

MEASLES

Background



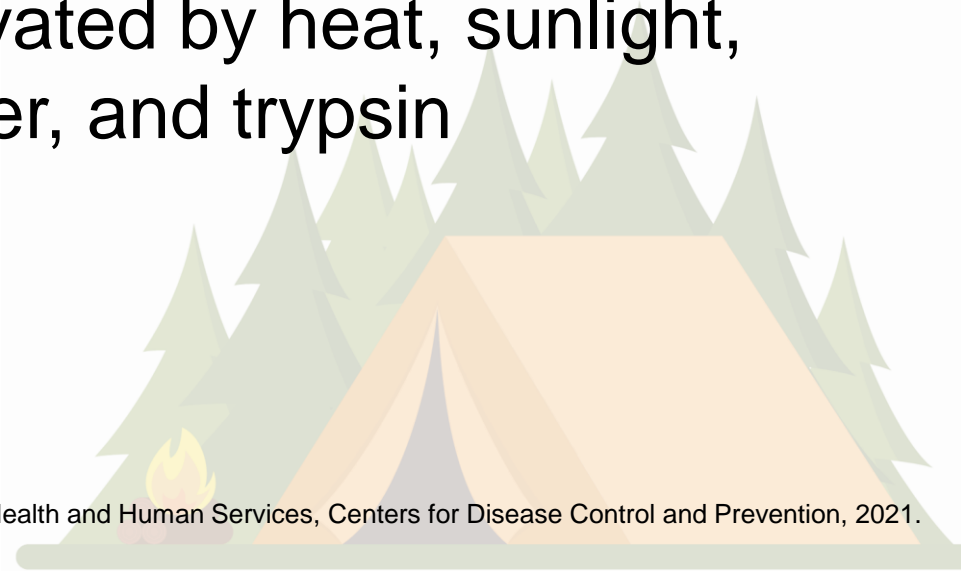
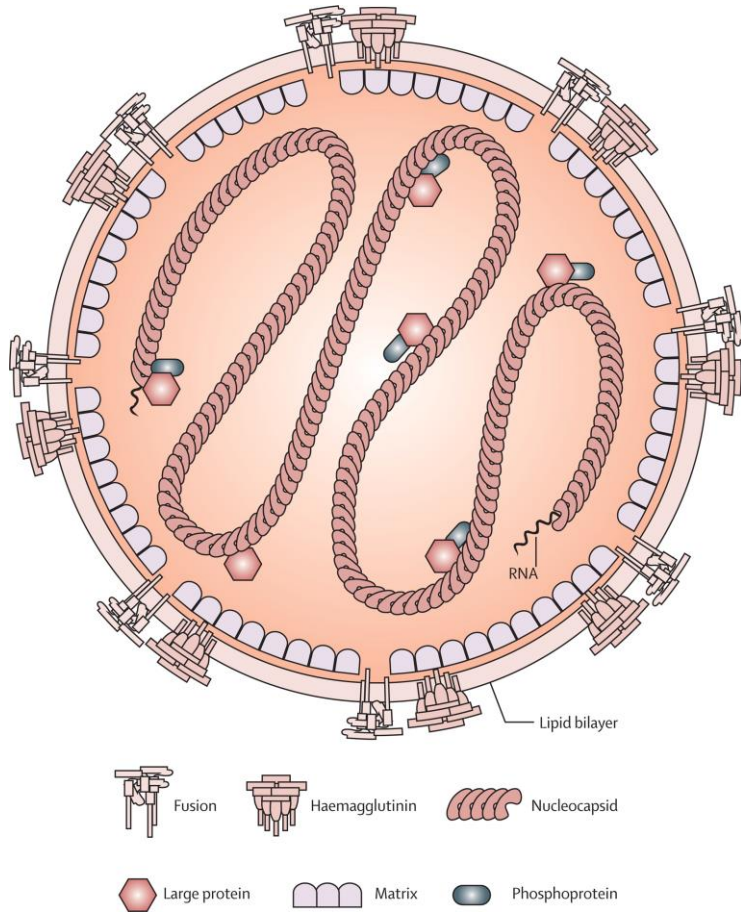
- Acute viral infectious disease first described in 7th century
- Vaccines first licensed include measles in 1963, MMR in 1971, and MMRV in 2005
 - Infection nearly universal during childhood in pre-vaccine era
- Still common and often fatal in developing countries



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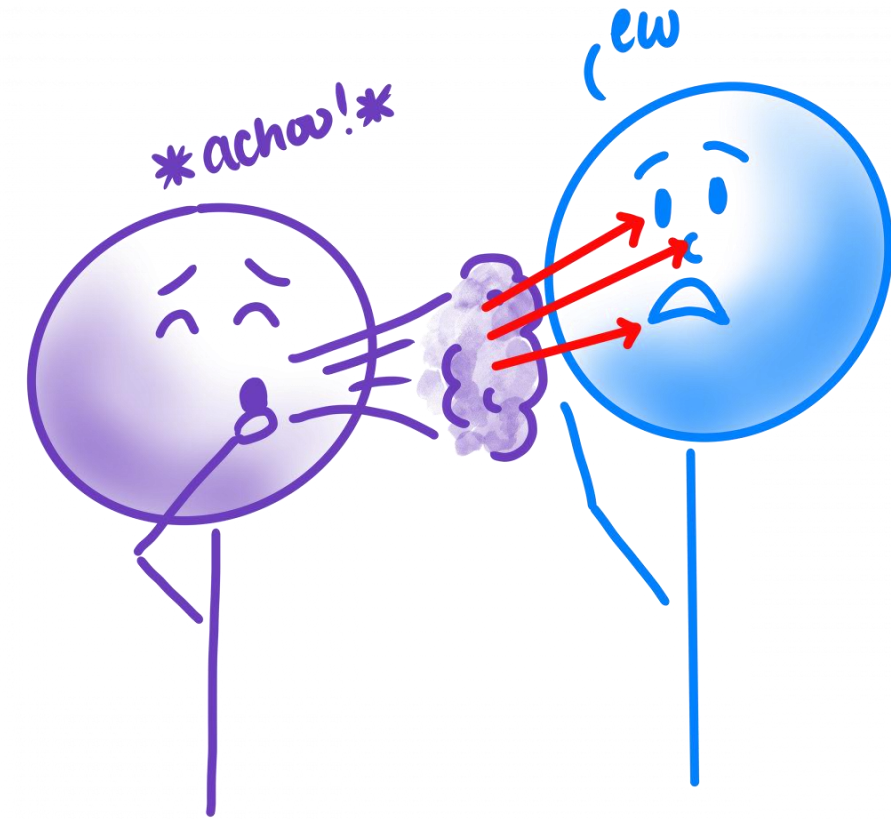
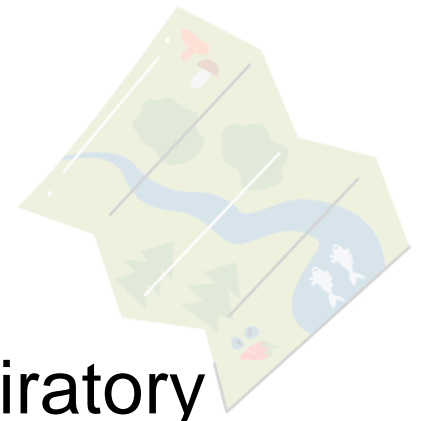
Characteristics of the Virus

- Paramyxovirus (RNA)
- F (fusion) protein fuses virus and host cell membranes and H (hemagglutinin) protein binds virus to host receptors
- One antigenic type
- Rapidly inactivated by heat, sunlight, acidic pH, ether, and trypsin

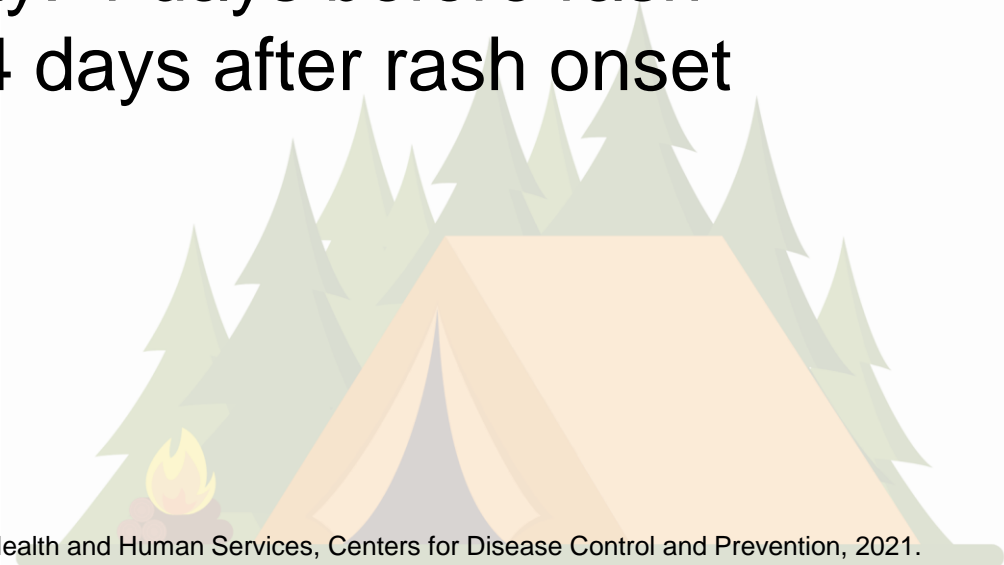


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Transmission



- Person-to-person via large respiratory droplets
- Airborne in closed areas for up to 2 hours
- Temporal pattern: primarily late winter and spring
- Communicability: 4 days before rash onset through 4 days after rash onset



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Incubation



- Incubation period 11 to 12 days
- Exposure to rash onset averages 14 days (*range of 7 to 21 days*)
- Prodrome lasts 2 to 4 days (3 C's – Cough, Coryza, Conjunctivitis) (*range of 1 to 7 days*)

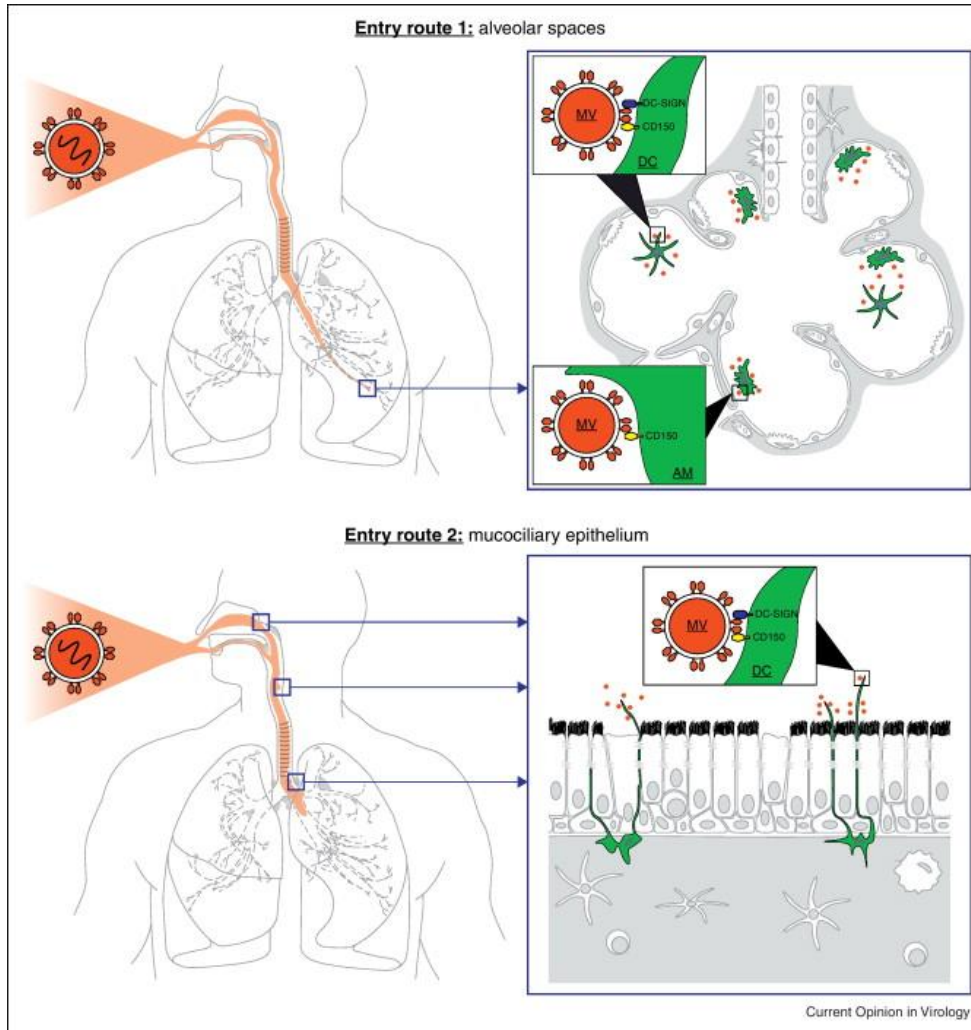


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Pathogenesis

- Primary site of infection is alveolar macrophages or dendritic cells
- Primary viremia 2 to 3 days after replication
- Secondary viremia 5 to 7 days after exposure



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Presenting Signs and Symptoms

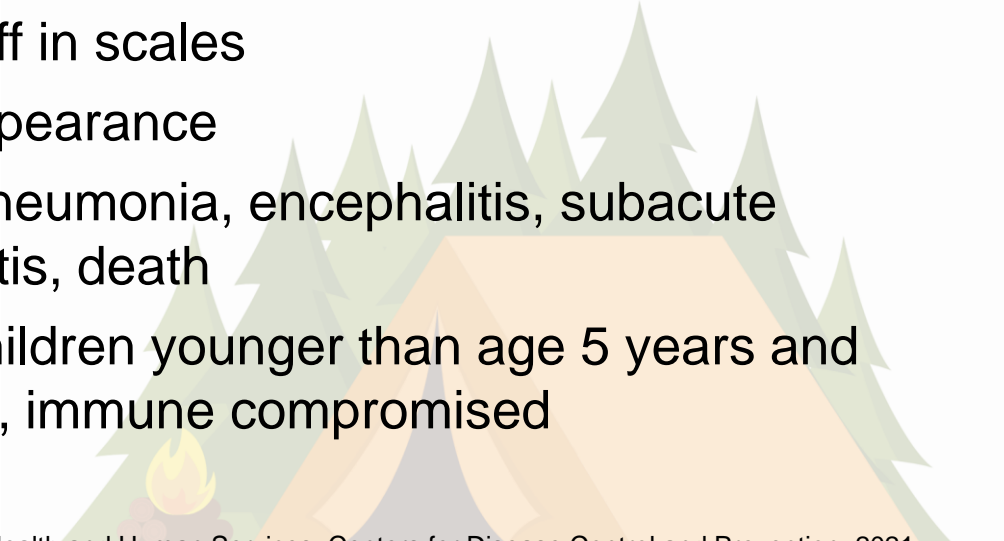
- Stepwise increase in fever to 103°F–105°F
- Cough, coryza, and conjunctivitis (3 C's)
- Koplik spots (on mucous membranes) – 70%
- Rash
 - Persists 5 to 6 days
 - Begins at hairline, then involves face and upper neck
 - Proceeds downward and outward to hands and feet
 - Severe areas peel off in scales
 - Fades in order of appearance
- Diarrhea, otitis media, pneumonia, encephalitis, subacute sclerosing panencephalitis, death
- Most common among children younger than age 5 years and adults over 20, pregnant, immune compromised



Koplik Spots



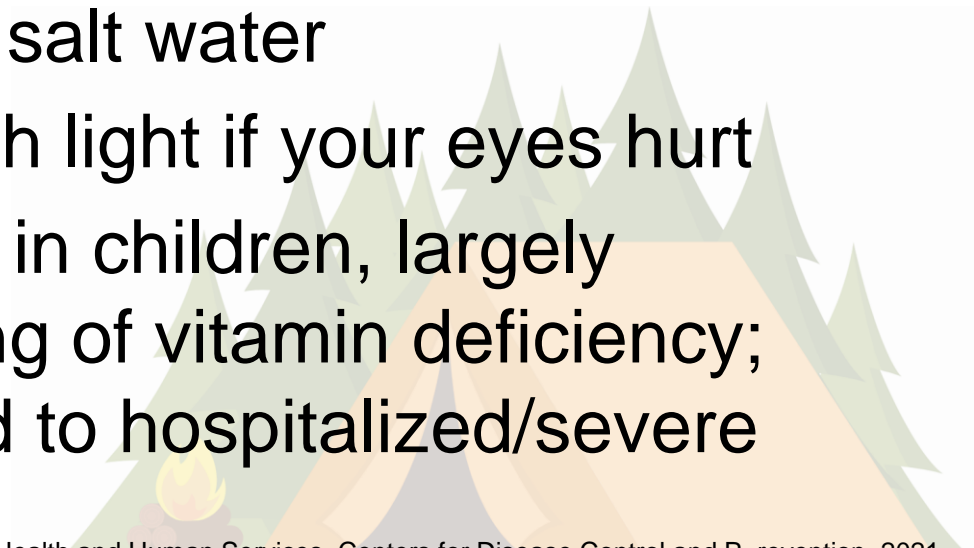
Rash



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Treatment

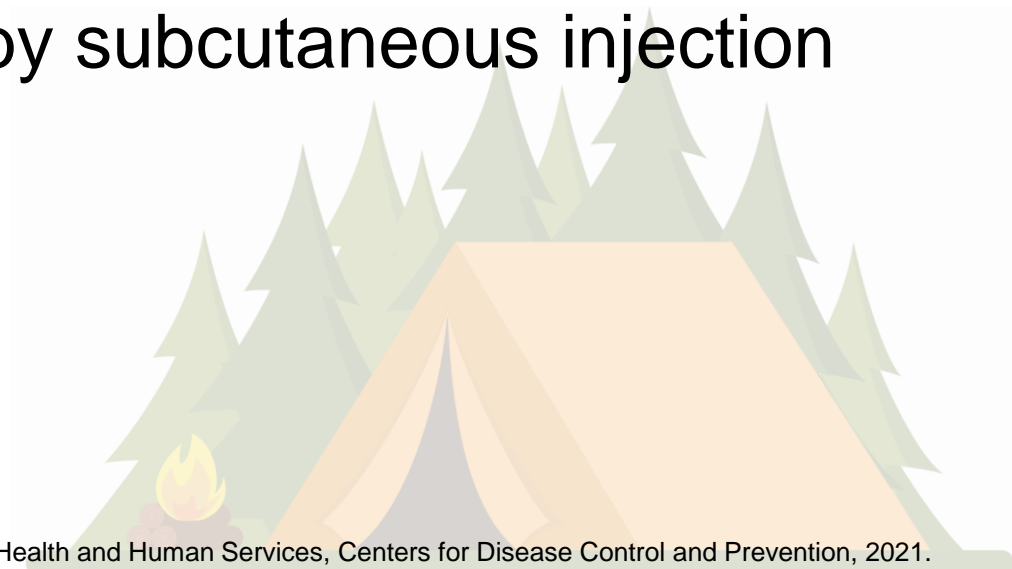
- You can do some things that might make you feel better, such as:
 - Taking acetaminophen or ibuprofen for aches, pains or fever
 - Getting plenty of rest
 - Drinking enough fluids
 - Gargling with salt water
 - Avoiding harsh light if your eyes hurt
- Vitamin A – data in children, largely effective in setting of vitamin deficiency; should be limited to hospitalized/severe cases



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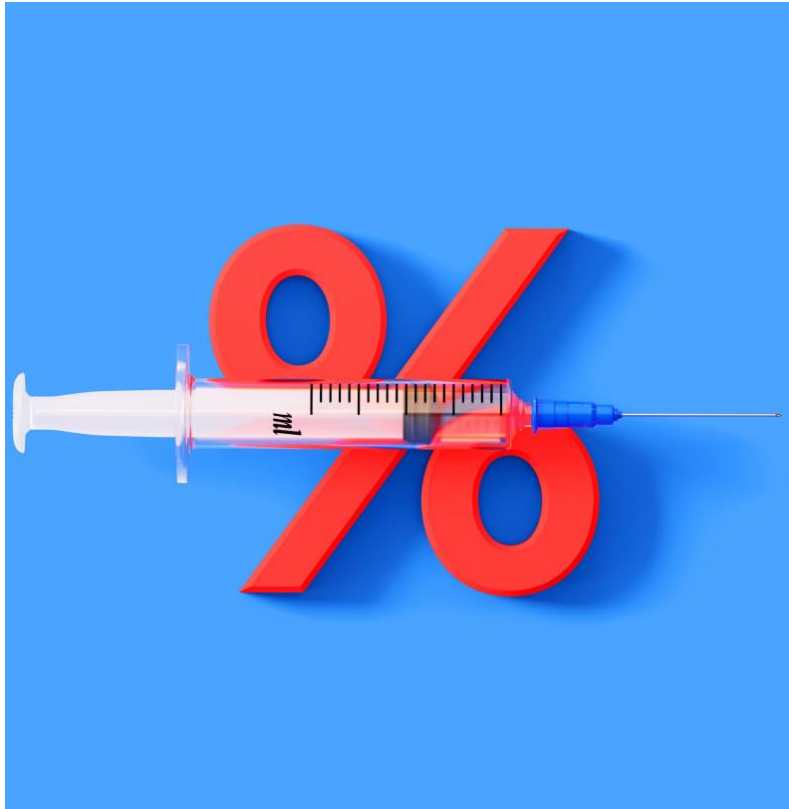
Vaccine Characteristics

- Measles vaccine is available as measles, mumps, and rubella vaccine (MMR [MMR-II]) and measles, mumps, rubella, and varicella vaccine (MMRV [ProQuad])
- The MMRII and MMRV vaccine is a live, attenuated vaccine
- Administered by subcutaneous injection

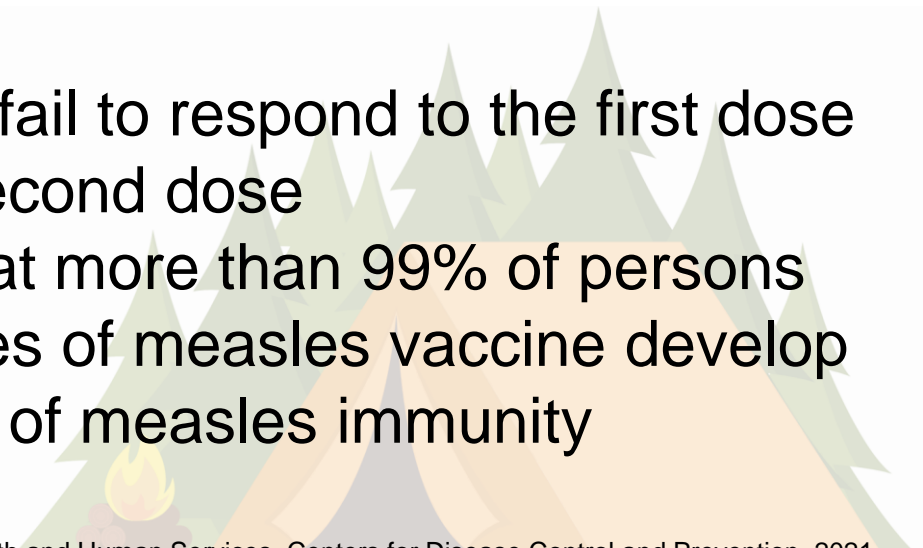


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Vaccine Efficacy



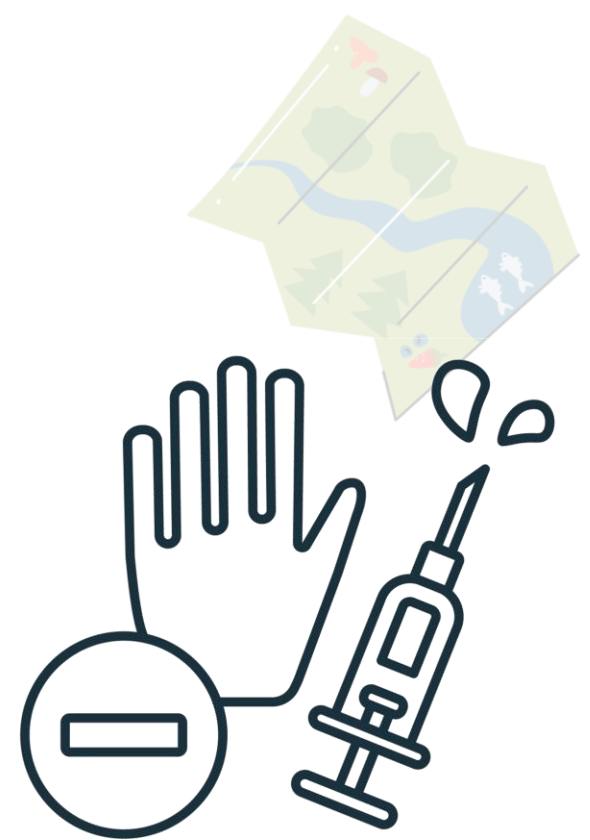
- Measles antibodies develop in approximately 95% of children vaccinated at age 12 months.
- Seroconversion rates are similar for single-antigen measles, MMR vaccine, and MMRV vaccine
- Approximately 2% to 7% of children who receive only 1 dose of MMR experience primary vaccine failure
- Most persons who fail to respond to the first dose will respond to a second dose
- Studies indicate that more than 99% of persons who receive 2 doses of measles vaccine develop serologic evidence of measles immunity



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Vaccine Contraindications

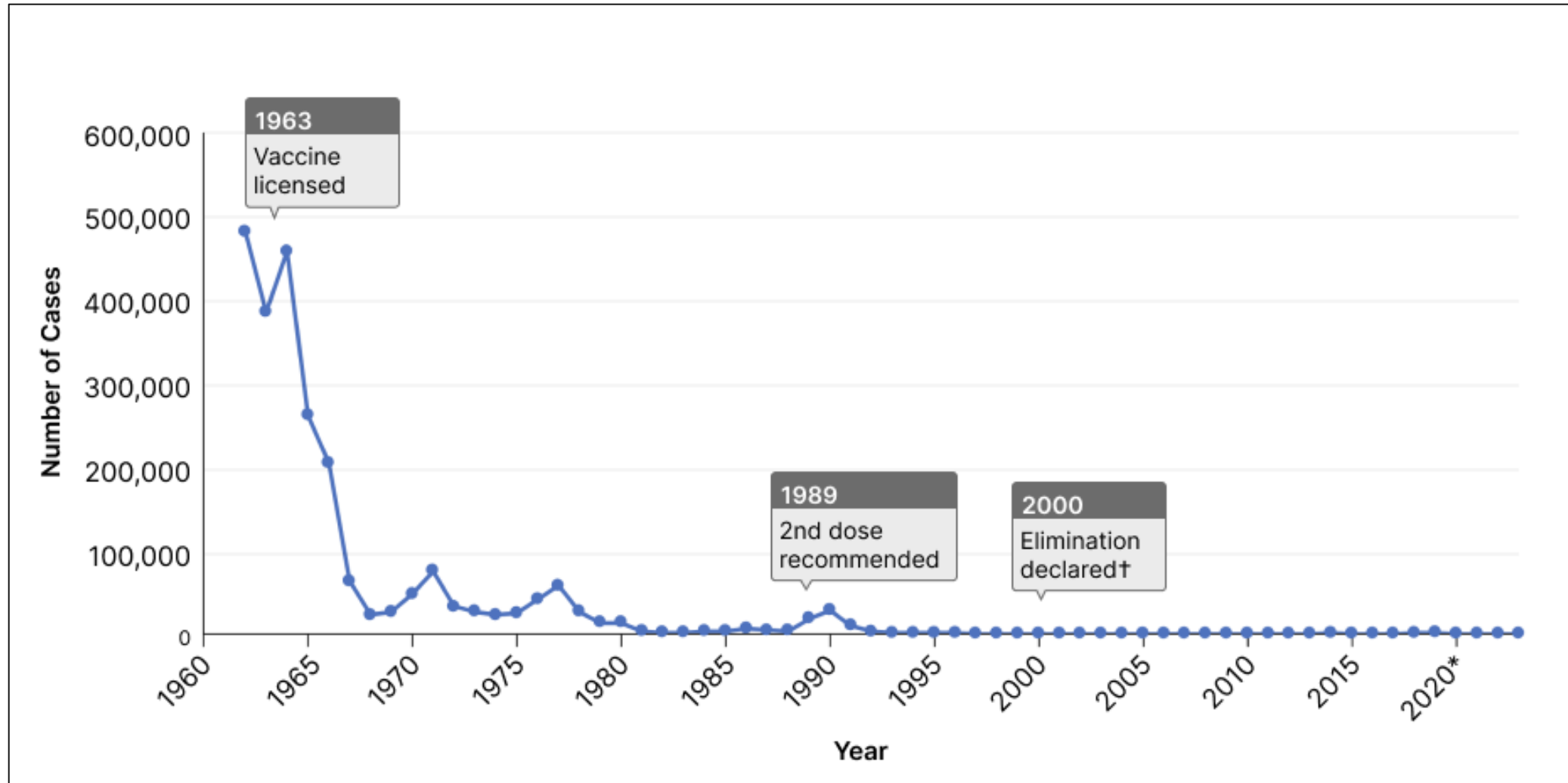
- Severe allergic reaction to vaccine component or following a prior dose
- Severe immunocompromise
 - Hematologic or solid tumors
 - Receipt of chemotherapy
 - Congenital immunodeficiency
 - Long-term immunosuppressive therapy or patients with HIV infection who are severely immunocompromised
- Systemic high-dose corticosteroid therapy for 14 days or more
- HIV infection, regardless of immunocompetence status [MMRV only]
- Family history of congenital or heredity immunodeficiency in first-degree relatives
- Pregnancy



Complication or Serious Adverse Event	Risk after Natural Disease†	Risk after Vaccination‡
Otitis media	7 to 9 per 100	0
Diarrhea	8 per 100	0
Pneumonia	1 to 6 per 100	0
Subacute sclerosing panencephalitis	4 to 11 per 100,000	0
Encephalitis	0.5 to 1 per 1000	<1 per 1,000,000
Death	Approximately 1 per 1000 (1 to 15 per 100 in developing countries)	0
Febrile seizure	—§	1 per 3000
Thrombocytopenic purpura	—§	1 per 30,000
Anaphylaxis	0	2 to 14 per 1,000,000

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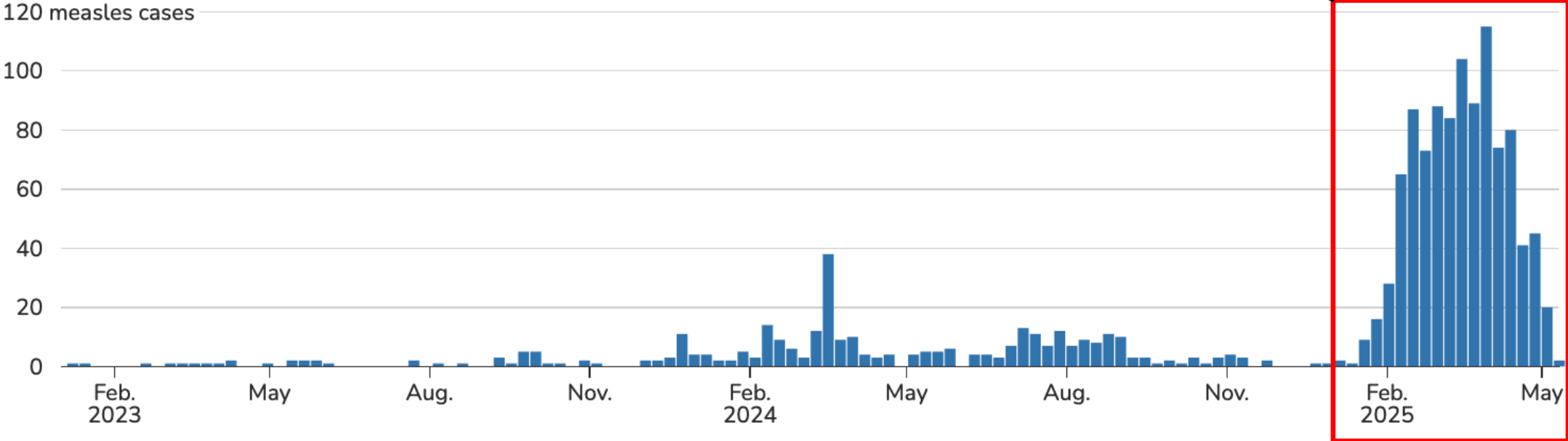
At a Glance: Measles in the US (1962-2023)



Weekly Measles Cases by Rash Onset Date

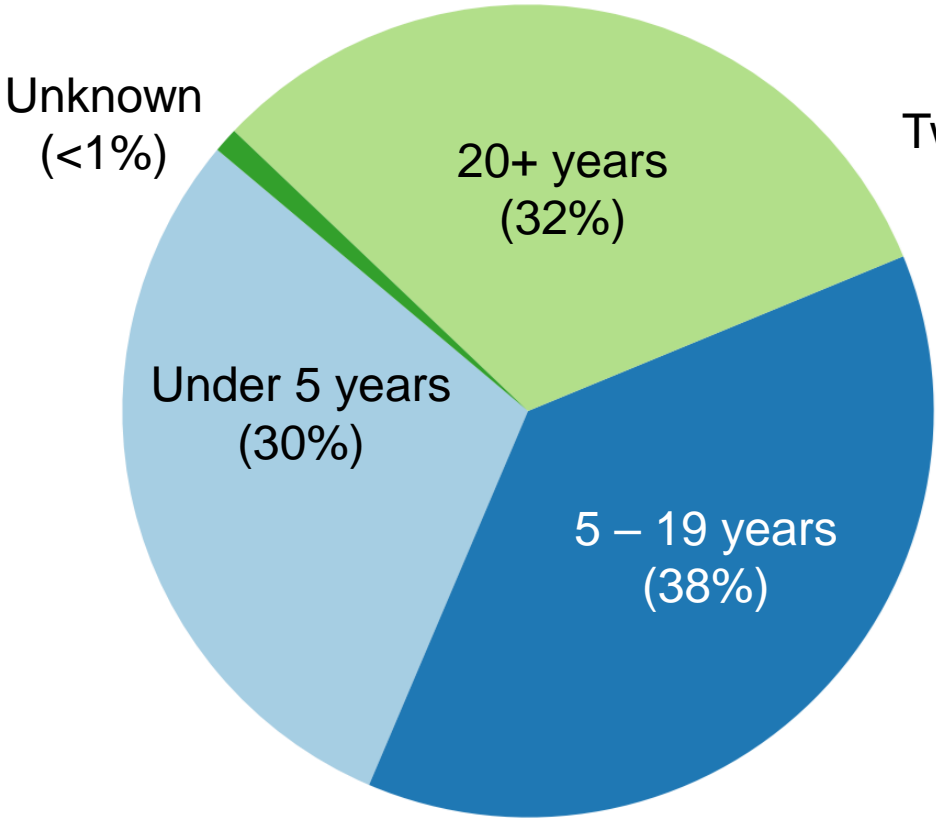
1024 Cases Reported in 2025

2023–2025* (as of May 15, 2025)

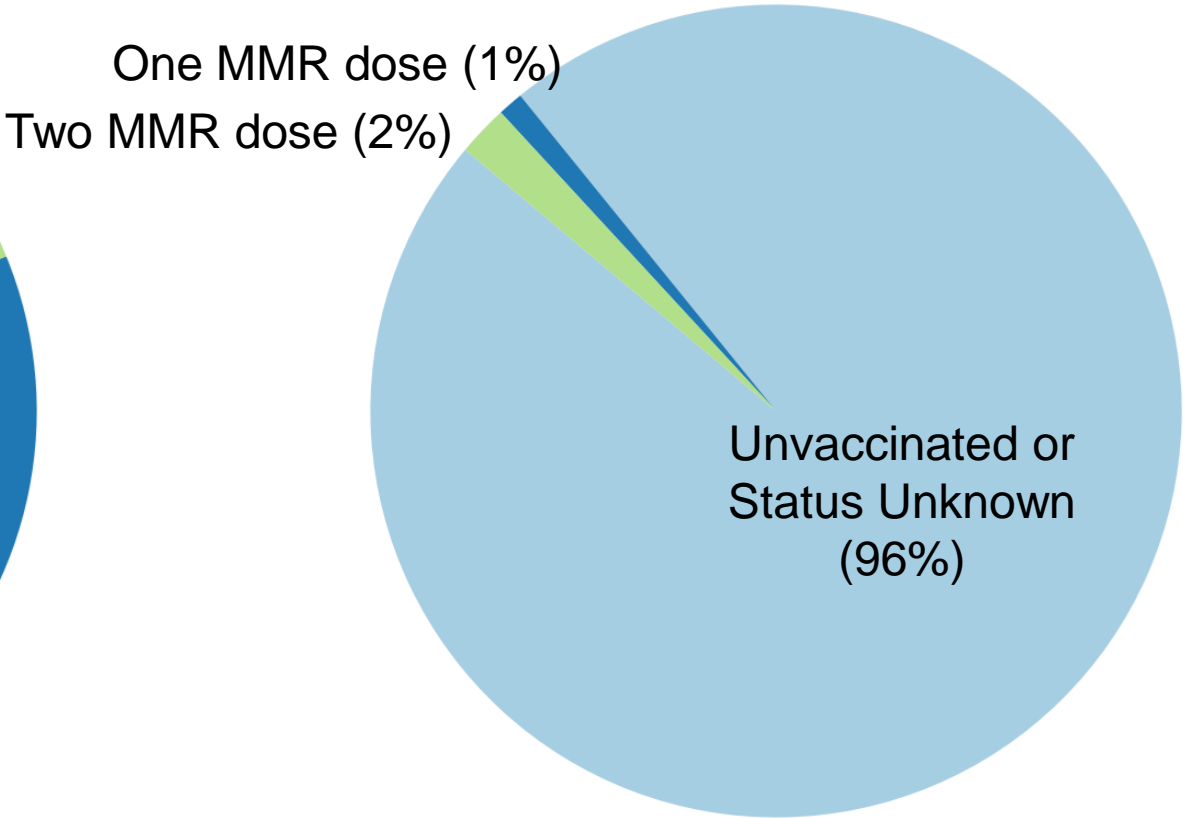


Age and Vaccination Status of Cases Reported in 2025

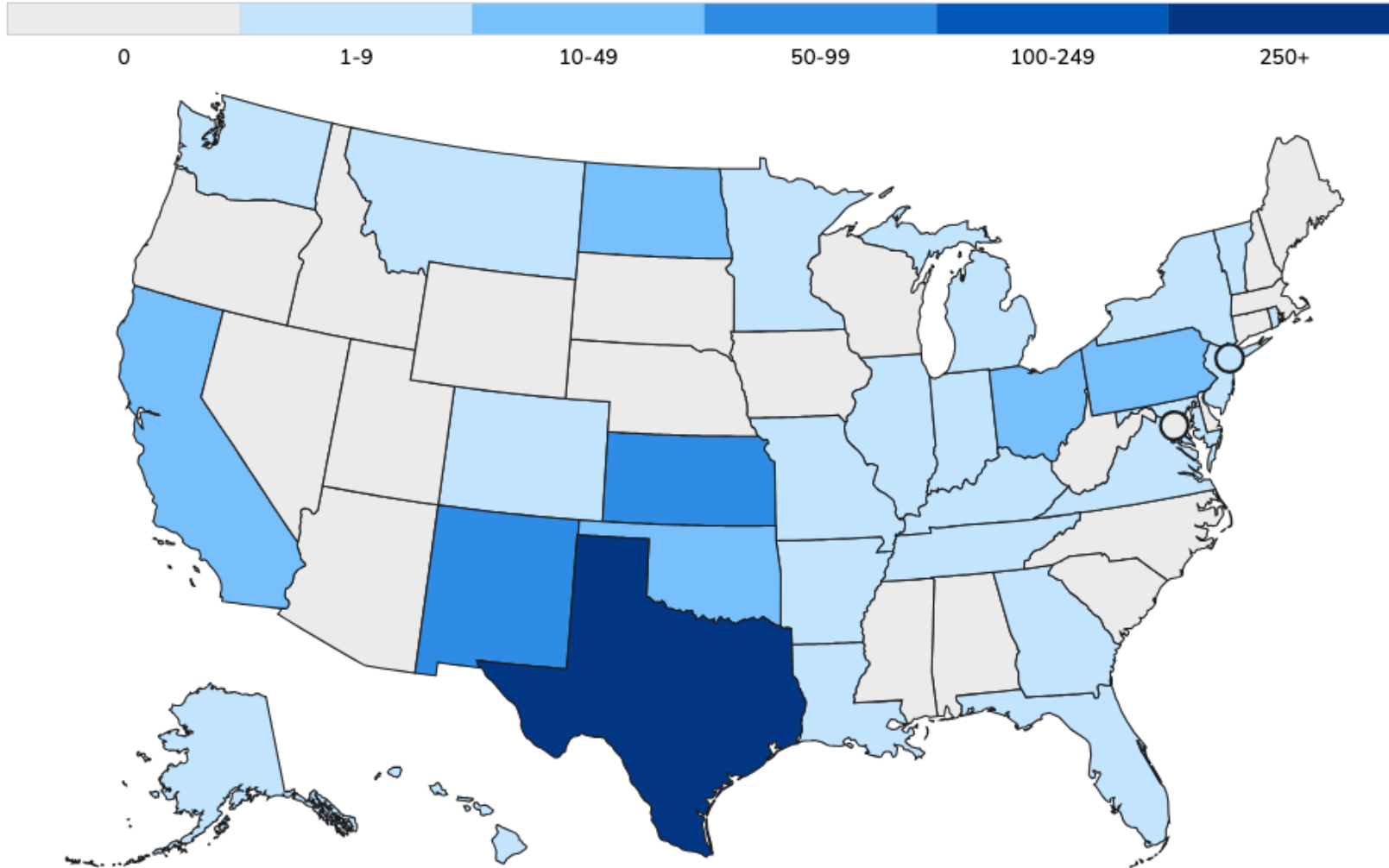
Age



Vaccination Status



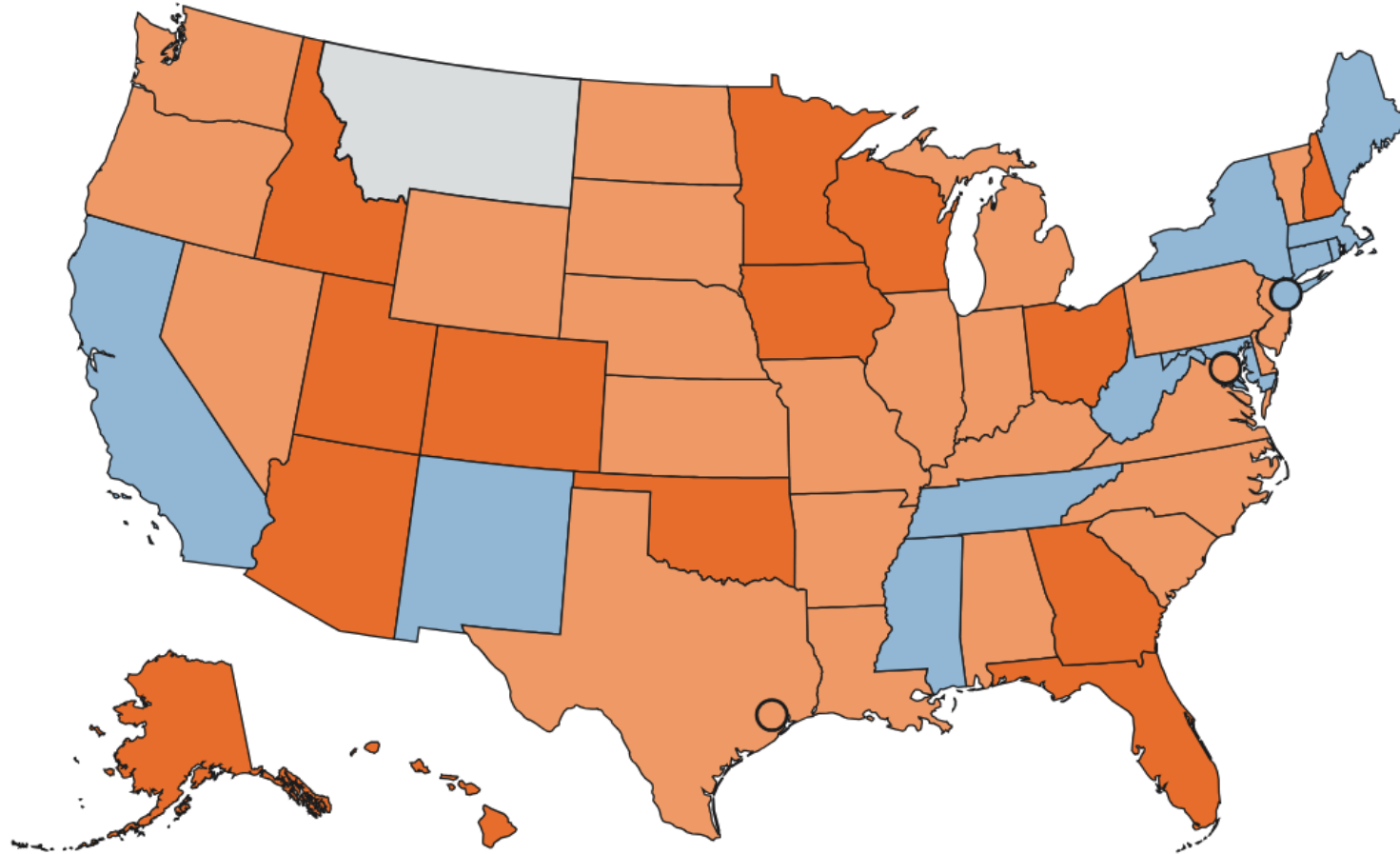
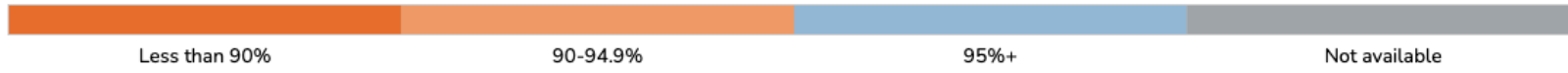
Map of Measles Cases in 2025



Texas outbreak began in late January in Gaines County

Over 718 cases statewide

US Measles Vaccination Rates by State (2023 - 2024)



Note: Alabama, Florida, Georgia, Iowa, Mississippi, New Hampshire, and New Jersey did not assess coverage for individual vaccines. Estimates shown are the percentage of kindergartners who received all doses of all vaccines required for school entry.



Millions of U.S. measles cases forecast over 25 years if shots decline

Measles, once virtually wiped out in the United States, could become commonplace again if declining vaccination rates continue, a new model shows.

April 24, 2025

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