



Immunization coverage levels and financial impact of vaccine preventable diseases in Arizona

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Introduction

Vaccine preventable diseases (VPDs) are becoming more common in the United States, as demonstrated with increasing numbers of measles and whooping cough outbreaks. This trend is driven by several factors, including the antivaccination movement and waning efficacy of certain vaccines.

In Arizona, millions of dollars are spent to treat VPDs in children. These costs could be reduced or eliminated if more children received lifesaving vaccines. Investigating the annual cost of care attributed to VPDs provides the opportunity to demonstrate gaps in coverage as well as data to aid policy makers to support adequate child vaccine coverage in Arizona.

Research Question

Is there an association between hospital costs for vaccine-preventable diseases individuals under the age of 18 and school vaccine exception rates between 2016 and 2018 in Arizona?

Materials and Methods

Services from the Arizona Partnership for Immunization (TAPI) and the Arizona Department of Health Services (AZDHS) were used for data collection. Data was collected utilizing the National Immunization Survey (NIS) data from the Centers for Disease Control, Arizona State Immunization Information System (ASIIIS) data, Arizona Department of Health Services (AZDHS) School Exemption and Coverage Rates and Disease Data and Statistics Report, Medicaid Immunization Coverage Rates (AHCCCS), internal United Healthcare Claims Data, and the Maricopa County Department of Public Health Services.

Hospitalization cost and cases for VPDs between 2016 and 2018 were obtained using customized ICD9 and 10 code report from Bureau of Public Health Statistics (Table 1). Data was analyzed by Paul Kang at the University of Arizona College of Medicine Phoenix statistician.

Results

| VPDs All Ages | ICD9 Codes | ICD10 Codes |
|---------------------------------|--|---|
| H Influenza B | 41.5, 320.0, 326, 482.2, 38.41 | B96.3 G00.0 G09 J14 |
| Diphtheria | 32.0, 32.1, 32.3, 32.85, 32.89, 32.9 | A36.0 A36.1 A36.2 A36.3 A36.8 A36.9 |
| Measles | 055.0, 055.79, 055.1, 055.2, 055.9 | B05.0 B05.1 B05.2 B05.3 B05.4 B05.8 B05.9 |
| Mumps | 072.0, 072.1, 072.2, 072.3, 072.79, 072.9 | B26.0 B26.1 B26.2 B26.3 B26.8 B26.9 |
| Pertussis | 033.0, 033.1, 033.8, 033.9 | A37.0 A37.9 |
| Tetanus | 037 | A33 A34 A35 |
| Polio | 45.1, 45.9, 45.2 | A80.0 A80.1 A80.2 A80.3 A80.4 A80.9 |
| Rubella | 056.09, 056.79, 056.9 | B06.0 B06.8 B06.9 |
| Hepatitis B | 70.2, 70.3 | B16.0 B16.1 B16.2 B16.9 B18.0 B18.1 B19.10 B19.11 |
| Congenital Rubella | 7710 | P350 |
| Varicella | 052.1, 052.9 | B01 B01.0 B01.1 B01.2 B01.8 B01.9 (shingles separate) |
| Influenza | 487, 487.1, 487.8, 488, 488.19, 488.19, 488.09 | J10 J10.1 J10.2 J11.0 J11.82 J09.X1 |
| Pneumococcal (Add to narrative) | V03.82, 484.3, 481 | J13 A40.3 B95.3, G00.1, G00.2 |
| Hepatitis A | 070, 070.1 | B15 |
| Neisseria Meningitides | 036 | A39.0 |

Table 1: Customized ICD9 and 10 Code Report

| Immunization Exemptions | Year | | |
|-------------------------|------------|------------|------------|
| | 2015-2016 | 2016-2017 | 2017-2018 |
| Kindergarten | % | % | % |
| Medical Exemption | 0.3 | 0.3 | 0.7 |
| Personal Exemption | 4.5 | 4.9 | 5.4 |
| Total exemption | 4.8 | 5.2 | 6.2 |
| 6th Grade | | | |
| Medical Exemption | 0.4 | 0.5 | 0.6 |
| Personal Exemption | 4.4 | 5.1 | 5.4 |
| Total exemption | 4.8 | 5.6 | 6.3 |
| Childcare | | | |
| Religious exemption | 3.6 | 3.9 | 4.3 |
| Medical Exemption | 0.5 | 0.5 | 0.7 |
| Total exemption | 4.1 | 4.4 | 4.8 |

Table 2: Percentage of kindergarten, 6th/7th grade public school students, and children in childcare that are exempt from school required immunizations, as reported through the 2015-2018 Immunization Data Report by the AZDHS.

Where the Exemptions Are:

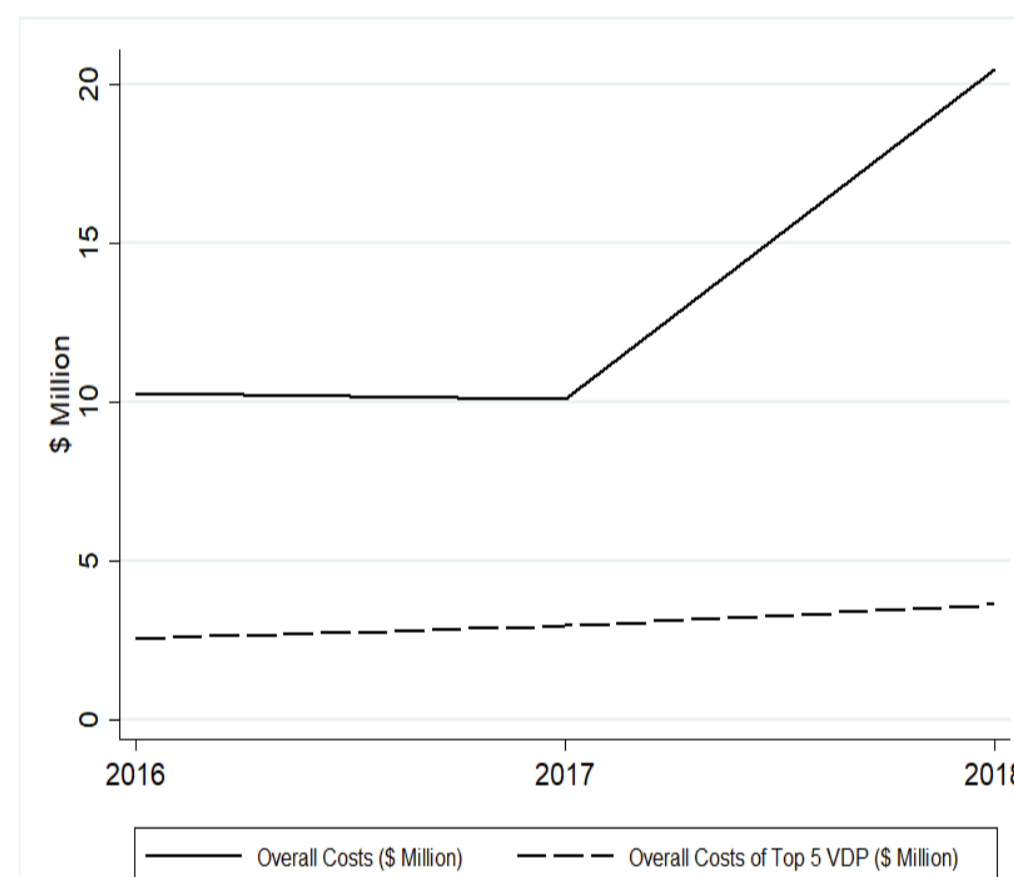
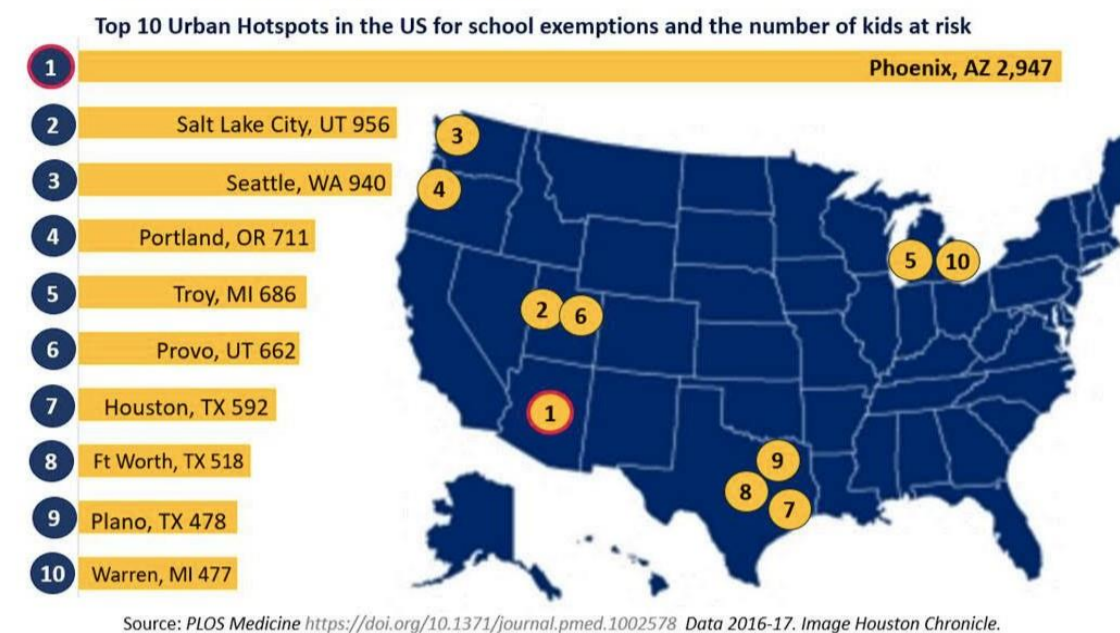


Figure 1. Cost analysis of exemption rates of Arizona Health Care Cost Containment System (AHCCCS) patients <18 years old vs overall cost for primary diagnosis of vaccine preventable diseases

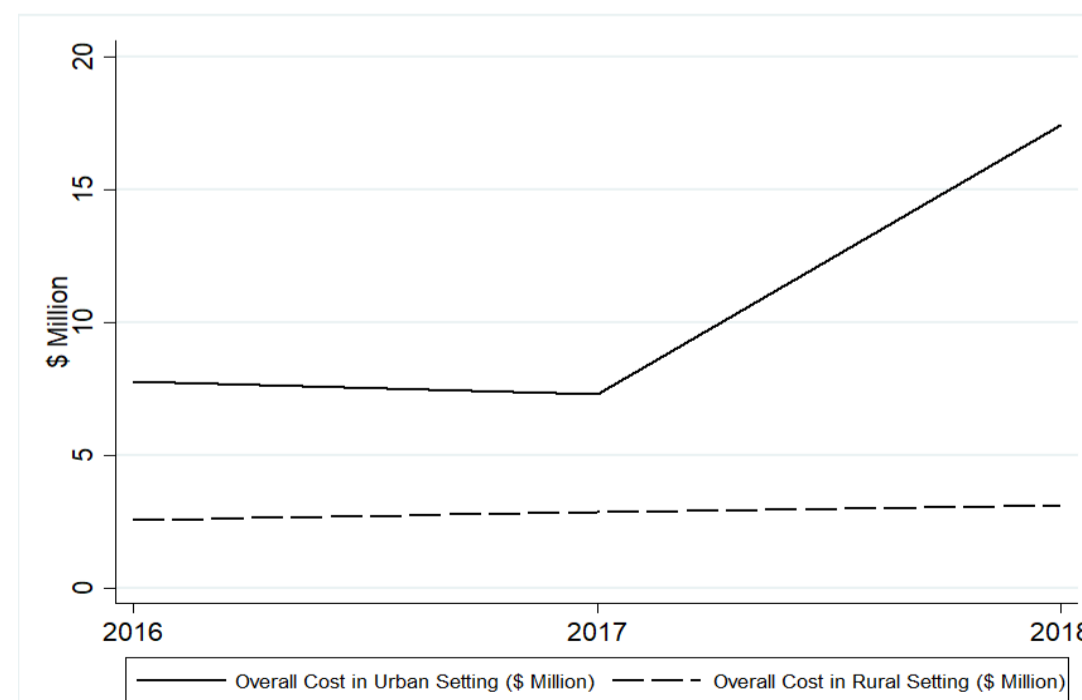


Figure 2. Cost analysis of exemption rates in Urban vs rural settings in Arizona

Conclusion

Over the past 3 years, there has been an 1.4%, 1.5%, and 0.7% increase in total vaccination exemptions in kindergarten, 6th grade, and childcare children, respectively (Table 2).

Between 2016 and 2018, summative hospital and emergency room costs for VPD in AHCCCS pediatric patients increased by more than \$10 million (Figure 1).

Similar trends were observed in both urban and rural Arizona counties. Considering the increased vaccination school exemption of Yavapai County (12.5%) versus Yuma county (1.3%), although population growth needs to be accounted for prior to additional analysis (Figure 2).

Summary

- There is a need for accurate and up to date information about vaccinations in Arizona, which can be attributed for the recent increase in VPDs outbreaks.
- Overall, more exemptions lead to increased illness and hospital cost
- Emphases on public health measures to lower exemption rates in Arizona will help to decrease preventable hospitalizations and overall medical cost.

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