# REDUCING CERVICAL CANCER DISPARITIES BY COUNTY POVERTY: THE ROLE OF HPV VACCINATION

Jennifer C. Spencer[1,2,3], MSPH; Noel T. Brewer, PhD[4,5]; Justin G. Trogdon[1,5]; Morris Weinberger[1]; Tamera Coyne-Beasley[6]; Stephanie B. Wheeler[1,5]

[1]Department of Health Policy and Management, University of North Carolina at Chapel Hill; [2]Department of Health Policy and Management, Harvard School of Public Health; [3]McGraw/Patterson Center for Population Sciences, Dana Farber Harvard Cancer Center; [4]Department of Health Behavior, University of North Carolina at Chapel Hill; [5]Lineberger Comprehensive Cancer Center, University of North Carolina at Chapel Hill; [6]Division of Adolescent Medicine, University of Alabama at Birmingham;

Methods

A previously calibrated US model of HPV transmission was updated to incorporate data specific to the US counties in the lowest and higher quartile of poverty (% population under 100% Federal Poverty Level)
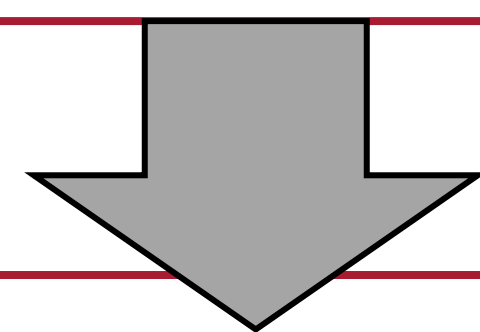
Data stratified by county poverty quartile:

- Pre-vaccine HPV Prevalence: National Health and Nutritional Examination Survey

- Cervical Cancer Screening: National Health Interview Survey

- HPV Vaccination: National Immunization Survey –Teen

- Pre-vaccine Cervical Cancer Incidence: Surveillance, Epidemiology, and End Results Study (SEER 2006)
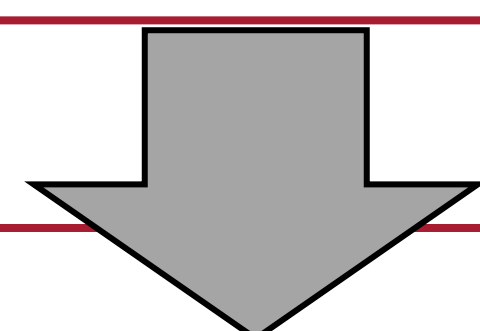
We produced 50 calibration input sets which fit pre-vaccine cervical cancer incidence and HPV prevalence data.

Vaccination data was used to projected future changes in cancer incidence in both low- and high-poverty counties through 2070.

We compared annual age-adjusted incidence to the 'near elimination' target of 4 cases per 100,000 women.

Funding

Using simulation models calibrated to reflex high- and low-poverty US counties, we show current HPV vaccination rate are likely sufficient to achieve targets for *elimination of cervical cancer as a public health problem* in both high- and low-poverty settings.
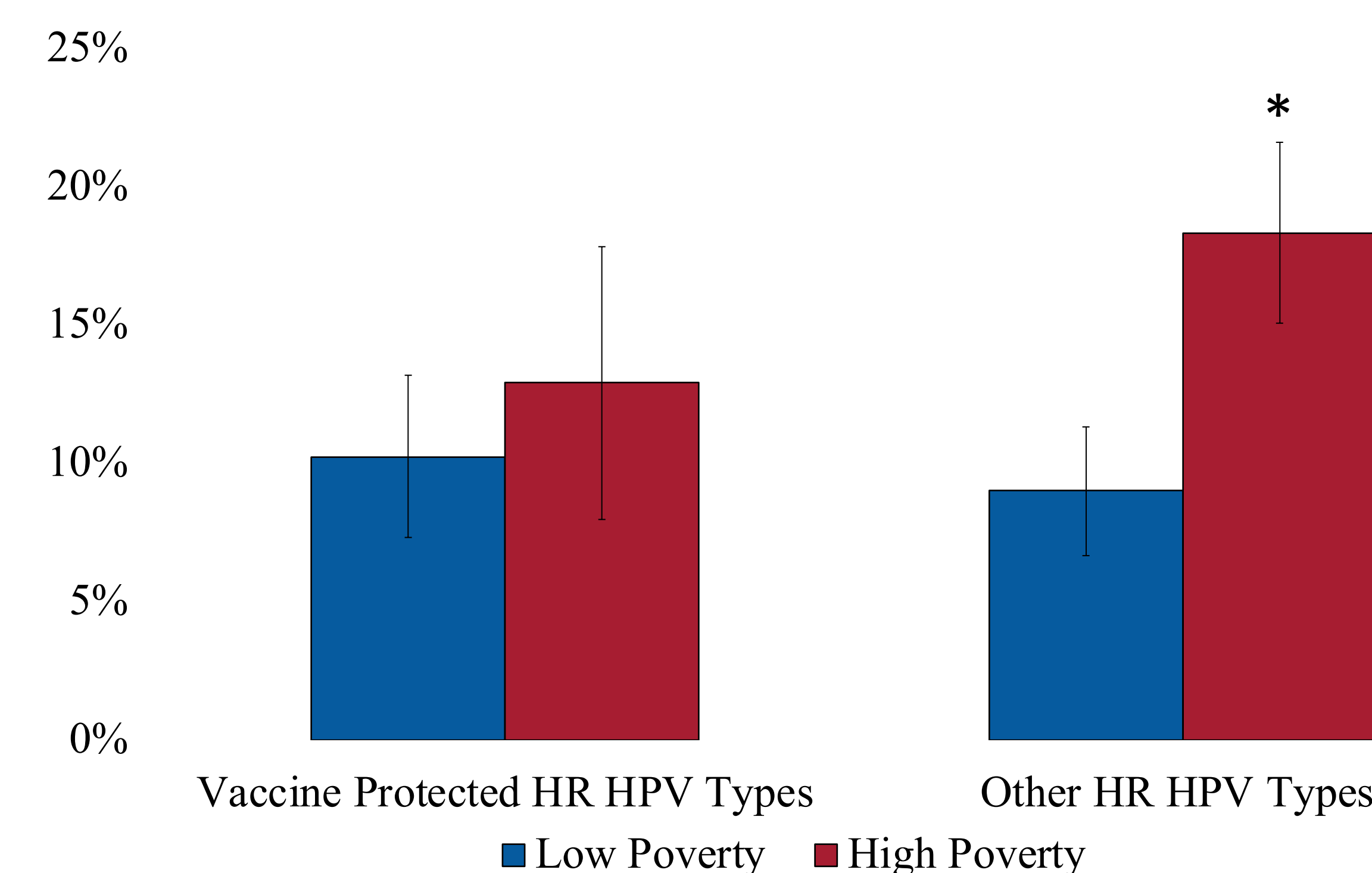
However, high-poverty counties in the US will take more than a decade longer to achieve this goal and will experience thousands of potentially preventable cases of cervical cancer over the next 50 years.

Results

Comparing pre-vaccination HPV prevalence rates from NHANES (Figure 1) showed no significant difference by county-poverty for vaccine protected high-risk HPV types, but high poverty counties had significantly higher prevalence of high-risk types not covered by HPV vaccine, with a 18.3% [13.5%-24.3%] of women 18-44 reporting at least one other high-risk type compared to 8.9% [6.4%-12.6%] in low-poverty counties.
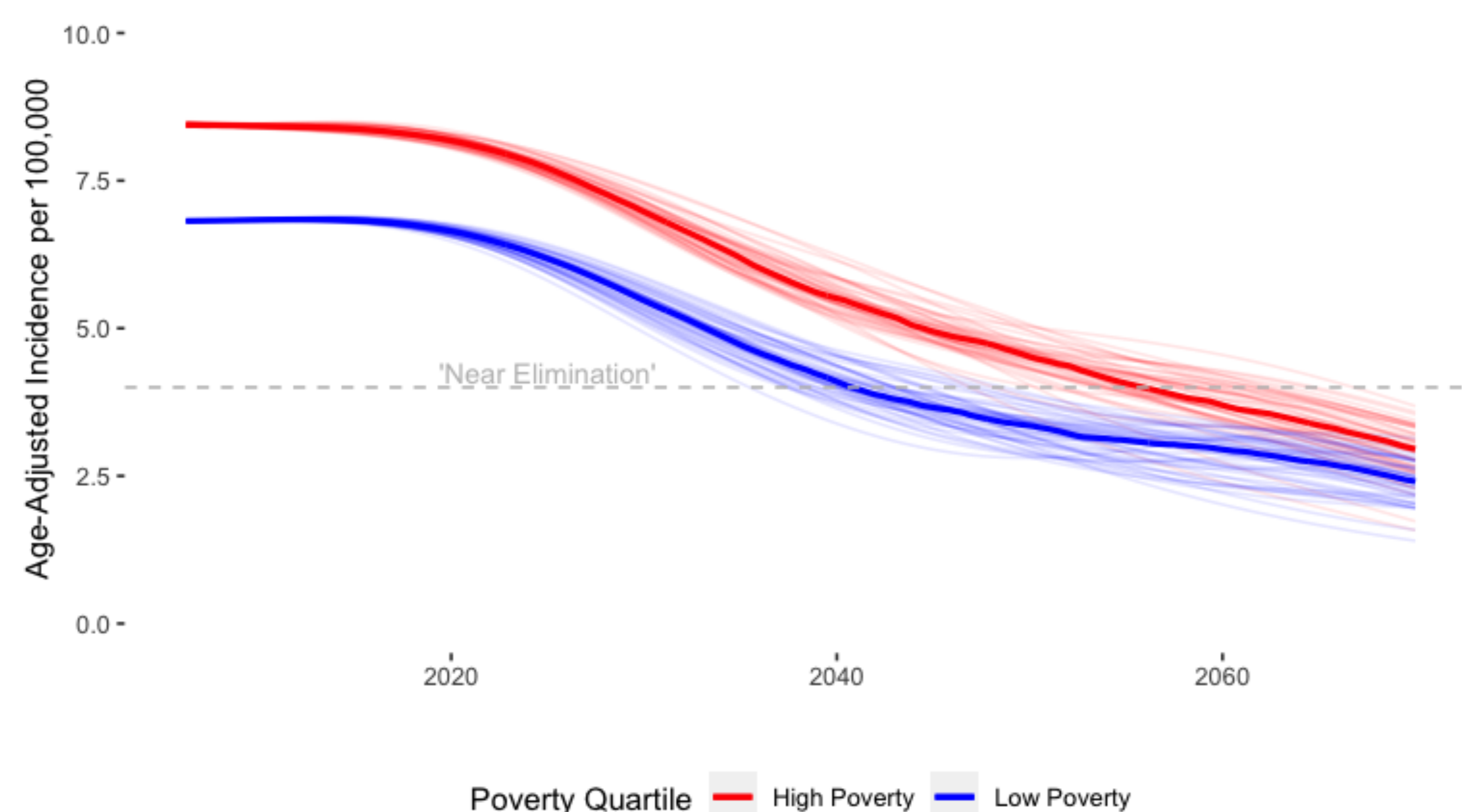
No differences were seen across high- and low-poverty counties in HPV vaccine initiation or completion for males or females. (data not shown)

Figure 2: Projected Cervical Cancer Incidence in Low- and High-Poverty Counties

Bold lines shows median of 50 calibration sets; lighter lines demonstrate output from each set of feasible inputs from calibration.

Figure 1: Pre-vaccine HPV Prevalence by County Poverty Quartile

*Data from NHANES 2003-2006; * p<.0001*

We find low-poverty counties will achieve the 'near elimination' target more than a decade earlier than high-poverty counties (2040 vs. 2054).

While the absolute magnitude of the disparity between high- and low-poverty counties will decrease over this period, relative differences will likely remain (from 1.4 in 2020 to 1.8 in 2070.)

Scaling the disparity to the size of the population in high-poverty counties, this represents 19,366 excess cervical cancer cases over this period (relative to low-poverty incidence)

Background

Eliminating cervical cancer as a public health problem is likely in the coming decades, yet inequities may delay this achievement in some areas of the US.

We sought to evaluate whether human papillomavirus (HPV) vaccination will reduce existing disparities in cervical cancer incidence between high- and low-poverty counties in the US.

Sensitivity Analysis

Immediately increasing HPV vaccination coverage in all counties to the Healthy People 2020 goal (80%) would prevent more than 1,000 excess cases over 50 years but have no measurable impact on the projected elimination year.

Changes to efficacy of the vaccine when starting but failing to complete the series had small effects on overall burden but no effects on relative disparities between high- and low-poverty counties.

Discussion

HPV vaccination is projected to reduce, but not eliminate disparities in cervical cancer between high- and low-poverty counties.

Increasing HPV vaccination should remain a public health priority, but to reduce disparities in cervical cancer incidence by county poverty, policymakers should emphasize a multi-component approach, including prioritizing screening programs in high-poverty areas with historically low cervical cancer screening uptake.

@jcspencer_unc

jspencer@hsph.harvard.edu