest level of detail required to ensure high utility of data published in the *Registration Reports* to support DPH's mission and a) protecting the identity and health information of individuals in this report and b) providing estimates that are sufficiently reliable for surveillance and analyses. Due to the nature of the *Registration Reports* containing vital event information that is fundamental to public health, government, business, and individuals, the suppression for small numbers in the *Reports* is less strict than the suppression typically applied to release of public health data by CT DPH.

Beginning with 2016, a revised set of suppression rules are used in the *Registration Reports* to address the first issue of disclosure risk associated with release of small numbers. In Connecticut, birth and fetal death data are confidential and are subject to suppression while death data are not confidential and are not suppressed.[79] In all instances of suppression, both counts and rates are censored since rates can be combined with knowledge of denominator values to back-calculate counts.

- Primary suppression:
  - Single year counts and rates at the state-, county-, and town-level that include stratification by limited race and ethnicity groups are not suppressed.
  - Counts and rates at the state-level stratified by three or more demographic or health outcome indicators are suppressed for cell values 1-4 or population denominators less than 100.
  - Counts and rates for geographies below the county-level stratified by two or more demographic or health outcome indicators are suppressed for cell values 1-4 or population denominators less than 100 when but are not suppressed when counts and rates are aggregated for 3 or more years.
- Secondary suppression:
  - Suppression of additional *Report* Table cells to prevent back-calculation of counts to which primary suppression has been applied.
- Additionally, although counts of zero or rates of 100% are released throughout the *Report* Tables, they are also suppressed if they are deemed to potentially allow for attribution of sensitive health outcome to an entire population group or area, a phenomenon known as group disclosure.
  - Rates for paternity status below the state-level are provided in 5% ranges to minimize group disclosure.
- "Unknown" indicator values are not suppressed unless utilized for secondary suppression.
- Suppression is denoted by an "*s*".

The second issue associated with small numbers, low statistical reliability, is addressed in the *Registration Report* through application of grey shading to cells with rates that have a high standard error value relative to the rate itself. The ratio of these two values multiplied by 100%, known as the Relative Standard Error (RSE), is a widely-used indicator of statistical

reliability.[86] Larger values indicate poorer reliability and thus a greater chance that the rate calculated from the data is a poor approximation of the true, underlying population rate. For *Registration Report* purposes, all rates with RSE > 30% are flagged using grey shading. Typically, statistics with RSEs of 25-30% would be suppressed to prevent misinterpretation and misuse; however, the nature of the *Registration Reports* as providing the official vital statistics for the state warrants full reporting of vital events and associated rates. Gray shading serves as an alternative method for discouraging misinterpretation and misuse.

APPENDIX VII
STATISTICAL METHODS

Standard statistical approaches for descriptive epidemiology are used in both the *Registration Report* Tables and the Population Health Highlights. Population Health Highlights may feature data that have not yet been included in *Registration Report* Tables. These data are available upon request from the DPH Surveillance Analysis and Reporting Unit. Figures and tabulations for Population Health Highlights are produced through R programming. *Registration Report* Tables are programmed in SAS software.[87,88] The epidemiological analyses fall into one of three categories: person-based (for a single point in time), geographic comparisons (for a single point in time) or trend (time-based) analyses, as described below.[89]

Person-based Comparisons

Person-based analyses, whereby rates of risk factors or poor health outcomes are compared among population groups for a single point in time,[90,91] are used frequently throughout the *Registration Report*. Person-based comparisons groups are defined by specific attributes, such as race, ethnicity, and age. The timeframe that defines the point in time for analysis varies throughout the *Report*. Most comparisons between groups are made for the most recent year of events. On occasion, counts of rare outcomes and risk factors are known to be too low for single-year reporting due to inadequate levels of statistical reliability. For these tables, the data for multiple years are combined to provide person-based comparisons using a three- or five-year period as the point in time for analysis.

In Population Health Highlights, rates between races and ethnicities for health outcomes of interest at a defined point in time are compared using Chi-Square Tests of Independence.[90,91] Results of pairwise comparisons between any two groups are inferred as significant based on $p<0.05$ after Bonferroni-adjustment for multiple comparisons.[92] Disparity ratios and associated Bonferroni-adjusted standard errors are calculated for multiple health indicators with Non-Hispanic White serving as the referent group. Conclusion of a higher or lower risk compared to non-Hispanic White for each comparison group is made based on exclusion of unity from the disparity ratio 95% confidence intervals .[93] Disparity Ratios for which the lower confidence limit > 1 indicated an elevated rate and those with upper confidence limits < 1 indicated a lower rate.[94]

Although trend analyses (described below) also evaluate health outcome patterns by population group, methodologies are different than those used for single point in time comparisons.

Geographic Comparisons

The *Registration Reports* provide geographic comparisons of rates for select indicators. Similar with person-based comparisons, geographic comparisons are made for a single point in time for which the definition varied from a one-year to a five-year period.

Connecticut-to-U.S. comparisons are a standard element of Population Health Highlights and have been available since 2018. These analyses are based on results of Chi-Square tests of independence to compare the rate for a specific health indicator in Connecticut to the national rate for the most recent year. Conclusion of a significant difference between Connecticut's rate and the national rate is based on $p< 0.05$. National rates are retrieved from NCHS's natality files via CDC's online data portal (CDC Wonder). Data quality caveats observed from any national rates in the Population Health Highlights are described in the *Birth Data Files' User Guide* provided on the online vital statistics data portal.[95]

Population Health Highlights provided Connecticut's state rank for poor health outcomes and risk factor rates for the most recent year. Washington D.C. is included in the state rankings such that the geographic area with the least favorable rate will rank 51st. Data used for ranking are derived from CDC Wonder or NCHS's National Vital Statistics Reports. Although not a geographic comparison, rates in Connecticut are also compared to Healthy People 2020 goals for

the most recent year. Conclusions of a rate different than the Healthy People goals are based on exclusion of the goal from the 95% confidence interval for the Connecticut rate for the index health indicator.

Five-year town-level teen birth rates are compared to the state rate in *Report* Table 17 and have been available in the *Registration Report* Tables since 2011.[96] Five-year figures are used to provide a reliable basis for estimating teen birth rates as single-year figures at the town-level pose risk of identity disclosure and low reliability of rates for many towns (see **Appendix V**). Rates by town are calculated using the 2010 Decennial Census population estimates[97] as 1) annual estimates by town with demographics are not currently available and 2) ACS 5-year estimates have margins of error by age and sex that are too large at the town level to provide stable rates. Statistical comparisons were not made for towns with fewer than 15 births unless the number of expected births based on the state rate was greater than or equal to 15. The consideration of "expected counts" in defining this threshold allows us to evaluate low but stable town rates which are based on large denominators and small numerators. Two statistical tests for rate differences are provided to answer two different questions. Single-Test seeks to determine if a town rate is significantly different ($p < 0.01$) than the state rate when considering only that single comparison to the state rate. Multi-Test seeks to determine if a town rate is significantly different ($p < 0.05$) than the state rate when analyzed simultaneously for all 169 towns in Connecticut after Bonferonni adjustment for multiple comparisons.[92] The Wilson Score method is used for calculating the confidence intervals around the town and state rates as it provides more precise endpoints when the ends of the intervals are close to 0 or 1, as is common with town-level teen birth rates.[98]

Trend Analyses

The final type of epidemiological analysis used in the *Registration Report* evaluates trends, or patterns over time, in the annual rates of health indicators in the Population Health Highlights. The timeframes for trend assessment begin with the year earliest compatible data availability and end with the focus year of the Registration Report. Although historical data spanning many decades exist for all Connecticut vital event datasets, the year of earliest availability used for trend analyses in the *Report* constitute those for which data are consistently defined and formatted with the most recent data year: 2005 for Connecticut deaths and 2003 for Connecticut births and fetal deaths.

Joinpoint regression analysis is used for statistical assessment of trends.[99] Joinpoint regression determines the optimal number and location of “joinpoints” which are points in a time series for which there is a significant difference in the rate of change over time during one time period compared to other time periods in the series. Selected models with more than one joinpoint are evidence of a change in the slope of the regression line for at least two separate time periods in the series.[100]

The optimal model, or number of joinpoints, is selected for inference using results of permutation tests using $p < 0.05$ for significance testing for individual tests. Minimum and maximum numbers of joinpoints for consideration are based on the number of data years included in the analysis.[101] Where appropriate, detail on trends for individual segments based on selected models are provided. Average annual percentage changes (AAPCs), which allow for overall assessment of trends patterns over an entire time series, regardless of dynamic slope patterns for segments therein, are provided when significantly different than null ($p< 0.05$).[102]

Trends for rates of target health outcomes are evaluated for the entire state of Connecticut, for individual races and ethnicities in Connecticut, and for the U.S. Races and ethnicities for which a substantial portion of the time series’ annual rates have RSE > 30% are not analyzed and are excluded from figures. National time series are derived from the same datasets used for geographic comparisons described above. Analyses of U.S. trends in these *Reports* are strictly administered and interpreted by DPH’s internal SAR-based analysis techniques and have not been examined for verification by CDC for the purpose of the Population Health Highlights.

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REGISTRATION TABLES 2019

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