

Measles: An Urgent Call To Action for Child Health Providers

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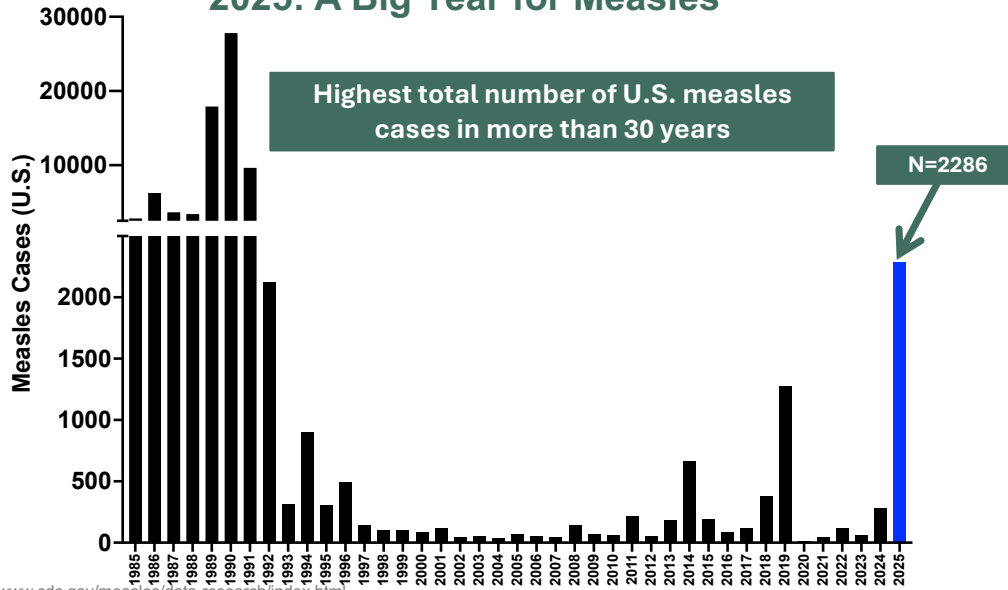
Disclosures

- I do intend to discuss use of commercial products/services – diagnostic tests and antiviral therapies.
- I do intend to discuss non-FDA approved uses of products/services – antiviral therapies, vaccines.
- I have no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.

Learning Objectives

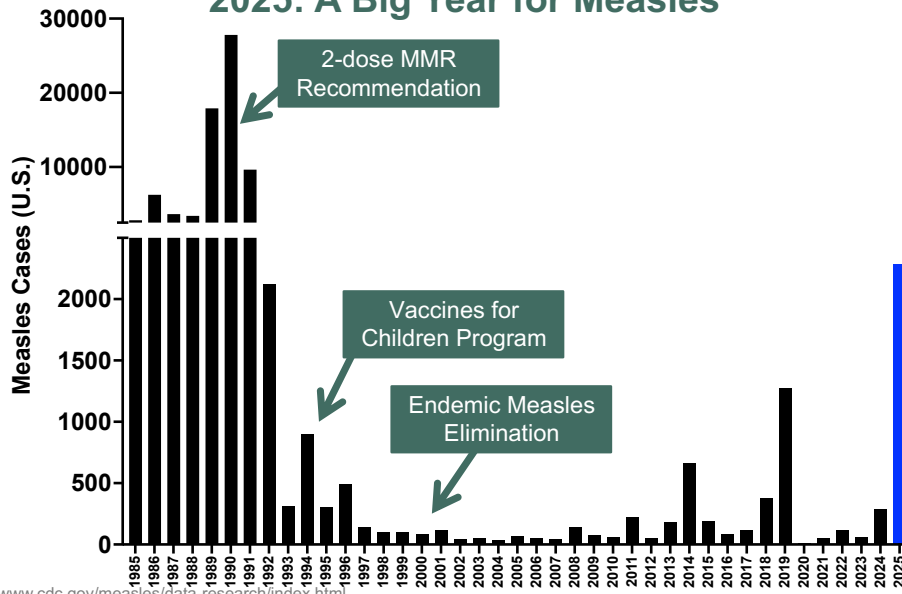
- Describe the key epidemiologic drivers behind recent measles outbreaks, including declining vaccination rates, misinformation, global travel patterns, and gaps in community immunity
- Explain the clinical presentation and complications of measles in children
- Assess the broader public health consequences of measles outbreaks, including strain on health systems, school and childcare disruptions, and risks to vulnerable populations
- Identify evidence-based prevention strategies, including MMR vaccination, community engagement, and effective communication approaches to address vaccine hesitancy

2025: A Big Year for Measles



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

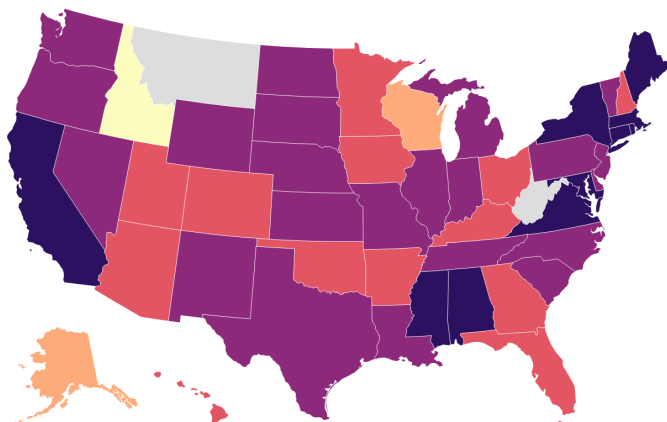
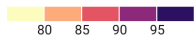
2025: A Big Year for Measles



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

Decreasing MMR Rates

2-dose MMR, Kindergarten, USA 2024-2025



U.S. kindergarten 2-dose MMR coverage

2019-2020	95.2%
2020-2021	93.9%
2021-2022	93.0%
2022-2023	93.1%
2023-2024	92.7%
2024-2025	92.5%

Source: CDC SchoolVaxView • Created with Datawrapper

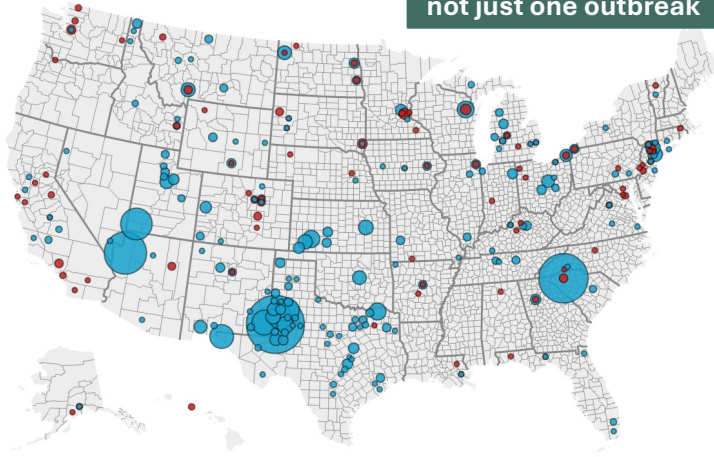
Data: <https://www.cdc.gov/schoolvaxview/index.html>

2025: A Big Year for Measles

Imported Local

count 40 150 400

Many states – not just one outbreak



Source: Johns Hopkins University

Data: https://github.com/CSSEGISandData/measles_data

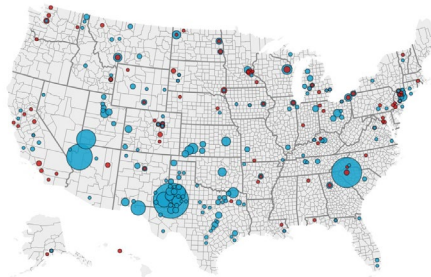
2025: A Big Year for Measles

2286 total cases

- 93% of cases unvaccinated/unknown
- 11% of cases hospitalized
- 3 deaths (~1.3 per 1000 reported cases)

Imported Local

count 40 150 400



Source: Johns Hopkins University

U.S. outbreaks in the context of high case numbers in Canada, Mexico, and other countries

Kennedy Said Measles Outbreaks Are 'Not Unusual.' Here's What the Data Says.

Experts answered key questions about the severity of the virus and the effectiveness of the vaccine.

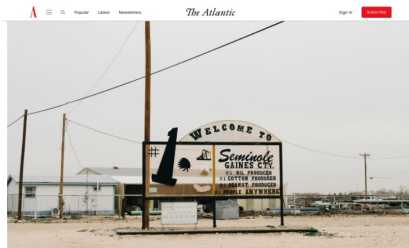
Listen to this article - 7:08 min

Share full article



Jan Sonnenmaier/Getty Images

By Nina Agrawal
Feb. 28, 2025



HIS DAUGHTER WAS AMERICA'S FIRST MEASLES DEATH IN A DECADE

A visit with a family in mourning

By Tom Bartlett
Photographs by Jake Dockins

MARCH 11, 2025, 9:07 AM ET

SHARE SAVE

Kennedy Links Measles Outbreak to Poor Diet and Health, Citing Fringe Theories

In a recent interview, the health secretary also suggested that the measles vaccine had harmed children in West Texas, center of an outbreak.

Share full article



In an interview posted online last week, Robert F. Kennedy Jr., the health secretary, offered unorthodox, and at times contradictory, messages on vaccination. Eric Lipton/The New York Times

By Teddy Rosenbluth

Published March 10, 2025 Updated March 11, 2025, 8:25 a.m. ET

How is 2026 looking?

Early April

Past 2 weeks 2025 **2026**

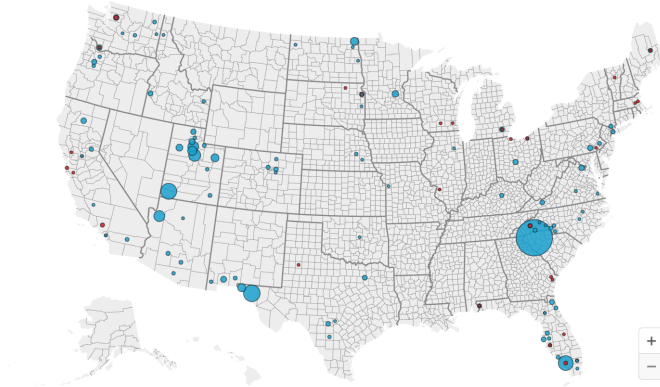
U.S. MEASLES CASES

2026
1654

Measles cases reported in the United States (2026)

■ Imported
 ■ Local

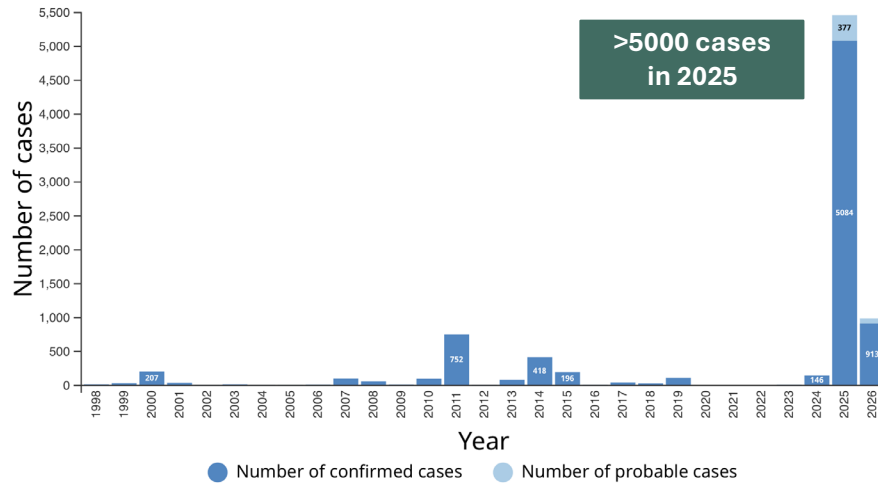
 count ○ 70 ○ 300 ○ 700



Source: Johns Hopkins University • [Get the data](#) • [Download image](#) • [Download PDF](#) • [Download SVG](#)

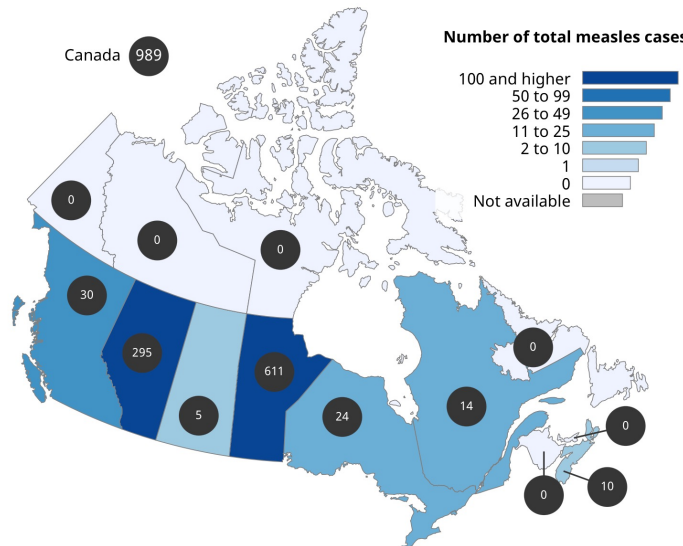
Canada: Ongoing Outbreak 2025-2026

Figure 3. Number of measles cases reported in Canada by year of rash onset from 1998 to May 2, 2026



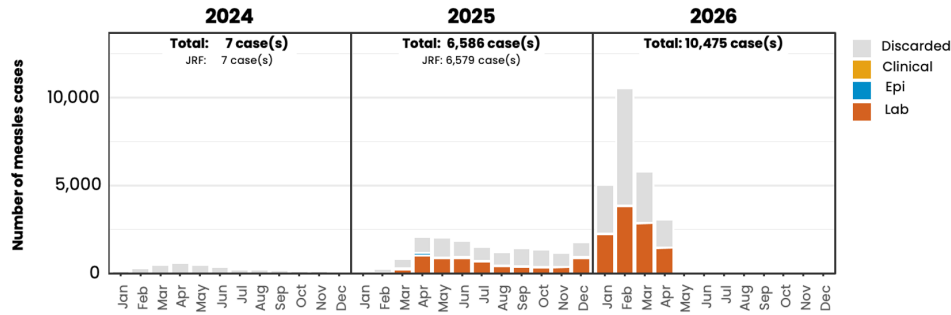
<https://health-infobase.canada.ca/measles-rubella/>

Canada: 2026 Measles Cases by Province



<https://health-infobase.canada.ca/measles-rubella/>

Mexico: Ongoing Outbreak 2025-2026

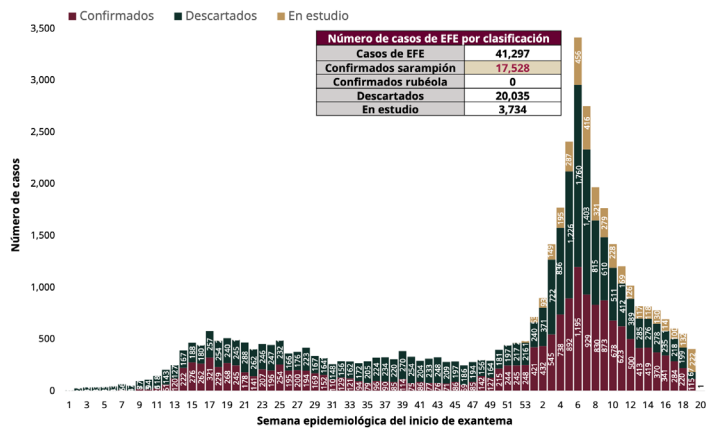


Based on data received 2026-05 - Data Source: IVB Database. Main epi curve was built using case-based surveillance data.

WHO Country Slides (measles). May 2026. <https://immunizationdata.who.int/global?topic=Provisional-measles-and-rubella-data&location=>

Mexico: Ongoing Outbreak 2025-2026

Gráfica 1. Curva epidémica de casos de sarampión por semana epidemiológica de inicio de exantema, México, 2025-2026*



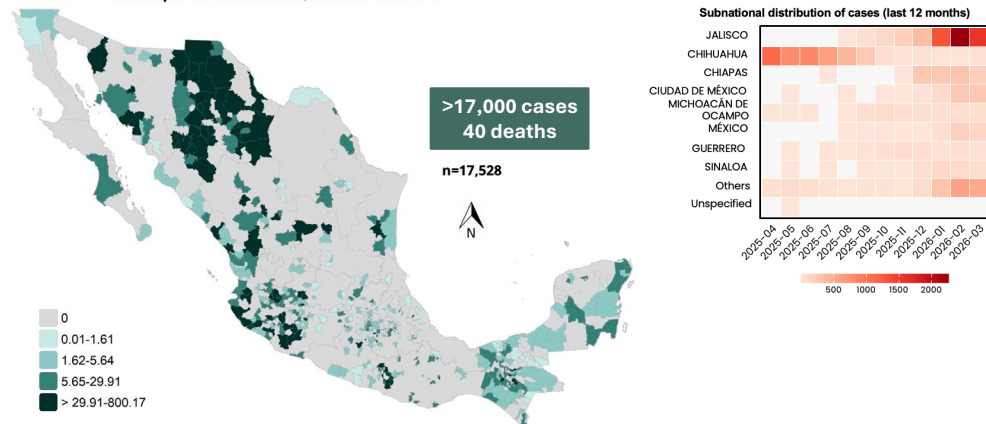
*Información preliminar con corte al 18 de mayo de 2026, 11:00 hrs.

Fuente: SSA/DGE/DVEET/Sistema Especial de Vigilancia Epidemiológica de Enfermedad Febril Exantemática.

<https://www.gob.mx/salud/documentos/informe-diario-del-brote-de-sarampion-en-mexico-2026> (May 18, 2026)

Mexico: Ongoing Outbreak 2025-2026

Mapa 1. Tasa de incidencia de casos confirmados de sarampión por entidad federativa y municipio de notificación, México 2025-2026*



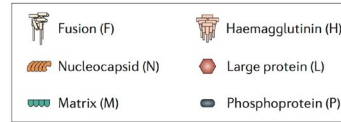
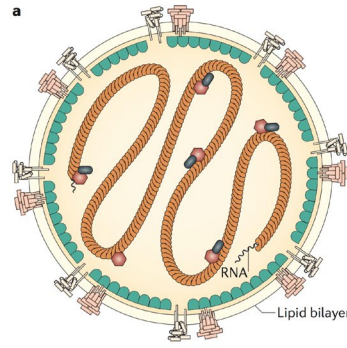
*Información preliminar con corte al 18 de mayo de 2026, 11:00 hrs. **Tasa de incidencia por cada 100,000 habitantes. Fuente: SSA/DGE/DVEET/Sistema Especial de Vigilancia Epidemiológica de Enfermedad Febril Exantemática. Estimaciones de población CONAPO 2025.

<https://www.gob.mx/salud/documentos/informe-diario-del-brote-de-sarampion-en-mexico-2026> (May 18, 2026)

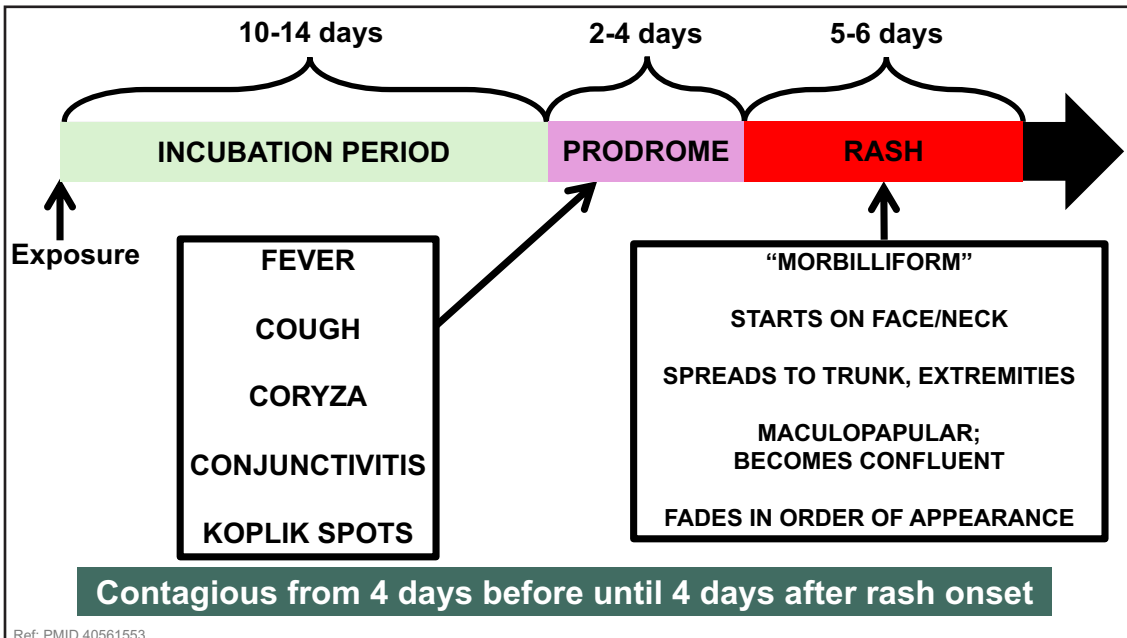
WHO Country Slides (measles). May 2026. <https://immunizationdata.who.int/global?topic=Provisional-measles-and-rubella-data&location=>

MEASLES VIRUS

- RNA virus
- Spreads through the air
- Infects humans (only)
- Incredibly contagious ($R_0 \sim 12-18$)
- Ancestor came from cattle (spillover)



Global measles elimination



Ref: PMID 40561553

Clinical Features of Measles

- FEVER
- COUGH
- CORYZA
- CONJUNCTIVITIS
- RASH



Image: CDC PHIL

Clinical Features of Measles

Koplik spots on buccal mucosa (A) and palate (B)

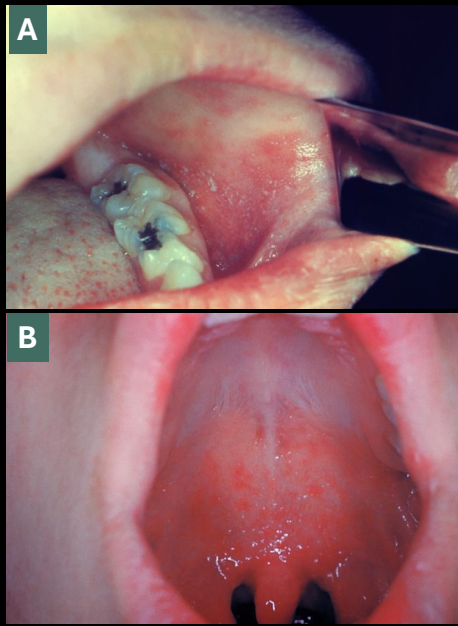


Image: CDC PHIL

Measles Complications

Complication	Approx. Rate
Diarrhea	5-10%
Otitis media	5-10%
Pneumonia	5-15%
Seizures	0.6%
Death	0.2%
Primary measles encephalitis	0.2%
Postinfectious encephalomyelitis	0.1%
Subacute sclerosing panencephalitis (SSPE)	0.01% (1:10,000)

~1:600 for children under age 1 year

Complications more common in children under age 5, adults over age 20, and immunocompromised people

Refs:
PMID 27695849
PMID 28387784

Recent (September 2025) death of a school-aged child in Los Angeles from SSPE due to measles acquired before 1 year of age

For Immediate Release:

September 11, 2025

Public Health Reminds Residents About the Importance of Measles Vaccination Following the Death of a Child from a Measles-Related Complication

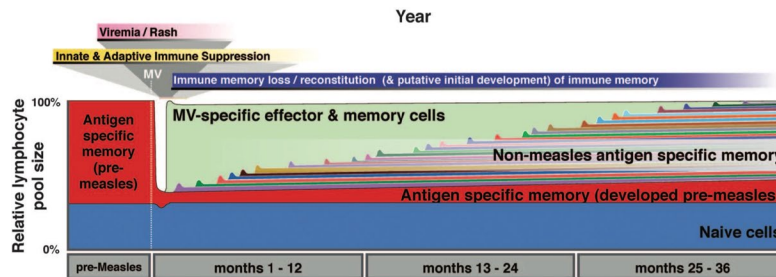
The Los Angeles County Department of Public Health encourages residents to make sure that all members of their families are protected against measles following the recent tragic death of a school-aged LA County resident from a complication of measles infection acquired during infancy. The child was originally infected with measles as an infant before they were eligible to receive the measles vaccine which is routinely recommended to be administered between 12 and 15 months. Although they recovered from the initial measles illness, the child developed and ultimately died from subacute sclerosing panencephalitis (SSPE)—a rare but universally fatal complication that can occur in individuals who had measles early in life.

SSPE

- Rare, degenerative disease of the central nervous system
- Generally **occurs 7-10 years after primary measles infection**
 - Higher rates and faster onset with early life infection (before age 2)
 - Only caused by wild-type (not vaccine) measles virus
- Behavioral and intellectual deterioration; seizures; visual disturbances
- Death usually within 1-3 years of symptom onset
- Ongoing production of **defective (non-contagious) measles viruses** in brain tissue – diagnosed by biopsy and PCR.
- **No proven treatment.**
- **Prevention** through vaccination.

Ref: AAP Red Book 2024-2027; PMID 28387784

Measles induces immune suppression through destruction of memory lymphocyte pools, leading to increased mortality for several years after infection



Measles vaccine decreases mortality due to a wide range of infections – not just measles

Long-term measles-induced immunomodulation increases overall childhood infectious disease mortality

Michael J. Mina,^{1,2*} C. Jordan E. Menall,^{1,2} Kirk L. de Swart,³ A. D. Hill, E. Osterholm,⁴ Bryan T. Grenfell^{1,2}

Diagnosing Measles

Diagnosis requires clinical suspicion and laboratory confirmation

- **Differential diagnosis** includes parvovirus, rubella, HHV-6, Kawasaki disease, scarlet fever, dengue, and others
 - Rash may be atypical or absent in immunocompromised patients
 - History (vaccination; exposures) is crucial
- **Serology**
 - IgM most common – may be negative early (before rash) or late (after 1 month)
 - Four-fold rise in IgG (acute/convalescent titers)
- **RT-PCR** – nasopharyngeal and/or oral swabs; urine PCR in some settings
- **Viral culture** – now rarely used

Your local public health department can assist with testing

Ref: AAP Red Book 2024-2027

Infection Prevention/Control

- **Assess clinical status and epidemiologic risk**
 - **Exposure risk** – local epidemiology, travel, visitors from area with active outbreak, timing of potential exposure
 - **Host status** – immunocompromise, medications (eg, steroid use)
 - **Measles immune status** – vaccination history; measles history
- **Isolate immediately!**
 - Mask patient on arrival; individual room / closed door (ideally airborne isolation room); providers: measles immune and in N95 respirators
 - Infectious measles virions may remain in air for ~2 hours
- **Notify local public health department**
- **Test**

Suspected measles is an epidemiologic emergency

Ref: AAP Red Book 2024-2027

Treatment / Prevention of Measles

- **No specific antiviral therapy** available
 - Ribavirin has some in vitro activity
 - Antibiotics for bacterial superinfection (otitis media; pneumonia)
- **Vitamin A**
 - Deficiency → increased rates of complications
 - Short-term supplementation → better outcomes
 - Underused in real-world settings
 - **Does not work for prevention of measles**
- **Vaccination** is the cornerstone of prevention
- **Post-exposure** vaccine or immune globulin

Ref: AAP Red Book 2024-2027; PMID 40561553

Vitamin A and Measles

Current AAP guidance:

The WHO currently recommends vitamin A for all children with measles, regardless of their country of residence. Many US experts concur with administering vitamin A to all children in the United States with measles, regardless of hospitalization status.

Ref: AAP Red Book 2024-2027

Vitamin A and Measles

- 1932: J.B. Ellison publishes data suggesting that **vitamin A decreases risk of pneumonia and death** in hospitalized children with measles
- **Vitamin A deficiency increases measles mortality** among children
- Multiple randomized controlled trials demonstrate that **vitamin A supplementation decreases measles mortality in low- and middle-income settings**
- U.S. data suggest that **measles infection can lower circulating vitamin A levels in children**
- No sufficiently powered trials have assessed vitamin A for measles treatment in high-income settings



Refs: PMID 20777111; 1625097; 2194128; 8502524; 1285727
AAP Red Book 2024-2027; <https://www.nfid.org/resource/vitamin-a-for-the-management-of-measles-in-the-us/>

Vitamin A and Measles

- **Vitamin A dosing**
 - **Once daily for 2 days** (on diagnosis and 24 hrs. later)
 - Third dose 2-6 weeks later *only* if there are clinical signs of vitamin A deficiency (eg, xerophthalmia)
 - No role for measuring vitamin A levels unless there are signs of deficiency
- **Age-based dosing (per dose)**
 - < 6 months: 50,000 IU (15,000 µg retinol activity equivalent [RAE])
 - 6-11 months: 100,000 IU (30,000 µg RAE)
 - ≥ 12 months: 200,000 IU (60,000 µg RAE)
- **No role of vitamin A in prevention of measles. Risk of vitamin A toxicity in children treated with high doses or for long periods.**

Ref: AAP Red Book 2024-2027



Public Health

West Texas children treated for vitamin A toxicity as medical disinformation spreads alongside measles outbreak

Texas Public Radio | By David Martin Davies
Published March 27, 2025 at 10:16 PM CDT



Julia Cortez/AP / AP

A sign is posted in German at the entrance of the children's emergency room at Covenant Children's Hospital, Tuesday, Feb. 26, 2025, in Lubbock, Texas.

Lessons learned from >60 years of measles vaccination in the U.S.

- Measles can be eliminated, **but very high rates of vaccine coverage ($\geq 95\%$)** are needed to control spread
- Well-enforced **school vaccine mandates** are crucial to achieving those rates
- **Two doses of MMR** are needed for optimal population immunity
 - ~93% of children protected after 1 dose; 97-99% after 2 doses
- Well-functioning **state and local health departments** are the first and most important line of defense against measles outbreaks
- **Stable funding for vaccines** is needed for families to reliably access vaccines
- **Antivaccine misinformation** threatens this progress

Measles Vaccination

- **Routine MMR vaccination (minimum age 12 months)**
 - 2 dose series at 12-15 months, age 4-6 years
 - MMR or MMRV may be administered
- **AAP recommendations re: MMRV**
 - No preference for MMR + varicella vs. MMRV for first dose.
 - MMRV generally preferred for second dose
- **Discuss rare possibility of febrile seizure 1-2 weeks after MMRV for first dose (1 additional seizure per ~2000-3000 first doses of MMRV compared with MMR. No difference at dose 2)**

Situation in flux:

MMRV may be unavailable for children under age 4 years

Ref: AAP Immunization Schedule 2026

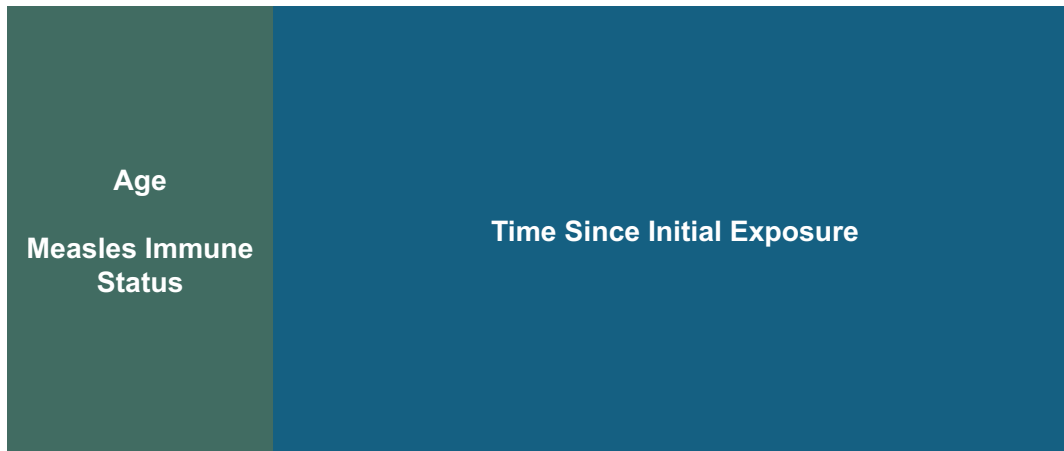
Measles Vaccination

- **Catch-up vaccination**
 - 2 dose series at least 4 weeks apart
 - Maximum age for MMRV is 12 years
- **International travel or local outbreak (per public health department)**
 - Infants age 6-11 months
 - Early dose ("MMR 0") at least 2 weeks before travel
 - Still need 2 dose series after age 12 months
 - Age ≥ 12 months
 - If unvaccinated, 2 dose series separated by at least 4 weeks (if MMRV, minimum interval between doses is 3 months)
 - If previously received 1 dose, give dose 2 at least 4 weeks after dose 1

Lots of questions about this

Ref: AAP Immunization Schedule 2026

Measles Post-Exposure Prophylaxis



Ref: 2024-2027 AAP Red Book

Measles Post-Exposure Prophylaxis

Not pregnant or immunocompromised				
Age	Immune status	≤ 3 days from initial exposure	4-6 days from initial exposure	> 6 days from initial exposure
≥ 6 months	Immune	PEP not indicated		
≥ 12 months	1 dose of MMR	Administer second dose of MMR if not up-to-date and if ≥ 28 days from first dose		
< 6 months	Nonimmune	Immune globulin		PEP not indicated
		Quarantine		Quarantine
6-11 months	Nonimmune	MMR vaccine	Immune globulin	PEP not indicated
		No quarantine	Quarantine	Quarantine
≥ 12 months	Nonimmune	MMR vaccine	PEP usually not administered	PEP not indicated
		No quarantine	Quarantine	Quarantine

Remember: Delay subsequent MMR in recipients of IG

Ref: 2024-2027 AAP Red Book

Measles Post-Exposure Prophylaxis

Pregnant or immunocompromised				
	Immune status	≤ 3 days from initial exposure	4-6 days from initial exposure	> 6 days from initial exposure
Severely immunocompromised	Immune/ nonimmune	Immune globulin		PEP not indicated
		Quarantine		Quarantine
Pregnant	Immune	PEP not indicated		
	Nonimmune	Immune globulin		PEP not indicated
		Quarantine		Quarantine

Remember: Delay subsequent MMR in recipients of IG

Ref: 2024-2027 AAP Red Book

Quarantine Times

Standard Recommendations:

- 21 days after the last exposure
- If IG is administered as PEP, extend the monitoring period to 28 days

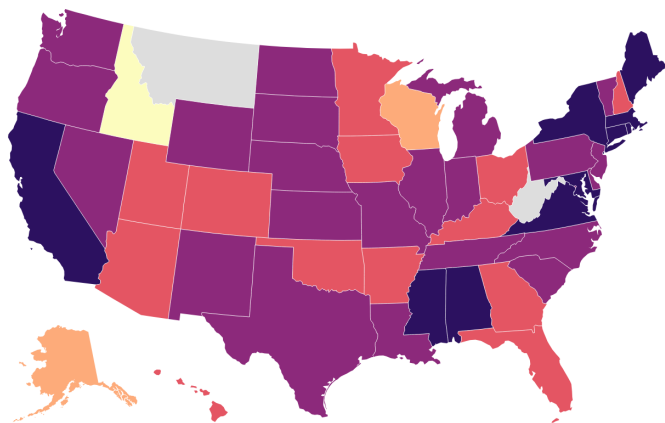
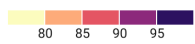
Exposure In Utero:

- All neonates born to women who had measles during pregnancy, regardless of gestational age at the time of measles, should be considered exposed to measles and at risk for delayed complications, including SSPE
- Neonates born to women with suspect or confirmed measles after maternal symptom onset or within 14 days of maternal rash onset should be considered for acute interventions, including empiric isolation, provision of immune globulin, and measles testing
- For neonates born more than 14 days after maternal rash onset, admission to high-risk settings (e.g., NICU) or premature birth may also inform the need for interventions such as empiric isolation and measles testing

Ref: 2024-2027 AAP Red Book; RBO

What does the future hold?

2-dose MMR, Kindergarten, USA 2024-2025



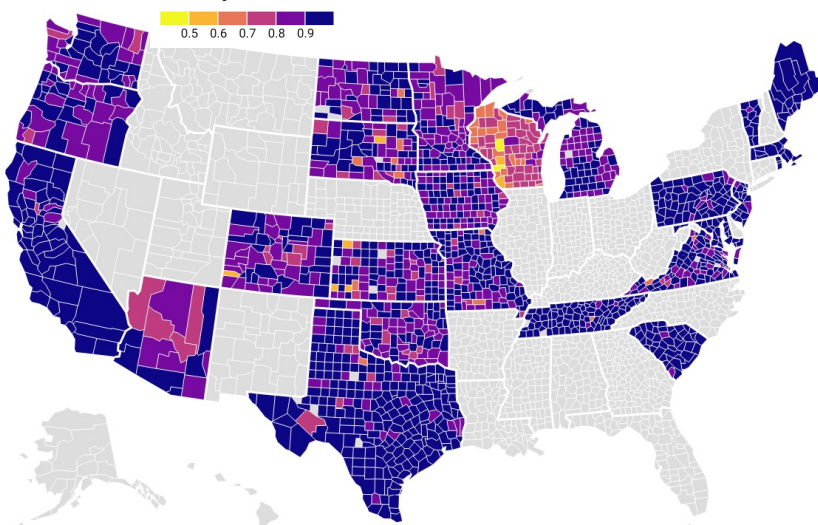
U.S. kindergarten 2-dose MMR coverage

2019-2020	95.2%
2020-2021	93.9%
2021-2022	93.0%
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2024-2025	92.5%

Source: CDC SchoolVaxView • Created with Datawrapper

Data: <https://www.cdc.gov/schoolvaxview/index.html>

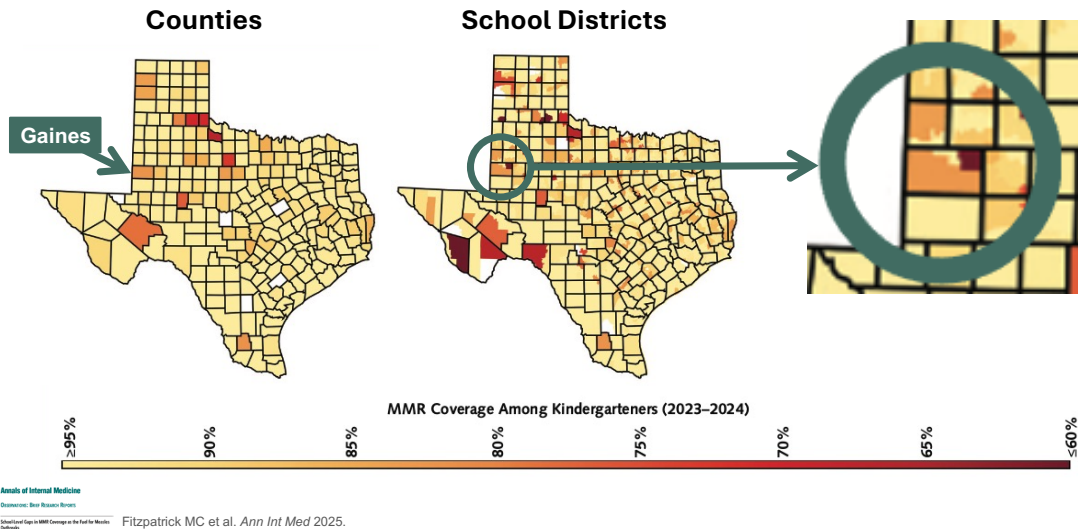
County-level 2-dose MMR rates 2023-2024



Source: Data from JHU. • Created with Datawrapper

Ref: PMID 40455620

Heterogeneity in MMR Coverage, Texas



Loss of U.S. elimination status is likely

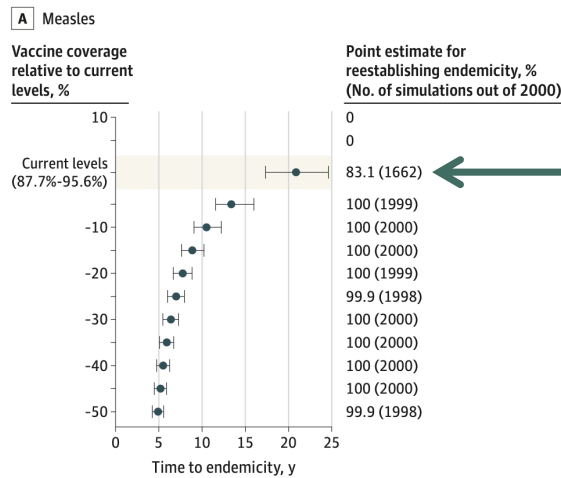


Figure 3. Predicted Probability and Timing for Return to Endemicity for Measles, Rubella, Diphtheria, and Poliovirus Over Time Under Different Scenarios of Declining Vaccination in the US

JAMA | Original Investigation
Modeling Reemergence of Vaccine-Eliminated Infectious Diseases Under Declining Vaccination in the US
Matthew V. Hong, ScD; Kate M. Bubar, PhD; Yvonne Mullooly, MD; Peter J. Hens, MD, PhD; Nathan C. Liu, MD, PhD

OPINION | FIRST OPINION

A grim milestone: U.S. is on the cusp of losing its official measles elimination status

It could happen within a year if current outbreaks continue



RONALDO SCHEMIDTARF via Getty Images

By Adam Ratner June 24, 2025
Ratner is a pediatric infectious diseases physician and the author of "Booster Shots: The Urgent Lessons of Measles and the Uncertain Future of Children's Health."

BBC

Home News Sport Business Innovation Culture Arts Travel Earth Audio Video Live

Canada loses its measles-free status, with US on track to follow

10 November 2025

Nadine Yousif
Senior Canada reporter

Share Save



Public health officials say the cases are spreading primarily to "under-vaccinated communities", urging people to get the MMR job.

Canada has lost its measles elimination status, said the Pan American Health Organization (Paho) on Monday, after failing to curb an outbreak of the virus for 12 consecutive months.

Health Care

“Not Just Measles”: Whooping Cough Cases Are Soaring as Vaccine Rates Decline



A digital billboard in Seminole, Texas, last month. While the measles outbreak has been concentrated in West Texas, cases of pertussis have soared nationwide.

by Duas Eideib and Patricia Callahan, and photography by Sarahbeth Maney

April 11, 2025, 4 a.m. EDT

How Robert F. Kennedy Jr.'s Vaccine Agenda Risks a Resurgence of Deadly Childhood Plagues



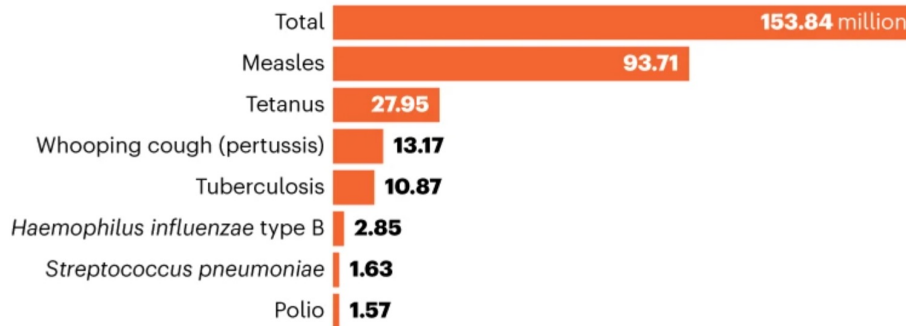
© PROPUBLICA. Photos by The Centers for Disease Control and Prevention. © Getty Images/Robert H. Frank. © iStockphoto.com/Robert H. Frank. © iStockphoto.com/Robert H. Frank.

by Patricia Callahan

March 18, 2025, 6:00 pm

CHILDHOOD VACCINES SAVE LIVES

Vaccines against measles, tetanus, whooping cough (pertussis) and tuberculosis, received during childhood, have saved about 154 million lives over the past 50 years.



©nature

Source: Shattock/The Lancet

nature

154 million lives and counting: 5 charts reveal the power of vaccines

154 million lives and counting: 5 charts reveal the power of vaccines

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154 million lives and counting: 5 charts reveal the power of vaccines

Take-Home Points

- Measles is **highly contagious** and **can cause severe disease and death**, especially in unvaccinated children
- **Falling vaccination rates** at the national, state, and (especially) local levels are driving outbreaks across the U.S.
- **Suspecting measles early** helps with:
 - Prompt isolation and diagnostic testing
 - Early consideration of vitamin A therapy
 - Timely use of post-exposure prophylaxis for eligible contacts
 - Alerting local public health agencies
- **Acceptance of vaccination by the public** is the only way out of this mess!