

### Introduction

#### Human Papillomavirus (HPV) and Cervical Cancer

- HPV is the most common sexually transmitted virus in the US and causes virtually all cases of cervical cancer and genital warts.
- HPV infects approximately 20 million people in the United States, and there are 6.3 million new cases each year. Cervical cancer is the second leading cancer killer of women in the US. Nearly 10,000 women are diagnosed with cervical cancer each year and 3,700 of these women die.

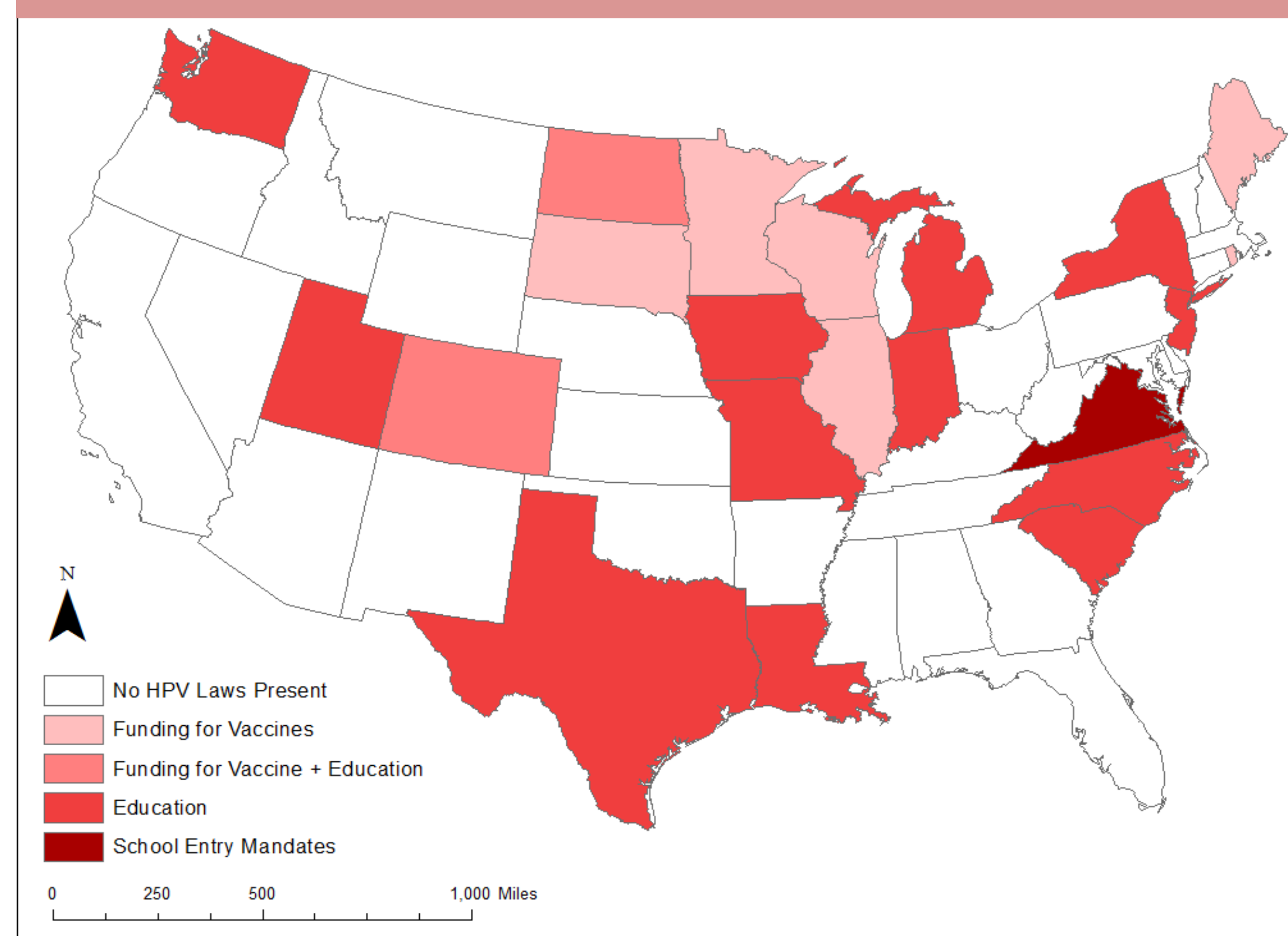
#### HPV Vaccinations

- Gardasil is currently the only HPV vaccine that helps protect against four types of HPV. Two of these types of HPV cause about 75% of cervical cancer cases, and two more types cause about 90% of genital warts cases. As of 2013, the vaccination rate for girls ages 13-17 was 57.3%.
- HPV vaccination is recommended by the federal Advisory Committee on Immunization Practices (ACIP) for boys and girls ages 11-12, but HPV vaccination rates lag behind other vaccination rates for this age group. Since 2006, 42 states have introduced some legislation regarding HPV vaccination, including vaccination mandates and educational programs.

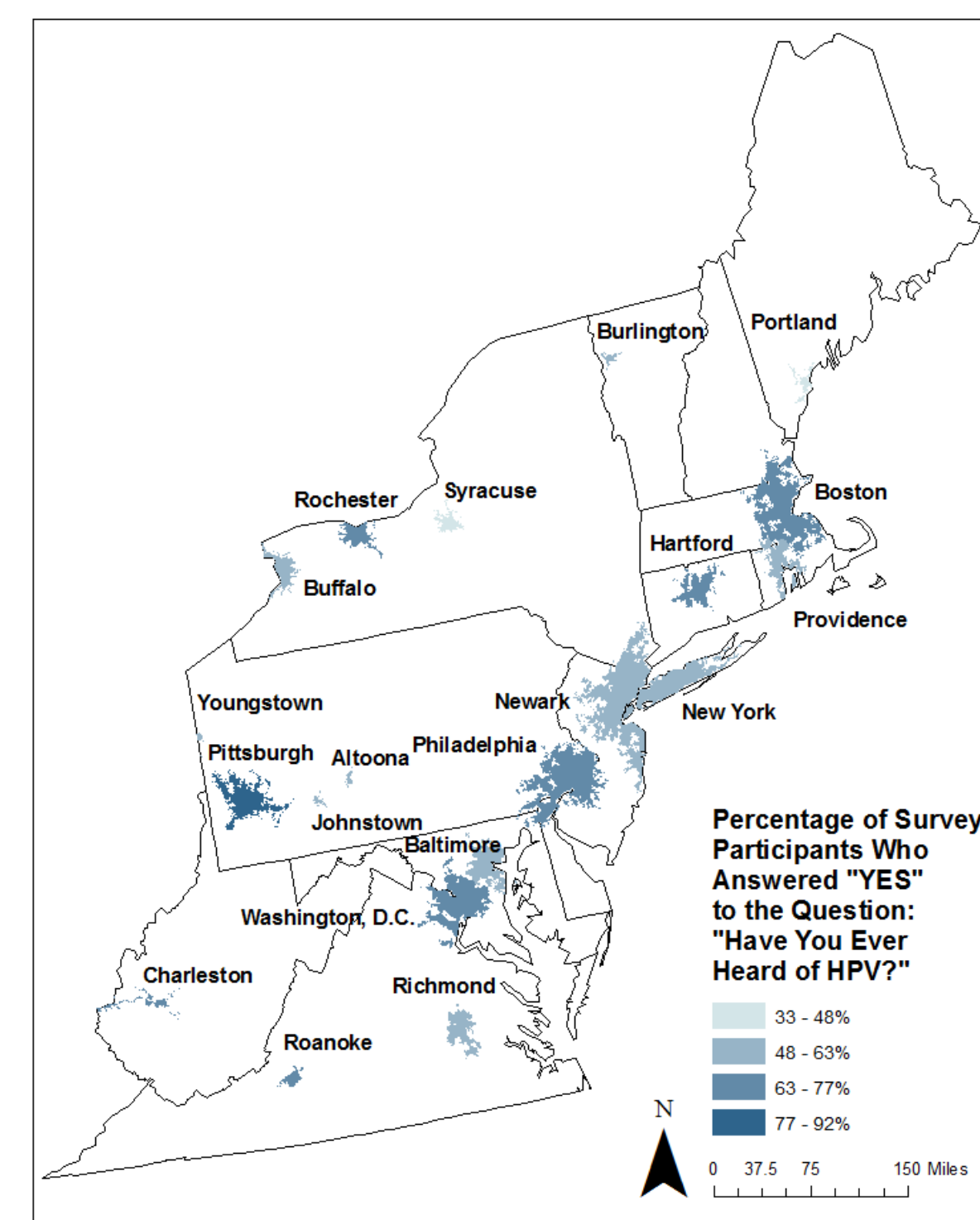
#### Project Aim

- This project aims to explore geographic variations in cervical screening rates, HPV and cervical cancer awareness, and HPV vaccination policies. Determining geographic differences in awareness, screenings, and policies will allow researchers to determine which regions could benefit from initiatives to raise vaccination and screening rates.

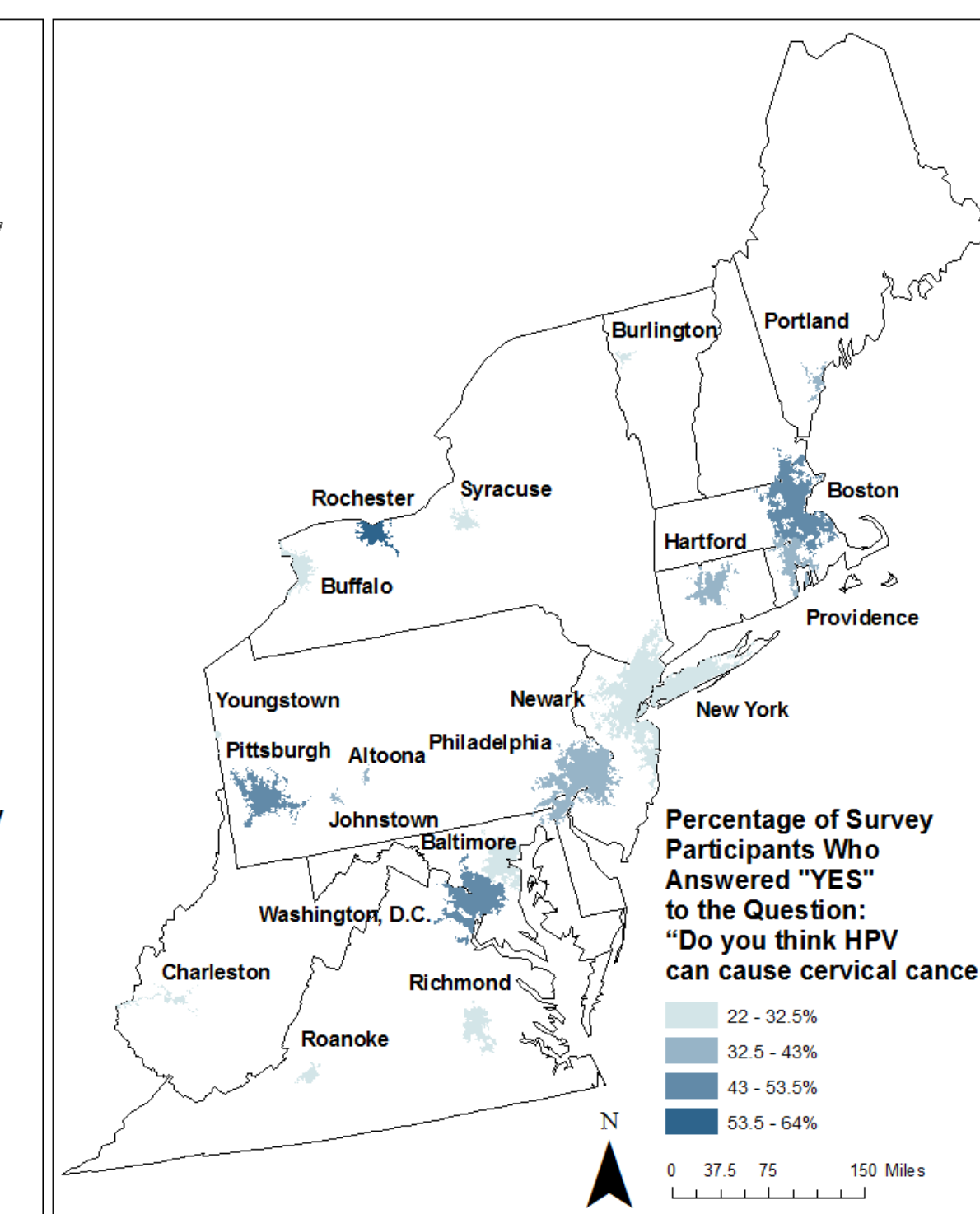
### HPV Vaccination Policies, 2014



### Have You Ever Heard of HPV?



### Do You Think HPV Can Cause Cervical Cancer?



### Methodology

#### Cervical Cancer Screening Rates, 2012

- State-level cervical cancer screening data from 2012 were obtained from the National Cancer Institute. The data were joined to a state-level shapefile of the United States, and a choropleth map was created based on five quantities of equal intervals.

#### HPV Vaccination Policies, 2014

- State level data about HPV vaccination policies were obtained from Kaiser Family Foundation. This data were joined to a state-level shapefile of the United States, and a choropleth map was created based on five categories of policies. The maps were projected using the coordinate system NAD 1983 Contiguous USA Albers.

#### Have You Ever Heard of HPV? Do You Think HPV Can Cause Cancer? 2014

- City-level survey data were obtained from the 2014 Health Information National Trends Survey. The data were cleaned from 3,185 records to 2,798, and then the percentage of "yes" answers was calculated for the questions: "Have you ever heard of HPV?" and "Do you think HPV can cause cancer?" The data were then joined to a city-level shapefile and a choropleth map was created based on four quantities of equal intervals. The map was then clipped to show only the Northeast and Mid-Atlantic. This map was also projected using the coordinate system NAD 1983 Contiguous USA Albers.

### Sources

Gardasil. <http://www.gardasil.com/>  
Health Information National Trends Survey. <http://hints.cancer.gov/dataset.aspx>  
HPV-Associated Cancers Statistics. (2014, September 2). <http://www.cdc.gov/cancer/hpv/statistics/>  
HPV and Men - Fact Sheet. (2015, January 28). <http://www.cdc.gov/std/hpv/stdfact-hpv-and-men.htm>  
HPV Vaccine Policies. <http://www.ncsl.org/research/health/hpv-vaccine-state-legislation-and-statutes.aspx>  
National Cancer Institute. <https://gis.cancer.gov/mapstory/cervical/>  
The HPV Vaccine: Access and Use in the US. (2015, February 26). <http://kff.org/womens-health-policy/factsheet/the-hpv-vaccine-access-and-use-in/>

### Results

Cervical cancer screening rates are high in the United States, from 74.6 and 89.6% across all states. There seem to be regional variations in cervical cancer screening rates, with higher rates in the Northeast and lower rates on the West coast, with the exception of California. This somewhat correlates with the data presented on the HPV vaccination policies map, which shows that there is a lack of HPV vaccination policies on the West coast, with the exception of Washington. Though the northeast has high rates of cervical cancer screening overall, there are some cities that showed lower knowledge of HPV as a virus and HPV's link to cervical cancer. Syracuse, NY and Portland, ME had the lowest percentages of survey respondents who had heard of HPV, and Syracuse, NY, New York, NY, Newark, NJ, Youngstown, PA, Baltimore, MD, Richmond, MD, Roanoke, VA, and Charleston, WV had the lowest percentages of survey respondents who thought that HPV caused cervical cancer.

### Conclusions and Reflections

Interventions that aim to increase cervical cancer screening rates, HPV vaccination rates, and HPV awareness should focus their efforts on the West Coast, and the aforementioned cities in the Northeast. There were some limitations of this project, which included the inability to use HPV surveillance data, because HPV is not a virus that requires reporting. There are data sources that contain self-reported HPV vaccination rates, but I was not able to access them for this project. Additionally, most of the data used was state level data, and the demographic diversity of each state makes it hard to generalize.

### Cervical Cancer Screening Rates, 2012

