

Karen S. Pawlish¹, Stasia S. Burger¹, Lisa E. Paddock^{2,3}, Antoinette M. Stroup^{2,3}
¹New Jersey Department of Health, Trenton, NJ
²Rutgers Cancer Institute of New Jersey, New Brunswick, NJ
³Rutgers School of Public Health, Piscataway, NJ

Background

Overall, stomach cancer incidence declined significantly in New Jersey men and women since before 1990.

Stomach cancer incidence and mortality have declined in the United States since 1975.¹

Non-cardia stomach cancer incidence is reported to be increasing in younger non-Hispanic white women in the United States.²

Objectives

Characterize time trends in stomach cancer incidence in New Jersey

- by sex
- by age at diagnosis group
- by race/ethnicity
- by primary site

Methods

- **Data Source:** New Jersey State Cancer Registry (NJSCR)
 - Population-based registry that collects data on all cancers diagnosed in New Jersey residents since 1979
- **Analytic Cohort:** NJ males and females diagnosed with invasive stomach cancer from 1990 to 2016
- **Exclusions:**
 - Cases of lymphoma, leukemia, mesothelioma, and cases of Kaposi sarcoma (ICD-O-3 histology codes 9050-9055, 9140, 9590-9989) (n=2,517 cases)
- **Statistical methods:**
 - Calculated annual age-adjusted invasive stomach cancer incidence rates for NJ residents by sex, race/ethnicity, age at diagnosis group, and primary site.
 - Primary site was classified as: Gastric cardia (primary site: C16.0); Non-cardia gastric (primary sites: C16.1 Fundus, C16.2 Body, C16.3 Antrum, C16.4 Pylorus, C16.5 Lesser curvature, C16.6 Greater curvature); Overlapping and unspecified (primary sites: C16.8 Overlapping lesion of stomach, C16.9 Stomach, NOS).

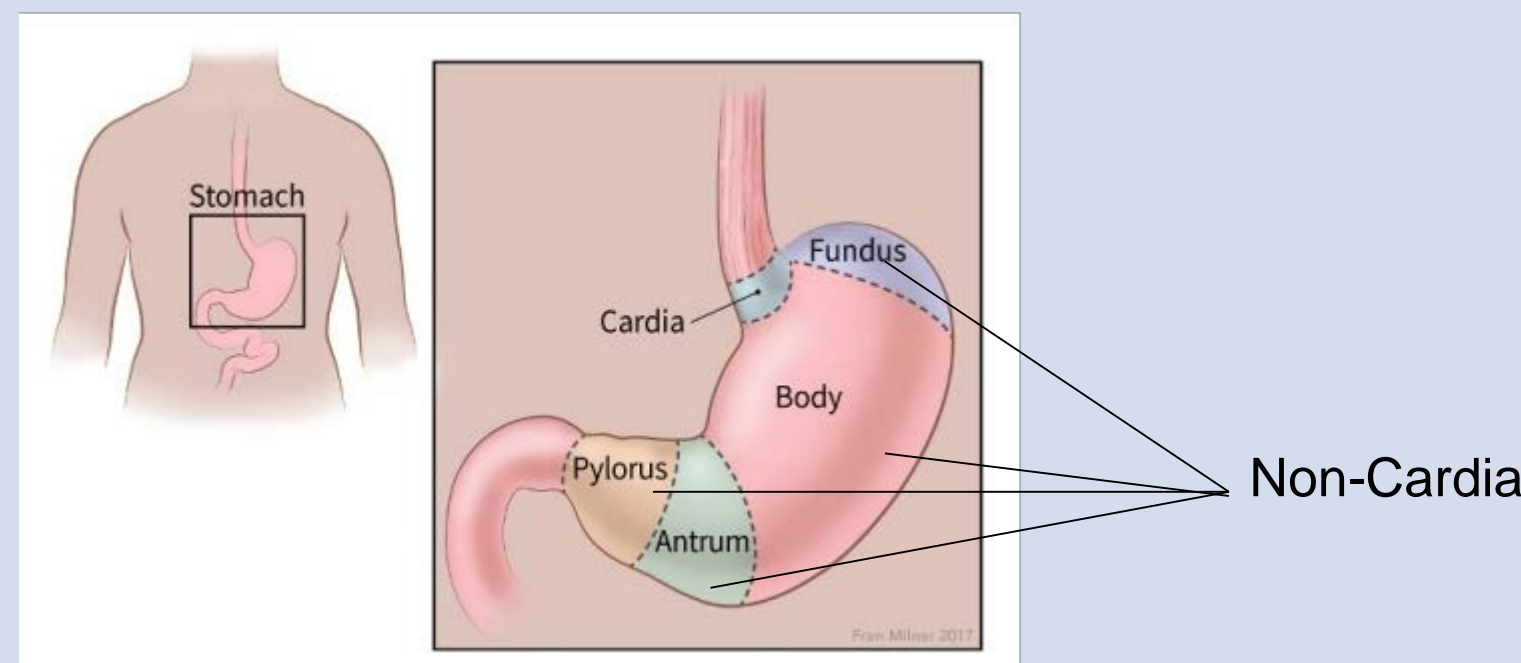


Image adapted from American Cancer Society. <https://www.cancer.org/cancer/stomach-cancer/about/what-is-stomach-cancer.html>

- Rates and counts were generated using SEER*Stat software versions 8.3.5.
- **Joinpoint regression analysis³**
 - Calculated annual percent changes (APCs) in stomach cancer incidence rates and identified points in time when incidence rate trends change significantly (joinpoints) using Joinpoint Regression Program, Version 4.6.0.0, April 2018 and Version 4.7.0.0, Feb 2019, National Cancer Institute.

References

1. Howlader N, Noone AM, Krapcho M, Miller D, Brest A, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds). SEER Cancer Statistics Review, 1975-2016. National Cancer Institute, Bethesda, MD. https://seer.cancer.gov/csr/1975_2016/, based on November 2018 SEER data submission posted to the SEER web site, April 2019.
2. Anderson WF, Rabkin CS, Turner N, et al. The changing face of noncardiac gastric cancer incidence among US non-Hispanic Whites. *JNCI* 2018 110(6): djx262.
3. Kim HJ, Pay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with application to cancer rates. *Stat Med* 2000; 19:335-351 (correction: 2000; 20:655).

Acknowledgments

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Results

Characteristics of New Jersey Stomach Cancer Patients Diagnosed 1990-2016

	Age at Diagnosis			
	< 50 years		50+ years	
	No.	%	No.	%
Total	2,109		20,673	
Sex				
Male	1,214	57.6%	12,394	60.0%
Female	895	42.4%	8,279	40.0%
Race/Ethnicity				
Non-Hispanic White	957	45.4%	14,776	71.5%
Non-Hispanic Black	358	17.0%	2,733	13.2%
Non-Hispanic Asian or Pacific Islander	241	11.4%	1,034	5.0%
Hispanic*	534	25.3%	2,049	9.9%
Other/unknown	19	0.9%	81	0.4%
Primary Site				
C16.0-Cardia, NOS	485	23.0%	5,320	25.7%
C16.1-Fundus of stomach	117	5.5%	1,036	5.0%
C16.2-Body of stomach	200	9.5%	1,751	8.5%
C16.3-Gastric antrum	328	15.6%	3,419	16.5%
C16.4-Pylorus	46	2.2%	491	2.4%
C16.5-Lesser curvature of stomach NOS	156	7.4%	1,548	7.5%
C16.6-Greater curvature of stomach NOS	93	4.4%	842	4.1%
C16.8-Overlapping lesion of stomach	143	6.8%	1,215	5.9%
C16.9-Stomach, NOS	541	25.7%	5,051	24.4%

*Persons of Hispanic ethnicity may be of any race or combination of races.

- **Stomach cancer incidence increased significantly in younger NJ women (age < 50 years) (APC= 2.9) from 1990-2016, but decreased significantly in women aged 50+ (APC= -1.8) and men age 50+ (APC= -2.0) during this time.**
- Stomach cancer incidence did not change significantly in younger NJ men (APC= -0.5) during this time.
- Significant increases in stomach cancer incidence were observed in younger Hispanic women (APC= 2.6).
- In analysis by primary site we observed significant increases in incidence of non-cardia stomach cancer (APC= 2.8) and overlapping lesions/ stomach cancer, NOS (APC= 3.1) in younger NJ women.
- Non-cardia stomach cancer incidence increased significantly in women aged 20-39 (APC= 3.4) and 40-49 (APC= 2.4) and decreased significantly in women aged 70+ (APC = -2.2).

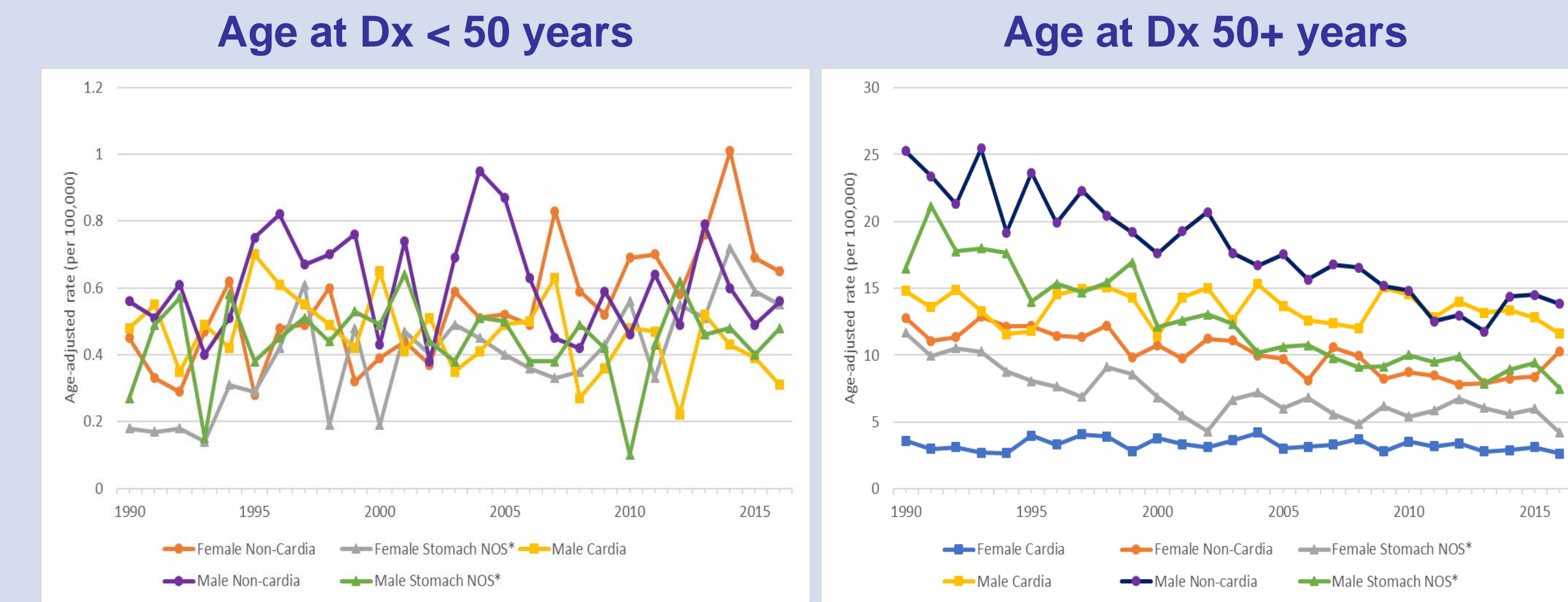
Trends in Stomach Cancer Incidence Rates in New Jersey by Sex and Race/Ethnicity, 1990-2016

Sex	Age at Diagnosis	Race/Ethnicity	Years	APC** (95% CI)	
Female	0 - 49 years	All	1990-2016	+2.9 [^] (2.0, 3.9)	
		NHW	1990-1994	+26.8 (-0.8, 61.9)	
			1994-2016	+1.3 (-0.1, 2.7)	
			1990-2016	+0.7 (-1.3, 2.7)	
		NHB	1990-2007	+2.9 (-0.3, 6.2)	
			2007-2011	-22.2 (-47.3, 15.0)	
			2011-2014	+52.9 (-41.6, 300.1)	
	2014-2016		-47.8 (-78.2, 24.9)		
	Hispanic*	1990-2016	+2.6 [^] (0.9, 4.3)		
	50+ years	All	1990-2016	-1.8 [^] (-2.1, -1.5)	
		NHW	1990-2016	-2.5 [^] (-2.8, -2.1)	
		NHB	1990-2016	-1.9 [^] (-2.4, -1.3)	
		NHAPI	1990-2016	-1.9 [^] (-3.1, -0.7)	
		Hispanic*	1990-2016	-1.2 (-2.5, 0.1)	
Male		0 - 49 years	All	1990-2016	-0.5 (-1.3, 0.3)
			NHW	1990-1996	+5.9 (-0.3, 12.4)
	1996-2016		-2.1 [^] (-3.1, -1.1)		
	1990-2016		-2.8 [^] (-4.5, -1.1)		
	NHB	1990-2016	-1.2 (-4.1, 1.8)		
	NHAPI	1990-2016	-1.2 (-4.1, 1.8)		
	Hispanic*	1990-2016	-0.6 (-2.2, 1.0)		
50+ years	All	1990-2016	-2.0 [^] (-2.3, -1.8)		
	NHW	1990-2016	-2.3 [^] (-2.6, -1.9)		
	NHB	1990-2016	-2.2 [^] (-3.0, -1.5)		
	NHAPI	1990-2016	-2.8 [^] (-3.9, -1.7)		
	Hispanic*	1990-2016	-2.3 [^] (-3.3, -1.3)		

Rates are per 100,000 and age-adjusted to the 2000 US standard population. 2016 data are preliminary.
 *Persons of Hispanic ethnicity may be of any race or combination of races. NHW= Non-Hispanic White, NHB= Non-Hispanic Black, NHAPI= Non-Hispanic Asian or Pacific Islander. **APC = annual percent change, 95% CI= 95% confidence interval.
[^]The APC based on incidence rates is significantly different from zero at p < 0.05. **APCs in red font are statistically significant increases; APCs in blue font are statistically significant decreases.**

Results (2)

Stomach Cancer Incidence Rates in New Jersey by Sex and Primary Site, 1990-2016



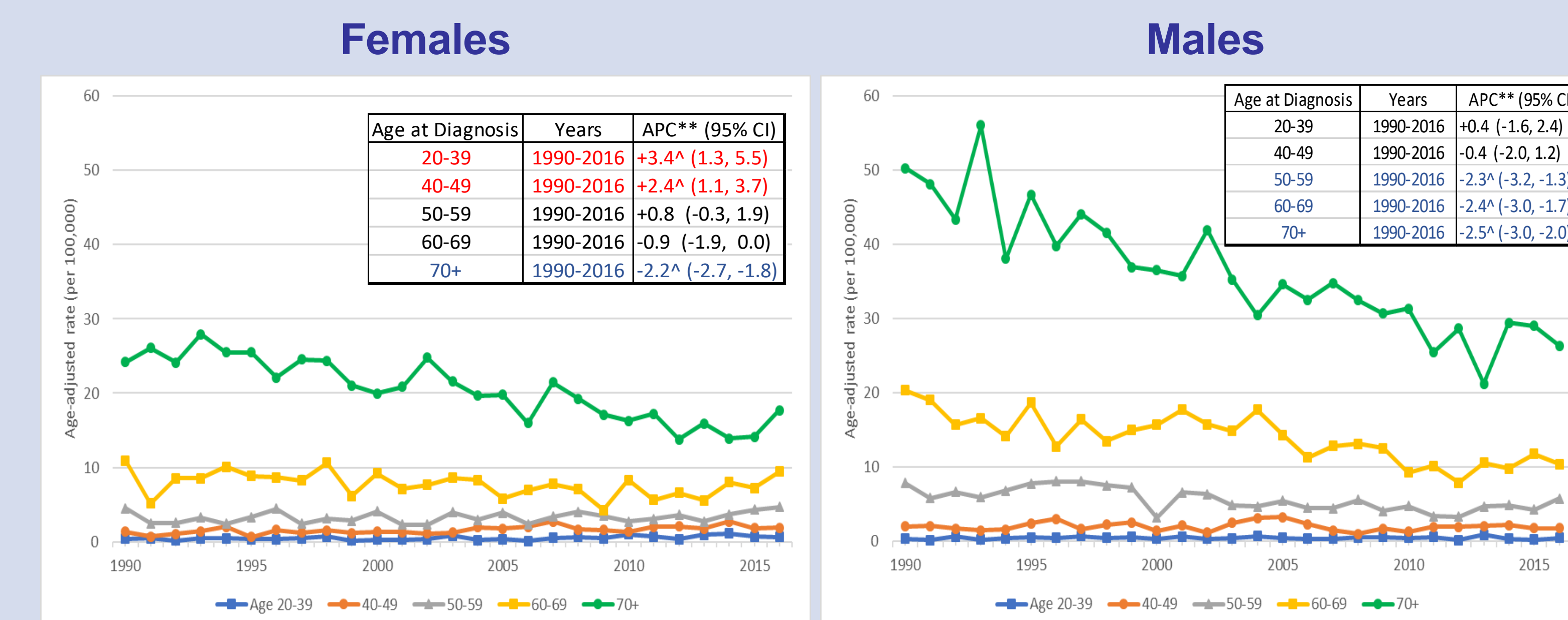
*Not otherwise specified.
 Note: The scales of the vertical axes on the graphs above are different. Results were not presented for female cardia stomach cancer in the age at diagnosis < 50 group due to small numbers

Trends in Stomach Cancer Incidence Rates by Sex and Primary Site in New Jersey, 1990-2016

Age at Diagnosis	Sex	Primary Site	Years	APC** (95% CI)
0 - 49 years	Female	Cardia	1990-2016	-
		Non-Cardia	1990-2016	+2.8 [^] (1.6, 4.0)
		Stomach, NOS*	1990-2016	+3.1 [^] (1.5, 4.8)
	Male	Cardia	1990-2016	-1.2 (-2.4, 0.0)
		Non-Cardia	1990-2016	-0.3 (-1.6, 1.1)
		Stomach, NOS*	1990-2016	-0.03 (-1.4, 1.4)
50+ years	Female	Cardia	1990-2016	-0.4 (-1.1, 0.3)
		Non-Cardia	1990-2016	-1.6 [^] (-2.0, -1.1)
		Stomach, NOS*	1990-2016	-2.7 [^] (-3.4, -2.0)
	Male	Cardia	1990-2016	-0.3 (-0.8, 0.2)
		Non-Cardia	1990-2016	-2.5 [^] (-2.9, -2.0)
		Stomach, NOS*	1990-2016	-3.4 [^] (-3.9, -2.9)

-Results were not presented due to small numbers.

Non-Cardia Stomach Cancer Incidence Rates in New Jersey by Age at Diagnosis Group, 1990-2016



Rates are per 100,000 and age-adjusted to the 2000 US standard population. Initial data report as of 12/2018; rates may change slightly as subsequent cases and additional information are reported.
 *Includes overlapping lesions of the stomach and stomach, not otherwise specified (NOS). **APC = annual percent change, 95% CI= 95% confidence interval.
[^]The APC based on incidence rates is significantly different from zero at p < 0.05. **APCs in red font are statistically significant increases; APCs in blue font are statistically significant decreases.**

Limitations

- Delayed reporting of cancer cases by out-of-state facilities may impact incidence rates in 2016 and trends in recent dx years.
- Delayed reporting of race or ethnicity in recent diagnosis years may impact race/ethnicity-specific rates and trends in recent dx years;
- Small numbers in some categories make it difficult to draw conclusions.

Strengths

- Population-based cancer registry with high-quality data
- Diverse population of New Jersey
- Long term follow-up to evaluate cancer incidence trend data (27 years)

Conclusions

- Although stomach cancer incidence remains lower in younger adults in New Jersey, it is concerning that stomach cancer incidence has increased in younger women since 1990.
- This trend could reverse the overall long-term declines in NJ in the future, especially if increased risk continues as this cohort of younger women ages.
- It is important to monitor changes in stomach cancer incidence, and research is needed to identify the role of antibiotic use, dietary factors, and other possible causes of increasing incidence in younger women, especially in younger Hispanic women.