Limitations and Utility of Exemption Data

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Limitations I

- Imperfect association between attitudes and actions
- Out-migration
  - Children migrating into new areas captured
- Homeschooled children
- Assessments based on surveys or voluntary response (e.g., an incomplete census)
  - can miss schools with higher or lower vaccination coverage and thereby bias results
Limitations II

• Exemption status may not reflect vaccination status.

• Vaccination coverage and exemptions among non-respondents and respondents within the same school type
Imperfect association between attitudes and actions
## Attitude vs. Actions

### Table 3.1

<table>
<thead>
<tr>
<th>ATTITUDE MEASURE</th>
<th>CORRELATION WITH BEHAVIOR (USING BIRTH CONTROL PILLS DURING A 2-YEAR PERIOD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Attitude toward birth control</td>
<td>.083</td>
</tr>
<tr>
<td>2. Attitude toward birth control pills</td>
<td>.323</td>
</tr>
<tr>
<td>3. Attitude toward using birth control pills</td>
<td>.525</td>
</tr>
<tr>
<td>4. Attitude toward using birth control pills during the next 2 years</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Data from Davidson and Jaccard (1979).*

*Frymier and Nadler, Persuasion: Integrating Theory, Research, and Practice, 2007*
Attitude vs. Actions

Which Physicians Are the Most Overweight?

- General Surgery
- Family Medicine
- Gastroenterology
- Critical Care
- Pulmonary Medicine
- Ob/Gyn & Women's Health
- Orthopedics
- Anesthesiology
- Cardiology
- Internal Medicine
- Emergency Medicine
- Urology
- Psychiatry & Mental Health
- Neurology
- HIV/Infectious Diseases
- Pathology
- Oncology
- Radiology
- Pediatrics
- Nephrology
- Rheumatology
- Diabetes & Endocrinology
- Allergy & Clinical Immunology
- Plastic Surgery
- Ophthalmology
- Dermatology
Attitude vs. Actions

• When and under what circumstances attitudes are related to behavior
  • Measurement issues
  • Perceived behavioral control
  • Attitude formation
  • Cognitive processing
  • Situational factors

Frymier and Nadler, Persuasion: Integrating Theory, Research, and Practice, 2007
2010 HealthStyles Survey

Intentions to Vaccinate
- Already vaccinated: 82%
- Planned to vaccinate: 11%
- Intend to partially vaccinate: 5%
- Would not give any vaccine: 2%

Specific Vaccine Concerns
- Yes: 23%
- No: 77%

Kennedy et al., Health Affairs, 2011
Parents’ Perceptions by Child's Vaccination Status

- % Non-Med Exempt
- % Vaccinated

Salmon, Moulton, Omer et al., AJPH, 2005
Incomplete Data on Homeschooled Children
Homeschooled Children

- 3 percent of U.S. population*
- Many covered by school requirements (e.g. use of school gyms and labs)

*US Department of Education, 2015
Table 2. Adjusted Odds Ratios for health care access and utilization  
*(reference group is public school children).*

<table>
<thead>
<tr>
<th></th>
<th>Homeschooled - Adjusted OR (C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health care access</strong></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>0.81 (0.55-1.18)</td>
</tr>
<tr>
<td>Medical home</td>
<td>0.59 (0.46-0.76)</td>
</tr>
<tr>
<td><strong>Health care utilization</strong></td>
<td></td>
</tr>
<tr>
<td>Medical visit in last year</td>
<td>0.55 (0.42-0.72)</td>
</tr>
<tr>
<td>Dental visit in last year</td>
<td>1.03 (0.75-1.41)</td>
</tr>
<tr>
<td>HPV vaccine (girls ages 12-17)</td>
<td>0.29 (0.10-0.89)</td>
</tr>
<tr>
<td>Meningitis vaccine (ages 12-17)</td>
<td>0.94 (0.52-1.70)</td>
</tr>
<tr>
<td>Tetanus vaccine (ages 12-17)</td>
<td>0.71 (0.46-1.11)</td>
</tr>
</tbody>
</table>
Online Survey of Homeschoolers

Thorpe et al., Vaccine, 2011
Assessments based on surveys or voluntary response (e.g., an incomplete census)
Estimated vaccination coverage by survey methodology

- **Stratified one-stage cluster sample**: 74%
- **Simple random sample**: 2%
- **Voluntary response**: 4%
- **Voluntary response (public), Census (private)**: 2%

- **Stratified two-stage cluster sample**: 16%

* Voluntary private (Census public) school response for 9 states

**86% of the US population**

*MMWR, August 28, 2015*
Exemption status may not reflect vaccination status
Completeness of Immunization Registries

FIGURE 1. Percentage of children aged <6 years participating in an immunization information system (IIS)* — United States, five cities,† and the District of Columbia (DC), 2012

* The combined (4:3:1:3*:3:1:4) vaccine series includes ≥4 doses of DTaP, ≥3 doses of poliovirus vaccine, ≥1 dose of measles-containing vaccine, full series of Hib vaccine (≥3 or ≥4 doses, depending on product type), ≥3 doses of HepB, ≥1 dose of varicella vaccine, and ≥4 doses of PCV.

68.4% completed the combined series* in 2012

71.6% completed the combined series* in 2014

* Child participation is defined as having two or more vaccinations for children aged <6 years documented in the IIS. National child participation = 86%.
† Chicago, Illinois; New York, New York; Philadelphia, Pennsylvania; Houston, Texas; and San Antonio, Texas.
Council of American Survey Research Organization (CASRO) Methodology for Response Rate (NIS)

- Household response rate = resolution rate x screening completion rate x interview completion rate
CASRO response rates for NIS

Childhood NIS

2014 Response Rates
- 62.6% landline
- 33.5% cell phone
CASRO response rates for NIS

Childhood NIS Response Rate (Weighted by Sample Frame Response)
Utility of Exemption Data

• Active decision on vaccinating or filing for exemption
• Capitalize on existing infrastructure
  • Already collecting the data, why not (judiciously) use it?
• Overall high completion rates
• Local precision
• Can identify clusters
Relative Locations of Pertussis Space-time Clusters & Exemptions Spatial Clusters

Overlap of Exemptions Clusters with Pertussis Clusters

Unadjusted OR

3.0 (2.5 – 3.6)

Adjusted OR

2.7 (2.2 – 3.3)

Omer, Enger, Moulton et al., Am. J. Epi., 2008
Relative Locations of Pertussis Space-time Clusters & Exemptions
Spatial Clusters –California (2010)

Overlap of Exemptions & Pertussis Clusters
Adjusted OR
2.5 (2.2 – 2.8)

Comparison of Pertussis Incidence Inside vs. Outside Exemption Clusters
Adjusted IRR
1.2 (1.1 – 1.3)

Atwell et al., Pediatrics., 2013

Tracy A. Lieu et al. Pediatrics 2015;135:280-289

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Summary
Summary: Limitations and Utility of Exemption Data

• Active decision on vaccinating or filing for exemption

• A few limitations
  • Should be interpreted in the context of other options

• Should be used judiciously
  • Useful for longitudinal data & clusters

• Capitalize on existing infrastructure
Acknowledgements

• Bob Bednarczyk
• Kristen Allen
Thank You!

Twitter: @SaadOmer3
Welcome to the September 2015 Meeting of the National Vaccine Advisory Committee

Great Hall
Hubert H. Humphrey Bldg
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