

PEDIATRIC READINESS PROGRAM EDUCATION SESSION



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MEASLES UPDATE - 2026

Lorne Walker, MD PhD

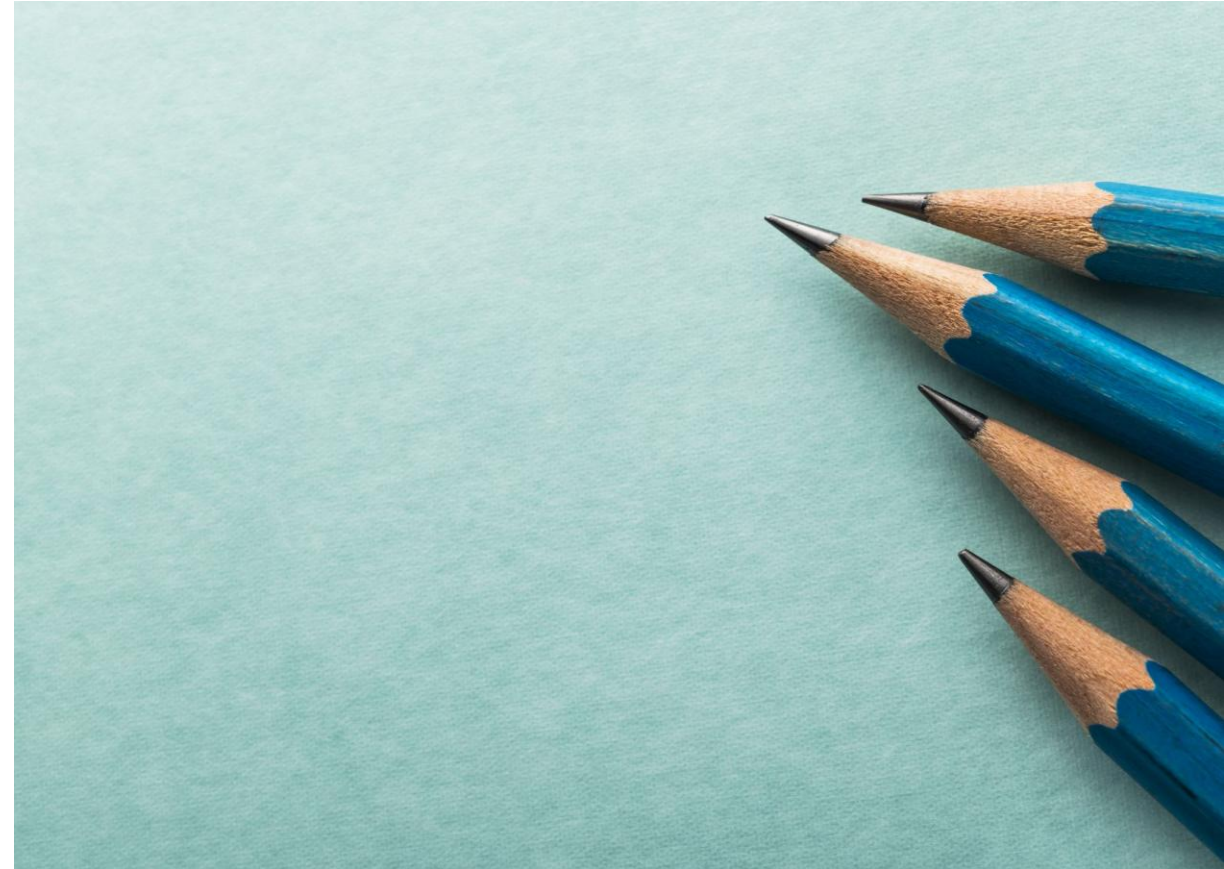
October 8, 2026

CME DISCLOSURE

None of the planners and faculty for this educational activity have relevant financial relationship(s) to disclose with ineligible companies whose primary business is producing, marketing, selling, reselling, or distributing healthcare products used by or on patients.

OBJECTIVES

- Describe the status of measles transmission in the US in 2026
- Identify effective approaches to reducing measles transmission
- Describe the influence of political climate on measles transmission risk



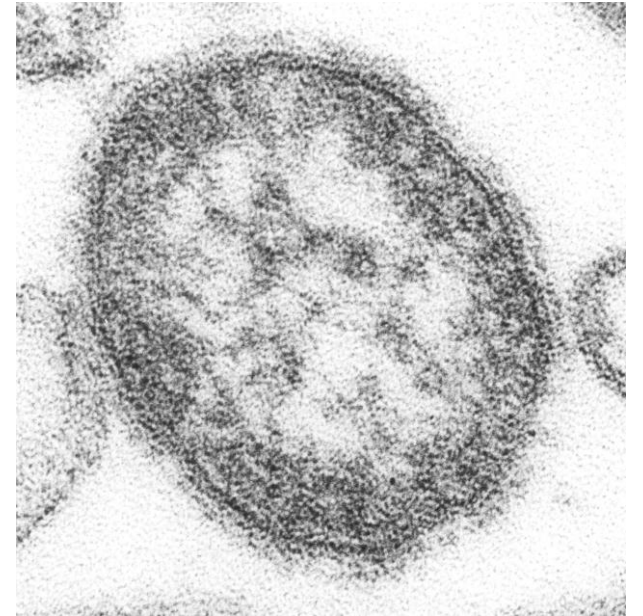
MEASLES INTRO & HISTORY



Charles Schulz, January 2, 1967

MEASLES VIRUS

- 120-300 nm RNA Morbillivirus
- Spread via respiratory droplets either through direct contact or through airborne particles
- Most contagious known pathogen
 - > 90% close contact attack rate in vulnerable populations
 - Remains airborne up to two hours in closed spaces
 - $R_0 = 12-18$



https://en.wikipedia.org/wiki/Measles_virus

HISTORY OF MEASLES

- Evolved from Rinderpest virus
 - Likely passed to humans between 400 BCE and 500 CE
 - Stabilized in the human population between 1100-1200 CE
- Recognized as a distinct disease from Smallpox by Abu Bakar al-Razi (860-932 CE)
- Isolated by John Enders and Thomas Peebles in 1954 at the Children's Hospital of Boston



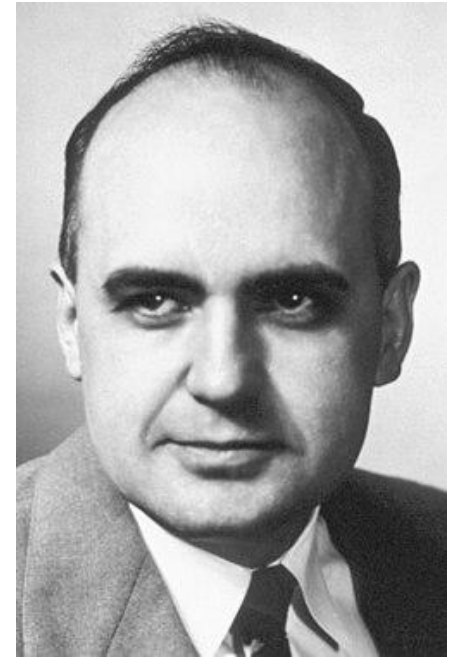
<https://en.wikipedia.org/wiki/Rinderpest>



<https://en.wikipedia.org/wiki/Measles>

MAURICE HILLEMAN (1919-2005)

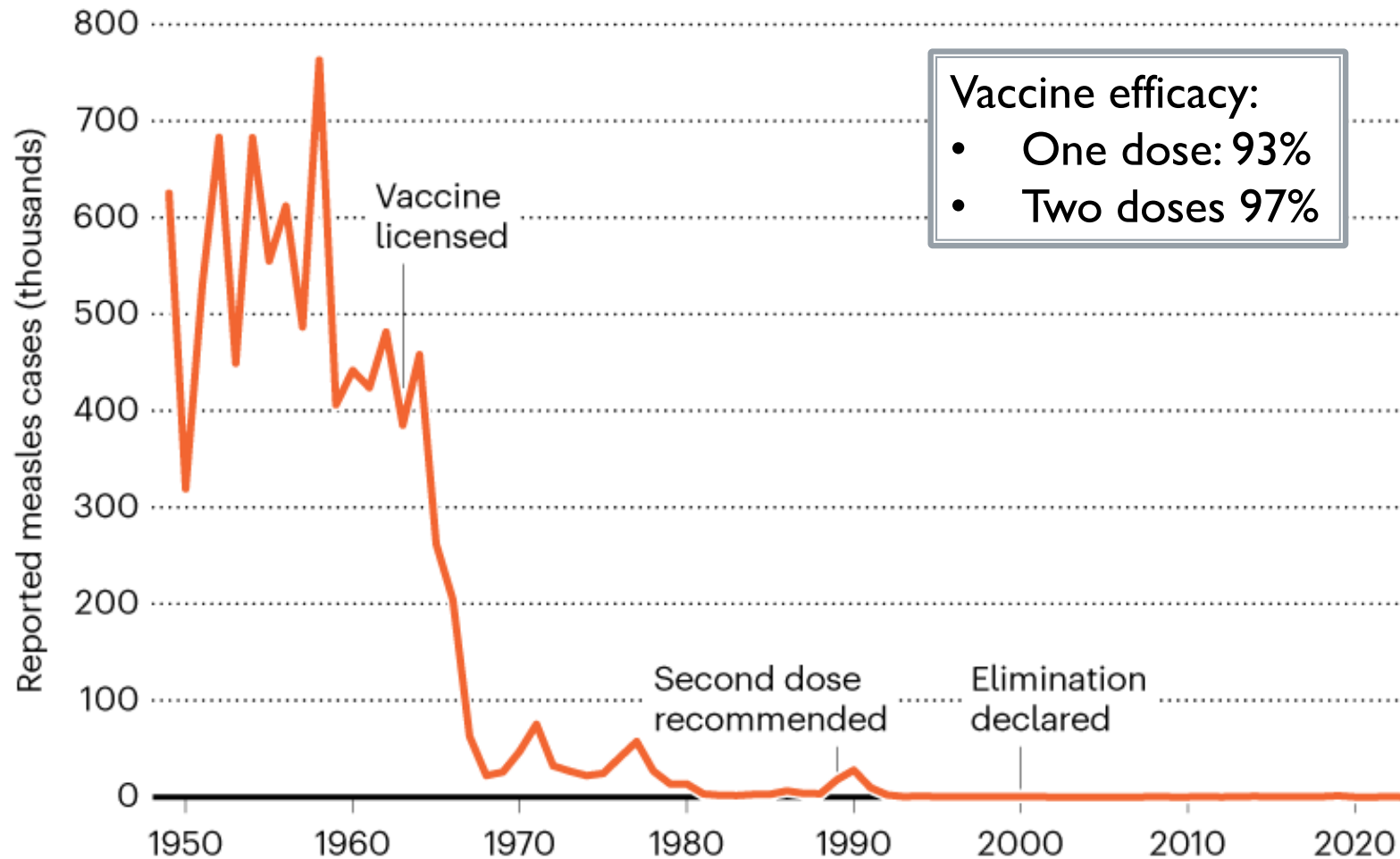
- Grew up in Miles City, Montana
- Discovered *Chlamydia trachomatis* as the cause of Chlamydia in 1944
- Worked as a microbiologist and vaccinologist at E.R. Squibb & Sons and Merck & Co.
- Developed 40 vaccines in his career, including:
 - **Measles**, Mumps, HAV, HBV, Varicella, Meningococcus, Pneumococcus, Hemophilus and some influenza strains
- Estimated to save 8 million lives yearly



https://en.wikipedia.org/wiki/Maurice_Hilleman

MEASLES CASES IN THE UNITED STATES

Before the measles vaccine was released in the United States in 1963, there were hundreds of thousands of infections each year.



CLINICAL PRESENTATION



Charles Schulz, January 3, 1967

Measles timeline

7-14 days after exposure

- “Prodrome” symptoms
- Fever (as high as 105°F) and malaise
- Cough, coryza, and conjunctivitis (three "C"s)

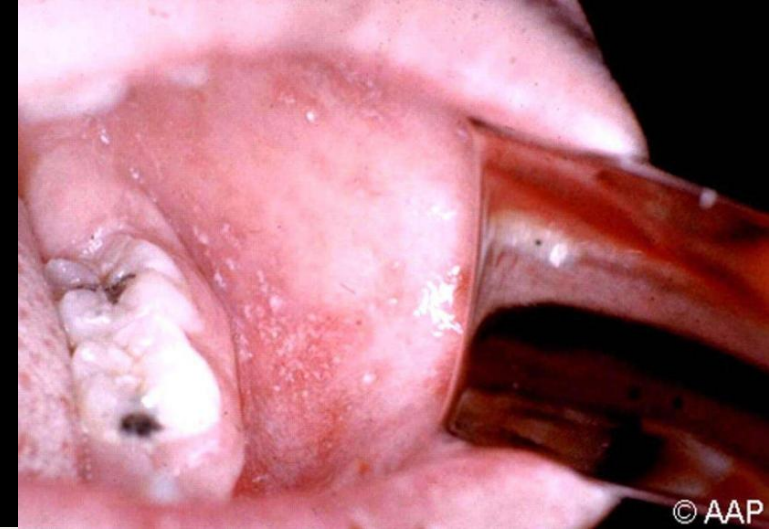
2-3 days after symptoms begin

- Pathognomonic enanthema (Koplik spots)

3-5 days after symptoms begin

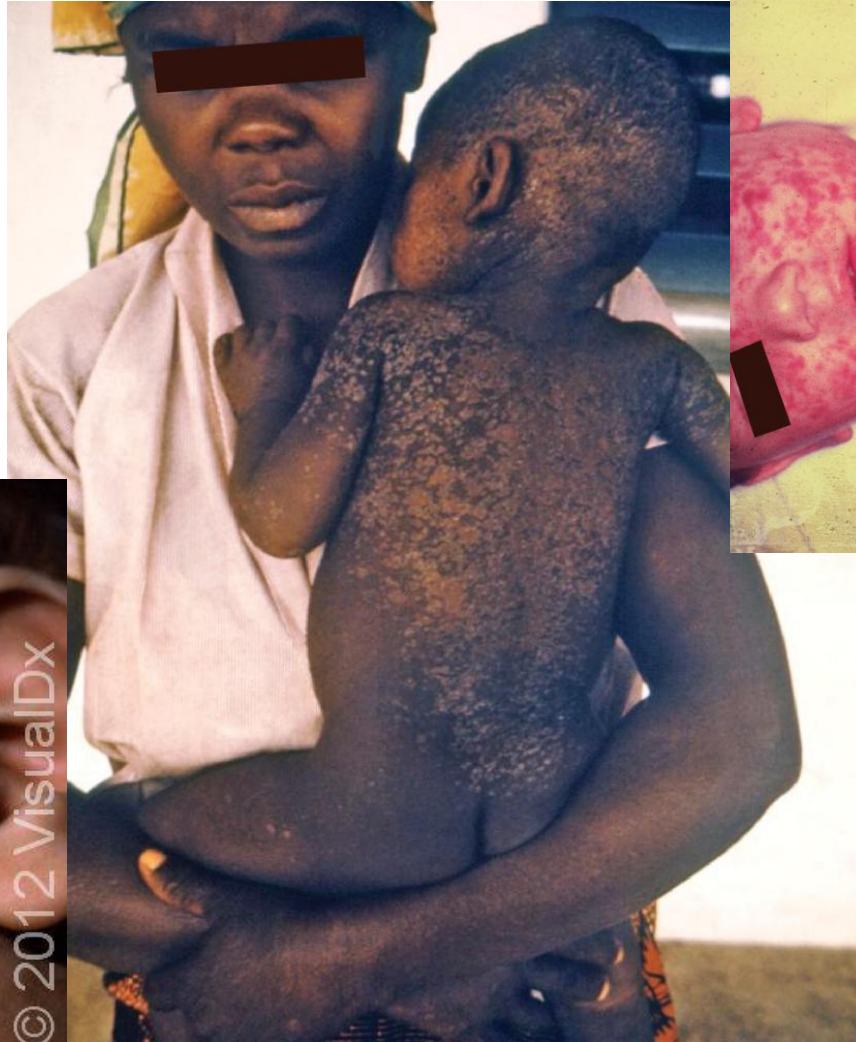
- Maculopapular rash develops
- Usual begins on the face at hairline, then spreads downward to neck, trunk, extremities.
- *Koplik spots are gone.*

Patients are **contagious** from 4 days before to 4 days after the rash appears





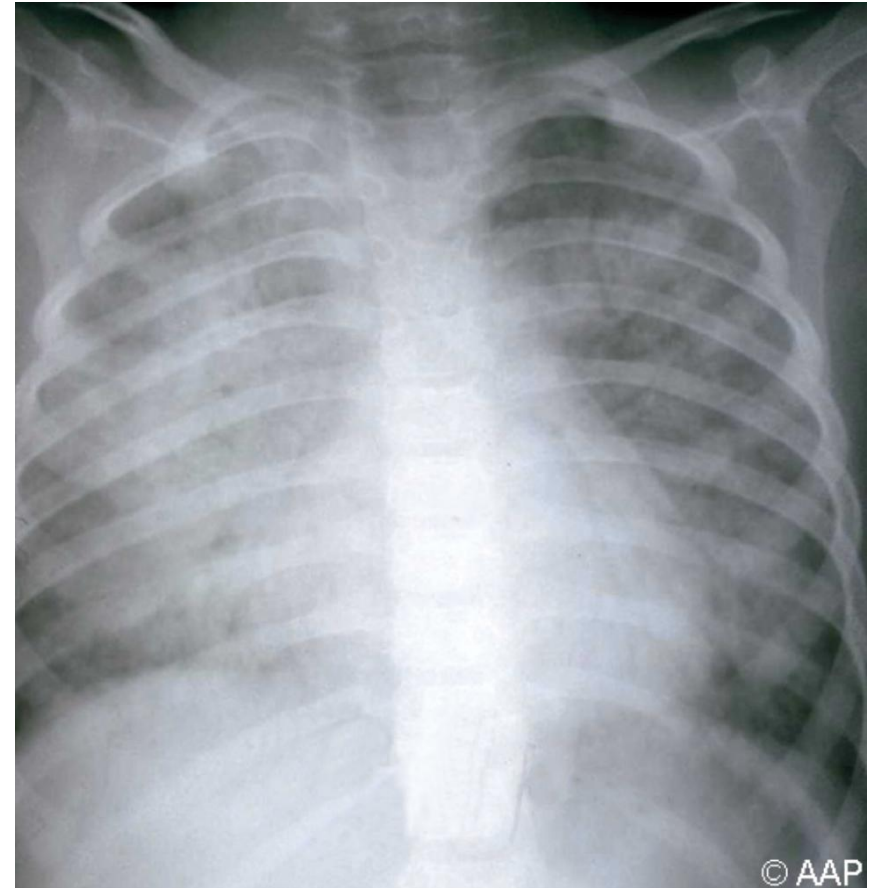
Conjunctivitis: may be associated with photophobia, tearing



Morbilliform rash: Not itchy or painful

ACUTE COMPLICATIONS

- Middle ear infection
- Pneumonia
- Croup
- Diarrhea
- Encephalitis (1 per 1000)
- Death: 1-3 per 1000 cases



© AAP

NEUROLOGICAL COMPLICATIONS

- Measles inclusion body encephalitis (MIBE)
 - Occurs in immunocompromised individuals within one year of acute measles infection
 - Presents with severe seizures and confusion
 - CSF studies typically normal
 - Measles RNA PCR from CSF positive
 - Pathology shows glial cell necrosis and inclusion bodies in neural tissue
 - **76%** mortality rate

NEUROLOGICAL COMPLICATIONS

- Subacute sclerosing panencephalitis (SSPE)
 - Progressive neurological degeneration over weeks to months
 - Behavior change, intellectual impairment, seizures, coma, death
 - Typical onset 7-11 years (max: 27 years) after acute measles infection
 - **Universally** fatal
 - 4-11 in 100,000 cases – more likely in males, infant infections

NEUROLOGICAL COMPLICATIONS

Morbidity and Mortality Weekly Report (*MMWR*)

[CDC](#) > [MMWR](#)

Notes from the Field: Subacute Sclerosing Panencephalitis Death — Oregon, 2015

Weekly / January 15, 2016 / 65(1);10–11



Format:

Juventila Liko, MD¹; Judith A. Guzman-Cottrill, DO²; Paul R. Cieslak, MD¹ ([View author affiliations](#))

[View suggested citation](#)



In 2015, the Oregon Health Authority was notified of the death of a boy with subacute sclerosing panencephalitis (SSPE), a rare and fatal complication of measles. The patient, aged 14 years, had reportedly been vaccinated against measles in the Philippines at age 8 months. However, the patient contracted measles at age 1 year while still in the Philippines. He had been well until 2012, when his neurodegenerative symptoms began. After the diagnosis of SSPE was made, the patient remained in home hospice care until his death. Investigators from the Oregon Health Authority and the Oregon Health and Science University reviewed the patient's medical records and interviewed the parents. Vaccination against measles can prevent not only acute measles and its complications, but also SSPE.

Investigators learned that, in 2012, at age 11 years, the boy, who was previously healthy and developmentally normal, had been admitted to a tertiary care children's hospital in Oregon with severe, progressive encephalopathy. Before the onset of his neurologic illness, the patient had been a straight-A, fifth-grade student who played soccer and basketball. The symptoms began approximately 4 months before the hospital admission, when the patient began to struggle with homework, drop utensils, and doze off during meals, eventually progressing to falling asleep while walking. During the subsequent month, his mother reported that he was less alert and sometimes seemed confused. He experienced myoclonic jerks and involuntary hand and arm movements, which became increasingly frequent, and his coordination deteriorated. He missed 3 weeks of school and required a home tutor. His appetite decreased, and he lost 12 pounds but remained playful and interactive.

MEASLES AND IMMUNE AMNESIA

- Measles infection results in loss of existing T-cell and memory B-cell populations
 - Increased infection-related mortality for up to 3 years post-measles
- “Reset button” for the immune system
- Not seen with MMR vaccination or other infections



MEASLES TESTING AND MANAGEMENT



Charles Schulz, January 4, 1967

MEASLES TESTING

- Testing approach
 - Serology: can be considered to confirm immunity
 - Viral PCR:
 - Nasopharyngeal swab, Urine collection
 - Preferably done within 4 days of rash onset (maximum 10)



Measles detection in Marion County wastewater prompts OHA alert to health care providers

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Oct. 17, 2025

PORTLAND, Ore.--Oregon Health Authority is alerting health care workers to a detection of measles found in a sewage sample through routine wastewater testing.

Wastewater testing, an early warning system, indicates at least one person with measles was in an area. OHA and Marion County health officials say health care providers should remain vigilant monitoring for patients who might have measles, and members of the public should ensure they are up to date on measles vaccination.

“One way to think about wastewater surveillance is like a ping on a radar -- it could be low levels of the virus just passing through or something more serious, like an outbreak,” says Howard Chiou, M.D., Ph.D., medical director of communicable disease and immunizations at OHA. “It gives us a chance to prepare our health care partners with information they can use to help patients take steps to protect themselves, including reminding them to be up to date on their measles vaccines.”

[View video clips of Dr. Chiou discussing the measles detection and wastewater surveillance.](#) A link to broadcast-quality clips for media is available upon request.

The positive sample was collected Oct. 6 from a wastewater treatment plant in Marion County. The detection means there was at least one person infected with measles virus within the local area serviced by the wastewater treatment plant.

Media contact

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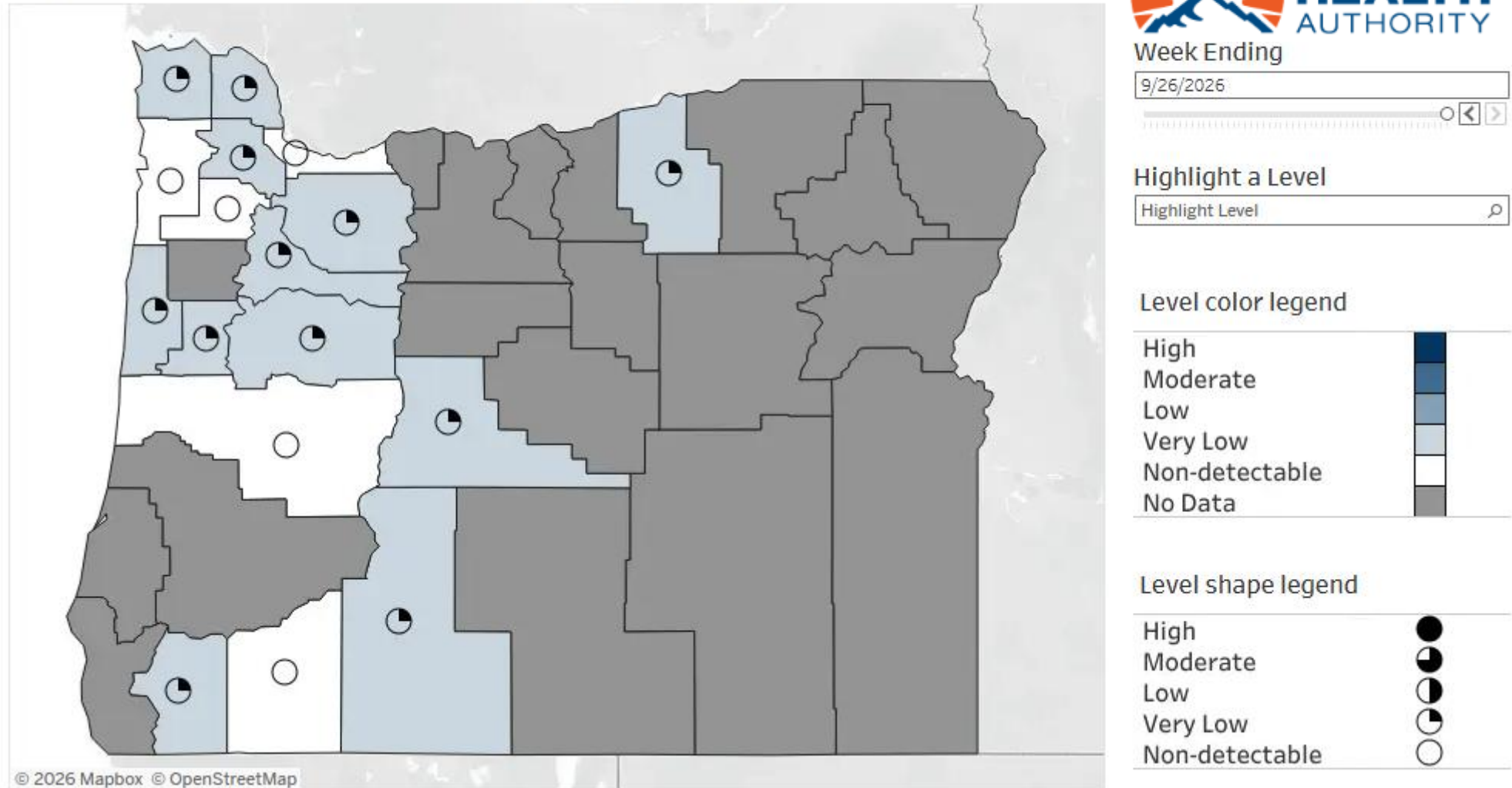
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Map of counties by **Measles** virus concentration detected by community wastewater treatment centers in the two-week period ending .



<https://public.tableau.com/app/profile/oregon.public.health.division.acute.and.communicable.disease.pre/viz/OregonsRVPWastewaterMonitoring/Mainpage>

MEASLES TREATMENT

- WHO: "All children or adults with measles **should** receive two doses of vitamin A supplements, given 24 hours apart"
- CDC: "Vitamin A **may** be administered to infants and children in the United States with measles"
- AAP: "Many US experts **concur** with administering Vitamin A to all children"

INTENSIVE VITAMIN THERAPY IN MEASLES

BY

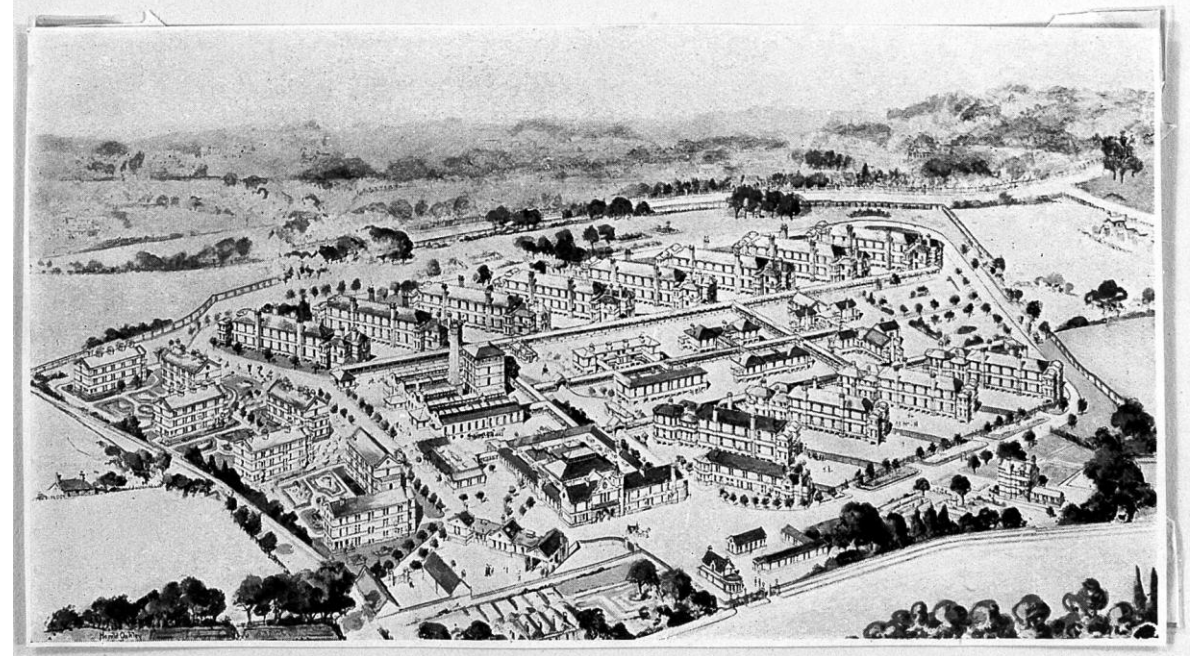
J. B. ELLISON, M.A., M.D., D.P.H.,
ASSISTANT MEDICAL OFFICER, L.C.C. FEVER HOSPITAL SERVICE

British Medical Journal, October 15, 1932

TABLE I

Controls				Treated Cases		
Age	Number	Deaths	Rate per cent.	Number	Deaths	Rate per cent.
0-1	32	4	12.5	31	1	3.2
1-2	90	16	17.8	101	8	8.0
2-3	60	4	6.7	55	1	1.8
3-4	61	2	3.3	61	1	1.6
4-5	57	0	0	52	0	0
Total ...	300	26	8.7	300	11	3.7

THE GROVE (fever) HOSPITAL, TOOTING, LONDON, SW.
(opened in 1899)



TO TREAT OR NOT TO TREAT?

- Indonesia, 1983
 - Children with Vitamin A deficiency had 4x higher all-cause mortality
 - Most marked difference in children < 2-3 years
- Indonesia, 1983
 - Villages randomized +/- Vitamin A supplementation
 - All-cause mortality decreased by $\sim 1/3$
- Tanzania, 1987
 - 180 children randomized +/- two doses Vitamin A
 - Mortality 7% vs 13% ($p = 0.13$)

Sommer, et al, 1983. PMID: 6136744.
Sommer, et al, 1986. PMID: 2871418.
Barclay, et al, 1987. PMID: 3101849.

WHO IS VITAMIN A DEFICIENT?

- Preterm infants
- Infants, children, pregnant & lactating people from low-and middle-income countries
- People with Cystic Fibrosis
- People with Chronic GI disease
- People with Measles (?!)

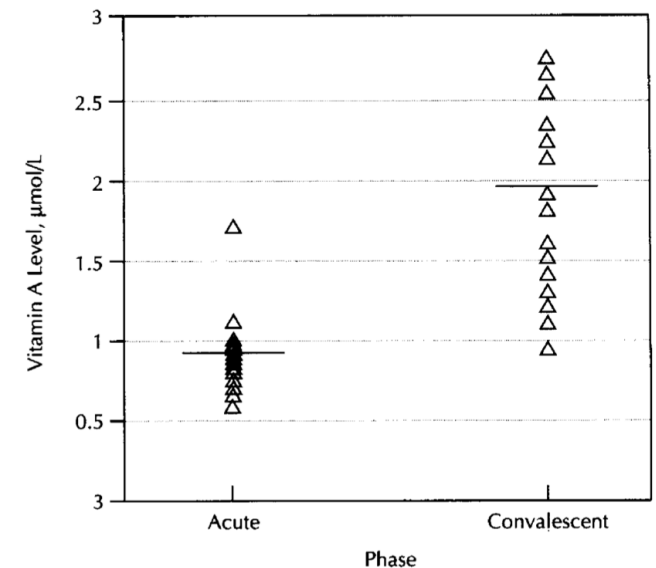


Fig 1.—Vitamin A levels in paired measles serological specimens (bars indicate mean levels). Of the 89 children studied, 21 had paired serum samples available. All paired serum specimens but one showed an increase in vitamin A level from first to second specimen.

TYPES OF ATTITUDES

- Enthusiastic acceptor
- Fence-sitter
- Vaccine skeptic
- Vaccine non-acceptor

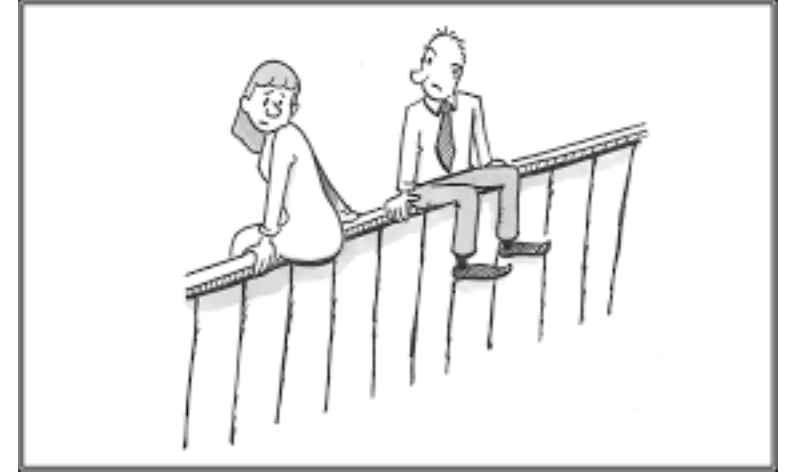
ENTHUSIASTIC ACCEPTER

- This is easy!



FENCE-SITTER

- No specific vaccine objections
- May be aware of other's concerns or alternative views
- May be swayed by other considerations (cost, additional time in clinic, needle fear, etc.)
- Responds best to presumptive approach



- Presumptive language: State recommendations clearly as standard care, share side effects, and offer to answer questions

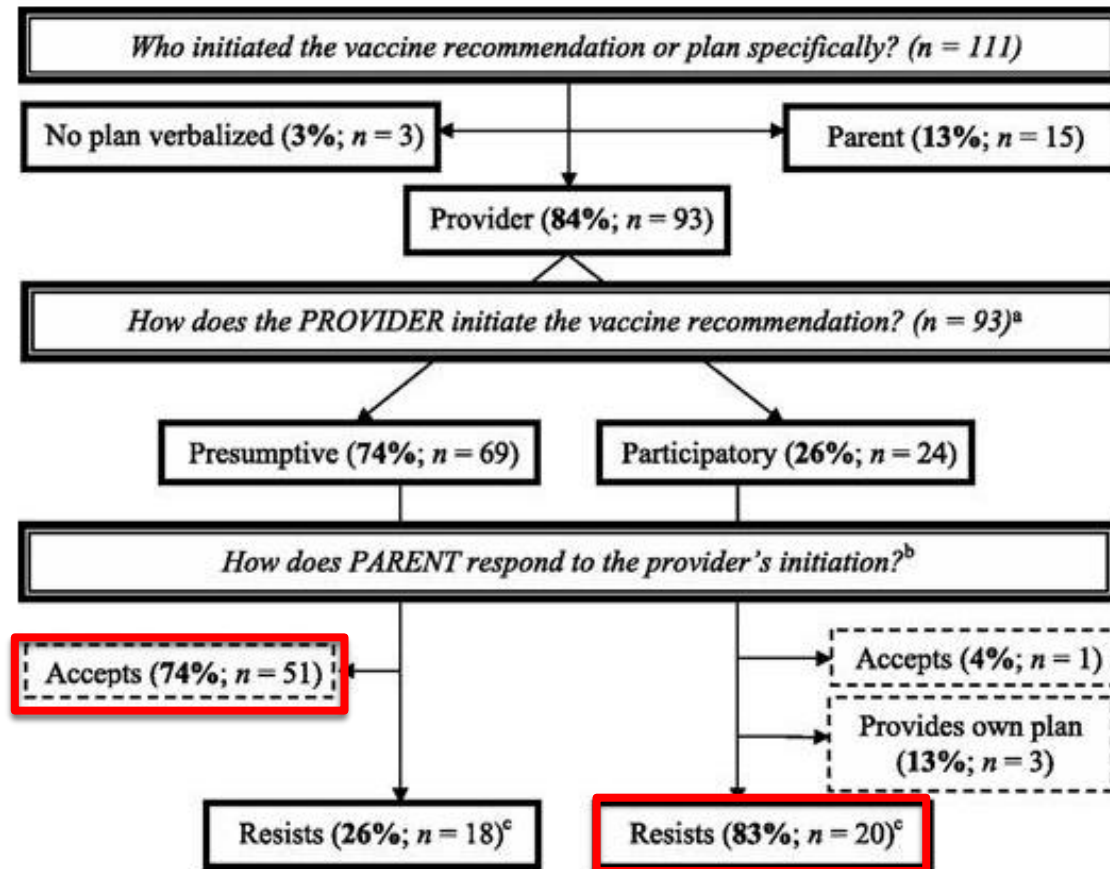
Presumptive

- “Standard vaccines at this age will protect against a measles, mumps and rubella. Common side-effects are discomfort, mild fever and redness. I can order those for you – do you have any questions for me?”

Not Presumptive

- “What do you think of doing some shots today?”
- “Do you want to follow the standard vaccine schedule?”
- “Do you want the MMR vaccine today?”

PRESUMPTIVE APPROACH



Opel et al. Pediatrics, 2013. PMID: 24190677

VACCINE SKEPTIC

- Has generally negative feelings about vaccines
- May have (earned!) doubt or mistrust of healthcare system
- May have received vaccine-related misinformation
- Might suggest a pick-and-choose or delayed approach
- Presumptive approach can **backfire**



VACCINE SKEPTIC

- Approach depends on specific concerns (and level of skepticism)
- *Motivational Interviewing* (MI) techniques can be helpful
 - “What benefits and risks of vaccines do you know of?”
 - “I can tell you’re thinking very carefully about your child’s health.”
 - “That’s a very common concern. Is it OK if I share a few thoughts about that?”

VACCINE NON-ACCEPTER

- Likely to have fixed negative beliefs about vaccination
- May have sophisticated (but misinformed) reasons
- Trying to persuade can **backfire**
- Presumptive approach **really backfires!**
- Best approach is openness, trust and continuity



MEASLES PREVENTION

- **Vaccinate!** 93-97% lifelong immunity
- What if they are non-immune but exposed?

Age/Condition	Time since exposure		
	≤ 3 days	4-6 days	> 6 days
< 6m	0.5 mL/kg IM IgG		None
6-11 m	MMR vax	IM IgG	None
> 12 m	MMR vax	None	
Immunocompromised	400 mg/kg IVIG		None

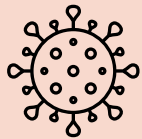
MEASLES PREVENTION

**Vaccinate
up to 72
hours after
exposure!**

- **Vaccinate!** 93-97% lifelong immunity
- What if they are non-immune but exposed?

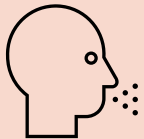
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6-11 m	MMR vax	IM IgG	None
> 12 m	MMR vax	None	
Immunocompromised	400 mg/kg IVIG		None

MEASLES ISOLATION



If infected

Until 4 days after onset of rash



If exposed, but asymptomatic

Day 5 after exposure until
day 21 (28 if given IgG)

MEASLES TRENDS



Charles Schulz, January 5, 1967

1989-91: resurgence of cases in US; increasing proportion of cases among unvaccinated preschool-aged children in urban areas



1963

Measles vaccine first licensed



1993

Vaccines for Children (VFC) program was initiated

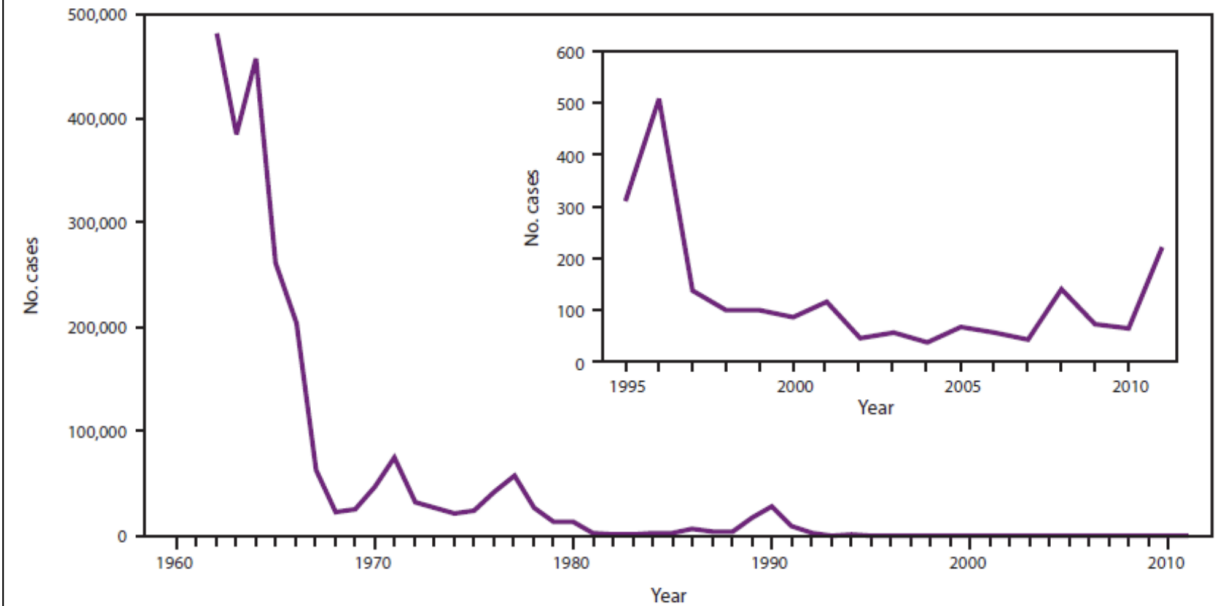
1984-1988: an average of 3,750 cases annually in US reported

ACIP added dose #2 for all children



1989

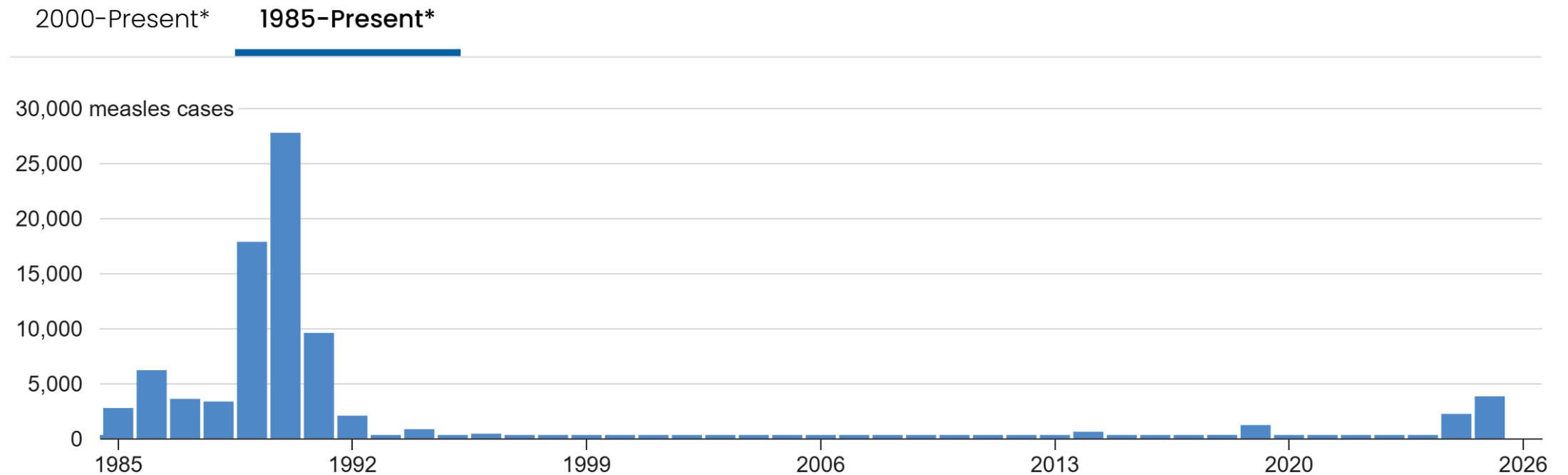
FIGURE 1. Number of measles cases — United States, 1962–2011



Source: Measles data provided were reported voluntarily to CDC from state health departments.

Yearly measles cases

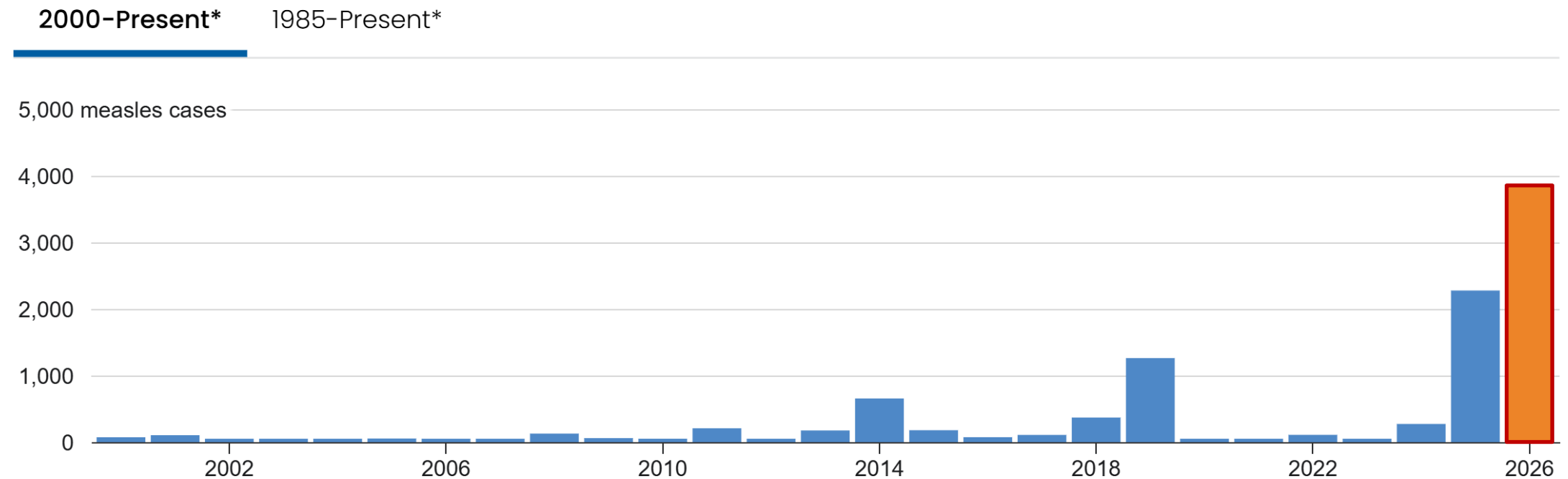
as of October 1, 2026



<https://www.cdc.gov/measles/data-research/index.html>

Yearly measles cases

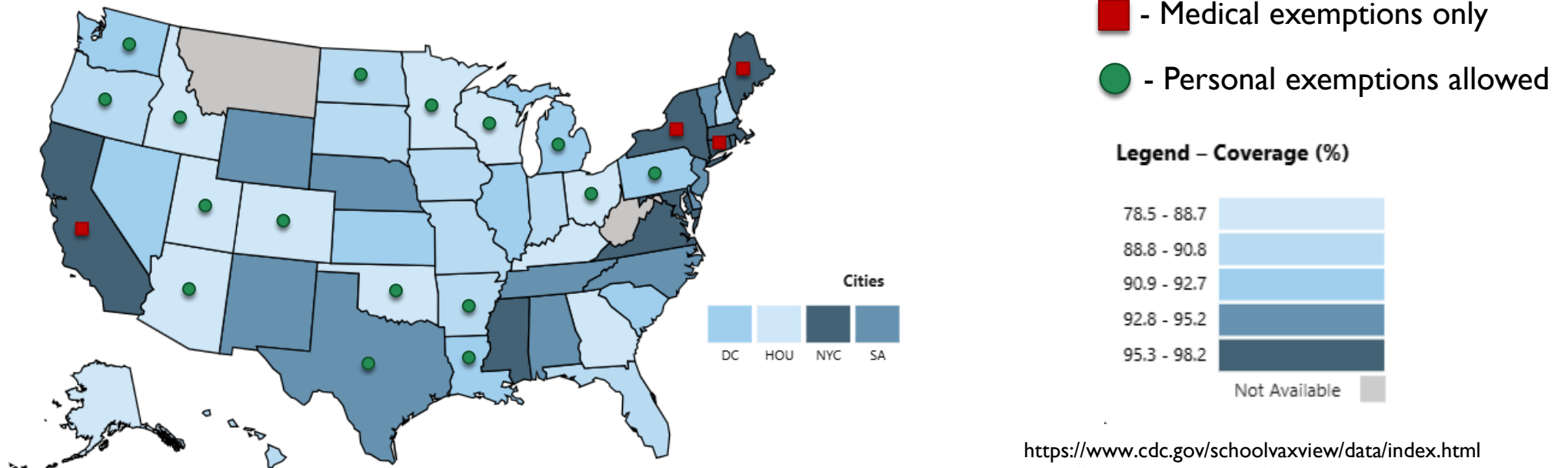
as of October 1, 2026



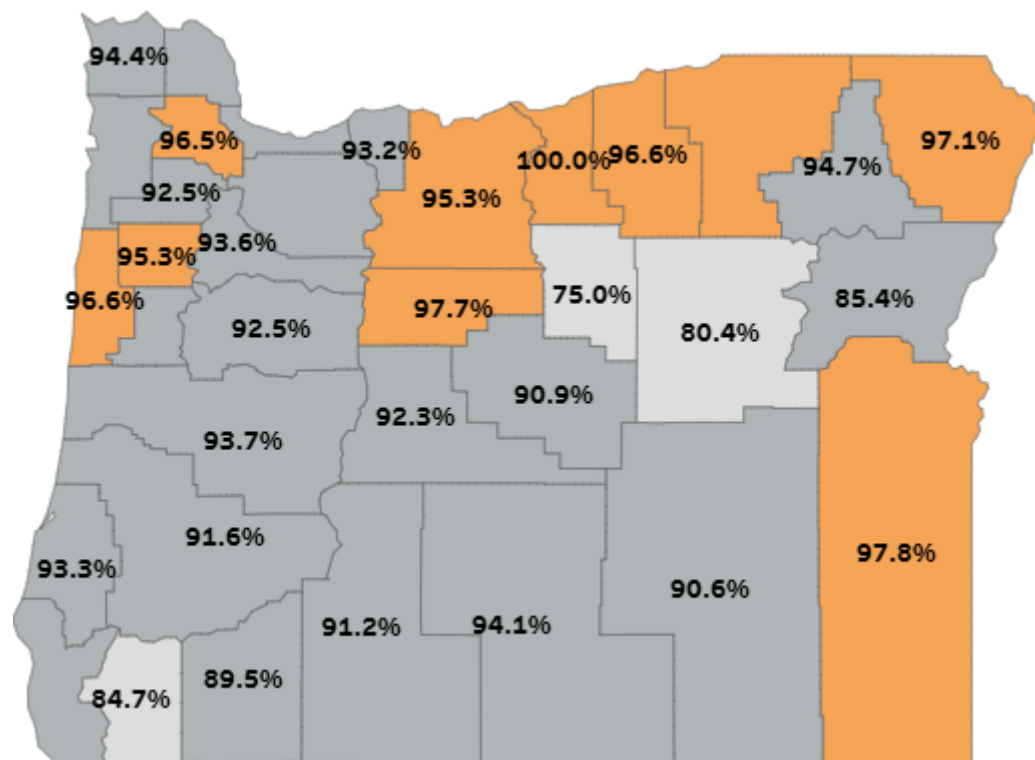
MEASLES IMMUNITY

- Population coverage for herd immunity: **95%**
- National MMR coverage 2024-25: **92.5%**

MMR Vaccination Coverage among Kindergartners by School Year

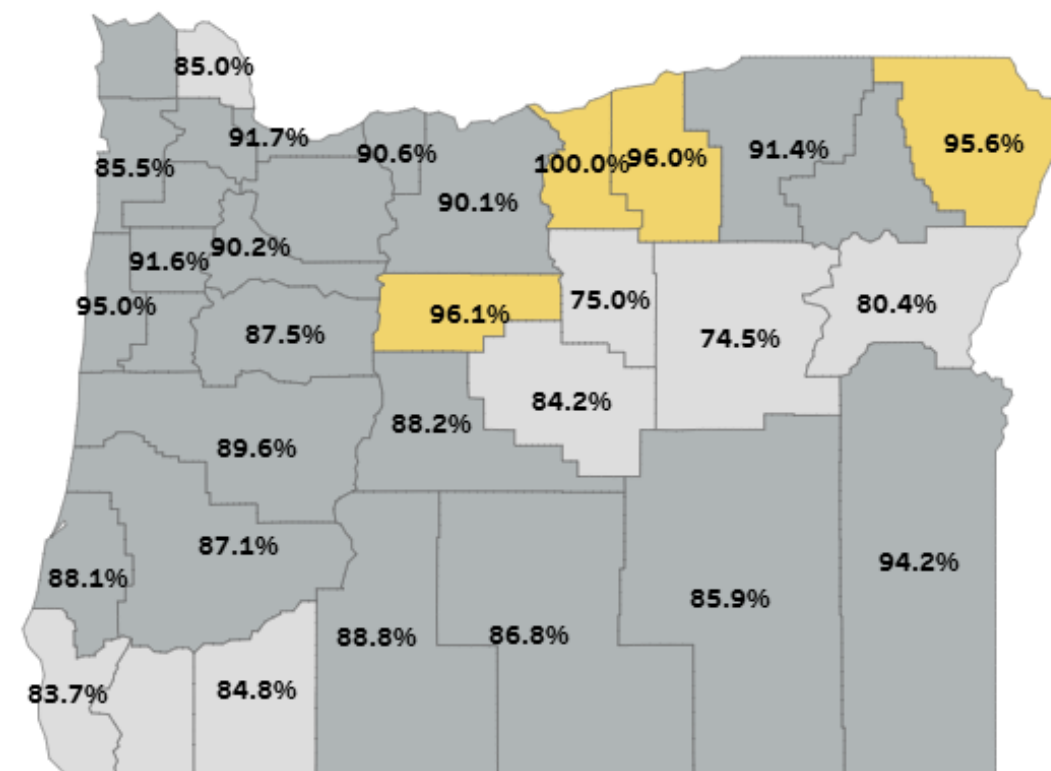


<https://www.cdc.gov/schoolvaxview/data/index.html>
<https://www.ncsl.org/health/state-non-medical-exemptions-from-school-immunization-requirements>



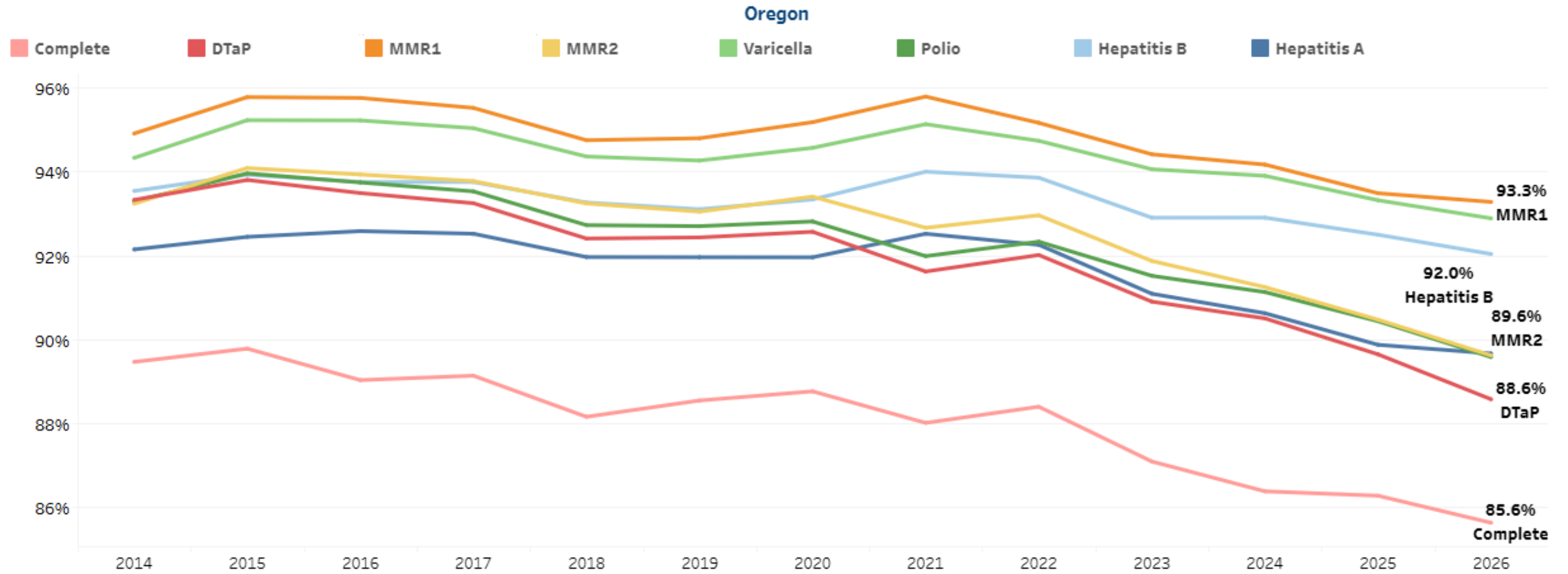
MMR Dose #1

<85%
 85-94%
 ≥95%



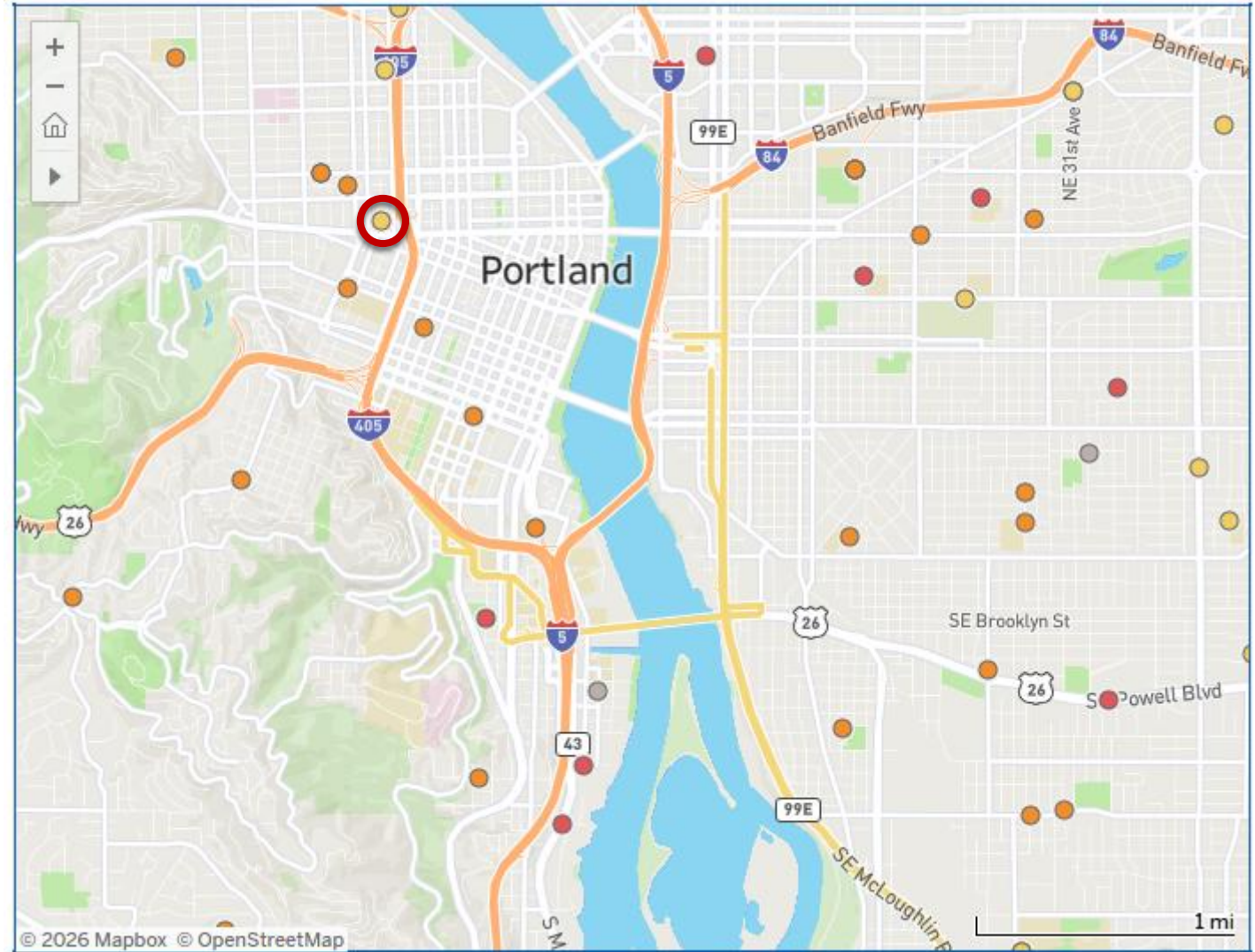
MMR Dose #2

≥95%



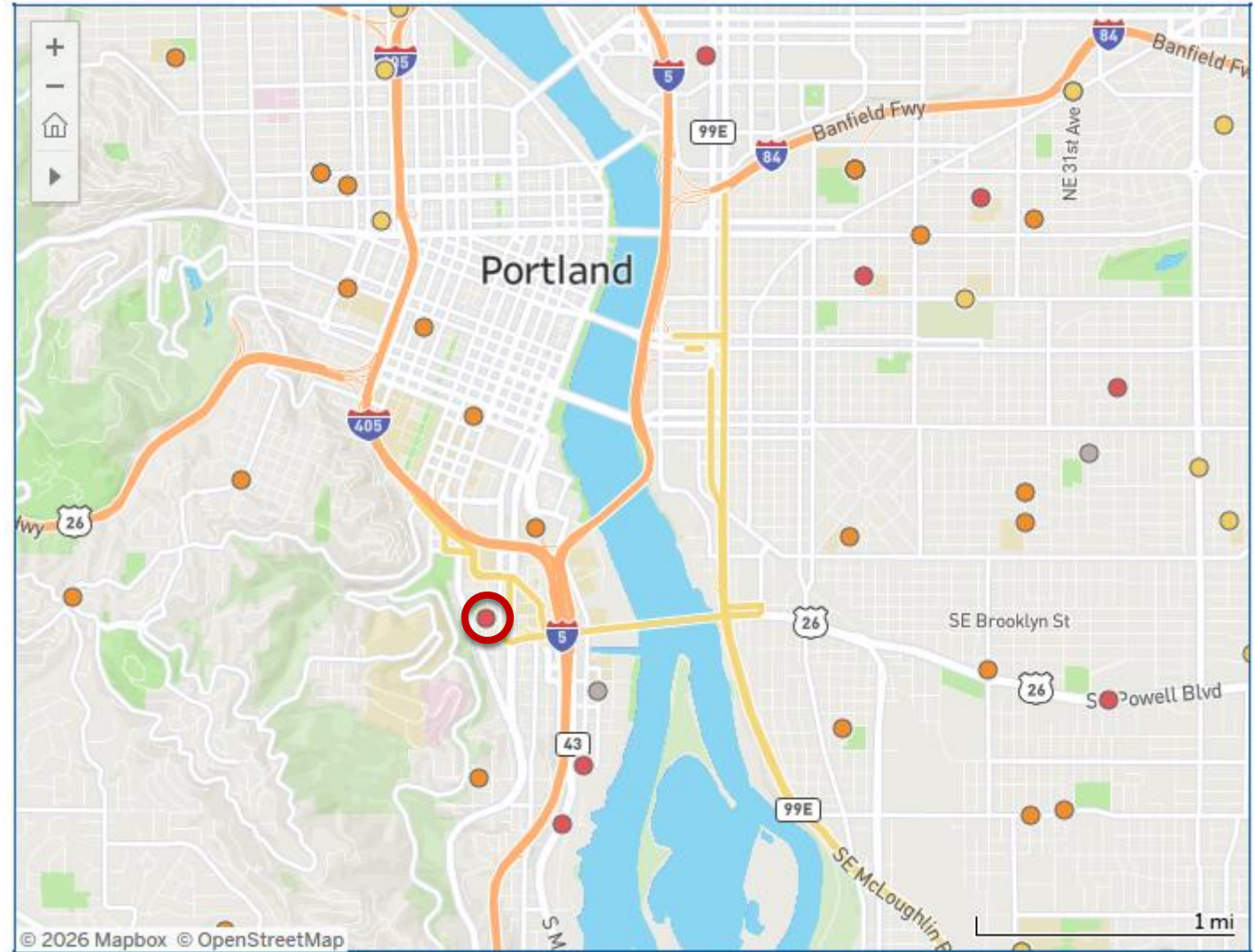
Enrollment*	172
Not Required**	0
% No Record***	0.0%
% All Required Vaccines	95.3%
% DTaP / Tdap	97.7%
% Polio	97.1%
% Varicella	95.3%
% MMR1	98.8%
% MMR2	97.1%
% Hep B	97.1%
% Hep A	97.1%

- >=95% vaccination for all school required vaccines
- 90-94.9% vaccination for all school required vaccines
- <90% vaccination for all school-required vaccines
- <10 students

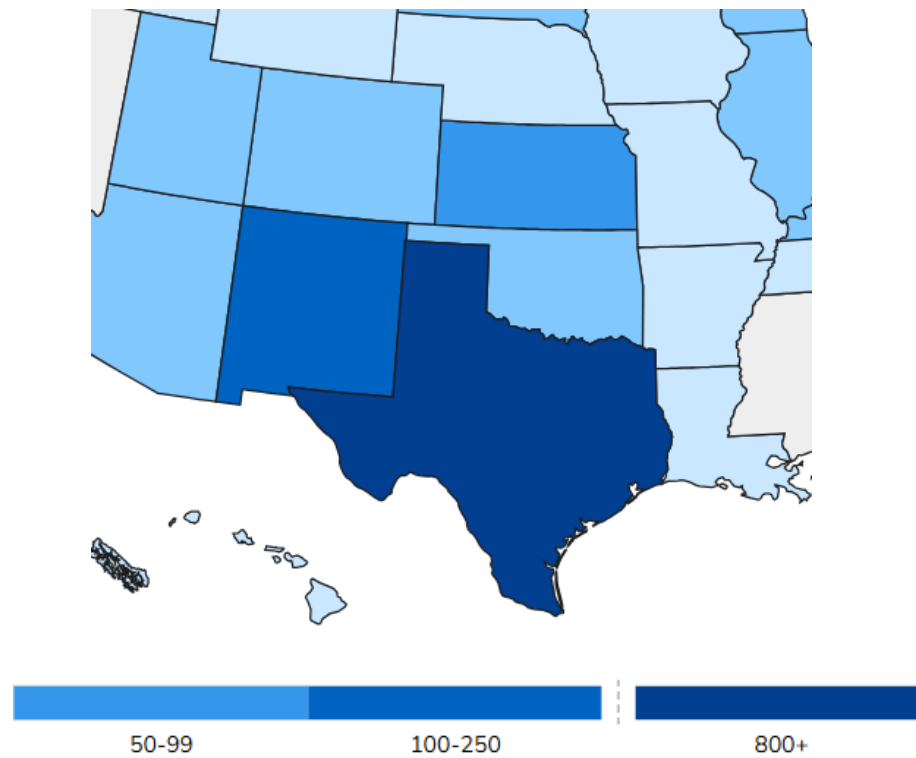
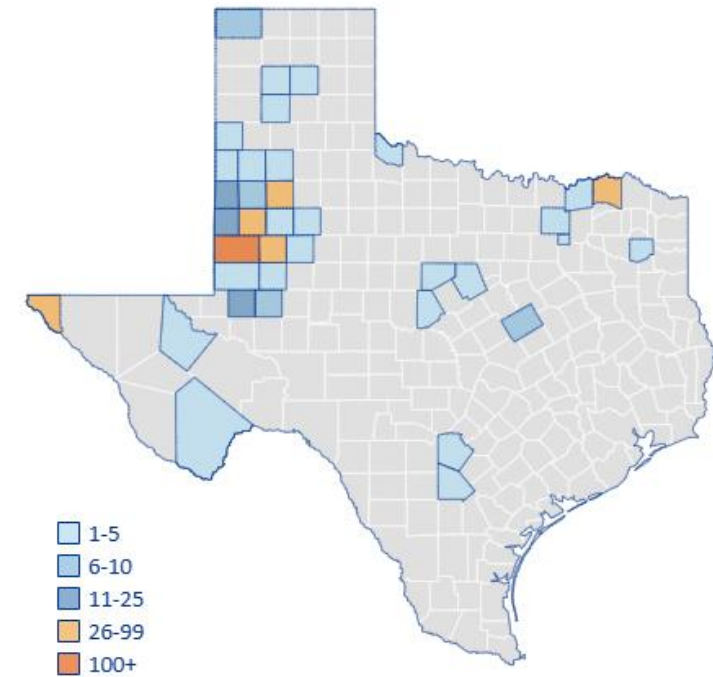


Enrollment*	193
Not Required**	0
% No Record***	0.0%
% All Required Vaccines	73.6%
% DTaP / Tdap	88.6%
% Polio	82.4%
% Varicella	88.1%
% MMR1	88.1%
% MMR2	85.0%
% Hep B	79.8%
% Hep A	84.5%

- >=95% vaccination for all school required vaccines
- 90-94.9% vaccination for all school required vaccines
- <90% vaccination for all school-required vaccines
- <10 students

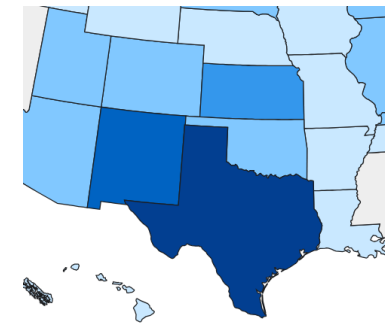
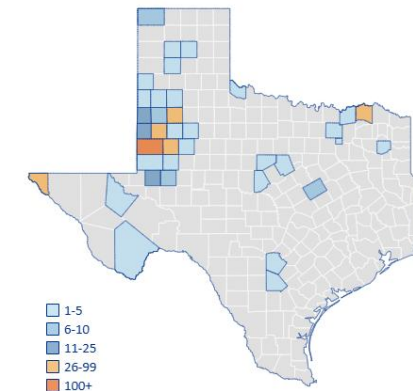


2025 TEXAS MEASLES OUTBREAK



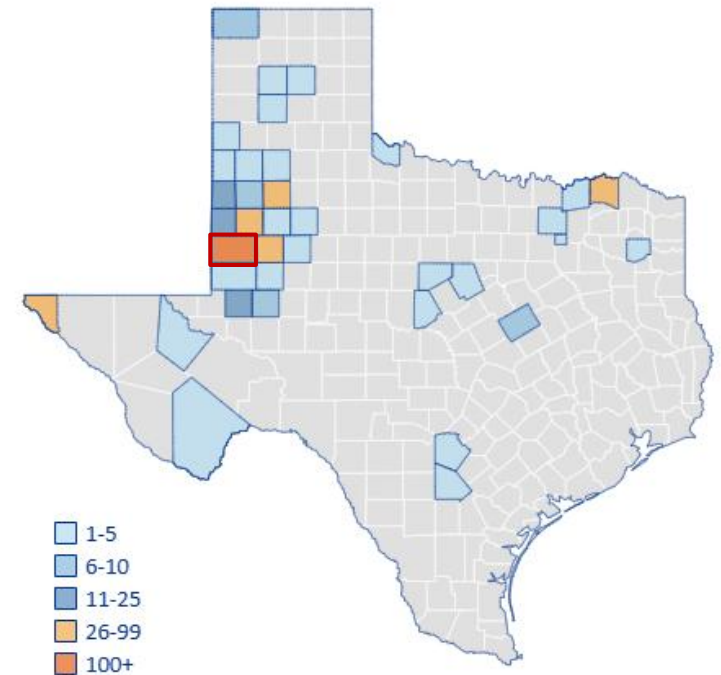
2025 TEXAS MEASLES OUTBREAK

- Total cases: 1,288
- Hospitalizations: 181 (12%)
- Deaths: 3
 - Texas: 6 year-old, 8 year-old
 - New Mexico: 1 Adult
 - **ALL** unvaccinated



2025 TEXAS MEASLES OUTBREAK

- Gaines County, TX
 - Population 21,598
 - 14% vaccine exemption rate
 - 82% Kindergarten MMR rate
 - Concentrated in Mennonite community



MENNONITES AND VACCINES

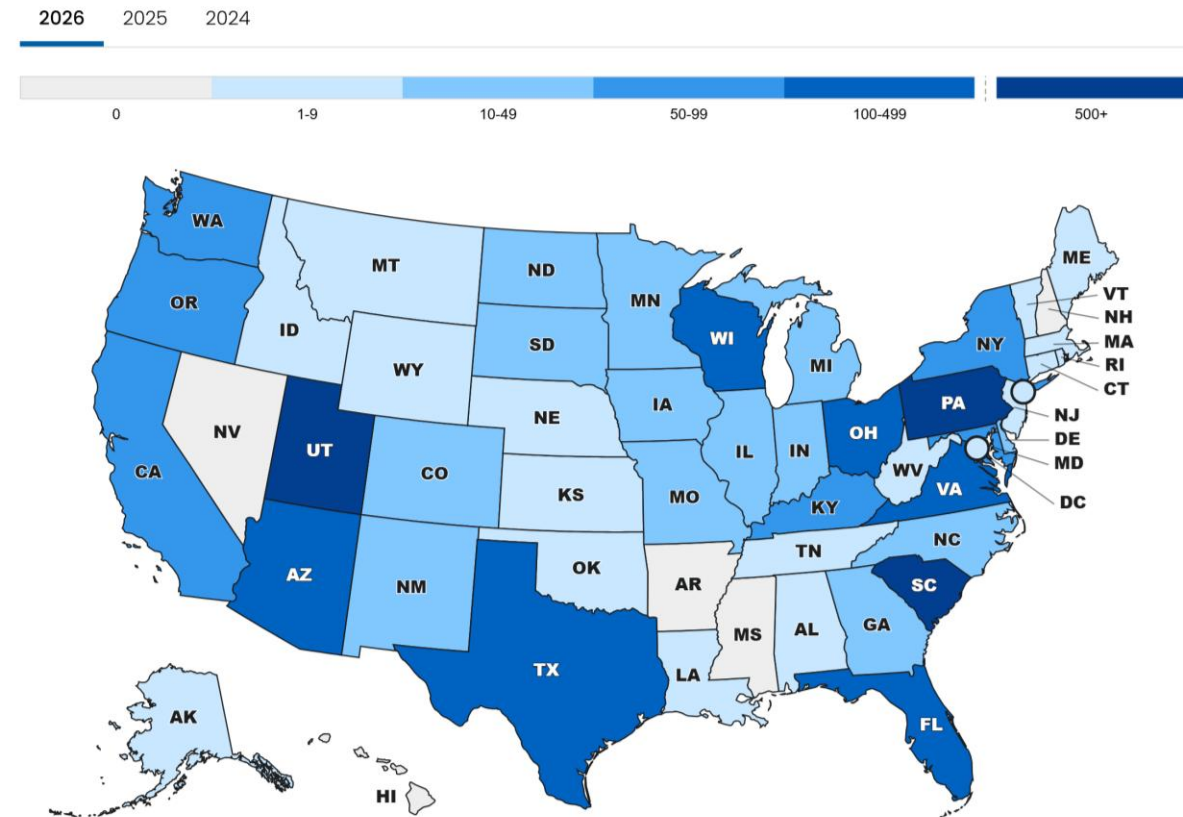
- Descend from Dutch and German-speaking parts of Europe
- Degree of technology and “plain dress” varies
- **No** theological ban on vaccination
- Low levels of engagement with modern healthcare



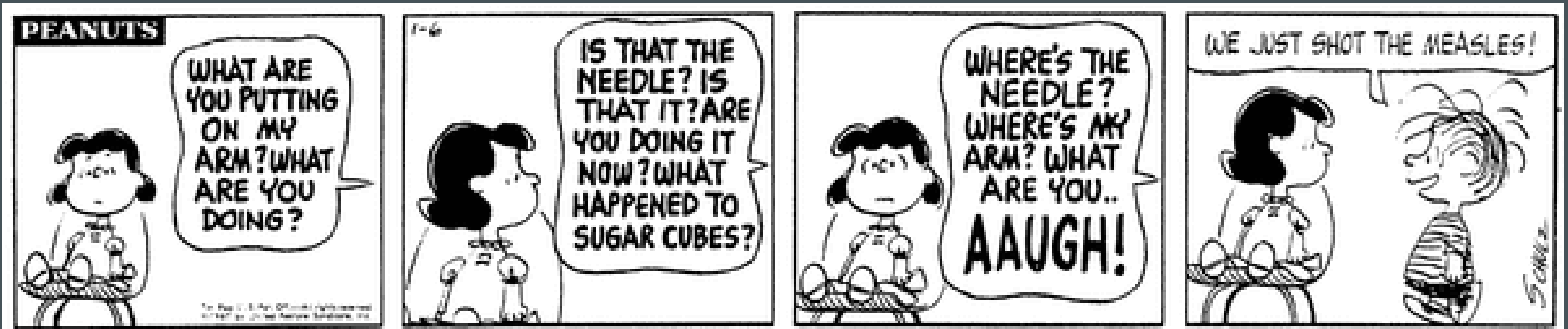
2026 –YEAR OF THE MEASLES?

- So far in 2026:

- 57 confirmed cases in Oregon
- 21 confirmed cases in Clark Co, WA
- Numerous community exposures
- Major outbreaks in
 - Pennsylvania (963 – 4 deaths)
 - South Carolina (670)
 - Utah (535)



MEASLES AND MISINFORMATION

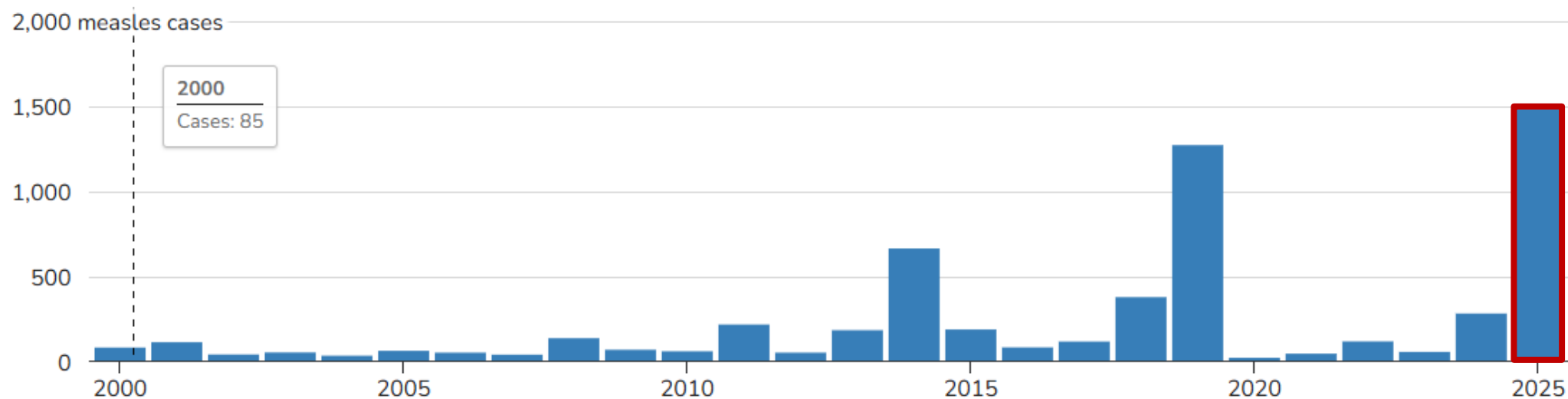


Charles Schulz, January 6, 1967

MISINFORMATION

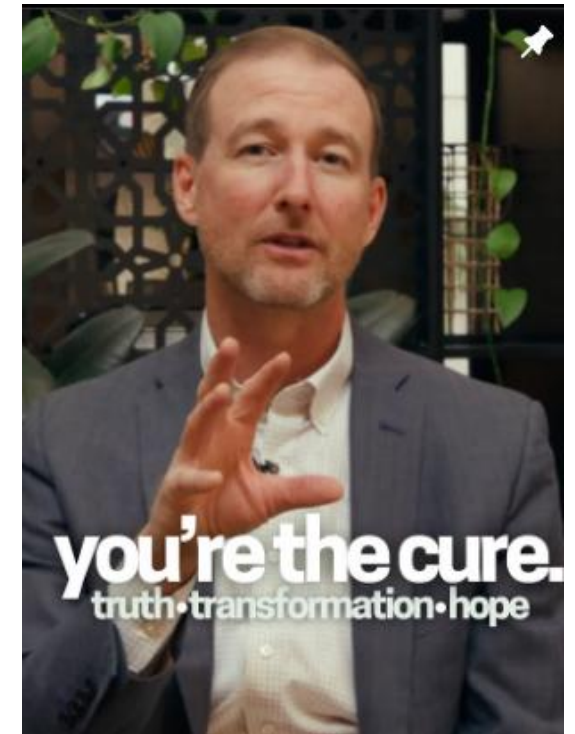


“... there have been four measles outbreaks this year. In this country last year there were 16. So, it's not unusual. We have measles outbreaks every year.” – Robert F. Kennedy Jr.



MISINFORMATION COMES TO TOWN

- Ben Edwards MD, Veritas Wellness
- Opened pop-up clinic in Seminole, TX
 - Focused on cod liver oil and budesonide
 - 70 children on the first day
 - “Treated and healed” over 300 children
- Mass infection is “God’s version of Measles immunization.”



"They're getting very, very good results, they report, from Budesonide ... and Clarithromycin, and also cod liver oil, which has high- high concentrations of vitamin A and vitamin D, and they're seeing what they describe as almost miraculous and instantaneous recovery from that."

– Robert F. Kennedy Jr.



Dr. Ben Edwards

Remedy Supported by Kennedy Leaves Some Measles Patients More Ill

After the health secretary promoted vitamin A as a cure, parents in West Texas began giving their children high doses, sometimes to prevent infection.

One of those supplements is cod liver oil containing vitamin A, which Mr. Kennedy has promoted as a near miraculous cure for measles. Physicians at Covenant Children's Hospital in Lubbock, Texas, say they've now treated a handful of unvaccinated children who were given so much vitamin A that they had signs of liver damage.



**“I've heard for years that there's a problem with it [MMR], but they say that there's no problem if you do each shot separately, not put together. So, an MMR, go out and do it separately.”
– Donald Trump**

PREPARING FOR THE NEXT OUTBREAK

- Build back towards herd immunity
- Empower public health with people and resources
- Meet vulnerable (and skeptical) communities where they are
- Combat misinformation



Charles Schulz, January 7, 1967

REFERENCES

- **OREGON HEALTH
AUTHORITY**

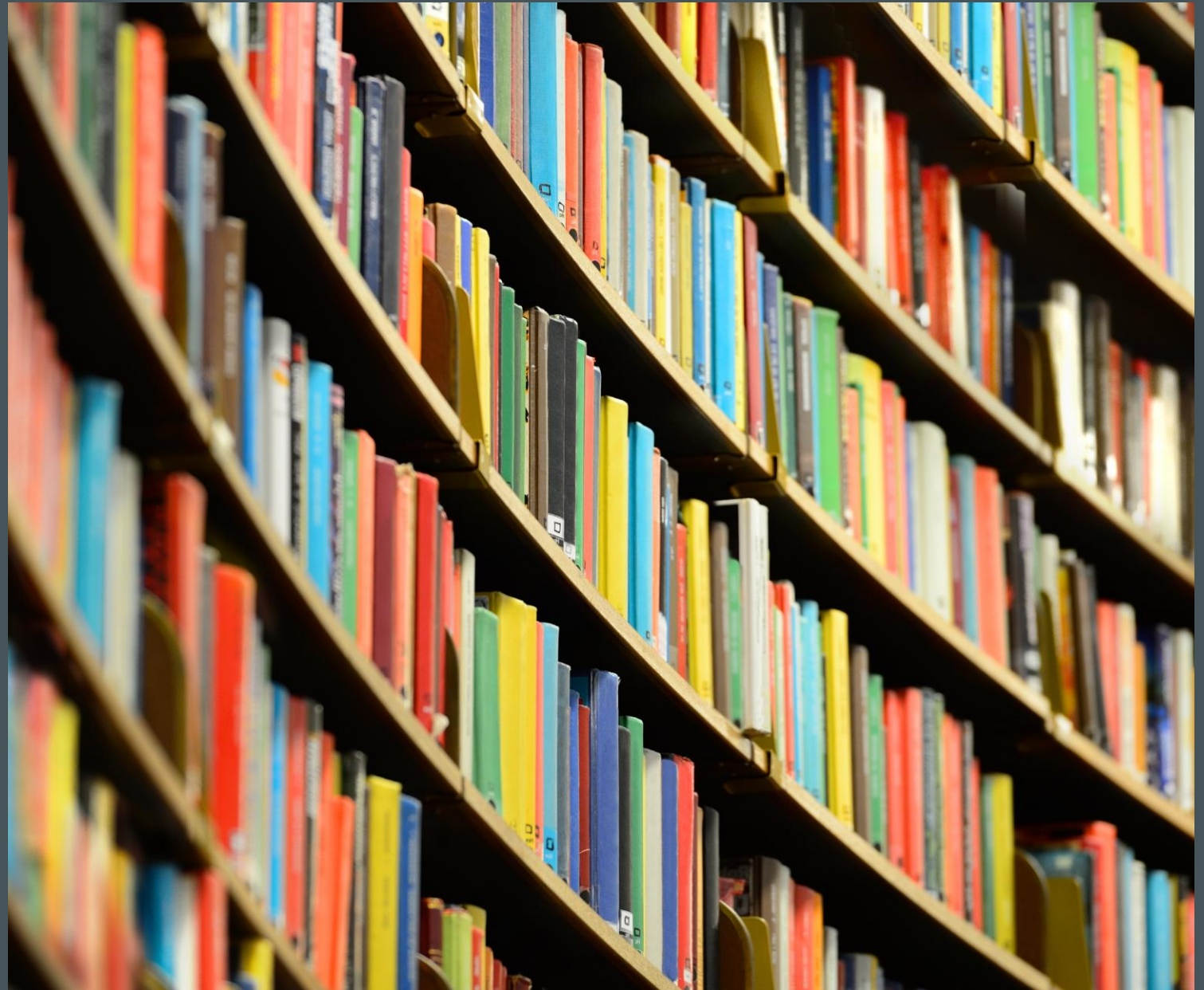
[HTTPS://WWW.OREGON.GOV/OHA/PH/DISEASES/CONDITIONS/DISEASES/PAGES/MEASLES.ASPX](https://www.oregon.gov/OHA/PH/DISEASES/CONDITIONS/DISEASES/PAGES/MEASLES.ASPX)

- **AMERICAN ACADEMY
OF PEDIATRICS**

[HTTPS://WWW.AAP.ORG/EN/PATIENT-CARE/MEASLES/MEASLES-VACCINE/](https://www.aap.org/en/patient-care/measles/measles-vaccine/)

- **AMERICAN ACADEMY
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