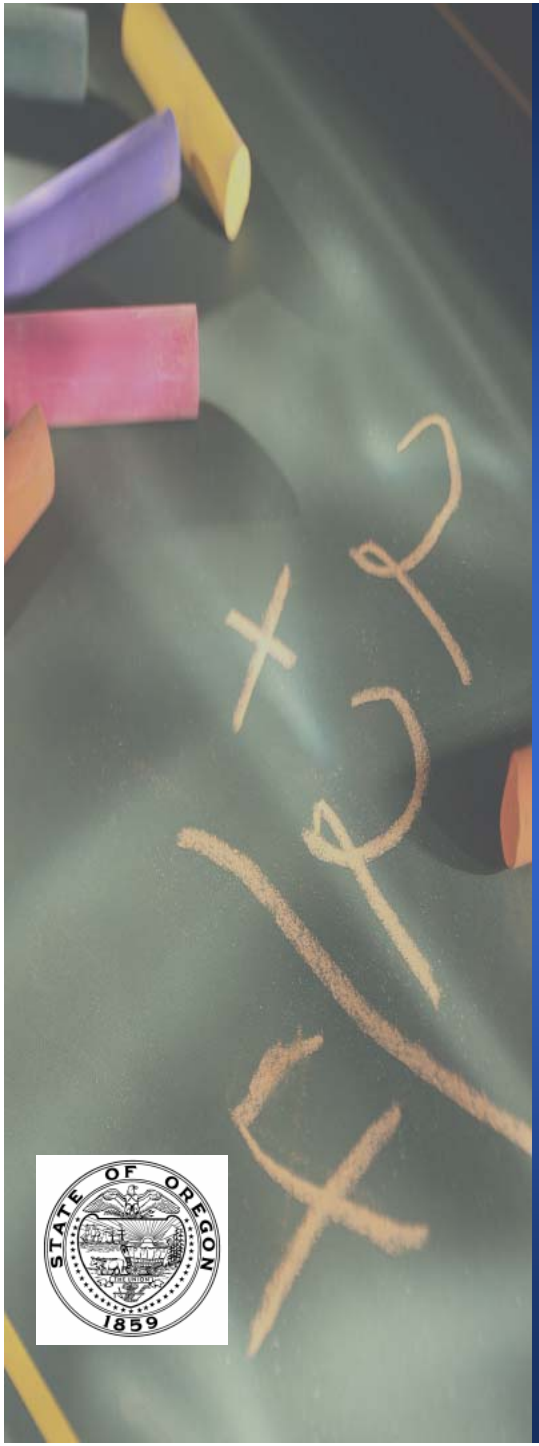

Community Influences On More Skeptical Parents: Community Levels of Personal-Belief Exemptions May Modify Risk Factors for Parents Claiming Personal-Belief Exemptions to School Immunization Requirements in Oregon, 2006

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Special thanks to Shannon Stokely, MPH, CDC
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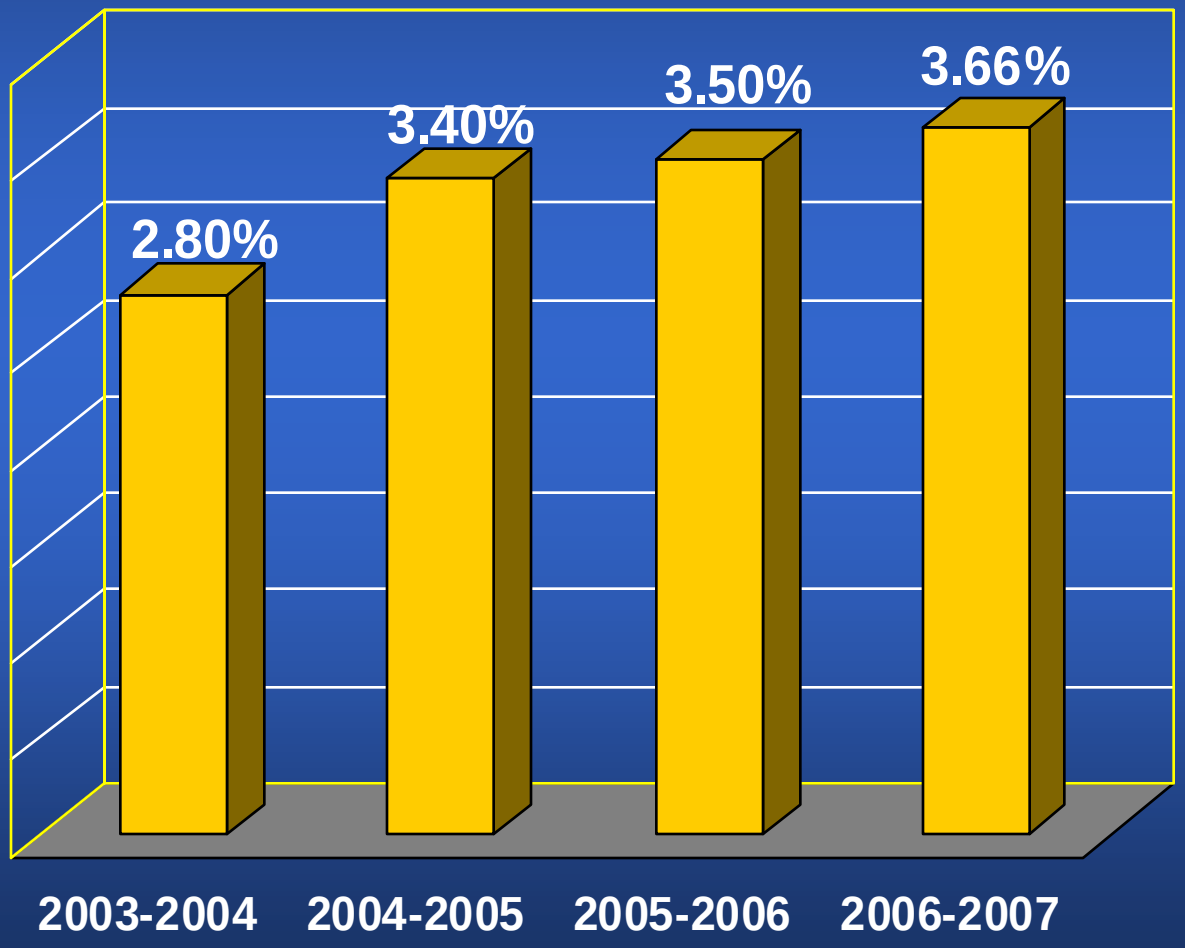
Background

- With effective immunization use, vaccine-preventable diseases (VPDs) among US children are at record lows.
- All US states have school immunization requirements—an important VPD prevention strategy — but also allow medical, religious, or philosophical exemptions.
- By Oregon school law, ‘religious’ exemptions are allowed for any system of beliefs, practices, or ethical values.
- Between 1994-1996, the average overall state exemption rate was 0.58% based on annual school surveys in 48 states (Rota et al. 2001).
- However, exemption rates in the US have risen (e.g., reports from Michigan, Colorado and Oregon.)

Oregon Religious Exemption Rates



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Purpose

- Identify factors associated with parent-claimed religious exemptions in Oregon.
- Evaluate risk factor differences among higher and lower rate communities.

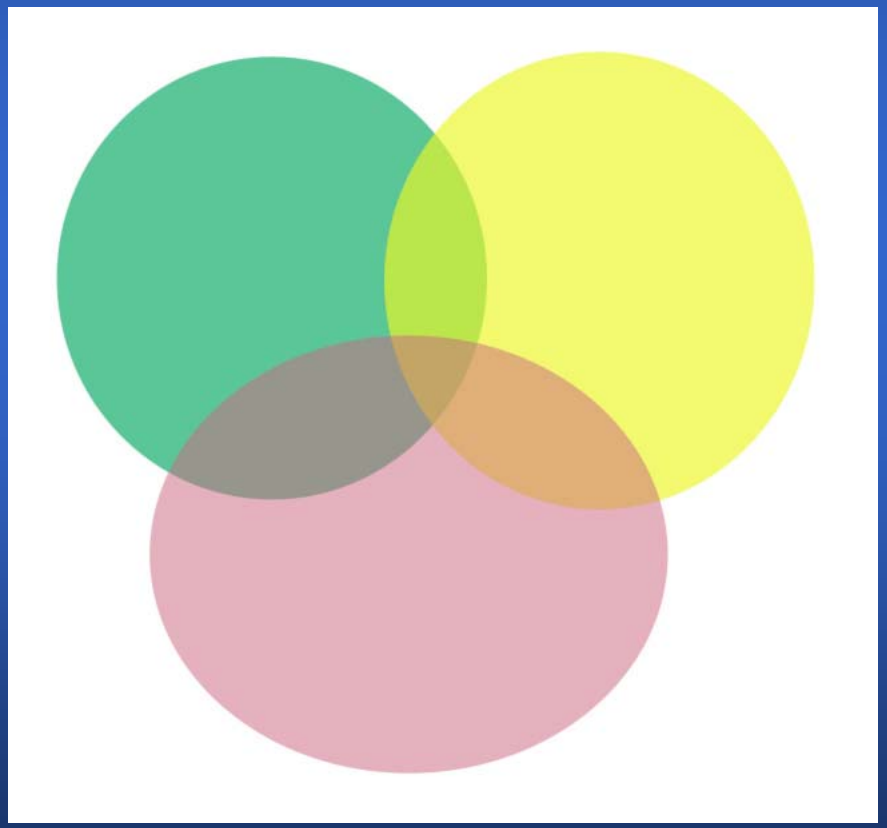
Two Possible Behavior Types Parents' Use of Exemptions to Explore

- Convenience-exempting parents.
- Vaccine-concerned or hesitant and anti-vaccine parents.

Vaccine Decision-making Framework

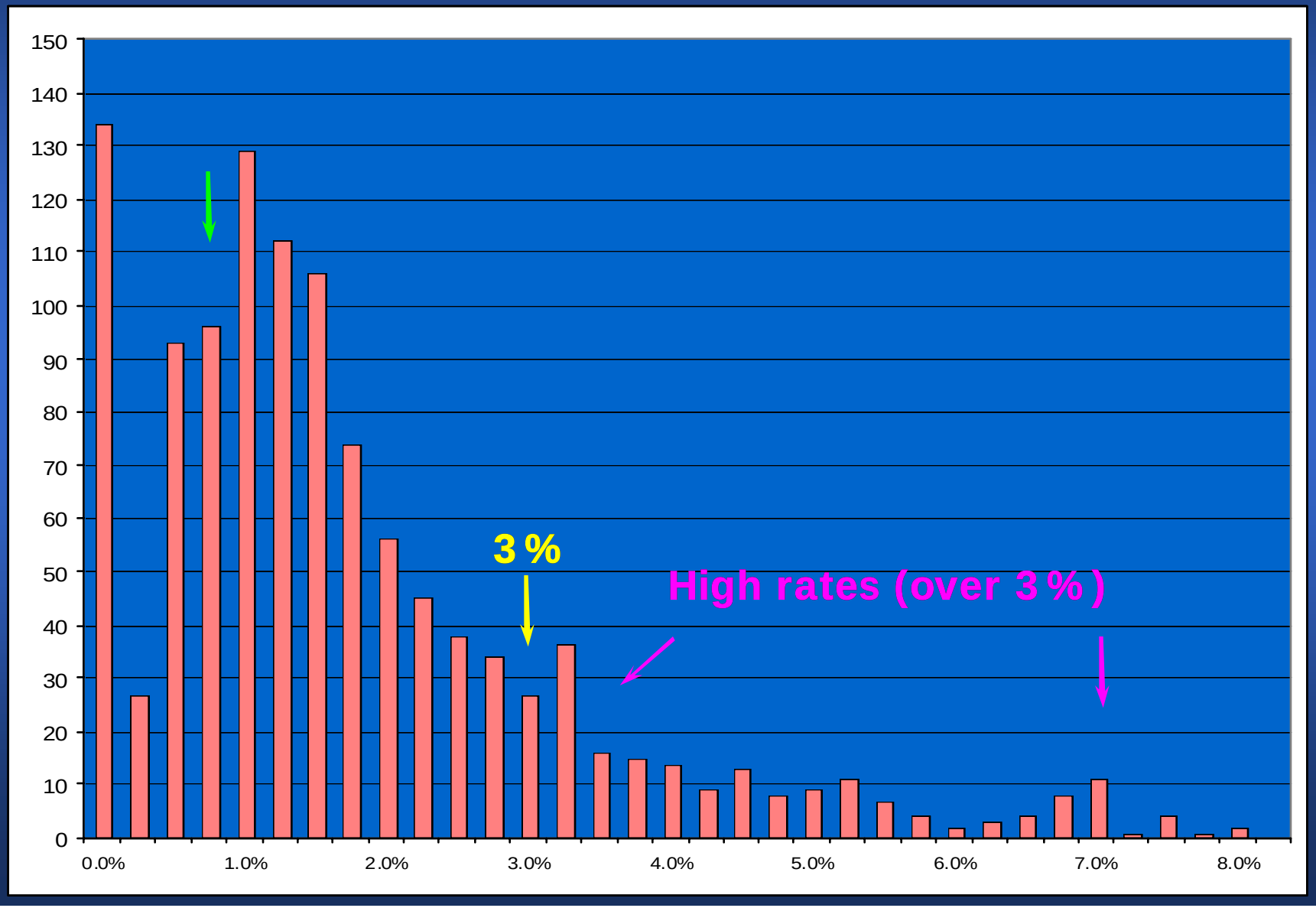
Community

Household



Information Sources

Figure 1: Distribution of School Exemption Rates, Public Schools, Oregon, 2002/2003



Methods-Parent Survey on Childhood Vaccines, Oregon, 2006

- Study Population and Design:
  - Case-control study
  - Used multi-staged, population-proportionate sampling.
  - Sampled case and control parents from 21 exemption rate and census-based locale strata.
  - School districts with selected schools were asked to participate and to provide parent school directory lists and student immunization data.
  - From all 21 strata, selected 2,900 exempting and non-exempting parents of public and private grade and middle school children (in K-5th grades) from the 2004-05 school year.
  - Over-sampled “exemptors” based on school records.

Methods-Parent Survey on Childhood Vaccines, Oregon, 2006

- Data were collected by the Washington State University (WSU) Social & Economic Sciences Research Center *and* by one school district and one private school opting to directly mail surveys.

- Pre-notified parents by postcard, then mailed the 43-question surveys in 2 rounds:

  1. Within sample strata, WSU-surveyed parents were randomly assigned to a first mailing by:
     - Regular US mail or
     - US Priority Mail or
     - Regular US mail with a small cash incentive.

  2. Second mailings to all non-respondents. WSU-surveyed non-respondents were sent the incentive.

  3. Remaining non-respondents were telephoned (WSU-surveyed parents only).

Methods-Survey Questions

Parents were asked about:

- General family demographics
- Healthcare for their youngest school-age child and self
- Discussions about immunizations with child's health care providers
- Attitudes and beliefs about child immunizations

Methods-Survey Questions

Parents were asked about:

- Use and experiences with immunization exemptions (past and future)
- Parents' subjective & perceived connection to children and others hurt by vaccines
- Sources of health care information
- Levels of trust in government, healthcare providers and other organizations regarding health issues

Methods - Parent Survey on Childhood Vaccines, Oregon, 2006

- Data were re-weighted to the original school age child population.
- Compared calculated weighted percent frequencies using chi square and Fisher's exact tests.
- Calculated weighted adjusted odds ratios for *parent-reported* exemptions using 4 separate logistic regression models for:
  - All parents (Incl. testing for effect modification by exemption rate areas.)
  - Parents in each of the high, medium, and low exemption rate areas.

Methods - Parent Survey on Childhood Vaccines, Oregon, 2006

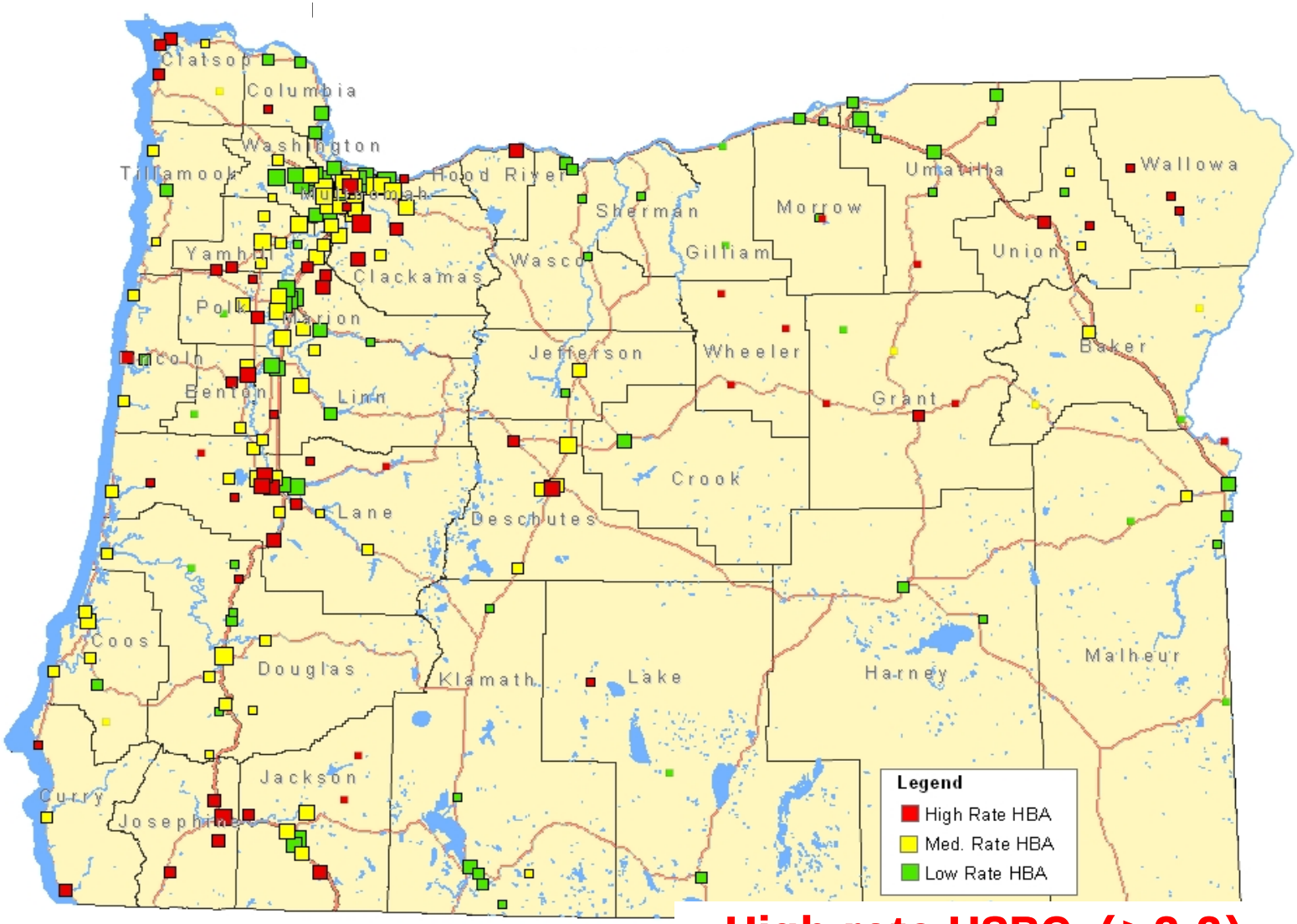
- Used nested model regression and Wald tests to assess statistical significance of weighted logistic model term estimates.
- Used a weighted goodness of fit test. Only selected “good fitting models.
- Used STATA 9.2.

Results - Childhood Vaccines Survey of Parents, Oregon, 2006

- The total adjusted response rate was 55%.
- Response rate of 48% (n= 323) among exemptors.
- Response rate of 56% (n= 1265) among non-exemptors.
- High HSBC exemption rate areas appear in various clusters around the state, especially in Western Oregon.

*Weighted 95% Confidence Intervals in parenthesis

Figure 2: High School-Based Communities (HSBCs) by Exemption Rate Categories, Oregon, SY 2004/05



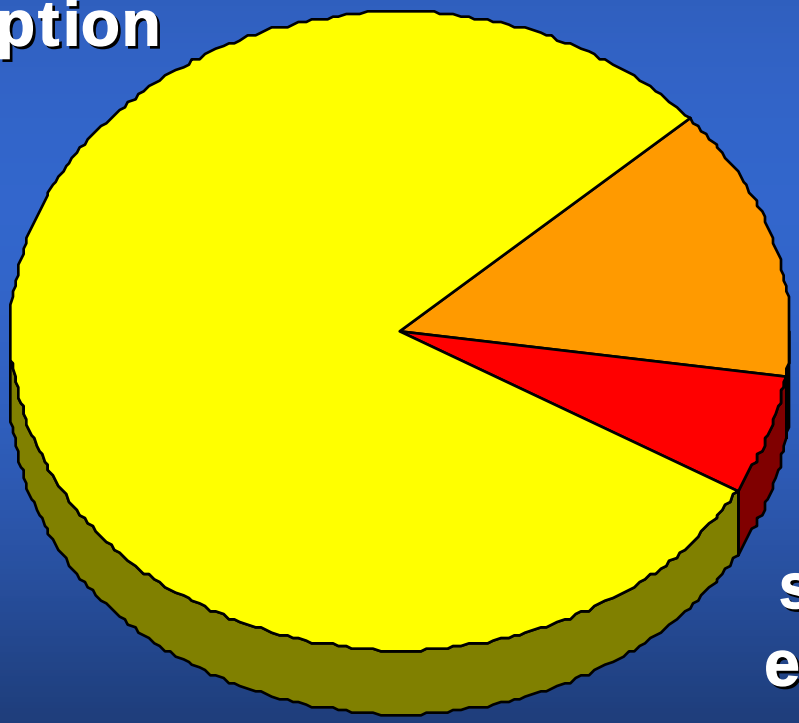
Oregon Immunization Program, DHS

- **High rate HSBC (≥3.2)**
- **Medium rate HSBC (1.2-3.1%)**
- **Low rate HSBC (<1.2%)**

*** Colored boxes mapped to HSBC centroids.**

To Vaccinate or Exempt?
Not that simple: The Contemplators

80% (76-83 %)* vaccinated without considering an exemption



14% (12-16 %)* vaccinated but considered an exemption

6% (5-8%)* signed an exemption

*Weighted 95% Confidence Intervals in parenthesis

Percent Family Demographics cont.

Characteristic	Exemptor	Non-Exemptor
Number of Children in Family		
1	19.3	18.5
2	43.7	45.4
3	17.8	22.2
≥ 4	19.2	13.9
Parent Employment - part 1		
Work for self	25.6*	17.2
Work for other	50.7	61.2
Not applicable	23.5	21.6
In school	7.3	7.2

Characteristic	Exemptor	Non-Exemptor
Parent Employment - part 2		
Work Full-time	29.8*	45.9
Work Part-time	33.5	26.9
Homemaker	51.1*	31.1
In school	7.3	7.2
Unemployed	12.5	5.8
- Looking for work	10.8*	2.8
- Not looking	2.6	3.1

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* Statistically significant difference between exemptors and non-exemptors, p<0.05

Percent* Responses By Selected Topics Parent Survey on Childhood Vaccines, Oregon, 2006

Topic	Exemptors	Non-Exemptors
Had ≥1 child birth(s) at a non-hospital, alternative setting?		
Yes	21.7**	3.3
No	72.9	96.7
Have no or slight trust of local doctors for health info?		
Yes	24.2**	3.8
No	75.8	96.2
Have no or slight trust of alternative or complementary providers for health info?		
Yes	8.6**	32.2
No	91.4	67.8

* Based on weighted percentages.

** Statistically significant difference between exemptors and non-exemptors, $p<0.05$

Percent* Responses By Selected Topics Parent Survey on Childhood Vaccines, Oregon, 2006

Topic		Exemptors	Non-Exemptors
Preferred naturopathic healthcare for themselves?	Yes	48.9**	13.1
	No	51.1	86.9
Reported their youngest school-age child usually received naturopathic healthcare ?	Yes	24.6**	2.2
	No	75.4	97.9
Reported their youngest school-age child usually received chiropractic healthcare ?	Yes	23.8**	2.8
	No	76.2	97.2

* Based on weighted percentages.

** Statistically significant difference between exemptors and non-exemptors, $p<0.05$

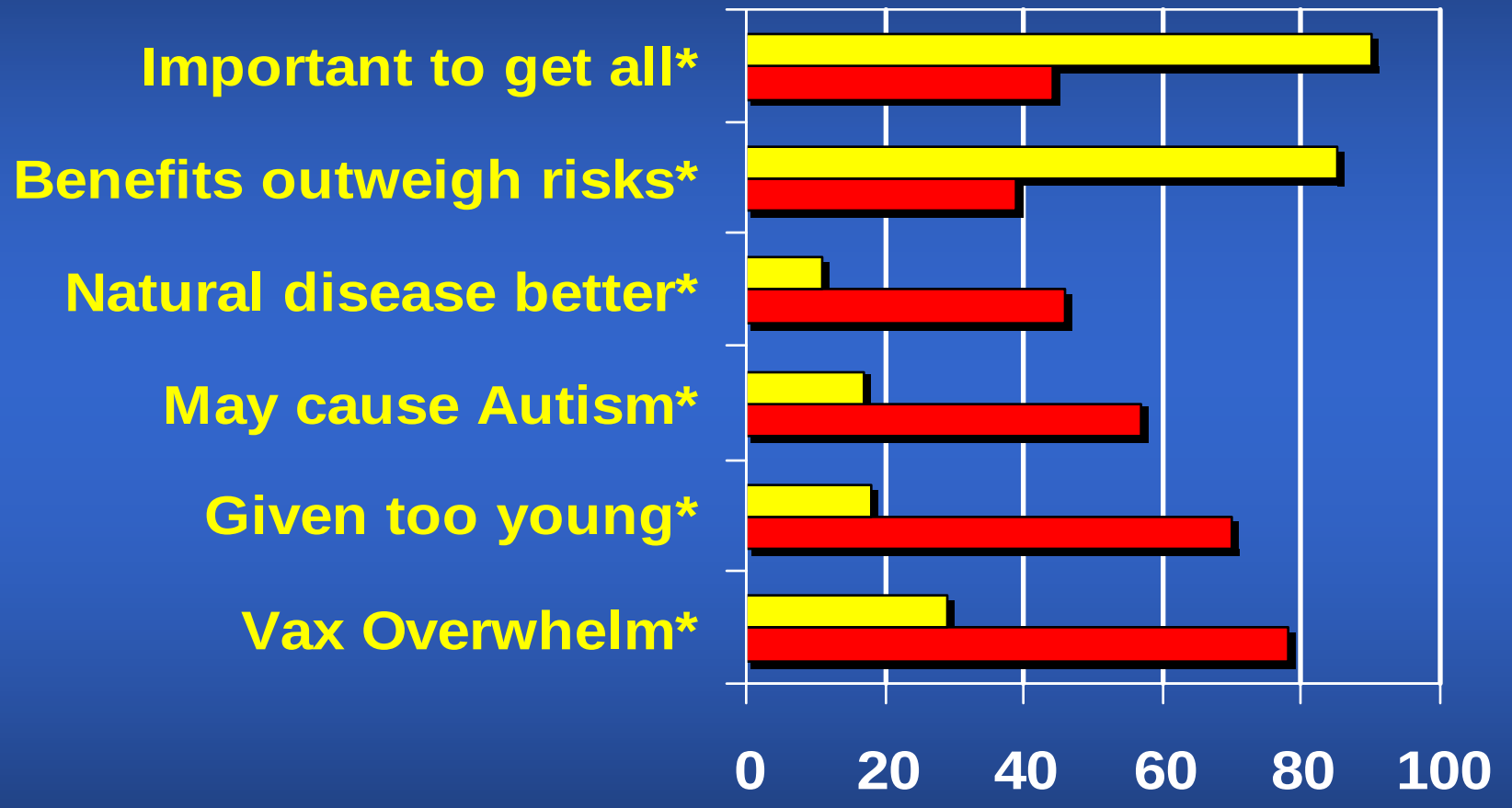
Percent* Responses By Selected Topics Parent Survey on Childhood Vaccines, Oregon, 2006

Topic		Exemptors	Non-Exemptors
Relies on print materials for health care info? (based on 4 questions, more often than median score)	Yes	28.8**	47.6
	No	17.2	52.4
Heard or read about vaccine-hurt children only ?	Yes	84.5**	69.7
	No	15.5	30.3
Know someone with a vaccine-hurt child?	Yes	56.4**	15.4
	No	43.6	84.6

* Based on weighted percentages.

** Statistically significant difference between exemptors and non-exemptors, $p<0.05$

Immunization & Disease Beliefs: Percent who Agreed or Strongly Agreed



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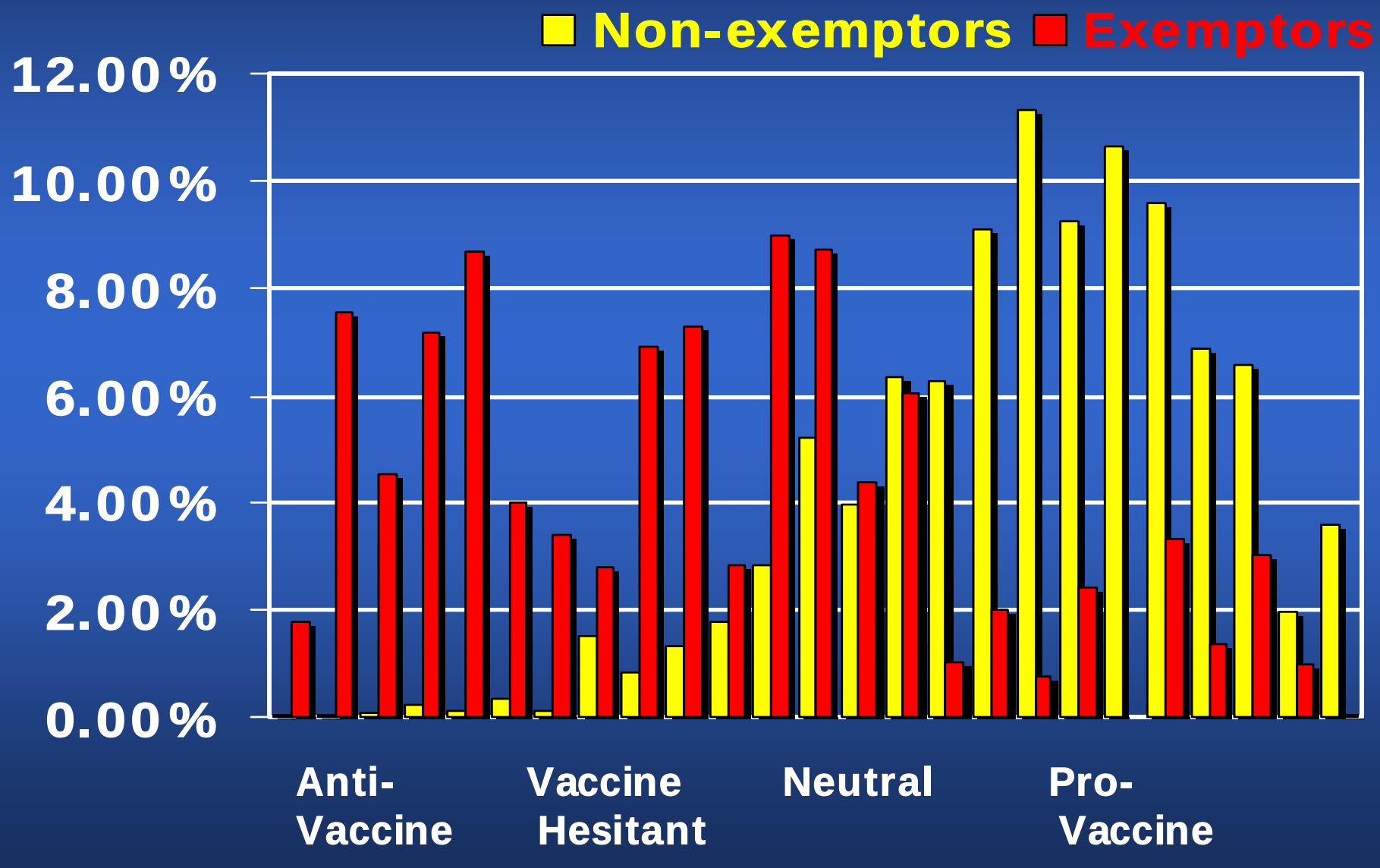
* Statistically significant difference between exemptors and non-exemptors, p<0.0001

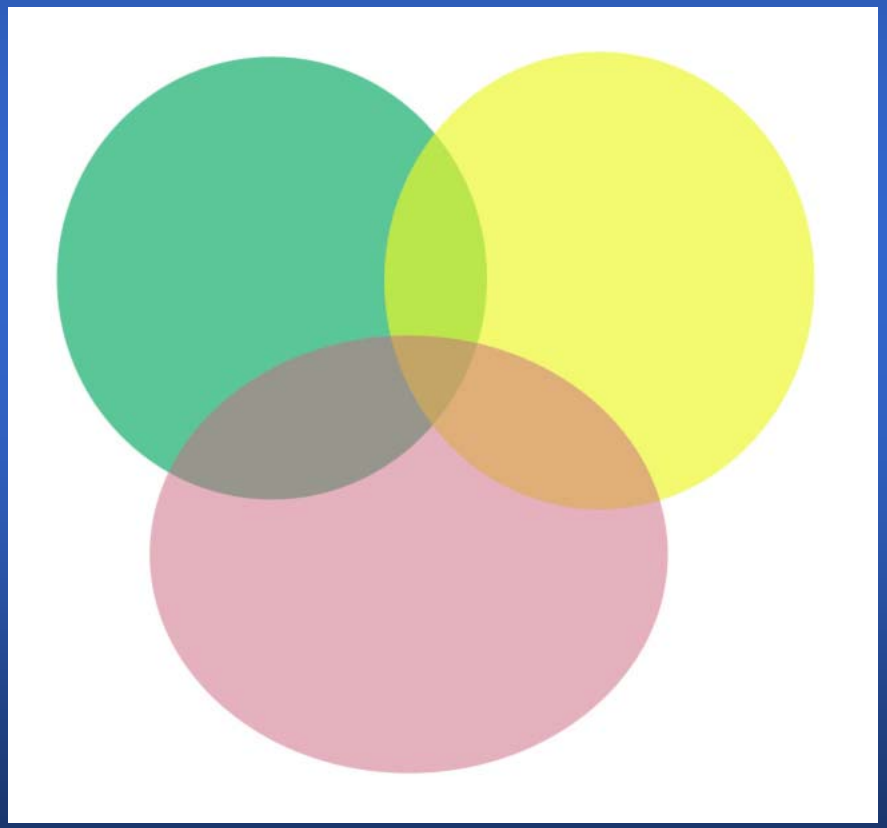
Belief Scale by Exemption Status



Results – Multivariable Models

Community

Household



Information Sources

Adjusted Odds Ratios (aOR)* for Parent Reported Immunization Exemption (All Parent Model 2)** Parent Survey on Childhood Vaccines, Oregon, 2006

Factor		aOR	95% CIs
Know someone with a Vaccine-hurt child?	Yes***	1.8	0.9 – 3.4
	No	Ref	
Had ≥1 child birth(s) at a non-hospital, alternative setting?	Yes	3.6	1.6 – 8.0
	No	Ref	
Have no or slight trust of local doctors for health info?	Yes	2.7	1.0 – 7.5
	No	Ref	
Preferred naturopathic healthcare for themselves?	Yes	1.3	0.5 – 3.0
	No	Ref	

* Weighted for school population and adjusted for all other factors listed

** Model goodness of fit p=.664, nested model regression test with 3 variables (looking for work and completed grad. school) removed p=0.2107

*** Statistically significant effect modification, medium exemption area by "know with" and "anti-vaccine belief" terms, nested regression test p=0.0042.

Adjusted Odds Ratios (aOR)* for Parent Reported Immunization Exemption (All Parent Model 2)** Parent Survey on Childhood Vaccines, Oregon, 2006

Factor		aOR	95% CIs
Always/most of time strongly agreed w/ Anti-vaccine beliefs/ concerns? (based on 6 questions)	Yes***	15.3	6.4 – 36.7
	No	Ref	
Often strongly agreed w/ anti-vaccine beliefs/concern answers - "Vaccine Hesitant" ? (based on 6 questions)	Yes	2.3	1.0 – 5.0
	No	Ref	
Always/most of time strongly agreed w/ Pro-vaccine beliefs/concerns? (based on 6 questions)	Yes	0.2	0.0 – 0.6
	No	Ref	

* Weighted for school population and adjusted for all other factors listed
** Model goodness of fit p=.664, nested model regression test with 3 variables (looking for work and completed grad. school) removed p=0.2107
*** Statistically significant effect modification, medium exemption area by "know with" and "anti-vaccine belief" terms, nested regression test p=0.0042.

Adjusted Odds Ratios (aOR)* for Parent Reported Immunization Exemption (All Parent Model 2)** Parent Survey on Childhood Vaccines, Oregon, 2006

Factor		aOR	95% CIs
Reported their youngest school-age child usually received chiropractic healthcare ?	Yes	3.9	1.8 – 8.5
	No		Ref
Relies on print materials for health care info? (based on 4 questions, more often than median score)	Yes	0.4	0.2 – 0.8
	No		Ref

* Weighted for school population and adjusted for all other factors listed
** Model goodness of fit p=.664, nested model regression test with 3 variables (looking for work and completed grad. school) removed p=0.2107

Adjusted Odds Ratios (aOR)* for Parent Reported Immunization Exemption
3 Exemption Rate Area "Model 2s"
Parent Survey on Childhood Vaccines, Oregon, 2006

Factor	aOR 95% CIs From 3 Exemption Area Models: High	Medium	Low
Always/most of time strongly agreed w/ Anti-vaccine beliefs/ concerns? Yes	8.8 3.5 – 21.7	13.2** 5.3 – 33.1	48.1 3.6 – 647.1
No (based on 6 questions)		Ref	
Know someone with a vaccine-hurt child? Yes	2.9 1.3 – 6.3	8.9** 3.5 – 22.6	0.5 0.1 – 2.6
No		Ref	

* Weighted for school population and adjusted for all other factors listed in previous "Model 2" slides

** In all parent model, statistically significant effect modification, medium exemption area by "know with" and "anti-vaccine belief" terms, nested regression test p=0.0042.

Limitations - Strengths

- Response rates were lower than hoped for BUT:
  - In-line with lower survey response trends.

- Wondered if some exempting parents selectively participated related to their particular exemption concern? BUT:
  - Large study
  - Used multi-stage sampling & post-stratification weighting to enhance representation AND
  - Responses reflected diversity of beliefs and experiences.

- Some potential risk factors could not be explored in-depth, esp. small numbers among parents in low exemption rate areas.

- Parent beliefs may have occurred *after* exemption and vaccination decisions since beliefs can change overtime and "firm up" to support decisions already made.

Past or present experiences?

Discussion and Conclusions

- Findings support the hypotheses that beliefs about vaccinations are *more important* than convenience in parent exemption decisions in Oregon.

- Findings suggest that some risk factors influenced exemptions differently in high, medium, and low exemption rate areas. These area-level differences may reflect underlying community-level differences in vaccine beliefs and norms. (E.g., wider diffusion of vaccine concerns and myths among high exempt areas.)

- Community networks, trusted healthcare information sources, and provider-related factors may be *indirectly* related to exemptions *by directly* influencing parent vaccine beliefs.

- Therefore, we also need to better understand the factors associated with parent beliefs.

Discussion and Conclusions

- We need to sort out factors associated with being "on-the-fence" or considering versus claiming exemptions.

- Prospective studies are also needed to determine influences on vaccine beliefs and decisions.

Times May Be Changing:

Community Demand for Polio Vaccinations 1960s

Crowds lined up for *newly* available polio vaccination, City Auditorium, San Antonio, Texas, 1962

Source: CDC, published in NEJM 2005; 352(10):1051