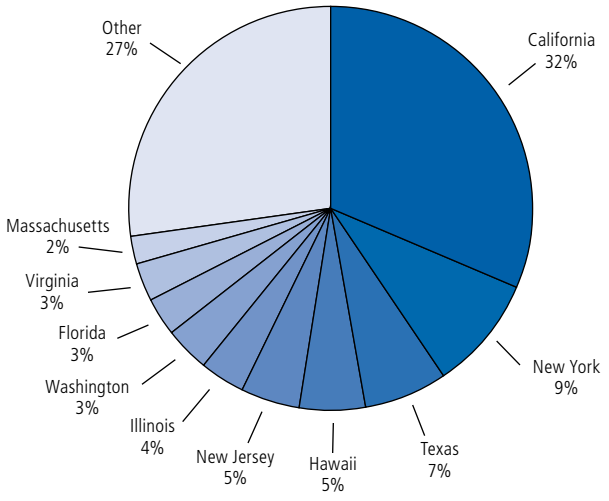
# Special Section: Cancer in Asian Americans, Native Hawaiians, and Pacific Islanders

## Introduction

Asian Americans are the fastest-growing racial/ethnic group in the US, representing 6.3% of the population (20.0 million/318.7 million) in 2014.[1] In contrast to Hispanics, the rapid growth of the Asian American population is driven by immigration as opposed to native births.[2] The Native Hawaiian and Pacific Islander (NHPI) population (1.5 million) is also among the fastest-growing groups.[1, 3] The term Asian refers to people with origins in the Far East, Southeast Asia, or the Indian subcontinent and includes, but is not limited to, Asian Indian, Cambodian, Chinese, Filipino, Hmong, Japanese, Korean, Pakistani, and Vietnamese.[4] The term NHPI refers to people with origins in Hawaii, Guam, Samoa, or other Pacific Islands.[3] According to the US Census, a person may be Asian American or NHPI alone or in combination with other races.[3, 4] While Asian Americans and NHPIs are distinct racial groups with very different cancer profiles, unfortunately demographic and health data are usually available only in aggregate. These two groups are collectively referred to as Asian American, Native Hawaiian, and Pacific Islander (AANHPI), Asian American and Pacific Islander (AAPI), or Asian and Pacific Islander (API).

**Figure S1. AANHPI Population by State, 2013**




AANHPI = Asian American, Native Hawaiian, and Pacific Islander.

**Source:** US Census Bureau Population Estimates Program, modified in collaboration with the National Center for Health Statistics with support from the National Cancer Institute, accessed through Surveillance, Epidemiology, and End Results (SEER) Program, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

The largest Asian subpopulation in the US is Chinese (23%), followed by Filipino (20%), Asian Indian (18%), Vietnamese (10%), Korean (10%), Japanese (8%), and 2% or less for Pakistani, Cambodian, Hmong, and other groups.[4] The largest NHPI subpopulation is Native Hawaiian (43%), followed by Samoan (15%), Guamanian or Chamorro (12%), and Tongan (5%).[3] Ten US states are home to 73% of the overall AANHPI population (Figure S1); California has the largest population with 32%, followed by New York (9%), Texas (7%), Hawaii (5%), and New Jersey (5%). Notably, AANHPIs comprise 71% and 15% of the total population in Hawaii and California, respectively. AANHPI populations are generally concentrated in urban areas.

## Sociodemographic Characteristics

AANHPI subgroups have highly heterogeneous demographic characteristics. For example, the median age among the largest subgroups ranges from 22 in Hmong to 37 in Japanese (Table S1, page 26). Some groups are largely composed of native-born US citizens, such as Native Hawaiians (98%), Samoans (91%), and Japanese (75%), while others are more likely to be foreign-born, such as Asian Indians (68%). Longer duration in the US is generally associated with the adoption of an American lifestyle, which can influence the prevalence of cancer risk factors, such as smoking and excess body weight.[5, 6] In addition, the ability to access preventive and health care services can be hampered by language barriers.[7] About 50% of Vietnamese and 40% of Chinese, Koreans, Cambodians, and Hmong report speaking a language other than English at home and speaking English less than "very well" (Table S1, page 26).

The variation in socioeconomic status between AANHPI subgroups is striking.[8] For example, more than one-third of Japanese, Filipinos, and Asian Indians have a bachelor's degree or higher and only about 5% live in poverty, compared to 12% and 20%, respectively, of Cambodians and Hmong (Table S1, page 26).

## Overall cancer statistics

Cancer patterns in AANHPIs are more similar to Hispanics than NHWs, with lower rates for the most common cancers and higher rates for cancers associated with infectious agents. However, cancer rates within the AANHPI population vary by immigration history, origin, acculturation, and socioeconomic status. For example, lung cancer incidence rates range from 21.1 (per 100,000) in Asian Indian/Pakistani men to 98.9 in Samoan men; these distinctions are masked in aggregated statistics.

## Table S1. Sociodemographic Characteristics of AANHPIs by Subgroup, 2011-2013

| | Total Asian | Chinese | Filipino | Asian Indian | Vietnamese | Korean | Japanese | Pakistani | Cambodian | Hmong | Laotian | Native Hawaiian | Samoan |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Median age | 34 | 35 | 34 | 32 | 35 | 34 | 37 | 29 | 29 | 22 | 29 | 27 | 23 |
| Nativity and citizenship (%) | | | | | | | | | | | | | |
| Native | 41 | 39 | 49 | 32 | 37 | 39 | 75 | 37 | 47 | 61 | 51 | 98 | 91 |
| Foreign-born, naturalized citizen | 34 | 36 | 34 | 34 | 47 | 35 | 8 | 38 | 36 | 27 | 34 | 1 | 5 |
| Foreign-born, not a citizen | 25 | 25 | 17 | 34 | 16 | 26 | 17 | 25 | 17 | 12 | 15 | 1 | 4 |
| Average household size (n of persons) | 3.1 | 2.9 | 3.4 | 3.1 | 3.5 | 2.7 | 2.4 | 4.0 | 3.9 | 5.1 | 3.8 | 3.2 | 4.1 |
| Language spoken at home and English-speaking ability (%) | | | | | | | | | | | | | |
| Only English spoken at home | 31 | 26 | 46 | 24 | 17 | 32 | 68 | 16 | 25 | 12 | 26 | 89 | 58 |
| Non-English at home | 69 | 74 | 55 | 76 | 83 | 68 | 32 | 84 | 75 | 88 | 75 | 11 | 43 |
| Non-English at home, English spoken less than "very well" | 31 | 41 | 18 | 21 | 49 | 38 | 15 | 27 | 39 | 38 | 35 | 2 | 11 |
| Poverty (%) | 10 | 11 | 6 | 6 | 14 | 12 | 5 | 16 | 20 | 25 | 15 | 13 | 17 |
| Per capita income ($) | 29,630 | 31,382 | 26,514 | 40,221 | 22,234 | 27,088 | 32,923 | 25,135 | 16,472 | 11,938 | 17,183 | 20,740 | 15,021 |
| Educational attainment (%) | | | | | | | | | | | | | |
| Less than high school graduate | 14 | 18 | 7 | 9 | 29 | 7 | 5 | 13 | 35 | 33 | 31 | 9 | 12 |
| High school graduate | 16 | 15 | 16 | 9 | 22 | 18 | 19 | 15 | 25 | 23 | 30 | 36 | 37 |
| Some college or associate's degree | 21 | 16 | 31 | 11 | 23 | 22 | 29 | 18 | 25 | 28 | 26 | 35 | 37 |
| Bachelor's degree or higher | 29 | 26 | 37 | 32 | 19 | 34 | 31 | 30 | 12 | 13 | 10 | 14 | 10 |

AANHPI = Asian American, Native Hawaiian, and Pacific Islander.

**Source:** US Census Bureau, 2011-2013 3-Year American Community Survey.

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Cancer is the leading cause of death among AANHPIs, accounting for 27% of all deaths (Table S2, page 28). Among non-Hispanic whites, heart disease remains the leading cause of death, followed by cancer. However, the cancer death rate in AANHPIs (104.2 per 100,000) is about 40% lower than that in NHWs (170.2).

The lifetime probability of developing cancer among AANHPIs is 36% in males and 33% in females (Table S3, page 29), compared to 42% and 38% in NHW males and females, respectively. In 2016, an estimated 57,740 new cancer cases and 16,910 cancer deaths will occur among AANHPIs. According to these estimates, the most commonly diagnosed cancers among males are prostate (18%), lung (14%), and colorectum (12%) (Figure S2, page 29). Among females, the most common cancers are breast (34%), thyroid (10%), and lung (9%). The three leading causes of cancer death are lung (27%), liver (14%), and colorectum (11%) among males, and lung (21%), breast (14%), and colorectum (11%) among females.

As mentioned previously, there is substantial variation in cancer occurrence among AANHPI subgroups. For both males and females, Samoans and Native Hawaiians have the highest overall cancer incidence rates, while Asian Indians and Pakistanis (grouped together) and Cambodians have the lowest rates (Figure S4, page 31).

Overall cancer incidence rates declined from 2003 to 2012 (the most recent 10 years for which data are currently available) among AANHPI males by 1.9% annually, compared with declines of 1.5% annually among NHW males.[9] During the same period, incidence rates remained stable among both AANHPI and NHW females (Figure S5, page 32). However, mortality rates during this period declined among both AANHPI males and females by 1.5% and 0.8% annually, respectively, similar to the declines in NHWs.[10] Trends in cancer occurrence among Asian Americans are influenced not only by the risk factor profiles of those living in the US, but also by the influx of immigrants.

Overall five-year cancer survival among AANHPIs compared with NHWs is lower for males (62% versus 68%) and similar for females (70% versus 68%; Figure S6, page 33). Survival is notably higher among AANHPIs for stomach, liver, and nasopharyngeal cancers, while it is similar for other major cancer sites (Figure S6, page 33). Survival statistics for minority groups in the US are particularly influenced by incomplete follow-up of cancer patients due to lost contact or inability to link to death registries, artificially inflating rates by as much as 6 percentage points among Asian Americans.[11] Lost contact of cancer patients is sometimes the result of terminally ill people returning to their country of origin. As a result, comparisons of survival between racial/ethnic groups should be interpreted with caution.

### Data limitations

The data presented in this report have several limitations and should be interpreted with caution. First, data are limited for racial and ethnic subpopulations, so many statistics are presented for Asian Americans, Native Hawaiians, and Pacific Islanders in aggregate, masking important differences within this heterogeneous group. For example, cancer risk factor data are only available for the three largest AANHPI subgroups (Chinese, Filipino, and Asian Indian) because estimates for other groups are unreliable due to insufficient representation in national population-based surveys; questionnaires only in English or limited Asian languages may also exclude some Asian Americans. NHPIs in particular have very distinct cancer risk profiles that are obscured when combined with Asian Americans. Increasing recognition of the need to improve health information for AANHPIs led the US Department of Health & Human Services to develop new standards for collecting data on race and ethnicity that will allow for more data reporting for the largest AANHPI subgroups in the future. In addition, data from the first NHPI National Health Interview Survey are forthcoming.

Second, much of the demographic information in health records, such as place of birth and racial/ethnic identity, is often incorrect or incomplete for minority patients. This can occur when information is assigned by a health care worker instead of obtained directly from the patient or their family. The resulting misclassification leads to inaccurate, often underestimated cancer rates. Similarly, it has been shown that a small percentage of decedents who had self-reported as AANHPIs were not recorded as such on death certificates. The standard US death certificate was revised in 2003 to include several AANHPI subgroups and had been adopted by 44 states in 2012. This change will improve the availability of disaggregated death data for AANHPIs, although issues of misclassification will likely persist.

Third, there are challenges when calculating statistics for racial/ethnic subgroups, especially those that are rapidly growing and changing. For example, population size, which is necessary for computing rates, is often difficult to estimate. Also, rates for subpopulations that are based on small numbers may be unreliable.

For information on data sources and methodology, please see Sources of Statistics on page 64.

## Major cancer sites

### Female breast

Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer death among AANHPI women, with a total of 11,090 new invasive cases and 1,180 deaths expected to occur in 2016 (Figure S2, page 29). About one in 10 AANHPI women will be diagnosed with breast cancer in her lifetime (Table S3, page 29). Age-standardized breast cancer incidence and mortality rates are 30% and 50% lower, respectively, than those in NHWs (Figure S3, page 30). There is substantial variation in breast cancer occurrence within the AANHPI population, with lower rates among groups that have immigrated more recently. Incidence rates range from 35.0 (per 100,000) in Cambodian women to 135.9 in Native Hawaiian women (Figure S4, page 31). These differences are thought to be related to extent of adoption of western behaviors that increase breast cancer risk, such as a later age at childbirth, fewer births, and higher body weight.[12] A California study found breast cancer rates to be generally higher among US-born compared to foreign-born Asian American women.[13] Breast cancer incidence rates in AANHPI countries of origin are generally substantially lower than in the US;[14] however, in many Asian countries, risk among recent generations is approaching that in the US.[15]

Breast cancer incidence rates among AANHPI women have been increasing gradually since 2005 (Figure S7, page 33). From 2003 to 2012, in contrast to stable rates in NHWs, rates in AANHPIs increased by 1.1% annually.[9] Reasons for this increase are thought to include changes in factors such as body weight and reproductive patterns following immigration and acculturation.[12, 16] Recent uptake of mammography screening among Asian Americans may also have contributed.[12, 17, 18] Increases in incidence of in situ breast cancers among AANHPIs since 1992 are consistent with increased screening.[19] Breast cancer mortality rates decreased by 1.4% annually from 2003 to 2012 among AANHPI women and by 1.9% annually among NHWs.[10] These reductions have been attributed to improvements in both treatment and early detection.[20]

The stage at breast cancer diagnosis is similar in AANHPIs and NHWs (Figure S8, page 34), although the overall 5-year cause-specific survival is slightly higher among AANHPI women (Figure S6, page 33). However, there are some notable differences in survival by nativity and between AANHPI subgroups. A study in California showed that compared with foreign-born women, those who are US-born are more likely to be diagnosed with breast cancer at a localized stage and have higher survival after adjusting for stage and other prognostic factors.[21] Compared to NHWs, survival rates are higher in Japanese but lower in NHPIs.[22] Factors thought to contribute to the Japanese survival advantage include lower body weight and healthy diet.[22, 23] Differences in survival between Asian American subgroups may also reflect biological differences in tumor characteristics;[24] a study in California showed differing prevalence of breast cancer subtypes, each with distinct treatment needs and prognosis, among Asian American subgroups.[25]

## Table S2. Leading Causes of Death among AANHPIs and NHWs, US, 2012

| | Asian American, Native Hawaiian, and Pacific Islander | | | | Non-Hispanic white | | | |
|---|---|---|---|---|---|---|---|---|
| | Rank | Number of deaths | Percent of total deaths | Death rate | Rank | Number of deaths | Percent of total deaths | Death rate |
| Cancer | 1 | 15,340 | 27.2 | 104.2 | 2 | 462,499 | 22.9 | 170.2 |
| Heart diseases | 2 | 12,266 | 21.8 | 92.0 | 1 | 481,991 | 23.9 | 171.2 |
| Cerebrovascular diseases | 3 | 4,108 | 7.3 | 30.8 | 4 | 100,154 | 5.0 | 35.5 |
| Accidents (unintentional injuries) | 4 | 2,372 | 4.2 | 15.0 | 5 | 99,288 | 4.9 | 43.7 |
| Diabetes | 5 | 2,158 | 3.8 | 15.7 | 7 | 50,443 | 2.5 | 18.5 |
| Influenza and pneumonia | 6 | 1,745 | 3.1 | 13.9 | 8 | 40,460 | 2.0 | 14.3 |
| Chronic lower respiratory diseases | 7 | 1,624 | 2.9 | 12.8 | 3 | 127,116 | 6.3 | 46.2 |
| Alzheimer's disease | 8 | 1,379 | 2.4 | 11.6 | 6 | 72,772 | 3.6 | 24.9 |
| Suicide | 9 | 1,152 | 2.0 | 6.2 | 9 | 33,727 | 1.7 | 15.7 |
| Nephritis, nephrotic syndrome & nephrosis | 10 | 1,054 | 1.9 | 8.0 | 10 | 33,105 | 1.6 | 11.8 |
| **All causes** | | 56,352 | 100.0 | 406.1 | | 2,016,896 | 100.0 | 742.3 |

AANHPI = Asian American, Native Hawaiian, and Pacific Islander. NHW = Non-Hispanic white. Rates are per 100,000 and age-adjusted to the 2000 US standard population.
**Source:** US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

## Lung and bronchus

Among AANHPIs, an estimated 3,460 men and 3,030 women will be diagnosed with lung cancer in 2016 (Figure S2). Lung cancer is the leading cause of cancer death among both men and women. Although incidence and mortality are roughly half that among NHWs, risk varies substantially by subgroup (Figure S3, page 30). The highest lung cancer incidence rate in men is in Samoans (98.9 per 100,000), followed by Native Hawaiians (72.1) and Vietnamese (62.7), while Asians Indians/Pakistanis have the lowest rate (21.1) (Figure S4, page 31). The highest rate in AANHPI women is in Native Hawaiians (44.0), followed closely by Samoans (41.8), with the lowest rate also in Asian Indians/Pakistanis (10.2).

In the US, smoking causes 83% and 76% of all lung cancer deaths among men and women, respectively.[26] Data on historical trends in smoking prevalence for AANHPIs are scarce. A survey of smoking status in 2002–2005 found that 42% and 27% of NHPI men and women, respectively, were current smokers compared to 21% and 4% of Indian/Pakistani men women.[27] Notably, lung cancer rates among Chinese women in both Asia and the US are relatively high given the low prevalence of smoking in this group. This may be attributable to exposure to cooking oils at high heat, secondhand smoke, genetic susceptibility, or other unknown risk factors.[28-31]

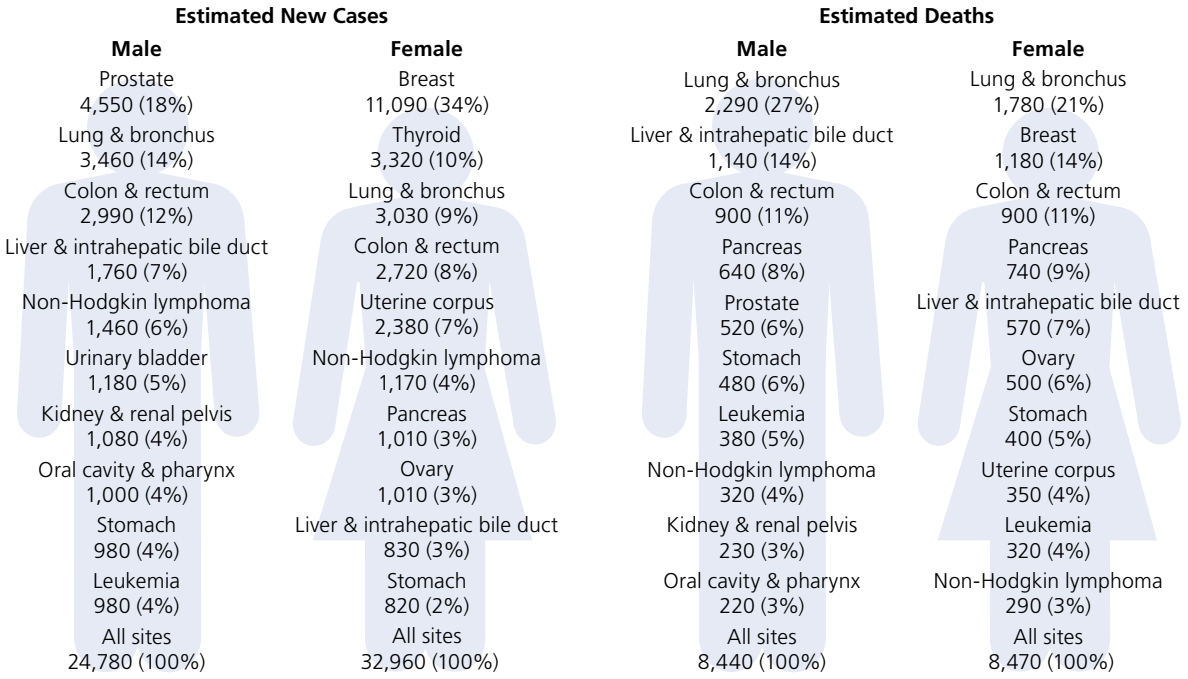
Since the early 1990s, when data became available, lung cancer occurrence has been decreasing among AANHPI men and relatively stable among women (Figure S7, page 33, and Figure S9, page 35).[19] From 2003 to 2012, incidence and death rates decreased in men by about 2% annually among AANHPIs and by about 2.5% annually among NHWs.[9, 10] Among AANHPI women, incidence rates were stable while death rates declined by 0.5% per year; in contrast, among NHW women, incidence and death rates decreased by about 1% annually.[9, 10]

AANHPIs are more likely than NHWs to be diagnosed with lung cancer at a distant stage of disease (58% versus 52%; Figure S8, page 34); however, five-year cause-specific survival is similar (Figure S6, page 33). AANHPIs and NHWs are equally likely to receive appropriate treatment for lung cancer.[32] The reasons for the roughly equivalent survival in AANHPIs given later stage at diagnosis are unknown, but may include genetic and/or cultural factors[32] or loss of patient contact.

## Colon and rectum

Among AANHPIs, an estimated 2,990 men and 2,720 women will be diagnosed with colorectal cancer in 2016 (Figure S2). It is the third leading cause of cancer death among both AANHPI men and women. Incidence and death rates are 20% lower and 30% lower, respectively, compared to NHWs (Figure S3, page 30). However, within AANHPI subgroups, colorectal cancer incidence rates are about three times higher in Japanese than in Asian Indians/Pakistanis (Figure S4, page 31). Higher incidence rates among US-born compared to foreign-born Chinese and Filipinos in a California study are likely due to a higher prevalence of behaviors associated with colorectal cancer risk, such as unhealthy diet, physical inactivity, and smoking.[33]

## Figure S2. Leading Sites of New Cancer Cases and Deaths among AANHPIs – 2016 Estimates




AANHPI = Asian American, Native Hawaiian, and Pacific Islander. Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder.



## Table S3. Probability (%) of Developing Invasive Cancer among AANHPIs during Selected Age Intervals by Sex, US, 2010-2012*

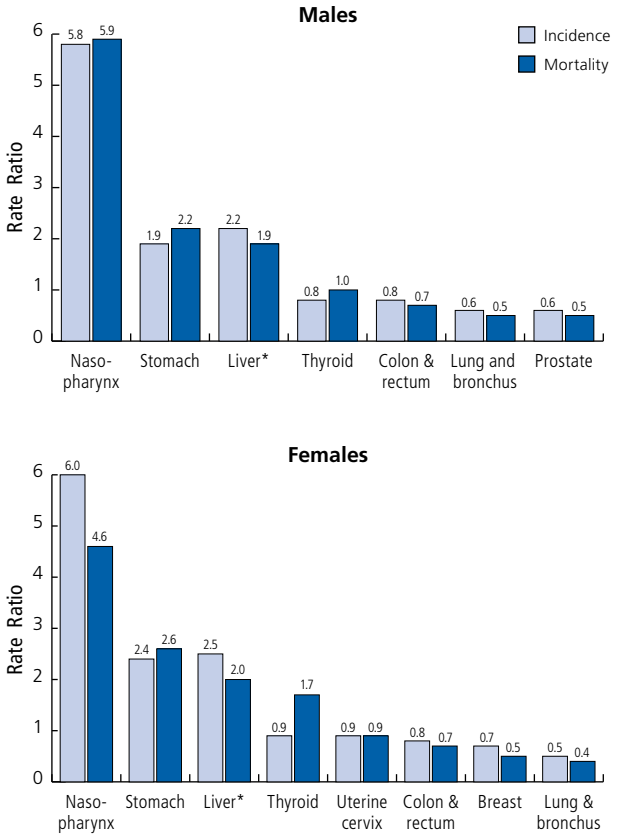
| | | Birth to 49 | 50 to 59 | 60 to 69 | 70 and older | Birth to death |
|---|---|---|---|---|---|---|
| All sites† | Male | 2.2 (1 in 46) | 3.8 (1 in 26) | 9.0 (1 in 11) | 29.2 (1 in 3) | 36.2 (1 in 3) |
| | Female | 4.5 (1 in 22) | 4.7 (1 in 21) | 7.1 (1 in 14) | 22.6 (1 in 4) | 33.3 (1 in 3) |
| Breast | Female | 1.8 (1 in 56) | 2.0 (1 in 50) | 2.7 (1 in 37) | 4.7 (1 in 21) | 10.3 (1 in 10) |
| Colon & rectum | Male | 0.3 (1 in 347) | 0.6 (1 in 159) | 1.2 (1 in 86) | 3.9 (1 in 25) | 5.3 (1 in 19) |
| | Female | 0.3 (1 in 377) | 0.5 (1 in 214) | 0.8 (1 in 130) | 3.5 (1 in 29) | 4.6 (1 in 22) |
| Liver & intrahepatic bile duct | Male | 0.2 (1 in 644) | 0.4 (1 in 249) | 0.6 (1 in 157) | 1.7 (1 in 59) | 2.6 (1 in 39) |
| | Female | <0.1 (1 in 2,828) | 0.1 (1 in 1,152) | 0.2 (1 in 431) | 1.0 (1 in 96) | 1.3 (1 in 78) |
| Lung & bronchus | Male | 0.1 (1 in 789) | 0.4 (1 in 229) | 1.3 (1 in 78) | 6.0 (1 in 17) | 6.8 (1 in 15) |
| | Female | 0.1 (1 in 823) | 0.3 (1 in 318) | 0.8 (1 in 128) | 3.6 (1 in 28) | 4.4 (1 in 23) |
| Prostate | Male | 0.1 (1 in 1,086) | 0.8 (1 in 122) | 3.0 (1 in 33) | 7.0 (1 in 14) | 9.4 (1 in 11) |
| Stomach | Male | 0.1 (1 in 1,411) | 0.2 (1 in 640) | 0.4 (1 in 273) | 1.8 (1 in 57) | 2.1 (1 in 49) |
| | Female | 0.1 (1 in 1,500) | 0.1 (1 in 1,155) | 0.2 (1 in 491) | 1.2 (1 in 84) | 1.4 (1 in 70) |
| Thyroid | Male | 0.2 (1 in 605) | 0.1 (1 in 878) | 0.2 (1 in 683) | 0.2 (1 in 420) | 0.6 (1 in 163) |
| | Female | 0.7 (1 in 136) | 0.3 (1 in 291) | 0.3 (1 in 302) | 0.5 (1 in 209) | 1.8 (1 in 55) |
| Uterine cervix | Female | 0.2 (1 in 537) | 0.1 (1 in 917) | 0.1 (1 in 901) | 0.3 (1 in 372) | 0.6 (1 in 156) |

AANHPI = Asian American, Native Hawaiian, and Pacific Islander. *For those free of cancer at beginning of each age interval. †All sites excludes basal and squamous cell skin cancers and in situ cancers except urinary bladder.

**Source:** DevCan: Probability of Developing or Dying of Cancer Software, Version 6.7.3. Statistical Research and Applications Branch, National Cancer Institute, 2015. http://surveillance.cancer.gov/devcan.

American Cancer Society, Inc., Surveillance Research, 2016

**Figure S3. Rate Ratios Comparing AANHPIs (numerator) with NHWs (denominator), 2008-2012**




AANHPI = Asian American, Native Hawaiian, and Pacific Islander.
NHW = Non-Hispanic white. *Includes intrahepatic bile duct.

**Sources:** Incidence– NAACCR, 2015. Mortality– National Center for Health Statistics, Centers for Disease Control and Prevention, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

From 2003 to 2012, colorectal cancer incidence rates decreased by 2.6% annually among AANHPI males and females, slightly lower than declines of 3.8% and 3.2% among NHW males and females, respectively (Figure S7, page 33).[9] Mortality rates declined during this time period in AANHPIs by 1.1% and 1.3% annually in men and women, respectively.[10] Long-term declines in incidence and death rates are attributed to changing patterns in risk factors, the uptake of screening, and improved treatments.[34, 35] However, the aggregation of AANHPIs likely masks differences in trends by subgroup. For example, a California study documented increasing colorectal cancer incidence rates in Koreans, Filipinos, and South Asians between 1988 and 2007.[36]

AANHPIs have slightly higher 5-year colorectal cancer-specific survival rates than NHWs (Figure S6, page 33). However, one study found differences in outcomes between subgroups, with the highest survival among Japanese and Asian Indians/Pakistanis, while rates in other groups were similar to those in NHWs.[32] Another study found that the survival advantage among Japanese was primarily due to sociodemographic factors, but also reflected specific disease characteristics.[37]

### Prostate

Prostate cancer is the most commonly diagnosed cancer and the fifth-leading cause of cancer death among AANHPI men, with 4,550 new cases and 520 deaths estimated in 2016 (Figure S2, page 29). Incidence and mortality rates are 50% lower in AANHPIs than in NHWs (Figure S3). However, incidence rates vary by three-fold among subgroups, with rates of about 30 per 100,000 among Cambodians and Laotians compared to 100 or more among Japanese, Filipinos, Native Hawaiians, and Samoans (Figure S4).

Prostate cancer incidence rates peaked among AANHPIs in the early 1990s, followed by a steady decline (Figure S7, page 33). This peak is largely due to the rapid uptake of prostate-specific antigen (PSA) testing.[38] Prostate cancer death rates have been generally declining among AANHPIs since 1993 (Figure S9, page 35), similar to NHWs. These declines are attributed to early detection and improvements in treatment, although the relative contribution of each is debated.[39, 40]

NHW men are more likely to be diagnosed with prostate cancer at the localized stage than AANHPI men (79% versus 74%; Figure S8, page 34), but 5-year cause-specific survival is roughly the same in both groups (Figure S6 page 33).

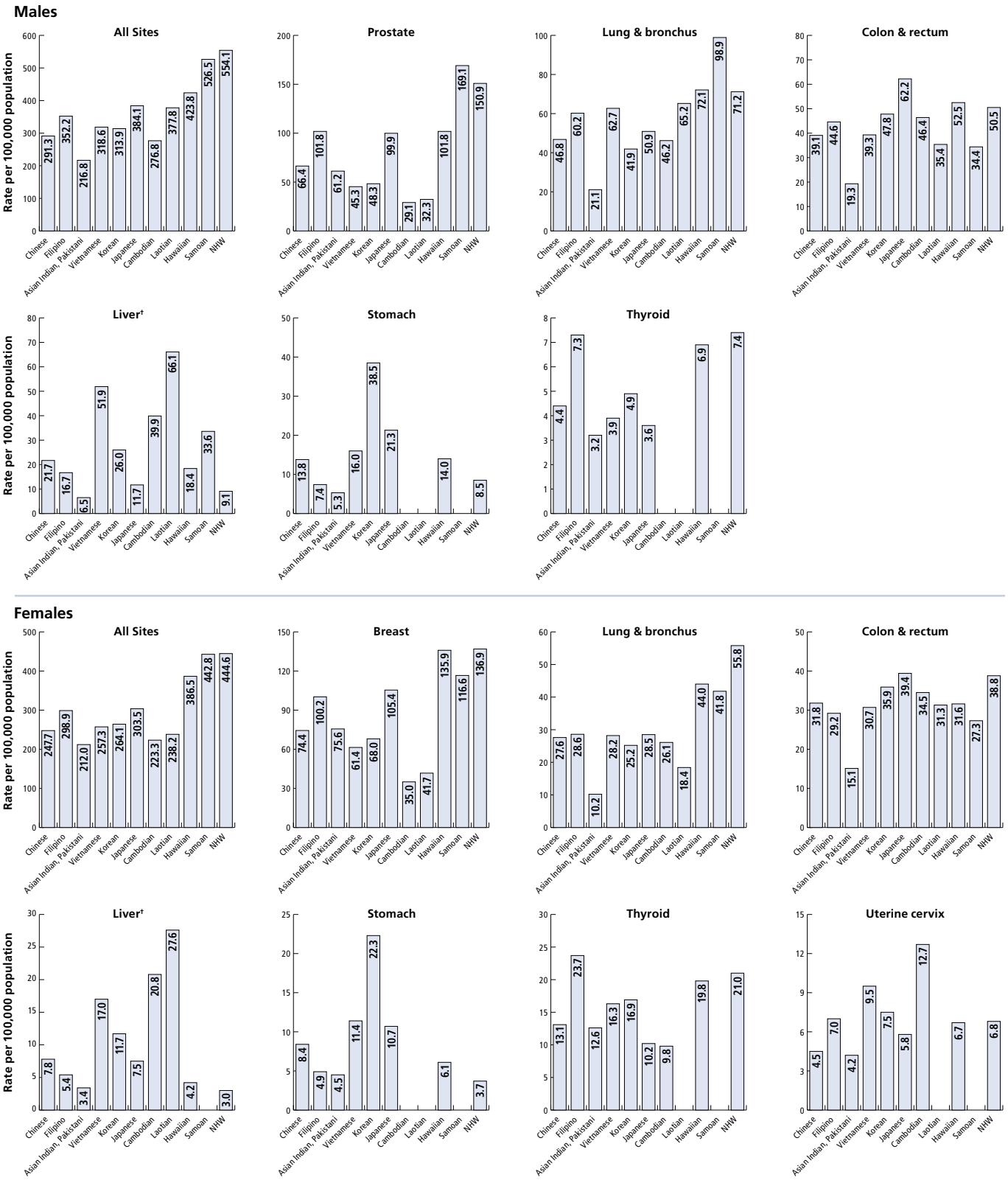
## Cancer sites with higher rates among AANHPIs

While AANHPIs generally have lower cancer rates than NHWs overall and for the most common cancers, they are at higher risk for stomach, liver, cervical (some subgroups), and nasopharyngeal cancers, which are associated with infections. The percentage of cancers attributable to infection in Asia ranges from 17% in central Asia to 26% in China, compared to 4% in North America.[41] The risk of infection-related cancers among AANHPIs in the US is particularly high among first-generation immigrants.[42] In addition to infection-related cancers, some AANHPI subgroups have a higher risk of thyroid cancer.

### Stomach

Stomach cancer incidence and death rates are about twice as high in AANHPIs as in NHWs (Figure S3). Among AANHPIs, an estimated 980 men and 820 women will be diagnosed with stomach cancer in 2016 (Figure S2, page 29). Incidence is particularly high among Koreans, with rates of 38.5 per 100,000 among males and 22.3 among females, roughly twice as high as those among Japanese, who have the second highest rates (Figure S4). Stomach cancer rates in Korea are the highest in the world for both males and females.[14]

## Figure S4. Cancer Incidence Rates* by Sex and AANHPI Subgroup, 2006-2010




AANHPI = Asian American, Native Hawaiian, and Pacific Islander. NHW = Non-Hispanic white. Rates are age adjusted to the 2000 US standard population. *Rates based on <25 cases are omitted. †Includes intrahepatic bile duct. Please note that cancer sites are presented on different scales.

**Source:** Surveillance, Epidemiology, and End Results (SEER) Program, SEER 11 registries plus Greater California and New Jersey, National Cancer Institute, 2013.

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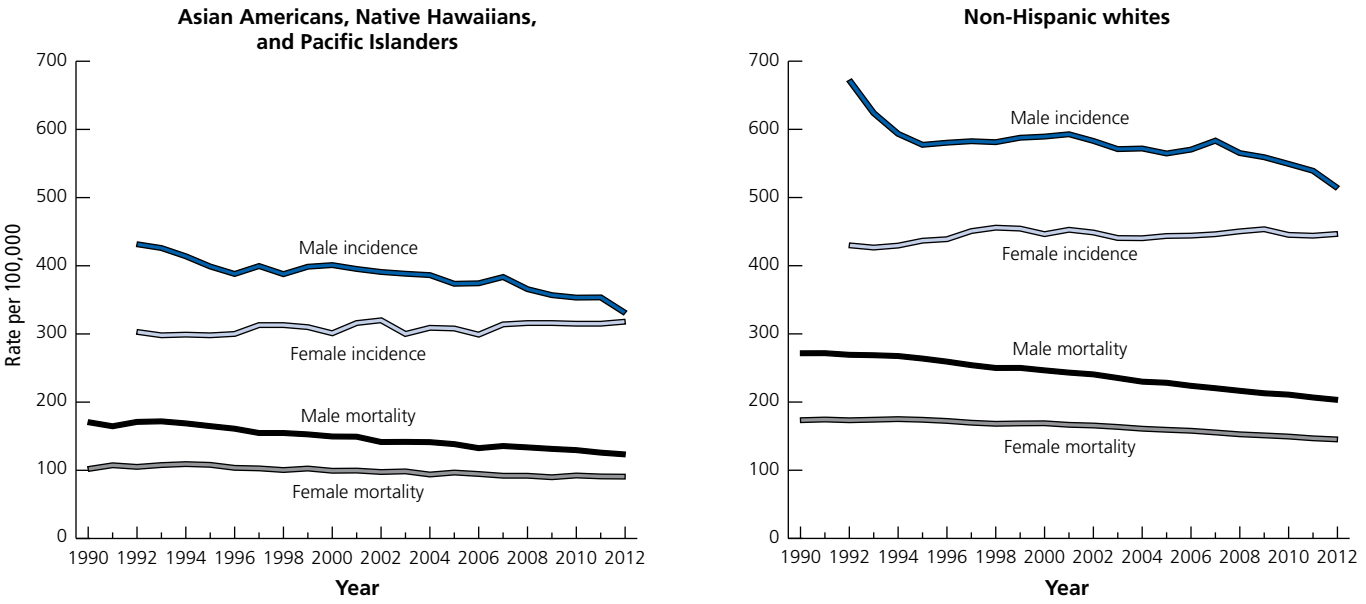
**Figure S5. Trends in Incidence and Mortality Rates for All Cancers Combined among NHWs and AANHPIs, 1990-2012**




AANHPI = Asian American, Native Hawaiian, and Pacific Islander. NHW = Non-Hispanic white. Rates are age adjusted to the 2000 US standard population.

**Sources:** Incidence- Surveillance, Epidemiology, and End Results (SEER) Program, SEER 13 registries, National Cancer Institute, 2015. Mortality- US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

The bacterium *Helicobacter pylori (H. pylori)* is the strongest risk factor for stomach cancer, accounting for the majority of cases worldwide.[43, 44] Other risk factors are thought to include dietary patterns, food storage and preservation practices, and low consumption of fresh produce.[45] Stomach cancer rates have been declining in the US since the early 20th century, and have also been declining more recently in Asian countries with historically high rates, such as Japan, Korea, and China.[46] These declines are thought to be due to improved availability of fresh fruits and vegetables, lower consumption of salt-preserved foods, and reduced prevalence of *H. pylori* infection through improved sanitation and antibiotic treatment.[47] Decreases in smoking may have also contributed to the declines.[48] Stomach cancer rates have been steadily declining among AANHPIs (Figure S7, and Figure S9, page 35), with annual decreases during 2003 to 2012 of about 3% to 4% for both incidence and mortality.[9, 10]

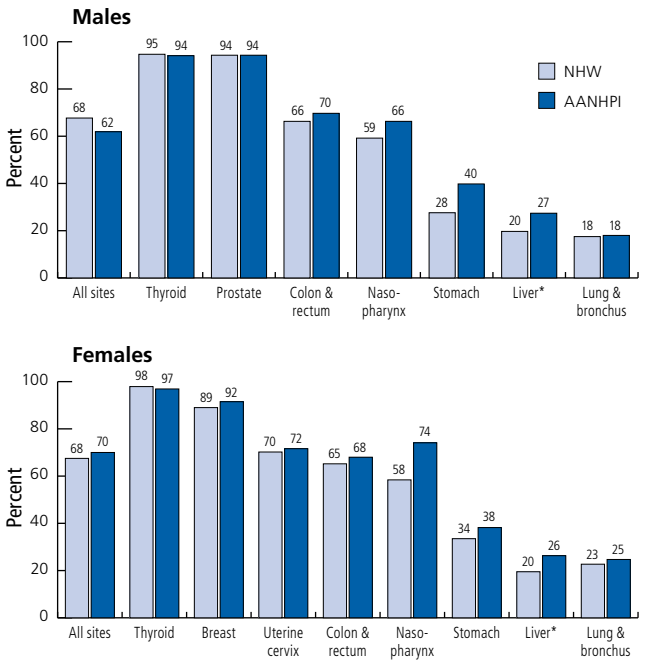
AANHPIs are more likely than NHWs to be diagnosed with stomach cancer at a localized or regional stage (Figure S8, page 34), possibly because of awareness of the higher risk among Asian Americans and/or recommendations by some medical societies for screening among Asian immigrants.[49] Likely due to earlier diagnosis, AANHPIs have higher 5-year survival than NHWs, 40% versus 28% in males and 38% versus 34% in females (Figure S6).

## Liver

Liver cancer is one of the most fatal cancers, and incidence and death rates among AANHPIs are about twice as high as those in NHWs (Figure S3, page 30). Among AANHPIs, an estimated 1,760 men and 830 women will be diagnosed with liver cancer in 2016 (Figure S2, page 29). It is the second-leading cause of cancer death among AANHPI men and the fifth-leading cause of cancer death among AANHPI women. Liver cancer rates are particularly elevated in Laotians, Vietnamese, and Cambodians, likely due to a high prevalence of hepatitis B virus (HBV) infection in their country of origin and more recent immigration (Figure S4, page 31).[28, 50]

Chronic infection with HBV or hepatitis C virus (HCV) is the strongest risk factor for hepatocellular carcinoma, the most common type of liver cancer.[51] Other risk factors in Asian and Pacific Island nations include certain toxins and parasitic infections.[52] Risk factors more common in developed countries include obesity, diabetes, alcoholic liver disease, and tobacco smoking. Risk factor prevalence varies both between and within AANHPI subgroups. For example, a study of Asian immigrants in New York City found that those born in Fujian Province, China, were more likely to have HBV infection than those born in other Chinese provinces.[53]

## Figure S6. Five-year Cause-specific Survival (%) by Sex and Site for AANHPIs and NHWs, 2005-2011




AANHPI = Asian American, Native Hawaiian, and Pacific Islander. NHW = Non-Hispanic white. *Includes intrahepatic bile duct.

**Source:** Surveillance, Epidemiology, and End Results (SEER) Program, SEER 18 registries, National Cancer Institute, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

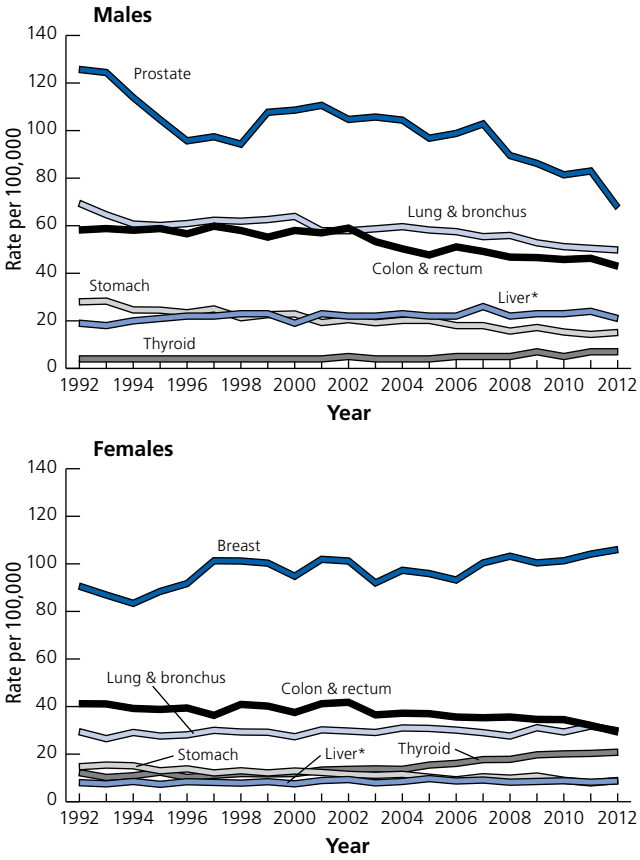
Liver cancer is one of the few cancers for which incidence and mortality trends differ in AANHPIs and NHWs. While it is among the most rapidly increasing cancers among NHWs, incidence rates among both male and female AANHPIs have been stable since the early 1990s (Figure S7).[19] Moreover, death rates increased among NHWs by 2.9% and 2.1% per year in men and women, respectively, from 2003 to 2012, in contrast to downward trends among AANHPI men (0.9% annually) and stable trends in AANHPI women.[10] The increasing rates among NHWs are thought to be due to increased prevalence of chronic infection with HCV as a result of exposure to contaminated blood or medical equipment and injection drug use during the 1960s and 1970s, and possibly increases in obesity and type 2 diabetes more recently.[54] Cultural awareness of HBV screening and treatment among AANHPIs, who have historically had the highest liver cancer rates in the US, may be driving the declining mortality rates.[54]

AANHPIs are more likely than NHWs to be diagnosed with liver cancer at a localized stage (46% versus 42%; Figure S8, page 34) and also have higher five-year survival rates (Figure S6). Better survival among AANHPIs may be due to earlier stage at diagnosis, differences in receipt of treatment, and/or other underlying risk factors, such as cirrhosis.[55,56]

## Thyroid

Thyroid cancer is estimated to be the second most frequently diagnosed cancer among AANHPI females in 2016, with 3,320 new cases diagnosed (Figure S2, page 29). However, it is not a leading cause of cancer death because survival is very high (Figure S6). The high ranking of thyroid cancer among AANHPIs is driven by elevated rates among Filipinos, the second largest AANHPI population, and the relatively low rates of most other cancers. Incidence rates per 100,000 among Filipino women are 23.7 compared with 21.0 among NHW women (Figure S4, page 31). Thyroid cancer incidence rates in AANHPIs as a group are slightly lower than those in NHWs, although mortality rates are slightly higher among females, 0.8 per 100,000 versus 0.5 (Figure S3, page 30). AANHPIs are less likely than NHWs to be diagnosed with thyroid cancer at a localized stage, 60% versus 69% (Figure S8, page 34), despite a similar 5-year survival rate of about 95% (Figure S6). The reasons for the elevated rates in Filipinos are not well understood, but are thought to include dietary or environmental factors.[57]

## Figure S7. Trends in Cancer Incidence Rates among AANHPIs by Site and Sex, 1992-2012

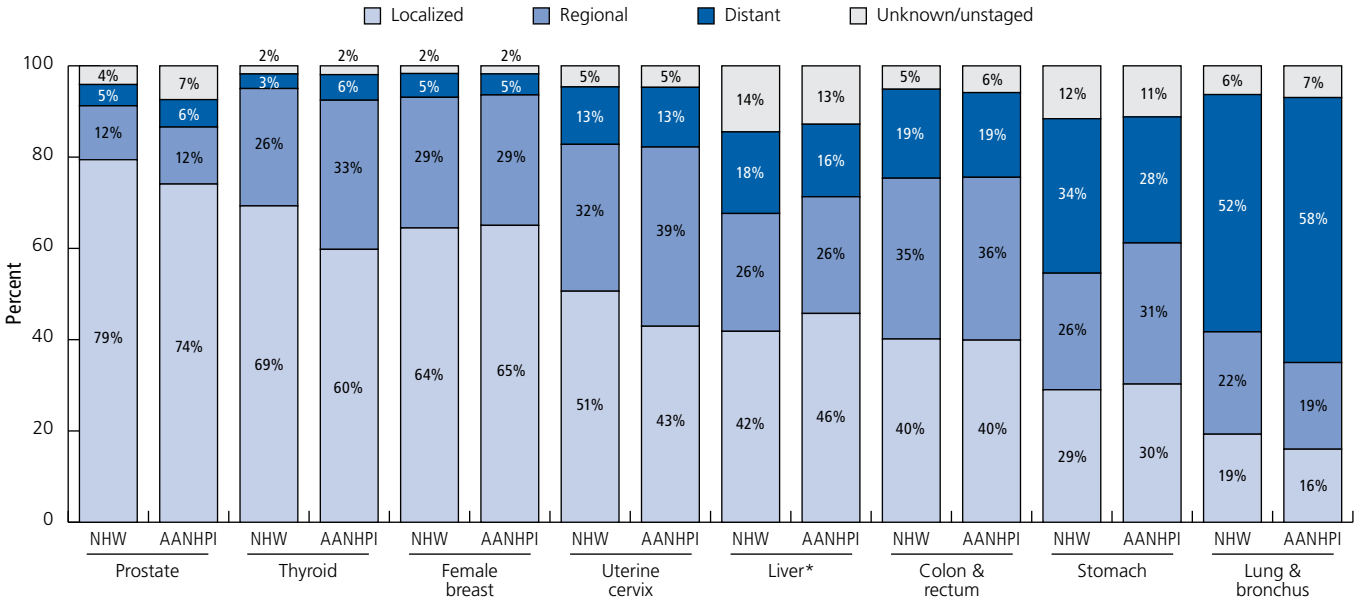



Rates are age adjusted to the 2000 US standard population. *Includes intrahepatic bile duct.

**Source:** Surveillance, Epidemiology, and End Results (SEER) Program, SEER 13 registries, National Cancer Institute, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

## Figure S8. Age-adjusted Stage Distribution for Selected Cancers among AANHPIs and NHWs, 2008-2012




AANHPI = Asian Americans, Native Hawaiians, and Pacific Islanders. NHW = Non-Hispanic whites. Based on rates age adjusted to the 2000 US standard population.
*Includes intrahepatic bile duct.

**Source:** Surveillance, Epidemiology, and End Results (SEER) Program, SEER 18 registries, National Cancer Institute, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

Thyroid cancer incidence rates have been increasing by more than 5% annually over the past 10 years of data among both AANHPIs and NHWs (Figure S7, page 33).[9] The increasing incidence is thought to be partially due to increased detection because of more sensitive diagnostic procedures and increased use of imaging, although incidental detection of thyroid tumors is unlikely to completely account for these trends.[58, 59] Increases across demographic and socioeconomic groups, as well as for larger and later-stage tumors, also implicate environmental factors.[60] Further research is needed to identify risk factors that may be causing these trends.

## Uterine cervix

Cervical cancer incidence rates are higher in several AANHPI subgroups than in NHWs (Figure S4, page 31), despite being lower overall (Figure S3, page 30). Incidence rates (per 100,000) are twice as high in Cambodians (12.7) as in NHWs (6.8), and 40% higher among Vietnamese women (9.5). In contrast, rates among Chinese (4.5) and Asian Indian/Pakistani (4.2) women are lower than those in NHWs.

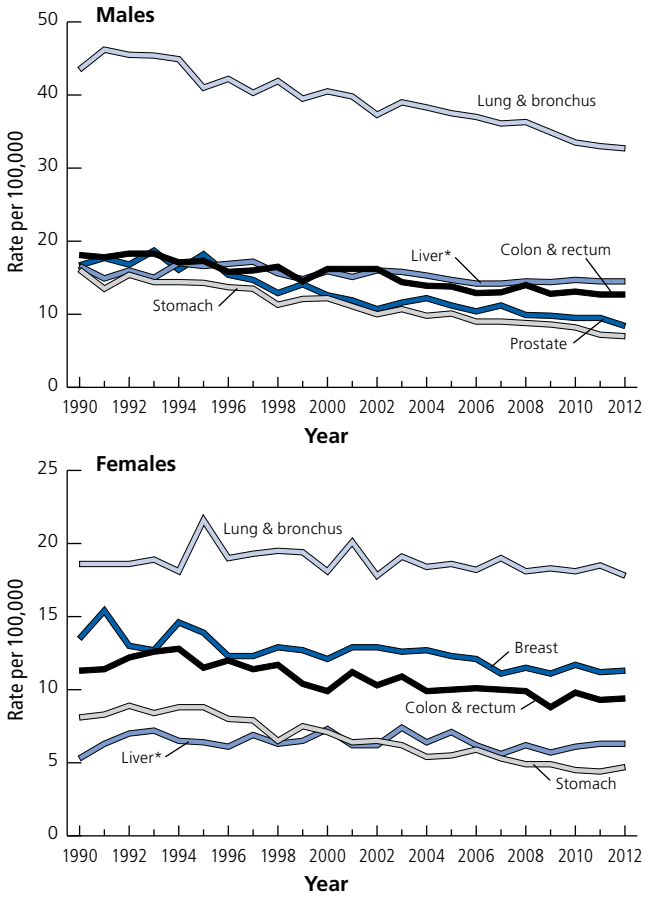
Contemporary disparities in cervical cancer incidence worldwide are attributable to differences in the prevalence of both human papillomavirus (HPV) infection, the cause of cervical cancer, and screening.[61-64] The Pap test has historically been the mainstay for screening in the US and can detect precancerous lesions of the cervix that can be treated to prevent cancer. The rapid declines in cervical cancer occurrence in the US over the second half of the 20th century, including those since 1990 among Vietnamese, Cambodian, and Laotian women, are attributed primarily to increased screening.[65]

Incidence and death rates among AANHPIs decreased by about 3% annually during the past 10 years of data, while incidence rates decreased slightly and mortality rates remained stable in NHW women.[9, 10] AANHPI women are less likely than NHW women to be diagnosed with cervical cancer at a localized stage (43% versus 51%), although five-year survival is about 70% for both groups (Figures S6, page 33, and S8).

## Nasopharynx

Nasopharyngeal carcinoma, which is the dominant form of nasopharyngeal cancer, is rare worldwide, although it has elevated incidence in certain regions and populations, including southern China and southeastern Asia.[47] (The nasopharynx is the upper part of the throat, behind the nose.) Incidence rates among AANHPIs overall are about 5 to 6 times higher than among NHWs (Figure S3, page 30), and are particularly elevated for men in certain subpopulations, including Chinese, Samoans, Guamanians/Chamorros, and Hmong.[66-69] Nasopharyngeal carcinoma is thought to be caused by a combination of viral, environmental, and genetic factors.[70] It has been estimated that about 98% of nasopharyngeal carcinoma cases worldwide are related to infection with Epstein-Barr virus (EBV),[47] although only a small fraction of people who are infected with EBV develop the disease. Other environmental risk factors include

**Figure S9. Trends in Cancer Mortality Rates among AANHPIs by Site and Sex, 1990-2012**




Rates are age adjusted to the 2000 US standard population. *Includes intrahepatic bile duct.

**Source:** US Mortality Data, National Center for Health Statistics, Centers for Disease Control and Prevention, 2015.

American Cancer Society, Inc., Surveillance Research, 2016

smoking, alcohol consumption, occupational exposures, and certain preserved foods.[71] Cantonese salted fish, which is high in nitrosamines, was identified as a risk factor for nasopharyngeal carcinoma among southern Chinese in the 1970s,[72] leading to its designation by the International Agency for Research on Cancer as a carcinogen.[73]

Incidence and mortality rates for nasopharyngeal carcinoma in AANHPIs declined by about 2% to 3% annually from 2003 to 2012.[9, 10] Rates have also been declining among some high-risk populations in Asia, possibly due to decreased smoking or consumption of salted fish.[74, 75] The recent declines among AANHPIs are not well understood, but may be attributable to dietary factors and decreased smoking.[74] Five-year cause-specific survival is higher for AANHPIs than NHWs (males 66% versus 59%; females 74% versus 58%; Figure S6, page 33) for reasons that are unknown, but may include lower prevalence of other health conditions and/or less complete follow-up of AANHPI patients after diagnosis.[11, 76]

# Prevalence of cancer risk factors

A large proportion of cancers are caused by known risk factors, such as tobacco use, excess body weight, and certain infectious agents.[77, 78] Prevalence of these risk factors within the AANHPI population sheds light on the unique cancer burden in this group as a whole, as well as differences between subgroups.

## Tobacco

Smoking among AANHPIs varies by sex, nativity, acculturation, and ethnicity. Overall, 10% of Asian Americans smoked in 2014, compared with 19% of NHWs (Table S4, page 36). National smoking estimates are not available for NHPIs. In Hawaii, where 55% of US Native Hawaiians reside, 27% of Native Hawaiians report being current smokers.[79] While similar percentages of NHW men (20%) and women (18%) are current smokers, Asian American men (14%) are more than twice as likely to smoke as Asian American women (6%). However, while US-born and foreign-born Asian American men are equally likely to be current smokers, among women, the US-born are five times more likely to smoke – 16% versus 3% of the foreign-born. These sex differences reflect smoking norms in home countries, where smoking is more accepted among men than women, and acculturation in the US.[5] Among the three largest Asian American ethnic groups, current smoking is more common among Filipinos (12%) than Chinese (7%) or Asian Indians (6%) (Table S4, page 36). A study of Asians in New York found smoking rates as high as 36% in Korean men.[80] Notably, while current smoking among NHWs is most common among those with lower income and/or less education and the same is true for Asian American men, the reverse is true for Asian American women.[81]

Smoking prevalence in Asian American men decreased from 25% in 1990-1992 to 14% in 2014, while in women, it has remained stable at 6% (Figure S10, page 37). However, national trends do not necessarily reflect those among specific groups or localities. For instance, there was no decline in smoking among Asian males in New York City from 2002 to 2010.[82]

## Overweight/obesity

Excess body weight increases the risk of several cancers, and also contributes to the development of other cancer risk factors, such as nonalcoholic fatty liver disease and type 2 diabetes. Worldwide, normal weight is defined as a body mass index (BMI, kg/m$^2$) of 18.5-24.9, while overweight is 25-29.9 and obese is ≥30. However, it has been shown that Asians have a higher percentage of body fat than whites at the same BMI, as well as a higher risk for type 2 diabetes at a lower BMI.[83] As a result, lower BMI cutpoints established by the American Diabetes Association are used for assessing diabetes risk in Asian Americans.[84, 85] Diabetes is a risk factor for several cancers, including breast, liver, pancreatic, and colorectal.[86] While some studies report elevated cancer risk at a lower BMI among Asians compared with other populations, especially for colon cancer,[87, 88] others do not.[89, 90]

## Table S4. Prevalence of Cancer Risk Factors and Health Care Access by Sex and Asian Subgroup, US, 2014

| | Asian | | | | | | | | | Asian subgroups* | | | | | | | | | Non-Hispanic white | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | | Male | | | Female | | | Asian Indian | | | Chinese | | | Filipino | | | | | |
| | US born | Foreign born | All | US born | Foreign born | All | US born | Foreign born | All | Male | Female | All | Male | Female | All | Male | Female | All | Male | Female | All |
| **Cancer risk factors** | | | | | | | | | | | | | | | | | | | | | |
| Smoking (18+ years) | | | | | | | | | | | | | | | | | | | | | |
| Current smoker | 14.5 | 8.4 | 9.5 | 14.0 | 14.1 | 13.7 | 15.6 | 3.3 | 5.7 | 8.8 | § | 5.6 | 12.2 | § | 6.8 | 15.3 | 10.0 | 12.1 | 20.2 | 18.4 | 19.3 |
| Former smoker | 16.3 | 11.3 | 12.2 | 18.2 | 18.3 | 18.3 | 14.3 | 5.5 | 7.0 | 13.5 | § | 8.0 | 12.5 | 4.5 | 8.0 | 28.2 | 11.3 | 18.6 | 27.0 | 21.2 | 23.9 |
| Never smoker | 69.2 | 80.3 | 78.4 | 67.7 | 67.5 | 67.9 | 70.1 | 91.2 | 87.3 | 77.8 | 95.9 | 86.4 | 75.3 | 92.7 | 85.1 | 56.6 | 78.7 | 69.2 | 52.8 | 60.5 | 56.8 |
| Alcohol† (18+ years) | | | | | | | | | | | | | | | | | | | | | |
| Moderate | 15.6 | 7.3 | 8.9 | 20.6 | 12.0 | 13.7 | 10.4 | 3.3 | 4.8 | 10.1 | § | 6.0 | 6.1 | 5.5 | 5.7 | 16.4 | 4.7 | 9.8 | 25.6 | 11.5 | 18.3 |
| Heavy | § | 1.0 | 1.3 | § | § | § | § | § | 1.5 | § | § | 1.3 | 0.7 | § | § | § | 3.6 | 2.9 | 6.5 | 6.4 | 6.5 |
| Body weight* (20+ years) | | | | | | | | | | | | | | | | | | | | | |
| Overweight/obese (BMI ≥25 kg/m$^2$) | – | – | 41.7 | – | – | 50.2 | – | – | 34.5 | – | – | – | – | – | – | – | – | – | 74.6 | 64.2 | 69.3 |
| Overweight (BMI = 25-29.9) | – | – | 29.1 | – | – | 37.6 | – | – | 22.1 | – | – | – | – | – | – | – | – | – | 39.9 | 26.0 | 32.9 |
| Obese (BMI ≥ 30) | – | – | 12.6 | – | – | 12.6 | – | – | 12.4 | – | – | – | – | – | – | – | – | – | 34.7 | 38.2 | 36.4 |
| Physical activity‡ (18+ years) | | | | | | | | | | | | | | | | | | | | | |
| No leisure time physical activity | 25.9 | 28.8 | 28.8 | 22.8 | 24.6 | 25.5 | 29.0 | 32.7 | 31.7 | 24.9 | 30.9 | 27.9 | 23.3 | 27.2 | 25.7 | 25.1 | 32.7 | 29.5 | 25.2 | 27.2 | 26.3 |
| Met recommended levels of aerobic activity | 51.6 | 47.7 | 48.1 | 58.2 | 53.9 | 54.3 | 45.4 | 42.3 | 42.8 | 58.3 | 40.6 | 49.8 | 55.3 | 47.4 | 51.0 | 53.2 | 44.6 | 48.3 | 55.7 | 51.3 | 53.4 |
| **Health care access (18-64 years)** | | | | | | | | | | | | | | | | | | | | | |
| Uninsured | 9.4 | 15.5 | 13.1 | 11.0 | 17.2 | 14.6 | § | 13.8 | 11.7 | 10.8 | 11.3 | 11.0 | 12.2 | 11.2 | 11.7 | 18.2 | 13.2 | 15.3 | 12.9 | 10.2 | 11.5 |
| No regular source of medical care | 12.2 | 20.5 | 17.3 | 16.3 | 24.3 | 21.1 | § | 16.8 | 13.8 | 20.5 | 15.9 | 18.1 | 17.9 | 11.6 | 14.6 | 21.1 | 13.4 | 16.8 | 20.1 | 10.6 | 15.3 |

BMI = Body mass index. *Estimates from 2013-2014 data combined. †Moderate: 12+ drinks in lifetime and (male) 3-14 drinks/week in past year or (female) 3-7 drinks/week in past year. Heavy: 12+ drinks in lifetime and (male) >14 drinks/week in past year or (female) >7 drinks/week in past year. ‡Aerobic activity recommendations: includes 150 minutes of moderate intensity activity or 75 minutes of vigorous intensity activity each week. §Estimate not provided due to instability. Note: Percentages are age adjusted to the 2000 U.S. standard population.

**Sources:** All risk factors except BMI – National Center for Health Statistics. National Health Interview Survey, 2013 and 2014. Public-use data file. BMI – National Center for Health Statistics. National Health and Nutrition Examination Survey Data, 2013-14.

American Cancer Society, Inc., Surveillance Research, 2016

Three large pooled studies did not find Asians to be at higher risk for cancer death at a lower BMI.[91-93] Thus, evidence to date is inconclusive about whether cancer risk is increased in Asians at a lower BMI.

Asian Americans are much more likely to be a healthy weight than NHWs.[94] About 42% of Asian Americans are overweight or obese compared to 69% of NHWs (Table S4). In contrast, three-quarters of Native Hawaiians in Hawaii are overweight or obese.[79] Asian American men (50%) are more likely to be overweight or obese than Asian American women (35%). Excess body weight has increased among US-born Asian Americans, as well as recent and long-term immigrants. For instance, the prevalence of overweight among US-born Filipinos increased from 36% in 1992-1995 to 55% in 2003-2008.[95] Prevalence of overweight and obesity varies by Asian American subgroup; a study in California found that only 8% of South Asian and 9% of Chinese children were overweight, compared to 16% of Japanese and Korean children and 18% of Filipino children.[96]

## Alcohol

Alcohol consumption is associated with increased risk of several cancers, and it also may interact with HBV and HCV to further promote the development of liver cancer.[97] This is of special concern among Asian Americans, who bear a disproportionate burden of HBV infection. Asian Americans are half as likely as NHWs to be moderate drinkers; however, prevalence among US-born Asian Americans (16%) approaches that of NHWs (18%) (Table S4).

## Infectious agents

### *H. pylori*

Chronic infection with *H. pylori* is highly endemic in Asia and prevalence patterns mirror gastric cancer risk.[98] *H. pylori* seroprevalence is close to 60% in China and Korea,[98] whereas it is about 30% in the United States, where *H. pylori* infection has been declining since the late 19th century.[99, 100] Although the spread of *H. pylori* is not well understood, infection occurs primarily during childhood and risk is higher in lower socioeconomic groups.[100] Among Japanese immigrants to the US in the 1970s and 1980s,

the risk of stomach cancer was shown to be lower than Japanese living in Japan, and risk was even lower among Japanese born in the US.[101] Preliminary studies in Asia have shown that eradication of *H. pylori* infection with antibiotics can reduce the risk of stomach cancer.[102]

### HBV and HCV

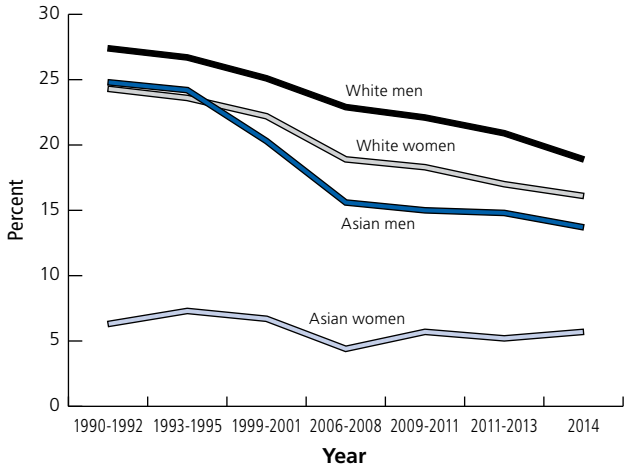
HBV infection is highly endemic in Asia.[103] As a result, Laos, Vietnam, Korea, and China have among the highest liver cancer incidence in the world.[14] Nearly 70% of AANHPIs living in the US were born or have parents who were born in a country where HBV is highly prevalent.[104] AANHPIs account for more than 50% of those infected with HBV in the United States, although most who harbor the virus are unaware.[104] The HBV vaccine was introduced in the early 1980s and has resulted in dramatic declines in liver cancer incidence among vaccinated cohorts in Taiwan.[105] HBV vaccination in the US among AANHPI teens (86%) is slightly lower than other racial/ethnic groups, which all have HBV vaccination coverage above 90%.[106] The United States Preventive Services Task Force (USPSTF) recommends screening all those born in regions with a prevalence of HBV infection ≥2%, which includes all countries of Asia and the Pacific Islands except Australia and New Zealand.[107] Among adults 18 years of age and older, about 28% of both Asian Americans and NHWs had received a hepatitis B test (Table S5, page 38).

While HBV is the leading liver cancer risk factor among Asian Americans in the US, HCV is also an important risk factor, especially in some groups.[108-110] For example, HCV is more common than HBV in Japan, where about 65% of liver cancers are estimated to be attributable to HCV;[111] however, HCV prevalence there has been decreasing due to public health programs.[112] HCV is also more prevalent in Pakistan and among older adults in Taiwan.[108] The USPSTF also recommends HCV screening for all adults born between 1945 and 1965, who account for three-quarters of HCV-infected individuals and HCV-related deaths in the United States.[113] HCV testing coverage in this cohort is 13% among NHWs and 10% among Asian Americans (Table S5, page 38). Through testing, HBV and HCV can be detected and treated, reducing the risk of liver cancer.[114]

### HPV

HPV causes nearly all cervical cancers in the US, as well as many oropharyngeal and anogenital cancers.[115] A clinic-based study in 2003-2005 found that 17% of AANHPI women had a high-risk HPV infection (the type most likely to cause cancer), compared with 23% of white women.[116] More recent HPV prevalence data are not available for AANHPI in the US. Worldwide, it is estimated that 5% of women in North America are infected with any type of HPV, compared with 11% of women in Eastern Asia, 7% in Southern Asia, and 14% in Southeastern Asia.[61] Vaccines to prevent infection with the most common cancer-causing types of HPV have been available since 2006 and are recommended for boys and girls at 11 to 12 years of age. Among Asian American girls 13-17 years of age, 36% received the three recommended doses and 72% of those who received the first dose completed all three doses, similar to uptake among NHWs (Table S5, page 38). HPV vaccination uptake in Asian American boys is higher than in NHWs, with 27% receiving the three recommended doses (compared with 19% in NHW boys) and 63% completion (compared with 58% in NHW boys) (Table S5, page 38). HPV vaccine uptake is influenced by caregiver awareness and varies by local context; in a study in Los Angeles, California, only 64% and 44% of Chinese and Korean mothers, respectively, with age-eligible daughters were aware of the vaccine.[117]

**Figure S10. Trends in Current Smoking* among Asian American Adults (18 Years and Older), 1990-2014**




*Estimates are age adjusted to the 2000 US standard population.

**Source:** 1990-2013: Health, United States, 2014: With Special Feature on Adults Aged 55-64.[6] 2014: Centers for Disease Control and Prevention. National Health Interview Survey, 2014. Public-use data file.

American Cancer Society, Inc., Surveillance Research, 2016

## Prevalence of cancer screening

Cervical and colorectal screening can detect and remove precancerous lesions, thus preventing the development of cancer. In addition, screening for colorectal, cervical, and breast cancer can detect cancers at an earlier stage when more treatment options are available. Please see page 66 for screening recommendations for people at average cancer risk.

Asian Americans are less likely than NHWs to be current for cervical and colorectal cancer screening, but have similar rates of breast cancer screening (Table S5). Seventy-one percent of Asian American women overall (21-65 years of age) reported having a Pap test within the past 3 years, compared with 83% of NHWs. However, prevalence varies widely by subgroup and in Filipinas is equal to that in NHWs. Slightly more than two-thirds of Asian American (68%) and NHW (69%) women 45 years of age or older

## Table S5. Cancer Screening Test Use (%), Vaccination Coverage (%), and Hepatitis Testing (%) by Asian Subgroup, US, 2013-2014

| | Asian* | | Asian Indian* | Chinese* | Filipino* | NHW | |
|---|---|---|---|---|---|---|---|
| | All | Uninsured | All | All | All | All | Uninsured |
| **Cervical cancer screening (women 21-65 years)†** | | | | | | | |
| Pap test within past 3 years | 70.9 | 54.9 | 69.6 | 65.8 | 83.0 | 82.8 | 57.3 |
| **Breast cancer screening (women 45+ years)** | | | | | | | |
| Mammogram within past 2 years | 67.7 | 51.7 | 64.0 | 65.6 | 67.8 | 68.9 | 39.8 |
| **Colorectal cancer screening (50+ years)** | | | | | | | |
| **Endoscopy/FOBT‡** | | | | | | | |
| Total | 52.3 | ‡‡ | 53.6 | 53.6 | 58.9 | 60.5 | 29.8 |
| Men | 59.0 | ‡‡ | ‡‡ | 55.3 | 72.4 | 60.4 | 21.3 |
| Women | 46.6 | 14.9 | ‡‡ | 52.3 | 46.6 | 60.8 | 36.6 |
| **FOBT (past year)** | | | | | | | |
| Total | 10.7 | ‡‡ | ‡‡ | 15.0 | 11.3 | 7.4 | 2.2 |
| Men | 9.7 | ‡‡ | ‡‡ | ‡‡ | ‡‡ | 7.6 | 2.1 |
| Women | 11.5 | ‡‡ | ‡‡ | 13.5 | 14.0 | 7.2 | §§ |
| **Endoscopy§** | | | | | | | |
| Total | 47.9 | ‡‡ | 49.6 | 46.8 | 54.2 | 58.0 | 28.1 |
| Men | 54.6 | ‡‡ | ‡‡ | 47.6 | 66.8 | 57.8 | 19.8 |
| Women | 42.2 | ‡‡ | ‡‡ | 46.2 | 42.9 | 58.3 | 34.6 |
| **HPV vaccine utilization¶ (13-17 years)** | | | | | | | |
| **Girls** | | | | | | | |
| ≥1 dose | 54.9 | – | – | – | – | 56.1 | – |
| ≥3 doses | 35.7 | – | – | – | – | 37.5 | – |
| Completion rate# | 71.7 | – | – | – | – | 70.6 | – |
| **Boys** | | | | | | | |
| ≥1 dose | 45.8 | – | – | – | – | 36.4 | – |
| ≥3 doses | 26.6 | – | – | – | – | 18.8 | – |
| Completion rate# | 63.0 | – | – | – | – | 57.9 | – |
| **Hepatitis B testing** (18+ years)** | | | | | | | |
| Has received hepatitis B test | 28.6 | 26.2 | 25.4 | 31.6 | 30.0 | 28.1 | 26.8 |
| **Hepatitis C testing** (48-69 years)†† ** | | | | | | | |
| Has received hepatitis C test | 10.4 | ‡‡ | 7.6 | 11.3 | 13.8 | 12.6 | 12.4 |

NHW = Non-Hispanic white. *May be of any ethnicity. †Among women with an intact uterus. ‡Either a fecal occult blood test within the past year, sigmoidoscopy within the past five years, or a colonoscopy within the past 10 years. §Sigmoidoscopy in the past 5 years and/or colonoscopy in the past 10 years. ¶Percentages for all Asians exclude Hispanic ethnicity. Data are for 2014. #Percentage who completed the 3-dose vaccination series among those who had at least 1 dose. **Combined 2013 and 2014 NHIS data. ††The US Preventive Services Task Force recommends screening for adults born 1945-1965; these adults would be 48-69 years of age for the 2013-2014 available data. ‡‡Estimate not provided due to instability. Note: Percentages for cancer screening hepatitis testing are age adjusted to the 2000 U.S. standard population.

**Source:** Cancer screening – National Center for Health Statistics. National Health Interview Survey, 2013. Public-use data file. HPV vaccination – Reagan-Steiner S, et al.[111] Hepatitis testing – National Center for Health Statistics. National Health Interview Survey, 2013 and 2014. Public-use data file.

American Cancer Society, Inc., Surveillance Research, 2016

report having a mammogram within the past two years. Only about half of Asian Americans (52%) 50 years of age and older received recommended colorectal cancer screening, compared with 61% of NHWs. Notably, this disparity is almost entirely driven by the low screening rate among Asian American women. While endoscopy is generally the preferred screening test among both NHWs and Asian Americans, Asian Americans are more likely than NHWs to have had a fecal occult blood test (11% versus 7%) and less likely to have had endoscopy (48% versus 58%) (Table S5). A recent study reported that Native Hawaiians were more than 30% less likely to get a colonoscopy or mammogram compared to NHWs.[118]

Asian Americans of lower socioeconomic status are less likely to receive recommended cancer screening, often because of less access to health care.[119] Among Asian Americans, 13% of adults 18-64 years of age were uninsured in 2014, including 16% of those who were foreign-born, while 21% of men and 14% of women had no regular source of medical care (Table S4, page 36). Among Native Hawaiians in Hawaii, 8% were uninsured and 16% had no regular source of medical care.[79] Successful interventions to promote cancer screening among Asian Americans utilize lay health workers, one-on-one communications, translated materials, and approaches that not only involve Asian community members, but also health care providers.[120] Patient navigators in particular have been shown to improve the receipt of recommended screening and follow-up.[121]

# Additional Resources

## American Cancer Society

The American Cancer Society provides information and services for AANHPIs, including:

- Cancer information in Asian languages: **cancer.org/asianlanguagematerials**
- California Chinese Unit: **acsccu.org**
- New York and New Jersey Asian initiatives: **cancer.org/myacs/eastern/programsandservices/asian-initiatives**

## Asian American Network for Cancer Awareness, Research, and Training

**aancart.org**

The Asian American Network for Cancer Awareness, Research, and Training (AANCART) aims to to reduce cancer health disparities by conducting community-based participatory education, training, and research by, for, and with Asian American community.

## Asian and Pacific Islander National Cancer Survivors Network

**apiahf.org/programs/chronic-diseases/api-national-cancer-survivors-network**

The Asian and Pacific Islander National Cancer Survivors Network (APINCSN) links cancer survivors, their family members, health care providers, researchers, health advocates, community members, and organizations who are concerned about the issue of cancer and survivorship in Asian American, Native Hawaiian and Pacific Islander communities.

## Asian & Pacific Islander American Health Forum

**apiahf.org**

The Asian & Pacific Islander American Health Forum (APIAHF) works with communities to influence policy and strengthen their community-based organizations to achieve health equity for Asian Americans and NHPIs across the country.

## Tufts University Selected Patient Information Resources in Asian Languages:

**spiral.tufts.edu**

Tufts University Selected Patient Information Resources in Asian Languages (SPIRAL) is a web resource that connects people to authoritative health information in Asian languages that is freely available on the Internet.

## 'Imi Hale Native Hawaiian Cancer Network

**imihale.org**

'Imi Hale collaborates with key local, state, national and international partners to reduce cancer incidence and mortality among NHPIs by increasing access to prevention and healthcare; developing and conduct evidence-based intervention research; and training and developing researchers using community-based participatory research (CBPR) methods to reduce health disparities.

### Asian Pacific Islander Cancer Education Materials Tool

The Asian Pacific Islander Cancer Education Materials (APICEM) tool is a searchable web tool where users can access hundreds of patient-focused cancer education materials in 22 Asian and Pacific Islander languages along with their English translations. The tool was created to help clinicians provide information to their Asian and Pacific Islander patients and is continually updated by its contributors, which include cancer research organizations and AANHPI health advocacy and community organizations. APICEM is made possible through the cooperation of the American Cancer Society; the Asian American Network for Cancer Awareness, Research and Training; and the National Cancer Institute.

Visit **cancer.org/apicem** for more information.

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