The Greater Bay Area Cancer Registry: 2015 Annual Incidence and Mortality Review

This report highlights the most current cancer statistics for the Greater San Francisco Bay Area and includes newly diagnosed cancer cases and mortality data from the 25-year period 1988 through 2012, with a focus on the latest five years of available data (2008-2012) [1, 2]. This report focuses on the incidence and mortality of invasive cancers (those that have invaded surrounding tissue); however, for some cancers (breast, skin) the incidence rates of in situ tumors (tumors identified that have unknown malignant potential) are also included due to their increasing relevance as a result of technological advances in diagnostics. Incidence and mortality statistics for the five most common cancers in males and females for the Greater Bay Area and California are available as Appendix 1 (Incidence) and Appendix 2 (Mortality).

As part of the California Cancer Registry, the Greater Bay Area Cancer Registry, operated by the Cancer Prevention Institute of California, collects information on all newly diagnosed cancers occurring in residents of nine Greater Bay Area California counties: Alameda, Contra Costa, Marin, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, and Santa Cruz.

To provide a reference point for rates in the Greater Bay Area, cancer rates and trends for California and the U.S. SEER 18 registries are also included throughout the report. The U.S. SEER 18 registries include registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry.

Readers interested in more information about the Greater Bay Area Cancer Registry can visit our website at www.cpic.org. Detailed cancer statistics for the Greater Bay Area region are available upon request by emailing data.release@cpic.org. For more detailed cancer statistics for our region or California, please visit the California Cancer Registry’s interactive cancer incidence and mortality mapping website, www.cancer-rates.info/ca/. This website allows users to create and view customized tables, charts, and maps of the most current cancer incidence and mortality data by cancer site, year of diagnosis, sex, race/ethnicity, and county or region.
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I. ALL CANCERS

Overall Cancer Incidence Rates
Over the period 1988 through 2012, rates of overall cancer incidence (i.e., occurrence of all new cancers combined) declined substantially in the Greater Bay Area, by 13.2% overall, and by 19.2% among males and by 7.4% among females (Figure 1). During the period, the incidence rate of all cancers combined was slightly higher in males (485.4 per 100,000) than in females (394.9 per 100,000). However, the decline over the more recent period 2008 through 2012 has been greater among males than females (9.4% vs. 6.0%, respectively). Among men, the largest contributors to the decline of overall cancer incidence were due to the declines in smoking-related cancers, colorectal cancer, and prostate cancer. Among women, the decline has been due primarily to declines in breast cancer, colorectal cancer, cervical cancer, and smoking-related cancers.

In the period 2008-2012, non-Hispanic (NH) black males had the highest overall incidence rate of cancer (589.3 per 100,000) and NH Asian/Pacific Islander (API) males had the lowest rate (342.3 per 100,000). Among females, NH whites had the highest overall incidence rate (445.1 per 100,000) and NH APIs had the lowest rate (310.1 per 100,000). Compared to rates for the state of California, overall cancer incidence rates in the Greater Bay Area were about 2% higher. Compared to cancer rates from the National Cancer Institute’s Surveillance, Epidemiology, and End Results Program for 18 U.S. registries (US SEER 18), cancer rates in California and the Greater Bay Area were substantially lower for both males and females (Figure 2) [3].

From 2008 through 2012, there were 155,303 new cases of cancer diagnosed in the Greater Bay Area. The five most common invasive cancers—breast, prostate, lung and bronchus, colorectal, and melanoma—accounted for 55% of all cases diagnosed during this time (Appendix 1).

Figure 1: Incidence Rates for All Cancer Sites Combined by Major Racial/Ethnic Group, 1988-2012, Greater Bay Area

![Incidence Rates Graph](image-url)
Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding incidence rates.

The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) United States SEER 18, which comprises registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry.

Overall Cancer Mortality Rates
In recent years, overall cancer mortality rates (i.e., rates of death due to any cancer) also have decreased in the Greater Bay Area (Figure 3), the state of California, and the US SEER 18 areas. From 2008 through 2012, the mortality rate for all cancers combined in the Greater Bay Area was 145.8 per 100,000, which was lower than the statewide rate of 154.6 per 100,000. During this period, the US SEER 18 overall cancer mortality rate was higher (173.8 per 100,000) than rates for the Greater Bay Area or California. Cancer mortality rates for the Greater Bay Area have declined for all cancer sites combined in all racial/ethnic groups and for both sexes by an average of 1.8% per year from 1995 through 2012; this decline was similar to that seen statewide and in the US SEER 18 data (1.5%) during a similar time frame.

A larger decline in cancer mortality has occurred in males than females over the past 25 years. From 1988 through 2012, the mortality rate for Greater Bay Area males declined by an average of 1.8% per year, from 260 deaths to 166 deaths per 100,000. Cancer mortality declined among females from 1988 through 2004 at an average of 1.2% per year, but a more rapid decline of 2.0% per year has been observed in recent years (2004-2012). Similar trends for males and females were observed statewide and in US SEER 18 areas [1, 4]. Lung, colorectal, breast, pancreatic and prostate cancer deaths together accounted for 51% of all cancer deaths from 2008 through 2012 in the Greater Bay Area (Appendix 2).
II. BREAST CANCER

Invasive breast cancer refers to any breast cancers that have invaded surrounding tissue and excludes those that are “in situ” (discussed below). In clinical settings, breast cancers are further categorized by the presence or absence of key tumor biomarkers that include receptors for estrogen receptors and the HER2Neu protein. From 2008 through 2012, breast cancer was the most commonly diagnosed cancer among females of Greater Bay Area (Appendix 1). During this time, 24,217 new cases of invasive breast cancer were diagnosed, comprising approximately 36% of the overall burden of invasive cancer incidence among females.

Invasive breast cancer incidence rates have changed substantially over the last two decades in the Greater Bay Area. A dramatic decline in breast cancer incidence rates began in 2003 among NH White women [5-8]. However, trends in incidence rates have been variable across racial/ethnic groups. For NH black females, rates were stable over the period from 1988 through 2012. For Hispanic females, rates declined consistently during this time period at 0.4% per year. For NH API females, rates increased significantly at 1.1% per year. These changes are likely due to several factors. Breast cancer incidence has been shown to vary with population prevalence of estrogen- and progestin-containing hormone therapy, which was more common among NH White women than other racial/ethnic groups [9]. In 2002, many women stopped using hormone therapy following new research findings of substantial health risks associated with hormone therapy use [6]. In addition, patterns of mammography utilization have changed in response to changing recommendations. The availability of new diagnostic technologies also may influence the timing of breast cancer diagnosis and, thereby, incidence trends over time patterns [10, 11].
Substantial variation in *invasive* breast cancer incidence was observed among racial/ethnic groups across Bay Area counties during 2008 to 2012. Among NH White females, the highest rates occurred in San Mateo, Santa Clara and Marin counties, and the lowest rates in Monterey, San Benito and Santa Cruz counties. Similar incidence patterns were seen among NH API females, with particularly high rates observed in San Mateo County relative to other counties. These patterns are likely attributable to differences in the population prevalence of established risk factors for breast cancer (for example, age at first birth, number of children, and alcohol consumption) [12]. Overall, for NH Whites and NH APIs, rates in the Greater Bay Area (144.5 and 101.7 per 100,000, respectively) were higher than rates for California (140.5 and 97.1 per 100,000, respectively), and for the US SEER 18 regions (134.0 and 97.8 per 100,000, respectively) (Figure 4).

<table>
<thead>
<tr>
<th>NH White</th>
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![Figure 4: Incidence Rates for Female Invasive Breast Cancer, 2008 through 2012, by Racial/Ethnic Group and Region*](image)

† Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding incidence rates.
* The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) United States SEER 18, which comprises registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry.

**Mortality rates for invasive breast cancer** declined consistently in all groups from 1988 through 2012, with the largest average annual declines seen in NH Whites (2.2% per year), followed by Hispanics (1.8%), NH Blacks (1.5%), and NH APIs (0.9%). Breast cancer mortality rates varied by race/ethnicity, with the highest rates among NH Blacks (29.5 per 100,000) followed by rates in NH Whites (22.2), Hispanics (15.9) and NH APIs (12.9). Similar rates were seen in California and in US SEER 18 data [1, 4].

**In situ breast cancers** represent about 20% of all breast cancer diagnoses in the Greater Bay Area. These tumors, which have uncertain malignant potential, are found almost exclusively by mammography. Among types of in situ breast tumors, the most common is ductal carcinoma in situ (DCIS), a condition in which abnormal cells found in the milk ducts have not spread to other tissues in the breast; however, DCIS may progress to become invasive [13]. Incidence trends have varied over time in the Bay Area, with significant increases from 1988 through 1999, and again from 2003 through 2008, and periods of
incidence stability in the other years and since 2008. From 2008 through 2012, the incidence rate of in situ breast cancer in the Greater Bay Area was greater than the rates for California or the SEER 18 regions; for all races combined, incidence rates were 34.3 per 100,000 (Greater Bay Area), 29.1 per 100,000 (California), and 31.7 per 100,000 (SEER 18 regions) [2, 3]. The higher in situ breast cancer rates observed in the Greater Bay Area may be associated with regional differences in the availability of mammography technology, specifically digital and other technologies more capable of distinguishing the in situ form of breast cancer [14].

III. PROSTATE CANCER

Prostate cancer was the most commonly diagnosed cancer in Greater Bay Area males in the years 1988 through 2012 (Appendix 1), comprising 29% of the overall burden of cancer incidence in males. In the Greater Bay Area, NH Blacks had the highest incidence rate (201.8 per 100,000) followed by NH Whites (144.1), Hispanics (136.5), and NH APIs (82.5). Prostate cancer incidence rates spiked in 1992 among all males, which has been attributed to the widespread adoption of prostate-specific antigen (PSA)-screening for the early detection of disease. Yet, incidence rates declined dramatically from 1992 to 1995 (by an average of 7.9% per year) that may be attributed to the drop in the detection of prostate cancers by subsequent PSA-testing after the initial screen [15, 16]. However, based on evidence that widespread screening by men older than 75 years of age did not result in increased survival, the US Preventive Services Task Force in 2008 recommended against PSA-screening in this age group [17]. Furthermore, in 2012, the Task Force recommended against screening at all ages due to evidence that treatment for screening-detected prostate cancer resulted in more harm than benefit [18]. This recommendation, and the associated decrease in screening, may continue to contribute to national declines in prostate cancer incidence in coming years. Compared to males in all of California, males in the Greater Bay Area had higher prostate cancer incidence rates in all racial/ethnic groups. In addition, Greater Bay Area prostate cancer incidence rates were higher than US SEER 18 rates for NH White, Hispanic, and NH API males. For NH Blacks, Greater Bay Area rates were lower than the US SEER 18 rates (Figure 5).

Figure 5: Incidence Rates† for Prostate Cancer, 2008 through 2012, by Major Racial/Ethnic Group and Region*

† Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding incidence rates. * The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) United States SEER 18, which comprises registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry.
Prostate cancer mortality rates have steadily declined for all racial/ethnic groups by an average of 3.7% per year since 1991. Because most prostate cancers have a good prognosis even without treatment, the lifetime risk for dying of prostate cancer is low (2.8%) [18]. From 2008 through 2012, the mortality rate was highest among NH Blacks (46.2 per 100,000), whose rate was more than double the rate in NH Whites (21.0 per 100,000), nearly triple the rate in Hispanics (16.7 per 100,000) and over five times the rate in NH APIs (8.4 per 100,000). These rates were similar to the mortality rates for all of California and SEER 18 regions from 2008 through 2012.

IV. LUNG CANCER AND OTHER SMOKING-RELATED CANCERS

Due to anti-smoking policies and subsequent declines in the prevalence of smokers, lung and bronchus cancer incidence in the Greater Bay Area has continued to decrease by an average of 1.8% per year from 1988 through 2012. The incidence rate decline was consistent across major racial/ethnic groups, with the largest decline seen among Hispanics (2% drop per year) and the smallest decline seen among NH APIs (0.8% drop per year). Nevertheless, lung cancer continues to be the second most common cancer diagnosis in the Greater Bay Area (Appendix 1). From 2008 through 2012, the highest incidence rates of lung cancer were observed among NH Black males and females (85.6 and 60.1 per 100,000, respectively) followed by NH White males and females (52.5 and 47.0 per 100,000, respectively). NH API females had the lowest incidence rate overall (29.3 per 100,000). From 2008 through 2012, the overall Greater Bay Area incidence rates for lung cancer were lower than rates in California and the SEER 18 regions for NH White males and females. In contrast, NH Black females and NH API males and females in the Greater Bay Area had slightly higher incidence rates of lung cancer than these groups in the US SEER 18 regions.

From 2008 through 2012, lung cancer represented 23.6% of all cancer deaths among females and 21.8% of all cancer deaths among males in the Greater Bay Area (Appendix 2). For the recent five years, Greater Bay Area NH Black males had the highest lung cancer mortality rate (65.9 per 100,000), which was slightly higher than the rate for NH Black males (63.0 per 100,000) throughout California. NH Black females had higher mortality rates of lung cancer (42.7 per 100,000) than NH White, Hispanic, or NH API males and females. Over the years 2001 through 2012, mortality rates of lung cancer declined by an average of 3.2% per year in the Greater Bay Area; in the U.S. SEER 18 regions, mortality rates of lung cancer have declined at a slower pace [4]. While mortality rates have dropped at a faster pace than in previous years, lung cancer still accounts for more than one in four cancer deaths in this country (27.2%) [19]. The U.S. Preventive Services Task Force, starting in 2013, recommended annual lung cancer screening by low-dose computed tomography (LDCT) for adults aged 55 to 80 years who are current or previous smokers [20]; starting in 2015, Medicare approved coverage for this screening [21].

Cancers known or thought to be smoking-related at least in part include cancers of the lung, oral cavity and pharynx, esophagus, stomach, colorectum, liver, pancreas, larynx, uterine cervix, bladder, kidney, and acute myeloid leukemia [22]. Following national declines in smoking prevalence [23], incidence rates of most smoking-related cancers declined from 1988 through 2012 among males in all major racial/ethnic groups. However, significant declines in lung cancer incidence were observed only among Hispanic and NH API females and not among NH White or Black females. Historically, the rates of decline in both incidence and mortality of smoking-related cancers in the Greater Bay Area have been among the steepest in the nation, likely due to the success of California’s stringent tobacco-control programs
For all smoking-related cancers combined (as defined above), the incidence rate in the Greater Bay Area was similar to California as a whole, and significantly lower than the rate in the SEER 18 regions.

For more information specific to lung cancer in the Greater Bay Area, please see our recent fact sheet on the CPIC website:

*Trends in Smoking and Cancer Incidence in the Greater Bay Area*

Highlights of trends in specific smoking-related cancers are as follows:

- **Cancer of the oral cavity and pharynx** (oropharyngeal cancer) was more common in males than females and in persons of NH White or Black race/ethnicity [25]. Risk factors include tobacco and heavy alcohol use, as well as infection with certain strains of human papillomavirus (HPV) [26]. In the Greater Bay Area, incidence rates declined among males by 1.7% per year from 1988 to 2003, and have been stable thereafter. Incidence rates also decreased in females of all races/ethnicities, by an average of 1.5% per year from 1988 to 2012. Overall, Greater Bay Area incidence rates for the period 2008-2012 were similar to the California rates, except for NH White males in the Greater Bay Area, who had slightly lower rates of oropharyngeal cancer (17.9 per 100,000 vs. 18.8 per 100,000, respectively). Compared to California, Greater Bay Area NH API males, and Hispanic and NH API females had somewhat higher rates of oropharyngeal cancer. Mortality rates from 2008 through 2012 were generally lower in the Greater Bay Area than in California and the nation for most racial/ethnic groups. However, NH API males and females in the Greater Bay Area had somewhat higher oropharyngeal cancer mortality rates than NH APIs in the state and nation (Figure 6).

*Figure 6: Mortality Rates for Oral and Pharyngeal Cancer, Males and Females, 2008 through 2012, by Major Racial/Ethnic Group and Region*

† Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding mortality rates.

* The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) the total U.S., mortality data from the SEER Program, provided by NCHS.
Bladder cancer, both invasive and in situ, was the eighth most commonly diagnosed cancer in the Greater Bay Area and was much more common among males (31.5 per 100,000) than females (8.1 per 100,000).[27]. Risk factors for bladder cancer include a history of smoking and exposures to various chemicals in the workplace, particularly in the dye, rubber, metal, textile, and leather industries [28]. Incidence rates have been declining since 2007 in all males except NH Blacks, in whom rates increased by 1.7% per year from 1988 through 2012. Mortality rates also increased in NH Black males by 2.9% per year during this time. In women, incidence and mortality rates decreased from 1988 to 2012. Incidence rates for NH White males in the Greater Bay Area were lower than California and the nation. However, compared to the US SEER 18 data, NH Black males in the Greater Bay Area had significantly higher incidence of and mortality rates for bladder cancer (Figure 7).

Figure 7: Incidence and Mortality Rates† for Bladder Cancer, NH Black Males, 2008 through 2012, by Region*

† Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding incidence rates.
* The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) United States SEER 18, which comprises registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry. Total U.S. mortality data provided by NCHS.

V. MELANOMA

The incidence of invasive melanoma, a deadly cancer of skin cells called melanocytes, is substantially higher among populations with fair complexions, which generally include NH Whites and some Hispanics. In the Greater Bay Area, melanoma was the third most common invasive cancer, after prostate and lung cancer, diagnosed among NH White males, accounting for 9% of all new cancers (Appendix 1). From 2008 through 2012, the incidence rate for NH Whites (39.4 per 100,000) was approximately seven times higher than that for Hispanics (5.5 per 100,000). Rates were extremely low in NH APIs (1.3 per 100,000) and NH Blacks (0.9 per 100,000). From 2002 through 2008, a dramatic increase in invasive melanoma incidence occurred in NH White males and females in the Greater Bay Area, at an average of 8.7% per year. Rates were particularly elevated among persons aged 65 and over
in the Greater Bay Area (Figure 8), and among residents of Marin County where melanoma was second only to prostate cancer in the number of new diagnoses per year. This geographic excess in melanoma incidence likely may be explained by a higher concentration of persons with known melanoma risk factors, as opposed to characteristics unique to the geography of the county. Overall, in the past decade, melanoma incidence rates among NH White males and females have been significantly higher and increasing more rapidly in the Greater Bay Area than in California, where the rates have remained stable or slightly decreased for NH White males and females combined. In US SEER 18 data, overall melanoma incidence rates for NH Whites appear to have been stable since 2006. Age-adjusted incidence rates for NH Whites (both sexes combined) for 2008-2012 were 39.4 per 100,000 (Greater Bay Area), 33.0 per 100,000 (California) and 30.2 per 100,000 (US SEER 18).

Mortality rates due to melanoma in the Greater Bay Area have decreased slightly since 1988 for all races/ethnicities and both sexes combined, by an average of 0.7% per year. For females, a decrease in mortality began in 1988 with a 1.4% average decline per year, yet in males mortality rates have remained stable. Melanoma mortality was twice as high among NH White males as among NH White females (5.5 vs. 2.3 per 100,000, respectively), a poorly understood difference. For NH Whites, the 2008-2012 mortality rate in the Greater Bay Area (3.8 per 100,000) was quite similar to the mortality rate in California (4.0 per 100,000), but higher than the US SEER 18 rate (3.0 per 100,000).

VI. COLORECTAL CANCER

Invasive colorectal cancer is the third most commonly diagnosed cancer among both males and females (Appendix 1). Obesity, smoking, history of colorectal polyps and a diet high in red meat are associated with increased risk of this cancer [29]. Incidence is higher among males (44.3 per 100,000) than females (35.9 per 100,000). Incidence rates of invasive colorectal cancer have been declining over time (6.0% per year since 2008), significantly among males of all major racial/ethnic groups (particularly NH White males, by 6.3% per year from 2008 through 2012). Incidence rates in NH Black males, Hispanic males, and NH API males have decreased since 1988 by approximately 1.5 % per year. Among females, there
were significant decreases from 2005 through 2012 in colorectal cancer incidence rates in NH Whites, NH Blacks, and NH APIs (4.9% to 7.6% per year) but a more modest decrease was seen in Hispanics (1.2% per year) from 2008 to 2012. The incidence rate was highest among NH Blacks (50.3 per 100,000), followed by NH Whites (40.3 per 100,000), while Hispanics and NH APIs have similar rates (36.2 and 36.5 per 100,000, respectively). However, recent studies indicate that incidence rates may be increasing in some API ethnic subgroups (Koreans, South Asians, Filipinos) in California due to lower screening rates [30, 31]. Incidence rates in the Greater Bay Area were generally similar to rates in California and the nation for all major racial/ethnic groups (Figure 9).

Figure 9: Incidence Rates\(^\dagger\) of Invasive Colorectal Cancer for Males and Females, 2008 through 2012, by Major Racial/Ethnic Group and Region*  

\[\text{Figure 9}\]: Incidence Rates\(^\dagger\) of Invasive Colorectal Cancer for Males and Females, 2008 through 2012, by Major Racial/Ethnic Group and Region*  

\(\dagger\) Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding incidence rates.  
* The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) United States SEER 18, which comprises registries in the states of California, Connecticut, Hawaii, Iowa, Kentucky, Louisiana, New Jersey, New Mexico, and Utah; the metropolitan areas of Detroit, Atlanta, and Seattle-Puget Sound; rural Georgia; and the Alaska Native Registry.

Mortality due to colorectal cancer declined steadily from 1988 through 2012 among most groups except NH Black and Hispanic males. The greatest decline (an average of 3.1% per year since 1988) was observed among NH White males. The mortality rate was highest among NH Blacks, at 21.1 per 100,000, and almost twice that for NH APIs (11.5 per 100,000). NH Whites and Hispanics had similar mortality rates (13.4 and 12.9 per 100,000, respectively). Mortality rates in the Greater Bay Area were similar to rates in the nation for most major racial/ethnic groups; the exception was among NH White males, for whom mortality in the nation was higher (18.2 vs. 15.6 per 100,000). Likely due to prevention (polyp removal) and early detection via screening, death rates from colorectal cancer have declined similarly in the Greater Bay Area, California, and nationwide over the past 25 years.

VII. PANCREATIC CANCER

From 2000 through 2012, incidence rates of pancreatic cancer increased in the Greater Bay Area among males by an average of 1.8% per year, but were stable among females. In the years 2008-2012, NH Black
males and females experienced the highest incidence rates of pancreatic cancer (17.0 and 17.6 per 100,000, respectively), followed by NH White males (14.4 per 100,000), and Hispanic males (13.2 per 100,000). NH API males and females had the lowest rates (10.8 and 9.3 per 100,000, respectively). Pancreatic cancer incidence rates in the Greater Bay Area were slightly higher than rates in California and in the US SEER 18 regions for NH Whites, Hispanics, and NH APIs. The largest difference was seen for NH Black females, who had higher incidence rates in the Greater Bay Area (17.6 per 100,000) than in the state (15.0 per 100,000) and in US SEER 18 regions (14.7 per 100,000). Risk factors for pancreatic cancer include obesity, history of smoking or diabetes, or a family history of pancreatitis or pancreatic cancer [32]. It is generally more common in males.

Pancreatic cancer mortality rates in the Greater Bay Area remained stable overall from 1988 through 2012, with a slight decrease observed among NH Blacks and an increase in Hispanics (1.0% per year). The pancreatic cancer mortality rate was higher for NH Blacks (14.5 per 100,000) than Hispanics (10.8 per 100,000), NH Whites (10.6 per 100,000), or NH APIs (8.1 per 100,000) for the period 2008-2012. Although the Greater Bay Area mortality rate for Hispanic males and females combined is comparable to the statewide rate, it is higher than rates in the nation for this group (Figure 10).

VIII. LIVER CANCER

The incidence of liver cancer in the Greater Bay Area has experienced a substantial increase. From 1988 through 2012, a roughly 4% yearly rise in incidence rates was seen for NH White, NH Black, and Hispanic males and females (Figure 11). These trends may be due to increases in the prevalence of hepatitis C virus infection and obesity [33]. In contrast, NH APIs, especially males, who historically have the highest liver cancer incidence rates of all racial/ethnic groups due to higher prevalence of hepatitis B infection [34], have had fairly stable rates over the past 25 years. Among males, the stable rates among NH APIs

\[\text{Figure 10: Mortality Rates of Pancreatic Cancer for Males and Females, 2008 through 2012, by Major Racial/Ethnic Group and Region*}\]

\[\text{\^ Error bars (in black at the top of the bars) indicate 95% confidence intervals surrounding the corresponding mortality rates.}\]

\[\text{* The three regions represented include: (1) the Greater Bay Area (nine-county region), (2) all of California (including the nine-county region of the Greater Bay Area), and (3) the total U.S., mortality data from the SEER Program, provided by NCHS.}\]
and increasing rates among NH Blacks and Hispanics have led the incidence rates for these three racial/ethnic groups for 2008-2012 to be relatively similar, at roughly 22.0 per 100,000, while NH Whites had the lowest incidence rate of 9.5 per 100,000 [35]. Liver cancer incidence rates were slightly higher for NH Black, Hispanic, and NH API males and females in the Greater Bay Area than in California and US SEER 18 regions.

Mortality rates due to liver cancer have increased by an average of 1.4% from 1997 through 2012 among all racial/ethnic groups except NH APIs, for whom mortality rates declined by an average of 1.2% per year since 1988. Hispanics experienced the largest rise in mortality, with an average 3.1% increase per year from 1988 through 2012. For the years 2008-2012, Hispanics and NH API males experienced higher rates of death due to liver cancer (13.3 and 13.9 per 100,000, respectively) than NH White females, who experienced the lowest rate (1.7 per 100,000). Liver cancer mortality rates also have been increasing in California and in the nation.

**Figure 11: Incidence Rates of Liver Cancer in the Greater Bay Area, 1988-2012**

Infection with HPV, particularly certain subtypes, is the most common risk factor for cervical cancer [36-38]. Regular screening for cervical abnormalities and cancer by Papanicolaou (“Pap”) testing has contributed significantly to the declines in cervical cancer, and in recent years, treatment of pre-cancerous cells/lesions have shown promising results [39]. The 2008-2012 incidence rate of cervical cancer was higher among Hispanics (8.8 per 100,000) than other racial/ethnic groups, among whom rates ranged from 5.6 per 100,000 in NH APIs to 6.4 per 100,000 in
NH Blacks. However, substantial rate heterogeneity occurs across API populations, with traditionally high rates among Southeast Asian women that have declined dramatically over the past decade [40]. Cervical cancer incidence rates were lower in the Greater Bay Area than in the state or the US SEER 18 region for all racial/ethnic groups. From 1988 through 2012, mortality rates due to cervical cancer decreased significantly across all racial/ethnic groups, with the largest decline seen among NH APIs (5.1% per year). Mortality rates were slightly higher among NH Black females (2.8 per 100,000) than females in other racial/ethnic groups. The decrease in mortality rates nationwide was similar to that seen in the Greater Bay Area, likely as a result of continuing increases in prevention and early detection due to wide-spread screening [41, 42]. Although a vaccine against HPV has been available and recommended since 2006, its impact on cancer incidence and mortality rates is still unclear in part due to the targeting of vaccination to a young population, and the long latency of HPV carcinogenesis [43]. The period between infection with a carcinogenic strain of HPV and manifestation of a pre-cancerous lesion is estimated at roughly 20 years, while the latency period between a persistent infection and precancerous lesions is estimated to be as low as five years [44]. Ongoing research will be able to determine the impact of the vaccine over the next several years, particularly for persistent infections.

X. OVARIAN CANCER

Incidence rates of ovarian cancer have decreased from 1988 through 2012 similarly for NH Whites (-1.2% per year), NH Blacks (-1.0% per year) and Hispanic females (-1.2% per year), and remained stable in NH APIs. The most common type of ovarian cancer is ovarian epithelial cancer, which begins in the tissue that covers the ovaries. Women with a family history of ovarian cancer have an increased risk for the disease. Other risk factors include obesity, nulliparity and use of postmenopausal hormone therapy, fertility drugs, and perineal talc [45]. Ovarian cancer accounts for only about 3% of cancers among women [46]. In the Greater Bay Area, NH White women had a somewhat higher incidence rate of ovarian cancer (13.6 per 100,000 for 2008-2012) than women of other race/ethnicities, who had incidence rates of roughly 10 per 100,000. Incidence rates in the Greater Bay Area are comparable to the rates in California and the US SEER 18 regions.

Mortality rates of ovarian cancer significantly decreased over the period 1988-2012 in all women (1.4% per year) and in NH whites (1.2% per year) and Hispanics (1.1% per year); mortality rates were stable in Blacks and APIs. From 2008 through 2012, Greater Bay Area mortality rates were similar to rates in California and US SEER 18 regions.

XI. UTERINE CANCER

The incidence rate of uterine cancer, of which the vast majority (95%) is cancer of the endometrius (lining of the uterus), increased by an average of 2.7% per year among all females from 2005 through 2012. Increasing incidence rates may be related to increasing prevalence of obesity [47]. Other risk factors for endometrial cancer are related to estrogen exposure, with risk increased for women who started menstruating early, started menopause late, were never pregnant, or took estrogen replacement therapy without progesterone [47]. Uterine cancer is primarily a cancer of postmenopausal women, with incidence peaking in the seventh decade of life. During the period 2008-2012,
incidence rates were highest in NH Whites (27.5 per 100,000), lower in NH Blacks (23.4 per 100,000), and lowest in Hispanics and NH APIs, who had similar rates (~21 per 100,000). In the US SEER 18 regions, incidence among all females has been increasing at a similar rate as in the Greater Bay Area. For all racial/ethnic groups, the Greater Bay Area incidence rates were similar to the state and US SEER 18 regions rates. However, because women who have undergone hysterectomy cannot subsequently get uterine cancer, actual incidence rates are likely higher than reported. Furthermore, the degree to which uterine cancer rates would increase is likely different by race/ethnicity [48, 49].

Uterine cancer mortality rates in the Greater Bay Area have remained stable since 1988 for all racial/ethnic groups. The mortality rate was highest among NH Blacks (6.1 per 100,000) and lowest among APIs (2.9 per 100,000). Mortality rates for the Greater Bay Area were similar to rates for California and the nation.

XII. THYROID CANCER

Invasive thyroid cancer incidence has increased dramatically since 2001, by an average of 6.0% per year, among both males and females of all racial/ethnic groups in the Greater Bay Area (Figure 12), as it has nationally and globally. This increase is thought to be related to increased cancer detection due to better imaging technology, and increased prevalence in the population of suspected risk factors (e.g., radiation exposure from previous diagnostics or cancer treatment, obesity, insulin resistance due to obesity or type 2 diabetes) [50-52]. For the period 2008-2012, females experienced an incidence rate at least three times that of males; this difference was apparent in all racial/ethnic groups and was greatest among Hispanics (15.9 per 100,000 in females vs. 3.9 per 100,000 in males). The highest incidence rates overall were observed among NH API females (17.4 per 100,000) and NH White females (17.3 per 100,000). Although the rate among NH Black females was less than half that of all other racial/ethnic groups (7.8 per 100,000), a steady incidence rate increase has occurred in this group since 1988 by an average of 4.3% per year. California and US SEER 18 incidence rates were significantly higher than Greater Bay Area incidence rates for males and females of all races/ethnicities (Figure 13).

![Figure 12: Incidence Rates of Thyroid Cancer in the Greater Bay Area, by Major Racial/Ethnic Group and Gender, 1988-2012](image-url)
Mortality due to thyroid cancer has remained low among all racial/ethnic groups and both sexes (0.6 per 100,000) and stable from 1988 through 2012 in the Greater Bay Area. Across racial/ethnic groups, the most recent five-year mortality rates were highest in Hispanic and NH API females (1.3 and 0.9 per 100,000, respectively), and significantly higher than the mortality rate in NH White females (0.5 per 100,000). California and nationwide mortality rates were similar to Greater Bay Area rates for all racial/ethnic groups except Hispanics, for whom the mortality rate in Greater Bay Area females was higher than the national rate (1.26 vs. 0.67 per 100,000, respectively).

For more information specific to thyroid cancer in the Greater Bay Area, please see our recent fact sheet on the CPIC website:

*Trends in Thyroid Cancer Incidence in the Greater Bay Area, 1988-2012*

[http://www.cpic.org/files/PDF/Cancer_Registry/Fact_Sheets/Fact_Sheet_Thyroid_Cancer_in_the_GBA_April_2015.pdf](http://www.cpic.org/files/PDF/Cancer_Registry/Fact_Sheets/Fact_Sheet_Thyroid_Cancer_in_the_GBA_April_2015.pdf)

**XIII. KIDNEY CANCER**

In the Greater Bay Area, kidney cancer incidence rates have been increasing in many groups. Steady increases have been seen over time for NH API (3.1% per year), NH Black (2.5% per year), and Hispanic (1.8% per year) males, while NH White males had a sharp increase from 2001 through 2009 (4.4% per year), and then a decrease in rates from 2010 through 2012 (3% per year). Females of all major racial/ethnic groups have experienced steady rate increases over time (NH APIs by 2.7% per year, NH Blacks by 2.8% per year, Hispanics by 2.9% per year, NH Whites by 1.8% per year). Increases in
incidence rates may in part reflect the rising prevalence of obesity and high blood pressure in the population. In addition, an increased use of imaging procedures has likely contributed to the increased detection of kidney cancer, leading to earlier stage at diagnosis [53-55]. Risk factors for kidney cancer include smoking, obesity, and hypertension, as well as a family history and certain environmental exposures [56]. Incidence rates were twice as high in males as in females (18.3 vs. 9.0 per 100,000, respectively) and highest in NH Black males (25.0 per 100,000), followed by Hispanics and NH Whites (20.0 and 19.7 per 100,000, respectively). For the years 2008-2012, the incidence rate for NH Whites in the Greater Bay Area was lower than the California and US SEER 18 rates; however, rates were comparable for all other major racial/ethnic groups.

Mortality rates due to kidney cancer have declined by almost 1% per year for NH White males and females, but have remained fairly constant for other racial/ethnic groups. Widening use of sophisticated imaging procedures, which has led to earlier diagnosis of kidney cancer, has been cited as important to the leveling of mortality rates nationwide [53]. Greater Bay Area mortality rates for NH White males and females are lower than the nationwide mortality rates; however, Greater Bay Area rates are comparable to the California rates. For other major racial/ethnic groups, Greater Bay Area mortality rates are similar to the California and national rates.
XIV. REFERENCES


13. National Cancer Institute. Breast Cancer Treatment (PDQ): Ductal Carcinoma In Situ. Available at:


