SEER and SEER*Stat Overview

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NCI Analytic Tools SEERies

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NIH NATIONAL CANCER INSTITUTE

SEER

Outline

- Introduction to SEER
- Example of Analysis using SEER Data
- SEER*Stat Tutorial

Surveillance, Epidemiology, and End Results (SEER)

- SEER mission to support research
  - Diagnosis, treatment, and outcomes of cancer since 1973
  - Provide baseline data on U.S. cancer incidence and survival trends
- Population-based registries representing almost 35% of the U.S. population
- Over 550,000 incident cases reported annually

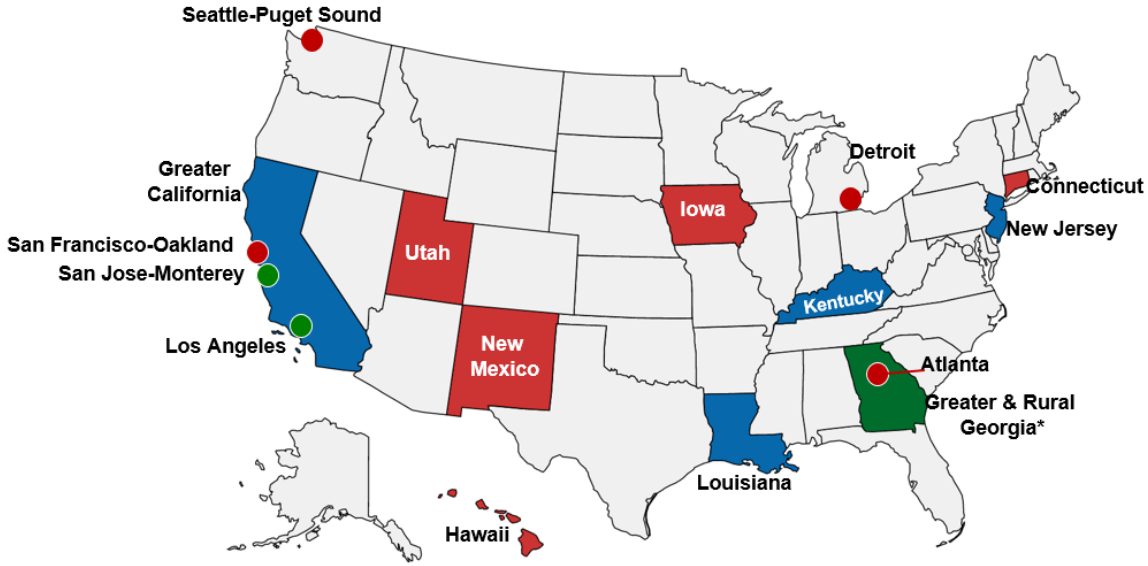
SEER Data: Quality and Timeliness

- Data quality is an important part of keeping data consistent and a reliable source for cancer statistics

- North American Association of Central Cancer Registries (NAACCR) issues certification for data quality including:
  - Case ascertainment 95% or higher completeness
  - Fewer than 3% of cases based on death certificates only
  - Less than 2% of cases have missing age, sex, and county

- Three year lag between diagnosis and reporting of cancer
  - November 1st 2020 data submission-> cases diagnosed through 2018-> Data release on April 15, 2021

U.S. Map with SEER Registries



SEER Registry Initiation Date

1973-1975 SEER | 1988-1999 SEER | 2000 SEER Expansion

*Rural GA, Los Angeles and San Jose-Monterey data available since 1992. Greater GA data available since 2000.

Evolution of SEER Over Time

- SEER 9 covering years 1975+
  - San Francisco-Oakland, Connecticut, Detroit, Hawaii, Iowa, New Mexico, Seattle, Utah, Atlanta
  - Covers 9.4% of the US population
- SEER 13 covering years 1992+
  - SEER 9 plus San Jose-Monterey, Los Angeles, Rural Georgia, Alaska Natives
  - Covers 13.4% of the US population
- SEER 18 covering years 2000+
  - SEER 13 plus California (excluding SF/SJM/LA), Kentucky, Louisiana, New Jersey, Georgia (excluding Atlanta and Rural Georgia)
  - Covers 27.8% of the US population

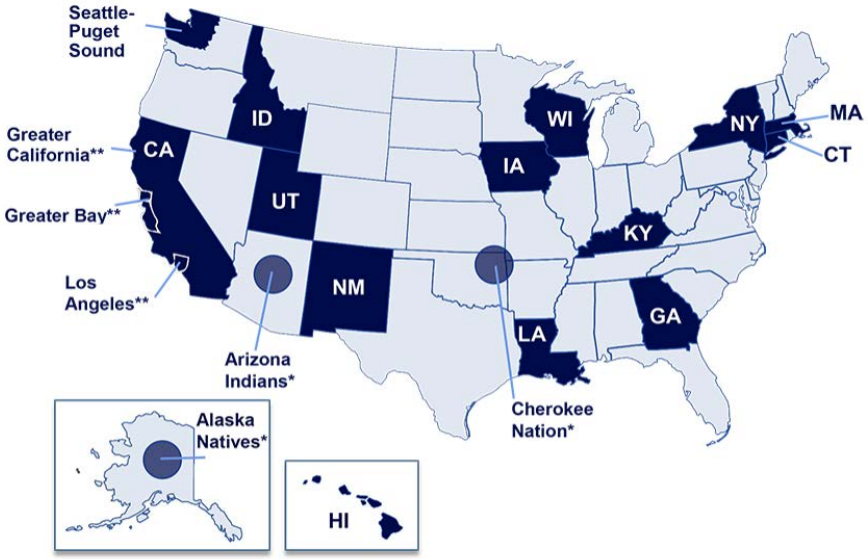
SEER Expansion in 2018 and 2021

- SEER has expanded in 2018:

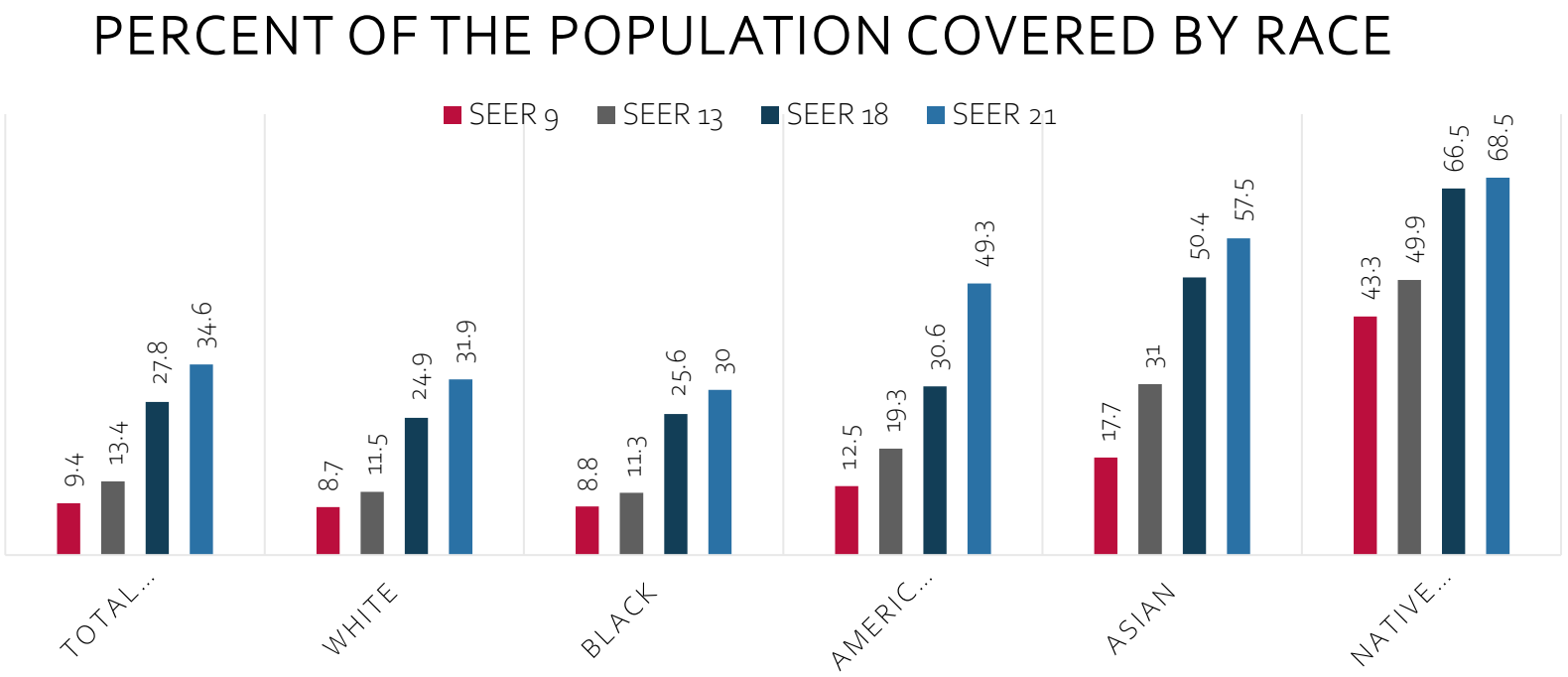
  New SEER areas include Massachusetts, New York, Wisconsin, and Idaho (36.7% of US population)

- SEER has expanded again in 2021:

  New SEER areas include **48%** of the US population!



Population Coverage by Race/Ethnicity



Data in SEER Registries

- **Demographic**: age, gender, area of residence, race and ethnicity, marital status.
- **Tumor (cancer):** primary cancer site, histology, morphology, stage, lab values and tumor markers
- **Treatment**: treatment in hospital more complete than outpatient (e.g., first course chemotherapy, surgery, radiation)
- **Outcome** (follow-up for vital status): living or deceased, month and year of death and cause of death
- SEER data is linked at the county level with Census data and provide socio-economic variables at the county of residency
- Data is consolidated and available for analyses in SEER*Stat

Where Are SEER Statistics Reported?

- Fact Sheets – Plain language summaries of key statistics by cancer site
http://seer.cancer.gov/statfacts/

- SEER*Explorer
https://seer.cancer.gov/explorer/

- State Cancer Profiles (Interactive Maps)
http://statecancerprofiles.cancer.gov/

- Annual Report to the Nation - provides an annual update of cancer incidence, mortality, and trends in the United States.

Standard Statistics Reported Using SEER Data

- Incidence: Rate per 100,000
- Trends in incidence, annual percent change in rates, or average annual percent change over a specified time frame
- Prevalence of people alive with a previous diagnosis of cancer
- Cancer Survival Statistics (Relative or Cause Specific Survival)
- Probability of developing or dying of cancer over a lifetime

Example of Analysis Using SEER Data

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

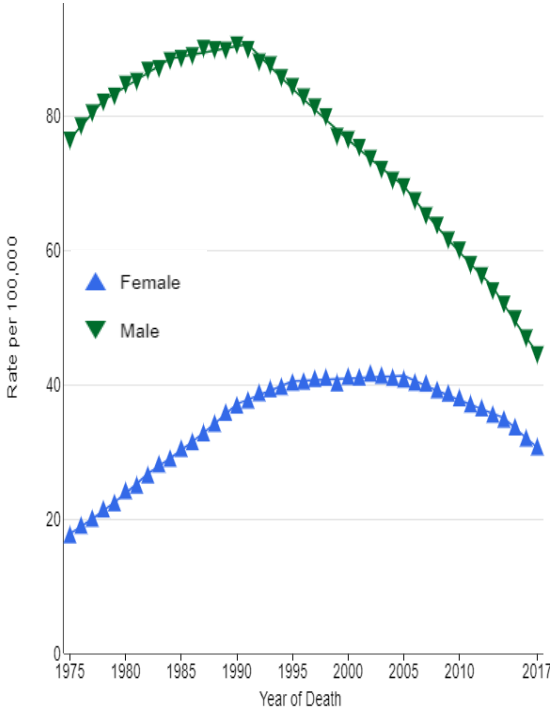
The Effect of Advances in Lung-Cancer Treatment on Population Mortality

Nadia Howlader, Ph.D., Gonçalo Forjaz, D.V.M., Meghan J. Mooradian, M.D., Rafael Meza, Ph.D., Chung Yin Kong, Ph.D., Kathleen A. Cronin, Ph.D., Angela B. Mariotto, Ph.D., Douglas R. Lowy, M.D., and Eric J. Feuer, Ph.D.

N ENGL J MED 383;7 NEJM.ORG AUGUST 13, 2020

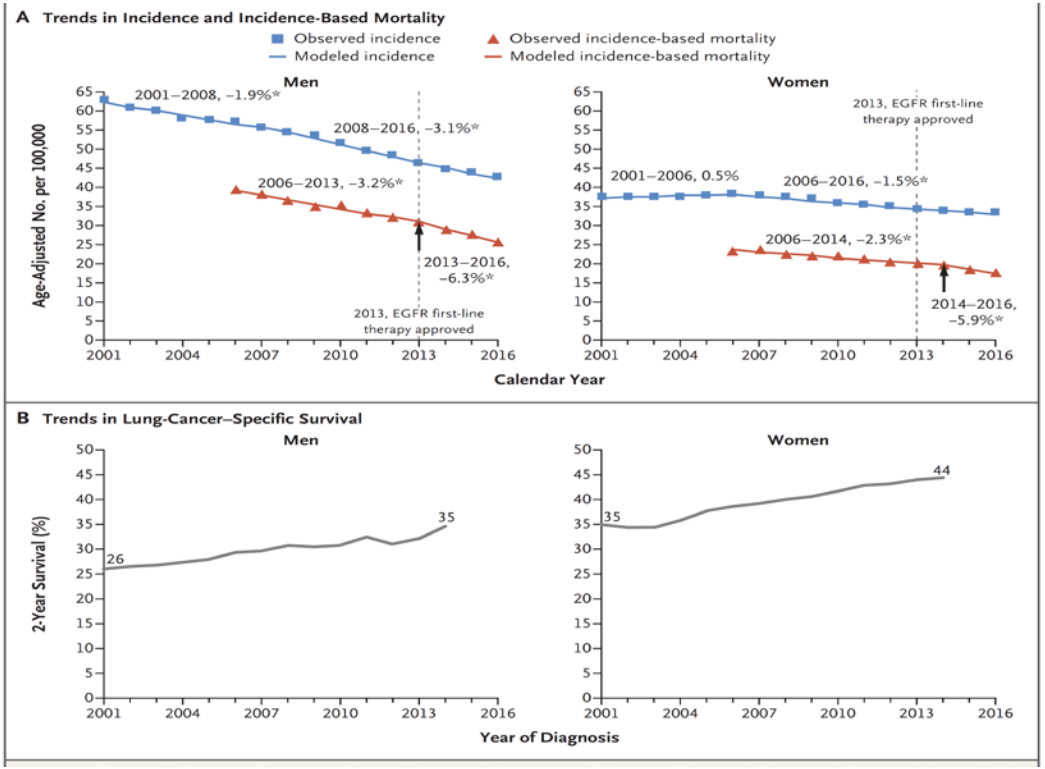
Background

Lung and Bronchus Cancer Mortality, US. 1975-2017

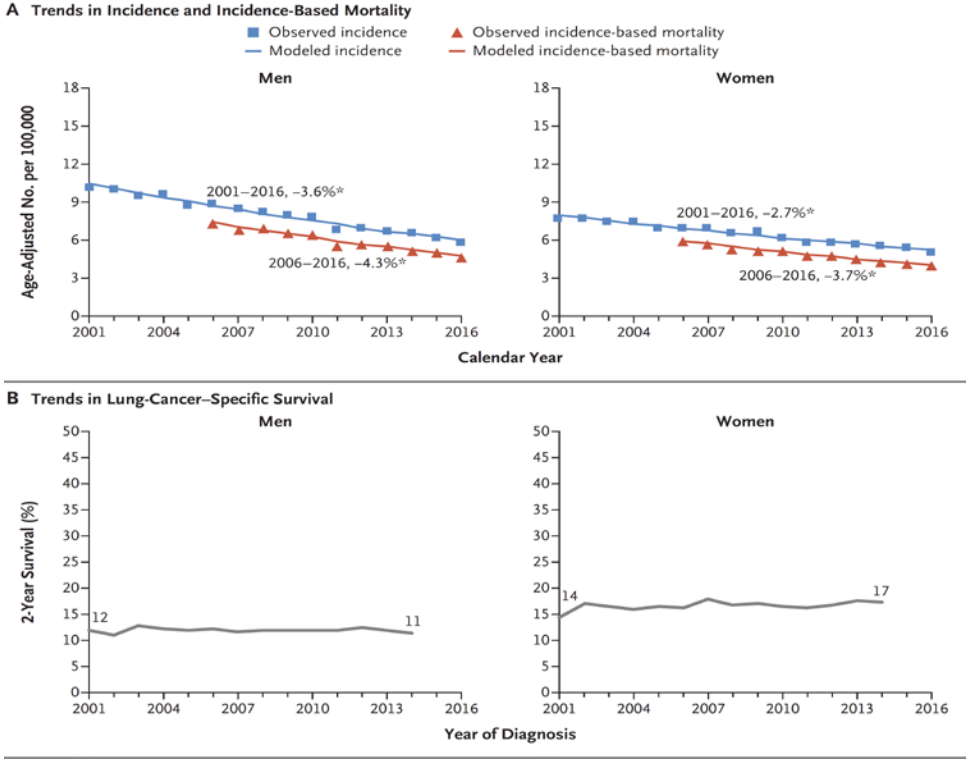


- Rapidly declining lung cancer mortality rates
- American Cancer Society (ACS) reported largest one-year drop in cancer mortality; decline in deaths from lung cancer drove the record drop last year
- This captures overall trend from all subtypes combined
- How much do specific lung cancer subtype contribute to this overall trend in mortality?

Trends in Non-small Cell Lung Cancer: Incidence, Mortality, and Survival



Trends in Small Cell Lung cancer: Incidence, Mortality, and Survival



Conclusions

- SCLC: steady decline in mortality explained entirely by lower incidence (potentially attributable to reduced tobacco use)
- NSCLC: steady decline initially followed by rapid decline in 2013-2016
  - Mainly explained by dissemination of targeted therapies approved in 2013 for stage IV EGFR+NSCLC as first line therapy
  - Estimates suggest possible population level impacts of targeted therapies

www.cancer.gov **www.cancer.gov/espanol**