

# Impact of HPV vaccination on cervical cancer incidence among females 15-34 years old, 2001-2018

Fangjian Guo<sup>1,2</sup>, MD, PhD; Abbey B. Berenson<sup>1,2</sup>, MD, PhD

## Background

- Since 2006, quadrivalent HPV vaccine and bivalent HPV vaccine human papillomavirus (HPV) vaccine has been recommended for young females in the US and 9-valent HPV vaccine has been available since 2009.
- HPV vaccine can reduce HPV infection rate and prevalence in young females.
- Previous research showed that cervical cancer incidence slightly decreased from 2001 to 2014 among young females 15-24 years old.

## Methods

- We used data from United States Cancer Statistics (USCS) 2001–2018 database among US females 15–34 years old.
- We compared the 4–year average annual incidence of invasive cervical cancer in 4 years before HPV vaccine introduction (2003-2006) and the latest 8 years in the vaccine era (2011-2014 and 2015-2018).
- Joinpoint regression models were fitted to identify the discrete joints (year) that represent statistically significant changes in direction of the trend.

Table 1. Basic characteristics of females 15-34 years old with cervical cancer from 2001 to 2018 (N=33,033).

	Frequency n(%)	
	15-24 Years Old (n=2,595)	25-34 Years Old (n=30,438)
Race/Ethnicity		
Hispanic	533(20.5)	6,019(19.8)
Non-Hispanic White	1,499(57.8)	18,919(62.2)
Non-Hispanic Black	415(16.0)	3,788(12.4)
Asian/Pacific Islander	49(1.9)	899(3.0)
Region		
Northeast	394(15.2)	4,667(15.3)
Midwest	531(20.5)	6,446(21.2)
South	1,095(42.2)	12,578(41.3)
West	575(22.2)	6,747(22.2)
Histology		
Squamous cell carcinoma	1,536(59.2)	20,149(66.2)
Not Squamous cell carcinoma	1,059(40.8)	10,289(33.8)

## Objectives

To assess the impact of HPV vaccine introduction on the incidence of cervical cancer among young women.

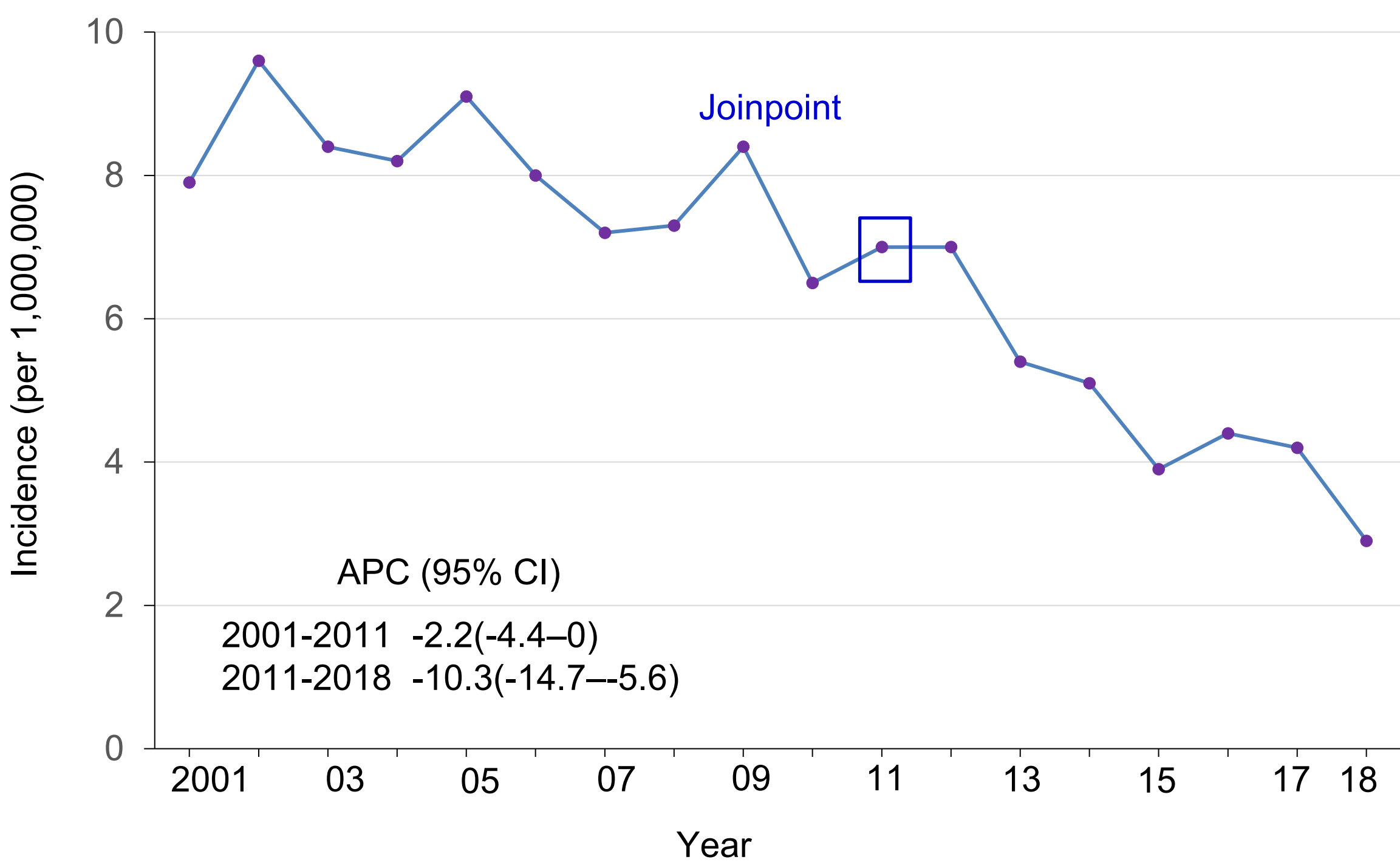
## Results

- The 4–year average annual incidence rates for cervical cancer among females 15-24 years old was 3.9 per 1,000,000 in 2015–2018, 6.1 in 2011–2014, and 8.3 in 2003–2006.
- The 4–year average annual incidence rates for cervical cancer among females 25-34 years old was 82.0 in 2015–2018, 76.8 in 2011–2014, and 88.33 in 2003–2006.
- Joinpoint analyses of cervical cancer incidence among females 15-24 years old revealed a significant joint at 2011 (APC for 2001-2011 -2.2, 95% CI -4.4–0 and APC for 2011-2018 -10.3, 95% CI -14.7–-5.6).
- Among females 25-34 years old, there was also one significant joint at 2011 (APC for 2001-2011 --2.3, 95% CI -2.9–1.8 and APC for 2011-2018 1.3, 95% CI 0.3–2.2).

Table 2. Age-adjusted incidence of cervical cancer among females 15-24 years old during 2003-2006, 2011-2014 and 2015-2018.

	Incidence (per 1,000,000 person-years)	Rate ratio vs. 2003-2006
Among female 15-24 years old		
2003-2006	8.4(7.8-9.1)	
2011-2014	6.1(5.6-6.7)	0.73(0.65-0.81)
2015-2018	3.9(3.5-4.3)	0.46(0.40-0.52)
Among female 25-34 years old		
2003-2006	88.3(86.2-90.4)	
2011-2014	76.8(75-78.7)	0.87(0.84-0.90)
2015-2018	82.0(80.1-84)	0.93(0.90-0.96)

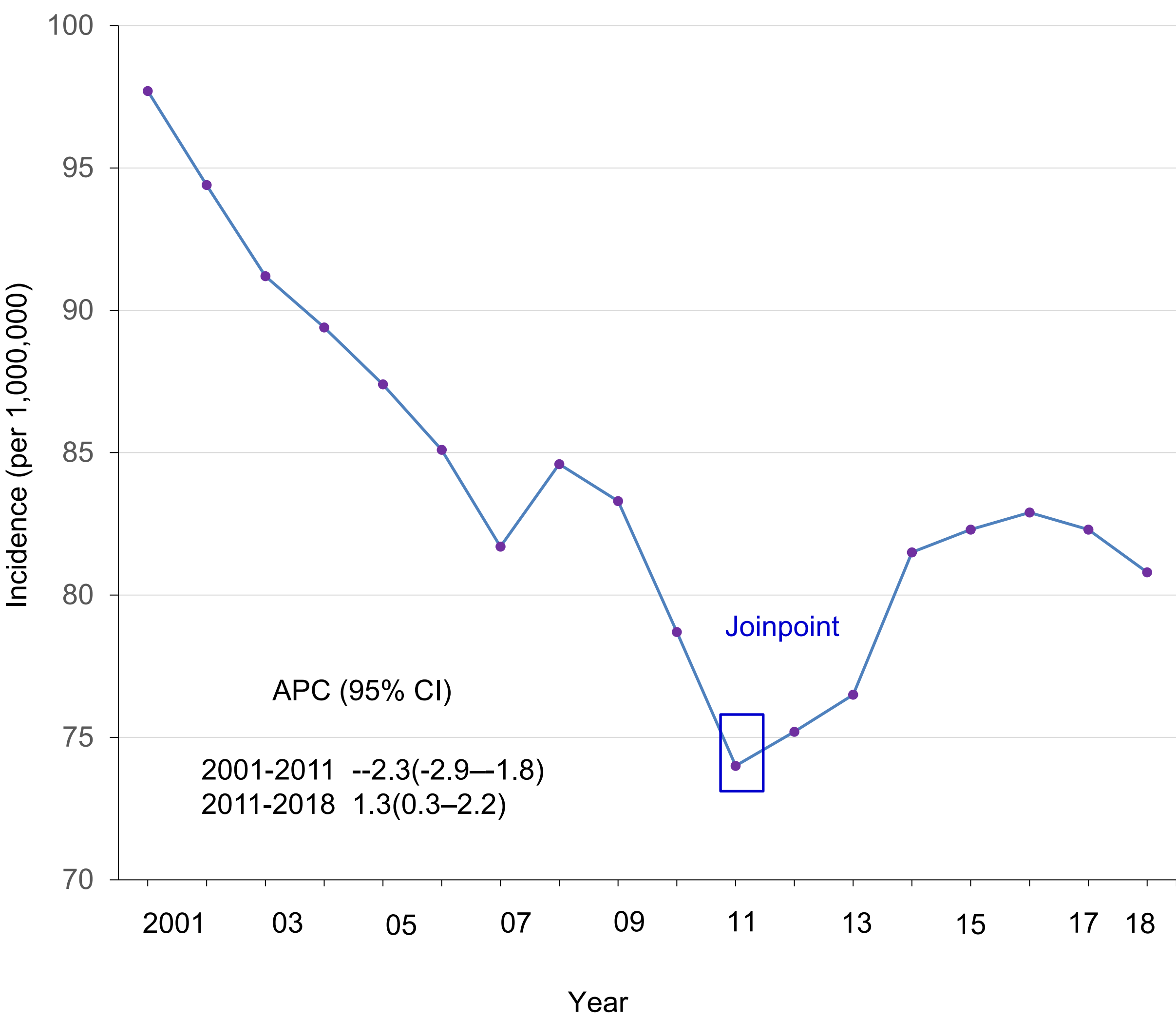
Figure 1. Age-adjusted incidence of cervical cancer from 2001 to 2018 among females 15-24 years old.



## Conclusions

- Cervical cancer incidence in the vaccine era was significantly lower than the pre-vaccine era among young women 15-24 years old.
- There was further decrease in the incidence of cervical cancer among young women 15-24 years old after 2011. This may indicate early effects of the introduction of HPV vaccination, improved HPV vaccine coverage, and availability of 9-valent vaccine.

Figure 2. Age-adjusted incidence of cervical cancer from 2001 to 2018 among females 25-34 years old.



### Author Affiliations

<sup>1</sup>Department of Obstetrics & Gynecology  
<sup>2</sup>Center for Interdisciplinary Research in Women's Health, The University of Texas Medical Branch at Galveston

Corresponding author: Fangjian Guo, MD, PhD; faguo@utmb.edu.

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