Analysis of the 2013-2014 School-Located Vaccination Program in Washoe County

IMPLICATIONS FOR INFLUENZA AND TDAP IMMUNIZATION
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Background

Vaccine Recommendations

The Advisory Committee on Immunization Practices (ACIP) recommends an annual influenza vaccine for all persons six months of age and older, and one dose of Tdap for adolescents between 11 and 18 years of age, preferably those between 11 and 12 years of age\(^1\). In the United States, recommendations for child and adolescent vaccination are often included as requirements for school entry\(^2\). While there is no school entry requirement for influenza; almost all states have Tdap school-entry requirements for secondary school\(^3\).

Healthy People 2020

The Healthy People 2020 objective for influenza immunizations is to increase the percent of children immunized to 70% by the year 2020\(^4\). While influenza vaccination for children has been increasing steadily since 2004\(^5\), during the 2013-2014 flu season, the influenza vaccination coverage of children between 6 months and 17 years was only 58.9%. Another Healthy People 2020 objective is to immunize 80% of adolescents between 13-15 years of age with one dose of Tdap\(^4\). In 2011, 78.2% of adolescents received at least one dose of Tdap and by 2013, 86.0% of adolescents received at least one dose in the US\(^6,7\).

School-Located Vaccination (SLV) Programs

Schools have been used during flu outbreaks as a place to immunize school children. School-based vaccination efforts were common during the 2009 H1N1 pandemic. SLV programs have the potential to reach a large number of children by bringing the vaccines directly to children and decreasing vaccination barriers for parents\(^8\)-\(^16\).

SLVs in Nevada

One strategy to improve immunization coverage in Nevada is through SLV programs. In 2012, the Nevada Division of Public and Behavioral Health Immunization Program received grant funding to implement SLV programs that utilized third-party billing. Immunize Nevada was given the responsibility of ensuring the implementation of the SLV programs in Clark, Elko, and Washoe counties. This report will focus on an in-depth look at the SLV program in Washoe County.
Purpose

The goal of this report is to describe the students who participated in the SLV program during the 2013-2014 school year in Washoe County and to address the following objectives:

1. Describe the differences in student participation among Title I and non-Title I schools that participated in the SLV program.
2. Determine if there are any socio-demographic differences among students who participated in Title I and non-Title I schools.
3. Determine if there is any socio-demographic difference among 6th graders who received either Tdap only, influenza only, or both vaccines.
4. Assess whether Washoe County vaccination rates for Influenza were higher in zip codes with SLV programs compared to zip codes without these programs.
5. Determine if the SLV program in Washoe County is able to sufficiently recapture the cost of the program through third-party billing.
Methods

Individual Level Analysis

Participants and procedures.

All students at participating SLV schools were sent home with an informational packet in English and Spanish (double-sided) about 3-4 weeks before the SLV clinic was to be held. This packet included an informational sheet, the consent form, a HIPAA acknowledgement, an Immunize Nevada remittance envelope, and a Washoe County Health District notice of health information sheet. The consent form collected basic information such as name, age, date of birth, and screening questions to determine if there were any contraindications. Additionally, the consent form had a section to collect insurance status and corresponding billing information. If parents wanted their child to get vaccinated, parents sent the consent form back to the school where the school nurse verified the information and reviewed the health history. During the SLV clinic, immunization nurses from the Washoe County Health District brought the vaccine and immunized the children who had returned consent forms.

This analysis of SLV programs focused on students, specifically 6th graders, in elementary schools and middle schools that participated in an SLV clinic during school hours between October 2013 and February 2014. This excluded 14 schools that participated in the program after school hours, or that were considered to be a very specific SLV clinic, such as school-entry requirements. One clinic that occurred during school hours was excluded due to the nature of student demographics and medical conditions that contraindicated some immunizations (Figure 1). In addition, all students enrolled in the Pre-K head start programs (under age 5) and adults were excluded from analysis. Individual-level data from the consent forms were entered into a database using Epi Info 7.2.1.

Measures.

Socio-demographic measures collected from the consent forms included school, clinic date, grade, gender, date of birth, age, race, ethnicity, insurance status, vaccine funding source, and the vaccines administered (influenza only, Tdap only, or both influenza and Tdap). Age was calculated in Epi Info 7.2.1 using the clinic date and the date of birth. If grade was missing, the probable grade was input based on age and date of birth. As recommended by
Immunize Nevada, if self-reported insurance status was not documented, individuals were recorded as uninsured.

Analysis.

The participating schools were analyzed by Title I and non-Title I status and frequency of grade, gender, self-reported insurance status, and vaccines administered were determined using IBM SPSS 22.0. If self-reported insurance status was reported as no insurance or underinsured, then these measures were collapsed into one category. Chi-square ($\chi^2$) tests were used to assess the relationship between socio-demographic characteristics and Title I status among those who were vaccinated through the SLV program. A sub-analysis with 6th graders was completed by stratifying by Title I status and independently analyzing each school type using chi-square tests to determine if there were differences between socio-demographic characteristics and vaccines administered, as this group is impacted by the Tdap requirement for entering 7th grade.

Data for SLV Participating Schools

School data were collected from the statewide Nevada Report Card database for the 2013-2014 school year. Nevada Report Card produced an Excel spreadsheet of school enrollment and demographic information for race/ethnicity and gender. Measures for the SLV participating schools include data for Washoe County and each participating school. These measures included the number of students enrolled, race/ethnicity, and gender. Measures from the individual level analysis were used in conjunction with Nevada Report Card. Vaccination rates of students at participating schools were determined by using the frequency of vaccines administered at each school to determine the numerator and the number of enrolled students at participating schools to determine the denominator.

County Level GIS Data

Washoe County zip code level immunization rates for influenza were obtained from the Nevada State Immunization Program from the immunization information system, Nevada WebIZ. Influenza vaccination rates were calculated for all children between 4-18 years of age in all Washoe County zip codes. The immunization rates were calculated for the past four years (2010-2014) by defining the school year to be July 1- June 30 of the corresponding school year. SLV participating schools were geocoded by using the latitude and longitude of each school.
Immunization rates for influenza were mapped using ArcGIS. The zip code shape files were provided from the Washoe County GIS Data Warehouse. Vaccination coverage was mapped in intervals of 15%. The SLV participating schools were geocoded onto the map file and labeled.

Billing information was obtained from Immunize Nevada. The total number of claims submitted between October 2013 and February 2014 were run in a billing software program, Collaborate MD, and exported to an Excel file. Dates that did not match SLV clinic dates were removed from the spreadsheet. Claim amounts were $21, $35, or $55 indicating a specific vaccine or insurance type. For anyone who had public insurance, the claim would cover the cost of vaccine administration because the vaccine was no cost with VFC coverage. For students who had private insurance, the influenza vaccine was $35 and the Tdap vaccine was $55, covering the cost of the vaccine and administration.

Analysis of third-party billing information was conducted using IBM SPSS 22.0 by running the frequency of each claim amount. This analysis was used to determine the actual number of claims submitted by insurance type as well as a dollar amount. Individual-level measures of insurance status and vaccine type were used to generate a “theoretical” number of claims and dollar amount. Comparisons of the theoretical number of claims and the actual number of claims were made. The dollar amount corresponding to each vaccine or insurance type was used to determine the costs of vaccine and administration only. Due to claim denials and resubmitting processes, the recapture was only assessed at the beginning of the third-party billing process.
School & Participant Data

Gender Comparison between Washoe County School District (WCSD), SLV Schools, and SLV Participants

Race/Ethnicity Comparison between Washoe County School District (WCSD), SLV Schools, and SLV Participants

Other includes Pacific Islander, American Indian/Alaska Native, Multiracial, and other races
School Level Comparison between Washoe County School District (WCSD), SLV Schools, and SLV Participants

Average Proportion of Students Vaccinated at SLV Schools by Title I Status

* Tdap available to those older than 11 years (participation based on 6th grade enrollment)
Influenza Immunization Rate by Title I Status & School

- Alice Smith ES: 16.9%
- Allen ES: 13.8%
- Anderson ES: 26.5%
- Bennett ES: 24.2%
- Cannan ES: 28.2%
- Corbett ES: 18.3%
- Donner Springs ES: 8.5%
- Duncan ES: 26.7%
- Dunn ES: 14%
- Elmcrest ES: 22.3%
- Greenbrae ES: 10.6%
- Kate M Smith ES: 27.4%
- Lemelson ES: 49.3%
- Lemmon Valley ES: 16%
- Lincoln Park ES: 13.9%
- Loder Academy ES: 25.9%
- Risley ES: 7.6%
- Stead ES: 27%
- Sun Valley ES: 16%
- Traneer MS: 14.3%
- Veterans ES: 31.4%
- Warner ES: 13.5%
- Beasley ES: 17%
- Beck ES: 12.7%
- Caughlin Ranch ES: 8.3%
- Clayton MS: 11.7%
- Depoali MS: 8.5%
- Diedrichsen ES: 8.7%
- Double Diamond ES: 5.7%
- Gomm ES: 17.8%
- Hunter Lake ES: 14.6%
- Juniper ES: 12.6%
- Mendive MS: 4.8%
- Moss ES: 15.5%
- Mount Rose K-8: 15.5%
- Pine MS: 9.5%
- Sepulveda ES: 15%
- SNACS: 11.2%
- Towles ES: 14.7%
- Verdi ES: 13.4%
- Whitehead ES: 28.6%
- Winnemucca ES: 13.4%

%
Tdap Immunization Rate* by Title I Status & School

* Tdap for those older than 11 years
† Missing data due to unknown number of 6th grade students OR school does not have 6th grade
### Table 1. Chi-Square analysis of socio-demographic and vaccination differences between participants from Title I and non-Title I schools, 2013-2014

<table>
<thead>
<tr>
<th></th>
<th>Title I n=2,363</th>
<th>Non-Title I n=1,424</th>
<th>p-value</th>
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<td><strong>Gender</strong></td>
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<tr>
<td>Female</td>
<td>52.9</td>
<td>51.2</td>
<td>0.594</td>
</tr>
<tr>
<td>Male</td>
<td>47.0</td>
<td>48.7</td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>68.2</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>20.6</td>
<td>56.6</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>3.9</td>
<td>7.5</td>
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</tr>
<tr>
<td>Other†</td>
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<tr>
<td>Black</td>
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<td>3.0</td>
<td></td>
</tr>
<tr>
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<td>18.9</td>
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</tr>
<tr>
<td>Private</td>
<td>13.5</td>
<td>44.9</td>
<td></td>
</tr>
<tr>
<td>No Insurance‡</td>
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<td>36.2</td>
<td></td>
</tr>
<tr>
<td><strong>Grade</strong></td>
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<td></td>
<td>&lt;0.001</td>
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<td>Kindergarten</td>
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<tr>
<td>1st</td>
<td>11.3</td>
<td>9.0</td>
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<td>2nd</td>
<td>11.5</td>
<td>8.4</td>
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<tr>
<td>3rd</td>
<td>13.5</td>
<td>8.5</td>
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<tr>
<td>4th</td>
<td>13.3</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td>12.4</td>
<td>13.1</td>
<td></td>
</tr>
<tr>
<td>6th</td>
<td>24.8</td>
<td>33.4</td>
<td></td>
</tr>
<tr>
<td>7th</td>
<td>1.1</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>8th</td>
<td>1.2</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td><strong>Vaccines Administered</strong></td>
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<td></td>
<td>&lt;0.001</td>
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<tr>
<td>Influenza</td>
<td>77.9</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>Tdap*</td>
<td>5.6</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>Influenza &amp; Tdap*</td>
<td>16.5</td>
<td>21.6</td>
<td></td>
</tr>
</tbody>
</table>

† Tdap required for entry into 7th grade  
† Other includes Pacific Islander, American Indian/Alaska Native, Multiracial, and other races  
‡ Includes those who indicated underinsured meaning they have insurance but it does not cover vaccines
6th Grade Analysis

Vaccines Administered to 6th Grade Students among Title I Schools by Gender

![Graph showing vaccines administered to 6th grade students by gender.](image)

N=586

Vaccines Administered to 6th Grade Students among Title I Schools by Race/Ethnicity

![Graph showing vaccines administered to 6th grade students by race/ethnicity.](image)

N=586

p=0.04
Vaccines Administered to 6th Grade Students among Title I Schools by Insurance Type

- Flu Only: 23.4% (Public), 12% (Private), 18.7% (No Insurance)
- Tdap Only: 31.3% (Public), 20.1% (Private), 57.4% (No Insurance)
- Flu & Tdap: 57.9% (Public), 56.6% (Private), 57.4% (No Insurance)

N=586
p=0.07

Vaccines Administered to 6th Grade Students among Non-Title I Schools by Gender

- Flu Only: 18.2% (Male), 13.2% (Female)
- Tdap Only: 26% (Male), 31.7% (Female)
- Flu & Tdap: 58.0% (Male), 56.8% (Female)

N=476
p=0.26
Vaccines Administered to 6th Grade Students among Non-Title I Schools by Race/Ethnicity

- Hispanic
- White
- Asian
- Black
- Other

N=476

p=0.65

Vaccines Administered to 6th Grade Students among Non-Title I Schools by Insurance Type

- Public
- Private
- No Insurance

N=476

p=0.05
## County Level Data

Table 6. **Washoe County Influenza Vaccination Rates of Children, 4-18, between 2010-2014 among Zip Codes with SLV Participating Schools**

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>2010-2011</th>
<th>2011-2012</th>
<th>2012-2013</th>
<th>2013-2014</th>
<th>Percent Increase†</th>
</tr>
</thead>
<tbody>
<tr>
<td>89431*</td>
<td>35.3%</td>
<td>43.5%</td>
<td>50.0%</td>
<td>55.8%</td>
<td>12.3%</td>
</tr>
<tr>
<td>89433*</td>
<td>33.6%</td>
<td>42.7%</td>
<td>49.4%</td>
<td>55.7%</td>
<td>13.0%</td>
</tr>
<tr>
<td>89434*</td>
<td>26.7%</td>
<td>36.0%</td>
<td>43.9%</td>
<td>50.4%</td>
<td>14.4%</td>
</tr>
<tr>
<td>89436</td>
<td>34.0%</td>
<td>43.4%</td>
<td>50.2%</td>
<td>56.2%</td>
<td>12.8%</td>
</tr>
<tr>
<td>89439</td>
<td>28.3%</td>
<td>36.3%</td>
<td>47.5%</td>
<td>51.3%</td>
<td>15.0%</td>
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<tr>
<td>89502*</td>
<td>34.6%</td>
<td>42.3%</td>
<td>49.2%</td>
<td>54.6%</td>
<td>12.2%</td>
</tr>
<tr>
<td>89503*</td>
<td>25.5%</td>
<td>33.1%</td>
<td>40.5%</td>
<td>46.9%</td>
<td>13.8%</td>
</tr>
<tr>
<td>89506*</td>
<td>29.5%</td>
<td>39.1%</td>
<td>46.5%</td>
<td>52.4%</td>
<td>13.3%</td>
</tr>
<tr>
<td>89509*</td>
<td>32.3%</td>
<td>41.6%</td>
<td>49.6%</td>
<td>55.1%</td>
<td>13.5%</td>
</tr>
<tr>
<td>89512*</td>
<td>36.3%</td>
<td>43.7%</td>
<td>51.0%</td>
<td>57.0%</td>
<td>13.3%</td>
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<tr>
<td>89519</td>
<td>45.3%</td>
<td>55.3%</td>
<td>62.6%</td>
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<td>89521</td>
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<tr>
<td>89523</td>
<td>32.0%</td>
<td>41.1%</td>
<td>48.2%</td>
<td>54.5%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

**Average Percent Increase**

|                | 13.4% |

* Indicates zip code with Title I school(s)

† Percent Increase is the difference from the 2011-2012 (year preceding the SLV program) and 2013-2014 school year (year 2 of the SLV program)
Table 7. **Washoe County Influenza Vaccination Rates of Children, 4-18, between 2010-2014 among Zip Codes without SLV Participating Schools**

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>2010-2011</th>
<th>2011-2012</th>
<th>2012-2013</th>
<th>2013-2014</th>
<th>Percent Increase†</th>
</tr>
</thead>
<tbody>
<tr>
<td>89405</td>
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<td>12.5%</td>
<td>14.3%</td>
<td>19.6%</td>
<td>7.1%</td>
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<td>89412</td>
<td>14.5%</td>
<td>16.1%</td>
<td>18.8%</td>
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<td>4.8%</td>
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<tr>
<td>89424</td>
<td>72.1%</td>
<td>77.1%</td>
<td>83.3%</td>
<td>87.4%</td>
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<td>39.1%</td>
<td>46.6%</td>
<td>54.0%</td>
<td>60.8%</td>
<td>14.2%</td>
</tr>
<tr>
<td>89442*</td>
<td>57.8%</td>
<td>64.8%</td>
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<td>75.3%</td>
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<td>89451</td>
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<td>44.4%</td>
<td>12.4%</td>
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<td>89501</td>
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<tr>
<td>89508</td>
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<td>11.8%</td>
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<td>10.5%</td>
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<td>89511</td>
<td>32.2%</td>
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<td>89704</td>
<td>32.9%</td>
<td>45.7%</td>
<td>50.4%</td>
<td>55.8%</td>
<td>10.1%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>10.4%</strong></td>
</tr>
</tbody>
</table>

* Indicates zip code with Title I school(s)
† Percent Increase is the difference between the 2013-2014 school year and the 2011-2012 school year
Figure 1. Influenza Vaccination Rates by Zip Code in Washoe County, Children 4-18 years, 2010-2011
Figure 2. Influenza Vaccination Rates by Zip Code in Washoe County, Children 4-18 years, 2011-2012

Percent Coverage
Influenza
- 0.0% - 15.0%
- 15.1% - 30.0%
- 30.1% - 45.0%
- 45.1% - 60.0%
- 60.1% - 75.0%
- 75.1% - 90.0%

SLV Participating Schools
Figure 3. Influenza Vaccination Rates by Zip Code in Washoe County, Children 4-18 years, 2012-2013

Percent Coverage
Influenza
- 0.0% - 15.0%
- 15.1% - 30.0%
- 30.1% - 45.0%
- 45.1% - 60.0%
- 60.1% - 75.0%
- 75.1% - 90.0%

SLV Participating Schools
Figure 4. Influenza Vaccination Rates by Zip Code in Washoe County, Children 4-18 years, 2013-2014

Percent Coverage
Influenza
- 0.0% - 15.0%
- 15.1% - 30.0%
- 30.1% - 45.0%
- 45.1% - 60.0%
- 60.1% - 75.0%
- 75.1% - 90.0%

♦ SLV Participating Schools
<table>
<thead>
<tr>
<th>Self-Reported Insurance Status</th>
<th>Theoretical Claims</th>
<th>Theoretical Reimbursement</th>
<th>Billable Claims*</th>
<th>Reimbursement Claims Submitted</th>
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<td>1610</td>
<td>$33,810</td>
<td>1749</td>
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<tr>
<td>Net Difference</td>
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<tr>
<td>Private</td>
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<td></td>
</tr>
<tr>
<td>Influenza</td>
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<td>736</td>
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<td>Tdap</td>
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<td>Net Difference</td>
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<td></td>
<td>$76,514</td>
</tr>
</tbody>
</table>

* Based on information collected from the consent forms
† VFC provides vaccines for free, claim is for administration fee
Conclusions

The use of SLV programs has the potential to reach children who are considered high risk, such as minorities, low-income students, and children who do not regularly access healthcare\textsuperscript{17}. SLV programs remove access and cost barriers for students who are underinsured or uninsured and may vaccinate children who have never been immunized against influenza or who might forgo vaccination\textsuperscript{18-20}.

- Over one-third of participants self-reported having no insurance
- Significant differences between students who utilized SLV program among Title I and non-Title I programs; including:
  - Race/Ethnicity
  - Insurance Status
  - Age
  - Vaccines Administered
  - Differences in sociodemographic characteristics suggest that utilization of program may stem from need for Title I schools and convenience for non-Title I schools
- Overall influenza immunization rates for children 4-18 years of age are increasing in Washoe County

Limitations

- Prior vaccine history is unknown for all students attending SLV schools
- Incomplete data from consent forms
- Descriptive report and therefore unable to establish any causality in influenza immunization rates in Washoe County
Recommendations

The use of schools in delivering immunizations is an innovative strategy and should be continued in the delivery of recommended and required vaccines for all school-age children in Washoe County and Nevada. The public safety net for Tdap in Washoe County and Nevada is currently in place with the secondary school-entry requirement. However, SLV programs can be used to ensure influenza vaccines are reaching students in schools who may not necessarily receive the vaccine and help Washoe County reach the Healthy People 2020 target of 70% of children 5-18 years of age immunized against the flu. The SLV programs in Washoe County reach students who may not necessarily receive influenza immunizations and reduce barriers often faced in the traditional immunization model. The use of SLV programs has support from many stakeholders, such as parents, schools, and society and should be considered best practice for reaching large numbers of school-age children in Washoe County.

Further recommendations:

- Increase support to the school nurses who are responsible for contacting parents
- Ensure implementation fidelity and better understand the differences in participation between schools
- Improve collaboration with Washoe County School District and Immunize Nevada
- Update consent form to ask why the child is not participating in the SLV program
- Utilize SLV program to deliver other target adolescent vaccines that are not required such as meningococcal and HPV vaccines.
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References


