



CALIFORNIA HEALTHCARE FOUNDATION



## Cancer Care Spending in California: What Medicare Data Say

Snapshot

August 2015

# Introduction

In California each year, nearly 135,000 people are diagnosed with cancer and almost 40,000 die from the disease. Despite these staggering numbers, little is known about how much is spent to treat cancer in the state.

This report provides Medicare spending estimates for the four cancers with the largest incidence in California: breast, prostate, lung, and colorectal cancer. Together these cancers account for half of all cancer diagnosed in the state and 40% of all deaths. This analysis focuses on the first year of diagnosis and the last year of life, periods where spending tends to be concentrated.

With this report, California health care leaders and policymakers are provided with a baseline of cancer care spending for Medicare fee-for-service patients in the state for the first time. At the same time, the report underscores the need for additional data linkages and access to data to gain a more complete understanding of the financial burden of all cancer care in this state. For example, researchers were unable to assess cancer care spending for the significant number of privately insured, non-Medicare patients in California due to the lack of available data.

## **Key findings in the *initial year following a cancer diagnosis*:**

- ▶ More was spent on cancers with the lowest survival rates.
- ▶ Late-stage diagnosis was associated with higher treatment costs.
- ▶ Medicare spending varied by race/ethnicity, with African Americans typically having the highest annual spending and Whites having the lowest.
- ▶ Medicare spending varied across California regions. Los Angeles County had the highest mean spending of all regions for all four cancers examined.

## **Key findings in the *last year of life*:**

- ▶ Average Medicare spending per person ranged from \$68,000 for breast cancer patients to \$82,000 for colorectal patients.
- ▶ Approximately half of Medicare spending occurred in the final three months before death.
- ▶ Spending was concentrated in the inpatient setting, with little spending on hospice care.

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## About the Data

Linking cancer registry databases (which provide data on stage of cancer at diagnosis) with claims databases (which contain payment information for treatments) allows for the estimation of spending on cancer treatment. *Cancer Spending in California: What Medicare Data Say* presents data from the National Cancer Institute's combination of Medicare claims data with California Cancer Registry (CCR-Medicare) data to yield state-level cancer care spending estimates for the Medicare fee-for-service (FFS) population.

### Other notes about the data:

- ▶ Only Medicare FFS patients were included in this analysis. Among Medicare enrollees in California diagnosed in 2007-2011 with one of the four cancers studied, approximately 53% are enrolled in a traditional fee-for-service plan. Medicare managed care patients were not included because managed care plans do not itemize health spending.
- ▶ Estimates for the privately insured, non-Medicare population, which accounts for about 40% of cancer care spending in the state, were also not included due to the lack of available data.\* Commercial health plan spending data do not contain detailed information about cancer type and stage, which is collected by the cancer registry. This underscores the need for future linkage efforts such as those recommended by a workgroup of experts convened by CHCF.†
- ▶ Medicare FFS beneficiaries of all ages were included. The vast majority (93%) of Medicare enrollees with the cancers studied were diagnosed at age 65 and older.
- ▶ Spending associated with long-term survivorship was not included. This research focused on the first year of diagnosis and the last year of life, periods of concentrated spending. The data for these two periods cannot be added together, however, as these periods may overlap.
- ▶ All figures reflect all health care costs, not just costs associated with cancer care.
- ▶ For last year of life spending, deaths can be from any cause, not just cancer.

For more details, see the Methodology section on page 28.

\*Jennifer Joynt, *One Million Lives: Cancer in California* (California HealthCare Foundation, June 2012), [www.chcf.org](http://www.chcf.org), analysis of the 2007-2008 Medical Expenditure Panel Survey data with state-level weights for California by Hao Yu, PhD.

†Robert A. Hiatt et al., *Fighting Cancer with Data: Enabling the California Cancer Registry to Measure and Improve Care* (California HealthCare Foundation, November 2014), [www.chcf.org](http://www.chcf.org).

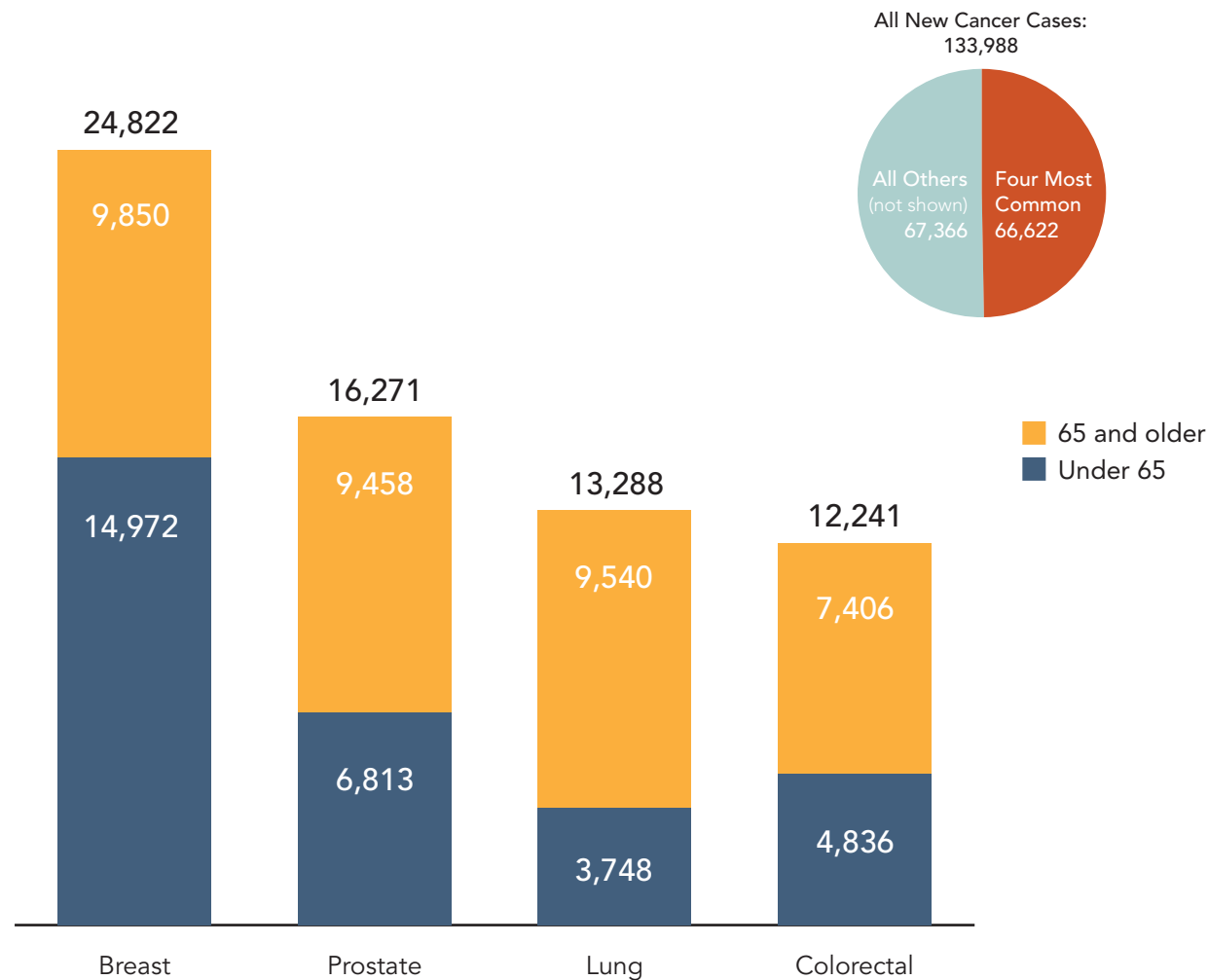
## Overview

This report uses the National Cancer Institute's linkage of Medicare data with data from the California Cancer Registry. Because CCR is one of the original SEER registries, Medicare spending estimates are available for the entire state. This data source was chosen because the majority of cancer patients are diagnosed at 65 and older. Also, in California, Medicare pays for approximately 40% of cancer care, and Medicare data, unlike data from other payers, are readily accessible.

# New Cancer Cases, by Cancer Site and Age Group

## All Payers, California, Dx 2007 to 2011

AVERAGE NUMBER OF NEW CASES DIAGNOSED PER YEAR



### Overview

Breast, lung, colorectal, and prostate cancers collectively account for half of all cancers diagnosed in Californians.

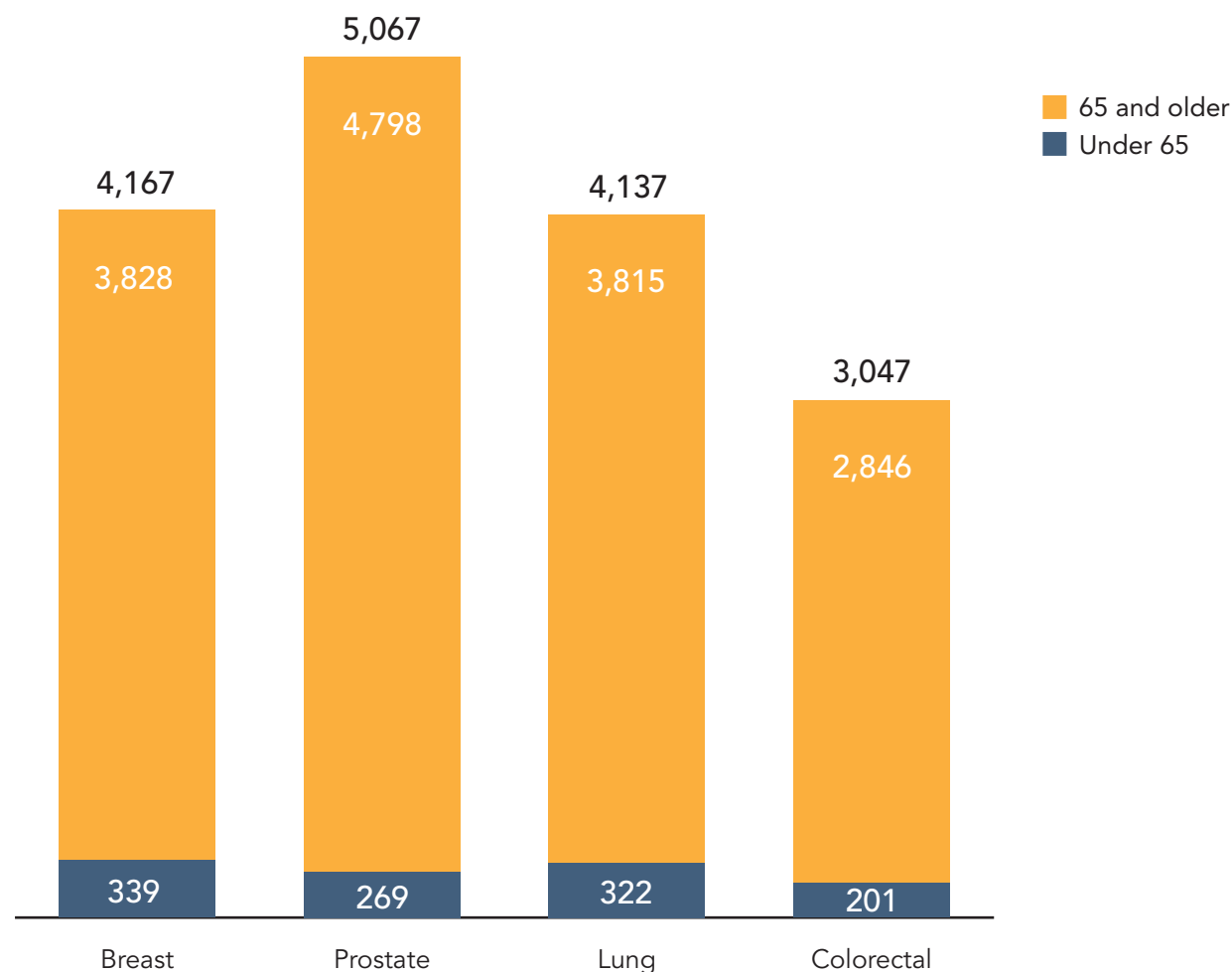
Notes: Dx is diagnosed. Age group represents patient's age at the time of diagnosis. Segments may not add to totals due to rounding.

Source: California Cancer Registry (CCR), a program of the California Department of Public Health's Chronic Disease Surveillance and Research Branch (CDSRB).

## New Cancer Cases, by Cancer Site and Age Group

### Medicare Analytic Cohort, California, Dx 2007 to 2011

AVERAGE NUMBER OF NEW CASES DIAGNOSED PER YEAR (IN ANALYTIC COHORT)



Notes: Medicare beneficiaries under 65 are considered permanently and totally disabled and have higher health care needs than the average person under 65. Dx is diagnosed. Age group represents patient's age at the time of diagnosis.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

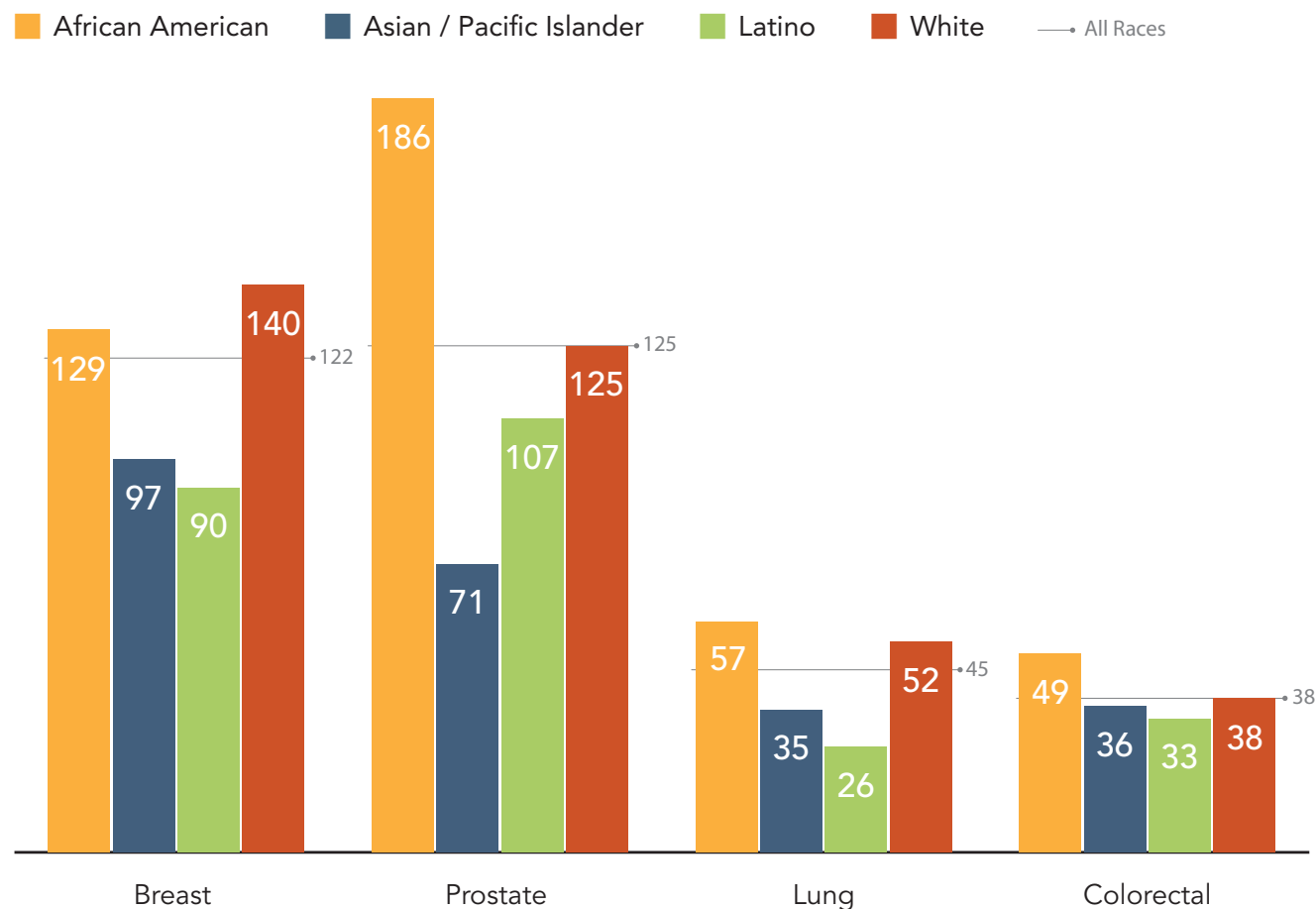
#### Overview

In the years studied for this report, 93% of patients diagnosed with breast, prostate, lung, or colorectal cancer in the Medicare fee-for-service population, the analytic cohort used for spending estimates, were 65 years or older at diagnosis.

# Incidence Rates, by Cancer Site and Race/Ethnicity

## All Payers, California, Dx 2011

RATE PER 100,000 PEOPLE



### Overview

Compared to other racial and ethnic groups in California, African Americans had higher incidences of prostate, lung, and colorectal cancer. White women had the highest incidence of breast cancer.

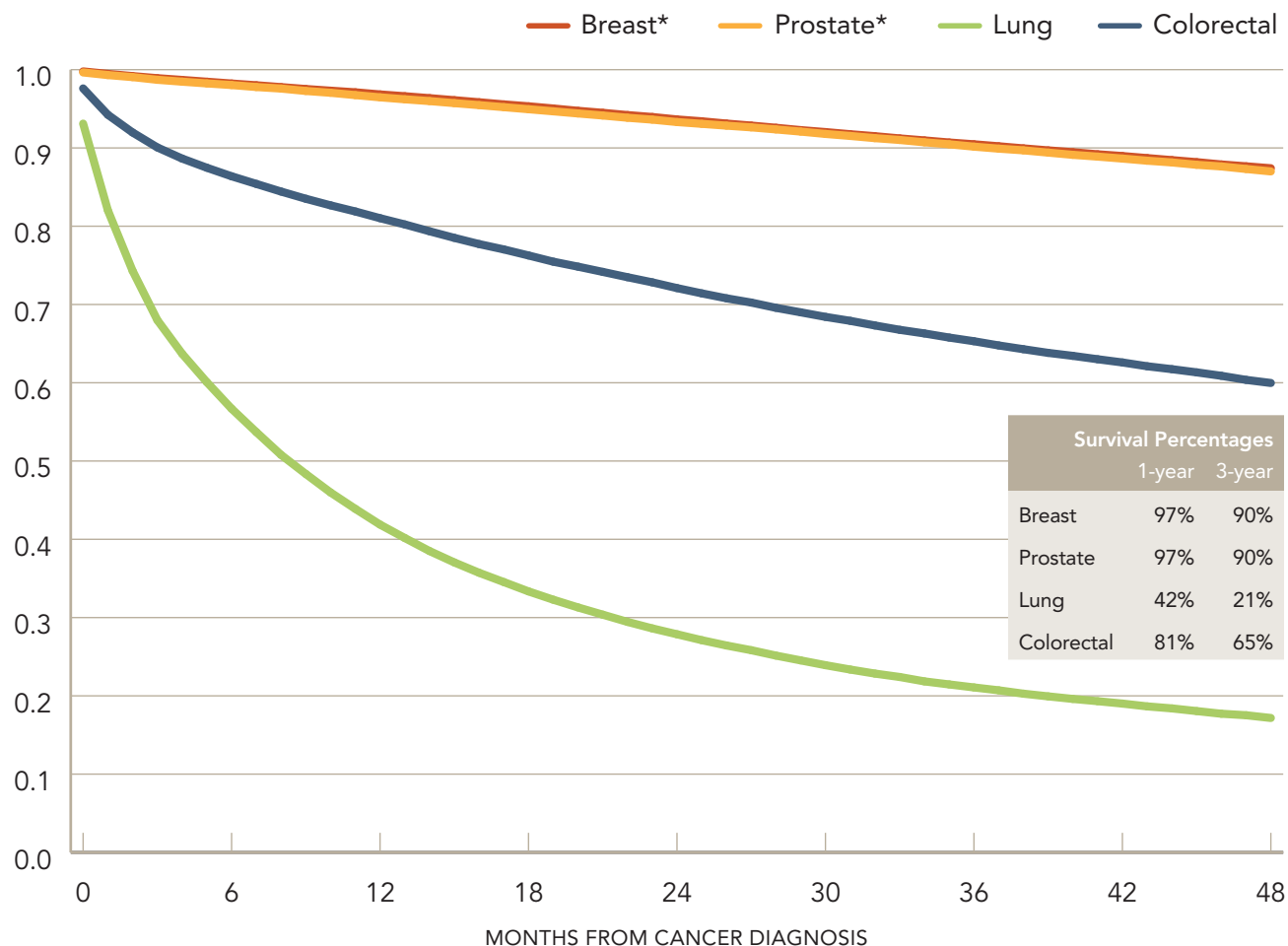
Notes: Rates are age-adjusted to the 2000 US Standard Million Population. Excludes in situ cancers. Breast cancer rates are for females only. Dx is diagnosed.

Source: California Cancer Registry (CCR), Annual Statistical Tables by Site.

# Cancer Survival Rates, by Cancer Site and Time Span

## All Payers, California, Dx 2007 to 2009

SURVIVAL PROBABILITY



\*The curves for breast and prostate cancer are nearly identical and therefore difficult to distinguish.

Note: Survival rates are depicted for patients diagnosed (Dx) in 2007-2009, and followed through 2011.

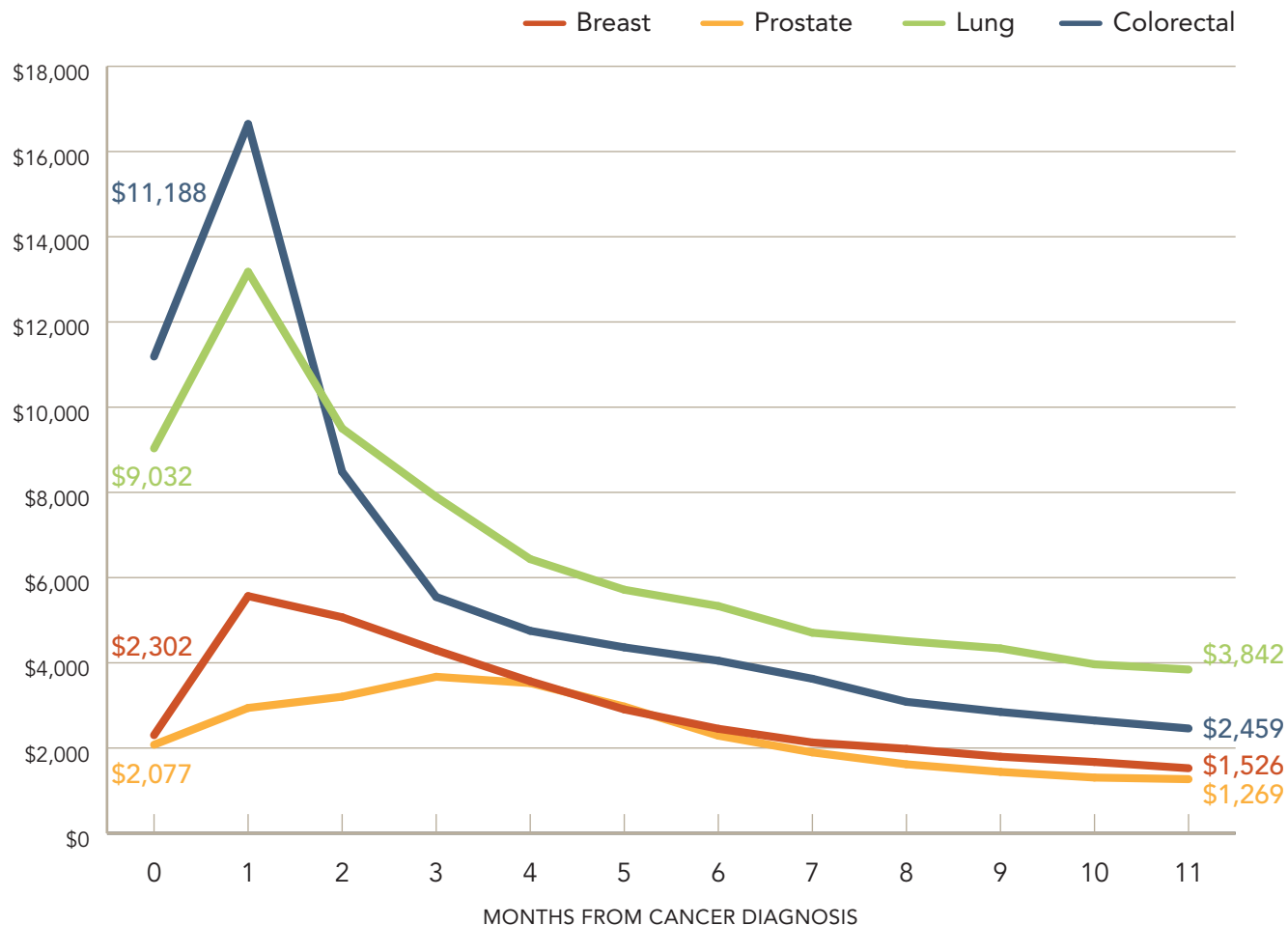
Source: California Cancer Registry (CCR), a program of the California Department of Public Health's Chronic Disease Surveillance and Research Branch (CDSRB).

### Overview

Survival rates vary by type of cancer, stage, and severity at diagnosis. The three-year survival rate for breast and prostate cancer was 90%, whereas 65% of colorectal patients and only 21% of lung cancer patients survived three years. The differences in survival rates are primarily due to stage at detection: Most breast and prostate cancers are detected at early stages, and most lung cancers are caught at more advanced stages.

# Mean Medicare Spending in First Year of Diagnosis by Cancer Site and Time Span, California, Dx 2007 to 2011

PER PERSON PER MONTH



## First Year of Diagnosis

Medicare spending in the initial months after cancer diagnosis tended to be higher than spending in the months at the end of the first year. For breast, lung, and colorectal cancer, Medicare spending peaked one month after diagnosis, which likely corresponds to the timing of initial surgery. Prostate cancer did not follow the same pattern, possibly because it is a less aggressive disease and fewer of these patients opt for surgical treatment than those with the other cancers.

Notes: Spending shown represents estimated mean Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.



## Mean Medicare Spending in First Year of Diagnosis by Cancer Site, California, Dx 2007 to 2011

PER PERSON PER YEAR



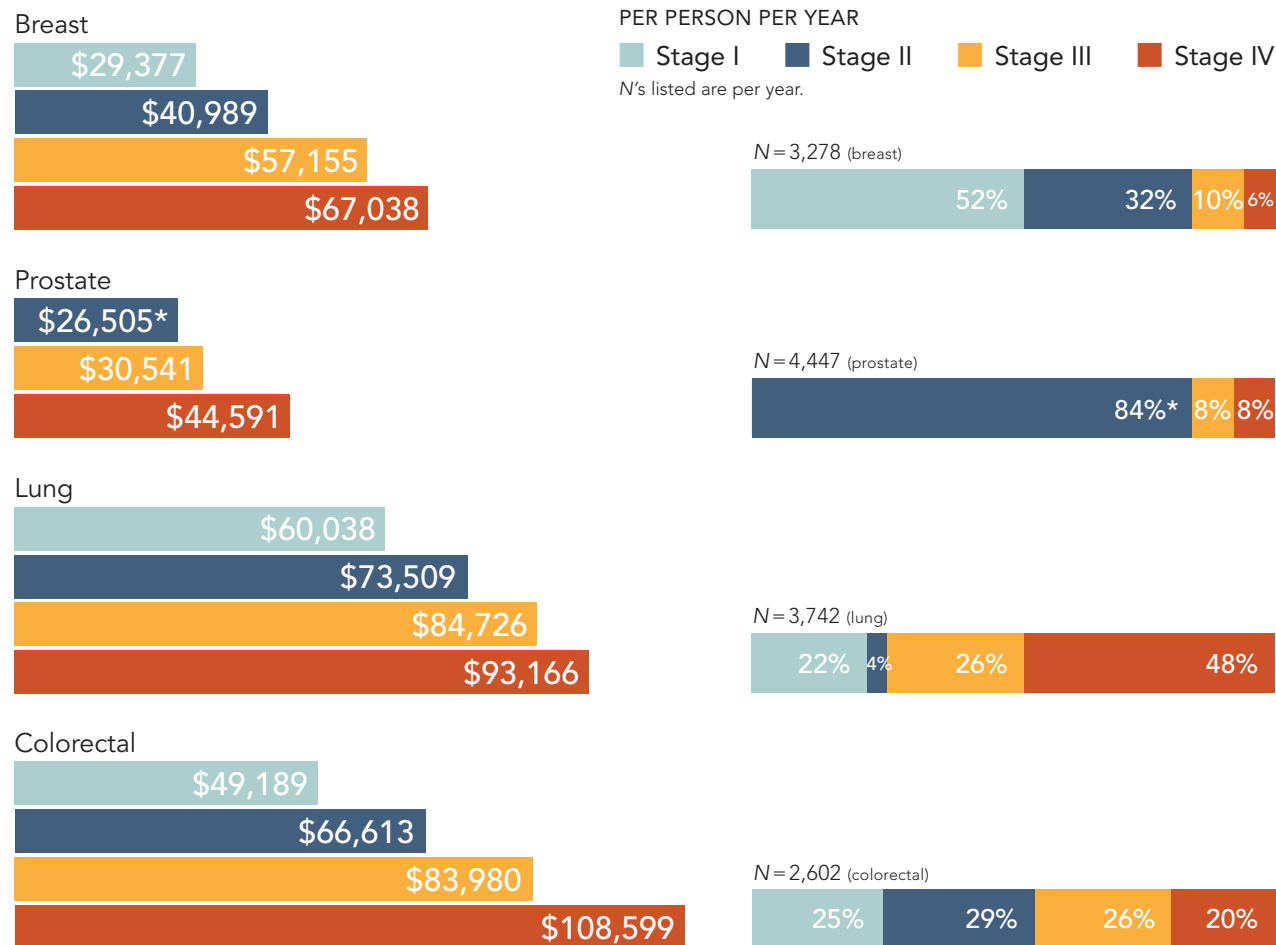
### First Year of Diagnosis

In California, more was spent in the initial year of diagnosis on cancers for which survival was the shortest. The most expensive, lung cancer, at \$79,000 per person, had the lowest survival rate; the least expensive one, prostate cancer, at \$28,000 per person, had one of the highest survival rates.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

# Mean Medicare Spending in First Year of Diagnosis by Cancer Site and Stage, California, Dx 2007 to 2011



\*Stages I and II have been combined due to small N's for stage I prostate.

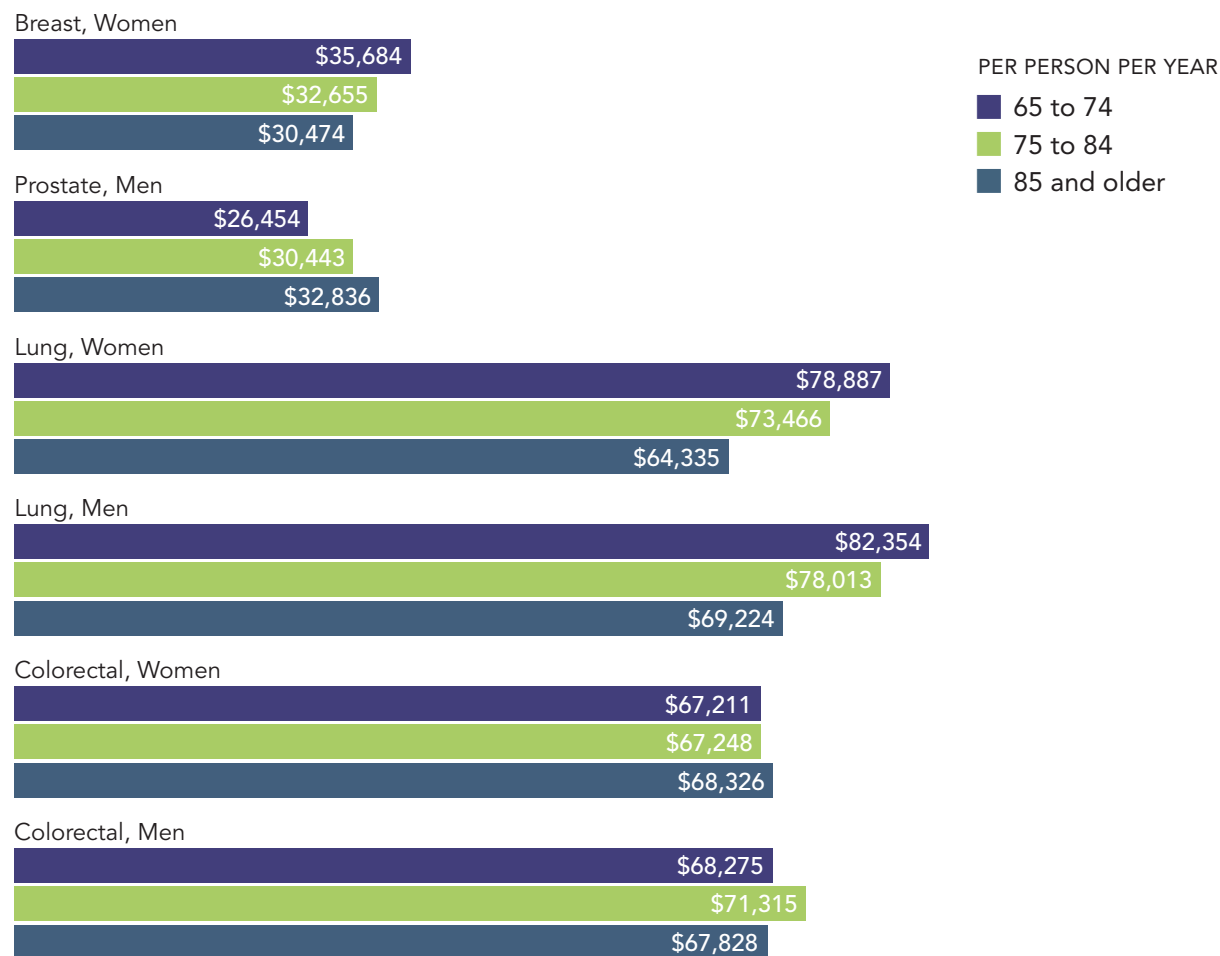
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Patients whose stage was unknown are not included.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## First Year of Diagnosis

Medicare spending in the first year after diagnosis was higher for patients diagnosed with advanced cancer (stage IV) than for patients diagnosed with early-stage cancer for each of the four cancers studied. The spending differences were greatest for colorectal cancer. The vast majority of breast and prostate patients are typically diagnosed at stage I or II, compared to lung and colorectal patients, who are more likely to be diagnosed at later stages.

## Mean Medicare Spending in First Year of Diagnosis by Cancer Site, Gender, and Age, California, Dx 2007 to 2011



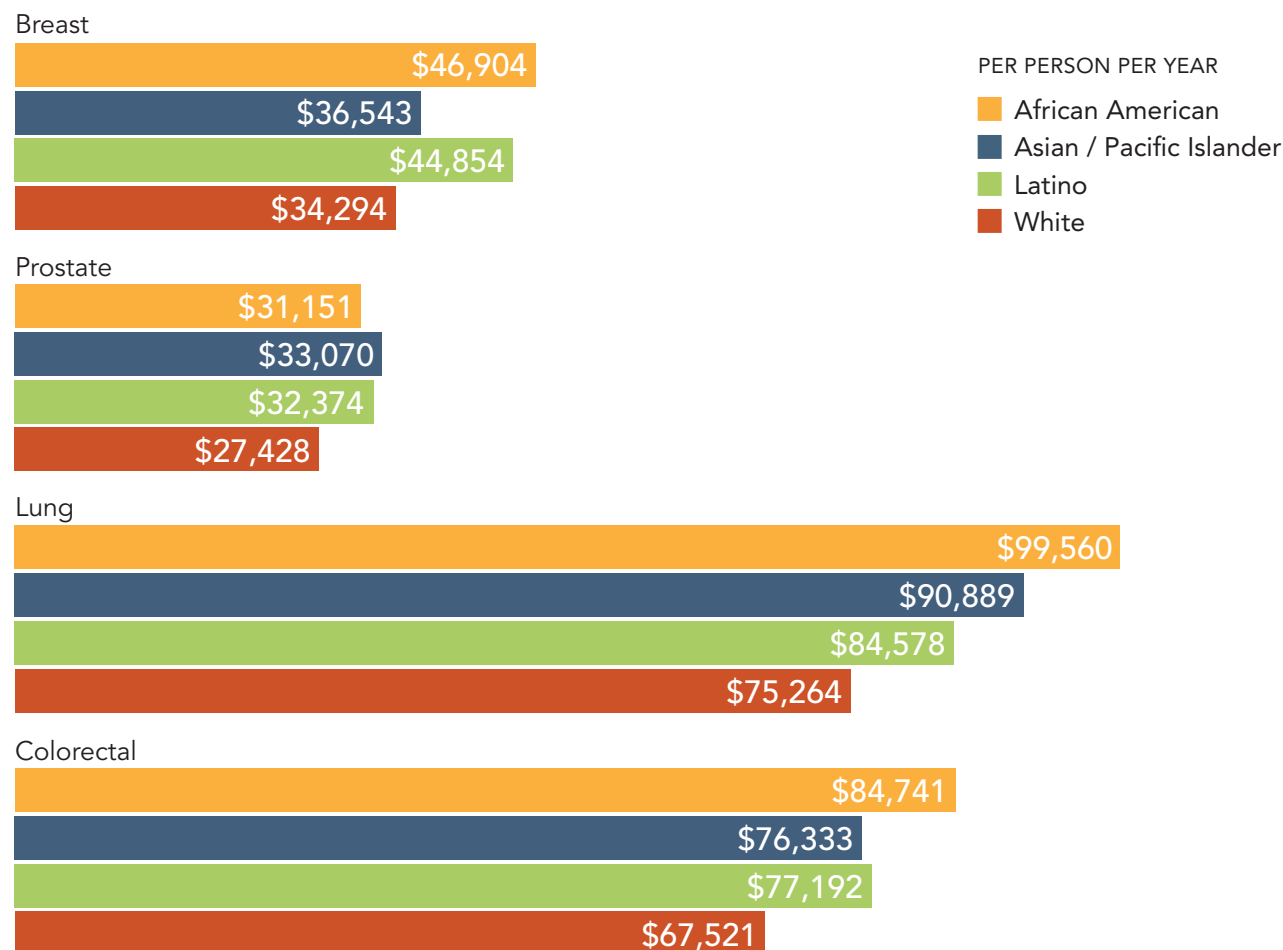
### First Year of Diagnosis

For breast and lung cancers, Medicare spending per person in the first year of cancer diagnosis was inversely correlated with age — more was spent on the 65 to 74 age group than on the 85 and older group. Medicare spending for lung cancer was greater for men than for women.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Does not include Medicare beneficiaries under 65. Almost all (93%) of Medicare cancer diagnoses in the study period were for beneficiaries 65 and older.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Mean Medicare Spending in First Year of Diagnosis by Cancer Site and Race/Ethnicity, California, Dx 2007 to 2011



### First Year of Diagnosis

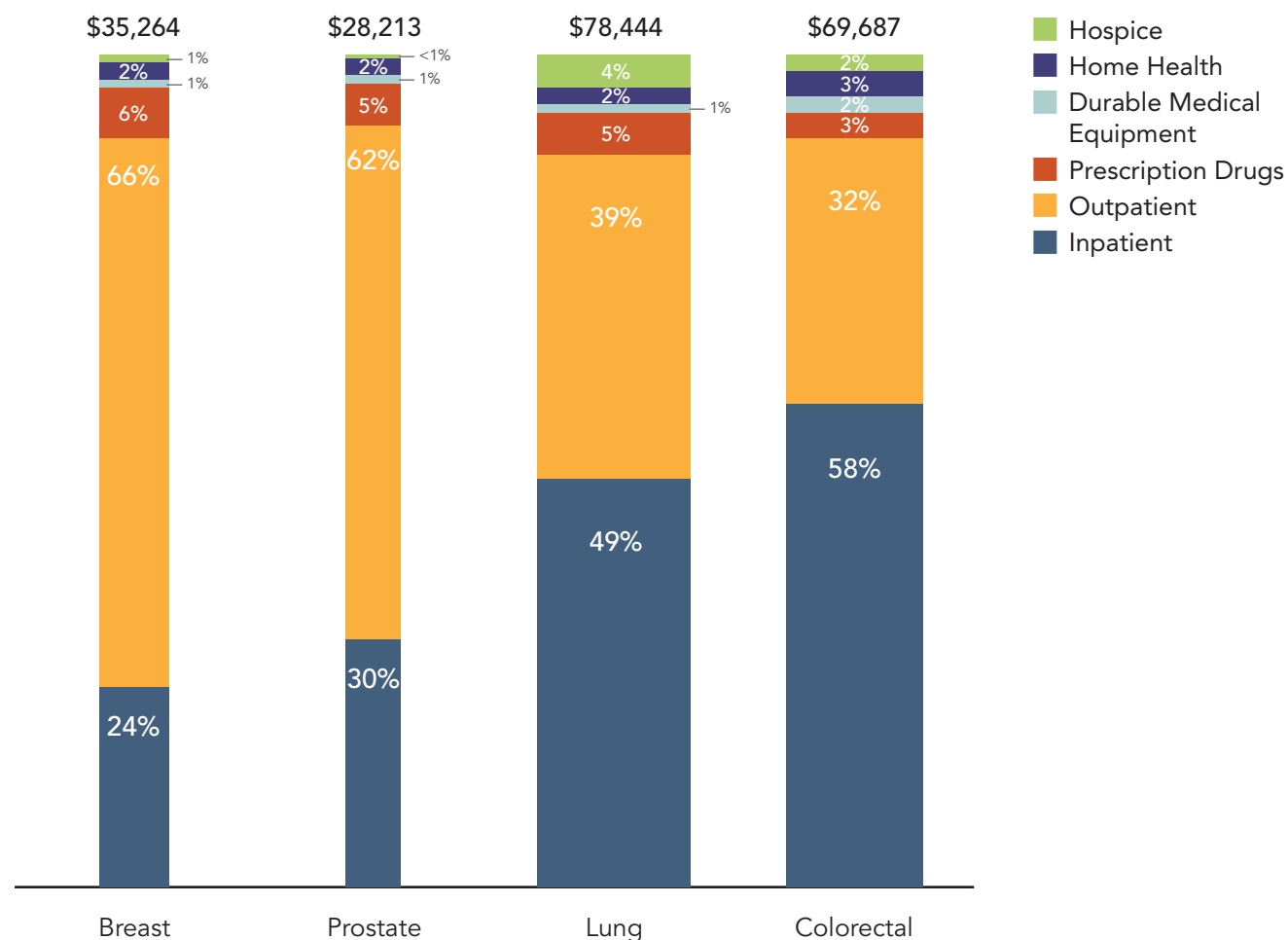
Medicare spending in the first year of cancer diagnosis varied by race/ethnicity, with the highest annual spending for African Americans (except for prostate cancer) and the lowest for Whites. African Americans tended to be diagnosed at a later stage. Also, African Americans have been found to use inpatient care at a higher rate than others, which likely contributes to higher spending for this group.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. See Appendix A for data by race/ethnicity and by stage.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

# Mean Medicare Spending in First Year of Diagnosis by Cancer Site and Category, California, Dx 2007 to 2011

PER PERSON PER YEAR



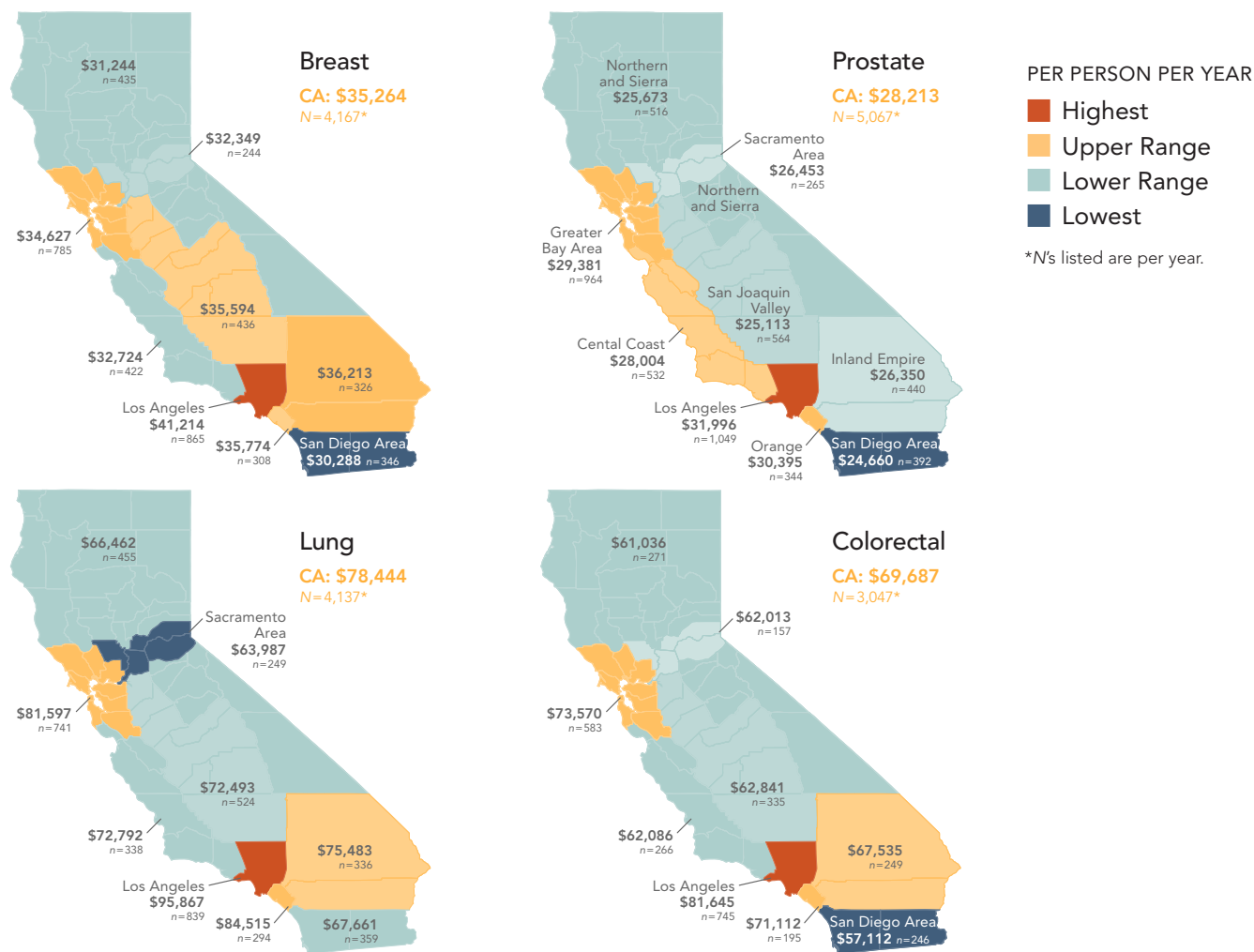
## First Year of Diagnosis

Medicare spending by type of service varied across cancer types. Inpatient care accounted for the largest proportion of first-year spending for colorectal and lung cancer. In contrast, outpatient care dominated Medicare spending for breast and prostate cancer, representing nearly two-thirds of all spending. Inpatient spending is highest for colorectal cancer because nearly all of these patients have surgery. For lung cancer, inpatient spending is high because many of these patients have complex comorbidities.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

# Mean Medicare Spending in First Year of Diagnosis by Cancer Site and Region, California, Dx 2007 to 2011



## First Year of Diagnosis

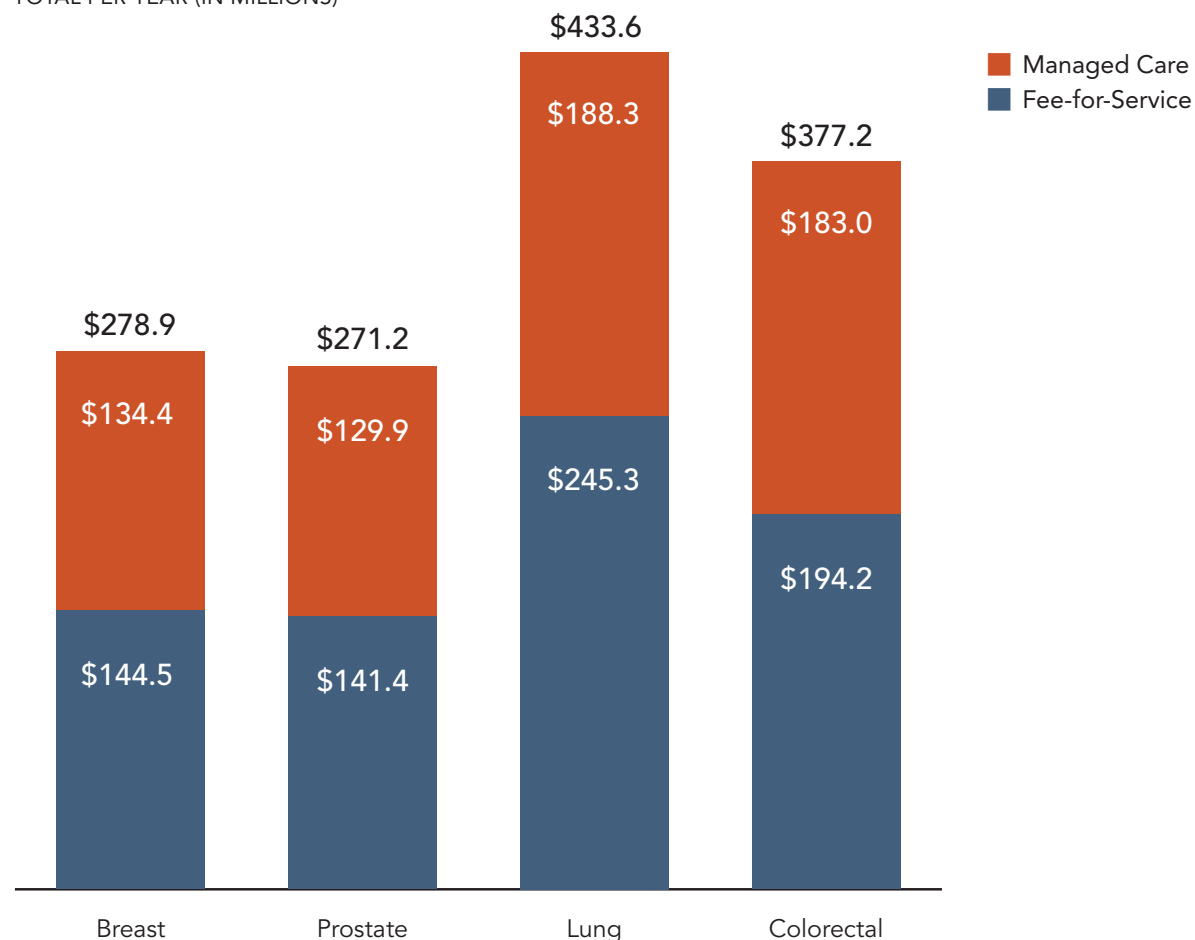
Medicare spending in the first year of diagnosis varied across California regions. Los Angeles County had the highest mean spending of all regions for breast, lung, colorectal, and prostate cancer. The San Diego Area region had the lowest mean spending for breast, prostate, and colorectal cancer, and the Sacramento Area region was lowest for lung cancer.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Region is based on patient's place of residence. See [Appendix B](#) for data by county and cancer site. [Appendix D](#) lists the counties in each region.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Estimated Medicare Spending in First Year of Diagnosis by Cancer Site, California, Dx 2007 to 2011

TOTAL PER YEAR (IN MILLIONS)



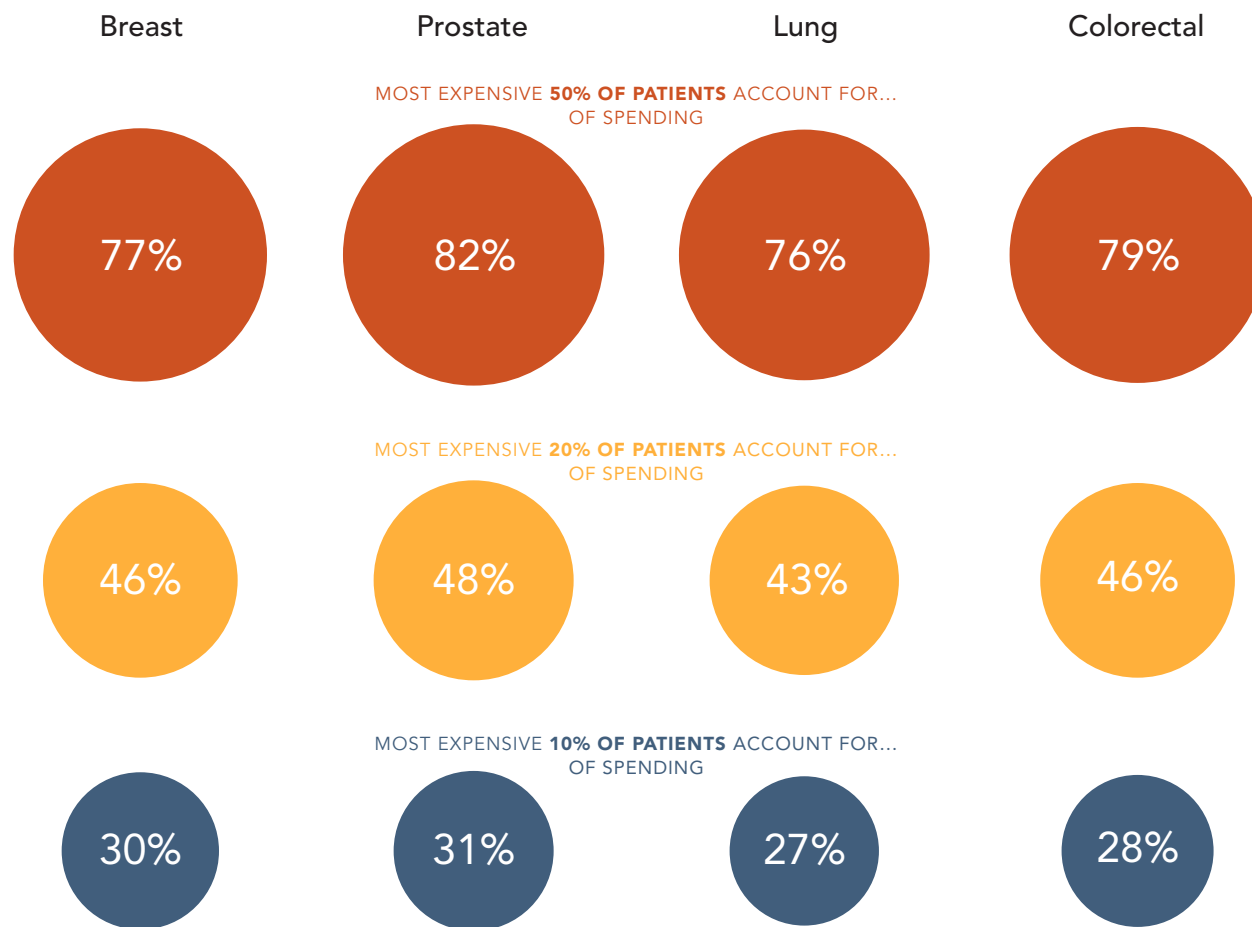
Notes: Spending shown represents estimated total annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates have been adjusted for inflation to 2013 dollars. Fee-for-service data were ascertained directly from the analytic cohort. Managed care data could not be ascertained directly from the CCR-Medicare data, so they were projected based on the assumption that managed care Medicare enrollees spend approximately the same as fee-for-service enrollees with similar demographic and clinical characteristics. Segments may not add to totals due to rounding.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

### First Year of Diagnosis

Total Medicare spending in the initial year of cancer diagnosis, for Californians with the four most common cancers in the state, was estimated at \$1.36 billion. This spending was distributed at about 32% (\$434 million) for lung cancer, 28% (\$377 million) for colorectal cancer, 20% (\$279 million) for breast cancer, and 20% (\$271 million) for prostate cancer.

## Concentration of Medicare Spending in First Year of Diagnosis, by Cancer Site, California, Dx 2007 to 2011



### First Year of Diagnosis

Medicare spending was not distributed evenly across patients. Relatively few patients who have the greatest expenses account for a disproportionate share of total expenditures. Twenty percent of cancer patients accounted for nearly 50% of Medicare spending.

Notes: Spending shown represents estimated mean annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

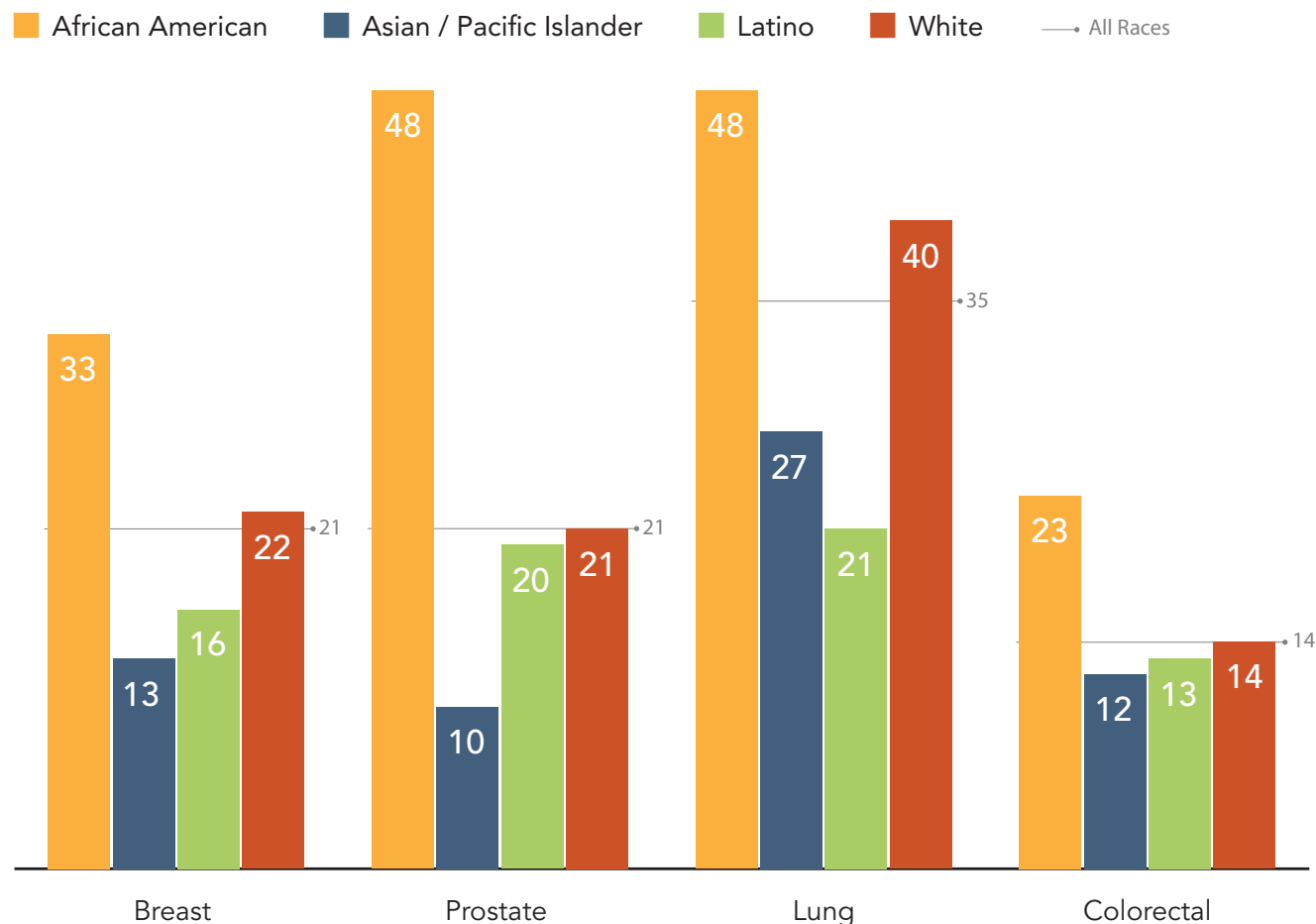
Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.



# Mortality Rates, by Cancer Site and Race/Ethnicity

## All Payers, All Ages, California, 2011

RATE PER 100,000 PEOPLE



### Mortality Rates

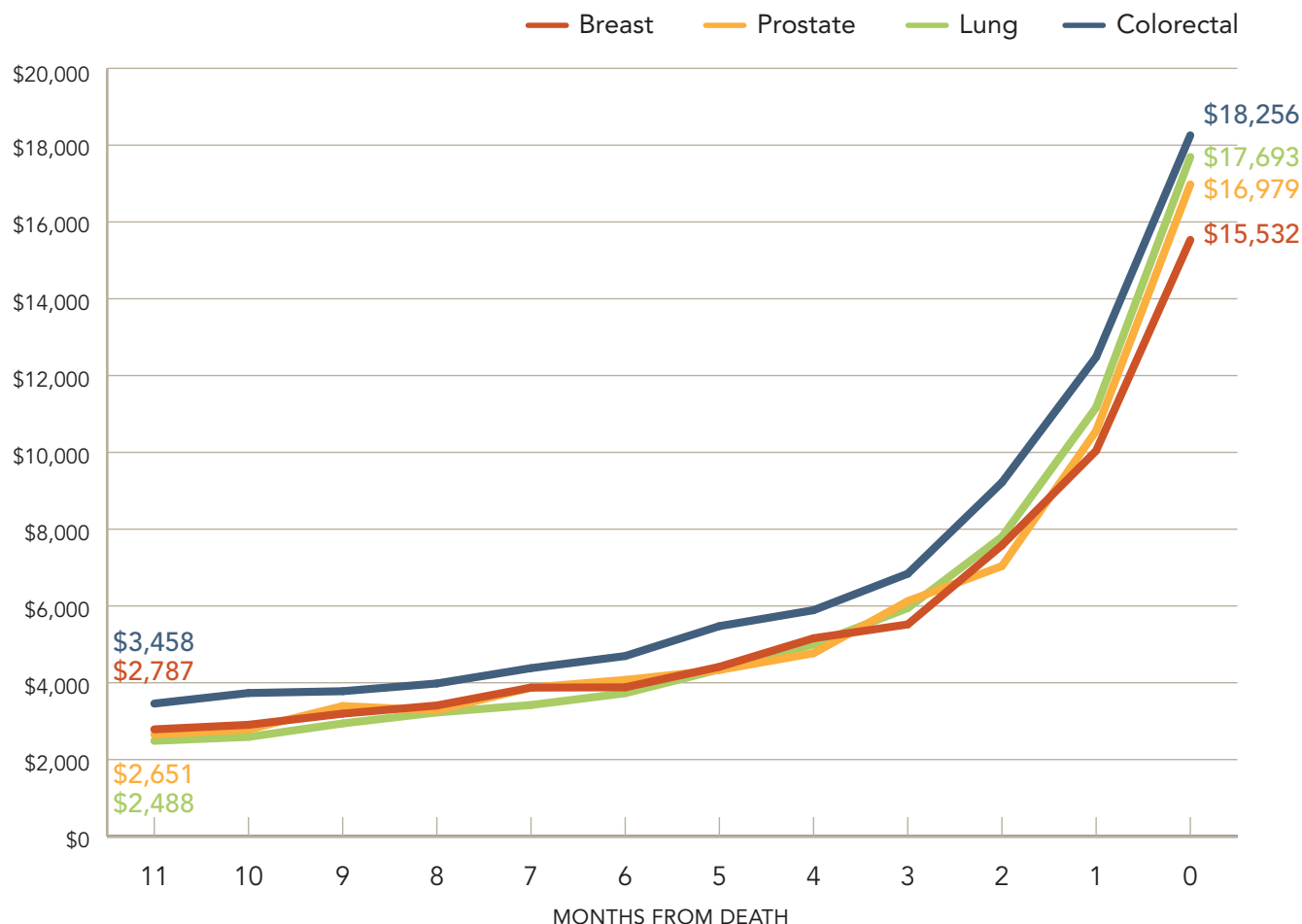
Over 38,000 Californians died from cancer each year from 2007 to 2011 (not shown). African Americans had higher mortality rates for all four cancers examined compared to other racial and ethnic groups in California. These higher mortality rates in African Americans could be due to later-stage detection in this group.

Notes: Rates are age-adjusted to the 2000 US Standard Million Population. Excludes in situ cancers. Breast cancer rates are for females.

Source: California Cancer Registry, Annual Statistical Tables by Site.

# Mean Medicare Spending in the Last Year of Life by Cancer Site and Time Span, California, Dx 2007 to 2011

PER PERSON PER MONTH



Notes: Spending shown represents estimated mean Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Data are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

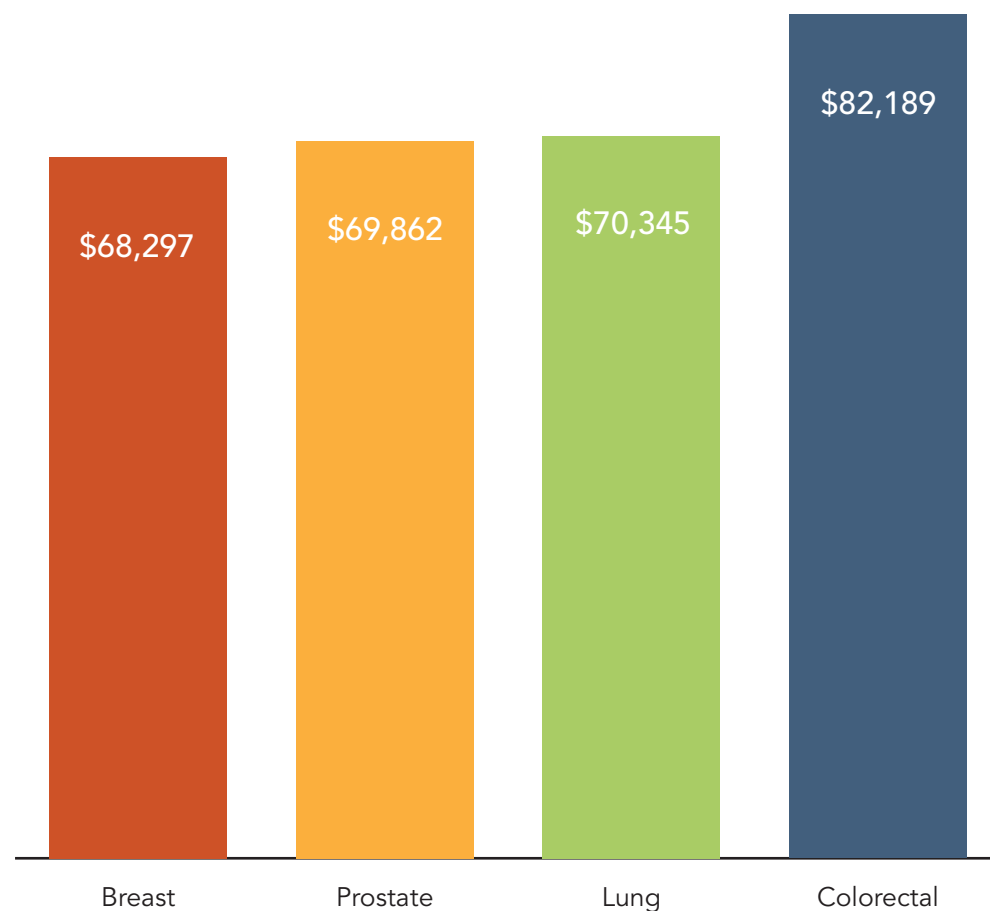
Sources: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute. *Percent of Cancer Patients Dying in Hospital*, The Dartmouth Atlas of Health Care, 2012, [www.dartmouthatlas.org](http://www.dartmouthatlas.org).

## End of Life

Approximately half of Medicare spending in the last year of a cancer patient's life occurred in the final three months before death, with the highest spending in the last month of life. In many cases, intensive, expensive care, such as chemotherapy, is provided in the last weeks of a patient's life.

## Mean Medicare Spending in the Last Year of Life by Cancer Site, California, Dx 2007 to 2011

PER PERSON PER YEAR



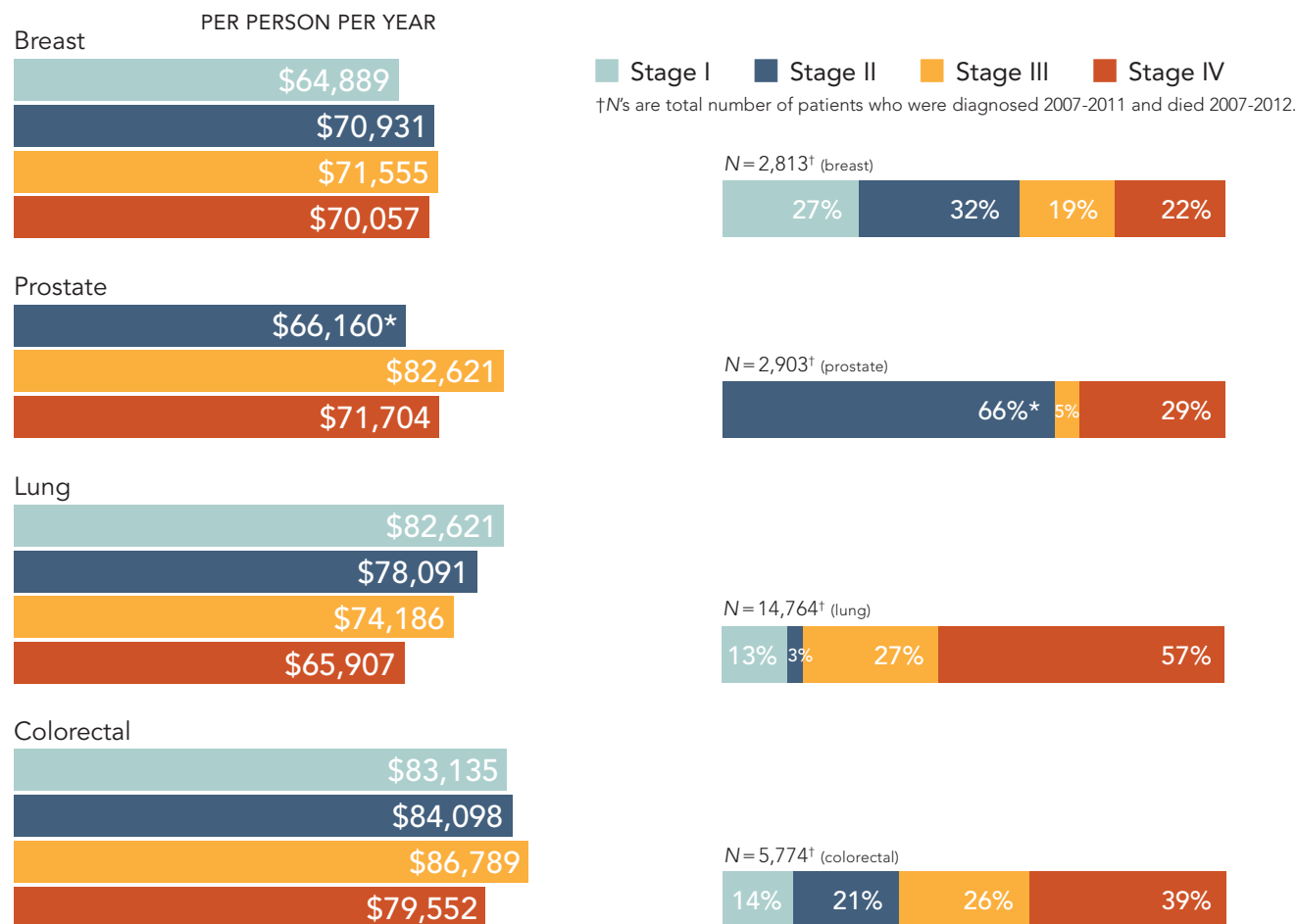
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

### End of Life

Medicare spending in the last year of a cancer patient's life was substantial, with average spending per person ranging from \$68,000 for breast cancer patients to \$82,000 for colorectal patients. Spending in the last year of life includes spending on patients who do not survive their initial course of treatment and spending on long-term cancer survivors who die from other causes, such as heart disease or stroke.

# Mean Medicare Spending in the Last Year of Life by Cancer Site and Stage, California, Dx 2007 to 2011



\*Stages I and II have been combined due to small N's for stage I prostate.

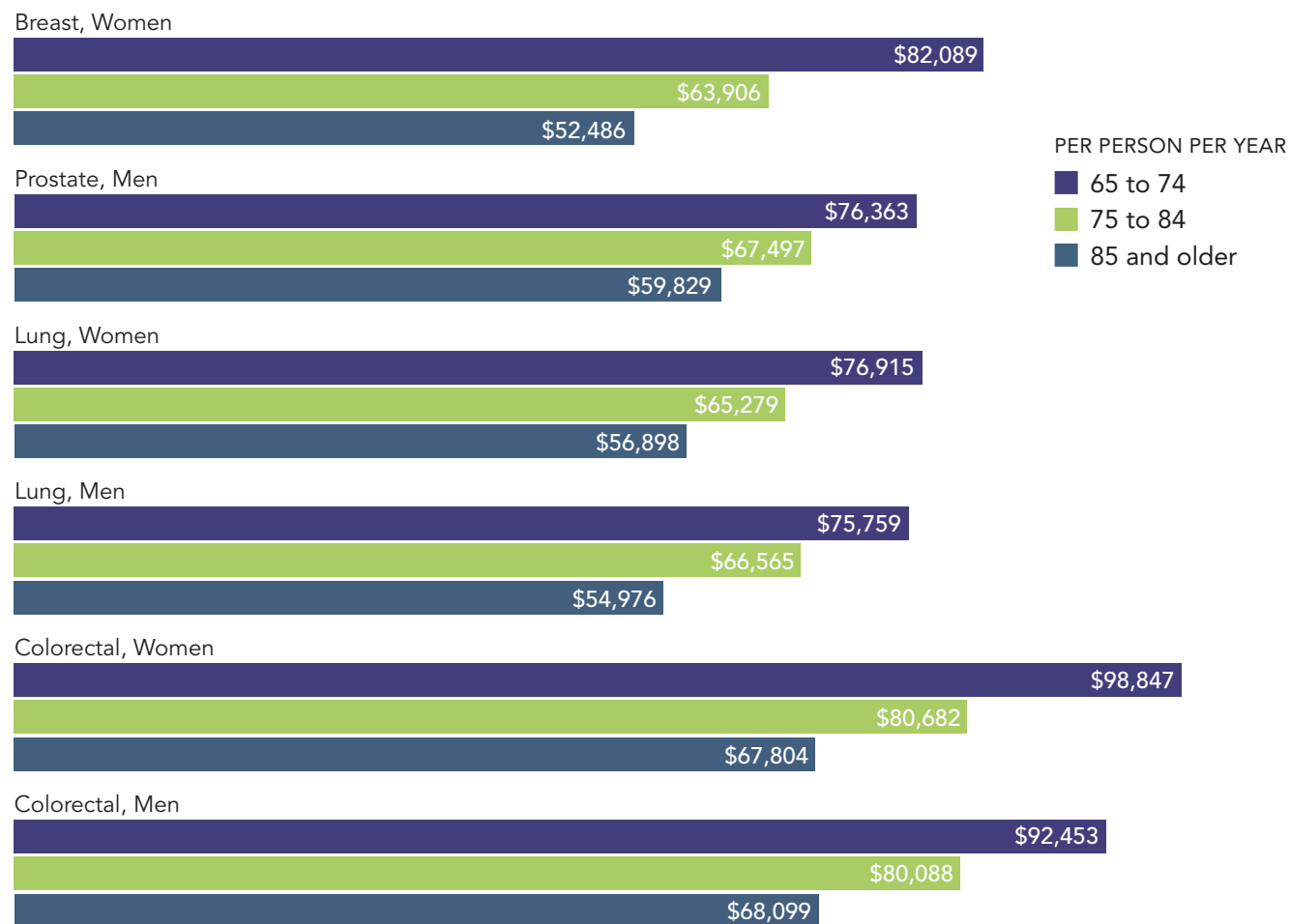
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults who were diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Patients whose stage was unknown are not included.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## End of Life

Medicare spending in the last year of life varied slightly by stage at diagnosis. Notably, there is less spending variation by cancer site and stage in the last year of life than there is in the initial year of diagnosis.

# Mean Medicare Spending in the Last Year of Life by Cancer Site, Gender, and Age, California, Dx 2007 to 2011



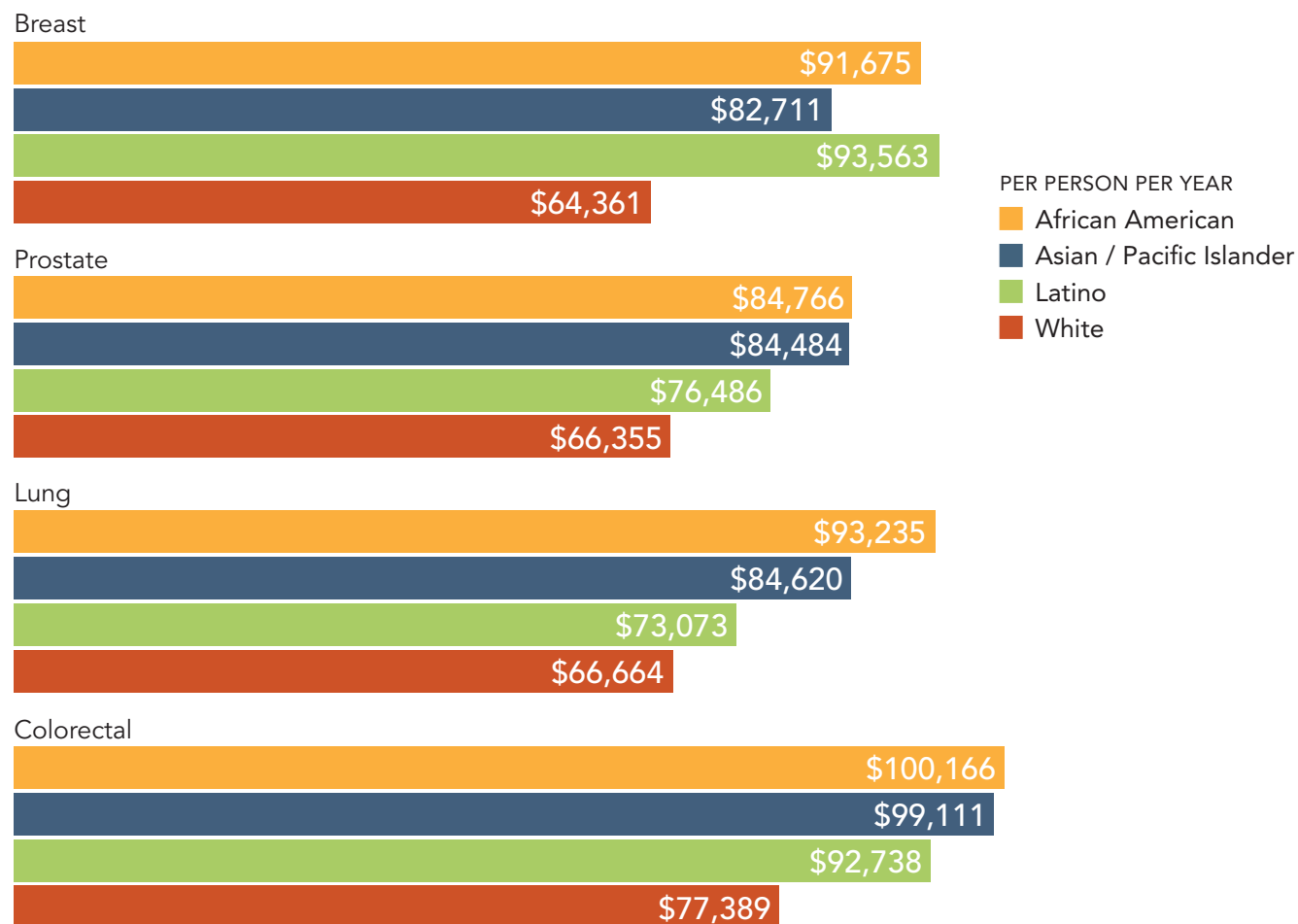
## End of Life

For lung and colorectal cancer, there was not much difference in Medicare spending in the last year of life between men and women. As age increased, spending decreased for all cancers.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults who were diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Does not include Medicare beneficiaries under 65.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Mean Medicare Spending in the Last Year of Life by Cancer Site and Race/Ethnicity, California, Dx 2007 to 2011



### End of Life

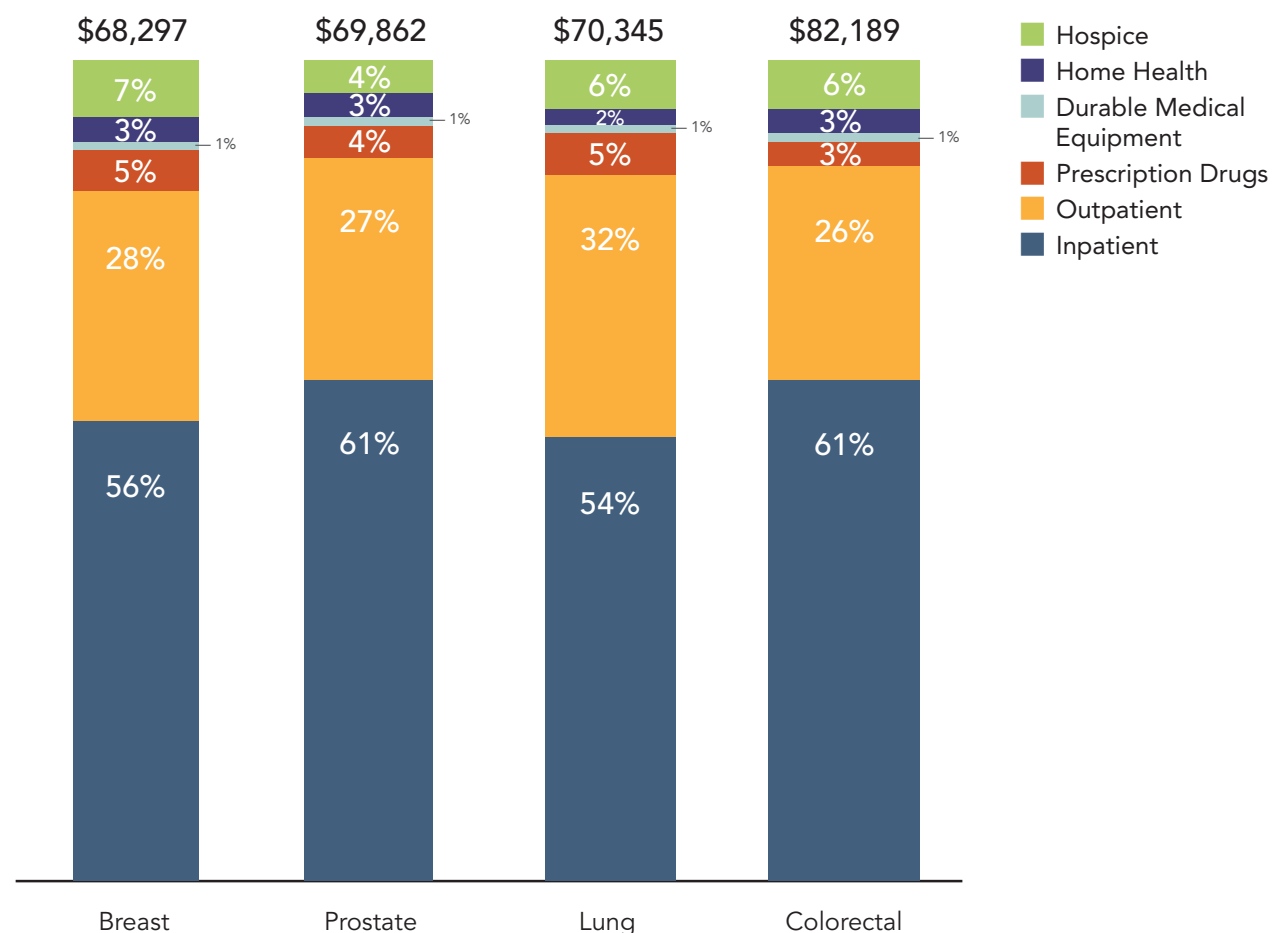
Medicare spending in the last year of life varied across racial and ethnic groups. African Americans had the highest mean spending in the last year of life for prostate, lung, and colorectal cancer, while Latinos had the highest spending for breast cancer. African Americans tend to use more inpatient care and also tend to be diagnosed at later stages than other groups, which could account for some of these differences in spending.

Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

# Mean Medicare Spending in the Last Year of Life by Cancer Site and Category, California, Dx 2007 to 2011

PER PERSON PER YEAR



Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Hospice includes inpatient hospice care.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

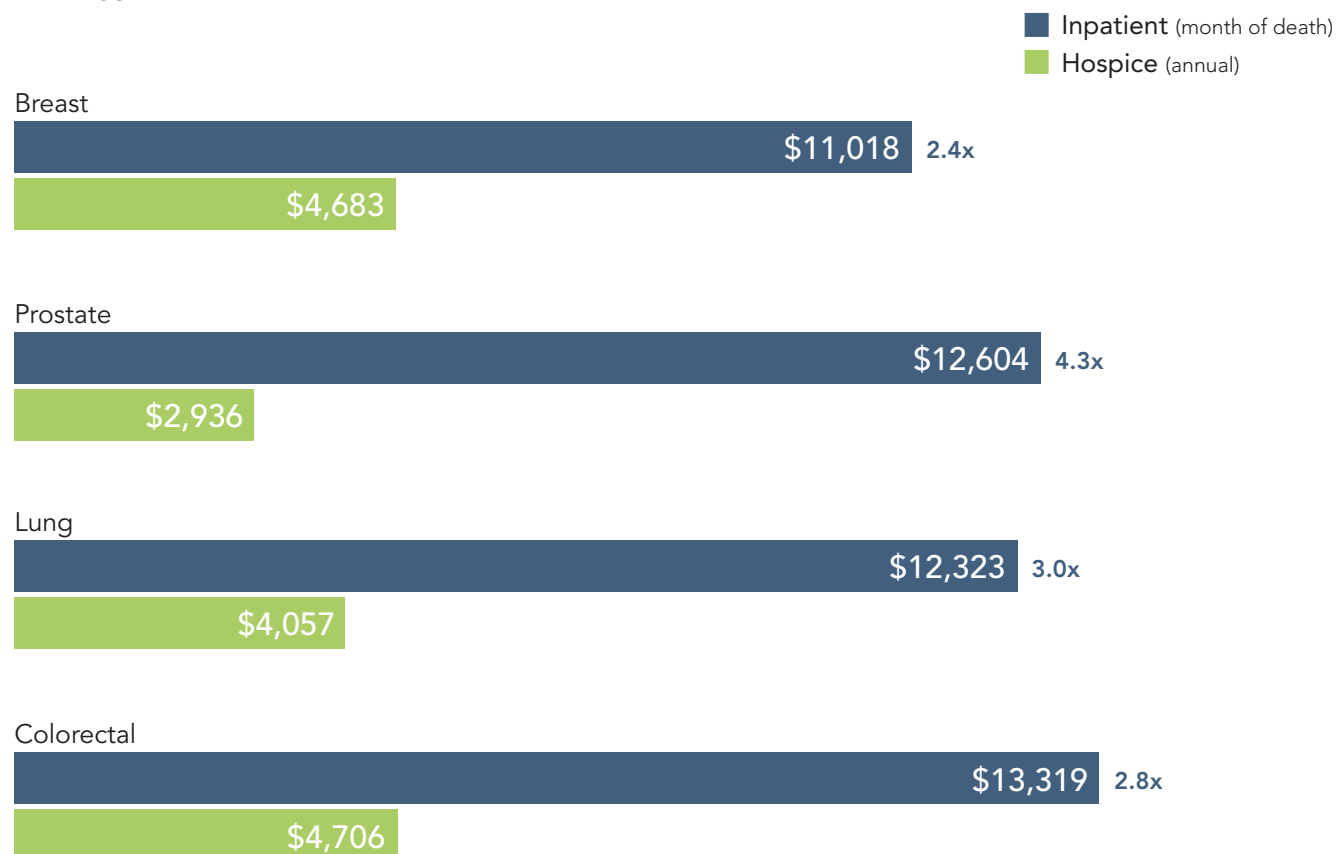
## End of Life

Overall, inpatient spending comprised the majority of Medicare spending in the last year of life for all four cancers studied, ranging from 54% of all spending for lung cancer to 61% of all spending for colorectal and prostate cancer. An average of only 6% of the spending in the last year of life was devoted to hospice care.

# Mean Medicare Spending in the Last Year of Life

## Inpatient vs. Hospice, by Cancer Site, California, Dx 2007 to 2011

PER PERSON



### End of Life

Medicare spending in the month of death for inpatient care was two to over four times higher than spending for hospice care in the entire last year of life for all four of the cancer types studied. This finding suggests an opportunity to replace intensive hospital and ICU care with outpatient and home-centered care, including hospice. Hospice care is more consistent with patient preferences to die at home.

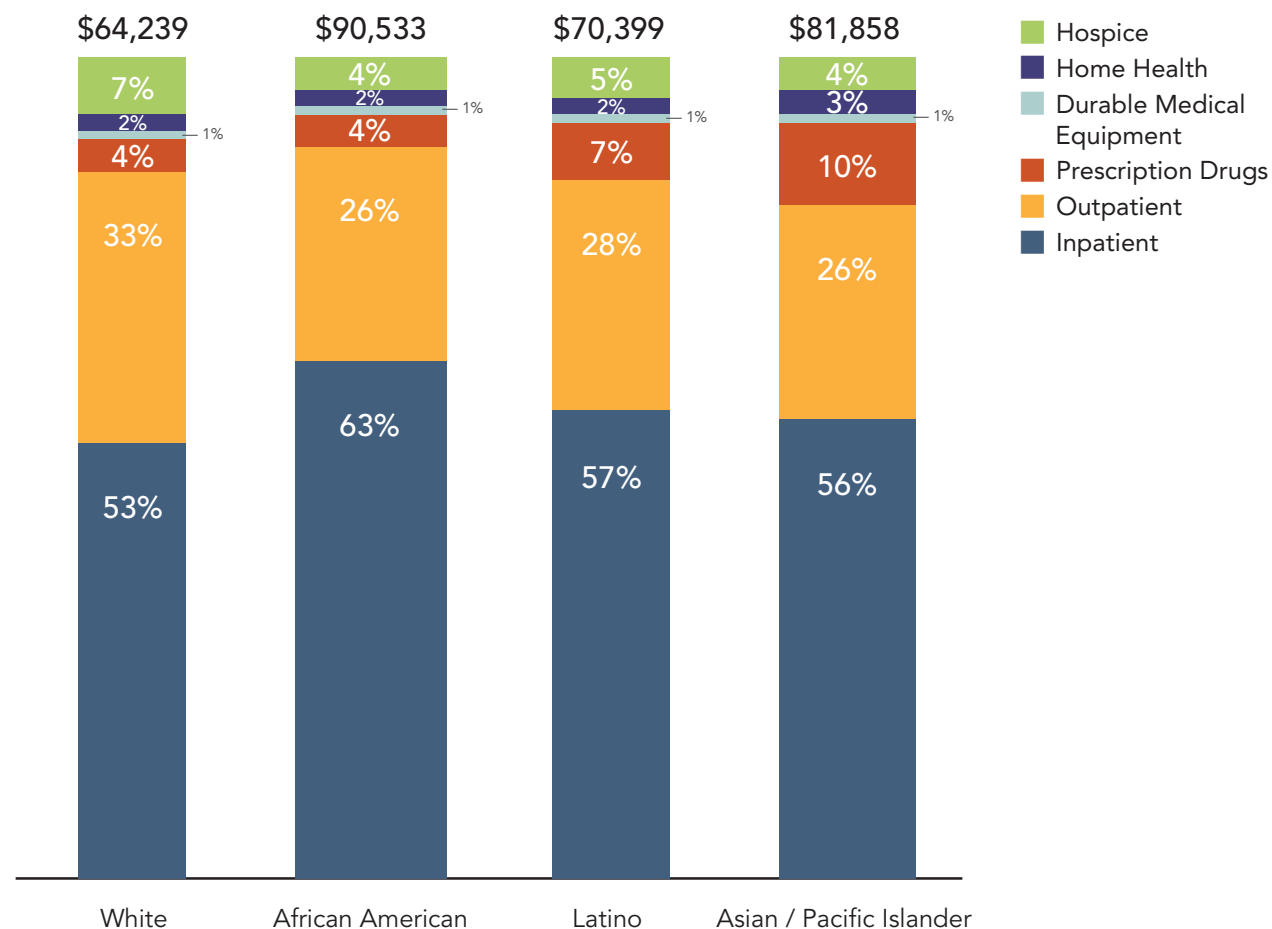
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Hospice includes inpatient hospice care.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.



# Mean Medicare Spending in the Last Year of Life Lung Cancer, by Race/Ethnicity, California, Dx 2007 to 2011

PER PERSON PER YEAR



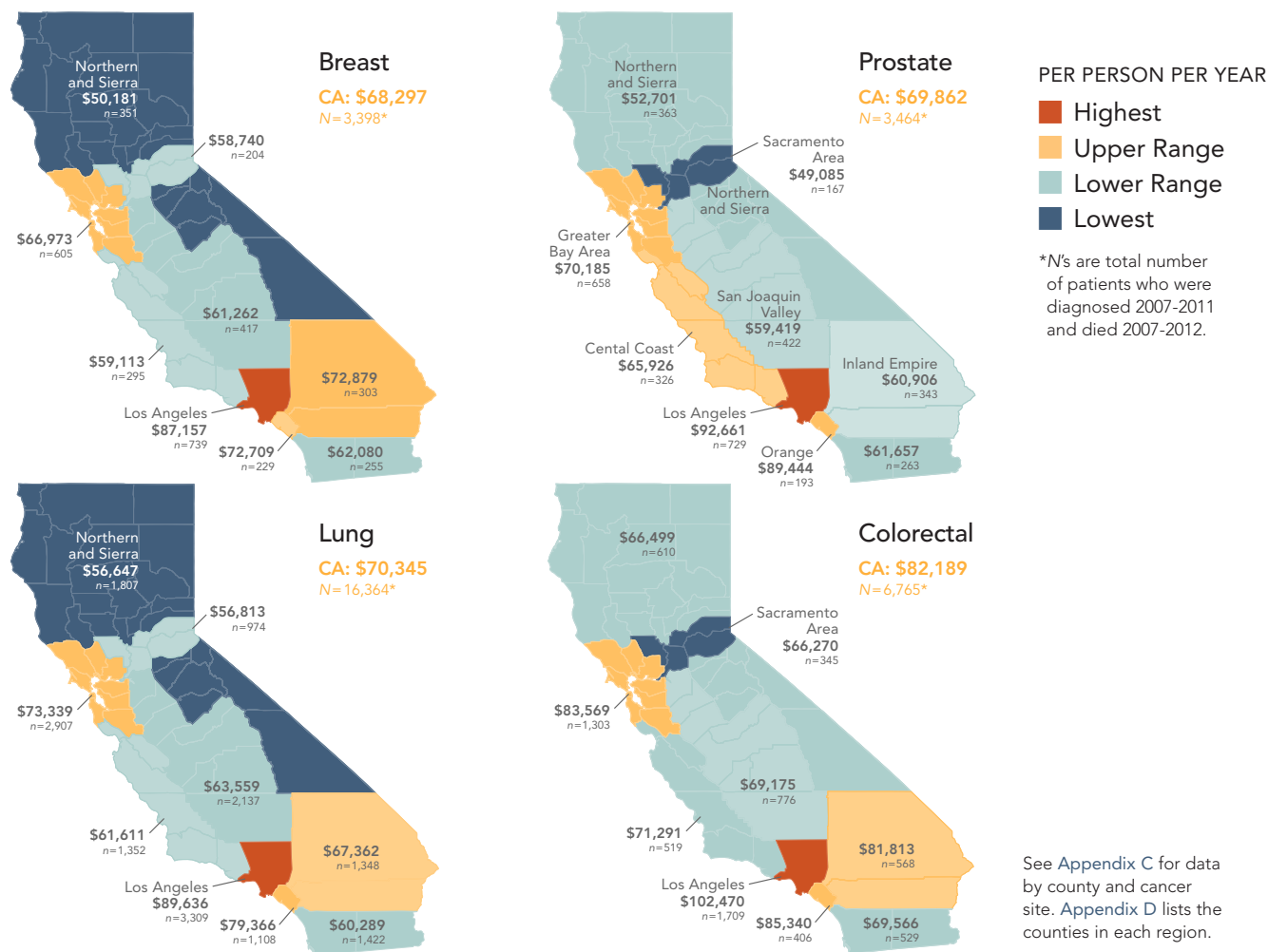
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. *Hospice* includes inpatient hospice care.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## End of Life

Location of end-of-life care differs by race/ethnicity. In the last year of life, over half of Medicare spending on patients with lung cancer was for inpatient care; however, the portion spent on inpatient care ranged from 53% for Whites to 63% for African Americans.

# Mean Medicare Spending in the Last Year of Life by Cancer Site and Region, California, Dx 2007 to 2011



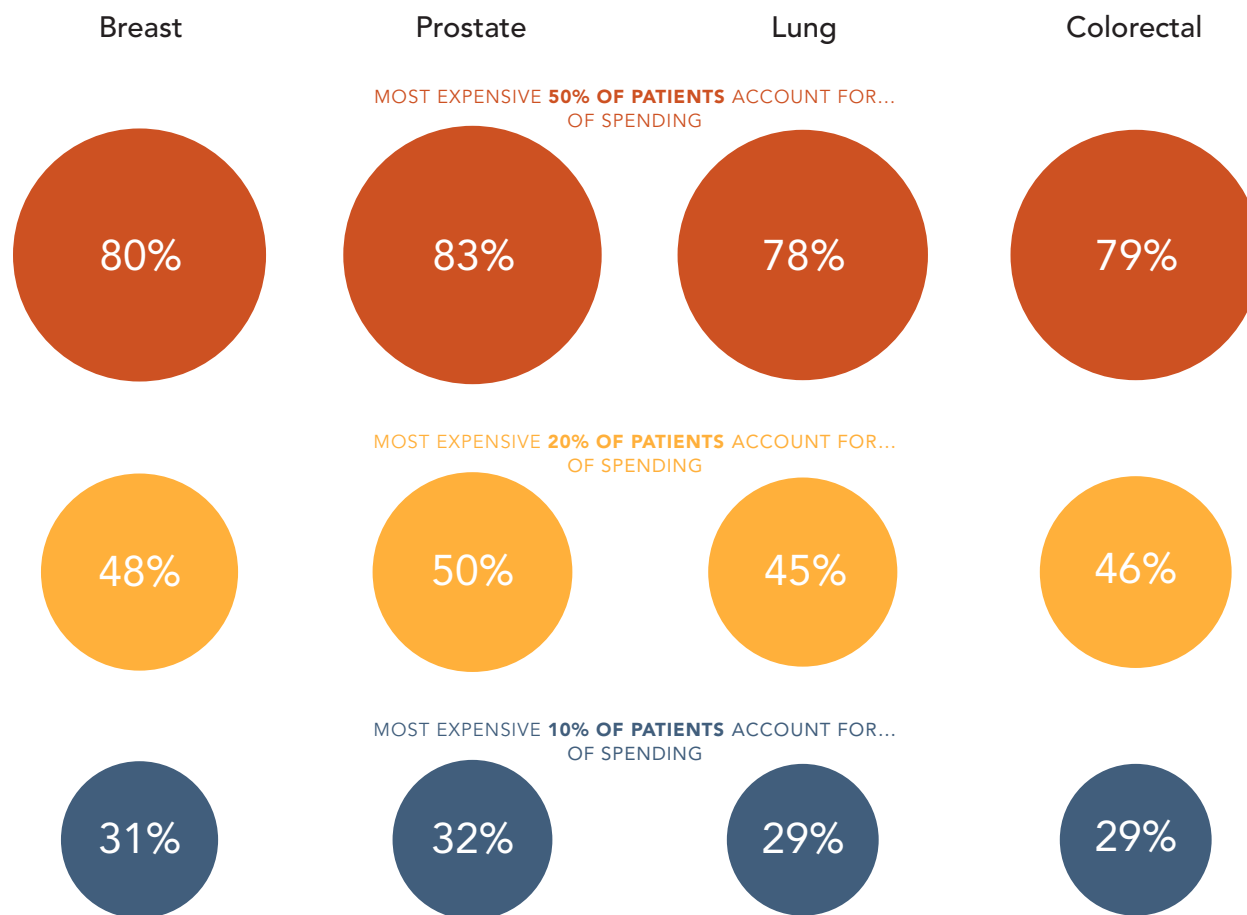
Notes: Spending shown represents estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Region is based on patient's place of residence.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## End of Life

Average Medicare spending in the last year of life varied across regions of the state. Spending was highest for patients in Los Angeles County. For example, mean Medicare spending in the last year of life for colorectal cancer patients was over \$100,000 in Los Angeles County, whereas it was approximately \$66,000 in the Sacramento Area region. Spending on breast and lung cancer were lowest in the Northern and Sierra region, while spending on prostate and colorectal was lowest in the Sacramento Area.

## Concentration of Medicare Spending in the Last Year of Life, by Cancer Site, California, Dx 2007 to 2011



### End of Life

Medicare spending in the last year of life was concentrated in a relatively small segment of cancer patients. In the last year of life, the most expensive 10% of cancer patients accounted for about 30% of Medicare spending on cancer patients. And 50% of Medicare patients with cancer accounted for about 80% of Medicare spending on cancer patients.

Notes: Spending shown represents estimated mean annual Medicare spending based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

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## Methodology

**Data source.** This report's spending estimates are from the linkage of the California Cancer Registry (CCR), which is a contributor to the National Cancer Institute's Surveillance Epidemiology and End Results Program (SEER), and administrative claims data from the Medicare program. CCR collects comprehensive information about every incidence of cancer diagnosed in the state, including type of cancer, the extent of cancer, and the date of diagnosis and death. Medicare provides health insurance coverage to Americans over the age of 65 regardless of health status and to Americans under the age of 65 with select chronic disabilities. Hospitals, physicians, laboratories, and pharmacies submit itemized claim forms to Medicare to request payment for goods and services delivered. The amount Medicare reimburses provides an estimate of spending.

This linked dataset includes tumor registry variables, demographics, and vital status as well as Medicare claims for inpatient, outpatient, nursing home, hospice, and durable medical equipment. Starting in 2007, files also include most pharmacy claims covered under Medicare Part D plans.

**Data limitations.** CCR-Medicare data are available only for enrollees in traditional Medicare plans, also known as fee-for-service plans. SEER-Medicare spending records are not available for enrollees in Medicare Advantage plans (frequently

referred to as HMO or managed care plans) because these may involve capitated payments, and itemized billing records are not mandated. Among all Medicare enrollees in California diagnosed in 2007 to 2011 with one of the four cancers studied, approximately 53% are enrolled in a traditional fee-for-service plan. Myriad prior studies have demonstrated the feasibility of identifying utilization and spending from Medicare claims for fee-for-service beneficiaries.

**Timeframe.** The report represents patients diagnosed with cancer in California in 2007 to 2011. They are tracked for vital status through the end of 2012. All spending estimates have been adjusted for inflation to 2013 constant dollars.

**Patients included.** The research focused on Medicare spending for Californians with one of the following four cancers as a primary cancer: breast, lung, colorectal, and prostate cancer. These are the most commonly diagnosed cancers in the state. (The primary cancer is the original, or first, cancer. Cancer cells from a primary tumor may spread to other parts of the body and form secondary cancers.) Medicare patients diagnosed with cancer at all ages are included. However, 93% of the Medicare fee-for-service enrollees who made up the analytic cohort for this report were diagnosed at age 65 or older.

**Spending estimates.** All health care costs for a patient and not just cancer care costs are included in these spending estimates. Costs in the first year of diagnosis and in the last year of life may be mutually exclusive or may be overlapping. Medicare reimbursement data were used to estimate spending.

► **First year of diagnosis.** These spending estimates include the first 12 months of spending on a cancer patient, beginning with the month of diagnosis. Patients who die within the 12-month period contribute to the numerator and denominator only in months during which they survived for at least a day.

► **Last year of life.** These estimates reflect spending in the last year of life prior to and including the month of death. These estimates consider months irrespective of when patients were diagnosed with cancer. For example, if a patient was diagnosed with cancer one calendar month before death, that person's last year of life would include 2 months when the cancer was known and 10 months when it was not. For the charts on last year of life, death can be from any cause, including cancer.

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Note: For more on methodology, see "Estimating Cancer Care Spending in the California Medicare Population: Methodology Detail" available at [www.chcf.org/cancer-spending](http://www.chcf.org/cancer-spending).

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## About the Author

Deborah Schrag, MD, MPH, is a medical oncologist; chief, Division of Population Sciences, Department of Medical Oncology, Dana-Farber Cancer Institute; and professor of medicine at Harvard Medical School. Schrag's team at Dana-Farber / Harvard Cancer Center includes Kun Chen, PhD, biostatistician and statistical programmer; Ling Li, MA, statistical programmer; and Jennifer Wind, MA, PMP, senior project manager.

The interpretation and reporting of these data are the sole responsibility of the author.

## Acknowledgements

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## About the Foundation

The California HealthCare Foundation (CHCF) is leading the way to better health care for all Californians, particularly those whose needs are not well served by the status quo. We work to ensure that people have access to the care they need, when they need it, at a price they can afford.

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## Appendix A: Mean Medicare Spending per Person in First Year of Cancer Diagnosis by Site, Stage, and Race/Ethnicity, California, Dx 2007 to 2011

	African American	Asian / Pacific Islander	Latino	White
Breast Stage I	\$35,606	\$30,915	\$36,119	\$28,965
Breast Stage II	\$50,159	\$43,729	\$50,946	\$39,762
Breast Stage III	\$73,956	\$58,063	\$58,776	\$55,580
Breast Stage IV	\$82,337	\$82,117	\$74,884	\$64,942
Breast Stage Unknown	\$48,180	\$43,397	\$51,164	\$39,543
Prostate Stage I+II	\$27,974	\$30,209	\$31,165	\$25,943
Prostate Stage III	\$26,532	\$31,659	\$40,687	\$30,433
Prostate Stage IV	\$48,247	\$55,411	\$41,025	\$43,926
Prostate Stage Unknown	\$40,594	\$36,410	\$30,340	\$27,140
Lung Stage I	\$75,777	\$62,494	\$69,069	\$58,826
Lung Stage II	\$81,795	\$85,843	\$73,900	\$71,126
Lung Stage III	\$108,977	\$96,010	\$84,820	\$81,336
Lung Stage IV	\$115,211	\$107,693	\$101,755	\$89,590
Lung Stage Unknown	\$91,260	\$85,207	\$71,736	\$68,515
Colorectal Stage I	\$60,384	\$61,796	\$51,755	\$47,593
Colorectal Stage II	\$81,215	\$71,838	\$74,891	\$64,944
Colorectal Stage III	\$97,602	\$83,505	\$88,831	\$82,858
Colorectal Stage IV	\$124,138	\$114,323	\$109,925	\$105,765
Colorectal Stage Unknown	\$75,065	\$72,157	\$64,152	\$62,853

Notes: Spending shown represents estimated mean annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. Due to small N's for stage I prostate, stages I and II have been combined.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix B: Mean Medicare Spending in First Year of Cancer Diagnosis, by County California, Dx 2007 to 2011

	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)
Alameda	124	\$44,184	148	\$32,782	137	\$97,818	103	\$82,645
Alpine								
Amador	16	\$32,520	18	\$23,394				
Butte	79	\$31,459	84	\$23,642	76	\$65,474	44	\$58,003
Calaveras	16	\$40,407	22	\$30,390				
Colusa								
Contra Costa	106	\$35,146	125	\$30,178	103	\$89,376	75	\$79,029
Del Norte								
El Dorado	34	\$31,897	41	\$27,689	34	\$58,556	25	\$69,269
Fresno	111	\$33,364	146	\$22,280	112	\$73,226	73	\$61,621
Glenn			11	\$19,578				
Humboldt	37	\$24,327	44	\$24,593	34	\$67,051	29	\$49,943
Imperial	20	\$38,164	38	\$34,606	26	\$70,515	20	\$53,600
Inyo			11	\$19,054				
Kern	78	\$39,087	96	\$24,797	97	\$78,733	54	\$73,438
Kings	16	\$34,493	19	\$26,941	19	\$72,945	13	\$55,604
Lake	21	\$31,436	21	\$30,352	26	\$76,598	17	\$72,779
Lassen								
Los Angeles	865	\$41,214	1,049	\$31,996	839	\$95,867	745	\$81,645
Madera	17	\$34,531	23	\$22,706	23	\$63,274	16	\$59,566

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending shown represents estimated mean annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence. Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix B: Mean Medicare Spending in First Year of Cancer Diagnosis, by County California, Dx 2007 to 2011, *continued*

	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)
Marin	50	\$31,180	79	\$24,692	39	\$64,153	35	\$70,615
Mariposa								
Mendocino	25	\$26,287	31	\$26,018	24	\$65,679	19	\$73,951
Merced	38	\$34,903	51	\$26,634	45	\$81,607	27	\$72,439
Modoc								
Mono								
Monterey	82	\$32,451	131	\$29,917	76	\$80,255	48	\$68,274
Napa	21	\$34,587	35	\$24,931	21	\$72,454	15	\$75,264
Nevada	39	\$29,067	35	\$28,745	29	\$62,035	15	\$49,248
Orange	308	\$35,774	344	\$30,395	294	\$84,515	195	\$71,112
Placer	55	\$32,117	60	\$26,379	47	\$61,718	31	\$55,170
Plumas			12	\$24,700				
Riverside	209	\$34,437	264	\$26,698	204	\$76,177	147	\$66,612
Sacramento	140	\$32,958	149	\$26,270	154	\$66,851	92	\$62,643
San Benito			16	\$37,842				
San Bernardino	118	\$39,436	176	\$25,828	133	\$74,408	102	\$68,843
San Diego	325	\$29,807	354	\$23,599	333	\$67,391	226	\$57,415
San Francisco	87	\$28,803	109	\$30,680	104	\$80,192	90	\$68,350
San Joaquin	73	\$34,004	96	\$26,329	96	\$65,893	59	\$59,973
San Luis Obispo	75	\$29,561	81	\$24,329	58	\$64,075	43	\$52,391

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending shown represents estimated mean annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.



## Appendix B: Mean Medicare Spending in First Year of Cancer Diagnosis, by County California, Dx 2007 to 2011, *continued*

	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)	N (per year)	Spending (per person)
San Mateo	94	\$32,427	109	\$29,983	80	\$64,089	55	\$65,486
Santa Barbara	90	\$27,584	91	\$24,650	65	\$64,095	55	\$53,231
Santa Clara	184	\$35,694	240	\$29,537	147	\$83,912	131	\$73,640
Santa Cruz	45	\$34,518	72	\$27,401	29	\$70,711	29	\$72,684
Shasta	60	\$37,294	74	\$29,399	64	\$67,746	33	\$61,092
Sierra								
Siskiyou	16	\$30,358	22	\$24,682	18	\$64,353	11	\$50,994
Solano	40	\$29,919	45	\$26,452	46	\$84,808	21	\$69,276
Sonoma	78	\$29,964	74	\$26,854	66	\$69,645	58	\$69,244
Stanislaus	45	\$36,075	53	\$28,166	63	\$69,566	42	\$61,996
Sutter	19	\$29,901	25	\$27,257	22	\$63,374	12	\$78,861
Tehama	16	\$29,886	25	\$25,648	24	\$67,495	15	\$55,907
Trinity								
Tulare	59	\$37,854	80	\$26,451	68	\$71,523	52	\$55,358
Tuolumne	22	\$32,143	24	\$26,724	22	\$62,174	14	\$62,221
Ventura	121	\$37,406	141	\$29,678	104	\$74,762	84	\$64,317
Yolo			15	\$25,174	15	\$55,414		
Yuba			16	\$26,006	24	\$68,155		

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending shown represents estimated mean annual Medicare spending based on California beneficiaries diagnosed (Dx) in 2007-2011, and followed through 2012. Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix C: Mean Medicare Spending in the Last Year of Life, by Cancer Site and County, California, Dx 2007 to 2011

	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)
Alameda	109	\$82,302	128	\$72,840	573	\$84,744	263	\$95,119
Amador					48	\$54,831	18	\$64,321
Butte	68	\$45,237	68	\$51,465	284	\$59,389	103	\$57,245
Calaveras	11	\$63,936	12	\$56,877	68	\$47,305	18	\$76,968
Colusa					30	\$80,927		
Contra Costa	78	\$74,240	87	\$62,997	400	\$80,032	159	\$80,042
Del Norte					36	\$48,503		
El Dorado	31	\$54,779	24	\$37,482	120	\$55,467	43	\$61,393
Fresno	109	\$58,645	115	\$50,524	453	\$65,224	183	\$62,236
Glenn					38	\$53,101	19	\$83,114
Humboldt	36	\$45,934	34	\$44,743	143	\$55,490	56	\$59,565
Imperial	19	\$54,829	27	\$50,493	108	\$58,711	44	\$63,104
Inyo					25	\$78,091	13	\$60,108
Kern	72	\$67,250	66	\$60,060	402	\$69,145	130	\$82,193
Kings	16	\$55,124	15	\$73,998	77	\$66,797	26	\$50,727
Lake	16	\$64,863	15	\$59,265	105	\$67,187	41	\$85,393
Lassen					36	\$53,070		
Los Angeles	739	\$87,157	729	\$92,661	3,309	\$89,636	1,709	\$102,470
Madera	17	\$42,299	12	\$61,916	92	\$59,656	38	\$72,116

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending estimates are for the patient's last year of life, and represent estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence. N's are total number of patients who were Dx 2007-2011 and died 2007-2012.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix C: Mean Medicare Spending in the Last Year of Life, by Cancer Site and County, California, Dx 2007 to 2011, *continued*

	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)
Marin	36	\$52,122	33	\$63,179	130	\$59,286	58	\$78,855
Mariposa					22	\$50,295	0	\$0
Mendocino	19	\$41,071	22	\$42,662	90	\$57,428	37	\$79,576
Merced	32	\$77,435	31	\$65,515	176	\$73,727	62	\$76,174
Modoc					13	\$76,215		
Mono								
Monterey	62	\$64,833	84	\$60,400	293	\$69,298	89	\$79,875
Napa	14	\$66,197	24	\$56,104	84	\$64,111	42	\$86,648
Nevada	25	\$78,572	25	\$65,838	111	\$52,033	31	\$52,679
Orange	229	\$72,709	193	\$89,444	1,108	\$79,366	406	\$85,340
Placer	37	\$57,573	22	\$48,005	181	\$57,646	61	\$68,448
Plumas					28	\$47,332		
Riverside	168	\$65,099	199	\$57,259	817	\$68,650	320	\$82,714
Sacramento	125	\$61,884	106	\$53,758	615	\$57,244	216	\$68,094
San Benito					30	\$88,986	15	\$92,985
San Bernardino	135	\$82,558	144	\$65,965	531	\$65,377	248	\$80,693
San Diego	236	\$62,664	236	\$62,942	1,314	\$60,415	485	\$70,152
San Francisco	58	\$69,782	72	\$77,083	417	\$73,688	198	\$79,684
San Joaquin	66	\$67,833	69	\$77,201	400	\$58,401	131	\$71,301

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending estimates are for the patient's last year of life, and represent estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence. N's are total number of patients who were Dx 2007-2011 and died 2007-2012.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix C: Mean Medicare Spending in the Last Year of Life, by Cancer Site and County, California, Dx 2007 to 2011, *continued*

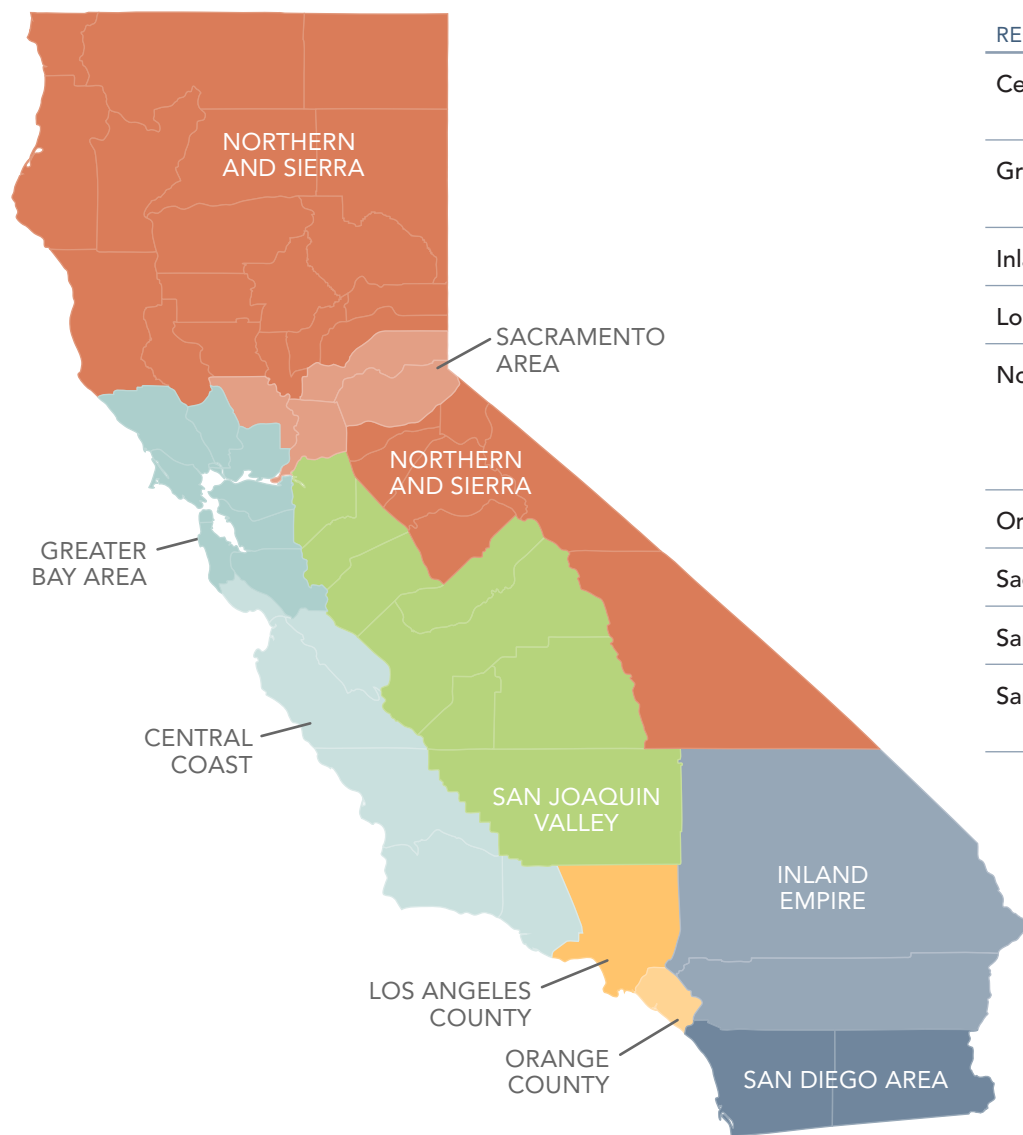
	BREAST		PROSTATE		LUNG		COLORECTAL	
	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)	N (total)	Spending (per person)
San Luis Obispo	54	\$55,297	56	\$49,406	238	\$52,209	82	\$59,333
San Mateo	79	\$59,729	68	\$74,829	288	\$61,669	116	\$71,652
Santa Barbara	53	\$49,513	52	\$56,369	263	\$56,212	104	\$54,700
Santa Clara	125	\$72,788	146	\$70,175	571	\$75,643	279	\$90,525
Santa Cruz	34	\$48,676	35	\$67,372	115	\$54,965	48	\$81,338
Shasta	47	\$49,999	52	\$62,633	254	\$58,011	80	\$68,423
Sierra								
Siskiyou	25	\$48,698	25	\$51,695	67	\$52,764	22	\$58,477
Solano	32	\$49,531	35	\$81,654	192	\$72,123	45	\$84,881
Sonoma	74	\$47,368	65	\$64,719	252	\$55,631	143	\$68,530
Stanislaus	44	\$63,161	44	\$56,204	249	\$62,591	100	\$69,832
Sutter					96	\$47,063	31	\$77,148
Tehama	12	\$29,939	23	\$63,134	99	\$56,504	37	\$63,740
Trinity					27	\$60,953		
Tulare	61	\$48,891	70	\$51,668	288	\$55,293	106	\$61,299
Tuolumne	17	\$56,385	15	\$54,120	86	\$51,484	29	\$70,529
Ventura	82	\$67,220	86	\$84,329	413	\$64,885	181	\$77,553
Yolo	11	\$38,118	15	\$36,276	58	\$52,409	25	\$53,709
Yuba					96	\$55,718	22	\$76,962

■ N is a small number, and therefore masked to protect confidentiality and adhere to the data use agreement.

Notes: Spending estimates are for the patient's last year of life, and represent estimated mean annual Medicare spending per patient based on California adults diagnosed (Dx) in 2007-2011, and who died 2007-2012 (Medicare claims 2006-2012). Estimates include the full year of Medicare spending prior to and including the month of death, irrespective of when the patient was diagnosed (see [Methodology](#) for more details). Spending estimates are based on Medicare fee-for-service patients only and have been adjusted for inflation to 2013 dollars. County is based on patient's place of residence. N's are total number of patients who were Dx 2007-2011 and died 2007-2012.

Source: CCR-Medicare, 2014 data linkage, Healthcare Delivery Research Program, National Cancer Institute.

## Appendix D: California Counties Included in Regions



REGION	COUNTIES
Central Coast	Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, Ventura
Greater Bay Area	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma
Inland Empire	Riverside, San Bernardino
Los Angeles County	Los Angeles
Northern and Sierra	Alpine, Amador, Butte, Calaveras, Colusa, Del Norte, Glenn, Humboldt, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, Tuolumne, Yuba
Orange County	Orange
Sacramento Area	El Dorado, Placer, Sacramento, Yolo
San Diego Area	Imperial, San Diego
San Joaquin Valley	Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare