Connecticut

Registration Report

for

Vital Events

Occurring in 2020

State of Connecticut
Department of Public Health

Manisha Juthani, MD, Commissioner

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FOREWARD

The *Registration Report* is a statistical summary of vital events for the State of Connecticut. The State Office of Vital Records (OVR) at 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 only one year lost in 1852. Although the narrative portion of the *Registration Report* is not available for 1999 through 2009 or for 2016 and 2017, *Report* Tables have been produced annually and are available online. In 2018, the format of the narrative portion changed, whereby detailed 2-page narrative summaries of target health indicators are now provided as "Population Health Highlights" instead of the previous long-form overview narrative approach. Highlighted indicators vary from year to year to provide continuous updates on key indicators within available agency resources. 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 research and program development and evaluation.

COVID-19. The year 2020 is synonymous with the COVID-19 coronavirus, cause of the first global pandemic of the 21st century. The spread of this virus into Connecticut required rapid deployment of public health interventions and unprecedented upscaling of public health surveillance efforts statewide and in coordination with national efforts.

As COVID-19 mortality data were critical to pandemic surveillance, the Department of Public Health (DPH) and the Office of the Chief Medical Examiner (OCME) collaboratively and independently adopted new procedures to facilitate complete and accurate mortality surveillance for the State of Connecticut and for the Centers for Disease Control and Prevention (CDC).[1] Notable operational changes included the following:

- As of February 1, 2020, the Commissioner of DPH added novel coronavirus to the reportable diseases list in Connecticut. All suspected or confirmed COVID-19 deaths were required by law to be reported promptly to the Office of the Chief Medical Examiner (OCME).
- DPH and OCME worked together to educate death certifiers on how to properly complete the cause of death statements for COVID-19.
- DPH and OCME exchanged reports of COVID-19 deaths to ensure both agencies had consistent counts of COVID-19 deaths.
- DPH implemented operational changes in its paper-based death registration process, which reduced processing times from 3-4 months to 1-2 weeks, to enable rapid reporting of COVID-19 deaths to DPH for state surveillance and to CDC for national surveillance.
- COVID-19 deaths were integrated with the statewide infectious disease surveillance system (Connecticut Electronic Disease Surveillance System) to facilitate public reporting of Connecticut deaths in near real-time.

In step with expanded mortality data collection necessitated by the COVID-19 pandemic, DPH reporting of mortality statistics provided in this *Registration Report* includes COVID-19 as a new classifiable cause of death in the state starting in 2020. COVID-19 death totals and rates in *Report* Tables are based on tabulations of deaths for which an ICD-10 code of U07.1 was assigned as the underlying (primary) cause of death, consistent with the *statistical definition* of mortality.[2-6] COVID-19 mortality based on the alternative *surveillance definition* of mortality, which includes all deaths for which ICD-10 code U07.1 is provided as either underlying or one of the 20 other multiple causes of death, are available by request and have been released elsewhere.[1]

In addition to inclusion of COVID-19 as a new cause of death in *Report* Tables, two new Population Health Highlights are released in this *Report* narrative, one focused on Connecticut's Leading Causes of Death and the other on COVID-19 Mortality. These Highlights supplement initial assessments on the state's COVID-19 mortality previously released by DPH.[1] Although births, deaths, fetal deaths, and marriages in Connecticut were all impacted by the pandemic, this year's

Registration Report Population Health Highlights are limited to mortality indicators due, in part, to the significant mortality incurred by COVID-19 that year and, in part, to the complexities in evaluating annual natality outcomes for which exposure to COVID-19 and pandemic living varied by gestational period. Selection of the mortality indicators for the Population Health Highlights was further influenced by the delayed release of population estimates (see 2020 Updates). The Population Health Highlights in subsequent *Registration Reports* will be more inclusive of key health indicators impacted by the pandemic.

METHODOLOGY

This section of the *Registration Report* provides general guidance for using and interpreting Connecticut vital statistics data. A summary of recent updates to the *Registration Report* is provided on the following page. Specific details on *Report* preparation methodology as well as other important resources for *Report* interpretation and use are provided as Appendices I - VI.

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, and a copy of that event certificate is shared with the individual's town of residence.

Connecticut's electronic birth registration system (EBRS) has been active since 2002. The EBRS collects birth registry information using a web-based data collection system. The birth certificate information is filed by the birth facility in which the hospital birth occurred or the town in which the home birth occurred. The town of occurrence then registers the birth records electronically. Electronic filing and registration ensure that the birth registry is essentially complete for births that occurred in-state.

As of 2020, the remaining three event registries (fetal death, death, and marriage) are paper-based and require 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 CT 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 the 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. Connecticut's 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) 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.[7,8] Rates and percentages are

Connecticut Vital Event Reporting: *2020 Updates*

Transition to Single and Two or More Race-Ethnicity Reporting

The 2020 *Registration Report* applies long-planned changes to the way race and ethnicity are reported for vital statistics by the Connecticut Department of Public Health.

Prior to 2020, annual *Registration Reports* reported single race or single bridged race. Single race refers to the collection of race using an older federal standard which does not allow for reporting of more than one race.[9] Single bridged race refers to the collection of race using a newer federal standard which allows for the reporting of multiple races, but then reassigning (or bridging) the multiple race responses to one of the single race categories.[10] Bridging has allowed for consistency in race reporting for state and national vital statistics between 2003 and 2018 as state vital event registries transitioned from old to new federal race standards. Connecticut's prior use of the "Bridged Race-Ethnicity Classification" as a reporting standard aligned with the National Center for Health Statistics (NCHS).

As of 2018, Connecticut had adopted the latest versions of the U.S. standard certificates for births, deaths, and fetal deaths. The standard certificates collect race and Hispanic ethnicity using the most recent federal standard which dictates use of five single-race categories and ability for respondents to identify as two or more races. In 2020, the *Registration Report* adopted a "Single and TOM Race-Ethnicity Classification" as the reporting standard for race and ethnicity following the national transition by NCHS in 2018.[11] With this new classification, vital events associated with non-Hispanic individuals who identified as multiple races are tabulated as their own separate race-ethnicity group (non-Hispanic Two or More), and vital event totals for single-race categories only include counts of individuals that reported a single race.

Impacts on use and interpretation of vital statistics reported using differing race-ethnicity classifications are detailed in a separate fact sheet from DPH.[12] Effective for this 2020 *Registration Report*, the "Bridged Race-Ethnicity Classification" is no longer utilized (see glossary). Vital statistics collected using single and multiple race are reported using the "Single and TOM Race-Ethnicity Classification" (see glossary). Vital statistics collected using single race only (without the option to choose multiple races) are reported using the "Single Race-Ethnicity Classification" (see glossary). Statistics reported using differing classifications are not directly comparable and are presented in separate *Report* tables to designate the difference. Data users should be aware of limitations in comparability of race data over time.

2020 Decennial Census – Delayed Release

The Decennial Census of Population and Housing occurs every 10 years to assess the current count and demographics of the U.S. population. Decennial Census counts serve as the foundation for the annual estimates over the remainder of the decade and, therefore, are essential for accurate population-based rates reported in annual *Registration Reports*. With the 2010 Decennial Census, release of 2010 data tables occurred 14 months after the April 1, 2010, count. In contrast, the 2020 Decennial Census data release is expected in May of 2023, a full three years after the April 1, 2020, count. The unprecedented delays for 2020 are attributed to the COVID-19 pandemic and U.S. Census Bureau policy changes aimed at protecting respondent privacy.[13]

Due to the delayed release of the 2020 Decennial Census data products, calculation of state and county vital statistics for data year 2020 are based on *provisional* April 1, 2020, population estimates by age, sex, race, and Hispanic origin developed internally by DPH. These provisional estimates temporarily fill the data gap created by the delayed 2020 Decennial Census release while incorporating the increased racial and ethnic diversity exhibited in the 2020 Census P.L. 94-171 Redistricting Data for Connecticut. The 2020 *Registration Report* Tables and Population Health Highlights may be revised after release of final 2020 Decennial Census data.

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 at the state- and county-level by age, sex, race, and ethnicity and at the town-level for total population. These estimates are used to calculate the *Report's* population-based rates. On occasion, additional population estimates may be used to calculate rates by town or for specific population subgroups. Population estimate sources are noted in the published annual *Report* Tables.

Reporting of Race and Ethnicity

The *Registration Report* provides data by racial and ethnic groups using mutually exclusive combinations of race and Hispanic ethnicity. The *2020 Registration Report* is the first to use the *"*Single and Two or More (TOM) Race-Ethnicity Classification*"* (see Appendix III: Race-Ethnicity Classification) in which persons who identified as non-Hispanic and multiple race are categorized as a separate race-ethnicity group (i.e., NH TOM) when reporting vital statistics. This change reflects the complete transition of Connecticut's vital statistics to collecting *and* reporting race and ethnicity using the 1997 Office of Management and Budget (OMB) standards (see Appendix III: Race-Ethnicity Collection Standards).[9]

Over time, federal standards for collection and reporting of race and ethnicity change, which impacts the standards for tabulating and reporting vital statistics in Connecticut (see Appendix III: Race-Ethnicity Classification). Births from 1999-2015, fetal deaths from 1999-2017, and deaths from 1999-2004 were collected using the 1977 OMB standard that did not allow for multiple races and have always been tabulated using the "Single Race-Ethnicity Classification" (see Appendix III: Race-Ethnicity Classification). Births from 2016-2020, fetal deaths from 2018-2020, and deaths from 2005-2020 were collected using the 1997 OMB standard that does allow for multiple races; however, prior to the 2020 Registration Report, events collected using the 1997 OMB standard were tabulated using the "Bridged Race-Ethnicity Classification" (see Appendix III: Race-Ethnicity Classification), which does not maintain a separate group for individuals reporting multiple races but instead "bridges" them to a single race group.[11] Beginning with the *2020 Registration Report*, events collected using the 1997 OMB standard are tabulated using the "Single and Two or More (TOM) Race-Ethnicity Classification" which categorizes multiple races into a Two or More races group.[11]

An important implication of the complete transition to the 1997 OMB standards is that counts and rates for years and vital event types published in this and future *Registration Reports* will differ from those published in previous *Registration Report*s. Vital statistics previously published using the "Bridged Race-Ethnicity Classification" have been re-released using the *"*Single and Two or More (TOM) Race-Ethnicity Classification". Re-release of statistics using the new classification minimizes the impact of changes in classification standards over time by having a single transition (Single Race to Single and TOM Race) rather than a double transition (Single Race to Bridged Race to Single and TOM Race).

Since data collected using different methods or data reported using different classifications are often not directly comparable, users of the *Registration Reports* should use caution when comparing counts and rates over time – both between and within *Registration Reports*. The *2020 Report* Tables use separate tables (as *a* and b) to clearly demarcate the change in race-ethnicity classification over time. Notably, the change in reporting classification affects the non-Hispanic single race categories (NH White, NH Black, NH AIAN, NH Asian) but does not affect the Hispanic

category. Additional information about the DPH transition from single to multiple race reporting is available from supplementary publications from DPH HSS section.[12]

In the *Registration Report*, rates that require a population estimate for the denominator are reported by race and ethnicity using only the groups defined by the "Single and Two or More (TOM) Race-Ethnicity Classification": NH White, NH Black, NH American Indian/Alaskan Native (AIAN), NH Asian (includes Native Hawaiian and Other Pacific Islander), NH Two or More Races (TOM), and Hispanic (represents individuals of Hispanic ethnicity regardless of racial identity). By contrast, when a rate's numerator and denominator are derived from the same data source (as with the majority of birth statistics), an expanded set of race-ethnicity categories can be used. In the *Registration Reports*, the expanded set includes all groups in the "Single and Two or More (TOM) Race-Ethnicity Classification", adds an additional race group for individuals who identify as non-Hispanic Some Other Race (NH Other Race), and provides Puerto Rican and Other Hispanic (includes Mexican, Cuban, or Other Hispanic) as two subcategories under Hispanic.

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.[14] 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.[15]

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*.

Cause of Death

For standardization and tabulation of mortality statistics, written cause of death (COD) statements made by the certifiers on death certificates are sent to the NCHS at the CDC. NCHS then assigns COD codes derived from the *International Causes of Disease 10th Revision* (ICD-10) classification system using the written COD statements on each death certifcate.[3,6] When more than one COD is entered by the physician, NCHS determines the "underlying cause of death", described by 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."[16] This determination is based on 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).

Underlying COD serves as the single selected cause for tabulation of mortality statistics in NCHS reporting, as well as for the mortality statistics provided in this *Report*.[17] The other COD codes assigned by NCHS may originate from Part I of the death certificate, wherein the CODs that comprise the chain of events leading to death, as determined by the death certifier, are provided. The other CODs may also come from Part II of the death certificate, wherein other causes or conditions that contributed to the death but were not directly in the chain of events leading to death, are stated by the death certifier.[18] Together, the underlying COD and all additional CODs assigned by NCHS for each death occurrence comprise its "multiple causes of death". Multiple-cause-of-death statistics can be used in disease surveillance to monitor the full impact of a disease or condition and may be updated outside of this *Report*.[19]

The International Classification of Diseases (ICD) is designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics and is revised occasionally to reflect changes in medical practices and new medical knowledge. The tenth revision of the ICD (ICD-10, as used currently by NCHS for

COD assignment) was implemented in the death and fetal death registries in 1999. NCHS has also developed a clinical modification (CM) of the classification system 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, 2018-2020), *Report* Tables (1998-2020), and methods discussion (1999-2006 and 2010-2015, 2018-2020) are available on the internet at the following web site:
http://www.ct.gov/dph/RegistrationReport

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

Leading Causes of Death

Leading Causes of Death (LCODs) are the most common cause-of-death categories in a population, usually listed in rank order such that the first-ranked LCOD is the one for which the most deaths occurred.[20] LCODs are presented for major cause-of-death categories based on the underlying (primary) cause of death and the ranked order highlights which causes have the greatest mortality burden in a population.[21] Surveillance of trends and patterns of LCODs overall and in varying populations informs public health efforts to help people live longer and healthier lives. However, LCODs patterns can be difficult to interpret, in part because rankings depend on death totals rather than population-based rates and have other limitations for public health use that are noted elsewhere.[22] Although standard LCOD reporting typically focuses on the top five (or ten) causes of death, the top six LCODs are reported here to present the five LCODs for 2015-2019 along with COVID-19, which emerged as a new LCOD in 2020.

Key Takeaways

- In 2020, COVID-19 emerged as a new LCOD in Connecticut and ranked third in the state.

- Excluding COVID-19, the relative rankings of the top five LCODs for 2015-2019 (Heart disease, Cancer, Unintentional injuries, Stroke, and Chronic lower respiratory diseases) did not change in 2020 compared to 2015-2019.

- COVID-19 ranked as the first LCOD among non-Hispanic Black and Hispanic residents in the state, compared to second and third, respectively, among non-Hispanic Asian and non-Hispanic white populations.

Trends Over Time

The top five LCODs in Connecticut for 2020 were Heart disease, Cancer, COVID-19, Unintentional injuries, and Stroke.[†] Heart disease (7,084 deaths) and Cancer (6,625 deaths) maintained their decades-long position as the first and second ranked causes of death, respectively (Fig. 1).[23] COVID-19 (5,805 deaths) ranked third, following the introduction of the novel coronavirus to Connecticut in March 2020 and displaced the remaining LCODs from previous years. Unintentional injuries (2,426 deaths) moved to fourth rank after having ranked third from 2013 to 2019. Stroke (1,466 deaths) ranked fifth for 2020 compared to fourth from 2017 to 2019. Chronic lower respiratory diseases (CLRD), which ranked fifth from 2017 to 2019, dropped to sixth place in 2020 (1,233 deaths).

Changes in death totals that would affect LCOD rank typically occur over a period of years or decades. The emergence of COVID-19 as a top ranked LCOD is unique and demonstrates the severity of mortality risk associated with the novel disease. In 2020, total death burden from the top five LCODs (including COVID-19 but excluding CLRD) was 23,406, an increase of more than 4,500 deaths over each of the previous five years' death totals, which ranged between 18,312-18,835 per year. When considering the top six LCODs (the previous top five LCODs plus COVID-19) in 2020, the total death burden was 24,639 – an increase of more than 5,700 deaths over previous years.

Demographic Comparisons

LCODs for males and females often differ as the rank progresses to less frequent causes of death.[22] For 2020, Heart disease, Cancer, and COVID-19 ranked as the top three LCODs for each sex while the remaining LCODs differed for males and females. For males, the fourth and fifth LCODs of Unintentional injury and Stroke aligned with statewide rankings. For females, Stroke and Alzheimer's held the fourth and fifth places. COVID-19 displaced CLRD in 2020 as one of the top 5 LCODs for both sexes in 2019.

Differences in the burden of LCODs in 2020 were evident by race and ethnicity (Table 2). Heart disease, Cancer, and COVID-19 all ranked among the top three LCODs, although the rank order varied among the racial and ethnic groups. Non-Hispanic White residents mirrored state rankings where COVID-19 was the third LCOD (14% of deaths). By contrast, COVID-19 was first-ranked for non-Hispanic Black and Hispanic residents (21-22% of deaths) and second-ranked for non-Hispanic Asian residents (16% of deaths).

Health Promotion and Prevention

Leading causes of death provide an overall picture of the mortality burden within a population. Information on mortality risk reduction and prevention associated with LCODs for Connecticut is available in previous Population Health Highlights, as well as the COVID-19 Population Health Highlight (pp. 10, this *Report*).[24]

[†]ICD-10 codes are provided in 2020 *Registration Report*, Table 27, as Diseases of the Heart (Heart disease), Malignant neoplasms (Cancer), COVID-19, Accidents (Unintentional injuries), Cerebrovascular disease (Stroke), and Chronic lower respiratory diseases.

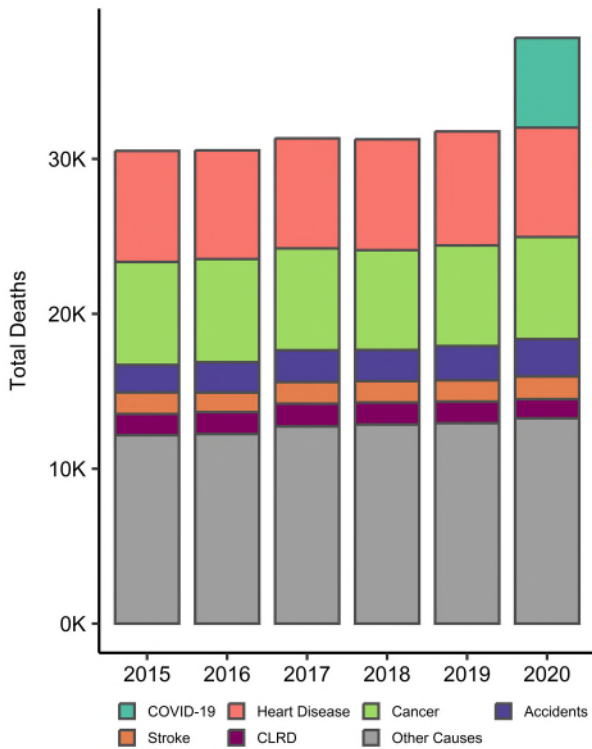**Figure 1: All Causes of Death, Connecticut, 2015-2020**

Table 1: Leading Causes of Death by Sex, Connecticut, 2019-2020

Rank	Total Population		Male		Female	
	2019	2020	2019	2020	2019	2020
1	Heart Disease 7,357 (23%)	Heart Disease 7,084 (19%)	Heart Disease 3,754 (24%)	Heart Disease 3,735 (20%)	Heart Disease 3,602 (22%)	Heart Disease 3,349 (18%)
2	Cancer 6,494 (20%)	Cancer 6,625 (17%)	Cancer 3,354 (21%)	Cancer 3,383 (18%)	Cancer 3,139 (20%)	Cancer 3,242 (17%)
3	Unintentional Injuries 2,213 (7%)	COVID-19 5,805 (15%)	Unintentional Injuries 1,528 (10%)	COVID-19 2,846 (15%)	Stroke 836 (5%)	COVID-19 2,959 (16%)
4	CLRD 1,398 (4%)	Unintentional Injuries 2,426 (6%)	CLRD 602 (4%)	Unintentional Injuries 1,700 (9%)	CLRD 796 (5%)	Stroke 901 (5%)
5	Stroke 1,373 (4%)	Stroke 1,466 (4%)	Stroke 537 (3%)	Stroke 565 (3%)	Unintentional Injuries 685 (4%)	Alzheimers 774 (4%)
6	Alzheimers 966 (3%)	CLRD 1,233 (3%)	Diabetes 413 (2%)	CLRD 558 (3%)	Alzheimers 677 (3%)	Unintentional Injuries 726 (4%)
	All Causes 31,774	All Causes 37,939	All Causes 15,839	All Causes 18,974	All Causes 15,932	All Causes 18,965

Table 2: Leading Causes of Death by Race and Ethnicity, Connecticut, 2019-2020

Rank	Total Population		Non-Hispanic White		Non-Hispanic Black		Non-Hispanic Asian		Hispanic	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
1	Heart Disease 7,357 (23%)	Heart Disease 7,084 (19%)	Heart Disease 6,333 (24%)	Heart Disease 5,997 (19%)	Heart Disease 564 (22%)	COVID-19 801 (22%)	Cancer 83 (24%)	Cancer 100 (21%)	Heart Disease 334 (17%)	COVID-19 573 (21%)
2	Cancer 6,494 (20%)	Cancer 6,625 (17%)	Cancer 5,513 (20%)	Cancer 5,539 (18%)	Cancer 507 (20%)	Heart Disease 589 (16%)	Heart Disease 76 (22%)	COVID-19 76 (16%)	Cancer 333 (17%)	Cancer 395 (14%)
3	Unintentional Injuries 2,213 (7%)	COVID-19 5,805 (15%)	Unintentional Injuries 1,682 (6%)	COVID-19 4,328 (14%)	Unintentional Injuries 204 (8%)	Cancer 543 (15%)	Stroke 23 (7%)	Heart Disease 75 (16%)	Unintentional Injuries 287 (15%)	Heart Disease 358 (13%)
4	CLRD 1,398 (4%)	Unintentional Injuries 2,426 (6%)	CLRD 1,278 (5%)	Unintentional Injuries 1,771 (6%)	Stroke 114 (4%)	Unintentional Injuries 275 (8%)	Unintentional Injuries 18 (5%)	Stroke 31 (7%)	Diabetes 79 (4%)	Unintentional Injuries 321 (12%)
5	Stroke 1,373 (4%)	Stroke 1,466 (4%)	Stroke 1,150 (4%)	Stroke 1,225 (4%)	Diabetes 94 (4%)	Diabetes 136 (4%)	Kidney Disease 11 (3%)	Unintentional Injuries 23 (5%)	Stroke 74 (4%)	Stroke 93 (3%)
6	Alzheimers 966 (3%)	CLRD 1,233 (3%)	Alzheimers 870 (3%)	CLRD 1,092 (4%)	Kidney Disease 87 (3%)	Stroke 108 (3%)	Influenza / Suicide 9 / 9 (3%)(3%)	Diabetes 18 (4%)	Liver Disease and Cirrhosis 52 (2%)	Diabetes 92 (3%)
	All Causes 31,774	All Causes 37,939	All Causes 26,884	All Causes 30,843	All Causes 2,563	All Causes 3,580	All Causes 339	All Causes 473	All Causes 1,944	All Causes 2,767

COVID-19 MORTALITY (*PROVISIONAL*)

COVID-19, also known as Coronavirus, is an infectious disease caused by the virus SARS-CoV-2. COVID-19 was officially declared a global human pandemic by the World Health Organization (WHO) on March 11, 2020.[25] Common COVID-19 symptoms in the first year of the pandemic included cough, fever, shortness of breath, loss of taste or smell, and sore throat. While most people with COVID-19 experience mild to moderate symptoms, severe cases of the illness require medical attention and may result in death. Risk of developing dangerous symptoms of COVID-19 increases with age and the presence of other serious health problems, such as heart or lung conditions, weakened immune systems, obesity, or diabetes.[26,27]

Annual mortality statistics represent deaths where COVID-19 was reported as the underlying (primary) cause of death. Deaths for which COVID-19 was reported but was not determined to be the underlying cause of death are not included in the statistical assessments and have been referenced separately.[1]

Key Takeaways

- COVID-19 was the third leading cause of death in Connecticut for 2020 with 5,805 resident deaths.

- A majority of 2020 deaths (69%) occurred during the first three months of the pandemic.

- Age was the strongest risk factor for death.

- NH Black and Hispanic residents were more likely to die from COVID-19 than NH White residents.

Patterns over Time

The first Connecticut resident death from COVID-19 occurred in mid-March 2020. The number of COVID-19 deaths increased rapidly at the start of the pandemic resulting in 3,855 deaths by the end of May (see Fig 1). The early spike in deaths was followed by a period of relatively few COVID-19 deaths (479 deaths, June-October) until counts rose again at the end of the year (1,471 deaths, November-December). In total, COVID-19 directly caused 5,805 deaths among state residents and contributed to the death of an additional 440 residents. Of the 37,939 deaths in 2020, 15.3% (5,805) were due to COVID-19 making it the third leading cause of death for the state.[28]

Demographic Comparisons

Risk of mortality due to COVID-19 varied by demographic group. Comparison of mortality rates by age group showed that COVID-19 mortality increased with age (Table 1, Fig. 2). Residents aged 85 and older, the oldest age group assessed, had the highest mortality rate (2,818.3 deaths per 100,000). This mortality rate was 670 times higher than the mortality rate of 4.2 deaths per 100,000 for the youngest age group (residents aged 25-34 years) for whom death totals were large enough to calculate rates.

As age was strongly associated with COVID-19 mortality risk, disparities in mortality rates between sexes and between racial and ethnic groups were assessed using age-adjusted mortality rates (AAMR; Table 2). After age-adjustment, COVID-19 mortality risk was higher among males than females (135.2 versus 93.6; Table 2) even though the total number of deaths for males and females were similar. Similarly, COVID-19 mortality risk was highest among non-Hispanic Black (229.7 per 100,000) and Hispanic (157.1 per 100,000) populations after age-adjustment even with NH White residents accounting for 75% of all deaths. Disparity ratios for age-adjusted COVID-19 mortality rates show that non-Hispanic Black residents were 2.3 times and Hispanic residents were 1.6 times more likely to die from COVID-19 than NH White residents (Table 2).

Health Promotion and Prevention

Connecticut experienced high COVID-19 mortality in 2020, particularly during the first two months of the pandemic. Initial public health prevention efforts focused on reducing transmission of the virus by social distancing (including closing schools and businesses), wearing masks, handwashing, and increasing use of personal protective equipment in health care facilities – in an effort to "flatten the curve".[29] Other prevention efforts during 2020 included travel advisories, testing and quarantines, and identification of medical treatments to reduce morbidity and mortality among severe cases.[30,31] Vaccines were approved by emergency authorization from the FDA in December 2020, just as a new variant of the virus emerged in the UK and US.[32]

For more information about health promotion and activities to prevent COVID-19 infection and deaths in Connecticut, visit the Connecticut Department of Public Health COVID-19 Information Page (https://portal.ct.gov/coronavirus).

Figure 1: Covid-19 Cumulative Death Counts by Race and Ethnicity, Connecticut, 2020
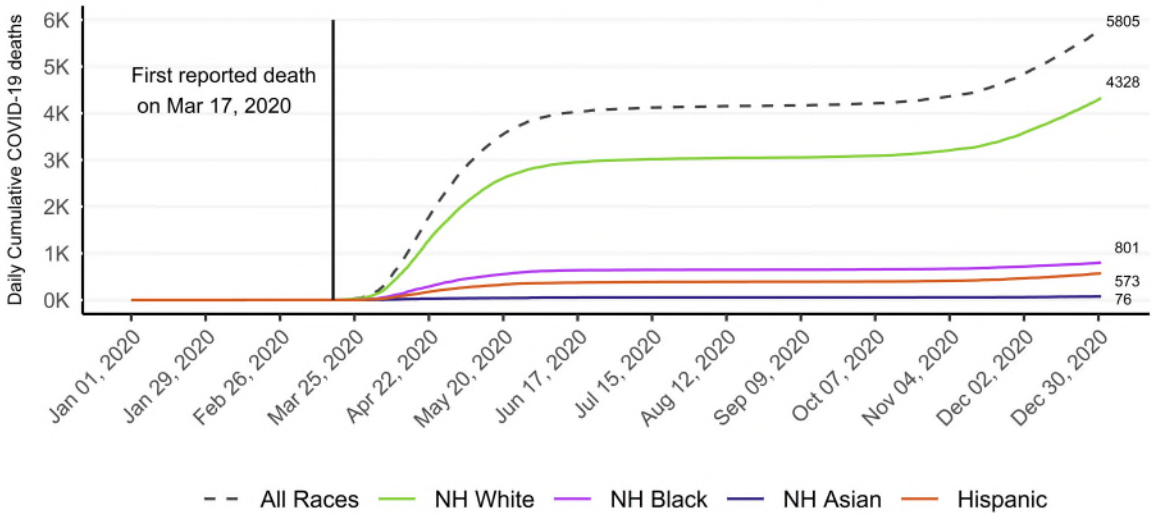
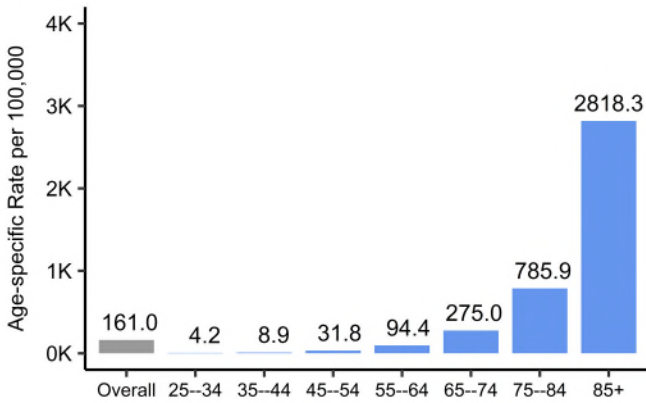Figure 2: Connecticut COVID-19 Age-specific Mortality Rates by age group, 2020

Figure 3: Connecticut COVID-19 Age-adjusted Mortality Rates by Race and Ethnicity, 2020

Table 1: Connecticut COVID-19 Mortality Statistics by age group, 2020

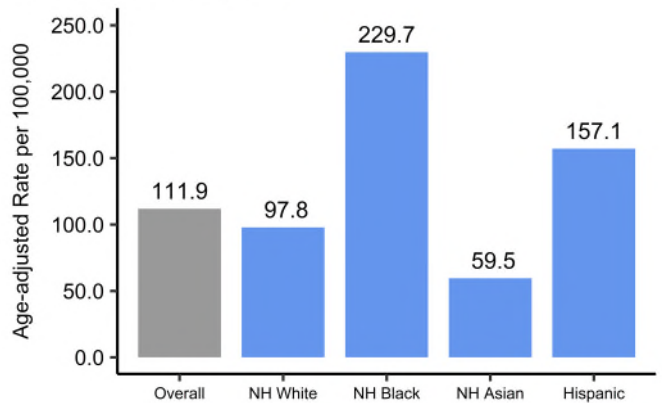| Age Group (yrs)	Death Total	Age-Specific Rate (95% CI)	Age-Specific Rate Ratio (95% CI)
25--34	19	4.2 (2.3, 6.0)	Ref
35--44	39	8.9 (6.1, 11.7)	2.1 (1.0, 4.4)
45--54	148	31.8 (26.6, 36.9)	7.6 (4.0, 14.4)
55--64	489	94.4 (86.0, 102.7)	22.5 (12.1, 41.7)
65--74	1,010	275.0 (258.0, 292.0)	65.5 (35.5, 120.6)
75--84	1,520	785.9 (746.4, 825.4)	187.1 (101.8, 344.0)
85+	2,576	2818.3 (2709.5, 2927.1)	671.0 (365.5, 1231.9)

Table 2: Connecticut COVID-19 Mortality Statistics by race and ethnicity and sex, 2020

Characteristic	Death Total	Age-Adjusted Rate (95% CI)[‡]	Age-Adjusted Rate Ratio (95% CI)[‡]
Race and Ethnicity			
Overall	5,805	111.9 (108.7, 114.5)	-
NH White	4,328	97.8 (94.8, 100.6)	Ref
NH Black	801	229.7 (212.1, 244.7)	2.3 (2.1, 2.6)
NH AI/AN	3	s	s
NH Asian	76	59.5 (45.8, 73.2)	0.6 (0.5, 0.8)
NH Two or more	4	s	s
Hispanic	573	157.1 (142.7, 169.7)	1.6 (1.4, 1.8)
Gender			
Female	2,959	93.9 (90.4, 97.3)	Ref
Male	2,846	135.2 (130.2, 140.3)	1.4 (1.37, 1.52)

[‡]Confidence intervals include adjustment for multiple comparisons using the Bonferroni method.
[s]Rates are suppressed for races and ethnicities with <15 deaths.

Appendices
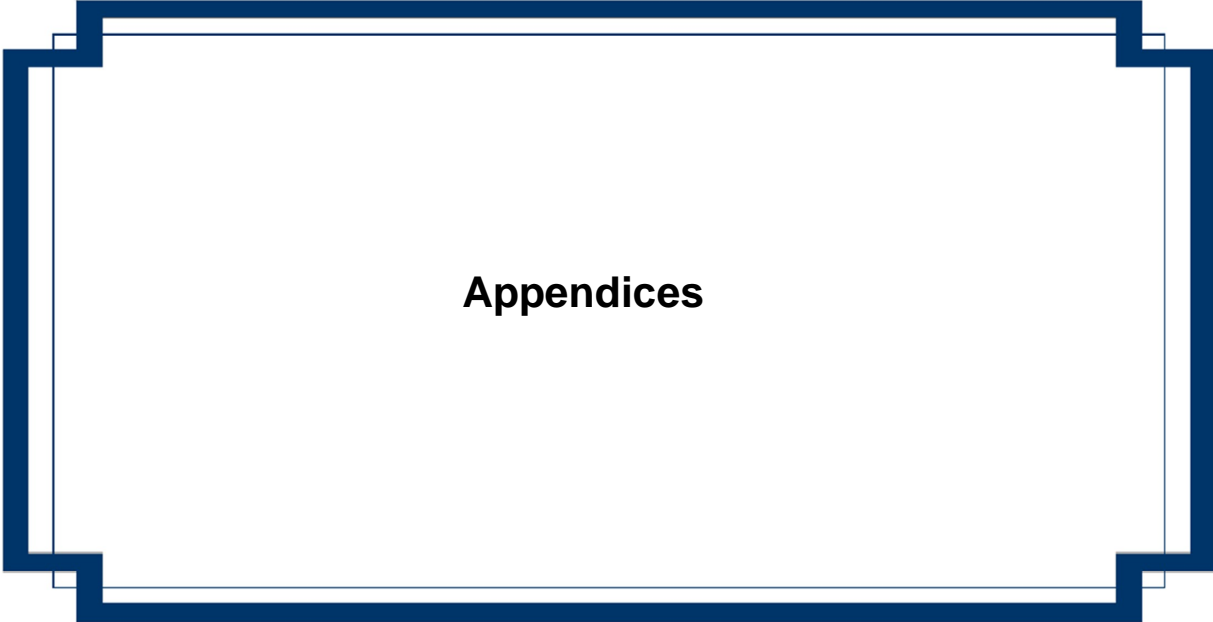
APPENDIX I
CONNECTICUT HEALTH PROMOTION
AND PREVENTION RESOURCES

The Connecticut DPH's Chronic Disease Prevention and Health Promotion programs and Injury and Violence Prevention programs work to collectively address the more than two 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. Connecticut DPH works to lessen the burden of chronic diseases and their risk factors through multiple CDC cooperative agreements and grants.

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 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

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 DPH'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.

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 OCME 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 ten 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 ten of our facilities.

Sexual Violence Prevention Program

The CT DPH Sexual Violence Prevention program receives funding from the CDC 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 CDC 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 CDC'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.

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.

APPENDIX II
HEALTH DISTRICT CONSTITUENT TOWNS

Health District	District Number	Constituent Towns
Bristol-Burlington	1	Bristol, Burlington
Central Connecticut	2	Berlin, Newington, Rocky Hill, Wethersfield
Chatham	3	Colchester, East Haddam, East Hampton, Hebron, Marlborough, Portland
Chesprocott	4	Cheshire, Prospect, Wolcott
Connecticut River Area	5	Clinton, Old Saybrook, Deep River, Haddam, Chester
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	18	Bozrah, Griswold, Lisbon, Jewett City, Lebanon, Montville, Norwich, Sprague, Salem, Voluntown, Franklin, Preston
West Hartford-Bloomfield	19	Bloomfield, West Hartford
Westport/Weston	20	Weston, Westport, Easton

State of Connecticut - Local Health Departments and Districts, July 2020
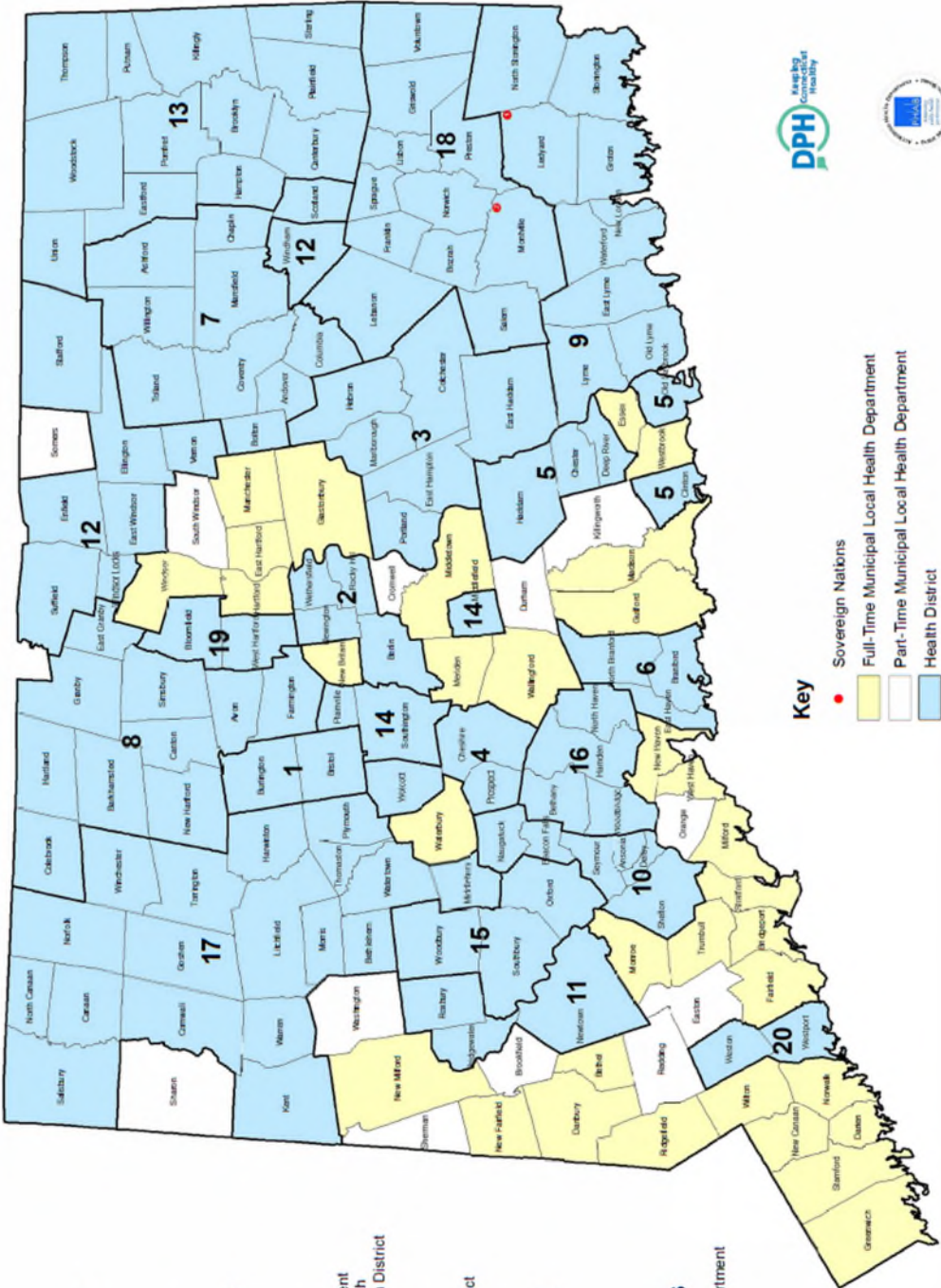
Health Districts [1]

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

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 Birth Weight 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 NCHS and WHO (ICD, 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 used for tabulation of mortality statistics.

- Multiple Causes - All causes of death which includes the underlying cause as well as any other cause(s) of death assigned an ICD-10 code by NCHS based on the written causes of death provided by the death certifier.

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

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 CERTIFIER – 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.

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 – A population of individuals who identify themselves as either "Hispanic/Latino" or "non-Hispanic/Latino." Ethnicity is considered a separate and distinct construct from race under the 1977 and 1997 OMB standards for the classification of race and ethnicity and is collected separately from race on vital certificates (see Appendix IV).

See also HISPANIC/LATINO, RACE-ETHNICITY COLLECTION STANDARDS, RACE-ETHNICITY CLASSIFICATION.

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.

HISPANIC/LATINO – Persons whose origins are from Spain, the Spanish speaking countries of Central America, South America, and the Caribbean, or people identifying themselves as Spanish, Spanish-American, Hispanic/Latino, Hispano, or Latino.

- On vital event certificates, Hispanic/Latino origin is collected using the following categories (see Appendix IV):
  - -- Not Spanish/Hispanic/Latino
  - -- Mexican, Mexican American, Chicana
  - -- Puerto Rican
  - -- Cuban
  - -- South or Central American
  - -- Other Spanish/Hispanic/Latino

See also ETHNICITY, RACE-ETHNICITY COLLECTION STANDARDS, RACE-ETHNICITY CLASSIFICATION.

INFANT DEATH – Death occurring within the first 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.

- Neonatal 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.

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.

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 with the exception of decennial reports. See the annual Registration Report Tables for specifics on which population estimates were used for the reporting year.

PRETERM – See GESTATIONAL AGE.

RACE – A population of individuals who identify themselves from a common history, nationality, or geographical place.
- On vital event certificates, race is collected using the following categories (see Appendix IV):

-- White
-- Black or African American
-- American Indian or Alaska Native
-- Asian:
    -- Asian Indian
    -- Chinese
    -- Filipino
    -- Japanese
    -- Korean
    -- Vietnamese
    -- Other Asian
-- Pacific Islander:
    -- Native Hawaiian
    -- Guamanian or Chamorro
    -- Samoan
    -- Other Pacific Islander
-- Other Race

- Single Race - Individuals who identify as a single race. Single race categories include White, Black, American Indian/Alaskan Native (AIAN), Asian, and Native Hawaiian or Other Pacific Islander (NHOPI).

- Single Bridged Race - Individuals who identify as multiple races but have been reassigned to a single race category by NCHS through a process called bridging. Single bridged race reflects the statistical assignment of a multiple race respondent to a single-race category based on research evaluating how persons of multiple races identify when given the option of reporting race using only single-race categories.

- Multiple Race - Individuals who identify as more than one race by selecting multiple single-race categories.

- Two or More (TOM) Races - Race category assigned to people who identify as multiple races.

See also RACE-ETHNICITY COLLECTION STANDARDS, RACE-ETHNICITY CLASSIFICATION.

RACE-ETHNICITY CLASSIFICATION – The combined racial and ethnic classification used for reporting race and ethnicity in Connecticut's vital statistics reports. Although race and ethnicity are collected separately, the constructs are combined into a single classification to create mutually exclusive categories, such that race categories represent non-Hispanic individuals only and Hispanic individuals are collapsed into one group irrespective of race. In Connecticut, the separate race categories for Asian and Native Hawaiian or Other Pacific Islander (NHOPI) are combined due to small numbers of NHOPI residing in Connecticut. Several race-ethnicity classification standards are used for vital statistics reporting:

- Single Race-Ethnicity Classification - Reflects the reporting classification for vital events collected under the 1977 OMB standards for race and ethnicity. This classification typically categorizes race-ethnicity into NH White, NH Black, NH AIAN, NH Asian, and Hispanic; it may also include a separate category for NH Other for respondents who identified as something other than the available single races and were not Hispanic.

- Bridged Race-Ethnicity Classification - Reflects the reporting classification consistent with Single Race-Ethnicity Classification for vital events collected under the 1997 OMB standards for race and ethnicity which allowed multiple race responses. This classification typically categorizes race-ethnicity into NH White, NH Black, NH AIAN, NH Asian, and Hispanic; it may also include a separate category for NH Other for respondents who identified as something other than the available single races and were not Hispanic. *In the Bridged Race-Ethnicity Classification, the NH single race categories include bridged-race individuals.*

  'Bridged' indicates that the single race categories include persons who reported multiple races but have been reassigned to a single race group by NCHS using a process called bridging. The bridging process was necessary for complete and consistent reporting of vital events by race-ethnicity in state and national vital statistics between 2003 and 2018 as states transitioned from the 1977 OMB standards to the 1997 OMB standards.[11]

Connecticut's use of the "Bridged Race-Ethnicity Classification" as a reporting standard aligned with national reporting of vital statistics.[22]

▪ Single and Two or More (TOM) Race-Ethnicity Classification - Reflects the reporting classification for vital events collected under the 1997 OMB standards for race and ethnicity. Individuals who reported multiple races are assigned to a single Two or More (TOM) group. This classification typically categorizes race-ethnicity into NH White, NH Black, NH AIAN, NH Asian, NH TOM, and Hispanic; it may also include a separate category for NH Other for respondents who identified as something other than the available single races and were not Hispanic.

See also RACE, ETHNICITY, RACE-ETHNICITY COLLECTION STANDARDS.

RACE-ETHNICITY COLLECTION STANDARDS – Standards that establish the definitions and minimum categories for data on race and ethnicity for all federally sponsored statistical data collections.

▪ 1997 Office of Management and Budget (OMB) Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity[9] - Vital events collected using the 2003 U.S. Standard Certificates conform to this minimum standard (see Appendix IV). Race and ethnicity are collected using separate questions. Respondents are offered the option of selecting multiple racial designations.

Race:

-- White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

-- Black or African American. A person having origins in any of the black racial groups of Africa. Terms such as "Haitian" or "Negro" can be used in addition to "Black or African American."

-- American Indian or Alaska Native. 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. 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 or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

Ethnicity:

-- Hispanic or Latino. A person of Cuban, Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race. The term, "Spanish origin," can be used in addition to "Hispanic or Latino."

▪ 1977 Office of Management and Budget (OMB) Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity[10] - Vital events collected using the 1989 U.S. Standard Certificates conform to this minimum standard. Race and ethnicity are collected using separate questions, but respondents are NOT offered the option of selecting multiple racial designations.

Race:

-- White. A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.

-- Black. A person having origins in any of the black racial groups of Africa.

-- American Indian or Alaskan Native. A person having origins in any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.

-- Asian or Pacific Islander. A person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa.

Ethnicity:

-- Hispanic. A person of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin, regardless of race.

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 aged 15-19 years per 1,000 females aged 15-19 years in the population. 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.

TRIMESTER OF 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 <u>Birth</u> 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 <u>Death</u> 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

VS-4 REV. 1/04
STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

CERTIFICATE OF DEATH

STATE FILE NUMBER (For State Use only. Do not write in this box)

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 | UNDER 1 DAY | 7. DATE OF BIRTH (MM/DD/YYYY)
Mo. | Days | Hours | Min.

8. BIRTHPLACE (City, State, 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

APPROXIMATE INTERVAL ONSET TO 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.

IMMEDIATE CAUSE (Final disease or condition resulting in death)
(a)
Due to (or as a consequence of):

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**
(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.[33-36]

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.[37-39]

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.[33] 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.[40] 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 the *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.[41,42] 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.[43]

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,[44,45] 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.[44,45] Results of pairwise comparisons between any two groups are inferred as significant based on $p<0.05$ after Bonferroni-adjustment for multiple comparisons.[46] 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.[47] Disparity Ratios for which the lower confidence limit > 1 indicated an elevated rate and those with upper confidence limits < 1 indicated a lower rate.[48]

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.[49]

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.[50] 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[51] 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.[46] 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.[52]
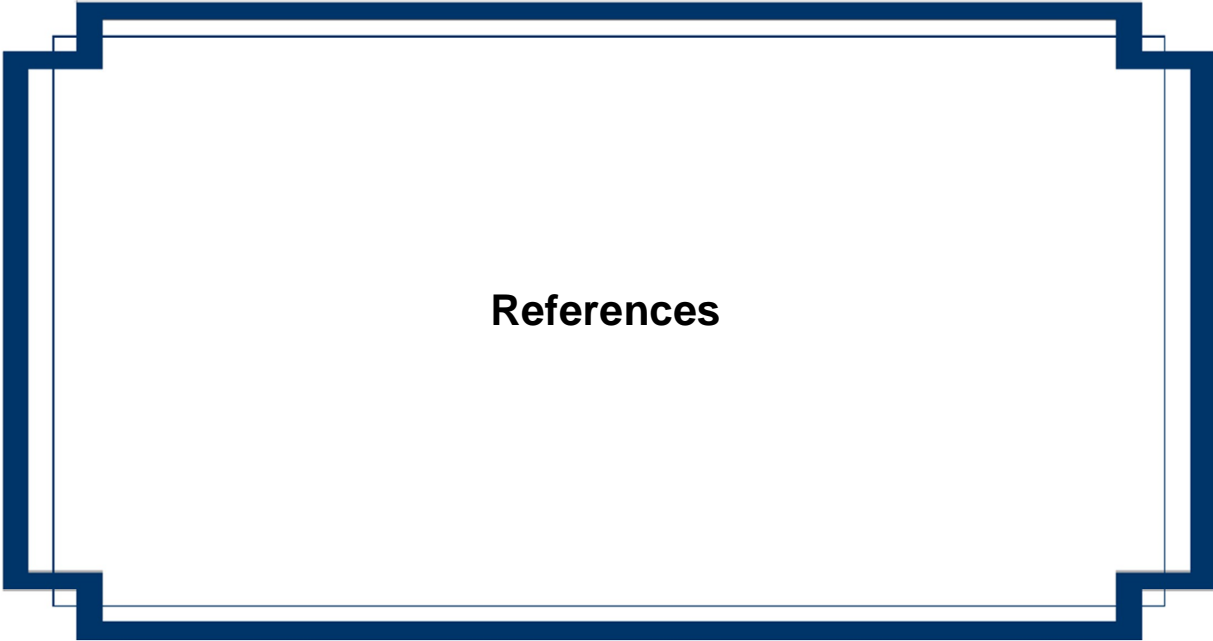
Trend Analyses

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.[53] 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.[54]

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.[55] 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 ($p < 0.05$).[56]

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.

References

1. Hayes LE, Abdellatif E, Olson J, Backus K. *Demographic Comparisons and Disparities in Connecticut COVID-19 Mortality, March 2020-February 2021.* Hartford, CT: Connecticut Department of Public Health; September 2021. Available at: https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/Vital-Statistics/COVID-19/CTDPH_DataBrief1_COVID-19_Mortality_Demographics_v20210915.pdf

2. World Health Organization. Emergency use ICD codes for COVID-19 disease outbreak. *International Classification of Diseases (ICD)* 2023; https://www.who.int/classifications/classification-of-diseases/emergency-use-icd-codes-for-covid-19-disease-outbreak.

3. National Center for Health Statistics. Reporting and Coding Deaths Due to COVID-19. 2020; https://www.cdc.gov/nchs/covid19/coding-and-reporting.htm.

4. National Center for Health Statistics. Guidance for Certifying Deaths Due to Coronavirus Disease 2019 (COVID-19). *Vital Statistics Reporting Guidance.* 2020(3):7. https://stacks.cdc.gov/view/cdc/86344.

5. National Center for Health Statistics. Guidance for Certifying Deaths Due to Coronavirus Disease 2019 (COVID-19) - Expanded in February 2023 to Include Guidance for Certifying Deaths Due to Post-acute Sequelae of COVID-19. *Vital Statistics Reporting Guidance.* 2023(3):9. https://www.cdc.gov/nchs/data/nvss/vsrg/vsrg03-508.pdf.

6. Anderson RN, Warner M, Anne L, Ahmad F. Guidance for certifying deaths due to coronavirus disease 2019 (COVID-19). 2020. Available at: https://www.hsdl.org/?abstract&did=837255

7. Centers for Disease Control and Prevention. Principles of Epidemiology in Public Health Practice, Third Edition: An Introduction to Applied Epidemiology and Biostatistics - Glossary. *Principles of Epidemiology in Public Health Practice, Third Edition* 2014; Third Edition:https://www.cdc.gov/csels/dsepd/ss1978/glossary.html.

8. Association of Maternal & Child Health Programs. Why Focus on Infant Mortality? *State Infant Mortality Toolkit.* 2014;2021(April 16, 2021):4. http://www.amchp.org/programsandtopics/data-assessment/InfantMortalityToolkit/Documents/Why%20Focus%20on%20IM.pdf.

9. Office of Management and Budget (OMB). Race and Ethnic Standards for Federal Statistics and Administrative Reporting. *Statistical Policy Directive* 1977; https://wonder.cdc.gov/WONDER/help/populations/bridged-race/Directive15.html.

10. Office of Management and Budget (OMB). Revisions to the standards for the classification of federal data on race and ethnicity. *Federal Register.* 1997;62(210). Available at: https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf

11. National Center for Health Statistics. U.S. Census Populations with Bridged Race Categories. 2022; https://www.cdc.gov/nchs/nvss/bridged_race.htm.

12. Surveillance Analysis and Reporting Unit, Health Statistics and Surveillance Section. Connecticut DPH Vital Statistics: Single and Two or More (TOM) Race-Ethnicity Classification, *Fact Sheet.* Hartford, CT: Connecticut Department of Public Health; 2023.

13. Hollingsworth CD, Devine J. 2020 Census Data Products: Next Steps for Data Releases. 2022; https://www.census.gov/newsroom/blogs/random-samplings/2022/04/2020-census-data-products-next-steps.html.

14. Ely DM, Driscoll AK. Infant Mortality in the United States, 2018: Data From the Period Linked Birth/Infant Death File. *Natl Vital Stat Rep.* 2020;69(7):1-18. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32730740

15. Kochanek KD, Murphy SL, Xu J, Arias E. Deaths: Final Data for 2017. *Natl Vital Stat Rep.* 2019;68(9):1-77. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32501199

16. World Health Organization. ICD-11 Reference Guide - 2.15 Mortality statistics. 2023; https://icdcdn.who.int/icd11referenceguide/en/html/index.html?sfvrsn=9ec05f86_1#what-is-tabulated-underlying-cause-of-death.

17. Heron M. Deaths: Leading Causes for 2018. *Natl Vital Stat Rep.* 2021;70(4):1-115. Available at: https://www.ncbi.nlm.nih.gov/pubmed/34029179

18. National center for Health Statistics. Instructions for Classifying Multiple Causes of Death, 2022 – Section I: Instruction Manual Part 2b. 2022; https://www.cdc.gov/nchs/nvss/manuals/2022/2b-sectioni-2022.htm.

19. Redelings MD, Sorvillo F, Simon P. A comparison of underlying cause and multiple causes of death: US vital statistics, 2000-2001. *Epidemiology.* 2006;17(1):100-103. Available at: https://www.jstor.org/stable/20486167

20.   Heron M. Deaths: Leading Causes for 2017. *Natl Vital Stat Rep.* 2019;68(6):1-77. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32501203

21.   Statistics NCfH. *Instruction Manual, Part 9: ICD-10 Cause-of-Death Lists for Tabulating Mortality Statistics.* Hyattsville, MD September 2020. Available at: https://www.cdc.gov/nchs/data/dvs/Part9InstructionManual2019-508.pdf

22.   Heron M. Deaths: Leading Causes for 2019. *Natl Vital Stat Rep.* 2021;70(9):1-114. Available at: https://www.ncbi.nlm.nih.gov/pubmed/34520342

23.   National Center for Health Statistics. *Leading Causes of Death, 1900-1998.* 2000. Available at: https://www.cdc.gov/nchs/data/dvs/lead1900_98.pdf

24.   Backus K, Hayes LE, Olson JC, Abdellatif E, Jiang Y. *Connecticut Registration Report for Vital Events Occurring in 2019 - Narrative.* Hartford, CT Connecticut Department of Public Health;2022. Available at: http://www.ct.gov/dph/RegistrationReport

25.   World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. *WHO Director-General* 2020; https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020.

26.   National Center for Immunization and Respiratory Diseases (NCIRD). Science Brief: Evidence used to update the list of underlying medical conditions that increase a person's risk of severe illness from COVID-19. 2021:23. https://stacks.cdc.gov/view/cdc/106171.

27.   National Center for Immunization and Respiratory Diseases (NCIRD). People with Certain Medical Conditions. 2023; https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html.

28.   Hayes LE, Backus K, Abdellatif E, et al. *Connecticut Registration Report for Vital Events Occurring in 2020 - Narrative.* Hartford, CT: Connecticut Department of Public Health;2023. Available at: http://www.ct.gov/dph/RegistrationReport

29.   Godoy M. Flattening A Pandemic's Curve: Why Staying Home Now Can Save Lives. *The Coronavirus Crisis.* Mar 13, , 2020. Available at: https://www.npr.org/sections/health-shots/2020/03/13/815502262/flattening-a-pandemics-curve-why-staying-home-now-can-save-lives

30.   CT DPH Infectious Disease Section. Travel Bans, Testing and Quarantines, and Identification of Medical Treatments to Reduce Morbidity and Mortality Among Severe Cases. 2020; https://portal.ct.gov/Coronavirus/Pages/Emergency-Orders-issued-by-the-Governor-and-State-Agencies.

31.   Centers for Disease Control and Prevention. *CDC Strategy for Global Response to COVID-19 (2020-2023).* April 18, 2022. Available at: https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/pdfs/CDCGlobalCOVIDStrategy_2020-2023.pdf?v=3

32.   American Journal of Managed Care. A Timeline of COVID-19 Developments in 2020. Jan 1, , 2021. Available at: https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020

33.   Duncan GT, Fienberg SE, Krishnan R, Padman R, Roehrig SF. Disclosure limitation methods and information loss for tabular data. *Confidentiality, disclosure and data access: theory and practical applications for statistical agencies.* 2001:135-166. Available at: https://www.academia.edu/19754386/Disclosure_Limitation_Methods_and_Information_Loss_for_Tabular_Data

34.   National Center for Health Statistics (NCHS). Disclosure Manual Preventing Disclosure: Rules for Researchers. *Disclosure Manual Preventing Disclosure.* 2019:15. https://www.cdc.gov/rdc/data/b4/Disclosure-Manual-v2.3.pdf.

35.   O'Keefe CM, Rubin DB. Individual privacy versus public good: protecting confidentiality in health research. *Stat Med.* 2015;34(23):3081-3103. Available at: https://www.ncbi.nlm.nih.gov/pubmed/26045214

36.   Matthews GJ, Harel O, Aseltine RH. Privacy protection and aggregate health data: a review of tabular cell suppression methods (not) employed in public health data systems. *Health Services and Outcomes Research Methodology.* 2016;16(4):258-270. Available at: https://ecommons.luc.edu/math_facpubs/16/

37.   Paita L, Rudolph B, Shah GH. Statistical Approaches for Small Numbers: Addressing Reliability and Disclosure Risk. *Public Health Data Dissemination Guidelines: NAHDO Working Technical Paper Series.* 2004:22. Available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.124.3325&rep=rep1&type=pdf

38. Parker JD, Talih M, Malec DJ, et al. National Center for Health Statistics Data Presentation Standards for Proportions. *Vital Health Stat 2.* 2017(175):1-22. Available at: https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf

39. Rudolph BA, Shah GH, Love D. Small numbers, disclosure risk, security, and reliability issues in Web-based data query systems. *J Public Health Manag Pract.* 2006;12(2):176-183. Available at: https://www.ncbi.nlm.nih.gov/pubmed/16479232

40. National Center for Health Statistics (NCHS). Health, United States, 2016: With Chartbook on Long-term Trends in Health. In: *Health, United States, 2016: With Chartbook on Long-term Trends in Health.* Hyattsville, MD: National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention's (CDC); 2017. Available at: https://www.ncbi.nlm.nih.gov/pubmed/28910066

41. *R: A language and environment for statistical computing* [computer program]. Vienna, Austria: The R Foundation; 2020. Available at: https://www.R-project.org/

42. *SAS: Statistical Analysis Software* [computer program]. Version 9.4. Cary, NC, USA: SAS Institute Inc.; 2021. Available at: https://www.sas.com/en_us/home.html

43. Dicker RC, Coronado F, Koo D, Parrish RG. *Principles of Epidemiology in Public Health Practice, Third Edition: An Introduction to Applied Epidemiology and Biostatistics.* Third ed. Atlanta, GA: Office of Workforce and Career Development, Centers for Disease Control and Prevention (CDC); 2012. Available at: https://www.cdc.gov/csels/dsepd/ss1978/SS1978.pdf

44. Centers for Disease Control and Prevention. An Introduction to Applied Epidemiology and Biostatistics - Lesson 1: Introduction to Epidemiology - Section 6: Descriptive Epidemiology. *Principles of Epidemiology in Public Health Practice, Third Edition* 2012; Third Edition:https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section6.html.

45. Centers for Disease Control and Prevention. Principles of Epidemiology in Public Health Practice, Third Edition: An Introduction to Applied Epidemiology and Biostatistics - Lesson 1: Introduction to Epidemiology - Section 6: Descriptive Epidemiology. *Principles of Epidemiology in Public Health Practice, Third Edition* 2012; Third Edition:https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section6.html.

46. Bland JM, Altman DG. Multiple significance tests: the Bonferroni method. *Bmj.* 1995;310(6973):170. Available at: https://www.bmj.com/content/310/6973/170

47. Dunn OJ. Multiple Comparisons among Means. *Journal of the American Statistical Association.* 1961;56(293):52-64. https://www.tandfonline.com/doi/abs/10.1080/01621459.1961.10482090.

48. Dicker RC. The CDC Field Epidemiology Manual - Analyzing and Interpreting Data. *Analyzing and Interpreting Data* 2018; https://www.cdc.gov/eis/field-epi-manual/chapters/analyze-Interpret-Data.html#ho8-2.

49. National Center for Health Statistics (NCHS). Vital Statistics Online Data Portal. *Public-Use Data Files* 2021; https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

50. Jiang Y, Mueller L, Backus K. *Connecticut Registration Report for Vital Events Occurring in 2015 - Narrative.* Hartford, CT: Connecticut Department of Public Health; July, 2018 2018. Available at: https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/Vital-Statistics/Registration-Reports/Reports/RR2015.pdf

51. U.S. Census Bureau. *2010 Census - Tables P12A-I: SEX BY AGE.* 2010. Available at: https://data.census.gov/cedsci/

52. Newcombe RG. Two-sided confidence intervals for the single proportion: comparison of seven methods. *Stat Med.* 1998;17(8):857-872. Available at: https://www.ncbi.nlm.nih.gov/pubmed/9595616

53. National Cancer Institute. Joinpoint Regression Program, Version 4.8.0.1 (released April 2020). *Download Joinpoint Desktop Software* 2020; https://surveillance.cancer.gov/joinpoint/download.

54. Kim HJ, Fay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with applications to cancer rates. *Stat Med.* 2000;19(3):335-351. Available at: https://www.ncbi.nlm.nih.gov/pubmed/10649300

55. National Cancer Institute. Joinpoint Regression Program, Version 4.9.1 (released April 2022): Number of Joinpoints. *Download Joinpoint Desktop Software* 2022; https://surveillance.cancer.gov/help/joinpoint/setting-parameters/method-and-parameters-tab/number-of-joinpoints.

56. Clegg LX, Hankey BF, Tiwari R, Feuer EJ, Edwards BK. Estimating average annual per cent change in trend analysis. *Stat Med.* 2009;28(29):3670-3682. Available at: https://www.ncbi.nlm.nih.gov/pubmed/19856324

REGISTRATION TABLES 2020

The following 2020 *Registration Report* Tables are available electronically on the DPH website by clicking here or by navigating to www.ct.gov/dph and searching for 'Vital Statistics' or 'Registration Reports' in the search field.