TEXAS STATEWIDE ASSESSMENT REPORT

SECTION 1. CANCER PREVENTION OVERVIEW

Research estimates that close to 50% of cancer cases are preventable by more consistently applying current knowledge of primary prevention strategies, such as lifestyle and behavior modifications, and secondary preventive interventions (i.e., cancer screening programs) to discover and control cancer, to the population.[i,ii] The potentially modifiable risk factors that are causally linked to cancer include cigarette smoking and secondhand smoke exposure; excess body weight; alcohol intake; dietary factors such as consumption of meat and processed foods and low consumption of fruits, vegetables and dietary fiber; physical inactivity; ultraviolet (UV) radiation exposure; and infection with viruses such as hepatitis B virus (HBV) and human papillomavirus (HPV).[iii] Experts have routinely outlined cancer prevention recommendations[iv] and defined evidence-based interventions that effectively prevent cancer and detect it at early stages.[v,vi] Despite this body of evidence, an immense gap exists between what we know about cancer prevention and what we do, including what individuals and families incorporate into their personal lives as well as actions taken by educators, policymakers, employers, government agencies and others to promote healthier workplaces, cleaner environments, and a culture that values and enables health and wellness as population-level priorities. which can be more available, more commonly chosen, and more routinely practiced.

However, some large scale, population-level cancer prevention efforts have been implemented in the past few decades with proven results. For instance, lung cancer incidence and mortality rates in the United States and Texas have declined dramatically in the past 20-30 years due to evidence-based tobacco control actions such as public education campaigns; state and federal support of tobacco control programming; the design, adoption and defense of policies that promote smoke and tobacco-free environments in public spaces; public support for tobacco treatment services provided to those who smoke at low or no-cost to assist them in cessation (e.g., state quitlines); state and federal policies to limit youth access to tobacco products (tobacco 21) and regulation of e-cigarettes; taxation on the sale of tobacco products with return of the generated revenues to tobacco prevention and treatment services; and most recently, improvements in lung cancer screening and early detection.[vii] Retrospective research has suggested that as much as 40% of reductions in male lung cancer deaths between 1991

and 2003 are attributable to tremendous reductions in smoking over the past 50 years in the U.S. and Texas.[viii]

In the early 2000s, the state of Delaware implemented a multi-modal plan to reduce the high rates of cancer incidence and mortality under the direction of the Delaware Cancer Consortium.[ix] The primary elements of the program included facilitated screening for colorectal cancer to all eligible residents including patient navigation services, targeted outreach efforts to medically underserved populations such as Black residents who had experienced cancer disparities, including higher rates of colorectal cancer mortality for decades, and a cancer treatment program for all uninsured individuals. In just seven years between 2002 and 2009, colorectal cancer screening for Delawareans aged 50 plus increased from 57% to 74%. The percentage of patients diagnosed with advanced colorectal cancer decreased, incidence rates per 100,000 decreased for both white and Black individuals, and the mortality rate declined for both groups.[x] During this period, the data also demonstrated that disparities in colorectal cancer screening and incidence and mortality rates were significantly reduced between populations of white and Black people in Delaware.

In 2007, Australia was the first country to introduce a national publicly funded human papillomavirus (HPV) vaccination program, and it has attained high vaccination coverage in both males and females since that time. In addition to promoting HPV vaccination, Australia also transitioned its cervical cancer screening practice from cytology-based screening every two years to cervical sampling for HPV screening every five years, a strategy which clinical trials suggest is more effective at detecting cervical abnormalities and preventing cervical cancer. Owing to the multi-HPV vaccination program and the HPV-based cervical screening program, with high rates of participation in both programs over a period of approximately 17 years, Australia may be the first country to eliminate cervical cancer.[xi] Recent modeling has projected the impact of these multiple interventions on cervical cancer incidence and mortality until 2035 at which point cervical cancer rates are expected to halve and mortality rates should decline by 45%.[xii]

These examples illustrate the ways in which primary and secondary cancer prevention strategies have had and can have a profound impact on cancer incidence and mortality over a relatively short period of time (i.e., 20 years or less) through the implementation of carefully chosen, highly coordinated, and faithfully implemented actions in evidence-based cancer control.

SECTION 2. TEXAS STATEWIDE ASSESSMENT OVERVIEW

In 2007, Texans made a historic vote in favor of a constitutional amendment creating the Cancer Prevention and Research Institute of Texas (CPRIT). In adopting the constitutional amendment, Texans also made a historic commitment to cancer prevention, dedicating 10% of CPRIT funds to support the delivery of evidence-based cancer prevention interventions to underserved populations in Texas. The CPRIT Prevention Program's guiding principles are "to fund evidence-based interventions across the prevention continuum for any cancer types that are culturally appropriate for the target population and validated by documented research or applied evidence."[xiii]

Since 2010, the prevention-focused funding has enhanced innovation in prevention in the state through the support of 231 grants in eight areas totaling $277 million in funding. CPRIT invests in effective community-based interventions so that new technologies and services are made available across the state, with priority given to areas and populations that are underserved. These programs have reached nearly every corner of the state and provided resources to fund important education and training, along with clinical services for cancer screenings, vaccinations (HPV and Hepatitis B), tobacco cessation counseling and treatment, genetic testing and counseling, and expansion of coalitions and networks delivering cancer prevention services.

The purpose of this report is to summarize the extent to which rates of preventable cancer risk factors and cancer morbidity and mortality have changed in the state of Texas in the first ten years of CPRIT Prevention Program funding (2010 to 2020). This analysis reviews key demographic factors and behavioral risk factors as well as cancer incidence, late-stage incidence, and mortality for all cancer types and five preventable cancers in particular: female breast (breast), cervix uteri (cervical), colon and rectum (colorectal), liver and intrahepatic bile duct (liver) and lung and bronchus (lung).

SECTION 3. DATA SOURCES AND METHODOLOGICAL APPROACH

The data presented in this report are derived from a variety of publicly available sources including the Texas Cancer Registry (TCR)[1], the American Community Survey (ACS), the Behavioral Risk Factor Surveillance System (BRFSS), and the National Immunization Survey-Teen (NIS-Teen). This analysis focuses on the period from 2010 to 2020 and presents data at the state and Public Health Region (PHR)[2] level where applicable and feasible. Data presented at the PHR level demonstrate the geographic and demographic variation of Texas. Throughout the report, PHRs are identified by their corresponding number and by the largest city in each.

The National Cancer Institute (NCI) suggests that the "best indicator of progress against cancer is a change in age-adjusted mortality (death) rates."[xiv] Although incidence rates are also important, the interpretation of these rates is not always straightforward. Increasing incidence could indicate a real increase in disease occurrence, or it could be due to factors such as new or improved screening techniques. Thus, to illustrate the burden of disease on Texas, this analysis focuses on mortality rates as well as cancer incidence rates and late-stage incidence rates. Incidence rate is defined as number of new cancers of a specific site/type occurring in a specified population during a year per 100,000 population at risk,[xv] and late-stage incidence is defined as new cancer cases that are Regional by direct extension (2), Regional to lymph nodes (3), Regional, both 2 and 3 (4), Regional NOS (5), and Distant (7).[xvi] Mortality rate is defined as the number of deaths, with cancer as the underlying cause of death, occurring in a specified population during a year per 100,000 population.[xvii]

For data on cancer incidence and mortality, we extracted rates from the publicly available TCR web query tool.[xviii] These data were extracted in the spring of 2024, and as TCR updates these rates routinely when new reporting data are available, the numbers reported in this analysis may not match the rates currently available in the web query tool. We selected a cluster of years at the beginning of the period (2010-2012) and at the end of the period (2017-2019) to account for any variance that reviewing a single year's data could cause. Though data for 2020 were available at the time of the analysis, we chose to use 2019 as the final year because of

[1] Texas cancer data have been provided by the Texas Cancer Registry, Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, 1100 West 49th Street, Austin, TX 78756 (www.dshs.texas.gov/tcr). Data from the Texas Cancer Registry is supported by the following: Cooperative Agreement #1NU58DP007140 from the Centers for Disease Control and Prevention, Contract #75N91021D00011 from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Program, and the Cancer Prevention and Research Institute of Texas.

[2] https://www.dshs.texas.gov/regional-local-health-operations/public-health-regions

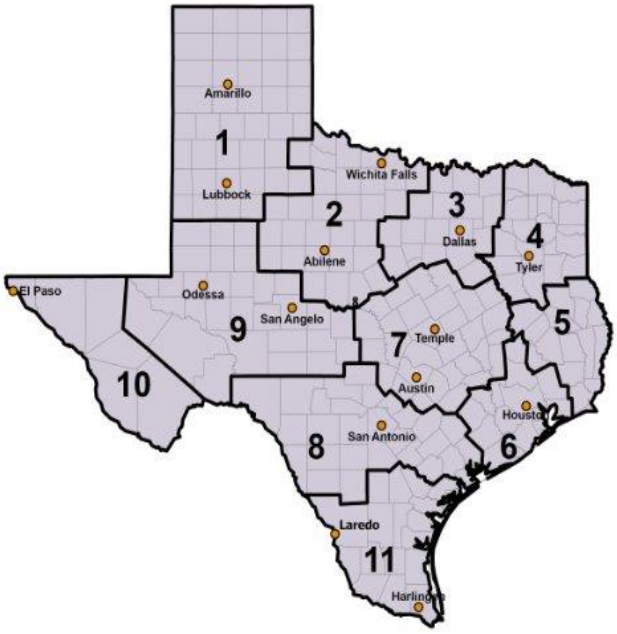
the potential effect of the COVID-19 pandemic on incidence and mortality data and reporting. The National Cancer Institute's Surveillance, Epidemiology, and End Results Program (SEER) and the TCR conducted similar analyses to determine the impact of COVID-19 on cancer data, and they found significant impact on cancer incidence in 2020; for many cancers, incidence rates did not fully recover to pre-pandemic levels.[xix] All incidence and mortality rates reported throughout are age-adjusted. Where it was possible to calculate, increases or decreases in rates that are statistically significant are noted throughout. Error bars are provided on most charts to display the variability and uncertainty in the data and help determine statistical significance.

Demographic data from ACS were analyzed using the 5-year estimates to account for any variation when reviewing data from a single year. Data on behavioral risk factors were derived from BRFSS and PHR-level estimates were generated by the Texas Behavioral Risk Factor Surveillance System, Center for Health Statistics, Texas Department of State Health Services. Reliable estimates at the PHR level that could be compared to 2020 were only available starting in 2014, and for those indicators the period of analysis is 2014 to 2020.

SECTION 4. DEMOGRAPHICS OF TEXAS

To contextualize changes in cancer incidence and mortality rates, we must first understand how the demographics of Texas changed in terms of population, racial and ethnic makeup, median income, health insurance coverage, and educational attainment. This section explores these changes.

Figure 1.1 Public Health Regions in Texas



POPULATION

Texas is the second largest state geographically (second to Alaska), and the second most populous state (second to California) in the United States.[xx] The state is divided into 254 counties and 11 PHRs as determined by the Texas Department of State Health Services.[xxi] See Figure 1.1.

In 2020 the population of Texas was 28,635,442.[xxii] From 2010 to 2020, Texas had the largest increase in population in the country, gaining nearly 4 million residents, and had the third fastest population growth rate of all the states. Every PHR had a net increase in population from 2010 to 2020, and the three most populous PHRs (3, 6 and 7, covering Dallas, Houston, and Austin, respectively) had the highest percentage increase in population. The median age of Texas residents in 2020 was 34.8. The percentage of the population in each age group as of 2020 is illustrated in Figure 1.2. The Texas population that is 65 years of age or older generally increased statewide. PHRs 4, 6 and 7 had the largest percentage increase in the population 65 years of age or older. See Figure 1.3.

Figure 1.2 Age Groups in Texas, 2020

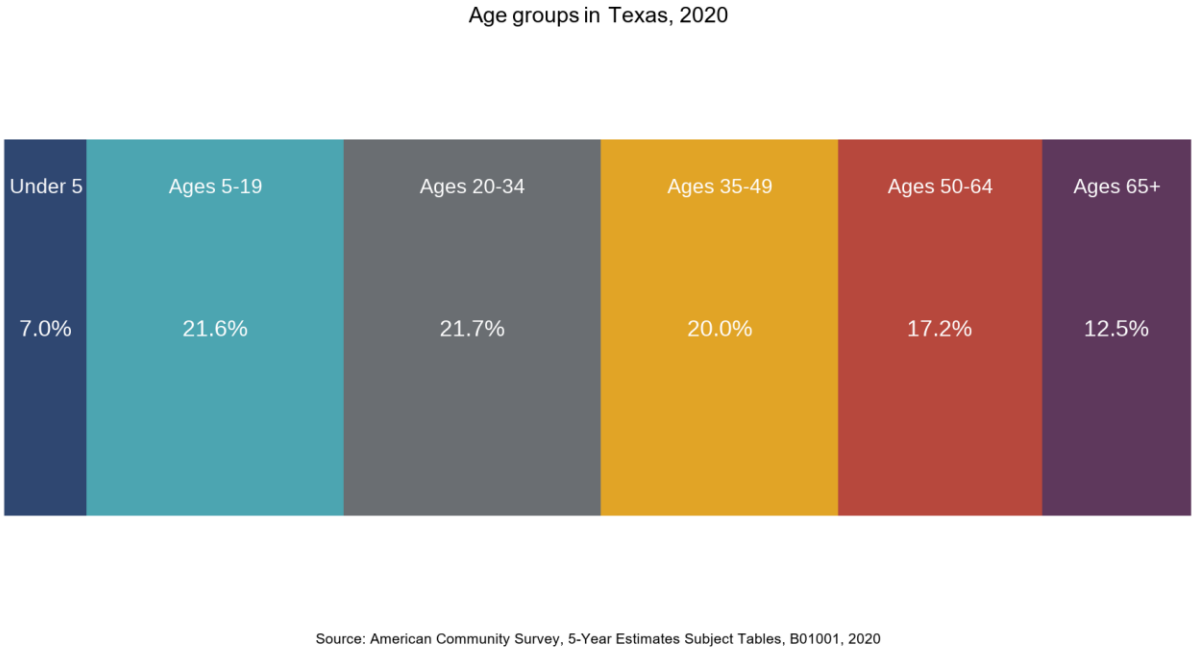
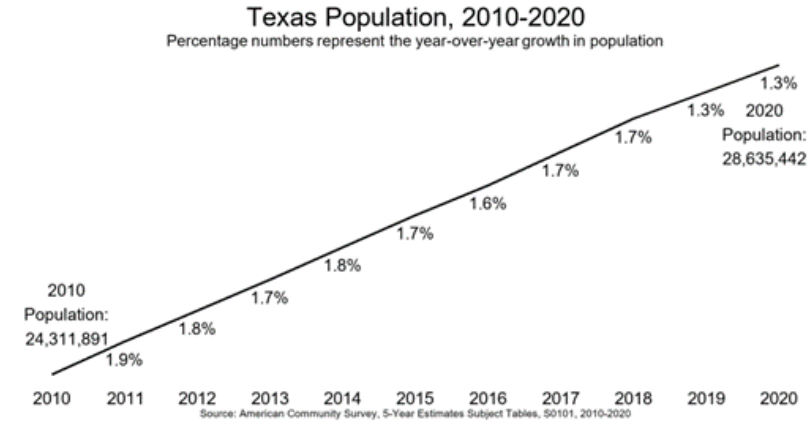
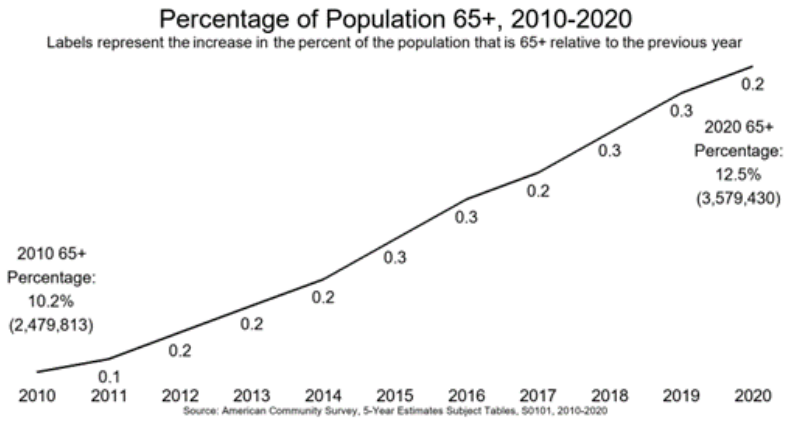


Figure 1.3 Texas Population Growth from 2010 to 2020

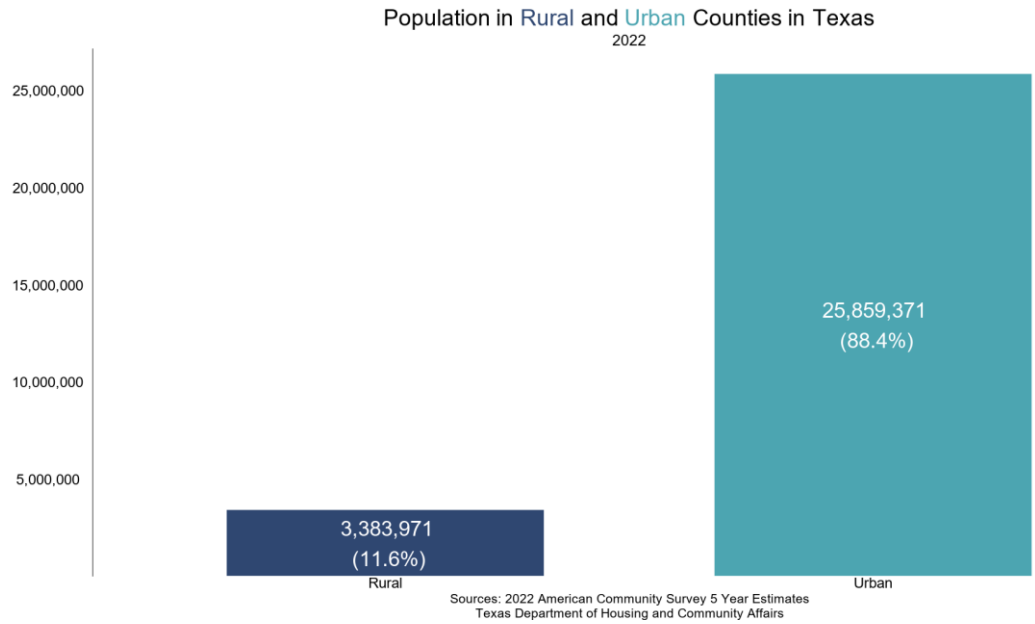




Rurality

Most Texas residents (88.4%) lived in counties classified as urban in 2022. See Figure 1.4.

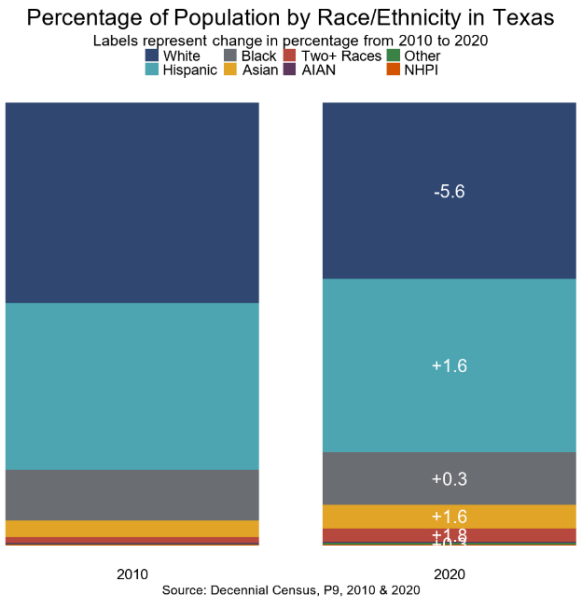
Figure 1.4 Urban and Rural Populations in Texas 2022



Race/Ethnicity

All racial/ethnic groups grew from 2010 to 2020 except for people identifying as white. From 2010 to 2020 there was an increase in residents who identified as Hispanic across all PHRs, conversely, there was a decrease in residents who identified as white. See Figure 1.5.

Figure 1.5 Change in Race/Ethnicity in Texas, 2010 to 2020



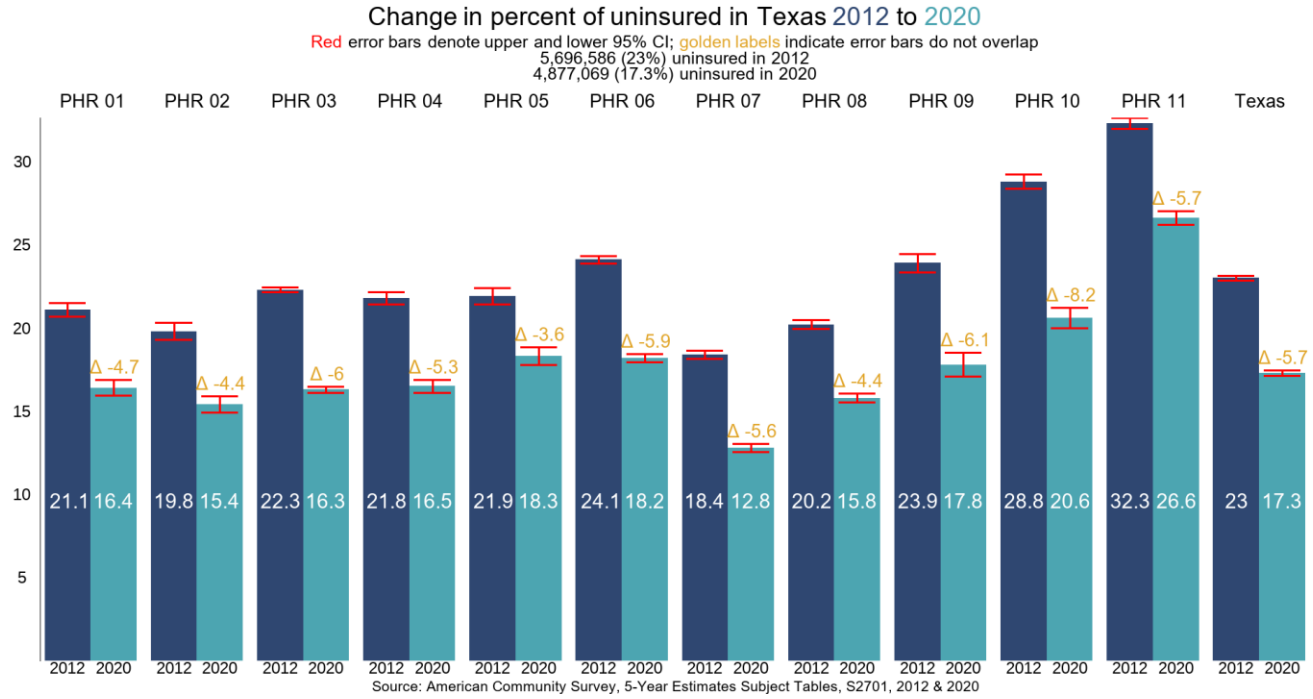
Median Household Income

In 2020 the median household income among Texas residents was $63,826; this is 28.5% higher in unadjusted dollars than in 2010 ($49,646). Median household income was not compared across PHRs due to the high variability across counties.

Health Insurance Status

In Texas overall, the percentage of residents without health insurance declined from 2012 (23.0%) to 2020 (17.3%)[3], meaning more Texans were covered by health insurance. This trend is also true for every individual PHR. Notably, PHR 10 (El Paso) had the largest decrease in the uninsured population, from 28.8% uninsured in 2012 to 20.6% uninsured in 2020. See Figure 1.6.

Figure 1.6 Change in Percent of Uninsured Texans, 2012 to 2020

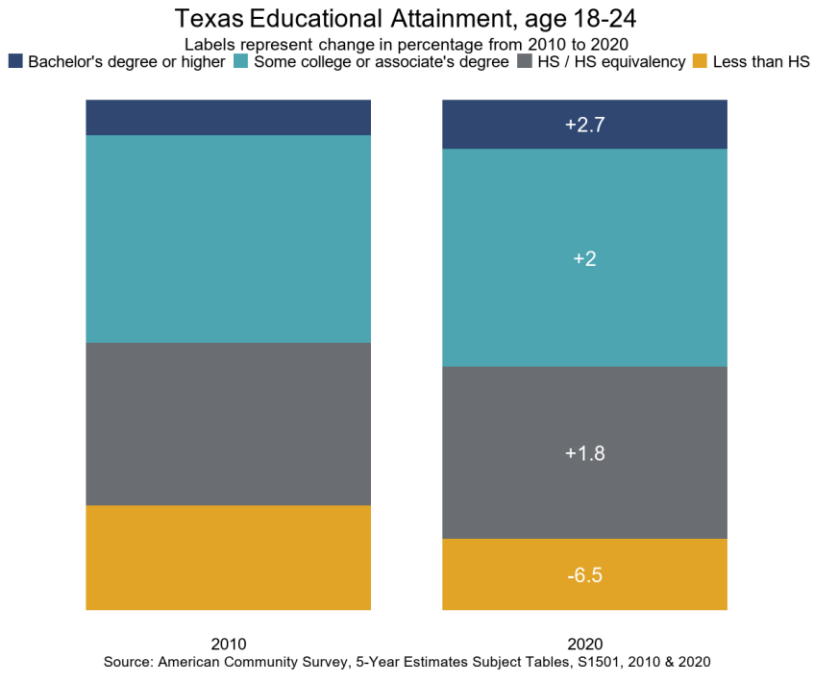


[3] Baseline year is 2012 in this instance because 5-year estimates were not available related to insurance status in 2010.

Educational Attainment

Texas experienced a net increase in educational attainment levels among those 18-24 during our analysis period. More Texans received a high school diploma or equivalent (+1.8%), attended college or earned an associate degree (+2.0%), and earned a bachelor's degree or higher (+2.7%) as compared to 2010. See Figure 1.7.

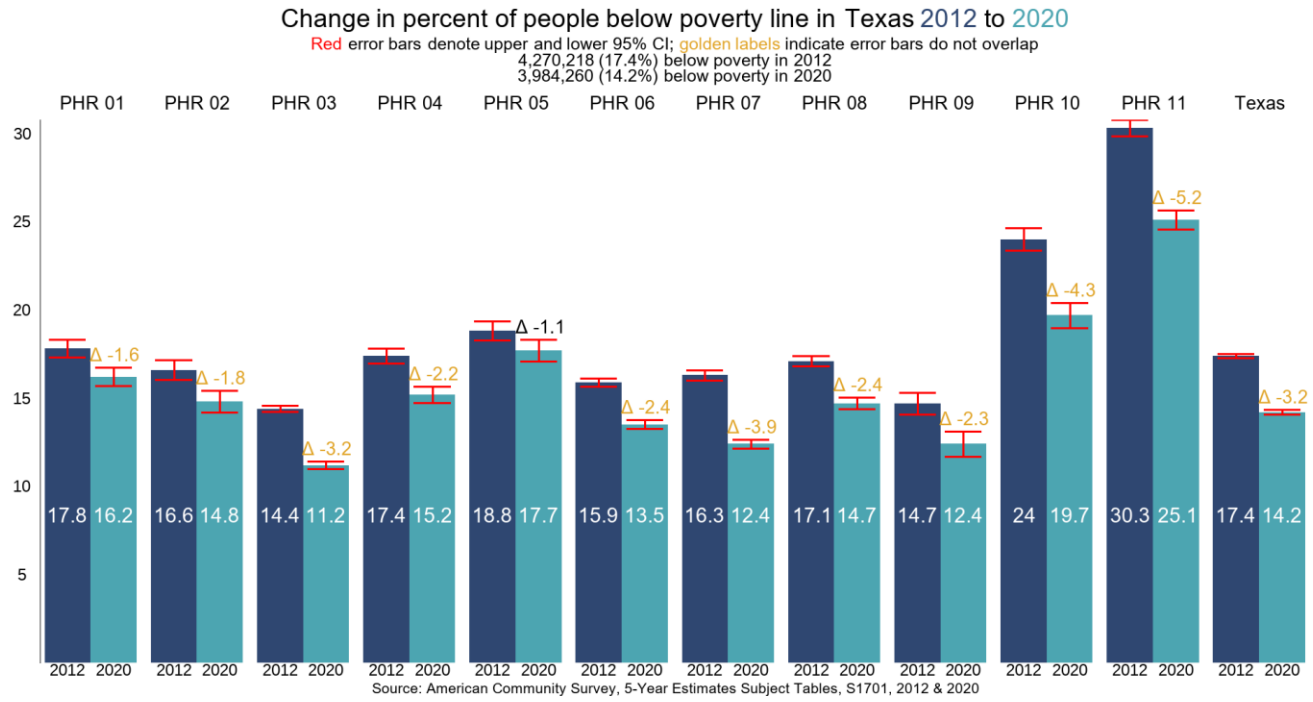
Figure 1.7 Change in Educational Attainment of Texans, 2010 to 2020



Poverty

From 2012 to 2020 the percentage of Texans living in poverty[xxiii] decreased significantly from 17.4% to 14.2% statewide.[4] The percentage of people living in poverty decreased for all PHRs with PHR 11 (Harlingen) having the largest statistically significant decline. See Figure 1.8.

Figure 1.8 Change in Percent of Texans Living in Poverty, 2012 to 2020



Demographic Summary

Over our analysis period, the population of Texas grew, the percentage of Texans who identified as Hispanic or of a race/ethnicity other than white increased, median household increased (but did not keep pace with inflation,) more Texans were covered by health insurance, more Texans achieved higher levels of educational attainment, and fewer Texans lived in poverty. These overall trends add context to the changes in cancer incidence and mortality during the analysis period for this project.

[4] Baseline year is 2012 in this instance because 5-year estimates were not available related to poverty status in 2010. The poverty thresholds are the original version of the federal poverty measure. They are determined annually by the US Census Bureau, as directed by the Office of Management and Budget's Statistical Policy Directive 14. They are updated annually to account for inflation using the Consumer Price Index.

SECTION 5. CANCER RISK FACTOR BEHAVIORS

As mentioned previously, several behaviors contribute to the risk of developing cancer such as obesity, physical inactivity, and tobacco use. As such, the US government sets goals for improvements in these behaviors and outcomes via Healthy People 2030.[xxiv] The table below shows the Healthy People 2020 and 2030 goals related to physical inactivity, obesity, smoking, HPV vaccination, and screening for breast, cervical and colorectal cancer for adults. In 2020, Texas did not meet the obesity goal, the smoking goal or the goals for any cancer screening but did meet the goal for physical inactivity. Texas will need to make improvements in every indicator to meet the Healthy People 2030 goals. See Table 1.1.

Table 1.1 Texas Health Behaviors compared to Healthy People 2030 Goals

Health Behavior	Texas Rate Baseline*	Texas Rate 2020	Healthy People 2020 Goal	Healthy People 2030 Goal
Physical Inactivity	27.6%	25.6%	32.6%	21.8%
Obesity	31.9%	35.7%	30.5%	36.0%
Smoking	14.5%	13.2%	12.0%	6.1%
Breast cancer screening	76.7%	77.7%	81.1%	80.3%
Cervical cancer screening	77.7%	75.0%	93.0%	79.2%
Colorectal cancer screening	60.8%	66.8%	70.5%	68.3%
HPV Vaccination	32.9%	54.9%	Not available**	80.0%

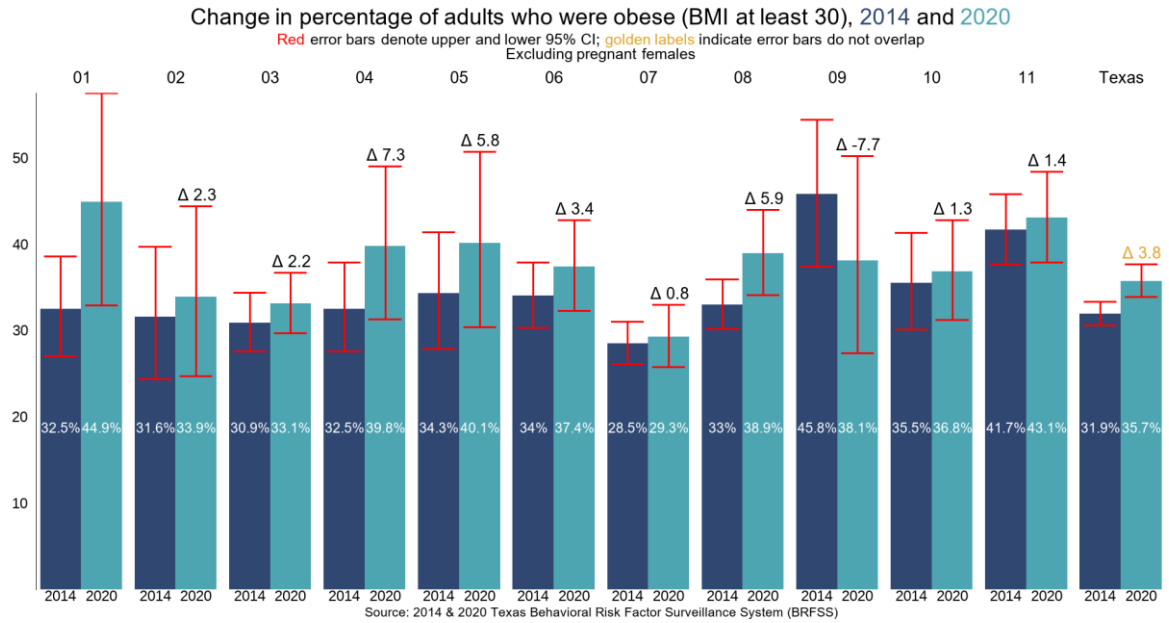
*Baseline years vary for the indicators; 2016 for HPV vaccination and 2014 for the other indicators.

**Healthy People 2020 did not define a combined male/female goal and used different age ranges than the current goal

Obesity

The percentage of people who are obese has increased significantly from 2014 to 2020 by 3.8% at the state level. The rates of obesity have increased in all PHRs, except PHR 9, though statistical significance could not be determined. See Figure 1.9.

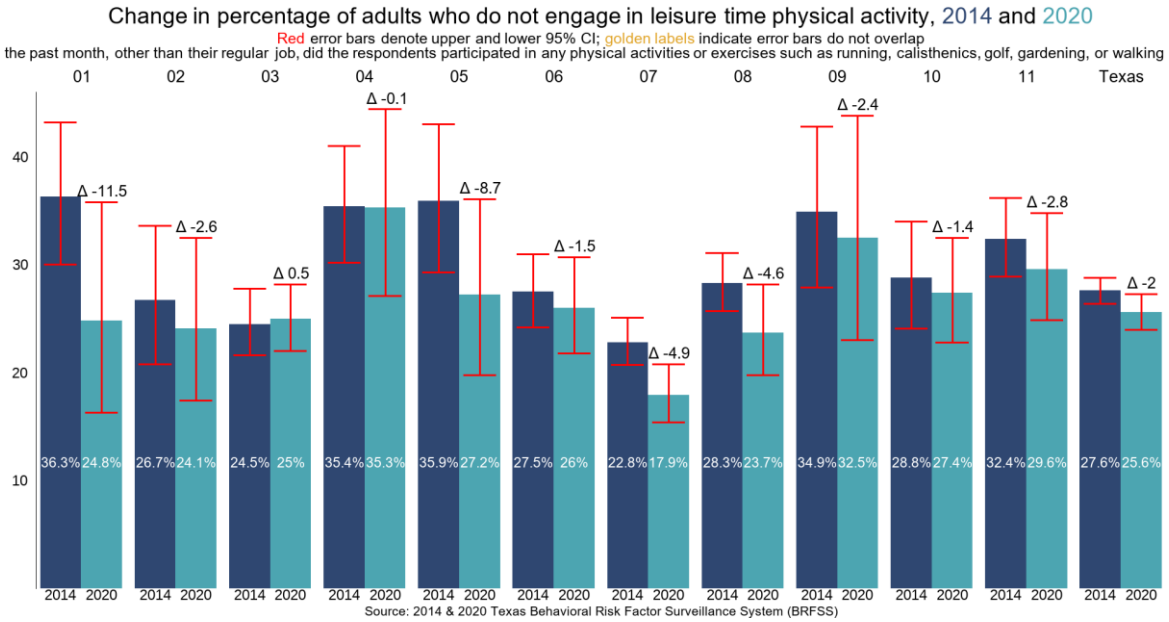
Figure 1.9 Change in Percentage of Adult Texans Who Are Obese, 2014 to 2020



Physical Inactivity

When looking across PHRs, the vast majority saw a decrease in the percentage of leisure time physical inactivity from 2014 to 2020. PHR 3 is the only exception showing a slight increase in leisure time physical activity from 2014 to 2020, though statistical significance could not be determined at the state level or for any PHR. See Figure 1.10.

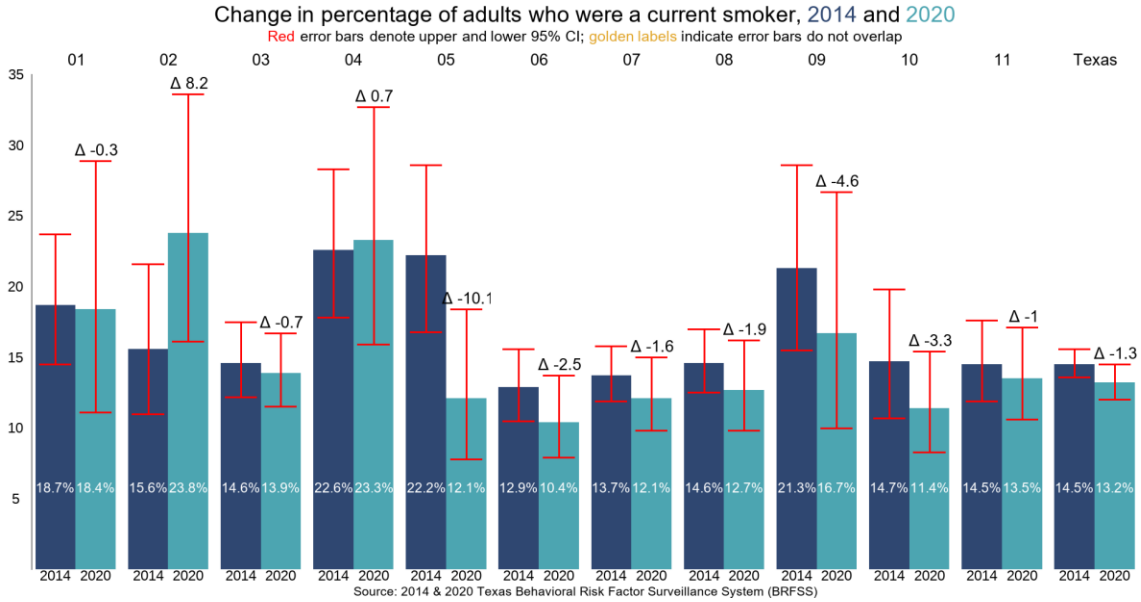
Figure 1.10 Change in Percentage of Adult Texans Who Do Not Engage in Leisure-time Physical Inactivity, 2014 to 2020



Smoking

The percentage of Texans who reported being a current smoker has decreased somewhat from 2014 to 2020. See Figure 1.11.

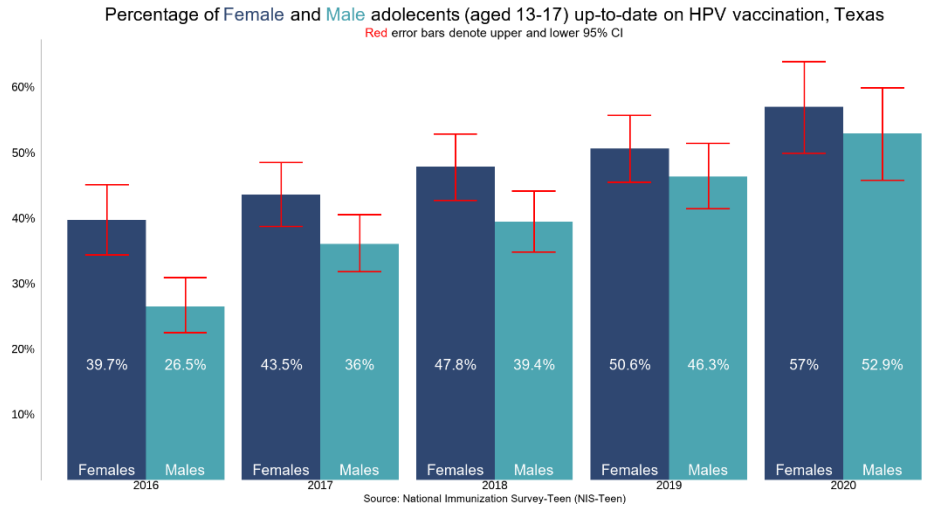
Figure 1.11 Change in Percentage of Adult Texans Who Currently Smoke, 2014 to 2020



HPV Vaccination

HPV vaccination is another behavior that can affect a person's lifetime risk of developing certain types of cancer, including cervical.[xxv] The rate of up-to-date vaccination for the state of Texas has risen each year for both males and females aged 13-17 years from 2016 to 2020 and is now above 50% for both groups, see Figure 1.12. However, this is still well below the Healthy People 2030 goal of 80% as noted in Table 1.1.

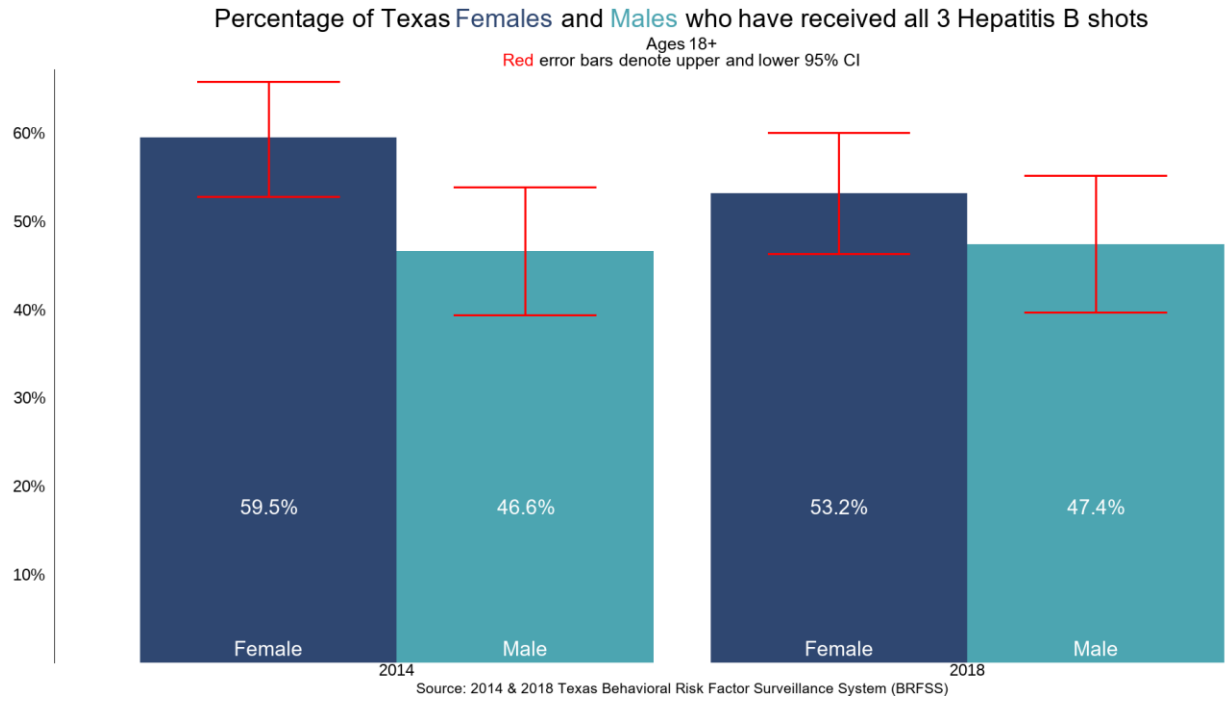
Figure 1.12 Percentage of Adolescent Texans Who Are Up to Date on HPV Vaccination, 2016 to 2020



Hepatitis B Vaccination

The hepatitis B vaccine is essential to prevent serious liver disease and to reduce the risk of certain cancers cancer,[xxvi] notably liver cancer. This specific vaccine is recommended for newborns and children and certain adults who are at high risk of acquiring the infection. The rate of individuals ages 18-65 years and up who have received all 3 hepatitis shots remains around 50% for the years 2014-2018. Females have a higher percentage of acquiring all 3 shots in both 2014 and 2018 compared to males. See Figure 1.13.

Figure 1.13 Percentage of Adult Texans Who Have Hepatitis B Vaccination, 2014 to 2018



Behavioral Risk Factor Summary

Progress on behavioral risk factors related to cancer has been mixed in Texas during the analysis period. For instance, Texas continues to make progress on smoking and has made modest progress on physical inactivity. However, obesity has worsened, and Texas is not meeting goals for needed vaccinations or cancer screenings.

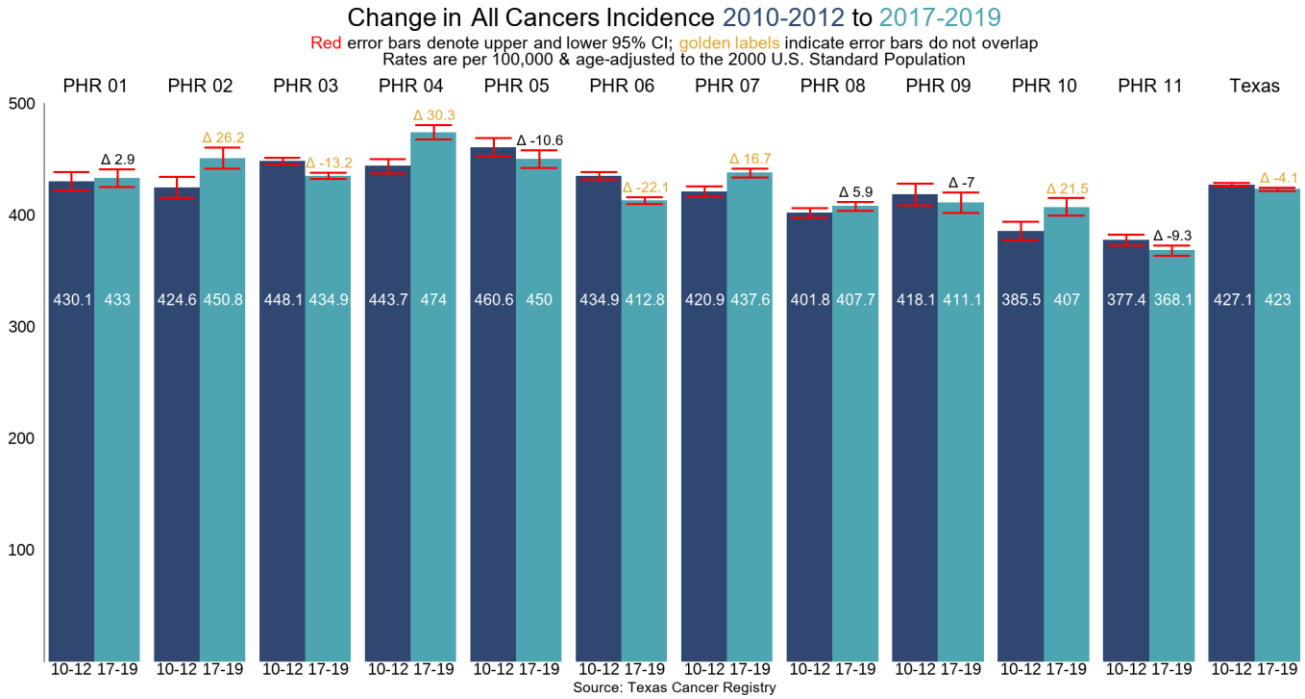
SECTION 6. CANCER IN TEXAS

Cancer is the second most common cause of death in Texas behind heart disease.[xxvii] Over 140,000 new cancer cases are expected to be diagnosed in Texas in 2024 with 48,335 expected deaths,[xxviii] and as of January 1, 2022, Texas was projected to have over 1 million cancer survivors.[xxix]

All Cancer Incidence

Overall cancer incidence in the state has significantly decreased from 427.1 per 100,000 in 2010-2012 to 423.0 per 100,000 in 2017-2019, as indicated by the non-overlapping confidence interval in Figure 1.14. Notably, the largest change in cancer incidence was in PHR 4 (Tyler), a significant increase from 2010-2012 to 2017-2019. Other significant increases occurred in PHRs 2 (Midland), 7 (Austin) and 10 (El Paso). Cancer incidence in PHR 3 (Dallas) and PHR 6 (Houston) significantly decreased during the analysis period. See Figure 1.14.

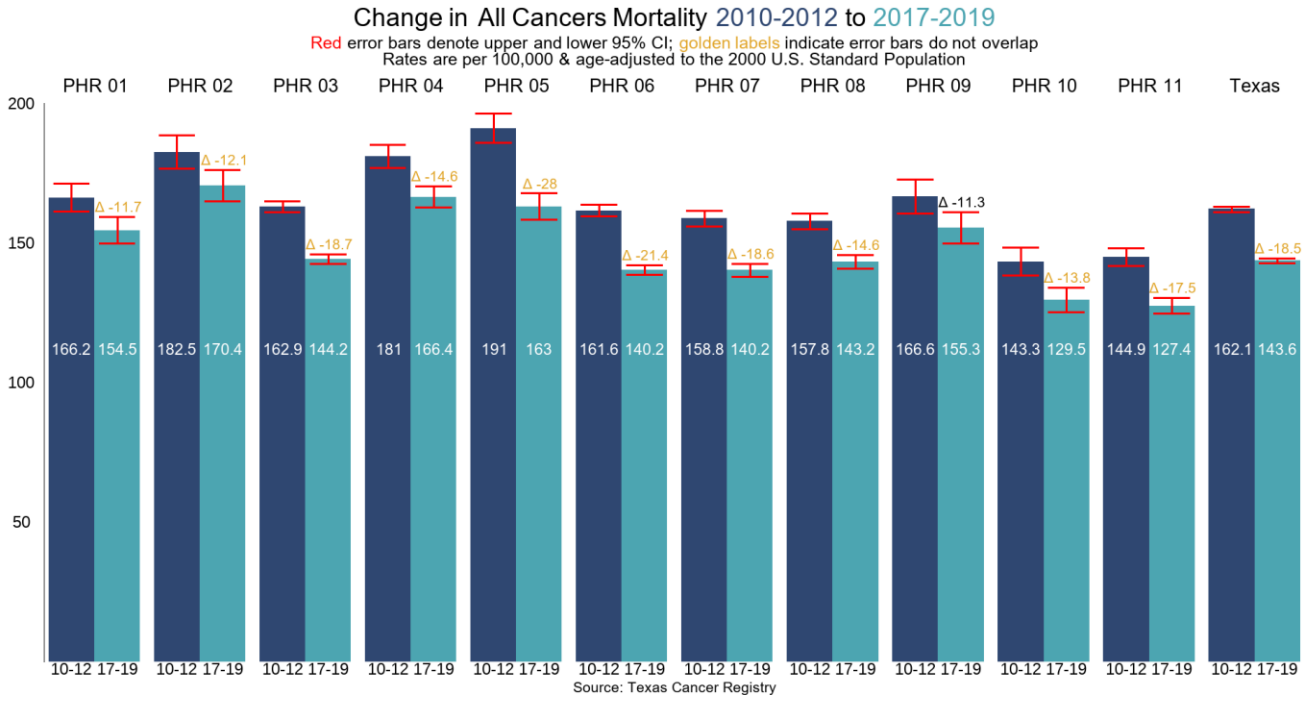
Figure 1.14 Change in All Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



All Cancer Mortality

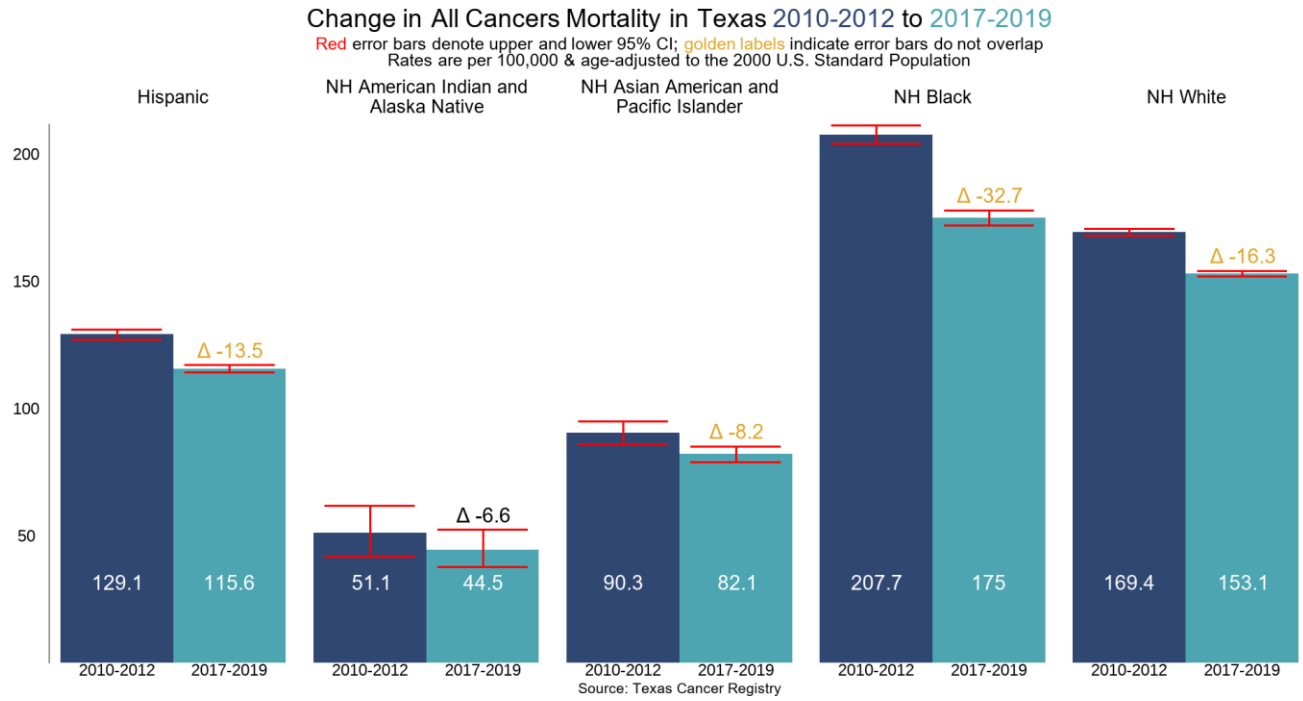
Overall cancer mortality decreased significantly in Texas from 162.1 per 100,000 in 2010-2012 to 143.6 in 2017-2019 as indicated by the non-overlapping confidence interval in Figure 1.15. Cancer mortality rates for all PHRs decreased significantly during this period, except for PHR 9 (Midland), where significance could not be determined. Notably, the largest rate change in mortality occurred in PHR 5 (Beaumont), with a decrease of 28.0 per 100,000. See Figure 1.15.

Figure 1.15 Change in All Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019



When looking at cancer mortality by race/ethnicity, cancer mortality rates significantly decreased for Hispanic, Black, White, and Asian American/Pacific Islanders from 2010-2012 to 2017-2019. The largest decrease in cancer mortality among groups was in Non-Hispanic Blacks, with a rate decrease of 32.7 per 100,000 from 2010-2012 to 2017-2019. See Figure 1.16.

Figure 1.16 Change in All Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019

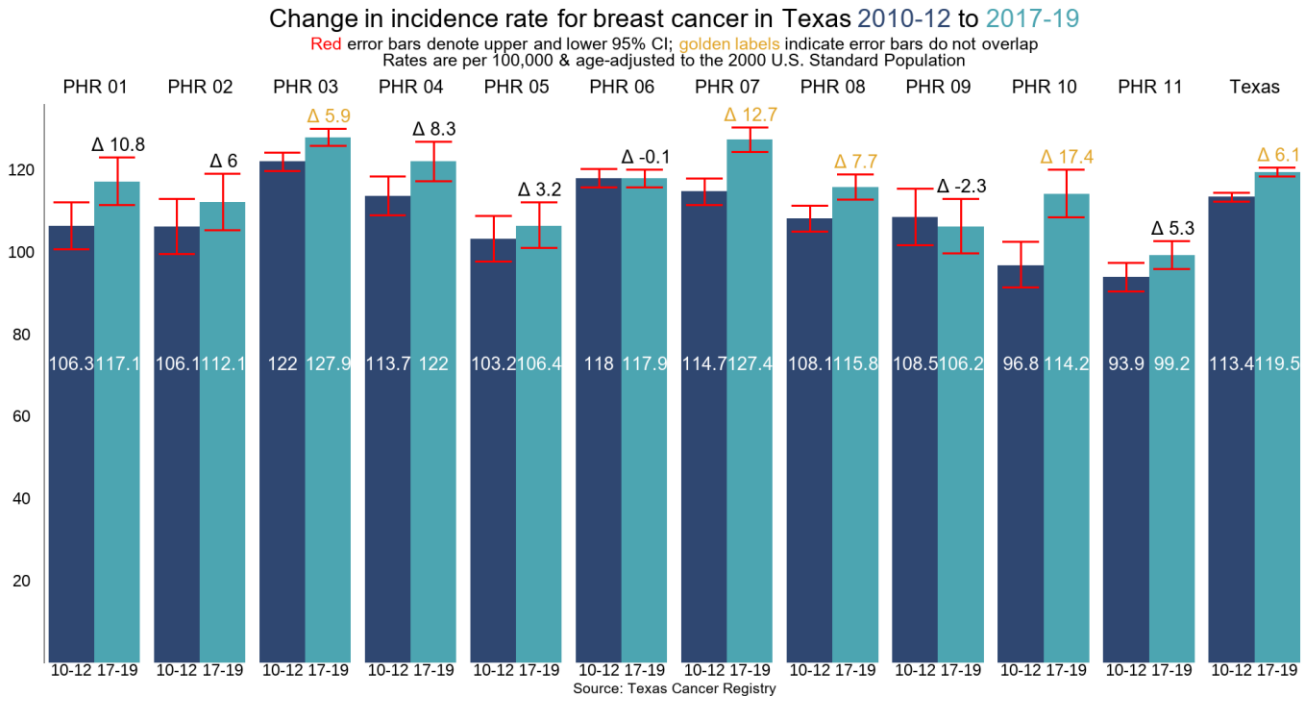


Breast Cancer in Texas

BREAST CANCER INCIDENCE

Although all cancer incidence in Texas decreased from 2010-2012 to 2017-2019, the incidence of breast cancer increased by 6.1 per 100,000 during the same time, a statistically significant increase. The increase in breast cancer incidence rate was statistically significant in PHRs 3 (Dallas), 7 (Austin), 8 (San Antonio) and 10 (El Paso). The greatest increase in breast cancer incidence rate was in PHR 10 (El Paso), an increase of 17.4 per 100,00 from 2010-2012 to 2017-2019. See Figure 1.17.

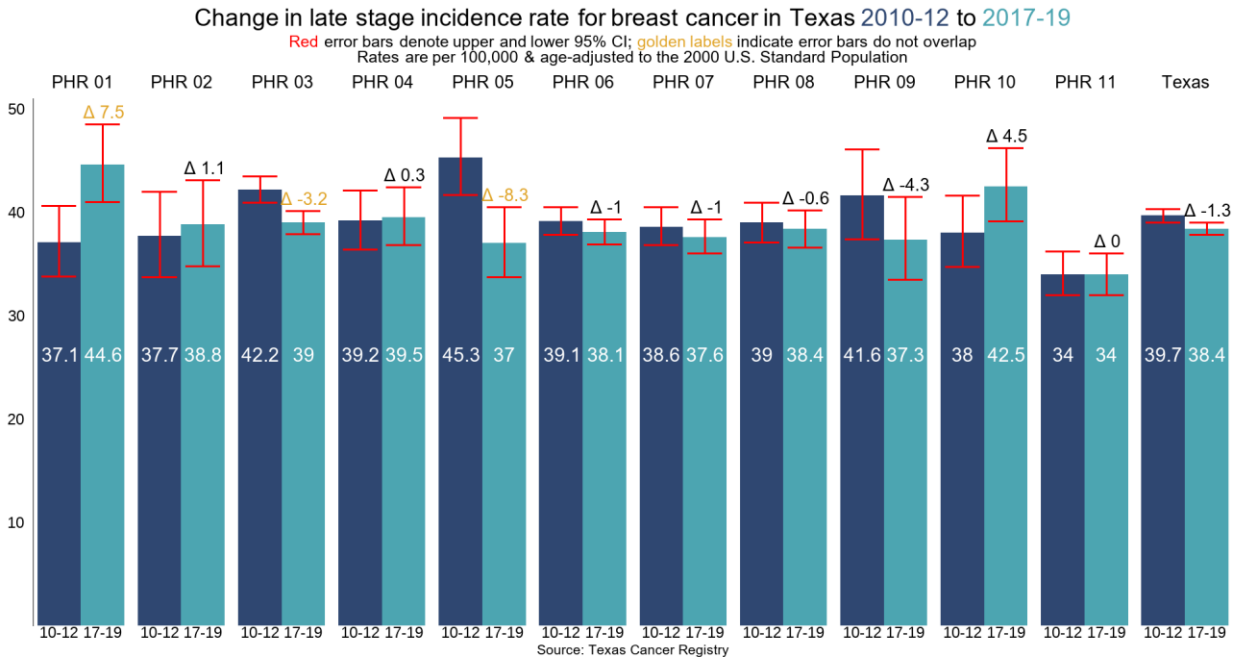
Figure 1.17 Change in Breast Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



BREAST CANCER LATE-STAGE INCIDENCE

Late-stage breast cancer incidence rate decreased slightly from 2010-2012 to 2017-2019 statewide, however, statistical significance could not be determined. The rate of late-stage breast cancer incidence in PHR 5 (Beaumont) and PHR 3 (Dallas) declined statistically significantly. However, these two PHRs (3 Dallas and 5 Beaumont) had an increase (PHR 3) or no significant change (PHR 5) in overall incidence. Late-stage breast cancer incidence in PHR 1 increased significantly from 2010-2012 to 2017-2019 by 7.5 per 100,000. See Figure 1.18.

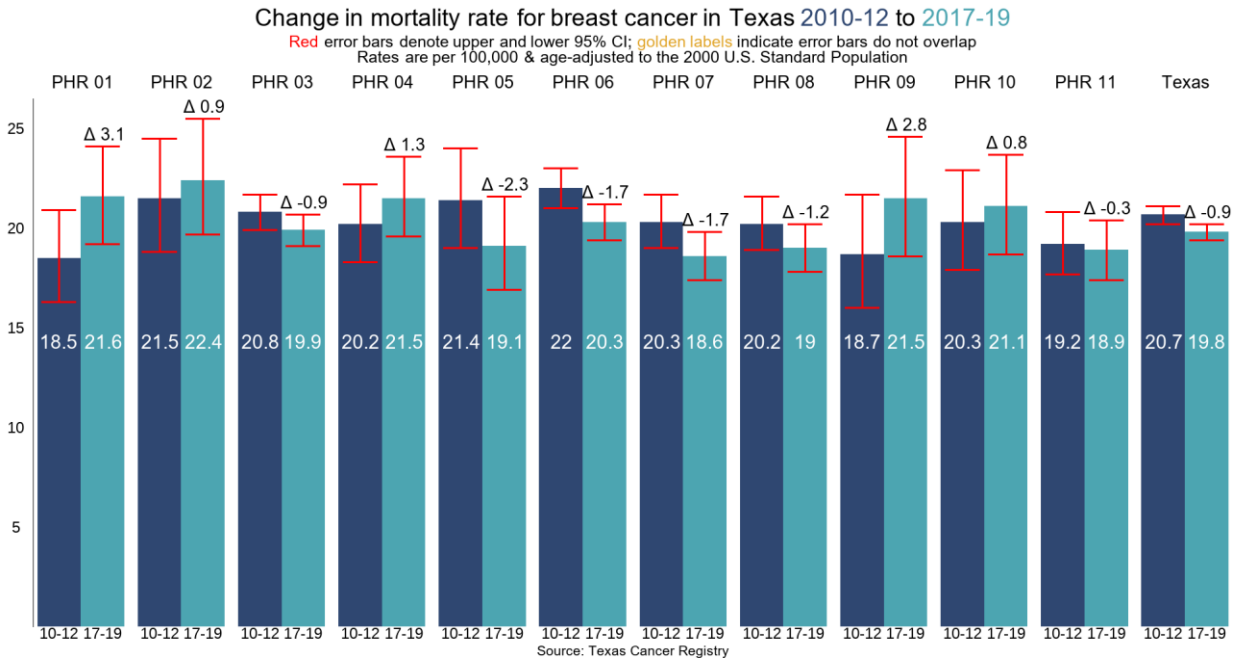
Figure 1.18 Change in Breast Cancer Late-Stage Incidence Rates in Texas, 2010-2012 to 2017-2019



BREAST CANCER MORTALITY

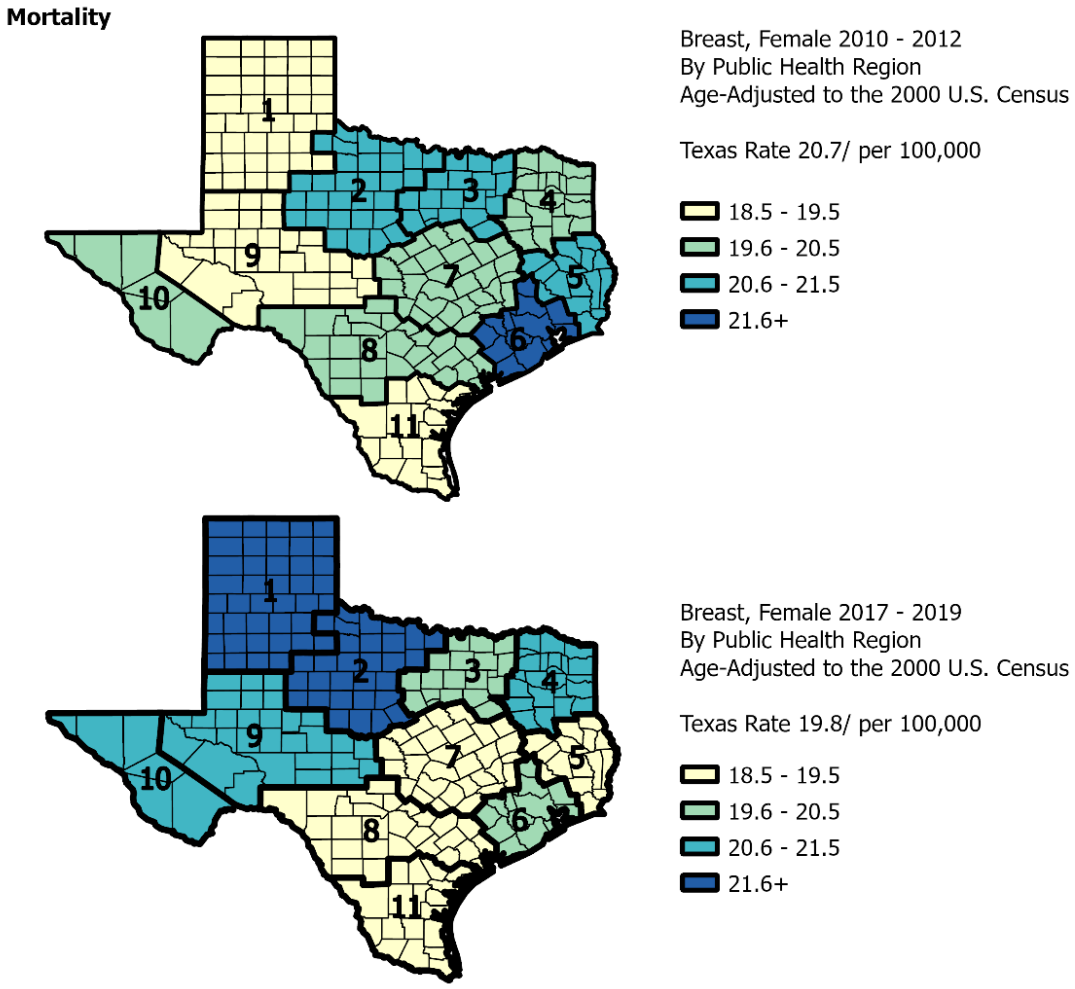
The breast cancer mortality rate for the state decreased from 2010-2012 and 2017-2019, though statistical significance could not be determined. Statistical significance could not be determined for any rate changes for any individual PHR. See Figure 1.19

Figure 1.19 Change in Breast Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019



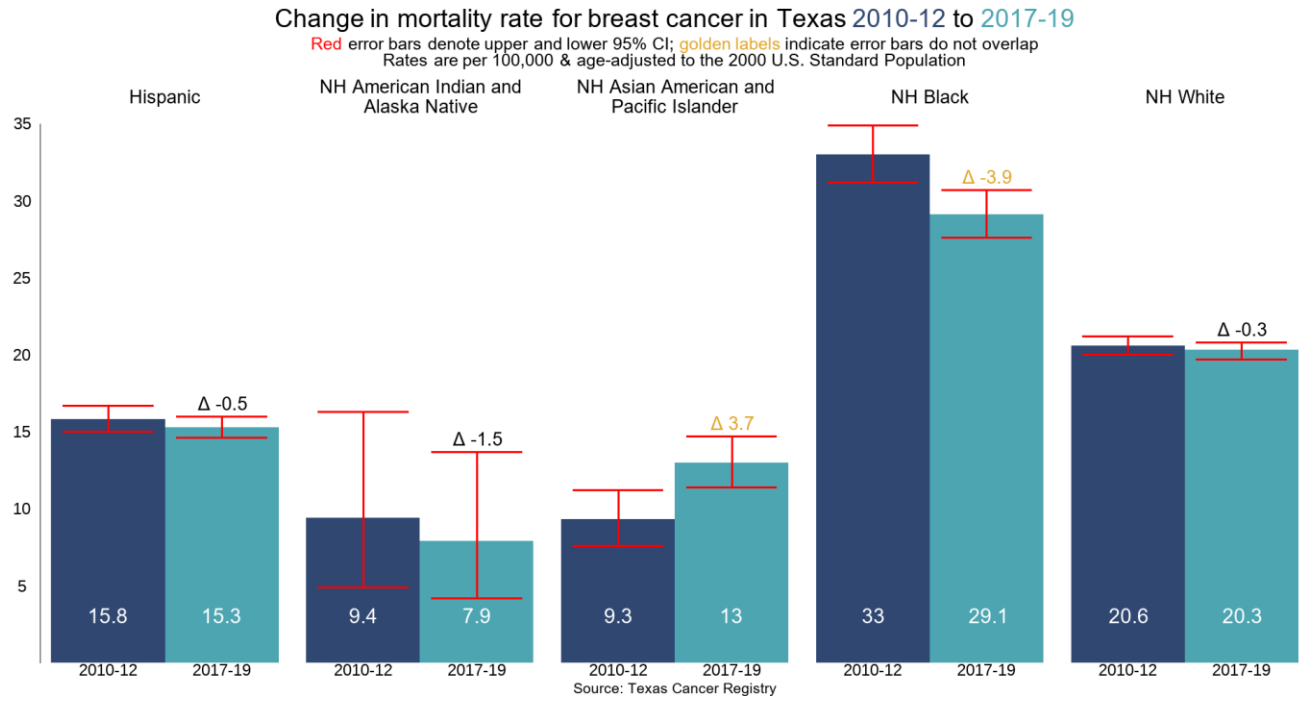
The maps in Figure 1.20 show where changes in breast cancer mortality from 2010-2012 to 2017-2019 have occurred.

Figure 1.20 Map of Changes in Breast Cancer Mortality Rates by PHR, 2010-2012 to 2017-2019



Breast cancer mortality rates for Non-Hispanic Asian American and Pacific Islanders increased significantly by 3.7 per 100,000, see Figure 1.21. The largest decrease occurred in Texans identifying as Black, down 3.9 per 100,000 though the mortality rate in 2017-2019 was still higher than that of any other racial or ethnic group.

Figure 1.21 Change in Breast Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019

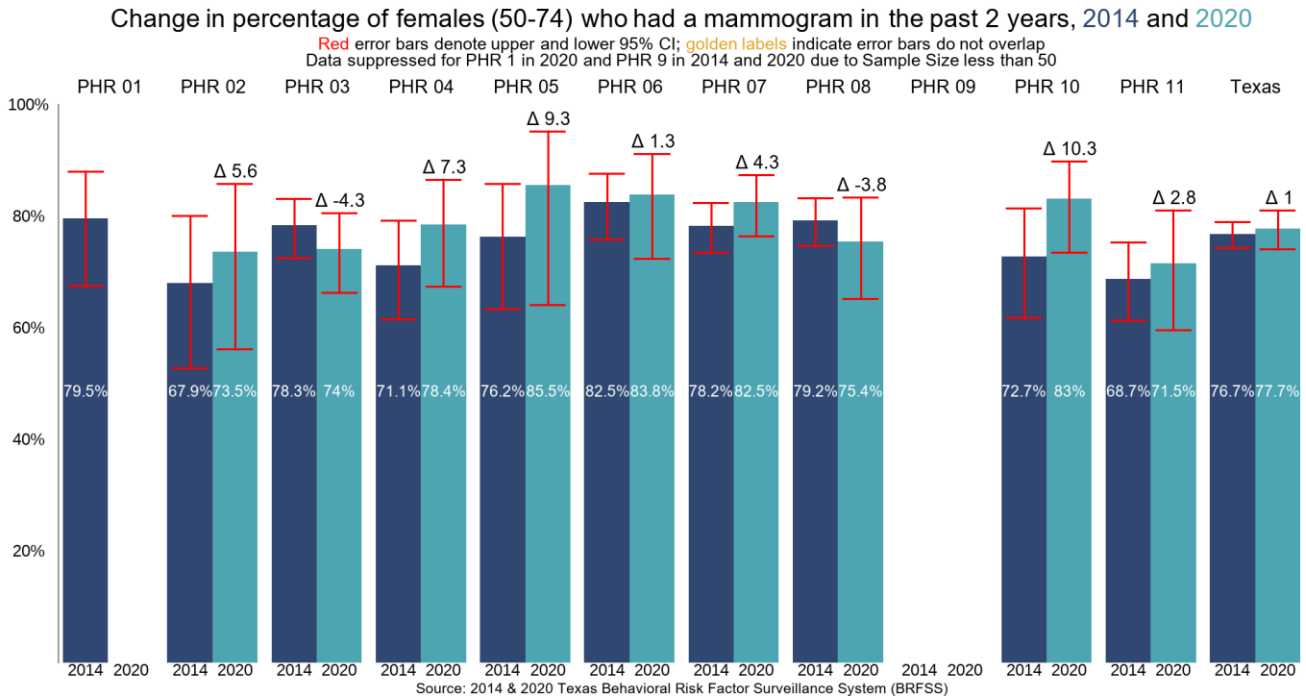


BREAST CANCER SCREENING

To assess breast cancer screening, we analyzed the percentage of females aged 50-74 who reported having a mammogram in the past two years as measured by BRFSS. From 2014 to 2020,[5] breast cancer screening for Texans remained similar at 76.7% and 77.7%, respectively. Statistical significance could not be determined for the state or for any individual PHRs. Estimates for PHR 1 (Lubbock) and PHR 9 (Midland) are not included as the sample size was too small. See Figure 1.22.

[5] BRFSS collects data on screening rates every other year, and due to changes in methodology, 2014 was selected as the most appropriate baseline year for screening data for this analysis.

Figure 1.22 Change in Percentage of Texas Females Who Have Had Breast Cancer Screening, 2014 to 2020

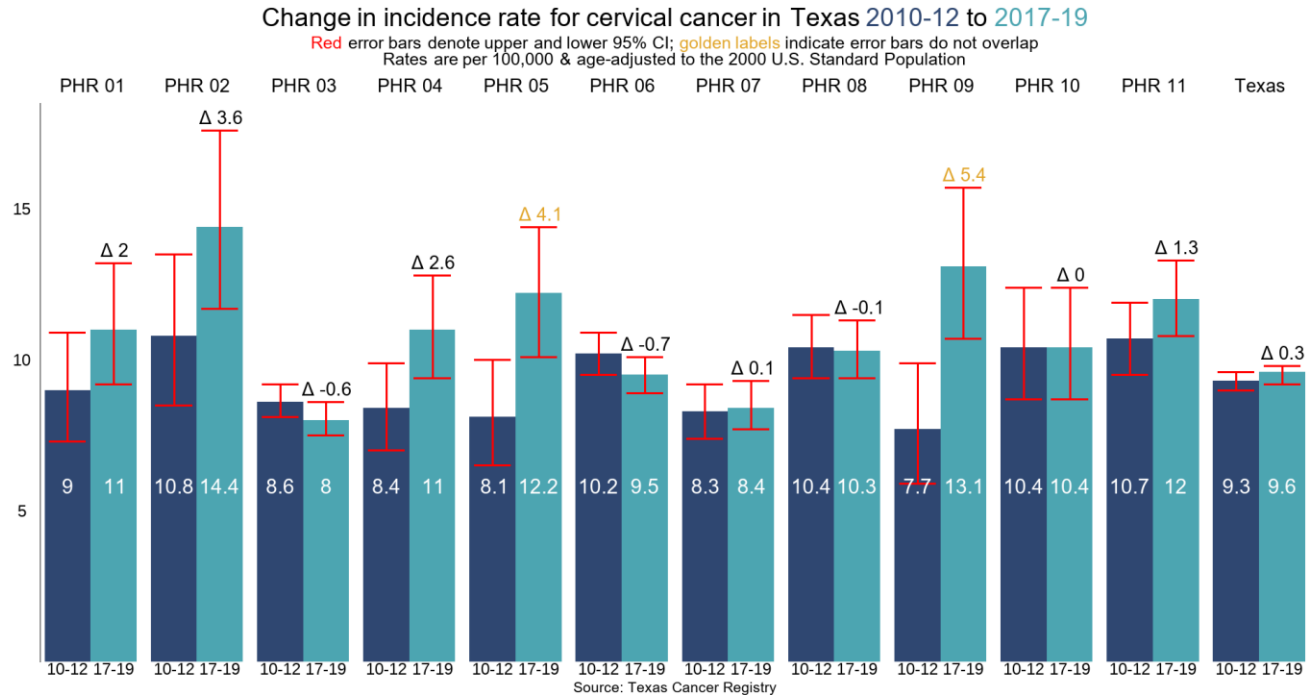


Cervical Cancer in Texas

CERVICAL CANCER INCIDENCE

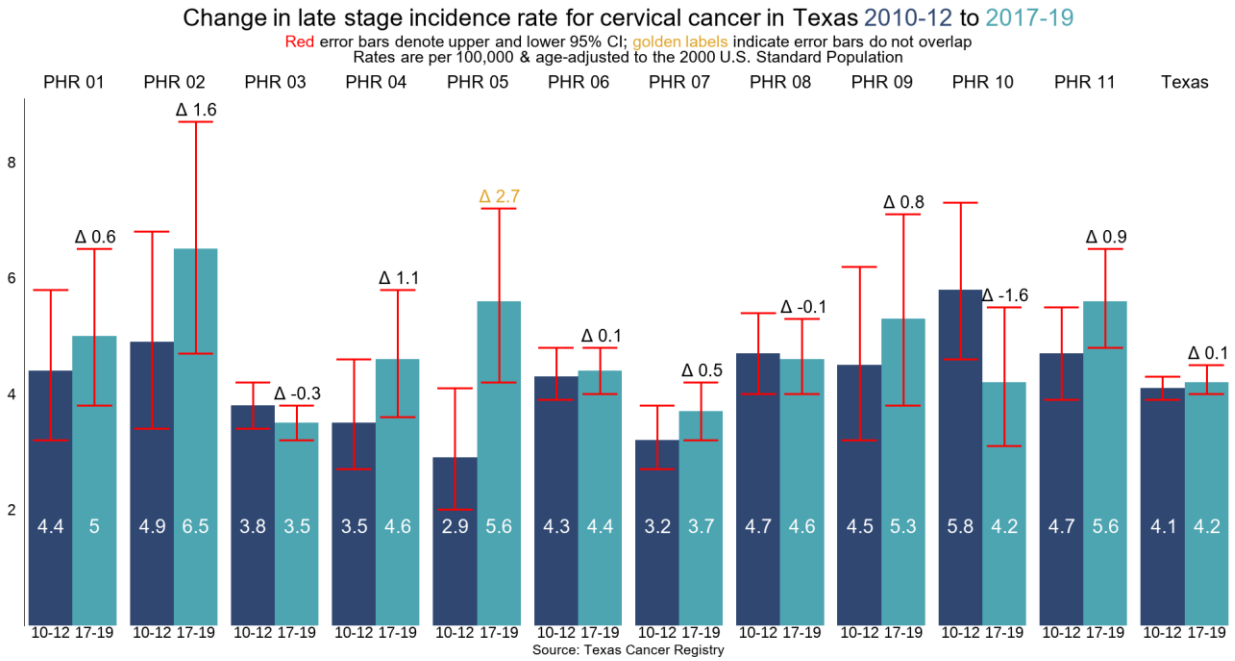
The overall incidence of cervical cancer in Texas increased slightly during the analysis period, though statistical significance could not be determined for the state or most PHRs. PHR 5 (Beaumont) and PHR 9 (Midland) both had a statistically significant increase in cervical cancer incidence. See Figure 1.23.

Figure 1.23 Change in Cervical Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



Late-stage cervical cancer incidence increased slightly for Texas from 2010-2012 to 2017-2019, and similar to incidence, statistical significance was not determined for the state or most PHRs. Late-stage incidence significantly increased in PHR 5 (Beaumont) during the period. See Figure 1.24.

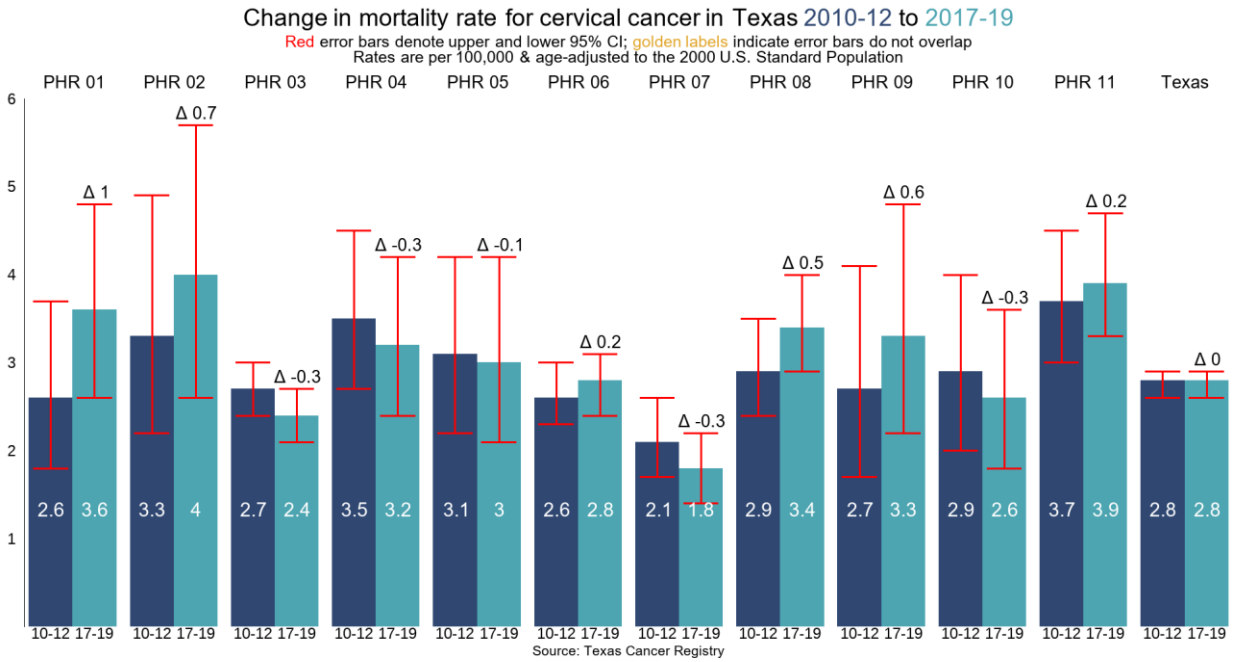
Figure 1.24 Change in Cervical Cancer Late-Stage Incidence Rates in Texas, 2010-2012 to 2017-2019



CERVICAL CANCER MORTALITY

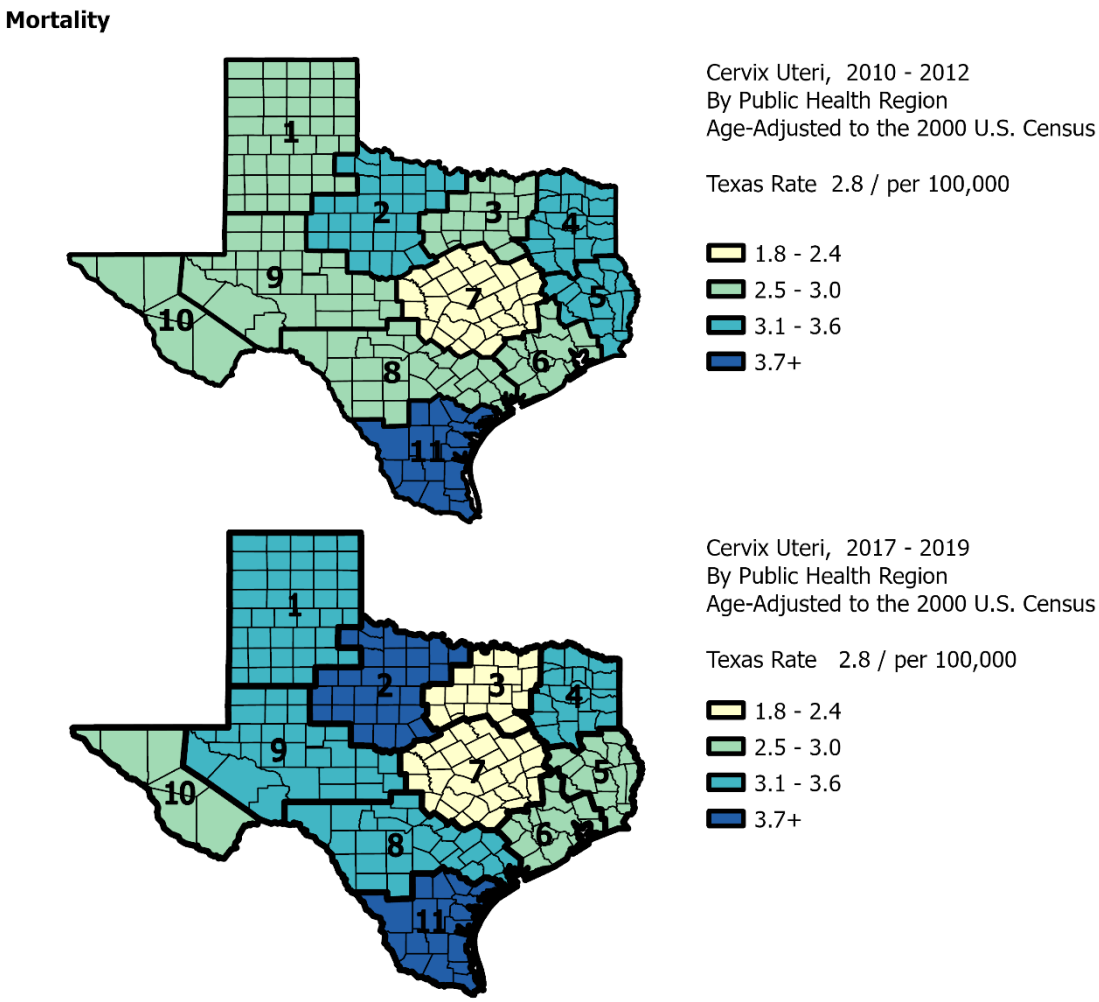
Cervical cancer mortality from 2010-2012 to 2017-2019 did not change at the state level. There were slight changes to mortality rates at the PHR level, however statistical significance could not be determined for any PHRs. See Figure 1.25.

Figure 1.25 Change in Cervical Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019



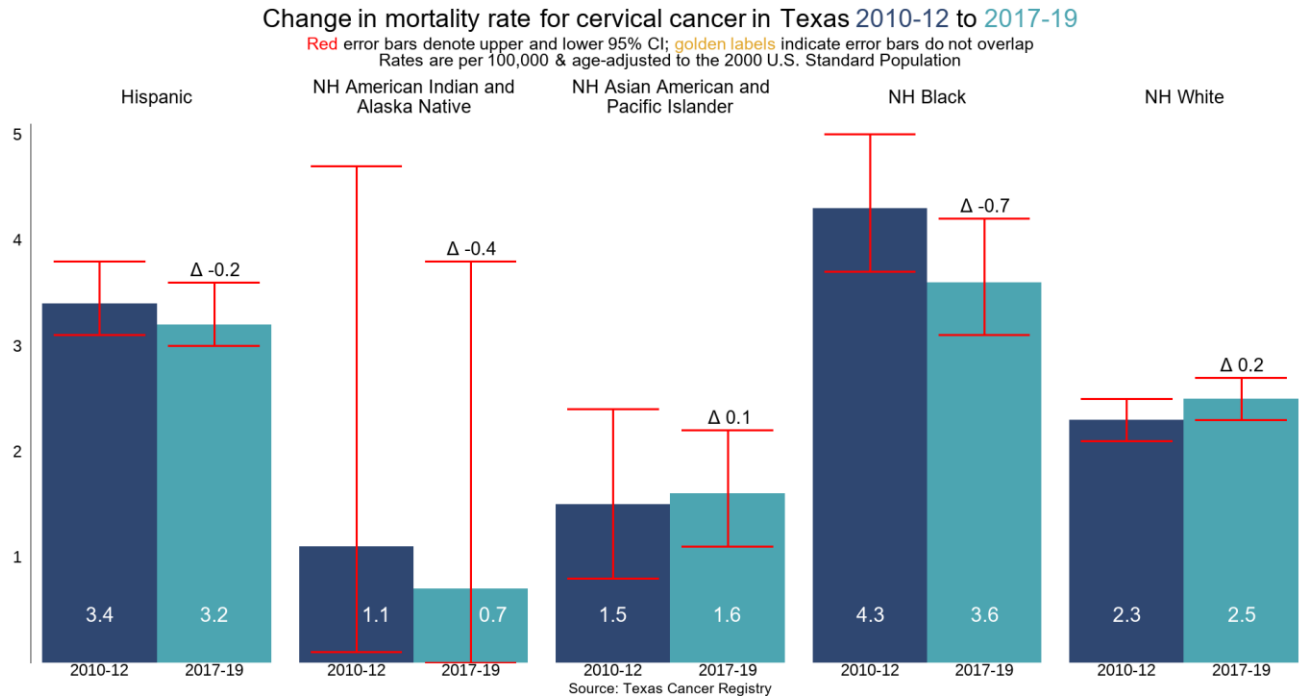
The maps in Figure 1.26 show the change in cervical cancer mortality from 2010-2012 to 2017-2019 across the state of Texas, by PHR.

Figure 1.26 Map of Changes in Cervical Cancer Mortality Rates by PHR, 2010-2012 to 2017-2019



When examining by race and ethnicity, cervical cancer mortality rates changed very little during the analysis period. See Figure 1.27.

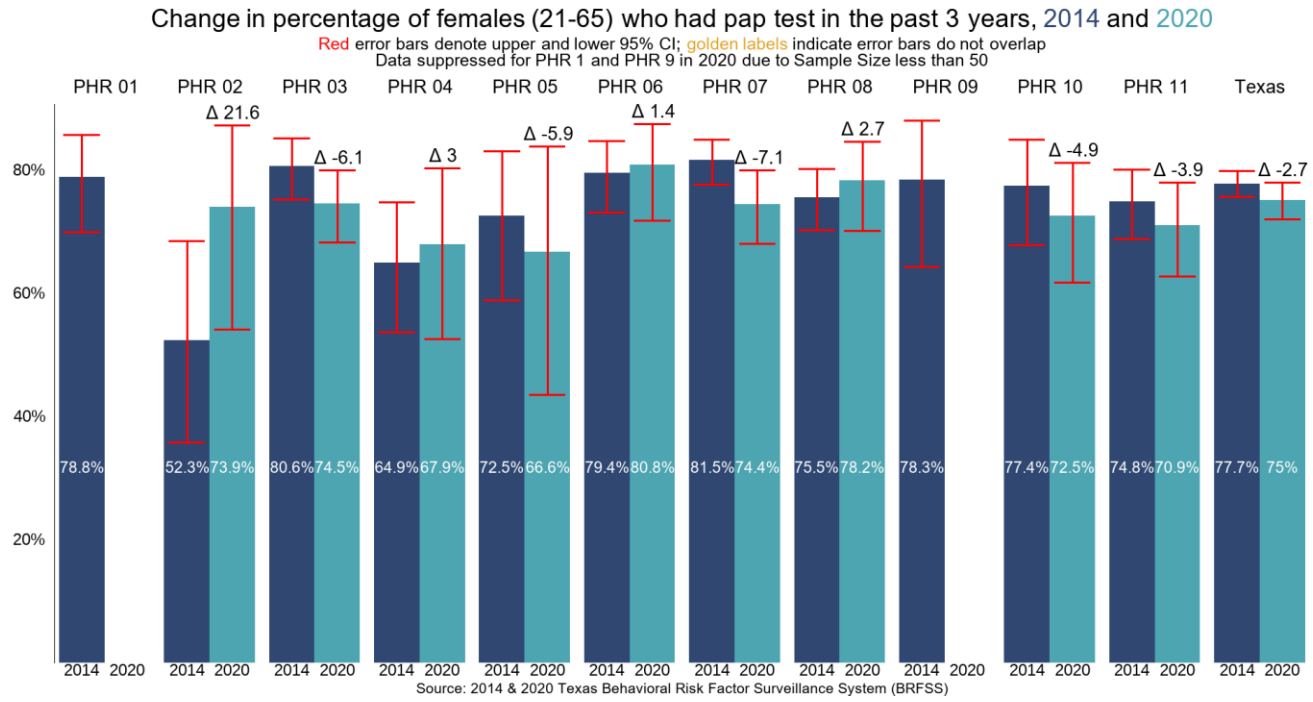
Figure 1.27 Change in Cervical Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019



CERVICAL CANCER SCREENING

The cervical cancer screening rate, as measured by females aged 21 to 65 who had a pap test in the past 3 years, decreased by 2.7% from 2014 to 2020 in Texas. Statistical significance could not be determined for the state or for any PHR. Most changes at the PHR level were slight. Endline estimates for PHR 1 (Lubbock) and PHR 9 (Midland) are not included as the sample size was too small. See Figure 1.28.

Figure 1.28 Change in Percentage of Texas Females Who Have Had Cervical Cancer Screening, 2014 to 2020

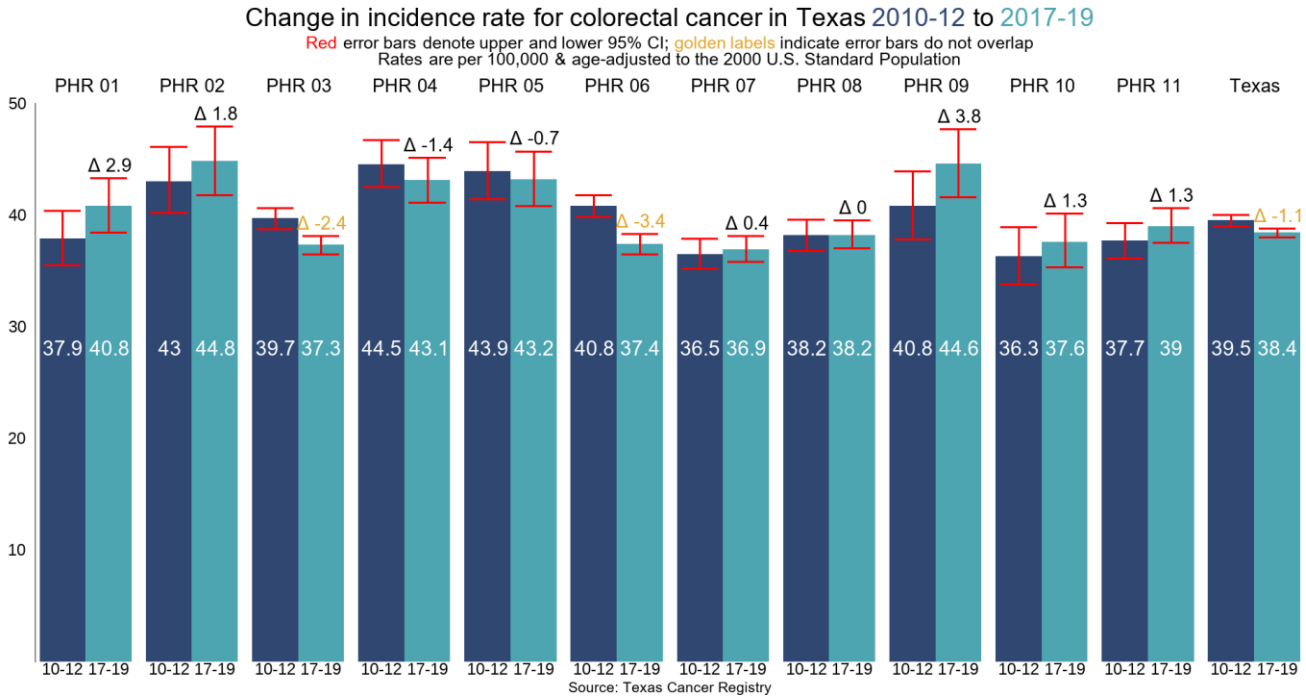


Colorectal Cancer in Texas

COLORECTAL CANCER INCIDENCE

The rate of colorectal cancer incidence in Texas decreased statistically significantly by 1.1 per 100,000 from 2010-2012 to 2017-2019. Colorectal cancer incidence rates also decreased statistically significantly for PHR 3 (Dallas) and PHR 6 (Houston) during the period. See Figure 1.29.

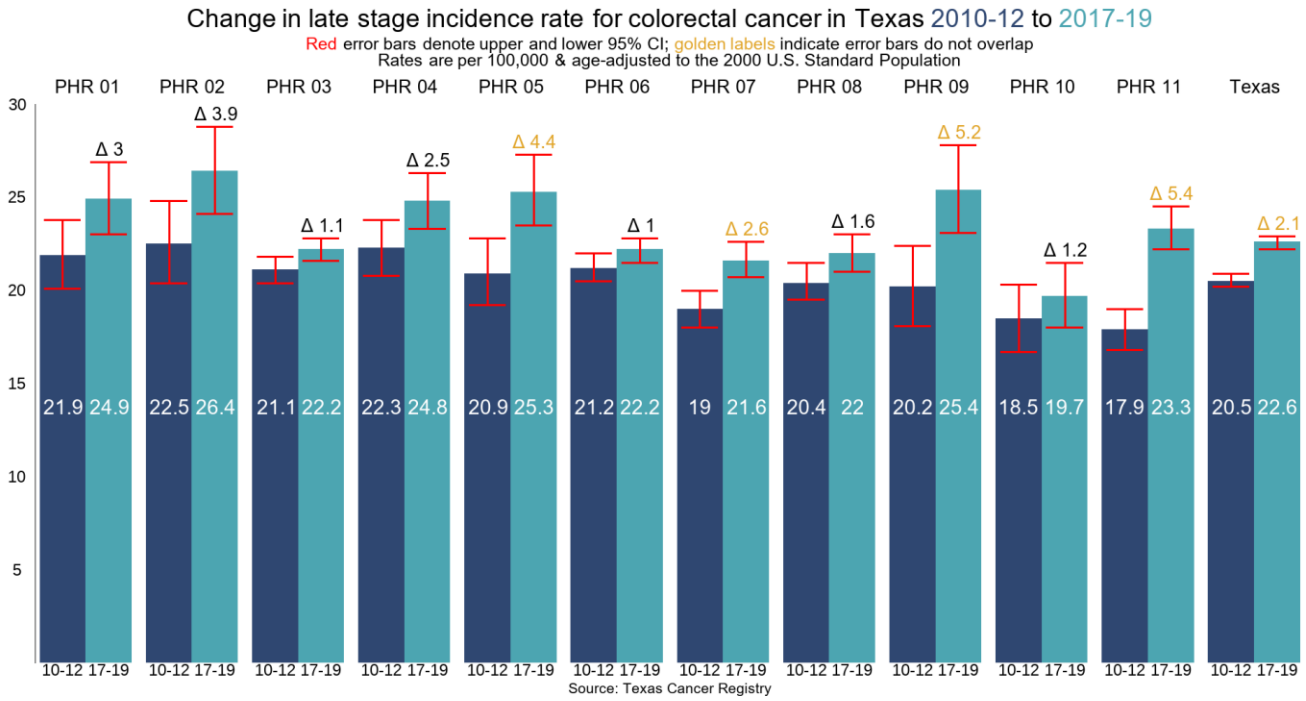
Figure 1.29 Change in Colorectal Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



COLORECTAL CANCER LATE-STAGE INCIDENCE

Late-stage colorectal cancer incidence increased statistically significantly in the state of Texas from 2010-2012 to 2017-2019 as well as in PHRs 5 (Beaumont), 7 (Austin), 9 (Midland) and 11 (Harlingen). Statistical significance could not be determined for the other PHRs, though late-stage incidence increased in all. See Figure 1.30.

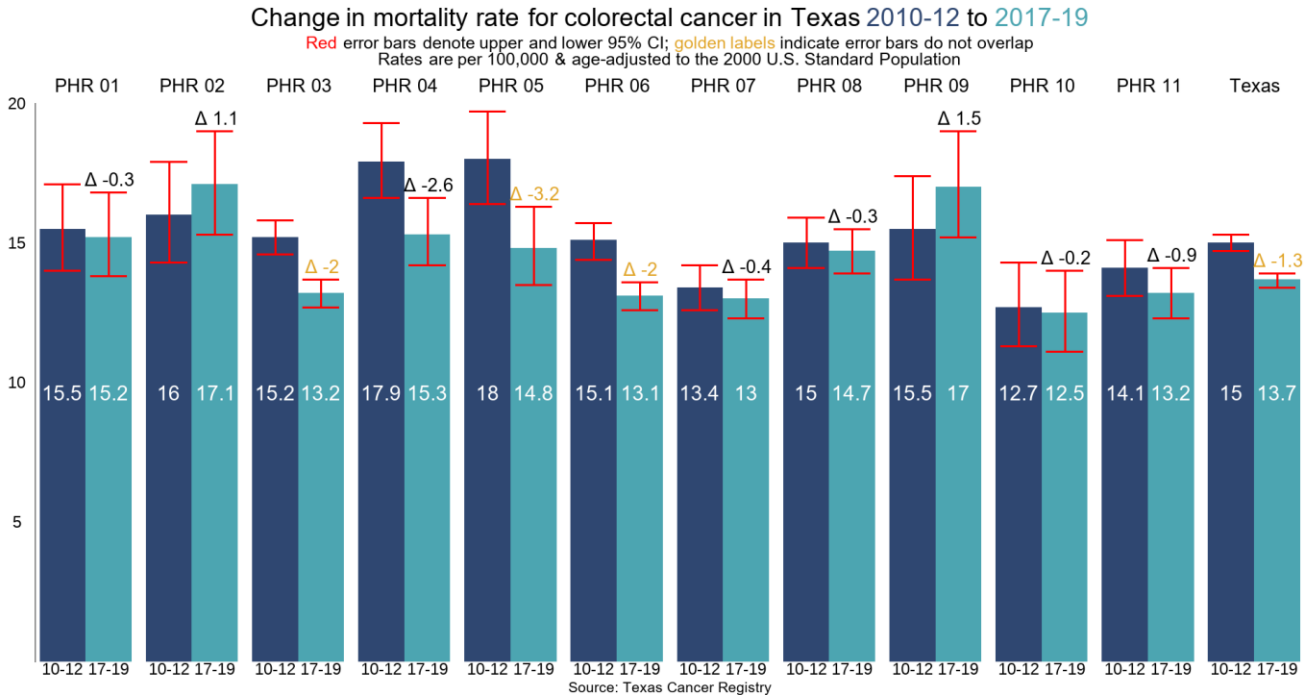
Figure 1.30 Change in Colorectal Cancer Late-Stage Incidence Rates in Texas, 2010-2012 to 2017-2019



COLORECTAL CANCER MORTALITY

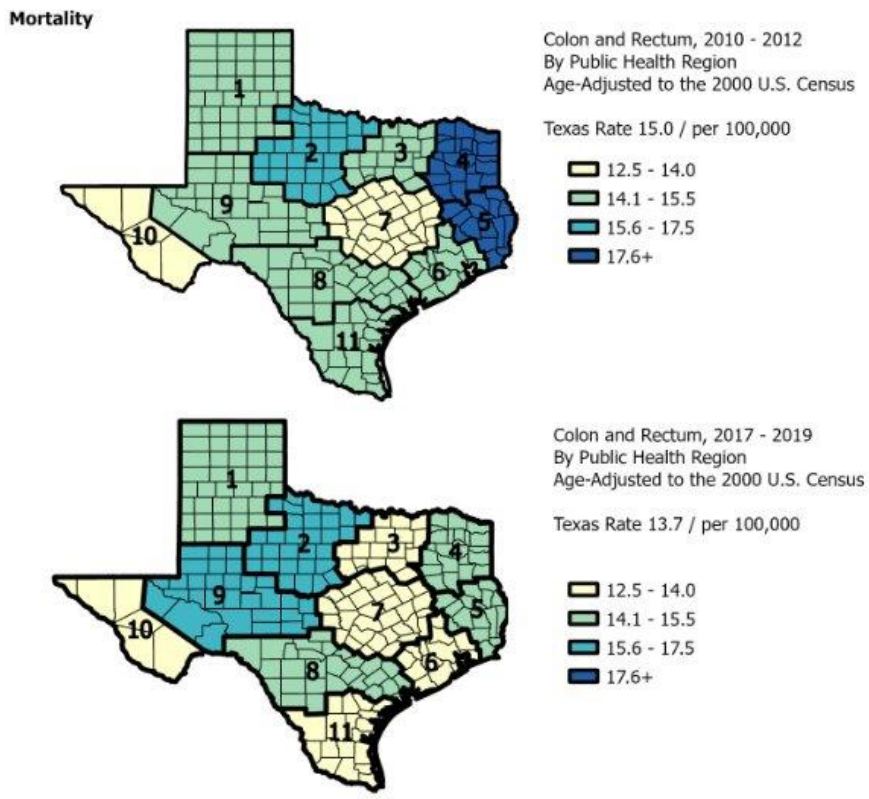
Colorectal cancer mortality decreased statistically significantly in Texas from 2010-2012 to 2017-2019 by 1.3 per 100,000. Mortality rates also decreased statistically significantly in PHRs 3 (Dallas), 5 (Beaumont) and 6 (Houston). See Figure 1.31.

Figure 1.31 Change in Colorectal Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019



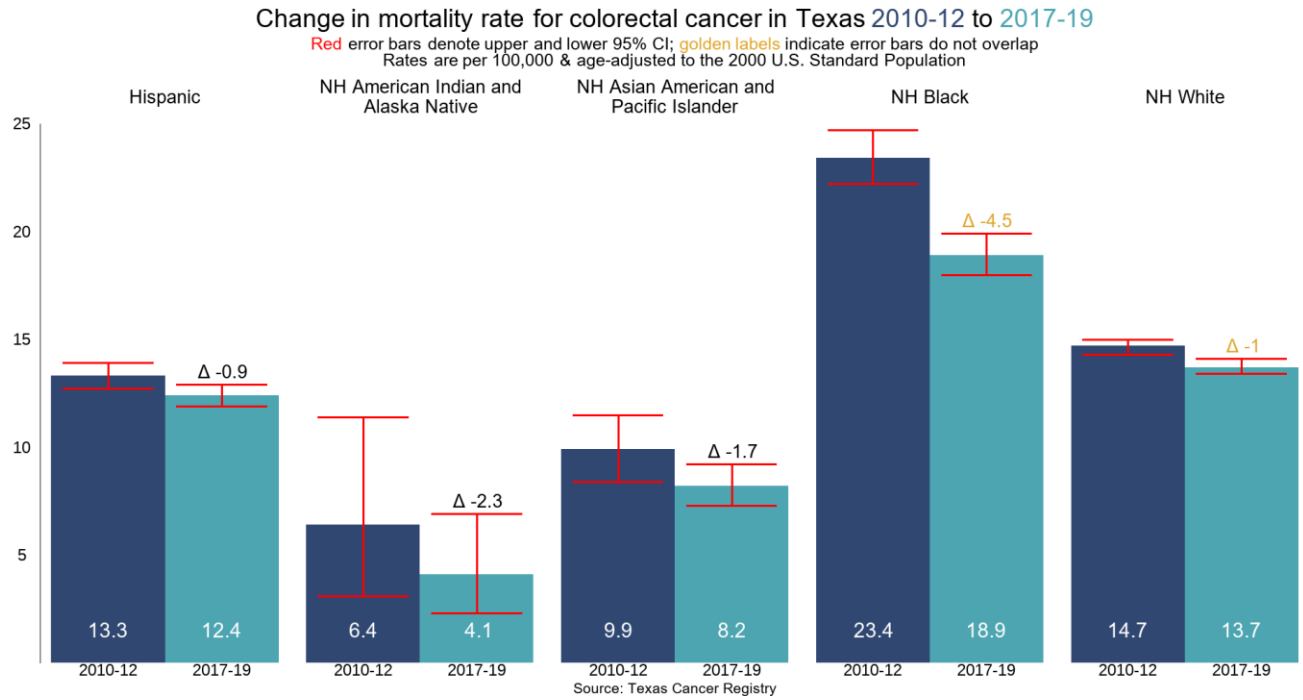
The changes in colorectal cancer mortality can also be seen geographically in Figure 1.32.

Figure 1.32 Map of Changes in Colorectal Cancer Mortality Rates by PHR, 2010-2012 to 2017-2019



Colorectal cancer mortality decreased for all racial and ethnic groups in Texas, though only statistically significantly for those who identified as Black or white. See Figure 1.33.

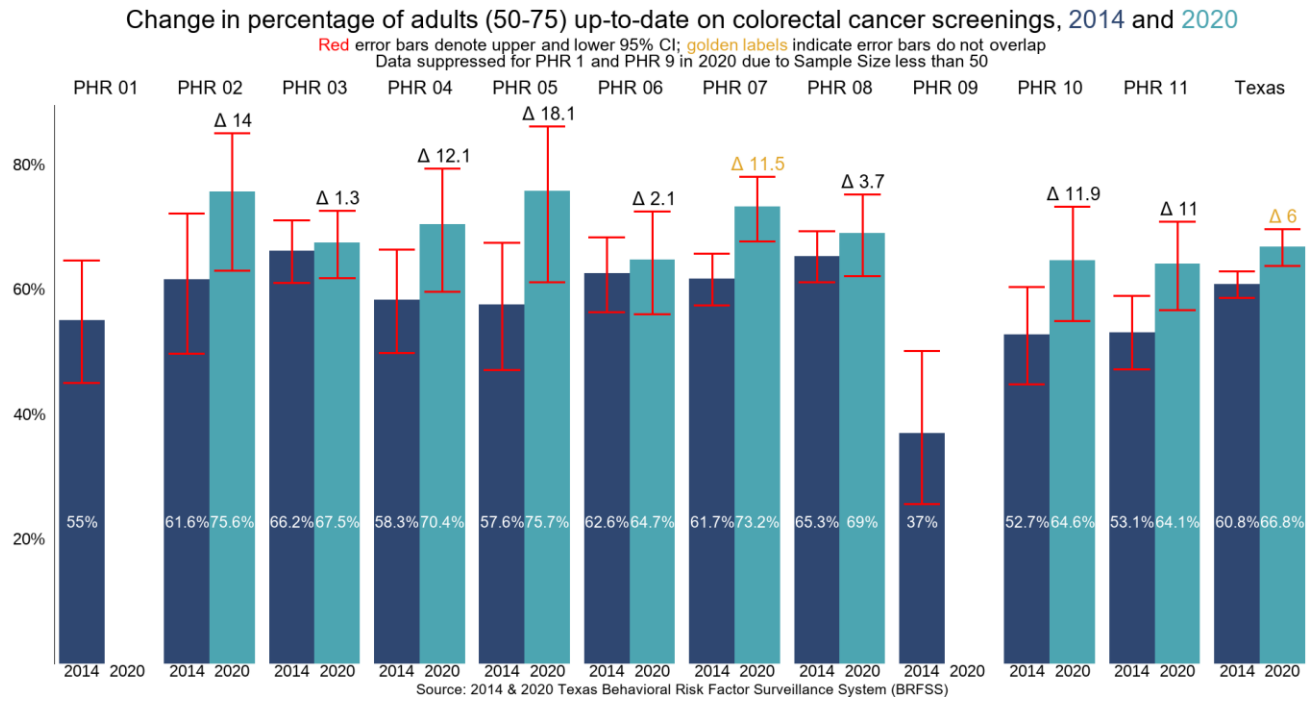
Figure 1.33 Change in Colorectal Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019



COLORECTAL CANCER SCREENING

Colorectal cancer screening, as measured by the percentage of adults aged 50 to 75 who reported being up to date on their colorectal cancer screenings, increased from 60.8% in 2014 to 66.8% in 2020 for Texas, a statistically significant increase. All PHRs reported an increase in screening, but PHR 7 (Austin) is the only PHR for which statistical significance could be determined. Endline estimates for PHR 1 (Lubbock) and PHR 9 (Midland) are not included as the sample size was too small. See Figure 1.34.

Figure 1.34 Change in Percentage of Texans Who Have Had Colorectal Cancer Screening, 2014 to 2020

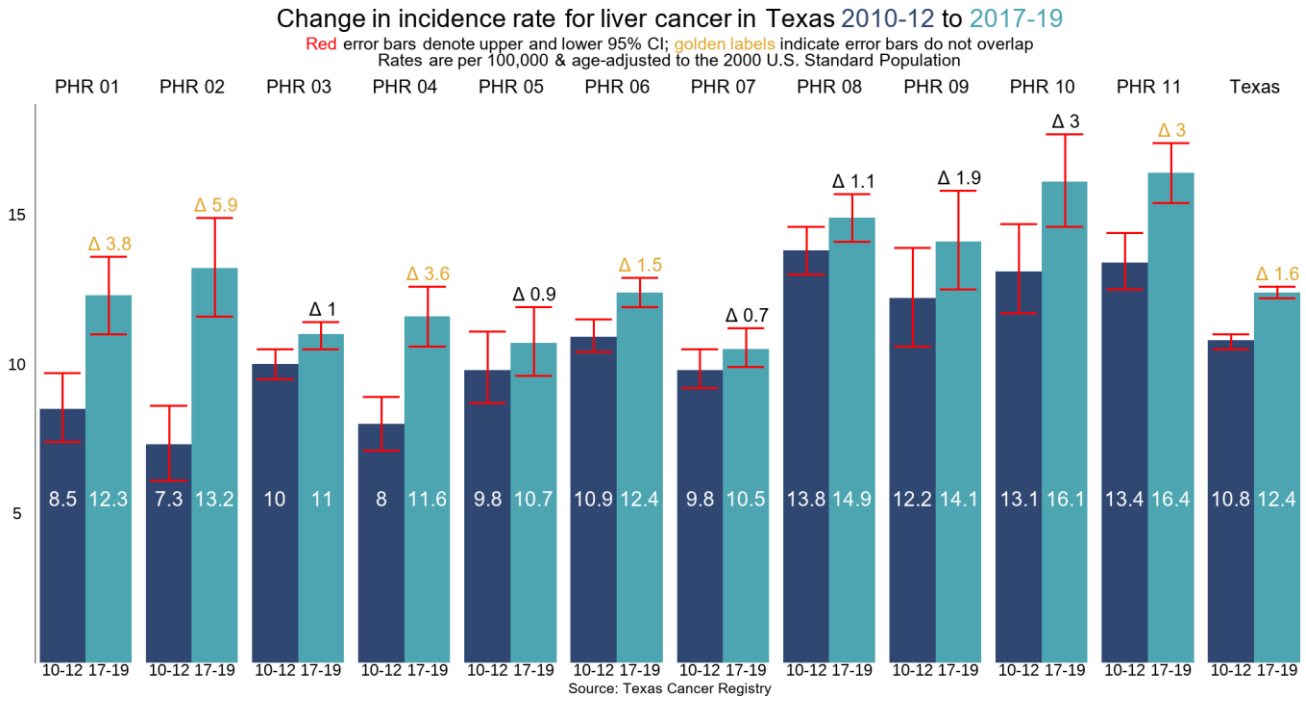


Liver Cancer in Texas

LIVER CANCER INCIDENCE

Liver cancer incidence increased significantly for Texas by 1.6 per 100,000 from 2010-2012 to 2017-2019. Liver cancer incidence also increased significantly in PHRs 1 (Lubbock), 2 (Midland), 4 (Tyler), 6 (Houston), and 11 (Harlingen) See Figure 1.35.

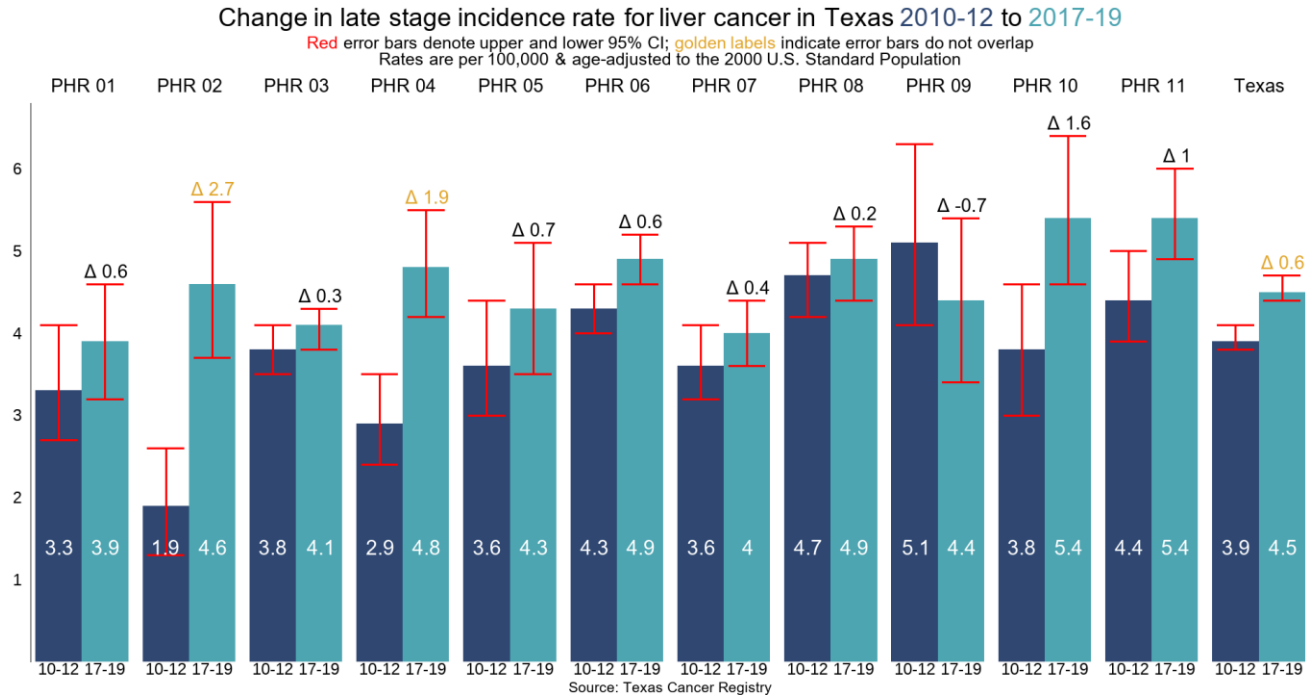
Figure 1.35 Change in Liver Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



LIVER CANCER LATE-STAGE INCIDENCE

Late-stage liver cancer incidence also increased significantly for Texas by 0.6 per 100,000 from 2010-2012 to 2017-2019. Late-stage incidence increased significantly in PHR 2 (Midland) and PHR 4 (Tyler). See Figure 1.36.

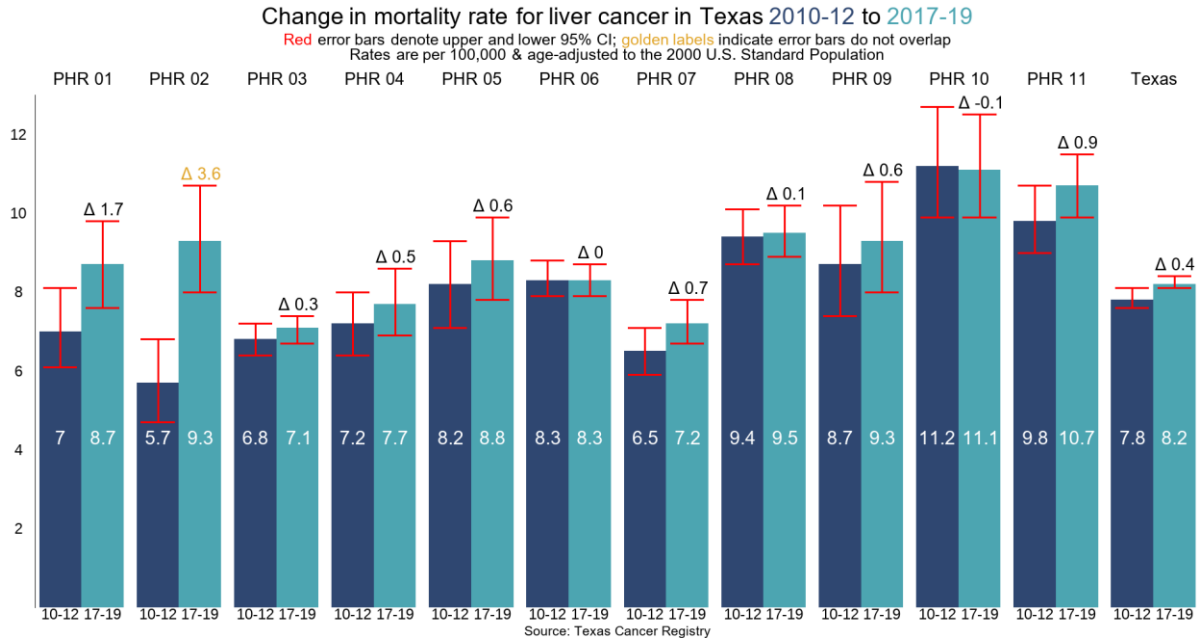
Figure 1.36 Change in Liver Cancer Late-Stage Incidence Rates in Texas, 2010-2012 to 2017-2019



LIVER CANCER MORTALITY

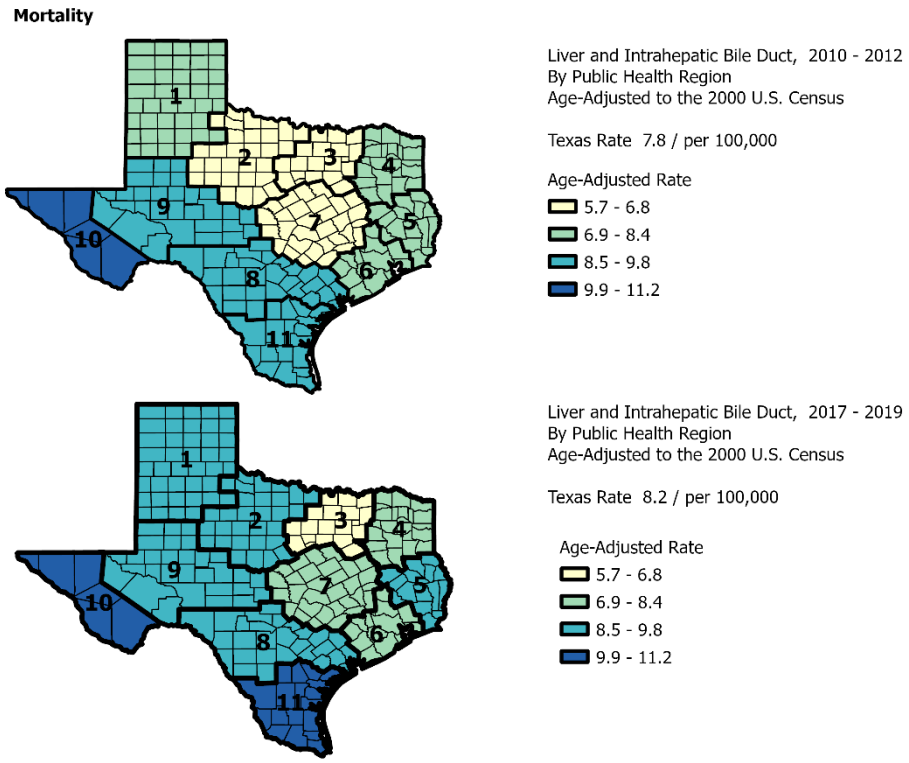
At the state level, and for most PHRs, liver cancer mortality rates increased modestly from 2010-2012 to 2017-2019. The increase in liver cancer mortality in PHR 2 (Midland) was statistically significant and the largest increase across all PHRs. See Figure 1.37.

Figure 1.37 Change in Liver Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019



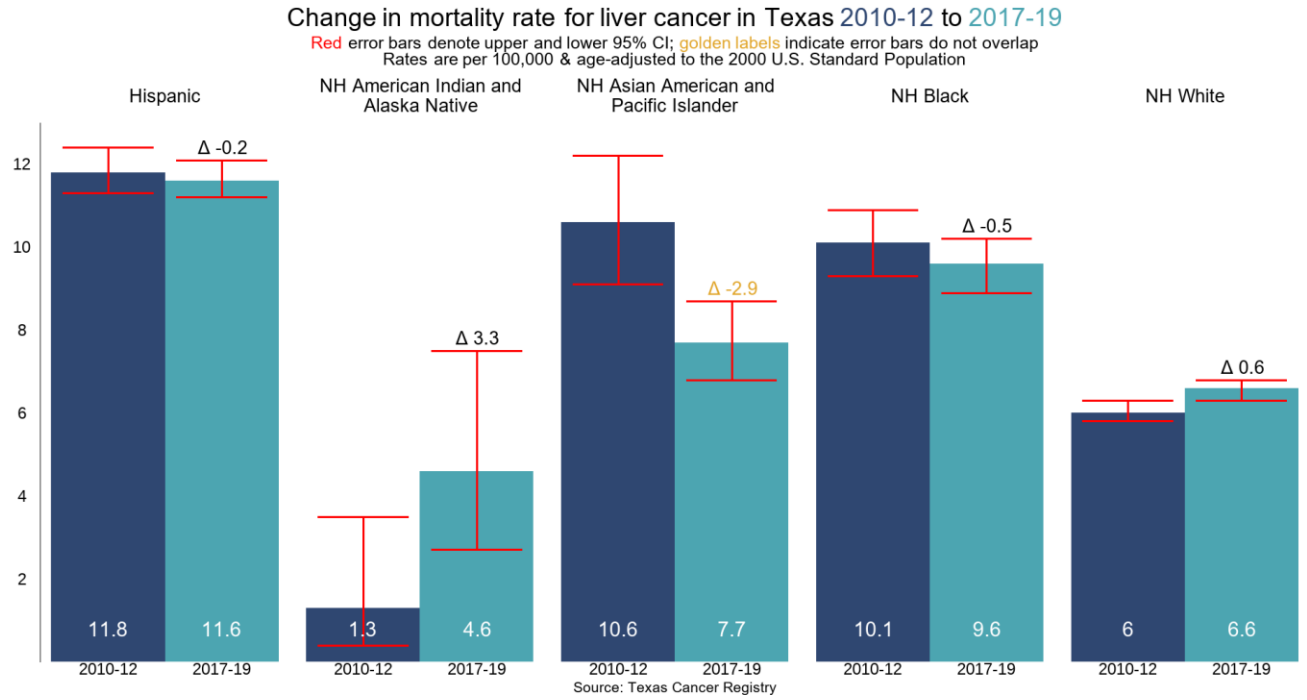
The changes in liver cancer mortality can also be seen geographically in Figure 1.38 below.

Figure 1.38 Map of Changes in Liver Cancer Mortality Rates by PHR, 2010-2012 to 2017-2019



Most changes to liver cancer mortality rates by race or ethnicity were modest during the period. The mortality rate for those who identified as Asian American and Pacific Islander decreased by 2.9 per 100,000, which is statistically significant. Though statistical significance could not be determined, the liver cancer mortality rate for American Indian and Alaska Natives increased during the period. See Figure 1.39.

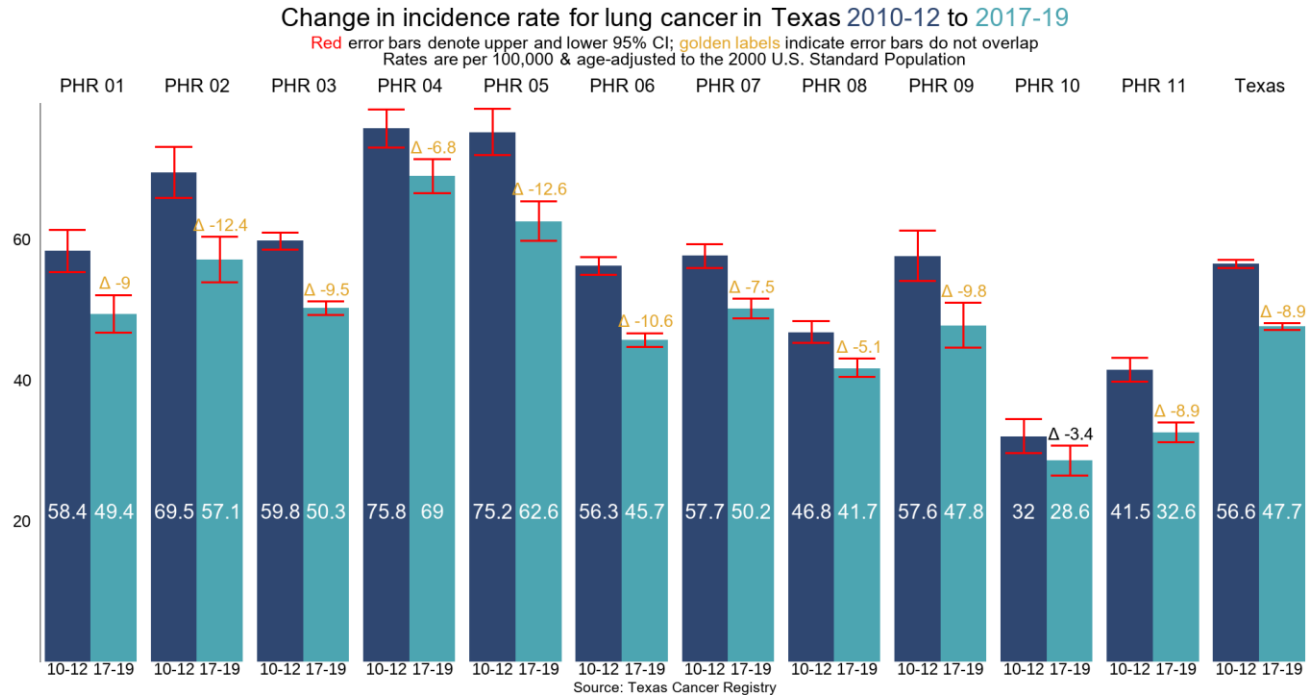
Figure 1.39 Change in Liver Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019



LUNG CANCER INCIDENCE

Lung cancer incidence rate decreased for Texas from 2010-2012 to 2017-2019 by 8.9 per 100,000, which was statistically significant. The incidence rate decreased for all PHRs and did so statistically significantly for all PHRs except PHR 10 (El Paso) where statistical significance could not be determined. See Figure 1.40.

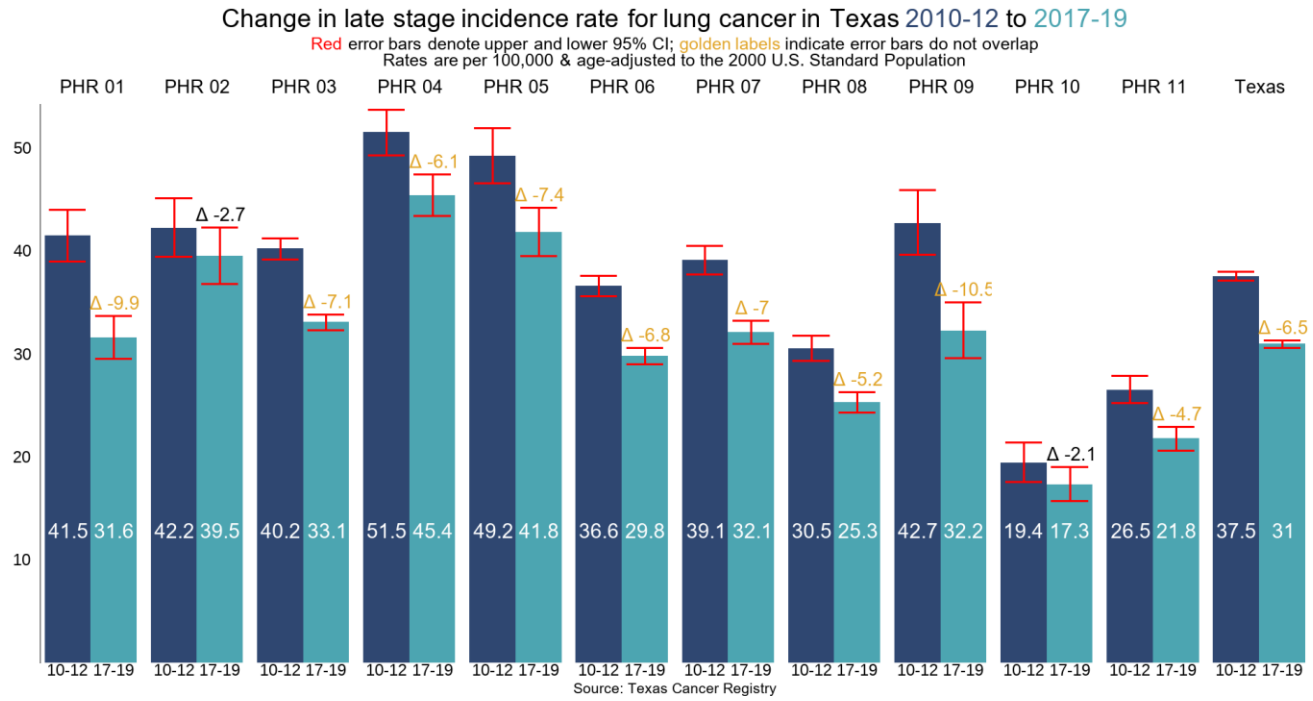
Figure 1.40 Change in Lung Cancer Incidence Rates in Texas, 2010-2012 to 2017-2019



LUNG CANCER LATE-STAGE INCIDENCE

Like incidence, late-stage lung cancer incidence decreased in Texas by 6.5 per 100,000 from 2010-2012 to 2017-2019. Late-stage lung cancer incidence decreased in all PHRs and did so statistically significantly for all expect PHR 2 (Midland) and PHR 10 (El Paso) where statistical significance could not be determined. See Figure 1.41.

Figure 1.41 Change in Lung Cancer Late-Stage Incidence Rates in Texas, 2010-2012 to 2017-2019



LUNG CANCER MORTALITY

Lung cancer mortality has decreased for Texas by 11.2 per 100,000 from 2010-2012 to 2017-2019, which is statistically significant. Mortality rates decreased statistically significantly for all PHRs with the largest declines in PHR 4 (Tyler) and PHR 5 (Beaumont). See Figure 1.42.

Figure 1.42 Change in Lung Cancer Mortality Rates in Texas, 2010-2012 to 2017-2019

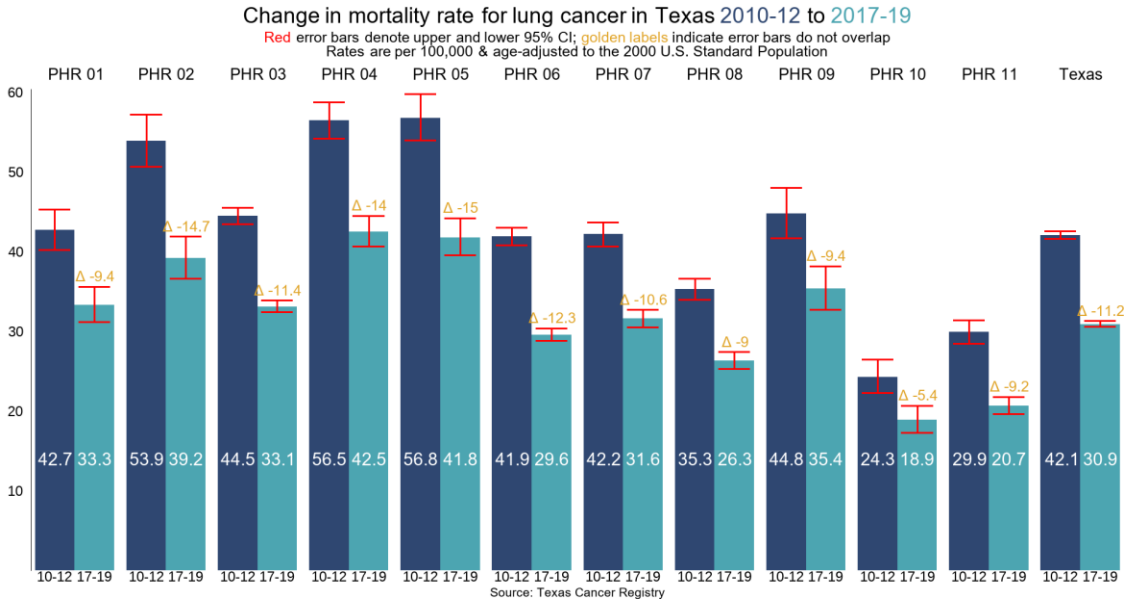
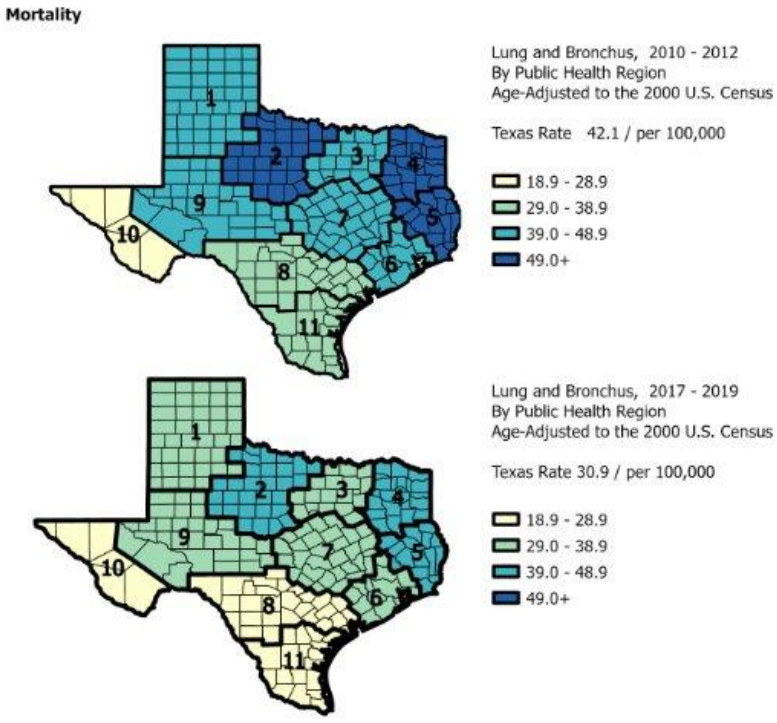


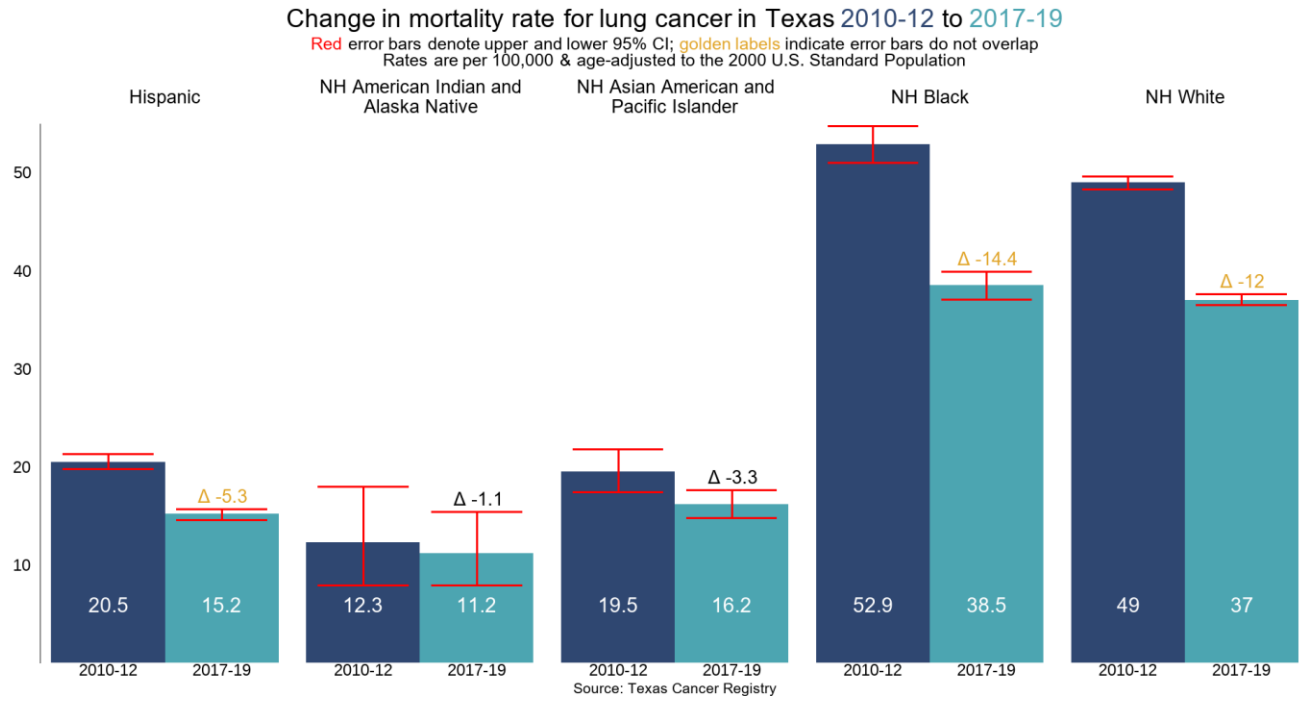
Figure 1.43 Map of Changes in Lung Cancer Mortality Rates by PHR, 2010-2012 to 2017-2019



The changes in lung cancer mortality can also be seen geographically in Figure 1.43.

Lung cancer mortality rate decreased statistically significantly for those who identified as Black, Hispanic, and white from 2010-2012 to 2017-2019. See Figure 1.44.

Figure 1.44 Change in Lung Cancer Mortality Rates in Texas by Race/Ethnicity, 2010-2012 to 2017-2019



LUNG CANCER SCREENING

According to the American Lung Association, only 1.2% of individuals who were at high risk for lung cancer were screened in the state of Texas as of 2021.[xxx,6] Data regarding the change in lung cancer screening rates over time or by PHR are not available.

[6] Lung cancer screening rates are only available at the state level.

SECTION 7. LIMITATIONS

There are several limitations to the present analysis. First, much of the data on risk factor behaviors are derived from BRFSS which relies upon participants to self-report their behavior. This may be prone to recall bias and/or social desirability bias, though research has indicated that estimates from BRFSS are comparable to other national surveys.[xxxi] Second, reported rates of cancer incidence, late-stage incidence and mortality in this analysis are publicly available rates provided by TCR, and because raw data were not analyzed, in many cases whether differences in rates were statistically significant could not be determined.

SECTION 8. SUMMARY AND IMPLICATIONS

In addition to trends over time, it is important to consider the current state of these indicators and how these compare to national averages. Data presented below show how Texas compares to the US averages on key demographic, behavioral risk factor and cancer incidence and mortality data. The data presented in the tables below are derived from the ACS and the National Cancer Institute's State Cancer Profiles.[xxxii]

As compared to the U.S., Texas has a higher percentage of the population who identify as Hispanic, has a higher percentage of uninsured individuals, lower median household income and higher percentage of people living in poverty. See Table 1.2.

Table 1.2. Demographic Characteristics Texas and U.S.

	Texas	US
Total Population	**29.1 million**	**331.5 million**
Race/Ethnicity	**White = 40.1%** **Hispanic = 39.9%**	**White = 58.9%** **Hispanic = 18.7%**
Population Over Age 65	**12.5%**	**16.0%**
% Uninsured	**16.6%**	**8.0%**
% Living in Poverty	**14.0%**	**12.6%**
Median Household Income	**$67,321**	**$69,021**

The Texas population has lower rates of breast, cervical and colorectal cancer screening, and higher levels of obesity and physical inactivity than the U.S. population. Fewer Texas minors

are up to date on their HPV vaccination compared to the U.S. However, a lower percentage of Texans indicate being current smokers than in the U.S. overall. See Table 1.3.

*Table 1.3. Behavioral Risk Factors Texas and U.S.**

	Texas Rate	US Rate
Breast cancer screening	**73.8%**	**76.3%**
Cervical cancer screening	**75.0%**	**77.7%**
Colorectal cancer screening	**61.4%**	**66.9%**
Obesity	**36.6%**	**34.2%**
Physical Inactivity	**25.5%**	**23.4%**
Current Smoker	**11.8%**	**14.0%**
HPV Up to Date	**51.5%**	**61.7%**

**Green – lower rates than US; red – higher rates than US; black – comparable rates to US*

Incidence rates for all cancer types, breast, and lung are lower than U.S. rates, and while slightly higher than the U.S., Texas's colorectal cancer incidence rate is comparable. Texas incidence rates for cervical and liver are higher than the national averages. See Table 1.4.

*Table 1.4. Cancer Incidence Rates Texas and U.S.**

	Texas Rate	US Rate
All Cancer Sites Incidence	**412.2**	**442.3**
Breast Cancer Incidence	**116.3**	**127.0**
Cervical Cancer Incidence	**9.4**	**7.5**
Colorectal Cancer Incidence	**37.1**	**36.5**
Liver Cancer Incidence	**12.1**	**8.6**
Lung Cancer Incidence	**46.5**	**54.0**

**Green – lower rates than US; red – higher rates than US; black – comparable rates to US*

Mortality rates for all cancer types and lung are lower than U.S. rates, with breast cancer mortality being comparable to the U.S. Texas mortality rates for cervical, colorectal, and liver cancer are higher than the national averages. See Table 1.5.

*Table 1.5. Cancer Mortality Rates Texas and U.S.**

	Texas Rate	US Rate
All Cancer Sites Mortality	144.5	**149.4**
Breast Cancer Morality	**19.7**	**19.6**
Cervical Cancer Mortality	**2.8**	**2.2**
Colorectal Cancer Mortality	**13.7**	**13.1**
Liver Cancer Mortality	**8.2**	**6.6**
Lung Cancer Mortality	**31.3**	**35.0**

**Green – lower rates than US; red – higher rates than US; black – comparable rates to US*

Broad trends in cancer incidence and mortality at the state level from 2010-2012 and 2017-2019 by cancer type are outlined below.

All cancers

Progress has been made over the period of this assessment (2010 to 2020). Incidence and mortality rates for all cancer sites combined have decreased in Texas statistically significantly during the analysis period and are lower in Texas than the U.S.

Breast cancer

Breast cancer incidence has increased overall across Texas during the period of this assessment. Breast cancer incidence has also been increasing over time across the US, in part at least due to increases in excess body weight.[xxxiii] Late-stage incidence and mortality have decreased at the state level. Similarly, breast cancer mortality has been decreasing in the US overall due to factors such as earlier detection, breast cancer awareness and improved treatments.[xxxiv] In Texas, there has been a small increase in breast cancer screening over time but rates of screening in Texas are lower than the US overall.

Cervical cancer

In Texas, cervical cancer incidence and late-stage incidence have increased modestly, and mortality has remained stable. Compared to the U.S., Texas has higher cervical cancer incidence and mortality. In the US, declines in cervical cancer mortality have been associated with screening and early detection. Additionally, HPV vaccination protects against the types of HPV that cause the large majority of cervical cancers.[xxxv] In Texas, there has been a decline in

cervical cancer screening but an increase in HPV vaccination. Texas has lower cervical cancer screening and HPV vaccination rates when compared to the US overall.

Colorectal cancer

In Texas, colorectal cancer incidence and mortality have declined slightly, while late-stage incidence has increased. Compared to the U.S., Texas has slightly higher colorectal cancer incidence and mortality. More than half of colorectal cancers in the US are associated with modifiable risk factors for cancer (e.g., excess body weight, physical inactivity, long-term smoking).[xxxvi] In Texas, colorectal cancer screening rates have increased; however, Texas has lower rates of colorectal cancer screening than the U.S.

Liver cancer

Liver cancer incidence, late-stage incidence and mortality have all increased in Texas, and incidence and mortality rates are higher in Texas than the U.S. The majority of liver cancers in the US are associated with modifiable risk factors for cancer (e.g., excess body weight, hepatitis B virus infection, heavy alcohol consumption).[xxxvii] The rate of individuals ages 18-65 years and up who have received all 3 hepatitis shots remains around 50% for the years 2014-2018 in Texas.

Lung cancer

In Texas, lung cancer incidence, late-stage incidence and mortality have all declined. Incidence and mortality rates are lower in Texas than the U.S. even through screening for high-risk people is very low compared to national rates. The rate of current smokers in Texas is lower than in the U.S. overall and has declined in the previous decade.

Implications for the Future

Overall, there are positive trends in Texas in relationship to cancer incidence and mortality at the state level. Breast cancer, colorectal cancer and lung cancer mortality have all decreased during the period of this assessment. These trends in cancer incidence, mortality and behavioral risk factors in Texas have implications for the future of cancer prevention throughout the state. More than half of all cancers, at the population level, are associated with modifiable risk factors for cancer such as excess body weight, tobacco use, and excessive sun exposure. Additionally, vaccinations such as HPV vaccination and HBV vaccination as well as cancer screening could have a significant impact on reducing cancer cases in Texas.

CANCER SCREENING

There are five types of cancer for which screening has been proven to reduce cancer mortality – breast, cervical, colorectal, prostate; and for high-risk individuals due to past tobacco use, lung. Based on BRFSS data, Texas has seen an increase in colorectal cancer screening, however, breast cancer screening remains stable and cervical cancer screening has decreased. Texas also has lower rates of breast, cervical and colorectal cancer screening as compared to the US. Further, breast cancer incidence is on the rise in Texas. Additional support in the future to increase cancer screening and maintain screening occurrence to be consistent with clinical recommendations at the population level would have a positive impact on the health of Texans as early diagnosis increases the likelihood of survival and improves treatment options for screenable cancers. This support includes connecting screened individuals who have a clinical finding to diagnostic, treatment, and follow-up services on a consistent basis.

VACCINATION

Texas has made progress on HPV vaccination rates for males and females, but there are still large portions of the population that have not been vaccinated and Texas remains below the US average for HPV vaccination. Improving vaccination rates will have a significant positive impact on the health of Texans by preventing more future cervical cancer cases as well as other cancers caused by HPV (i.e., oral/pharyngeal and anal/genital cancers). Liver cancer incidence and mortality rates have increased in the past few decades both nationally and in Texas. Incidence and mortality rates for Texas are higher than the national average. Increasing HBV vaccination would have a positive impact on reducing liver cancer incidence.

OBESITY AND PHYSICAL INACTIVITY

Obesity is associated with at least 12 types of cancer[xxxviii] including many of the most common cancers in Texas. Obesity is on the rise in the state of Texas including almost every PHR in the state. Obesity and physical inactivity rates in Texas are worse than the US overall. Opportunities to deploy evidence-based interventions that increase healthy eating and physical activity starting in childhood and leading into adulthood may help to reduce the long-term cancer burden in the state.

When comprehensive statewide approaches for cancer prevention are applied, they can be expected to have a positive impact on cancer risk reduction at the population level. For example, due to a multicomponent comprehensive approach to tobacco control in the state of Texas, significant progress against lung cancer and other tobacco-related cancers has been

made. While there is more work to be done, tobacco use is on the decline and lung cancer incidence has been declining in the past three to four decades. Overall, continuing or scaling up efforts to deploy evidence-based strategies could significantly reduce the cancer burden in Texas.

Additionally, primary prevention through vaccination or healthy lifestyle strategies (i.e., controlling weight, remaining physically active, HPV vaccination, etc.) can be taken by individuals and promoted at the population level through public education, the implementation of policies that promote clean public environments and healthy workplaces, and by reinforcing actions proven to be healthful. Currently these strategies are too rarely or inconsistently practiced, but they could be transformative for our population, not only in reducing cancer risks, but promoting health and wellness more broadly.

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