

# Preliminary Cancer Incidence Rates and Trends, 2000-2022

*Panelists:*

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**SURVEILLANCE RESEARCH PROGRAM**

DIVISION OF CANCER CONTROL AND POPULATION SCIENCES

# Speakers:



# Preliminary Cancer Incidence Rates and Trends, 2000-2022

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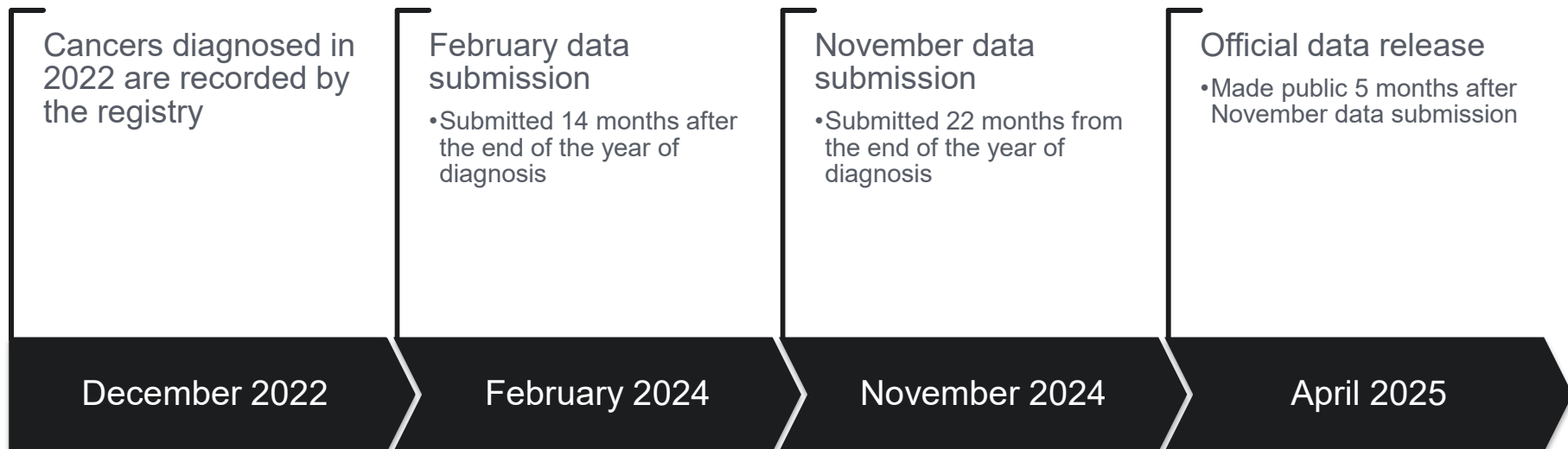
# Incidence data submission and release

- Each April, the NCI releases official cancer statistics using data submitted by the registries the prior November
    - For example, in April of 2024 data submitted in November 2023 includes cases diagnosed through 2021
- 24 months + 4 months = 28 months

# Goal

- Normally it takes 28 months for reporting cancer trends and rates
- **We want to shorten the time from 28 months**

## Two submissions for the same diagnosis year



# Methodology

# Delay Adjustment

- Delay adjustment is needed to capture the eventual count
  - Some incident cases are not reported in the first submission due to many reasons
    - Those cases not reported in the first submission are updated in the subsequent submissions.
  - We have developed a statistical model (delay model), applied to November submission data
    - The model produces “delay factors”. For example, if a delay factor is 1.06, delay adjusted rate =  $1.06 \times$  observed rate
- Trend may change when incidence rates are adjusted for delay



# Myeloma Incidence Rates

	Diagnosis Year	Observed rate	Delay factor	Delay adjusted rate
■ SEER 22 registries	2007	6.22	1	6.22
	2008	6.49	1	6.49
	2009	6.71	1	6.71
	2010	6.84	1	6.84
■ Nov 2023 submission	2011	7.00	1	7
	2012	7.11	1	7.11
	2013	7.12	1.006	7.16
■ All races	2014	7.15	1.010	7.22
	2015	7.25	1.015	7.36
■ Male and Female	2016	7.46	1.021	7.62
	2017	7.37	1.026	7.56
	2018	7.28	1.030	7.5
	2019	7.45	1.044	7.78
	2020	6.80	1.063	7.23
	2021	7.00	1.099	7.69

Cancer Site

Myeloma

Sex

Both

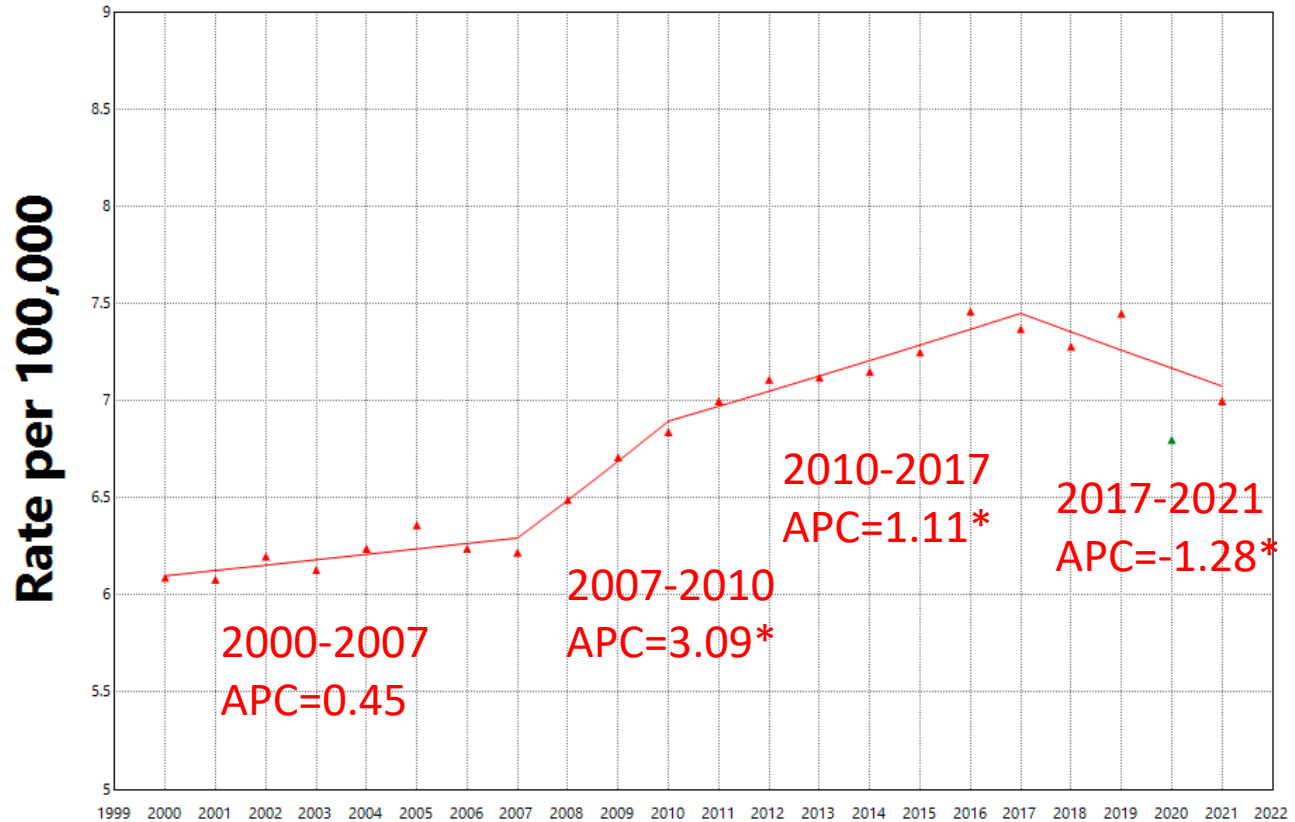
Race

All

Rate Type

Observed

# Myeloma Incidence



SEER 22 Registries

APC: Annual Percent Change

\*indicates APC is statistically significant

Cancer Site

Myeloma

Sex

Both

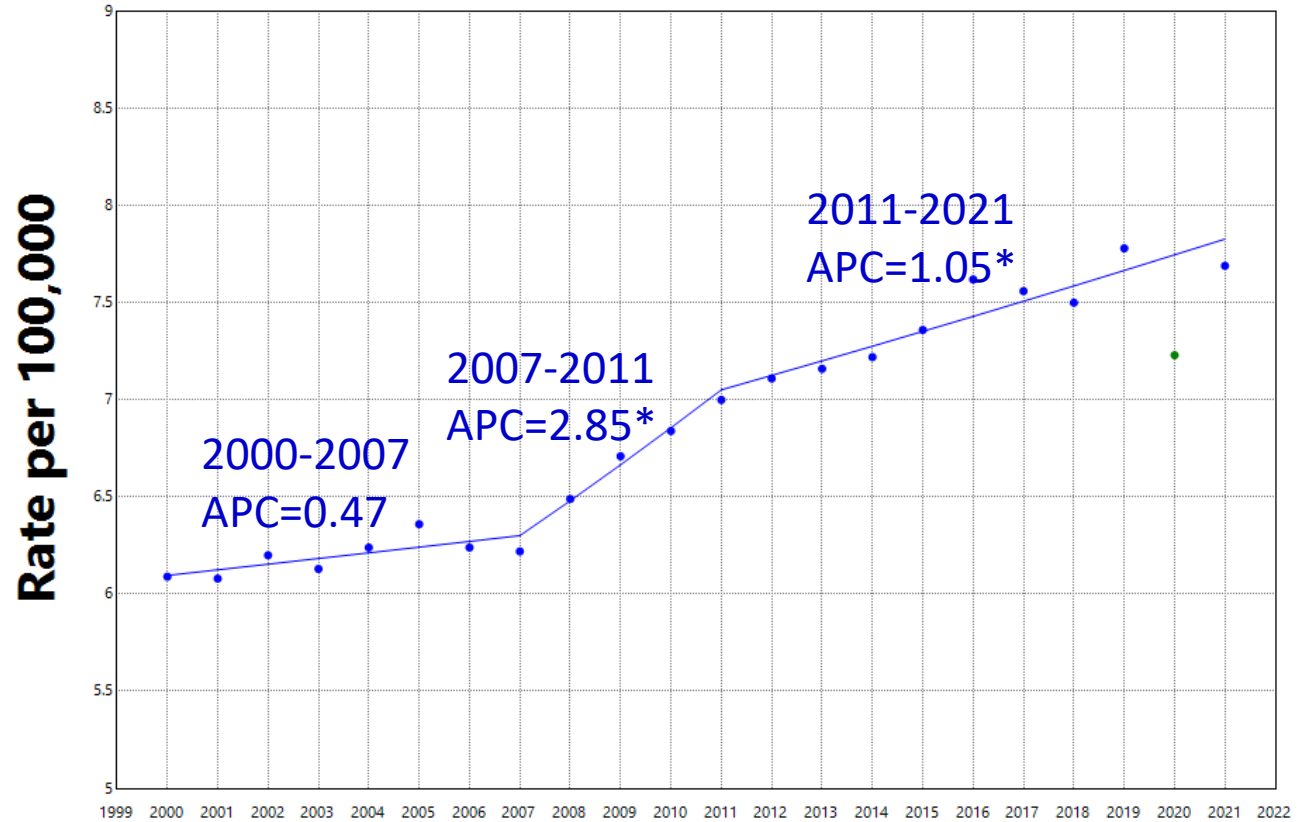
Race

All

Rate Type

Delay-adjusted

# Myeloma Incidence



SEER 22 Registries

APC: Annual Percent Change

\*indicates APC is statistically significant

Cancer Site

Myeloma

Sex

Both

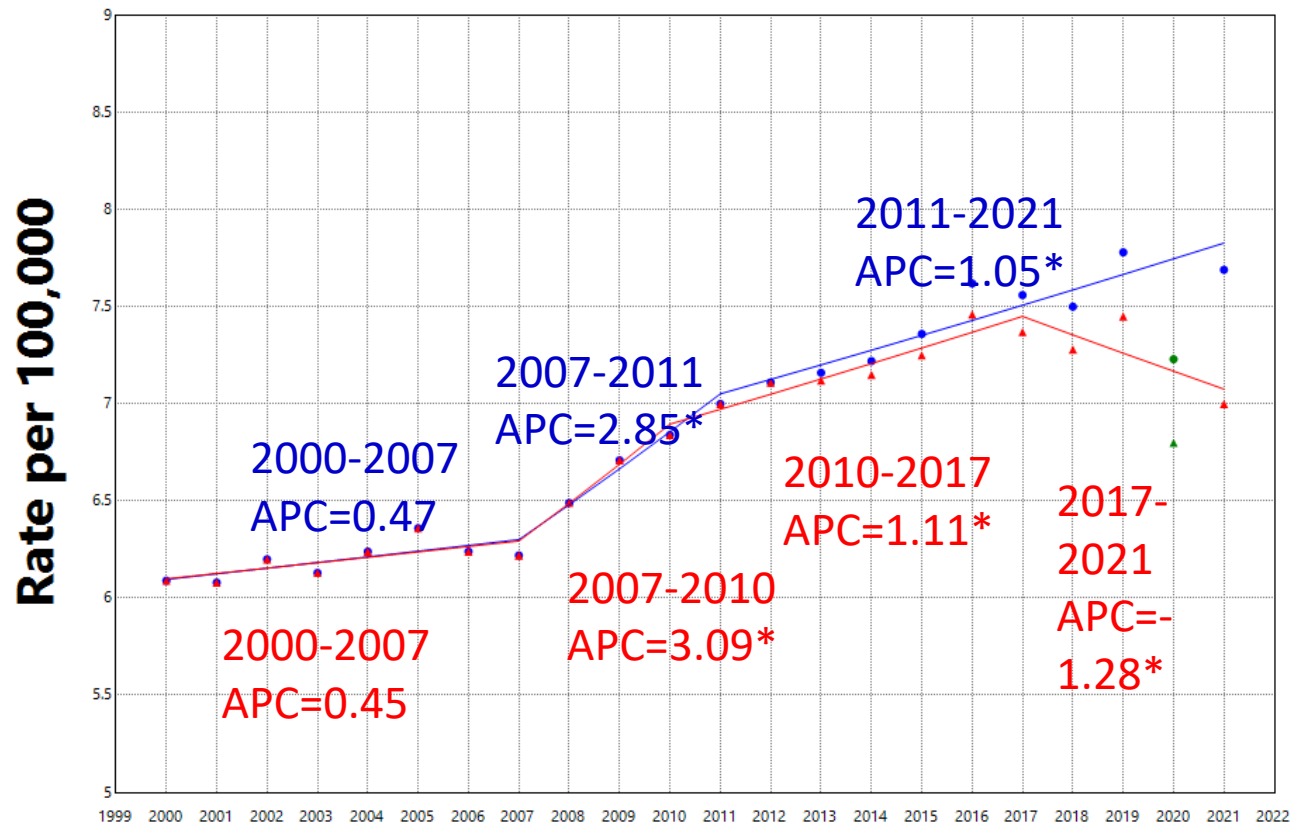
Race

All

Rate Type

Delay-adjusted vs. Observed

# Myeloma Incidence



SEER 22 Registries

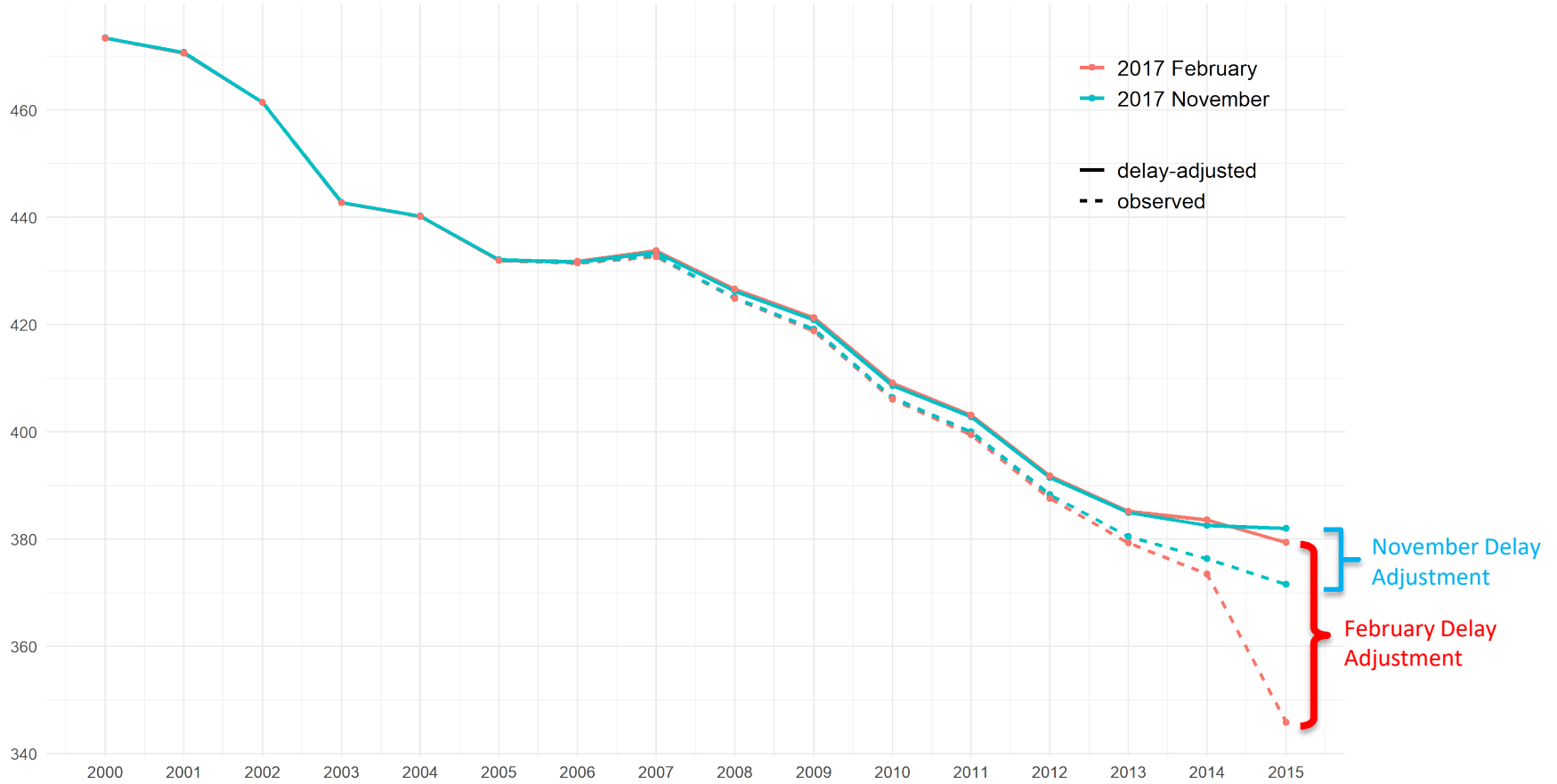
APC: Annual Percent Change

\*indicates APC is statistically significant

# Delay adjustment using February submission data

- Delay model is applied to February submission data
  - Results in bigger delay adjusted factor than November submission
  - Need validation – Compare with November submission

# Observed and Delay-Adjusted Incidence Rates for All sites for selected SEER 18 submissions



# Need validation for February model– Compare with the subsequent November submission

- Diagnosis year 2021 data submitted in Feb 2023 and Nov 2023
- Using all eligible SEER registries – 17 registries
  - Can't validate – delay adjusted rates from the two submissions differ by more than 5%
- Select registries based on 95% completeness threshold
  - Only 7 registries meet the criteria
  - Validated– February and November submission trends and rates are comparable

# SEER Completeness

- A measure for data quality
- A registry is expected to submit a certain amount of count for the most recent diagnosed cases based on past record of the same registry.
  - A trend model (Joinpoint model) is used to find the most recent trend using the past record.
  - The most recent trend is used to project the expected count.
- Completeness =  $\frac{\textit{the submitted count}}{\textit{the expected count}}$



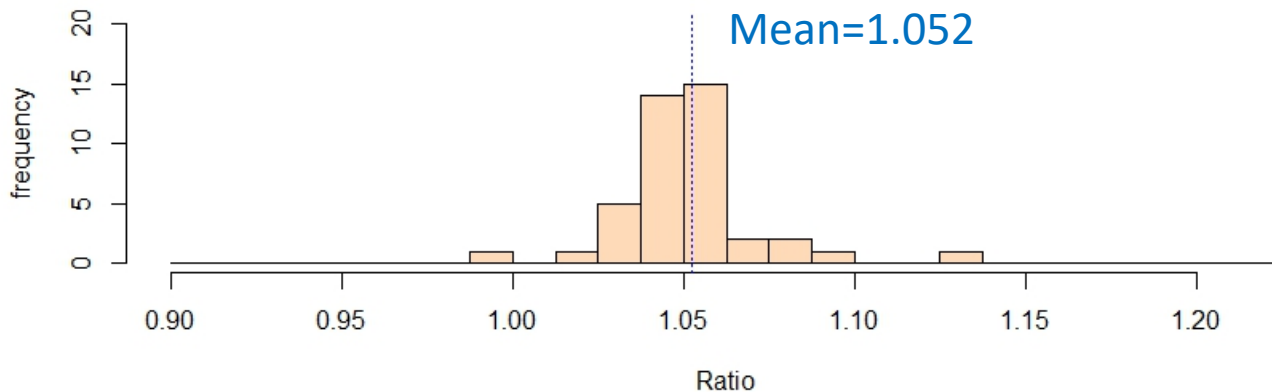
# Completeness of SEER Registries for Cases Diagnosed in 2021, 2022

	> 95%	≤ 95 %
February 2023 completeness for diagnosis year 2021	7	10
November 2023 completeness for diagnosis year 2021	17	0
February 2024 completeness for diagnosis year 2022	10	7

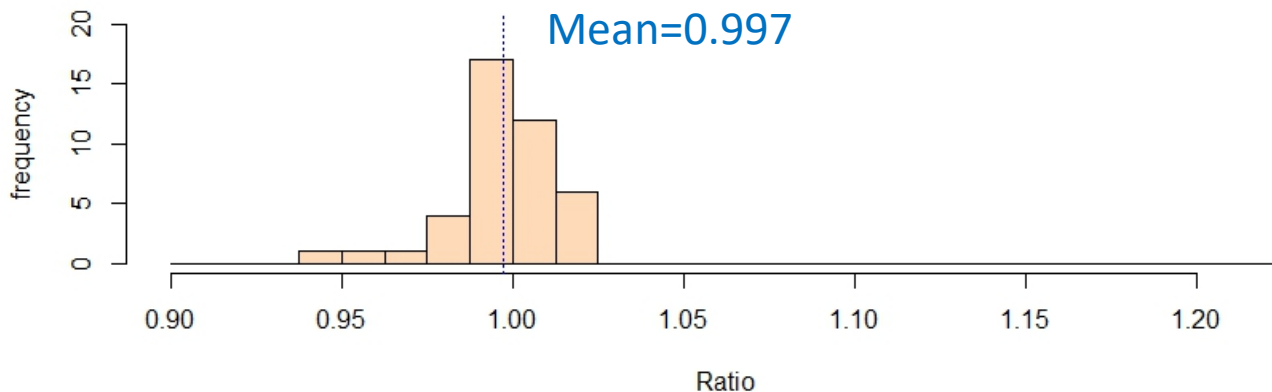
# Validation: Part I

- Diagnosis year 2021
- Feb 2023 vs Nov 2023
- Delay-adjusted rates
- 42 combinations of cancer site by sex
- Ratio:  $\frac{\textit{Delay adjusted rates from 2023 Nov submission}}{\textit{Delay adjusted rates from 2023 Feb submission}}$
- Ideally, **the ratio should be close to 1** if they are similar.
- Based on the 42 ratios we create a histogram (or distribution)

**All races: SEER 17 Delay-adjusted (Nov 23) rates / (Feb 23) rates**



**All races: SEER 17 Exclude 10; Delay-adjusted (Nov 23) rates / (Feb 23) rates**



## Validation: Part II

- Diagnosis year 2021
- Feb 2023 vs Nov 2023
- APC of the last segment from Joinpoint model trends
- 42 combinations of cancer site by sex
- Significance change:
  - APC Change in significance for the last Joinpoint segment
  - AAPC Change in significance for the last 5 years
  - AAPC Change in significance for the last 10 years

## Comparative trend changes between February 2023 (14 months) and November 2023 (22 months) for diagnosis year 2021

	All 17 registries	17 registries – 10
Last Segment APC	9/42	1/42
Last 5-year AAPC	7/42	0/42
Last 10-year AAPC	5/42	0/42

## Preliminary rates and trends up to diagnosis year 2022

- After the model is validated, the delay model is applied to 2024 February submission for selected registries that meet the completeness threshold, with the most recent diagnosis year 2022

# Summary of Methodology

- **Delay model:** To estimate the eventual count
- **Completeness Measure:** To select registries to be included in the analysis/model
- **Validation:**
  - Compare delay-adjusted rates from **prior year's** February (14 months) and November (22 months) submissions
    - Rates (delay-adjusted)
    - Trends (from delay-adjusted rates)

# Data Series and Years Presented on the SEER Webpage

## **Preliminary Cancer Incidence Rates and Trends, 2000-2022**

Estimates from Early Reporting of Incidence Data Adjusted for Case Undercounts: Selected SEER Registries

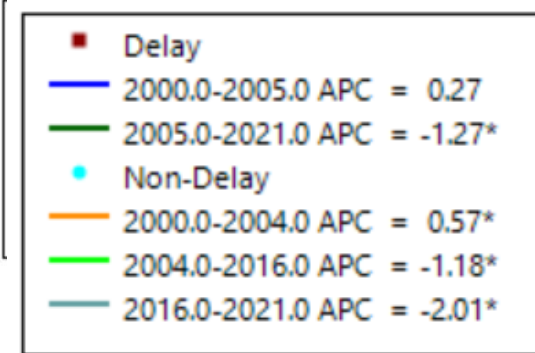
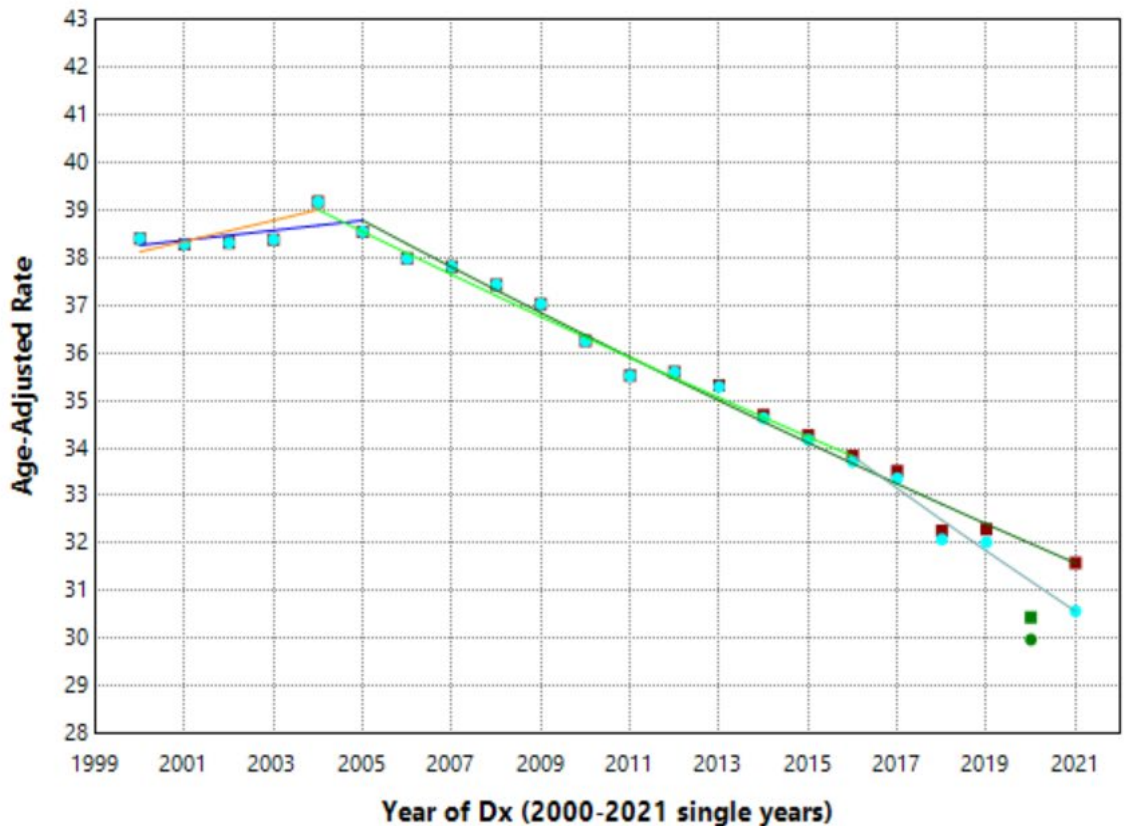
<https://seer.cancer.gov/statistics/preliminary-estimates/>



## Male Urinary Bladder Cancer Incidence

Observed Rates: 2 joinpoints (final segment APC = -2.0%\*)

Delay-Adjusted Rates: 1 joinpoint (final segment APC = -1.3%\*)



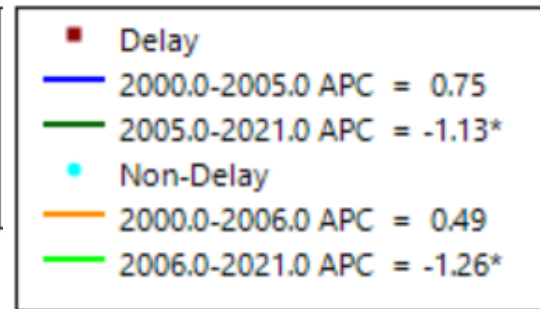
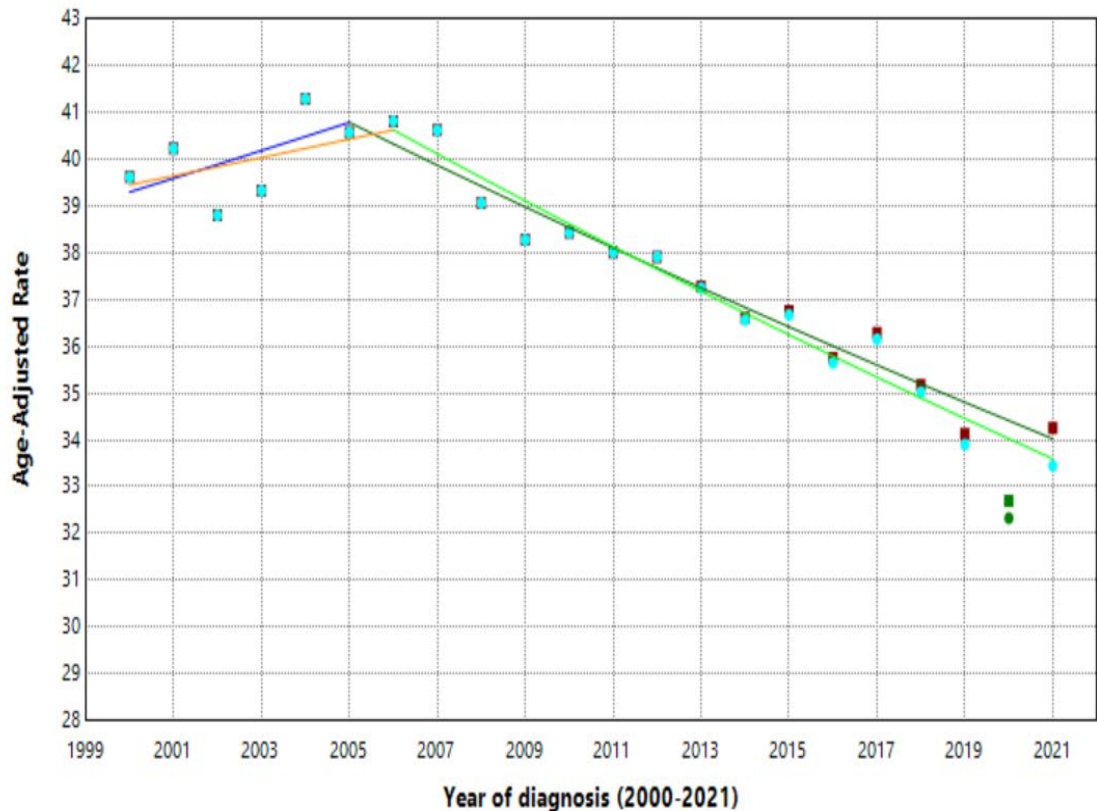
2020 data points not included in trend

## Selected Registries (2000-2021)

## Male Urinary Bladder Cancer Incidence

Observed Rates: 1 Joinpoint (final segment APC = -1.3\*)

Delay-Adjusted Rates: 2 joinpoints (final segment APC = -1.1%\*)



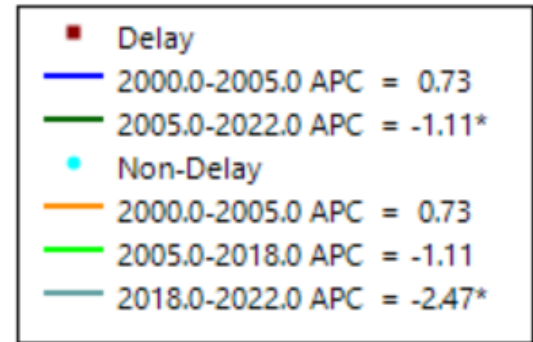
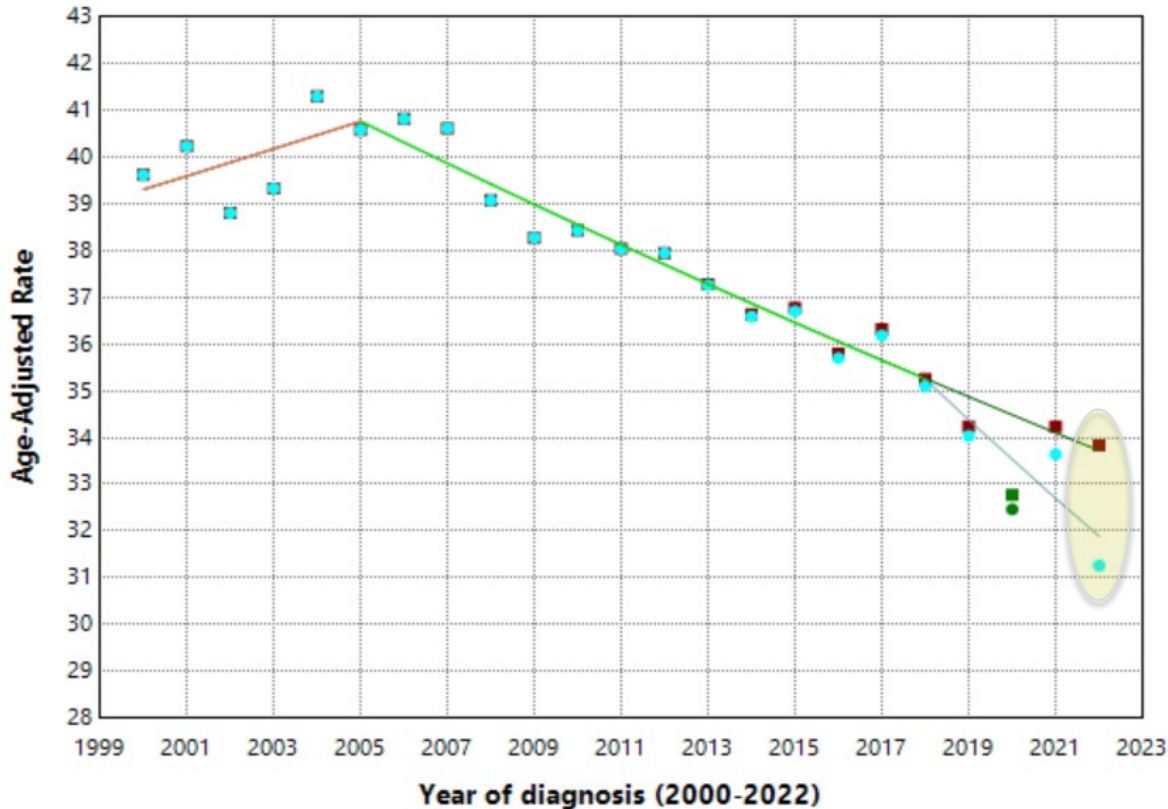
2020 data points not included in trend

Preliminary Estimates  
(Selected Registries 2000-2022)

## Male Urinary Bladder Cancer Incidence

Observed Rates: 1 Joinpoint (final segment APC = -2.5%\*)

Delay-Adjusted Rates: 2 joinpoints (final segment APC = -1.1%\*)



2020 data points not included in trend

# Three Important Cautions in Using Preliminary Estimates

# (1) Preliminary estimates include a limited set of registries representing less of the U.S. population

## SEER 17 registries

1. Connecticut	10. Louisiana
2-3. Greater Bay- SF & San Jose	11-12-13. Atlanta, Greater Georgia, Rural Georgia
4. Seattle	14. New Mexico
5. Utah	15. Los Angeles
6. New Jersey	16. Greater California
7. Kentucky	17. Alaska Natives
8. Iowa	
9. Hawaii	

## Newer registries making up the remainder of SEER-22\*

- 18. Illinois
- 19. New York
- 20. Idaho
- 21. Texas
- 22. Massachusetts

\*Do not have a sufficient history of February submissions necessary to produce delay-adjusted rates for February

# (1) Preliminary estimates include a limited set of registries representing less of the U.S. population

## SEER 17 registries

1. Connecticut	10. Louisiana
2-3. Greater Bay- SF & San Jose	11-12-13. Atlanta, Greater Georgia, Rural Georgia
4. Seattle	14. New Mexico
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6. New Jersey	16. Greater California
7. Kentucky	17. Alaska Natives
8. Iowa	
9. Hawaii	

10 selected registries with >95% completeness in Feb 2024 submission

# Demographic Characteristics of Total US, SEER22, SEER17, and Selected Registries

	% of US Population (2020 Census)	% Foreign Born <sup>1</sup>	% Less than HS Diploma (ages 25+) <sup>1</sup>	% Below Poverty Level <sup>1</sup>	% Rural <sup>2</sup>
Total US	100.0%	12.9%	14.3%	14.9%	15.0%
SEER 22	47.9%	17.8%	15.8%	14.9%	10.1%
SEER 17	26.5%	18.4%	15.8%	14.7%	10.1%
Selected Registries	12.9%	15.1%	12.7%	12.5%	12.5%

<sup>1</sup>2008-2012 five-year American Community Survey estimates

<sup>2</sup>RUCA classifications by 2010 census tract populations aggregated to US, SEER 22, SEER 17, and selected registries

# Racial/Ethnic Characteristics of Total US, SEER22, SEER17, and Selected Registries

	% White	% Black	% Asian / Pacific Islander	% American Indian / Alaska Native	% Hispanic
Total US	61.6%	12.4%	6.2%	1.1%	18.7%
SEER 22	54.0%	11.6%	9.2%	1.2%	25.9%
SEER 17	52.1%	10.1%	11.0%	1.4%	25.4%
Selected Registries	60.2%	10.1%	11.8%	0.8%	15.3%



## **(2) Case counts based on the February submission represent a much larger undercount than the counts in the subsequent November submission**

### **Diagnosis year 2021 delay factors averaged across 24 cancer sites by sex (42 total data series)**

- Average delay factor for Nov 2023 submission for:
  - 7 selected registries with >95% Feb 2023 completeness = 1.031 (3.1% undercount)
  - SEER 17 registries = 1.034 (3.4% undercount)
  - SEER 22 registries = 1.040 (4.0% undercount)
  
- Average delay factor for Feb 2023 submission for:
  - 7 selected registries with > 95% completeness = 1.09 (9% undercount)
  - SEER 17 registries = 1.12 (12% undercount)

## The larger the undercount, the more potential there is for larger errors in our statistical models

- The November submission for SEER 22 registries represents our official submission because the undercount is relatively small, and does not vary much with respect to the registries included
- February submissions for selected registries that have >95% completeness have an undercount about 3 times as large as the November submissions
- February submissions for SEER 17 registries have an undercount about 4 times as large as the November submissions

*Our goal is to produce the most accurate preliminary estimates possible, even if it only represents a selected set of registries. Caution should be exercised in generalizing to the US population.*

**(3) Validation studies have demonstrated generally good agreement between the delay adjusted preliminary incidence rates and the ones later released in April of each year**

**For 2000-2021 validation estimates, there are 42 data series**

**Two metrics:**

1. 
$$\frac{\text{November 2023 submission delay-adjusted rate for 2021}}{\text{February 2023 submission delay-adjusted rate for 2021}}$$

for 7 selected registries with >95% completeness

38 of the 42 ratios are between 0.98 and 1.02

## 2. *Change in significance for the last Joinpoint segment based on the 7 selected registries with >95% completeness comparing:*

- *The 2000-2021 preliminary estimates (based on the February 2023 submission) and the estimates based on the Nov. 2023 submission*

Only 1 of 42 series has a change in significance, indicating that the February submission results are generally confirmed by the subsequent submission in November

***Despite the fact that the Nov. 2023 results generally confirmed the preliminary estimates from Feb. 2023 for 2000-2021 data, past performance is not necessarily indicative of future results!***

**We will be working to see how well the Nov. 2024 results confirm the preliminary results from Feb. 2024 for 2000-2022 data.**

# Recent trends 2000-2022

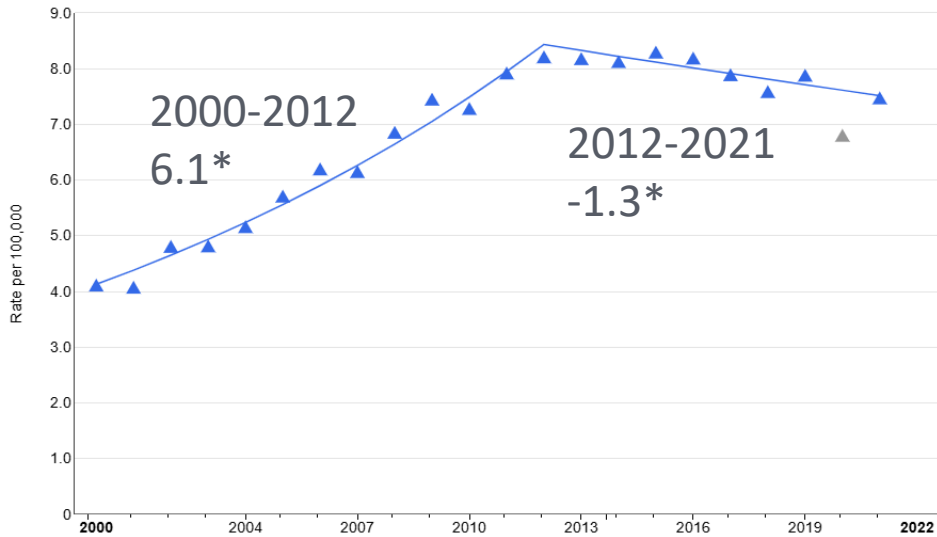
*Highlighting cancer sites where the most recent segment has changed from 2021*

*Dr. Annie None*

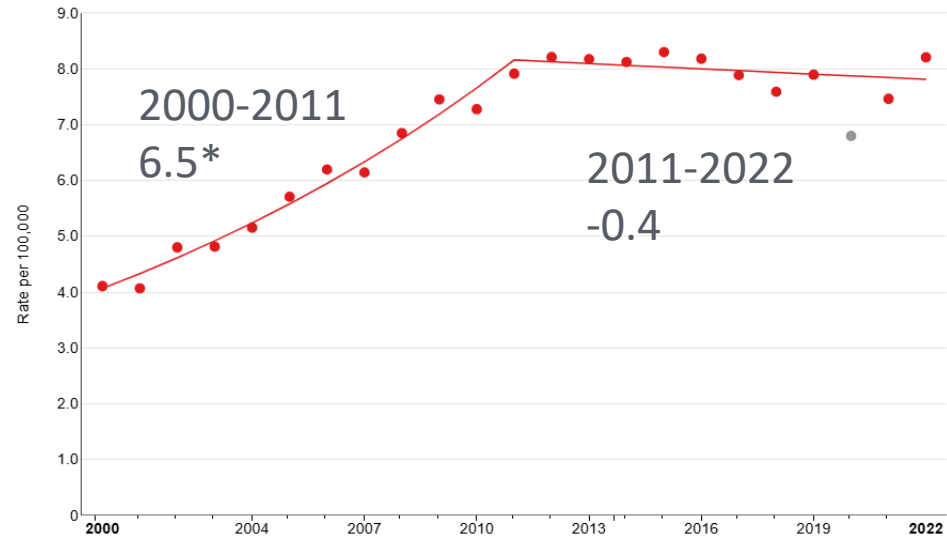
# Thyroid cancer incidence, 10 selected registries

## Men

2000-2021



Preliminary estimates: 2000-2022

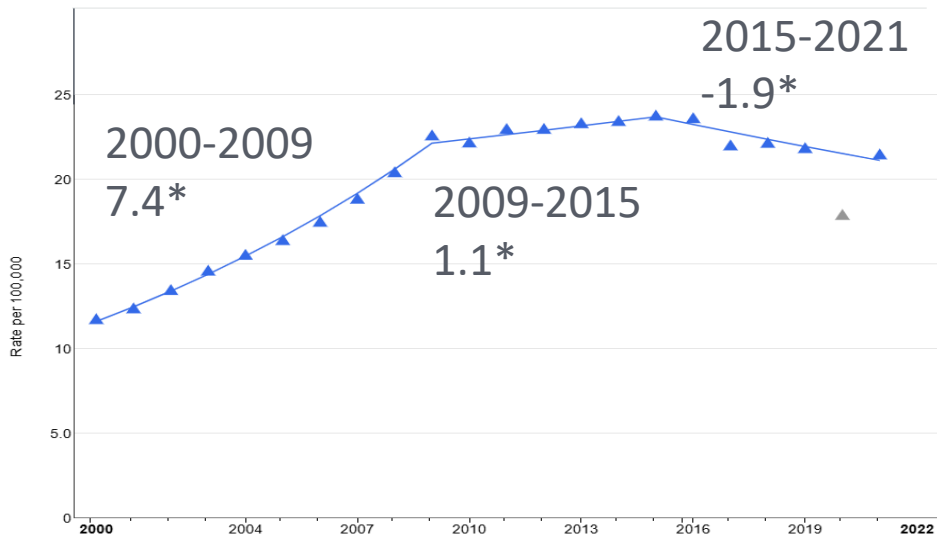


\*Indicates APC is statistically significant  
2020 incidence rate not included in trend

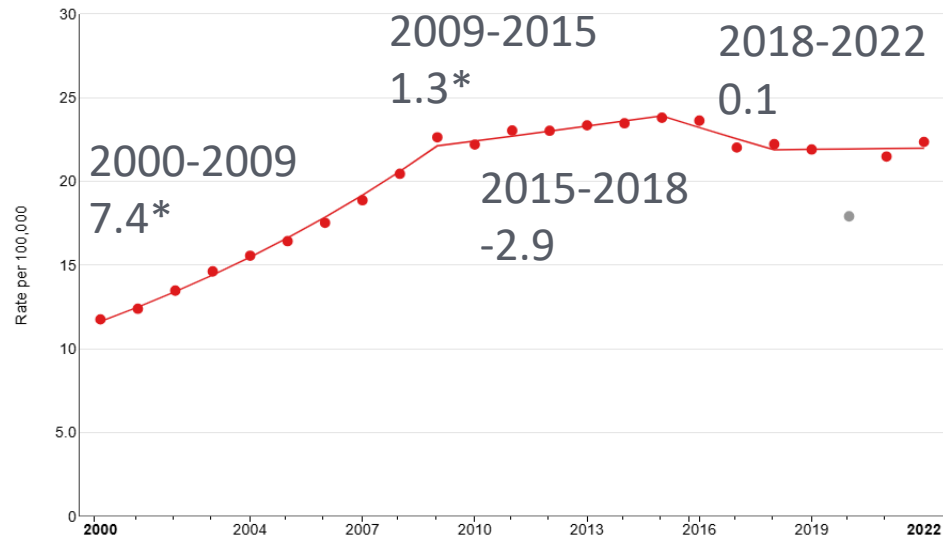
# Thyroid cancer incidence, 10 selected registries

## Women

2000-2021



Preliminary estimates: 2000-2022

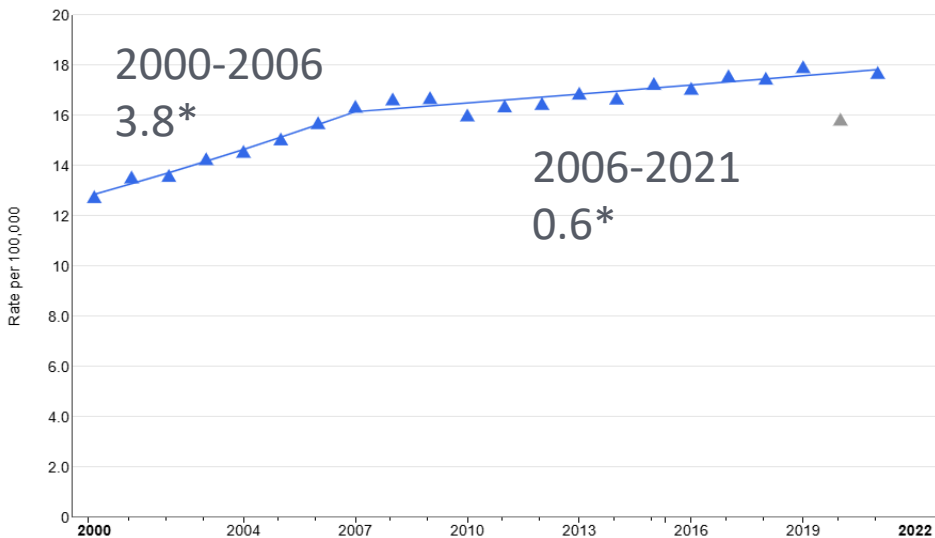


\*Indicates APC is statistically significant  
 2020 incidence rate not included in trend

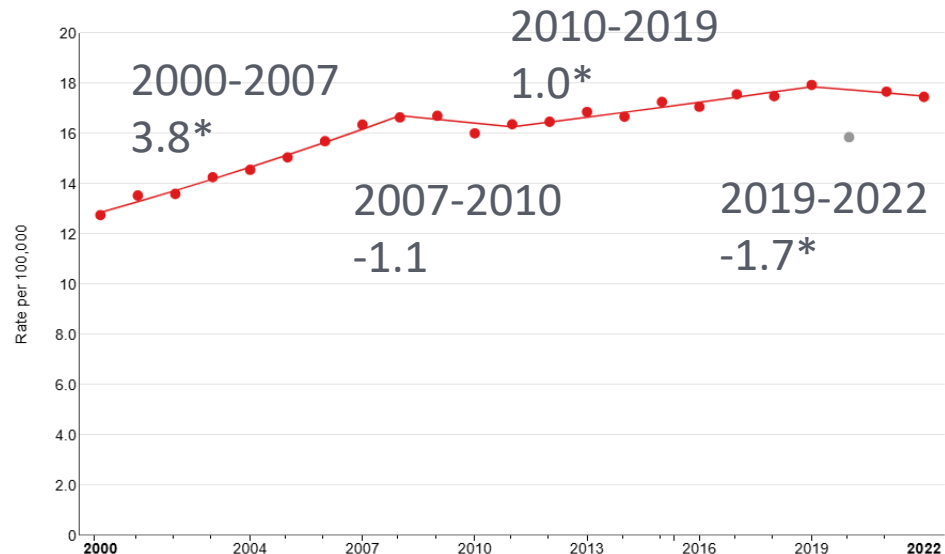
# Kidney and renal pelvis cancer incidence, 10 selected registries

## Women

2000-2021



Preliminary estimates: 2000-2022



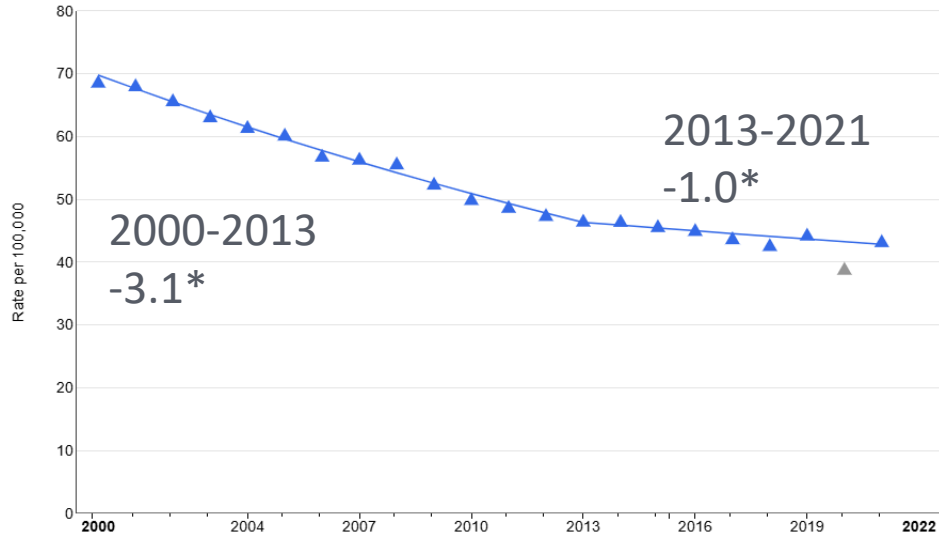
\*Indicates APC is statistically significant  
2020 incidence rate not included in trend



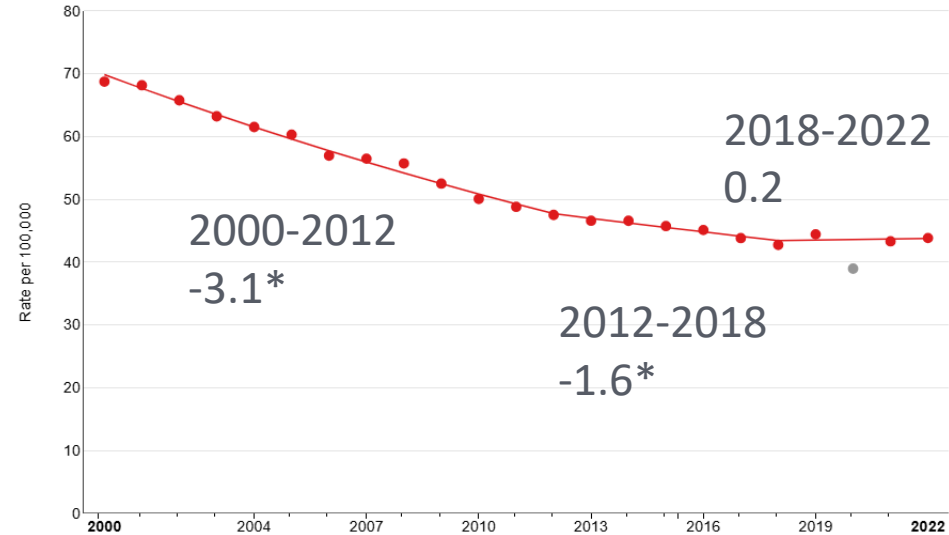
# Colon and rectum cancer incidence, 10 selected registries

## Men

2000-2021



Preliminary estimates: 2000-2022

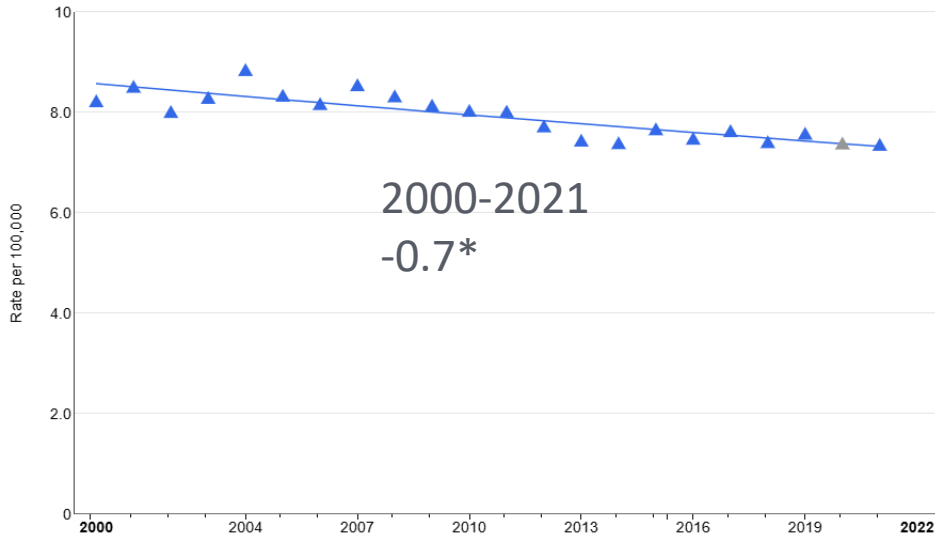


\*Indicates APC is statistically significant  
2020 incidence rate not included in trend

# Esophagus cancer incidence, 10 selected registries

## Men

2000-2021



Preliminary estimates: 2000-2022



\*Indicates APC is statistically significant  
2020 incidence rate not included in trend

# Complete list of cancer sites with change in most recent trend

Women	Men
Hodgkin lymphoma	Colon and rectum
Kidney and renal pelvis	Esophagus
Liver and intrahepatic bile duct	
Melanoma	Stomach
Myeloma	Myeloma
Ovary	
Thyroid	Thyroid

# Where to find preliminary estimates

- Delay-adjusted rates and trends are available by sex for 33 cancer sites

- SEER website: Preliminary Estimates

<https://seer.cancer.gov/statistics/preliminary-estimates/preliminary.html>

- SEER\*Explorer

<https://seer.cancer.gov/statistics-network/explorer/>

NIH NATIONAL CANCER INSTITUTE  
Surveillance, Epidemiology, and End Results Program

Cancer Statistics Explorer Network SEER\*Explorer Updated November 5, 2024 Application About SEER Statistics

Get Started with a Cancer Site  
All Cancer Sites Combined

Choose a Statistic to Explore  
Preliminary Incidence Rates

Recent Trends

Compare By: Sex Registries/Years Included

# Conclusions

- Preliminary estimates are available for cancer diagnoses through 2022
- May provide early insights into changing cancer trends
- Exercise caution when interpreting
  - May want to wait for November data release to finalize any analysis

# Thank You!

<https://seer.cancer.gov/news/seerstat-webinars.html>



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