Measles Scenario-Based Human Health Risk Assessment for the United States

Updated as of January 31, 2024

Currently, the Center for Outbreak Response Innovation (CORI) judges the measles outbreak in the United States to be in Scenario 1:

	Risk to unvaccinated people	Risk to children	Risk to healthcare workers	Risk to the US general public
Scenario 1 – Sporadic cases of measles, no outbreaks (baseline)	Low-Moderate	Low-Moderate	Low	Low

Our confidence in these risk scores is moderate given the amount of information available locally, nationally, and globally.

2025 Surveillance Updates:

- As of January 31, 2025, a total of seven measles cases have been reported in the United States (US) this year, all among unvaccinated individuals. Six had a history of international travel. These cases include three children, all of whom were hospitalized, and four adults.
    - CORI has determined that measles cases nationwide are sporadic, placing us in Scenario 1.
- Measles cases have been reported across 4 states: Texas (Houston, the South Plains Region), Georgia (Atlanta), Rhode Island, Alaska (Southern Kenai Peninsula).
    - Public health authorities have issued press releases and health alerts to inform community members and healthcare professionals about the cases, potential exposures, and the importance of vaccination.
- Recent measles cases highlight the risk associated with international travel and underscore the importance of measles-mumps-rubella (MMR) vaccination, particularly before international travel. Maintaining population-level herd immunity (≥95% vaccination coverage) is critical; however, US coverage has declined to 92.7% in the 2023-2024 kindergartener school year, with pockets of undervaccination persisting.

2024 Surveillance Overview:

- As of December 31, 2024, a total of 284 measles cases were reported to the Centers for Disease Control and Prevention (CDC). The majority of cases (70%) have been outbreak-associated, occurred in children under 5 years (42%), and involved individuals who were either unvaccinated or had an unknown vaccination status (89%).

    - Among all cases, 40% of US measles cases required hospitalization, with the highest rate (52%) among children under 5 years old.
- There were 16 outbreaks (≥3 related cases) reported in the US, including two large outbreaks (>50 cases):
    - Chicago, Illinois: 57 cases
    - Twin Cities, Minnesota: 52 cases
- Measles cases have been reported across 32 jurisdictions in the US. *
    - The East North Central region reported the highest measles case count (83 cases), and the West North Central region (72 cases), largely driven by the large outbreaks in Illinois and Minnesota.
- In April of 2024, CDC projected approximately 300 measles cases and fewer than 19 outbreaks for 2024. The final reported numbers—284 cases and 16 outbreaks—closely aligned with these estimates.

*AZ, CA, DC, FL, GA, ID, IL, IN, LA, MD, MA, MI, MN, MO, NC, NH, NJ, NM, NYC, NY, OH, OK, OR, PA, SC, SD, TN, VT, VA, WA, WI, WV

Notable Limitations

- As of January 2, 2025, CDC transitioned to monthly reporting of measles cases.
- National Notifiable Diseases Surveillance System (NNDSS) data is often delayed, leading to potential underreporting in real time.
- CDC reporting delays due to administrative changes require supplemental data, resulting in moderate confidence in current estimates.

Scenarios

CORI identified 5 key scenarios that may shape the risk of measles in the US for the upcoming year. These scenarios consider the health risks of measles, taking into account the differing impacts to various population groups within the US.

Features that would characterize each scenario include:

- **Scenario 1 – Sporadic cases of measles, no outbreaks (baseline):** In this scenario, the measles virus is occasionally introduced, usually by international travelers, into a community, but transmission lasts for less than 12 months. While sporadic cases can occur in any community with varying vaccination coverage, they often occur in well-vaccinated communities (over 90% coverage). There is no or limited transmission from these cases, with a total of 1–2 related cases, and they do not lead to an outbreak.
- **Scenario 2 – Development of small-to-medium outbreaks:** In this scenario, small-to-medium outbreaks occur, with or without reports of sporadic cases, and do not result in sustained transmission beyond 12 months. These outbreaks usually occur when the

measles virus is introduced to an undervaccinated community (90% coverage or less), which leads to a small-to-medium outbreak, ranging from 3 to 49 related cases.

- **Scenario 3 – Development of 1–2 large outbreaks:** In this scenario, large outbreaks occur, with or without reports of small-to-medium outbreaks and/or sporadic cases, and do not result in sustained transmission beyond 12 months. Large outbreaks typically occur in close-knit, undervaccinated settings with high population density, especially when there are pockets of unvaccinated individuals, such as migrant shelters or mass gatherings. This results in a large outbreak, ranging from 50 or more cases.
- **Scenario 4 – Development of 3+ large outbreaks:** In this situation, three or more large outbreaks (50+ cases) occur across different communities, with or without reports of small-to-medium outbreaks and/or sporadic cases and does not result in sustained transmission beyond 12 months. These outbreaks are not connected by a shared chain of transmission but emerge independently due to various factors such as localized drops in vaccination coverage, mass gatherings, or travel-related introductions. Additionally, there may be an increase of sporadic cases in highly vaccinated communities due to widespread prevalence of the virus.
- **Scenario 5 – Sustained transmission beyond 12 months leading to loss of measles elimination status:** In the fifth scenario, the virus maintains sustained transmission, regardless of vaccination coverage levels, for at least 1 year. The sustained transmission of the virus results in measles once again becoming endemic in the US. CDC defines endemic transmission as a chain of measles virus transmission that is continuous for 12 months or more within the US. Under this scenario, the US would lose its measles elimination status, which was achieved in 2000.

Scenario-Based Human Health Risk Assessment for the US

Please note: *We are evaluating the risks to human health should each scenario occur,* ***not*** *the relative risk of any one scenario occurring. This risk assessment will be updated regularly.*

	Risk to unvaccinated people	Risk to children	Risk to healthcare workers	Risk to the US general public
Scenario 1 – Sporadic cases of measles, no outbreaks (baseline)	Low-Moderate	Low-Moderate	Low	Low

Scenario 2 – Development of small-to-medium outbreaks	Moderate	Moderate	Low	Low
Scenario 3 – Development of 1-2 large outbreaks	Moderate-High	Moderate-High	Low	Low
Scenario 4 – Development of 3+ large outbreaks	High	High	Low-Moderate	Moderate
Scenario 5 – Sustained transmission beyond 12 months leading to loss of measles elimination status	High	High	Low-Moderate	Moderate

Our overall **confidence** in these risk scores is high given the current level and availability of information for each of these factors, historical knowledge from past outbreaks on transmission dynamics, and the availability of vaccination and treatment resources.

Recommendations

To minimize the spread of measles in general, CDC recommends:

- All children receive a routine 2-dose measles, mumps, and rubella (MMR) vaccine: the first dose at age 12 through 15 months and the second dose at age 4 through 6 years (before school entry).
- Adults and teens should also be up to date on MMR vaccinations, with either 1 or 2 doses (depending on risk factors), unless they have other presumptive evidence of immunity to measles, mumps, and rubella.
- Healthcare personnel without presumptive evidence of immunity should get 2 doses of MMR vaccine, separated by at least 28 days.

To minimize the risk of measles transmission due to international travel, CDC recommends:

- Individuals DO NOT travel while sick, especially with a fever and rash.
- Individuals planning to travel outside of the US are fully vaccinated against measles at least 2 weeks prior to departure, in accordance with CDC guidelines.
- Individuals traveling internationally with infants under 12 months old should ensure that their child receives an early dose of vaccine between 6 and 11 months, a second dose at 12 to 15 months, and a final dose at 4 to 6 years, in accordance with CDC guidelines.

- Individuals returning to the US after international travel should monitor their health for 3 weeks and contact their local health department or provider if symptoms such as high fever, cough, or rash develop.

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