Overview of the latest SEER data and statistics released April 2024

Nadia Howlader, Annie Noone, Angela Mariotto, Kathy Cronin

Surveillance Research Program

Outline

- Highlights of the April 17, 2024 data release
  - Population and mortality rates
  - Impact of COVID on the data, statistics & reporting: Implications of using 2020 and 2021 data in Joinpoint models
  - Other changes & updates
- Q & A

Populations & mortality rates

Census 2020

- Two new annual bridged race population estimates produced
  - New intercensal population estimates using both 2010 and 2020 Census from Woods and Poole
  - Postcensal populations based on 2020 Census

- Census creates population files specifically for NCI that reflect mid-year, race bridged population, at the county

- Contract with the census is to continue to create race-bridged population files through calendar year 2025
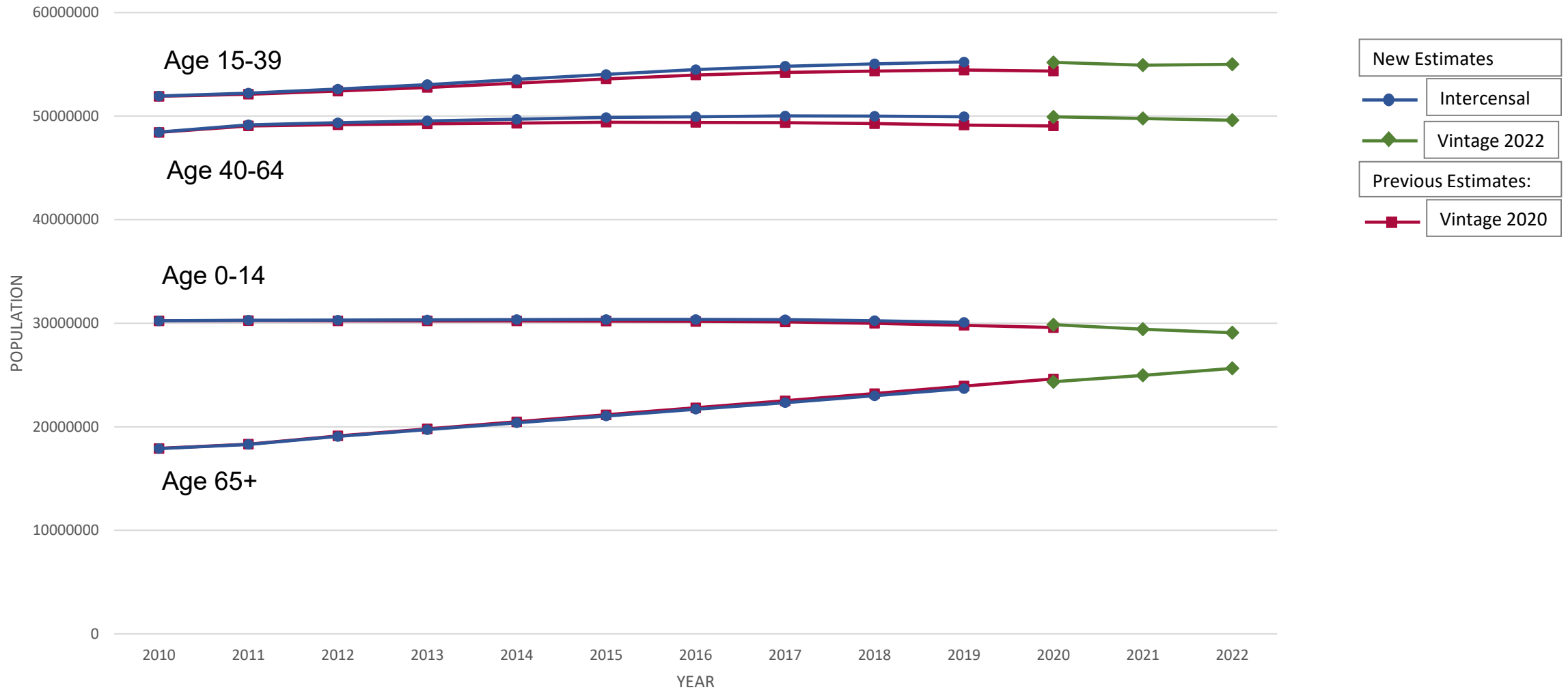
Populations for data release

- April 2023
  - 2011-2020 populations projected forward from Census 2010 (Vintage 2020)
- April 2024
  - 2020-2022 populations first year estimated using information from Census 2020 (Vintage 2022)
  - 2011-2019 populations produced by Woods and Poole (Intercensal estimates)
    - Using same methodology as Census
    - Use Census estimates in next data release
- April 2025
 - 2010-2020 Census Vintage populations and Intercensal estimates (Vintage 2023)

Comparison of new population estimates to previous estimates

- Time-series graphs for 50 states, DC, SEER regsitries, and SEER groupings
- Estimates shown
  1. 2011-2020 populations projected forward from Census 2010 -- Vintage 2020
  2. Intercensal 2011-2020 population estimates (Woods & Pool estimated populations going back in time using both Census 2010 and Census 2020) – Intercensal
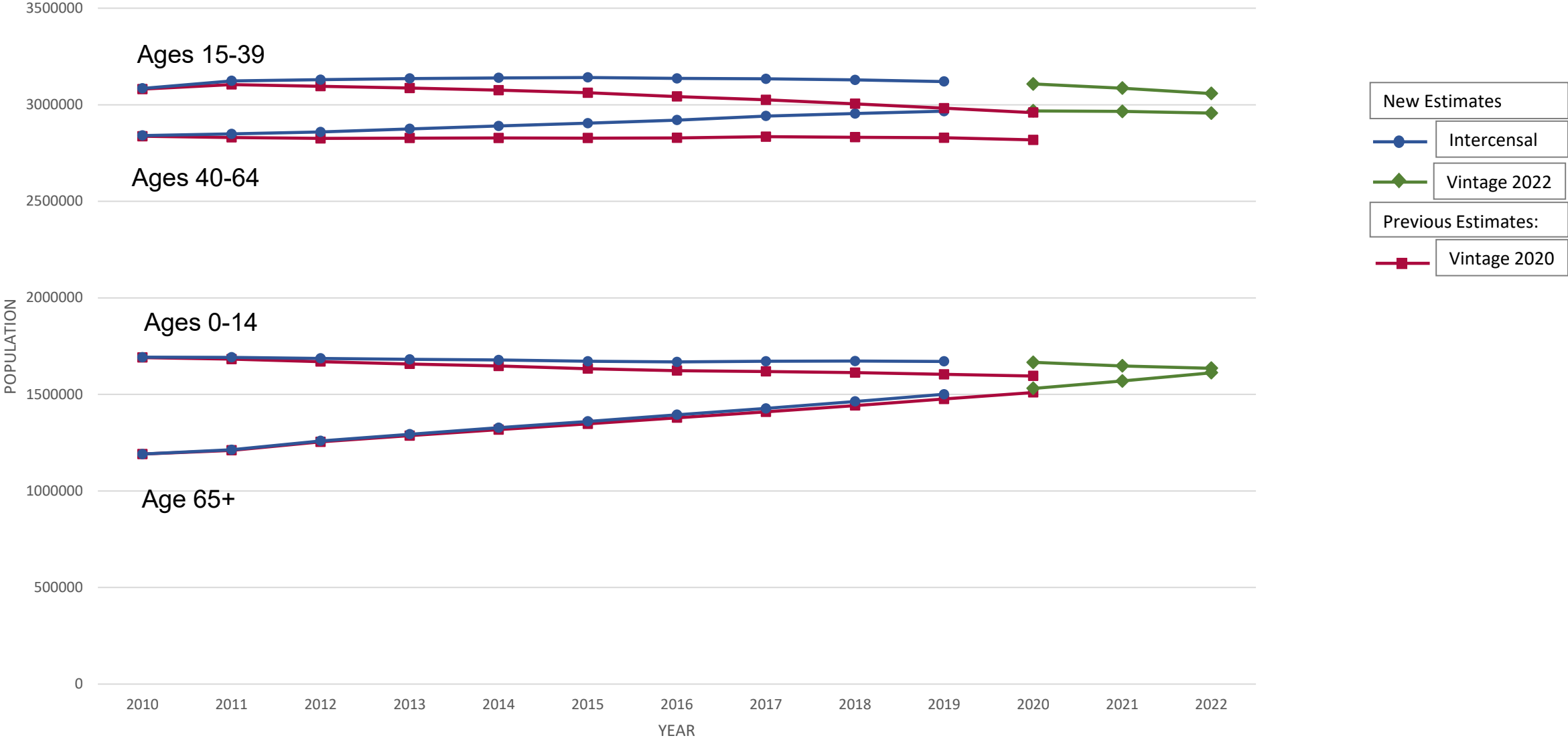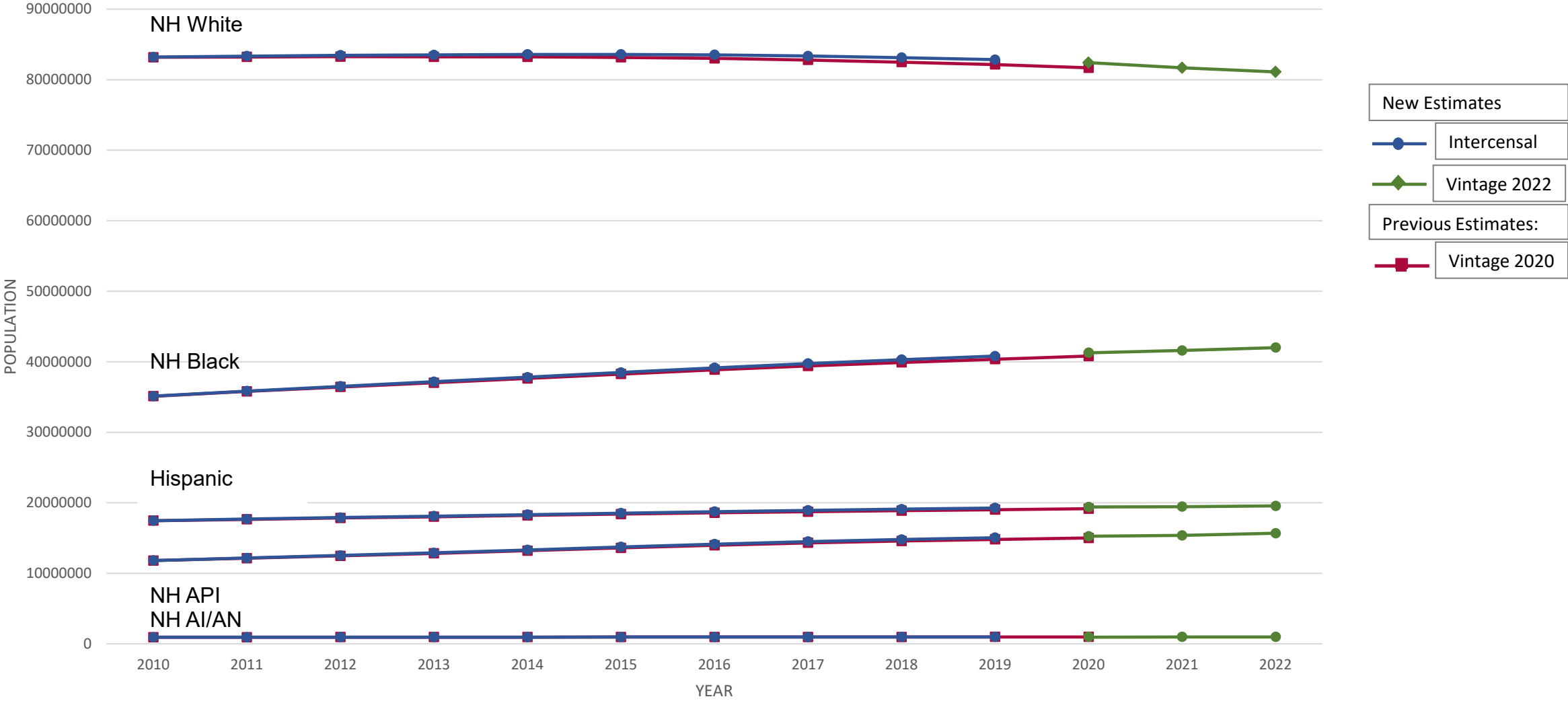 3. 2020-2022 populations projected forward from Census 2020 -- Vintage 2022

SEER-22

California

Ages 15-39

Ages 40-64

Ages 0-14

Age 65+

POPULATION

YEAR

New Estimates

Intercensal

Vintage 2022

Previous Estimates:
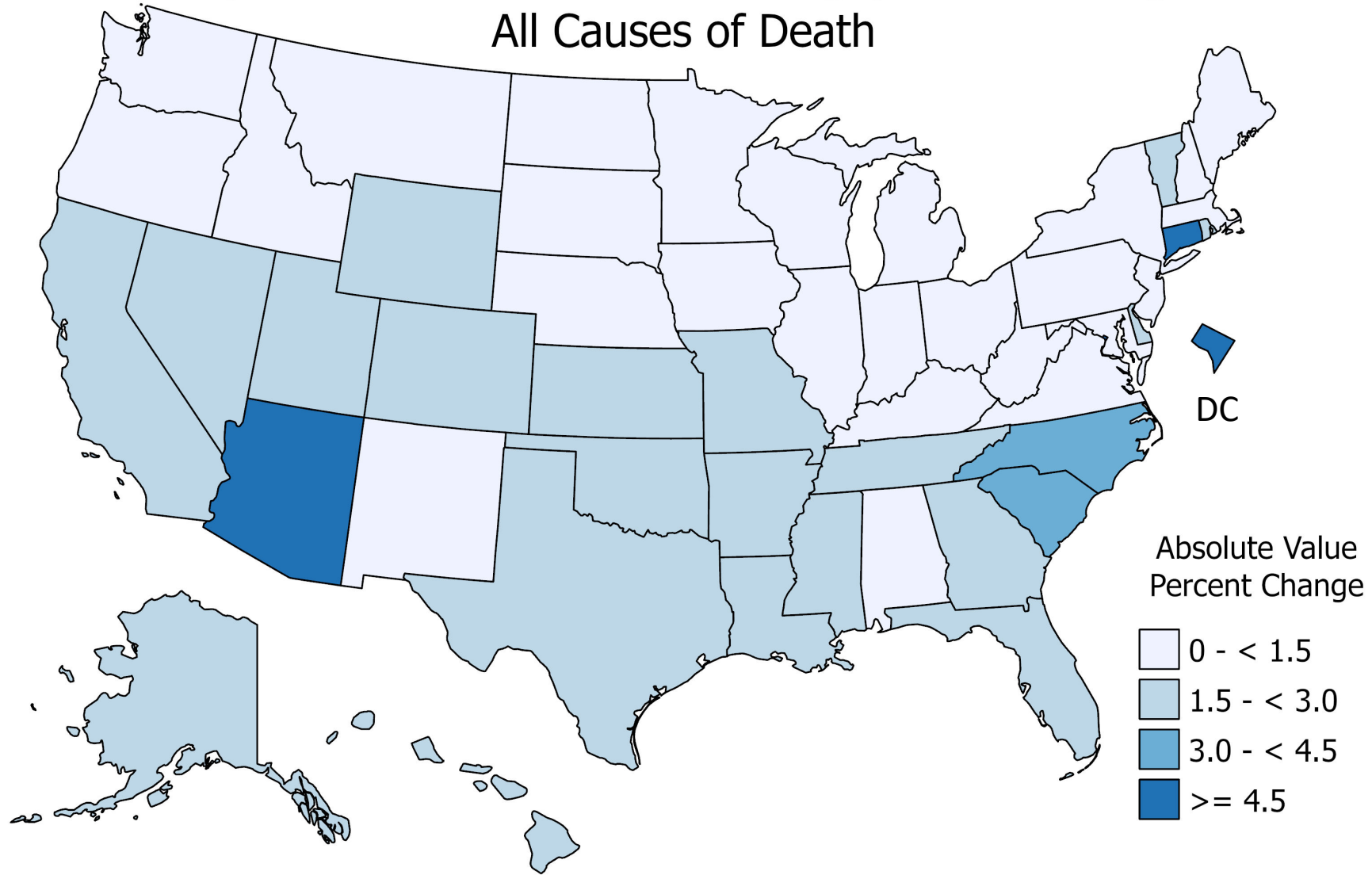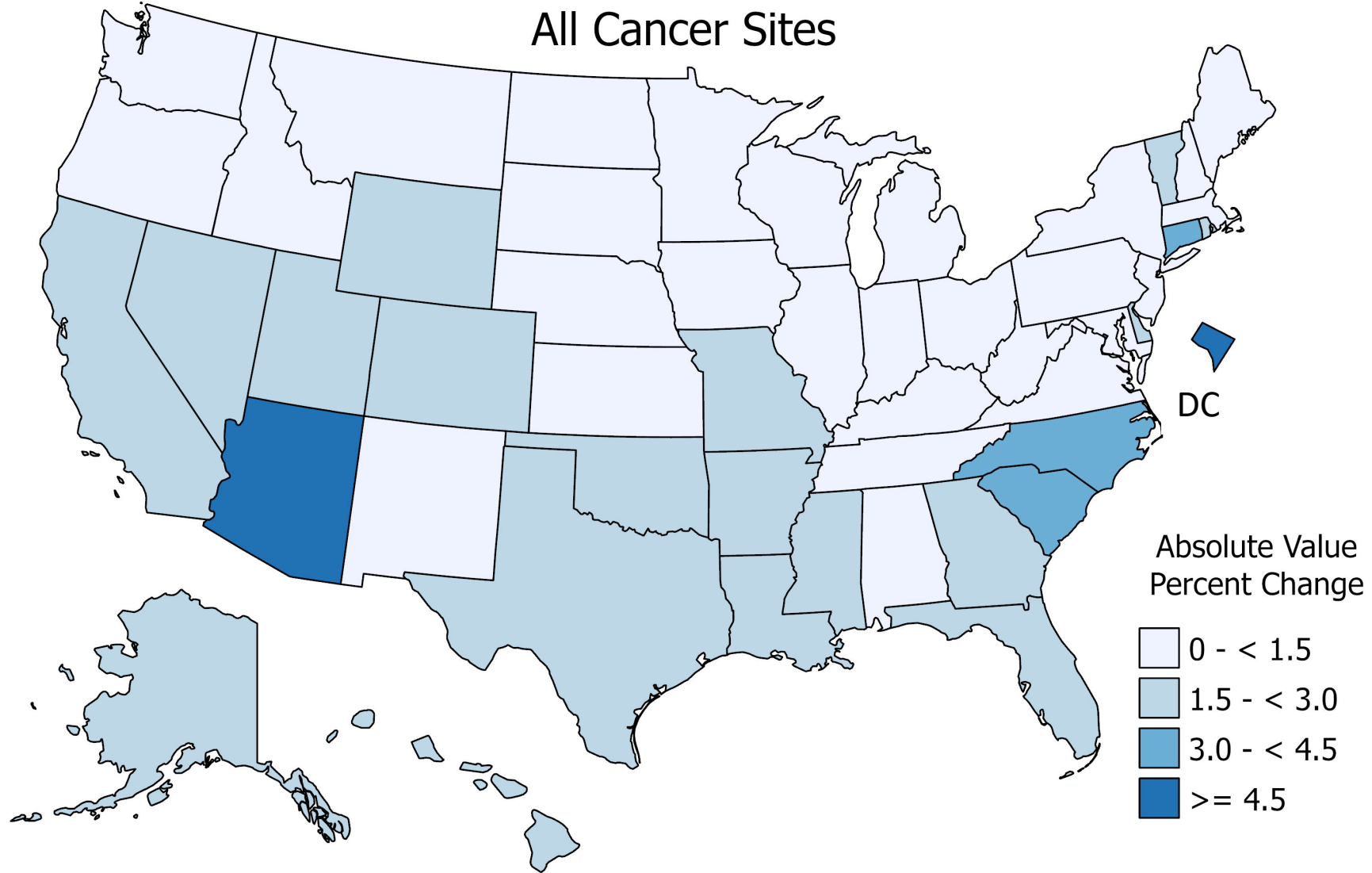
Vintage 2020
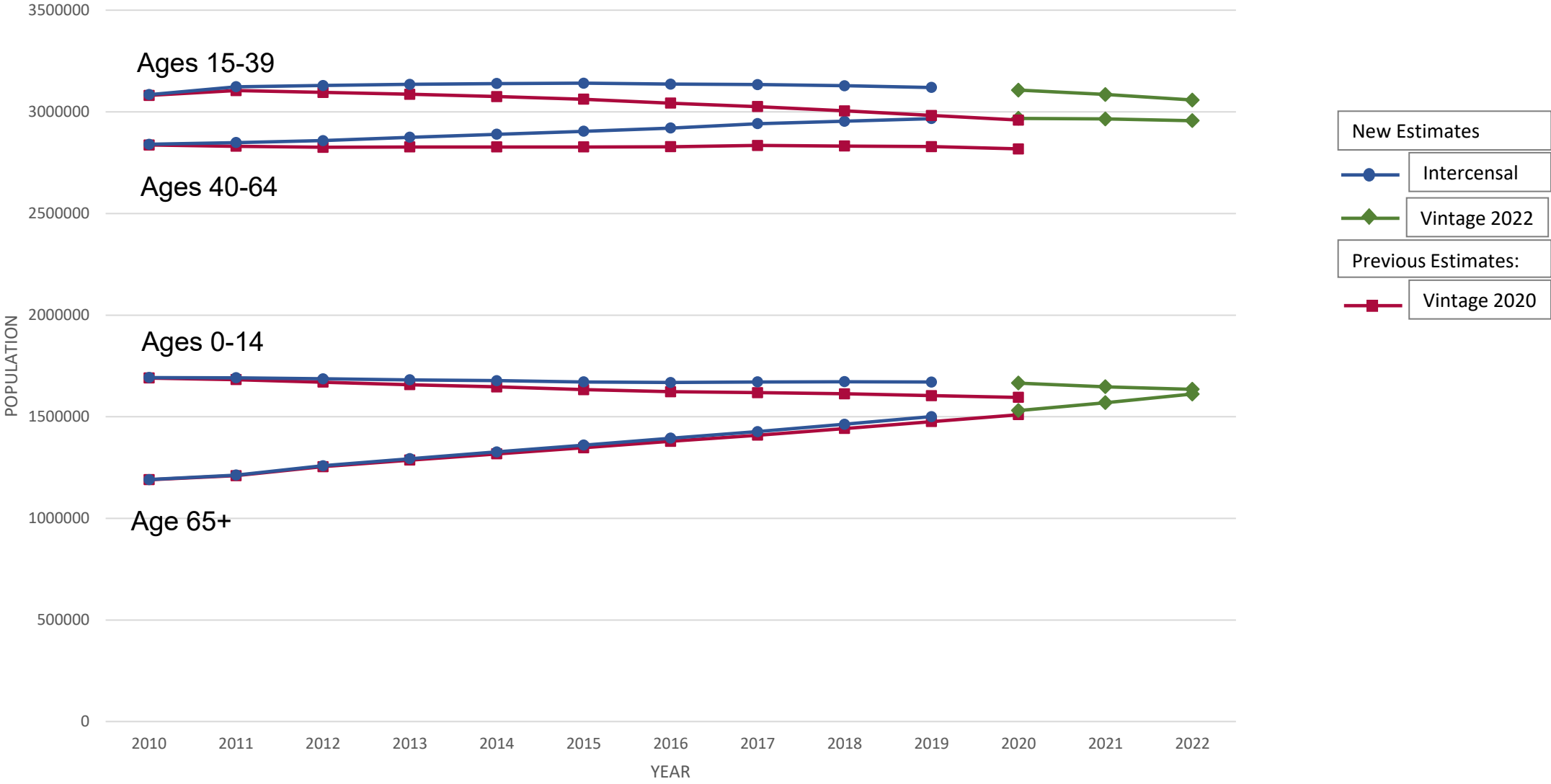
New Jersey

SEER-22

Intercensal population impact on mortality rates

- New population estimates are not very different
- Mortality rates based on both population and number of deaths
- Changes in population can cause increases or decreased in rate

- Percentage change in 2020 rates from new intercensal population compared to Vintage 2020 population
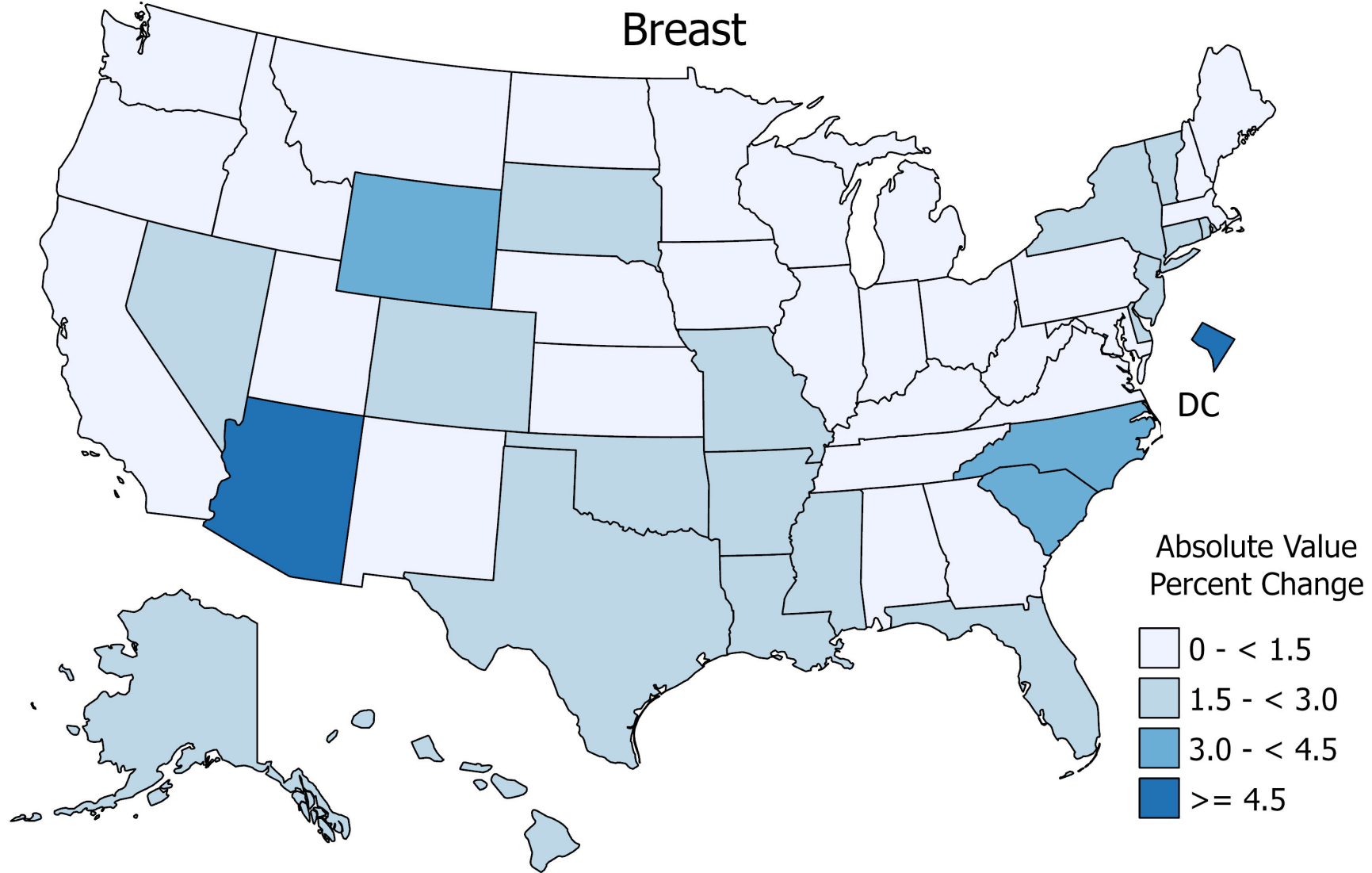
Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
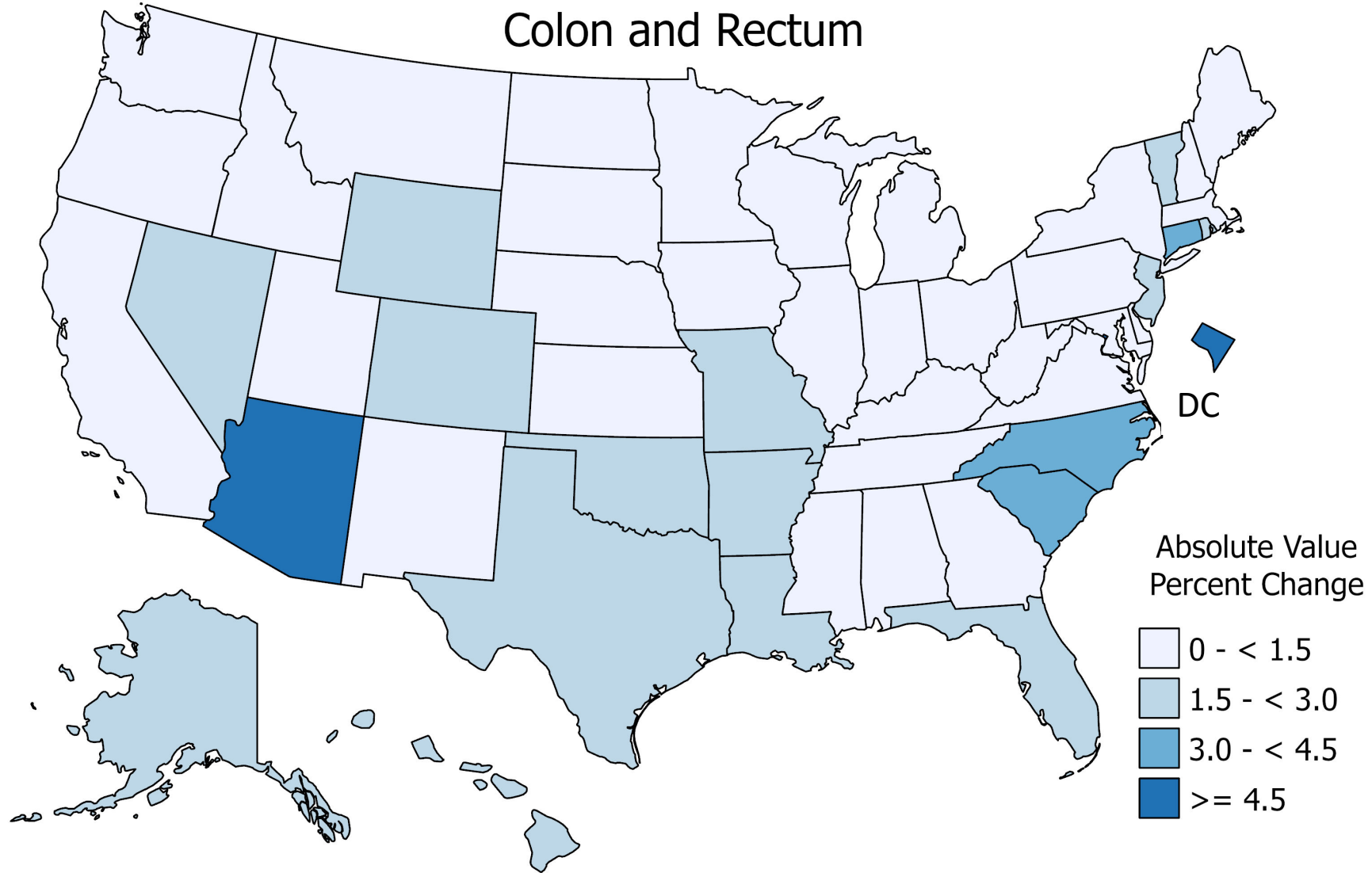## All Causes of Death

DC

Absolute Value Percent Change

- 0 - < 1.5
- 1.5 - < 3.0
- 3.0 - < 4.5
- >= 4.5

Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
All Cancer Sites

DC

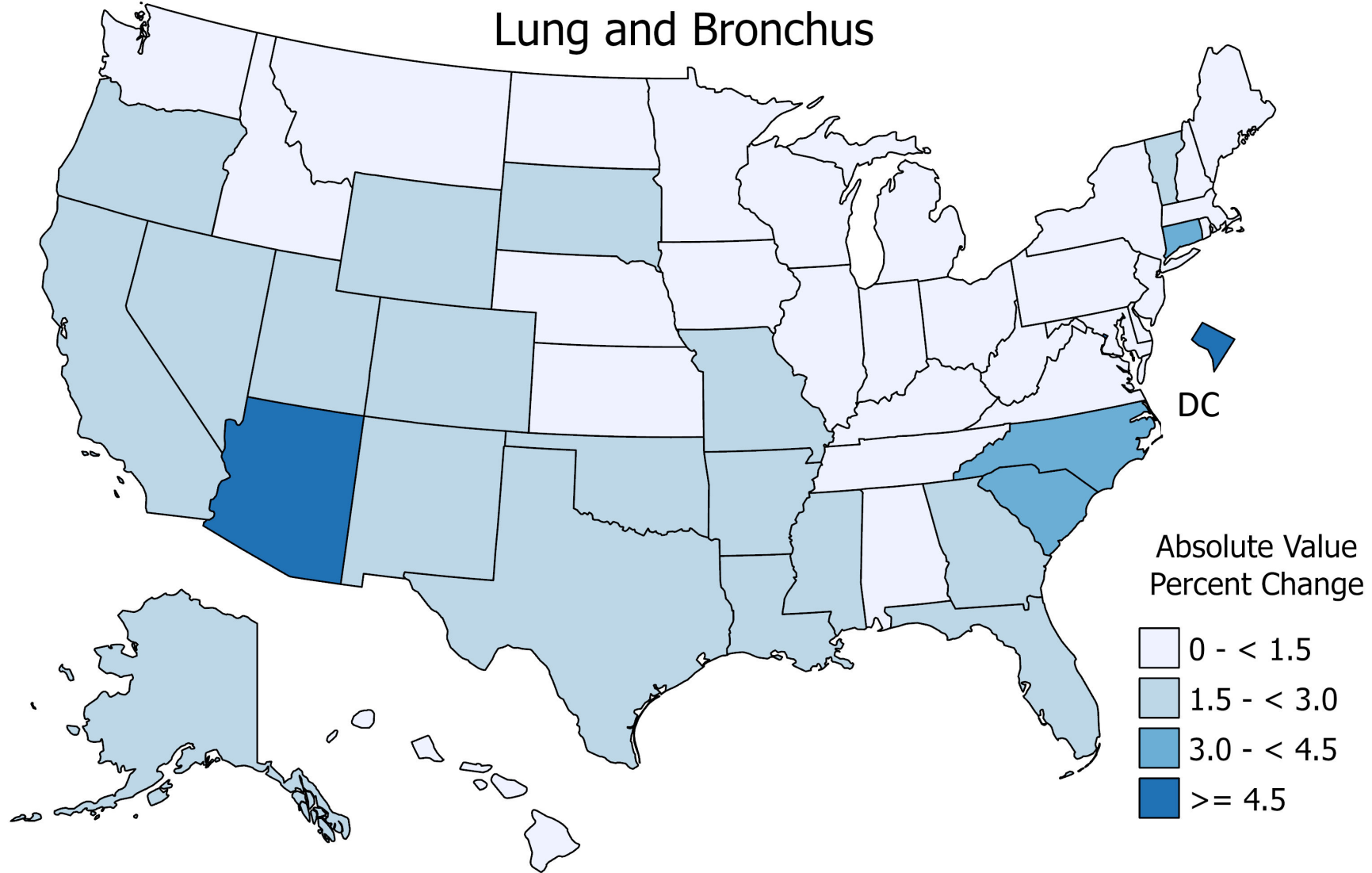Absolute Value
Percent Change

- 0 - < 1.5
- 1.5 - < 3.0
- 3.0 - < 4.5
- >= 4.5

Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
Breast

Absolute Value
Percent Change

0 - < 1.5

1.5 - < 3.0

3.0 - < 4.5

>= 4.5

DC

Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
Colon and Rectum

DC

Absolute Value
Percent Change

0 - < 1.5

1.5 - < 3.0

3.0 - < 4.5

>= 4.5

Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
Lung and Bronchus

DC

Absolute Value
Percent Change

- 0 - < 1.5
- 1.5 - < 3.0
- 3.0 - < 4.5
- >= 4.5

Mortality Rates Absolute Value Percent Change
(2020 Intercensal - 2020 Vintage) / 2020 Vintage
Prostate
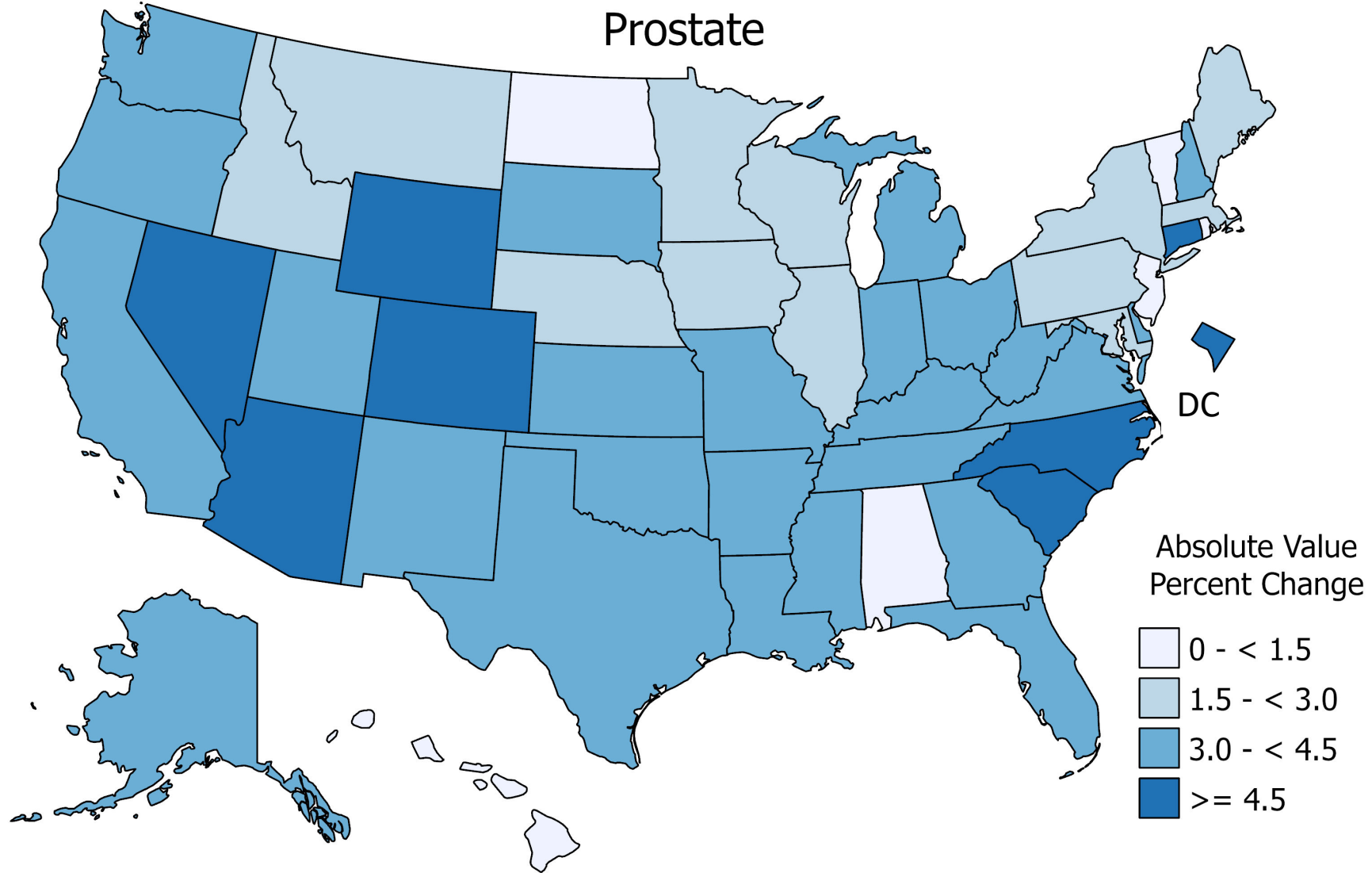
DC

Absolute Value
Percent Change

- 0 - < 1.5
- 1.5 - < 3.0
- 3.0 - < 4.5
- >= 4.5

Impact of COVID on the data, statistics & reporting: Implications of using 2020 and 2021 data in Joinpoint models

Using the November 2023 Data Submission

Introduction

- Cancer incidence rates for all cancers combined fell 10% in 2020 relative to 2019 rates, due to COVID-19 pandemic-related delays in cancer diagnosis and screening

- Inclusion of the 2020 data point led to a loss of power in Joinpoint models due to the added variance introduced by the 2020 data point, which is considerably lower than the predicted trend

The loss of power may have a few consequences

- Poorer fit to the data and detection of fewer Join-points

- Less precise annual percent change (APC) estimates (larger variance, more estimates being statistically non-significant)

- Both

The 2023 SEER Data Release:

- Excluded the 2020 incidence data from the estimation of Joinpoint trends and risks of developing cancer (DevCan)

- The 2020 incidence data was included in all other statistics and SEER databases

- More information on exclusion of 2020 data in joinpoint trend modeling provided in JNCI paper.

https://seer.cancer.gov/data/covid-impact.html

SEER November 2023 Data Submission -

- Includes new cancer cases diagnosed in 2021, the second year of the COVID-19 pandemic.
- Delay-Adjusted 2021 incidence rates for all cancer sites combined is:
  - 9% higher compared to 2020 incidence rate
  - We are not seeing a rebound. 2021 rates are 1% lower relative to 2019 rates (pre-pandemic)

How to Handle 2020 and 2021 Incidence Rates in the Joinpoint Model

- Should we include all data or should we continue excluding 2020?

- We fit 3 Models to the data
  - Model 1: **Excluding 2020 and 2021-Pre-pandemic trends**
  - Model 2: **Including all data**
  - Model 3: **Excluding only 2020 (including 2021)**

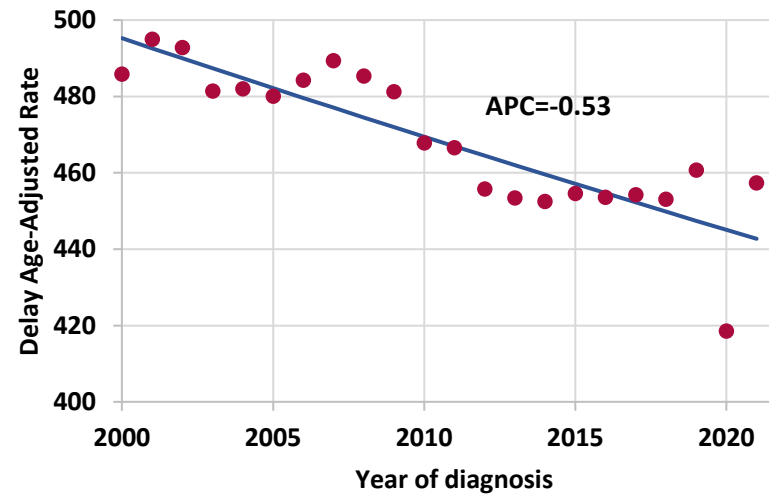# Examples of some common patterns

- When all data is included (Model 2):
  - Poorer fit and estimation of smaller number of joinpoints: **all cancer sites and female breast**
  - APC of last segment is not significant: **colorectal and melanoma**
  - For some cancer sites the models including and excluding 2020 present somewhat similar results: **prostate and bladder**
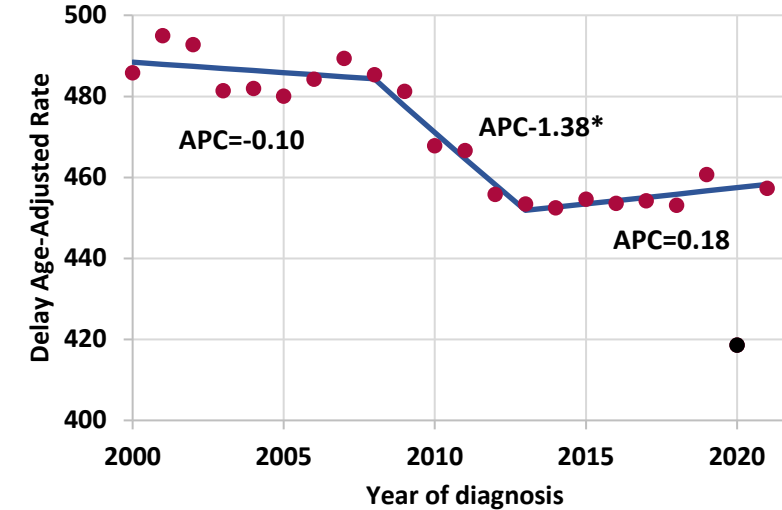
All Sites Combined

Model 1
(Excludes 2020 & 2021)
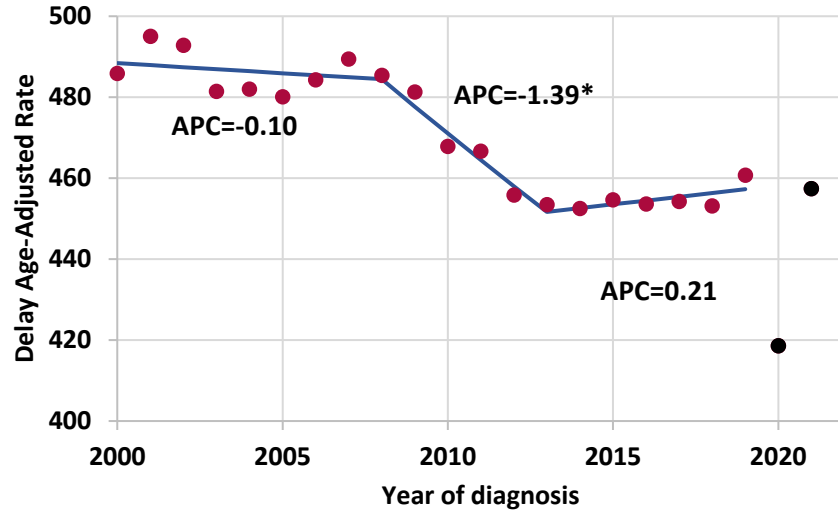
Model 2
(All Data)

Model 3
(Excludes 2020)

Joinpoints in 2008 and 2013

- Trend significantly declined between 2008-2013 by 1.39% per year
- Trend has been stable between 2013-2019
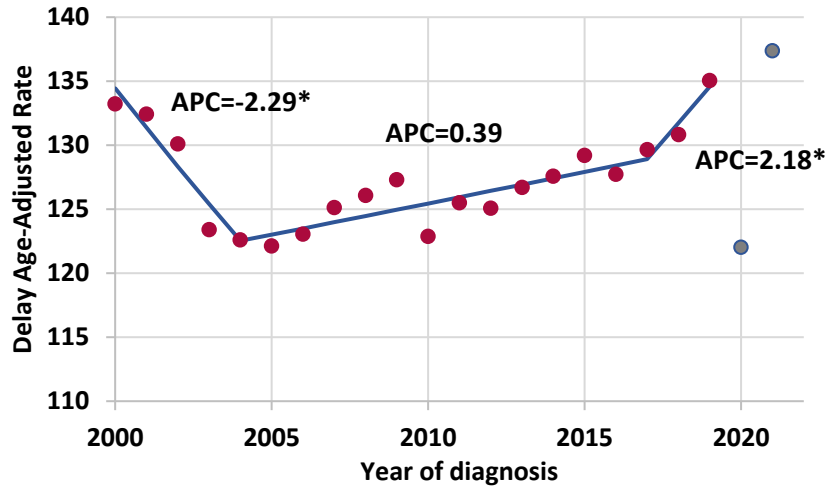
Very poor fit of the model

- Trend has been declining at a constant rate of 0.5% per year since 2000, but not statistically significant
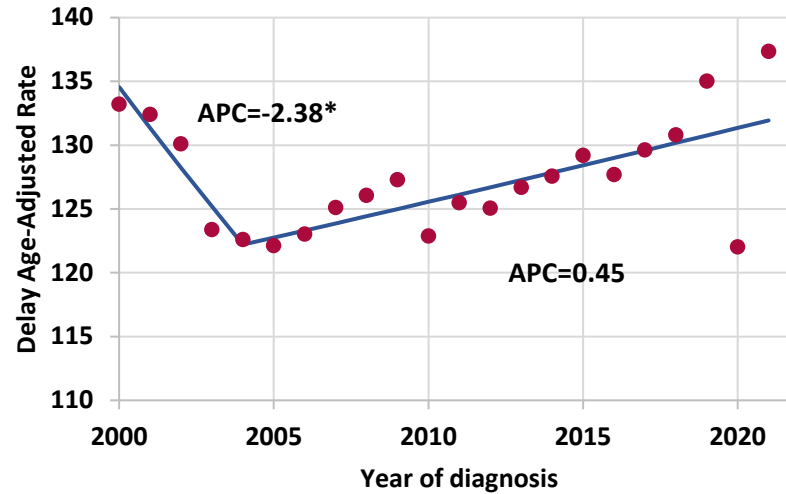
Joinpoints in 2008 and 2013

- Trend significantly declined between 2008-2013 by 1.38% per year
- Trend has been stable between 2013-2021
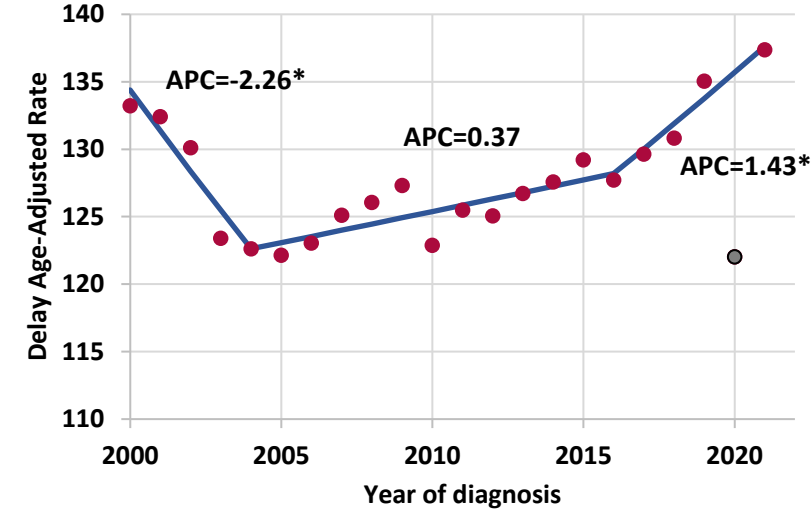
Female Breast

Model 1
(Excludes 2020 & 2021)

APC=-2.29*

APC=0.39

APC=2.18*

Model 2
(All Data)

APC=-2.38*

APC=0.45

Model 3
(Excludes 2020)

APC=-2.26*

APC=0.37

APC=1.43*

Joinpoints at 2004 and 2017

- Trend has been increasing between 2017-2019 at 2.18%
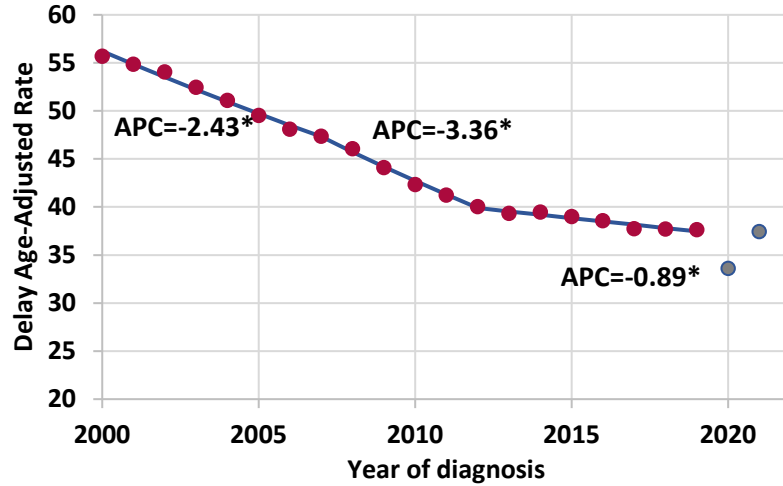
Joinpoint at 2004

- Poor fit last segment
- Trend has been increasing at a constant rate of 0.45% per year since 2004, but not statistically significant
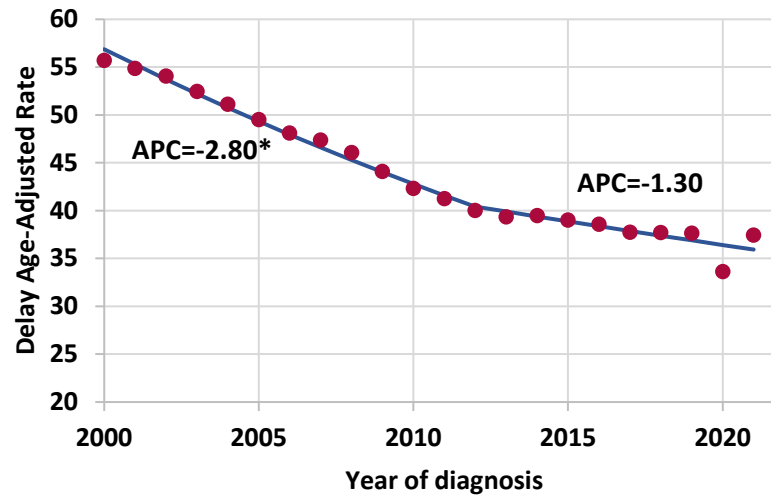
Joinpoints at 2004 and 2016

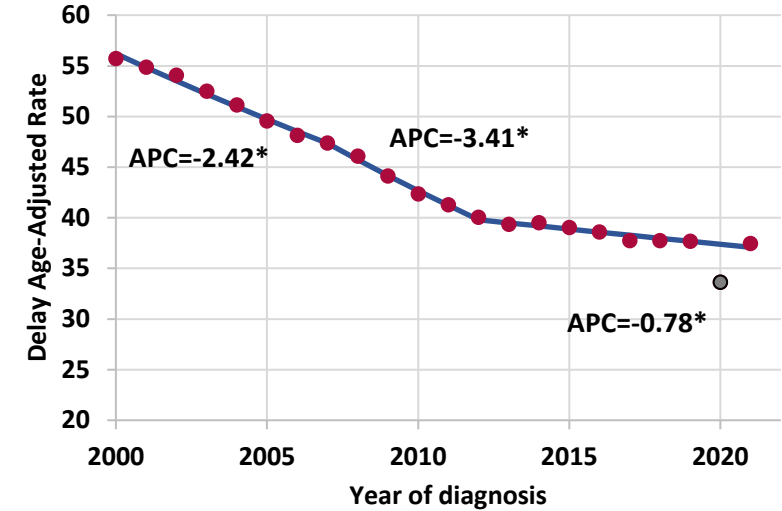- Trend has been increasing between 2016-2021 at 1.43%

Colorectal

Model 1
(Excludes 2020 & 2021)

APC=-2.43* APC=-3.36*

APC=-0.89*

Model 2
(All Data)

APC=-2.80*

APC=-1.30

Model 3
(Excludes 2020)

APC=-2.42* APC=-3.41*

APC=-0.78*

Joinpoints in 2007 and 2012

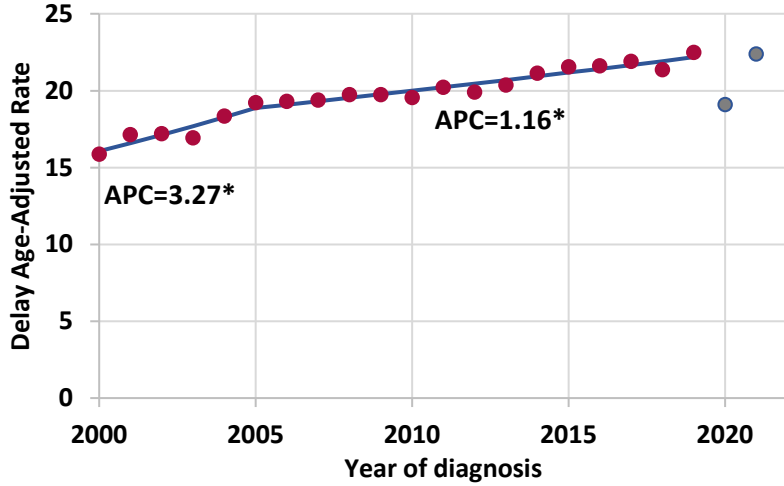- Trend significantly declined in all periods

Joinpoint in 2012

- The trend in 2012-2021 is **NOT significantly decreasing**
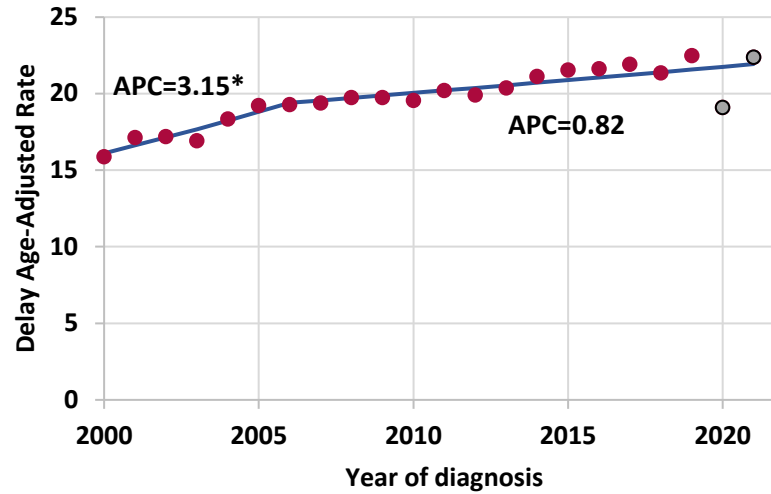
Joinpoints in 2007 and 2012

- Trends similar to Model 1
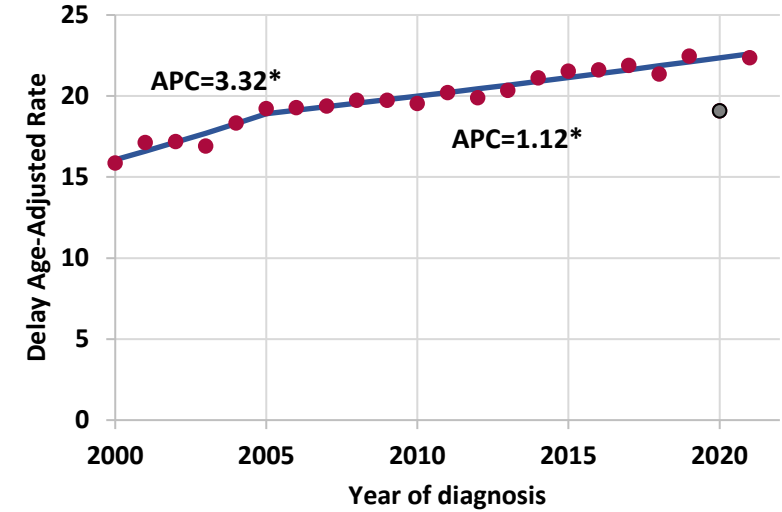- Trend significantly declined in all periods

Melanoma

Model 1
(Excludes 2020 & 2021)

APC=3.27*

APC=1.16*

Model 2
(All Data)

APC=3.15*

APC=0.82

Model 3
(Excludes 2020)

APC=3.32*

APC=1.12*

Joinpoint in 2005

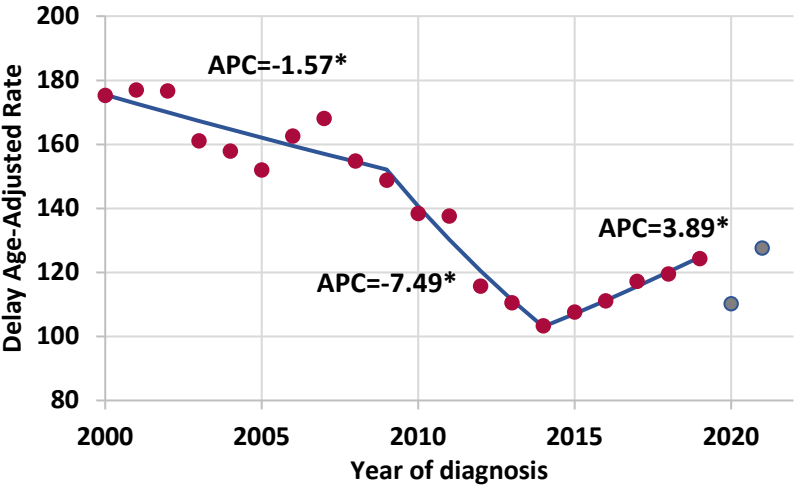- Trend significantly increasing in all periods

Joinpoint in 2005

- The trend in 2005-2021 is **NOT significantly increasing**

Joinpoint in 2005

- Trends similar to Model 1
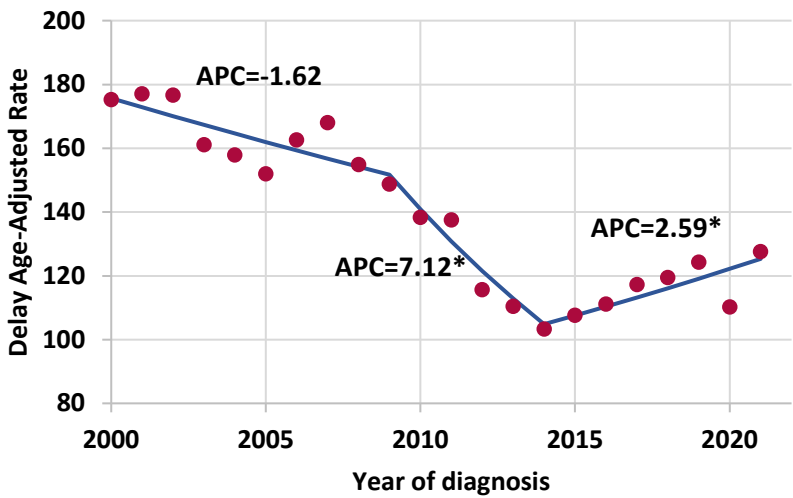- Trend significantly increasing in all periods

Prostate

Model 1
(Excludes 2020 & 2021)

APC=-1.57*

APC=-7.49*

APC=3.89*

Model 2
(All Data)

APC=-1.62

APC=7.12*

APC=2.59*

Model 3
(Excludes 2020)

APC=-1.60*

APC=-7.29*

APC=3.31*

Joinpoint in 2009 and 2014

- Trend significantly increasing 2014-2019, APC=3.9%

Joinpoint in 2009 and 2014

- Trend significantly increasing 2014-2019, APC=2.6%
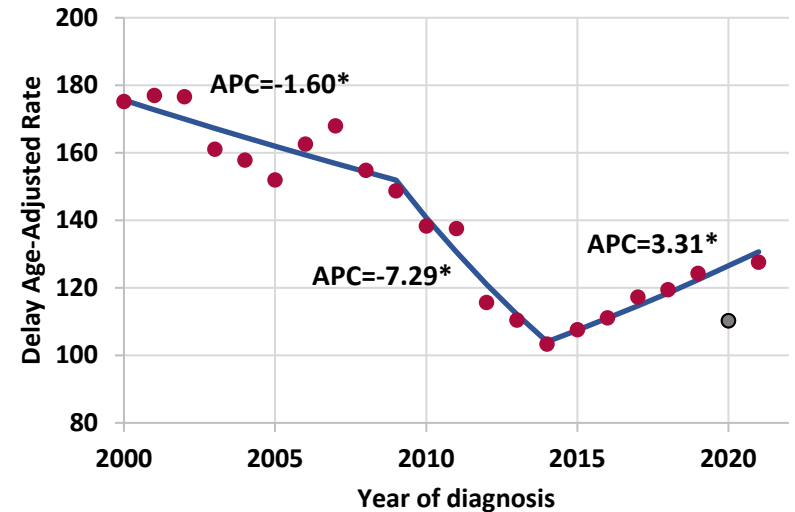
Joinpoint in 2009 and 2014

- Trend significantly increasing 2014-2019, APC=3.3%

Bladder

**Model 1
(Excludes 2020 & 2021)**
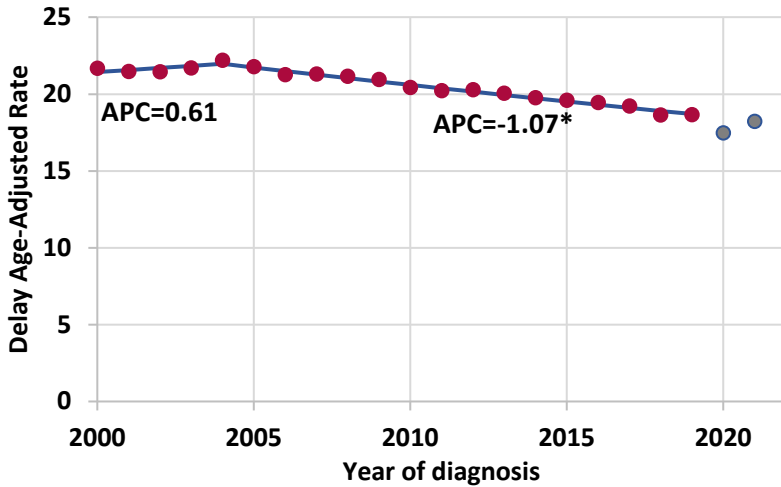
APC=0.61

APC=-1.07*

**Model 2
(All Data)**

APC=0.76

APC=-1.16*

**Model 3
(Excludes 2020)**

APC=0.63

APC=-1.08*
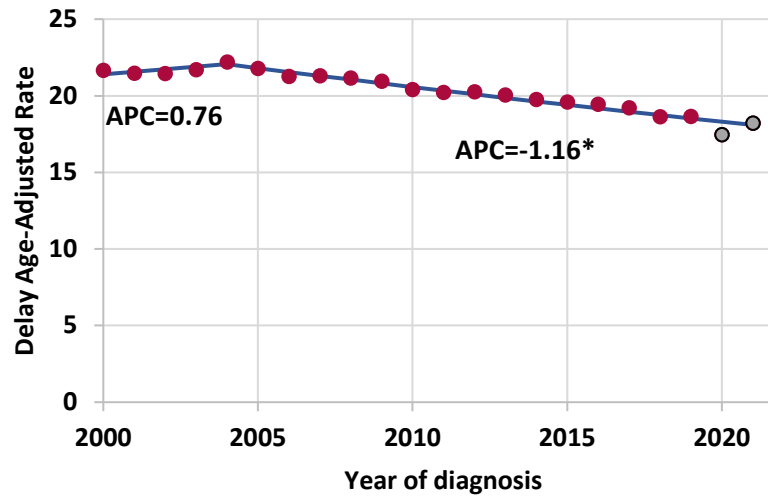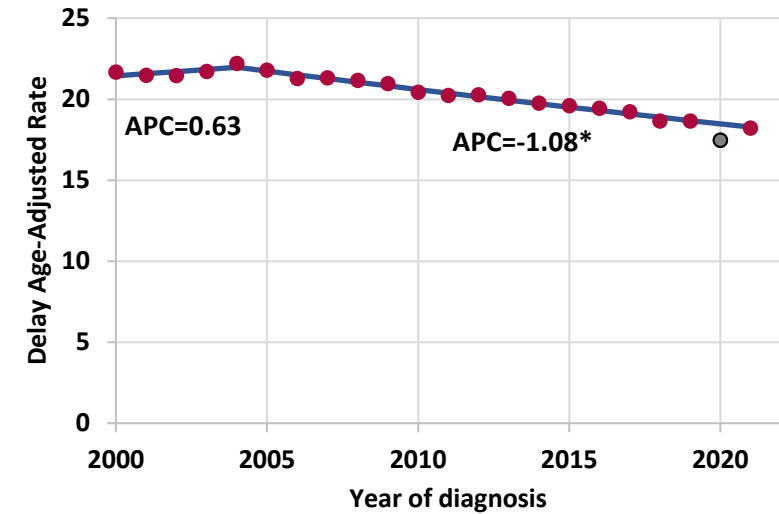
Joinpoint in 2004

- Trend significantly declining 2004+ , APC=-1.1%

Joinpoint in 2004

- Trend significantly declining 2004+ , APC=-1.2%

Joinpoint in 2004

- Trend significantly declining 2004+ , APC=-1.1%
- Closer to Model 1

Advantages of Model 3, excluding 2020 data

- Demonstrates a better fit to the data, facilitating improved identification of joinpoints

- Exhibits greater statistical power and yields more significant APC estimates.

- Shows trends estimates that more closely resemble pre-pandemic trends (as seen in Model 1).

- In cases where all data versus Model 3 (2020 excl.) yielded similar results, the trends in Model's 3 last segment were less influenced by the 2020 decline

April 2024 Data Release→ Model 3 will be used

- **2020 incidence data is excluded** from two cancer statistics (similar to last year)
  - Trends using the joinpoint model
  - Risk of being diagnosed with cancer using DevCan
    - Instead of using the cross–sectional incidence rates for 2019-2021 we are using 2018, 2019 and 2021

- **2020 and 2021 incidence data is included all SEER*Stat databases** and all the other cancer statistics in SEER*Explorer, Stat Facts, and other web-based reports

https://seer.cancer.gov/data/covid-impact.html

Survival Statistics- No change

- Survival statistics in SEER reports will include cases diagnosed in 2020 but not in 2021 (the last year of data)
  - Last year of data (2021) is not included because of not having a complete 1 year of follow-up
- SEER*Explorer will show:
  - 5-year relative survival rates for cases diagnosed in 2014-2020
  - Trends (2000-2020) estimated from JPSurv

Expected Survival Life Tables for Relative Survival

- SES/Geography/Race Annual Life Tables
  - Default for databases that include 1992+ incidence data
  - Race/ethnicity groups: (Non-Hispanic [NH] White, NH Black, NH American Indian/Alaskan Native, NH Asian and Pacific Islander, and Hispanics)
  - Geography and SES modeling varies depending on enough deaths and population for each state/race
- U.S. Annual Life Tables (1970+)
  - Default for databases with incidence prior to 1992
  - Race: white, blacks, other

Updated SES/Geography/Race Annual Life Tables

- 2010-2021 have been re-estimated using the new intercensal populations

- Each lifetable is estimated separately using respective mortality data (e.g., 2010 data for the 2010 lifetable, …)

- Using a single year facilitate updates as new mortality data becomes available and also better capture changes in mortality, (e.g. COVID-19 in 2020)

U.S. Annual Life Tables

- For whites, blacks and all races combined we use the respective NCHS U.S. Annual Life Tables (1975-2017).

- For 2018+, NCHS stopped producing Life Tables for whites and blacks. We use the NCHS Non-Hispanic White and Non-Hispanic Black instead, to represent whites and blacks.

- We generate the tables for the Other (AIAN & API)
  - 2001-2018 we used 3-year mortality data for each year (e.g., 2017-2019 for 2018) and for 2019-2021 we used single
  - The 2009-2021 Other race life tables were updated using revised intercensal population estimates.

Thank you

- Cancer registries
- IMS
- NCI