



# Public Health in the Era of the Internet: Lessons Learned From Immunizations

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# What's True About Immunizations

- One of top three public health advances in history
- Safe for the vast majority of people
- Some have track record of problems (e.g. DTP, original rotavirus)

# The War on Science

- The world is flat
- Dr. Strangelove – Fluoridation
- Andrew Wakefield – Immunizations & Autism (1998)

# Problem Statements

- Much of science is counter-intuitive – the “show me” problem
- Information over-supply
- Information discrimination
- Science education deficits
- The power of fear – known vs. unknown
- Gap between public & scientific community’s perceptions

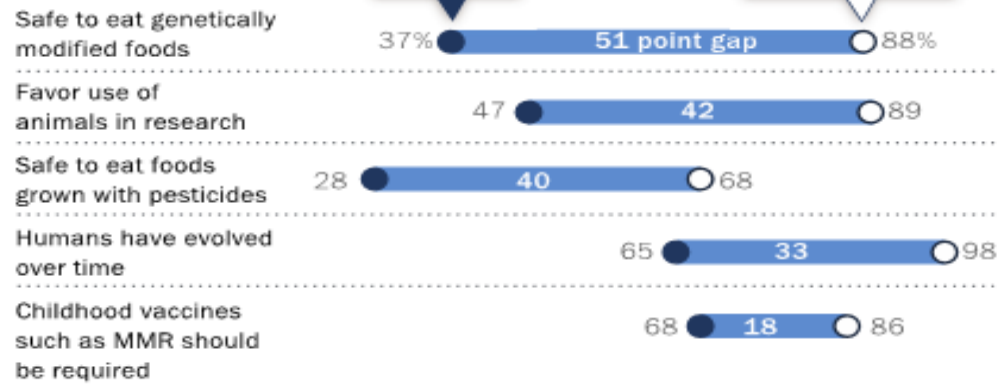
# The Challenge

- The parable of the feather pillow
  - Removing bad information
  - Debunking myths

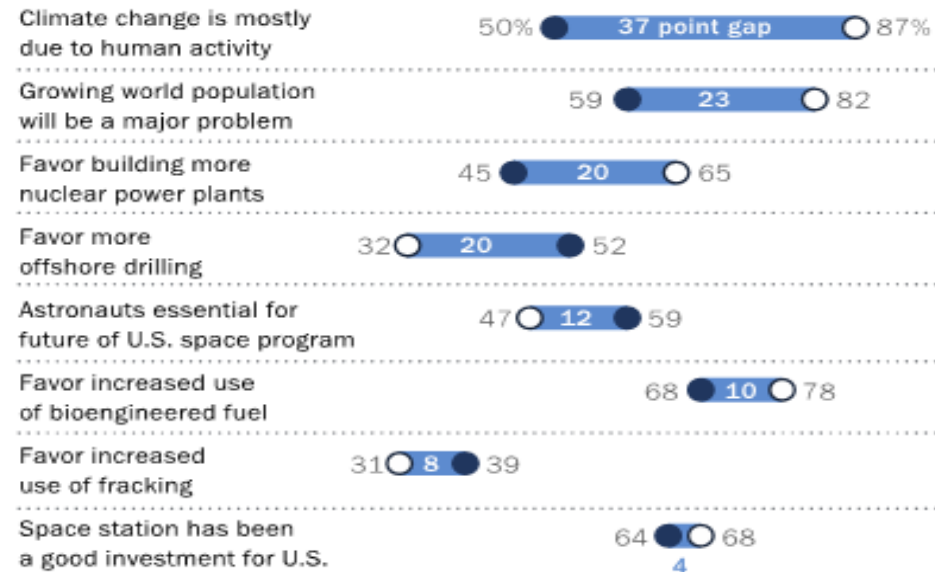
## Opinion Differences Between Public and Scientists

% of U.S. adults and AAAS scientists saying each of the following

### Biomedical sciences



### Climate, energy, space sciences



Survey of U.S. adults August 15-25, 2014. AAAS scientists survey Sept. 11-Oct. 13, 2014. Other responses and those saying don't know or giving no answer are not shown.

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## Scientists' Perspective: Limited Public Knowledge About Science Is a Major Problem

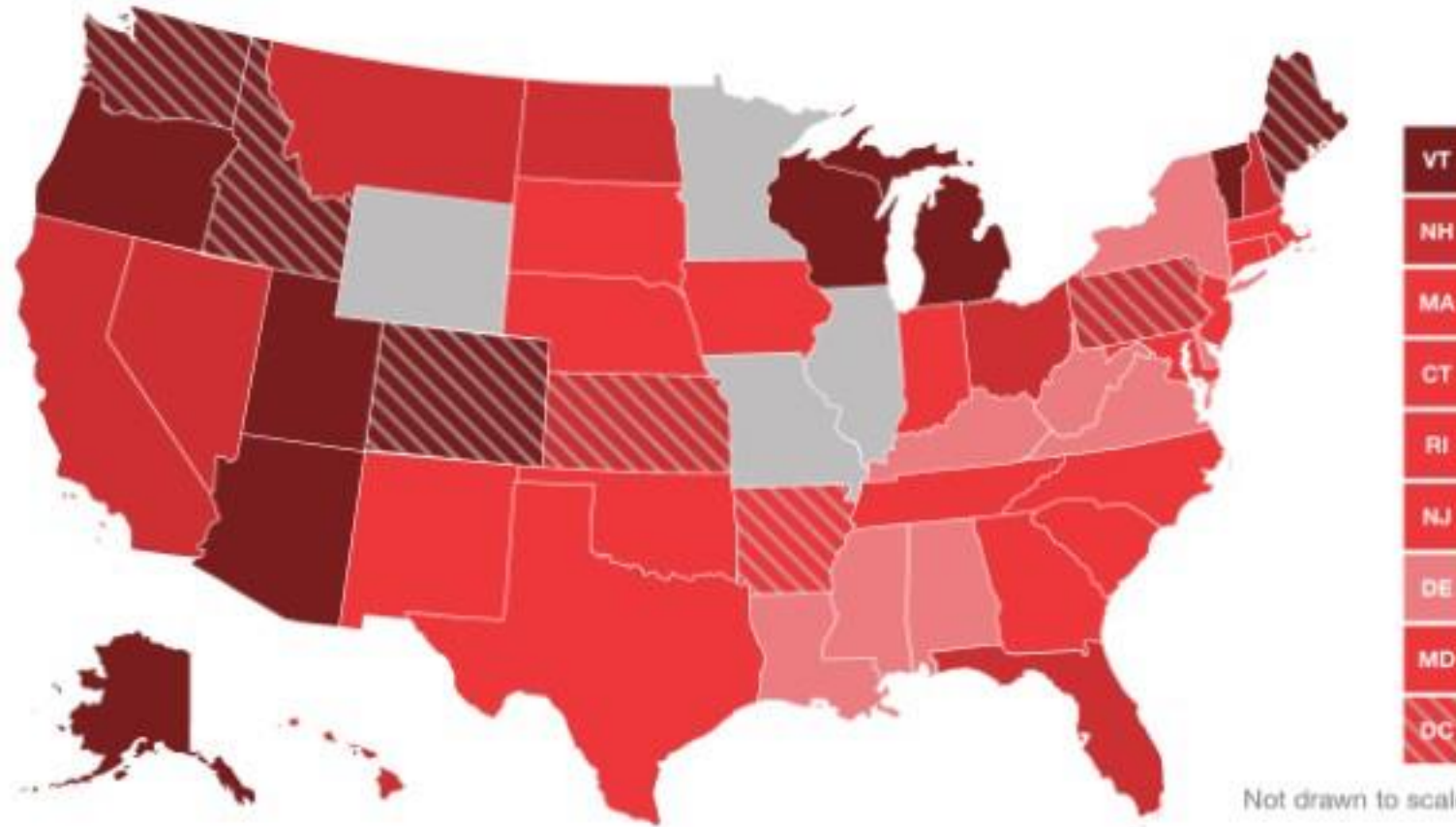
*% of AAAS scientists saying... is a major or minor problem for science in general*



AAAS scientists survey Sept 11-Oct 13, 2014. Q5d. Those saying this is not a problem or giving no answer are not shown.

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# KINDERGARTENER EXEMPTION RATES



## EXEMPTION RATE

< 1%

1% - 2%

2% - 4%

≥ 4%

■ Data not available

\* Exemptions might not reflect a child's vaccination status. Children with an exemption who did not receive any vaccines are indistinguishable from those who have an exemption but are up-to-date for one or more vaccines.

## MMR COVERAGE

/// < 90%

Not drawn to scale

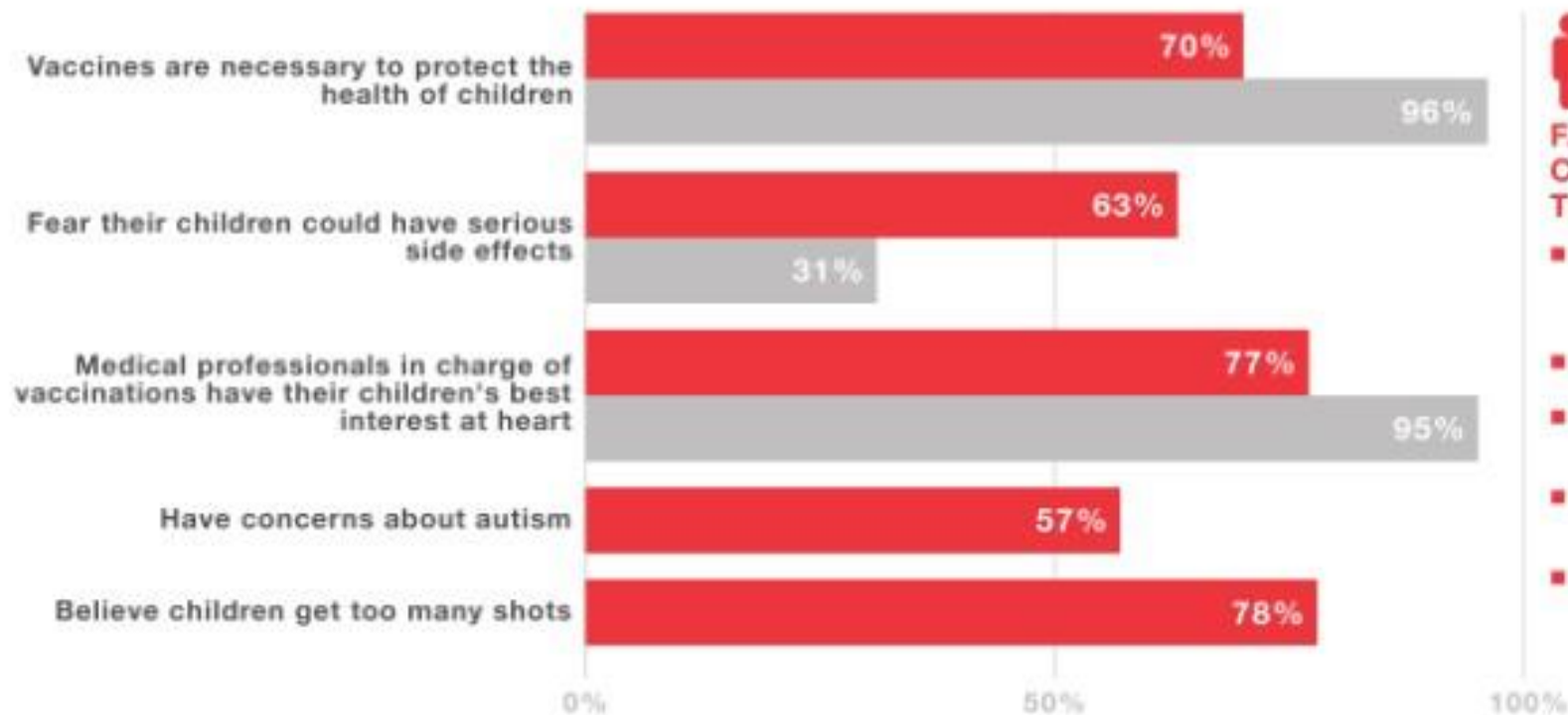
Source: CDC, 2013-2014 school year





# WHO ARE THE FAMILIES THAT DELAY AND REFUSE VACCINATIONS?

**PARENTS WHO DELAY AND REFUSE VACCINES** vs.  
PARENTS WHO DON'T DELAY OR REFUSE VACCINES



## FAMILIES OF UNVACCINATED CHILDREN ARE MORE LIKELY TO BE:

- Wealthier on average, with annual incomes more than four times the poverty level
- Non-Hispanic white
- Married couples in English-speaking households
- Educated, with college degrees
- Covered by private health insurance

SOURCE: Public Health Reports

# The spread of anti-vax sentiment in California

Share of public school kindergartners with personal belief exemptions to vaccination requirements

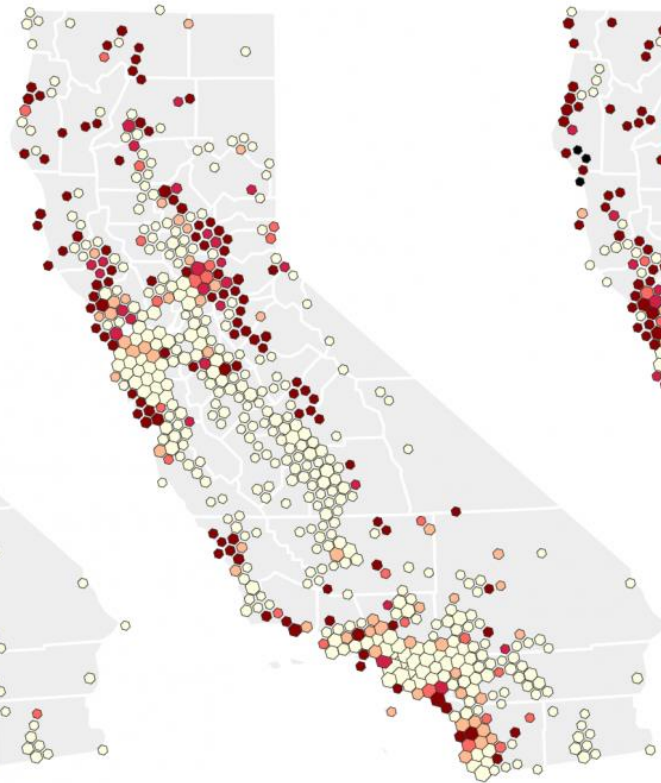
<2%   3%   4%   5+%



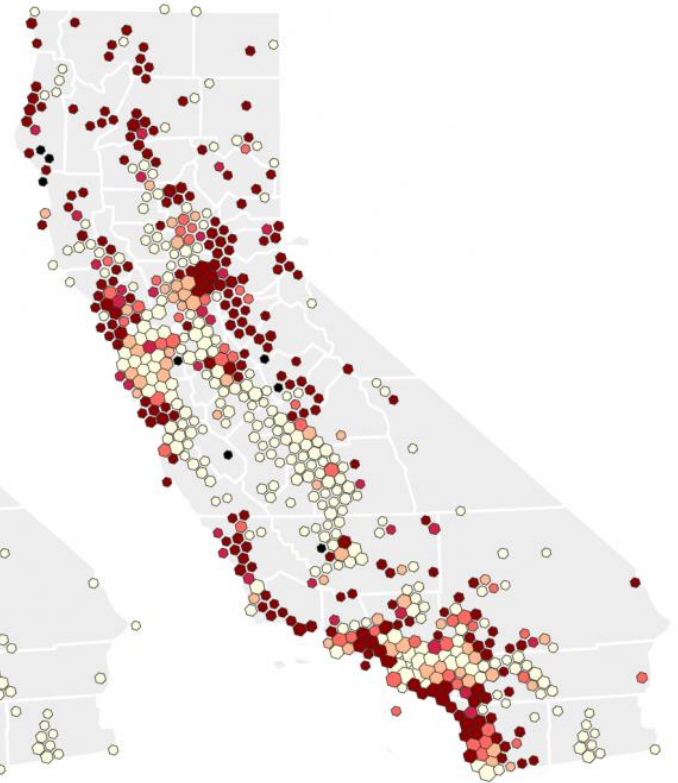
2000



2007



2013



# Literature on Refusal

- Search for “vaccines”, “vaccinations”, or “Immunizations”, combine with search for “treatment refusal”, English language, under age 18, multiple databases = 130
- 1992 – 2005 = 45
- 2006 – present = 85
- Slope is increasing!

# Common Reasons for Hesitancy

- Autism
- Pain
- Immune system dysfunction
- “Too many shots at once”
- Natural immunity better
- Lack of awareness of adverse effects of vaccine-preventable disease
- Possible to protect child without immunizations

# Types of Interventions\*

- Dialogue-based
- Incentive-based
- Reminder/Recall-based

\*[http://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](http://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf) Note: many of the included studies evaluated populations somewhat unlike the U.S. population

# Effective Interventions for Vaccine Uptake\*

- Directly target unvaccinated or under- vaccinated populations;
- Aim to increase knowledge and awareness surrounding vaccination;
- Improve convenience and access to vaccination;
- Target specific populations such as the local community and HCW;

\*[http://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](http://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf) Note: many of the included studies evaluated populations somewhat unlike the U.S. population

# Effective Interventions for Vaccine Uptake\*

- Mandate vaccinations or impose some type of sanction for non-vaccination;
- Employ reminder and follow-up; and
- Engage religious or other influential leaders to promote vaccination in the community.

\*[http://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](http://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf) Note: many of the included studies evaluated populations somewhat unlike the U.S. population

# Effective Interventions for Psychological Shift\*

- Education initiatives, especially associated with specific process
  - Hospital admission, medical procedure, etc
- Note: All effective interventions are targeted

\*[http://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](http://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf) Note: many of the included studies evaluated populations somewhat unlike the U.S. population



# Strategies to Address Hesitancy

- Public Policy
- Health Care Provider – Family
- Community Dialogue

# Role of Policy

- Changing types of exemptions
  - Medical vs non-medical
  - Note: NOT ONE SINGLE WORLD RELIGION PROHIBITS IMMUNIZATIONS
- Changing “opt-out” requirements
  - How parents implement non-medical exemptions
- Incentives & disincentives
  - School & day-care attendance
  - Financial
  - Substantive non-financial

# Role of Community Dialogue

- Religious and/or community leaders – particularly helpful in low trust populations
- Mass Marketing – evidence inconclusive
- Peer-to-Peer – PTA, children's activities, etc

# Peer Influence

- Studies suggest 90-95% of parents consult peer network re vaccines
- Can work both pro- and con-vaccines
- Developing peer networks
- Public-private partnerships ([www.vaxnorthwest.org](http://www.vaxnorthwest.org) Immunity Community)

# Change the Rhetoric

- Parents with vaccine hesitancy are not bad parents
- Empathy more successful than judgment or censure
- Tragedy of the Commons

# What Has Oregon Done?

- SB 132 (2013) – Change process for non-medical exemptions
- SB 895 (2015) – Refine SB 132, add school & daycare disclosure.

# Role of Public Health

- Accurate, timely data on disease prevalence & immunization rates
- Facilitate dissemination of accurate information in multiple formats & contexts
- Partner with lay leaders for communication & education
  - Promote valid information
  - Debunk myths

# Conclusion

- Houston, we have a problem
- We also have some solutions
- Multi-factorial problems require multi-modal solutions



# Resources

- American Academy of Pediatrics - <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/immunization/Pages/refusal-to-vaccinate.aspx>
- WHO – Strategies for Addressing Vaccine Hesitancy: A Systematic Review (2014) - [http://www.who.int/immunization/sage/meetings/2014/october/3\\_SAGE\\_WG\\_Strategies\\_addressing\\_vaccine\\_hesitancy\\_2014.pdf](http://www.who.int/immunization/sage/meetings/2014/october/3_SAGE_WG_Strategies_addressing_vaccine_hesitancy_2014.pdf)