Measles Scenario-Based Human Health Risk Assessment

Updated as of April 19, 2025

Currently, the Center for Outbreak Response Innovation (CORI) judges the measles outbreak in the United States to be in Scenario 4: *We are evaluating the potential risks to human health based on the scenarios outlined. In cases where multiple scenarios are occurring simultaneously nationally, we will highlight the highest-level scenario in the risk assessment (RA). Readers should refer to the scenario that applies to their specific region. Scenarios are detailed in the methodology and listed on page 10.*

	Risk to unvaccinated people	Risk to children	Risk to healthcare workers	Risk to the US general public
Scenario 4 – Development of 3+ large outbreaks (50+ cases) or at least one extra-large outbreak (300+ cases)	High	High	Low-Moderate	Moderate

Our confidence in these risk scores is **moderate** given the currently available information.

Notable Highlights

As of April 19, 2025, approximately 844 measles cases (including probable cases) and 11 outbreaks have been reported this year across 29 jurisdictions in the United States. *

- **Texas Outbreak Updates:**
  - New spread to Reeves, Parmer, Potter, and El Paso counties in Texas.
  - CORI includes the Kansas outbreak as part of the Texas Outbreak.
- **Other Notable Reports**
  - New outbreaks have been reported in Montana; Erie County, Pennsylvania; Montcalm County, Michigan; Middle Tennessee; and Upshur County, Texas.
  - The first measles cases were reported in Alabama, Louisiana, Missouri, Montana, and Virginia.
  - Many states are regularly updating measles dashboards or reports, which CORI has linked in the State Updates Table.
  - Detailed updates are available in the State Updates Table on page 3.

* Alabama, Alaska, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, Montana, New Jersey, New Mexico, New York City, New York State, Ohio, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Virginia, Vermont, and Washington.

Transmission Risk: Increased domestic and international travel during spring break and holidays, like Easter, heightens the risk of measles spreading. Travelers to and from U.S. outbreak areas raise concerns for interstate transmission, while mass gatherings in under-vaccinated, high-density settings or close-knit communities increase the risk of sustained transmission and large outbreaks (≥50 cases) if measles is introduced.

NEW: Measles public exposure information has been added to the dashboard. The CORI measles dashboard provides real-time data on reported cases and immunization coverage for counties with available information, sometimes before risk assessments.

National Outbreak Summary

The majority (over 90%) of cases occurring nationally are related to outbreaks but sporadic cases, mostly related to international travel, have also been reported.

Age: Most cases are among children: 31% aged 5 and younger, 38% aged 5-19 years.

Hospitalizations: At least 85 individuals were hospitalized, with children under 5 years most affected. The majority (73%) of hospitalizations are linked to Texas.

Vaccination Status: Approximately 96% of reported cases are among individuals unvaccinated or with unknown vaccination status, underscoring the critical importance of measles-mumps-rubella (MMR) vaccination in preventing spread.

Fatalities: Three measles-associated deaths were reported, marking the first U.S. measles-related fatalities since 2015 and the first pediatric measles fatality since 2003. Two pediatric deaths were confirmed in Lubbock County, Texas and one adult death is under investigation in Lea County, New Mexico. None of the individuals had known underlying conditions.

Note: The typical measles case fatality rate is about 1 in 1,000, making the three reported deaths in this outbreak unusually high. Health officials suspect there may be more cases than reported, as some individuals may not seek testing or medical care.

Outbreaks: Eleven outbreaks have been reported: Texas (2), Ohio (2), Indiana, Pennsylvania, Tennessee, Michigan, Montana, New Jersey, and Georgia:

- **Texas Outbreak (Extra-Large Size, 711 cases):** This outbreak, which originated in Texas, has since spread to additional states, and is the largest outbreak this year.
    - **Texas**: The outbreak remains centered in Gaines County, where transmission began within a close-knit, undervaccinated Mennonite community. It has spread across at least 25 counties, primarily in the western region of Texas.
    - **New Mexico:** Originated in Lea County, which borders Gaines County. All but four cases remain in Lea; the others are spread across three counties which border other outbreak areas.

  - **Oklahoma:** The initial case was linked to Texas/ New Mexico. Most of the subsequent cases occurred through household or extended family exposures.
  - **Kansas:** The source of exposure remains unknown, but genetic sequencing of the first Kansas case suggests a link to the Texas outbreak. The initial case was identified in Stevens County, with the outbreak spreading to seven additional counties in southwestern Kansas near Oklahoma's border.
  - **Pennsylvania:** One case is linked by travel to Texas.
  - **Chihuahua, Mexico:** At least 39 cases have been reported with links to the Texas outbreak. *These cases are not included in outbreak numbers reported by CORI.*
  - **Colorado:** At least one case linked to the outbreak in Chihuahua, Mexico, which is related to the Texas outbreak.
- **Ashtabula County, Ohio (Medium Size, 14 cases):** The outbreak is linked to an unvaccinated adult who had contact with a recent international traveler. It is unknown if this outbreak is related to other cases or ongoing outbreaks. CORI may reclassify as additional information becomes available.
- **Knox County, Ohio (Medium Size, 14 cases):** Initial case linked to an individual with international travel history.
- **Allen County, Indiana (Small Size, 6 cases):** Source of initial exposure is unknown. All cases are linked to the first reported case in the state and unconnected to other outbreaks.
- **Montcalm, Michigan (Small Size, 3 cases):** Initial case linked to large outbreak in Ontario, Canada.
- **Erie County, Pennsylvania (Small Size, 3 cases):** Cases linked to a case in a child reported in late March. The source of exposure for the initial case has not been reported.
- **Tennessee (Small Size, 4 cases):** Initial exposure is unknown, but occurred domestically. Two of the cases were known contacts quarantining, so there were no additional exposures.
- **Upshur County, Texas (Medium Size, 19 cases):** All cases are linked to two out-of-state residents and located in an undisclosed location. It is unknown if this outbreak is related to the Extra-Large Texas Outbreak.
- **Montana (Small Size, 5 cases):** Initial exposure is related to out-of-state travel.
- **New Jersey (Small Size, 3 cases):** Initial case linked to international travel. Since it has been at least 42 days (two incubation cycles) since the last reported case, this outbreak is considered complete.
- **Georgia (Small Size, 3 cases):** The initial exposure occurred in the US, though the specific source has not been disclosed. Since it has been at least 42 days (two incubation cycles) since the last reported case, this outbreak is considered complete.

State Updates Table. *Jurisdictions with measles dashboards or tables linked under jurisdiction.*

Jurisdiction	Cases (# since last RA)	Updates
Texas Outbreak (Extra-Large Size)		
Texas	597 (+92)	New outbreak-related cases have been identified in Reeves County, Parmer County, Potter County, and El Paso County. In El Paso, two previously reported cases have been reclassified as outbreak-related, and 16 additional measles cases have been newly reported as outbreak-related. In El Paso, at least one measles case has been identified in a high school. The El Paso County Health Department has issued guidance to exclude children aged ≥4 years without proof of measles immunity in schools with confirmed measles cases. In response to the outbreak, the county has also launched a measles dashboard. According to the state, approximately 4% of confirmed cases (fewer than 30 individuals) in the outbreak are currently considered actively infectious. **Overview** / **Value** % of cases unvaccinated/unknown status: 98% Hospitalizations: 62 (+5) Measles-associated deaths: 2 (confirmed) Most affected age group: Children 5-17 yrs
New Mexico	63 (+7)	New spread to Doña Ana County, which borders El Paso County in Texas, where 18 cases were recently reported. One case has been reported in Doña Ana County, with the remaining cases occurring in Lea County. Three new hospitalizations have been reported. **Overview** / **Value** % of cases unvaccinated/unknown status: 90% Hospitalizations: 5 (+3) Measles-associated deaths: 1 (under investigation) Most affected age group: Adults 18+ yrs
Oklahoma	12 (+2)	Two additional cases reported. Relations to other cases are unknown. Three of the reported cases are probable. **Overview** / **Value** % of cases unvaccinated/unknown status: 100% Hospitalizations: 0 Measles-associated deaths: 0 Most affected age group: Unspecified

Jurisdictions with cases related to TX Outbreak	2 (+0)	Colorado (1 outbreak related), Pennsylvania (1 outbreak related)
Small-to-Medium Outbreaks		
Allen County, Indiana	6 (+0)	*CORI reports no major updates.* **Overview** / **Value** % of cases unvaccinated/unknown status: 100% Hospitalizations: Unknown Measles-associated deaths: 0 Most affected age group: Children <18 yrs
Kansas Outbreak	37 (+5)	Five additional cases have been reported: one in an adult, one in a child aged 0–4 years, and three in children aged 5–17 years. While the specific counties are not yet confirmed, the new cases are in either Finney, Ford, Grant, Gray, or Morton County. **Overview** / **Value** % of cases unvaccinated/unknown status: 94% Hospitalizations: 1 Measles-associated deaths: 0 Most affected age group: Children 5-17 yrs
Knox County, Ohio (OH) Outbreak	14 (+0)	Ohio has reported all 14 measles cases in Knox County as indigenous to the state. It remains unclear whether this outbreak is connected to other outbreaks in the state. CORI continues to investigate and is currently treating this as separate, though this may change as additional information becomes available.
Ashtabula County, OH	14 (+4)	Four new cases reported. One hospitalization was reported associated with this outbreak.
Erie County, Pennsylvania	3 (+2)	A new outbreak has been identified after two additional cases were identified, both linked to a pediatric case from late March. The source of exposure for the initial case remains undisclosed. It is unclear whether this outbreak is linked to the two previously reported travel-related adult cases in Erie County, which are not included in the outbreak case count.
Montcalm, Michigan	3 (+2)	A new outbreak has been reported in the county, with two additional cases linked to the initial case, which was associated with a large outbreak in Ontario, Canada.
Montana	5 (+5)	Montana has reported its first measles cases since 1990, with five cases identified among children and adults in Gallatin County. All individuals were either vaccinated or have unknown vaccination status. The source of

		exposure is linked to out-of-state travel, though it remains unclear whether it was domestic, international, or tied to ongoing outbreaks. CORI suspects a possible connection to existing outbreaks but has not yet identified which. Cases may be reclassified as new information becomes available.
Tennessee	4 (+2)	Two new cases have been reported in the Upper Cumberland region, linked to previously identified cases and marking a new outbreak. The initial exposure occurred domestically, though the source remains unknown. The newly reported cases were known contacts already in quarantine, helping to prevent further exposures. **Overview** / **Value** % of cases unvaccinated/unknown status: 100% Hospitalizations: 0 Measles-associated deaths: 0 Most affected age group: Children 5-17 yrs
Upshur County, Texas	19 (+19)	19 cases have been reported in Upshur County at a single, undisclosed location, all linked to two out-of-state visitors. Only two of the individuals are Upshur County residents. The state is working to confirm the residency status of the remaining individuals and assess potential links to the Extra-Large Texas Outbreak. All cases are over the age of 17 and currently in quarantine.
Unknown or Unrelated to Outbreaks		
Arkansas	2 (+2)	First two cases reported in state in unvaccinated children with recent out of state travel in Saline County and Faulkner County. These may be related to other cases or ongoing outbreaks. CORI may reclassify the cases as new information becomes available.
Hawaii	2 (+1)	One new measles case has been reported in an adult from the same household as the initial case in Hawaii. The Hawaii Department of Health identified 92 individuals who were exposed and successfully reached 96% for monitoring. While most had evidence of immunity, ten individuals were found to lack immunity, placing them at increased risk. It is unclear whether these contacts chose to receive post-exposure prophylaxis (PEP). Given measles' high transmissibility, additional cases are likely if PEP was declined or not administered within the recommended timeframe.
Louisiana	1 (+1)	First case in state reported in an adult from Region 1, which includes Jefferson, Orleans, Plaquemines, and St. Bernard parishes, likely linked to international travel.
Michigan (unlinked to outbreaks)	4 (+1)	New case reported in Ingham County in a child with recent out-of-state travel. The state is continuing to investigate to determine the source of exposure.
Minnesota	2 (+1)	A new case has been reported, though the county has not been confirmed.

Missouri	1 (+1)	First case in the state reported in Taney County. The case was in a child with recent international travel who was visiting Missouri.
Ohio (unlinked to outbreaks)	2 (+2)	A case was reported in March in Allen County involving an unvaccinated child, with an out-of-state exposure. It is unclear whether the exposure was domestic or international, and whether the case is connected to other reported cases or outbreaks. CORI may reclassify the case as more information becomes available. Additionally, a new adult case reported in Holmes County, which borders Knox County. The individual was exposed in Ohio, and due to the geographic proximity to the outbreak, CORI suspects it may be related to the Knox County outbreak. CORI may reclassify the case as outbreak related as new information becomes available.
Pennsylvania (unlinked to outbreaks)	7 (+1)	One case reported in Philadelphia County related to international travel.
Tennessee (unlinked to outbreaks)	2 (+0)	Two previously reported cases from the Upper Cumberland region have been reclassified as outbreak-related. The remaining two cases from the Mid-Cumberland region are unlinked to the Tennessee outbreak but were acquired domestically. CORI may reclassify these cases as additional information becomes available.
Texas (Unlinked to Outbreak)	8 (+2)	Two new cases have been reported in Harris County (1) and Brazoria County (1), both currently considered unlinked to the ongoing Texas outbreak. The previously reported cases (2) in El Paso have been reclassified as outbreak related.
Virginia	1 (+1)	First case in the state reported in the northwestern region in a child with recent international travel.
Washington	4 (+1)	A new case was reported in King County related to international travel.
Jurisdictions with at least one case within the last 30 days with no major updates (total # of cases)		California (9), Colorado (2 unlinked to outbreaks), Kentucky (2), Maryland (3)
Other		
Jurisdictions with no measles cases in the last 30 days (total # of cases)		Alaska (2), Florida (1), Georgia (3 – now complete small outbreak), New Jersey (3 – now complete small outbreak), New York State (1), New York City (3), Rhode Island (1), Vermont (1)

Impact of MMR Vaccination Coverage

- The MMR vaccine is highly effective, providing 93% - 97% protection from one to two doses.
- Maintaining ≥95% vaccination coverage is critical for herd immunity, yet US MMR coverage stands at 92.7% for kindergarteners in the 2023-2024 school year. Pockets of undervaccination in high-density settings or close-knit communities increase the risk of sustained transmission and large outbreaks (≥50 cases).
- Most cases this year are among children, the majority of whom are school aged. Schools can be high-risk settings for outbreaks— once MMR coverage falls below 85% in a school, the likelihood of an outbreak and outbreak size increases significantly.

Notable Limitations

- Limited information and ongoing outbreak investigations may impact reported numbers, which are subject to change as more data becomes available.
- As of February 21, 2025, CDC transitioned to weekly reporting of measles cases.
- National Notifiable Diseases Surveillance System (NNDSS) data is often delayed, leading to potential underreporting in real time.
- Data is being supplemented by other sources, resulting in moderate confidence in current estimates.

Mitigation Recommendations

To minimize the spread of measles and the potential for large and extra-large outbreaks, CORI recommends:

- Monitoring vaccination coverage rates within local and state jurisdictions, at the provider or clinic level, and within sub-communities that may be at increased risk of transmission due to mass gatherings (e.g., schools, shelters, etc.).
- Promoting targeted and culturally informed vaccine messaging and mobile clinics for populations with low vaccine coverage.
- Promoting community and provider awareness of measles cases early on and through diverse media (e.g., health alerts, clinician letters, and press releases).
- Building strong relationships with providers, community leaders, and schools (including school leadership and school nurses) to increase awareness of importance and efficacy of MMR vaccination, measles symptoms, testing, and isolation protocols.
- Enhancing communication between public health and medical leaders to share outbreak response experiences and lessons learned.
- In high-risk areas experiencing outbreaks, strengthening vaccination policies is critical to prevent further transmission. Measures may include mandating vaccination for school attendance and high-risk settings and implementing exclusion policies for unvaccinated individuals in schools and childcare settings. Additional public health measures, such as masking requirements in healthcare settings and targeted immunization campaigns, can further reduce transmission and increase community protection.

To minimize the spread of measles and the potential for small to medium-sized outbreaks, CORI recommends:

- Provision of post-exposure prophylaxis (PEP) as needed to possibly provide protection or alter the progression of illness.
- Implementation of temporary, adjusted vaccination schedules at the discretion of the state and local health departments.
    - NOTE: The Texas Department of State Health Services and Kansas Department of Health are now recommending adjusted vaccination schedules for those in affected counties.
- Routine documentation of measles immunity status among healthcare professionals to facilitate appropriate PEP or quarantine of individuals in the event of an occupational exposure.
- During a measles outbreak in a healthcare facility or facilities serving outbreak areas, healthcare personnel are recommended to receive two doses of MMR vaccine, regardless of birth year, if they lack laboratory evidence of immunity or laboratory confirmation of measles disease.

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

- Individuals DO NOT travel while sick, especially with a fever and rash.
- Individuals planning to travel outside of the US to be 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.

To minimize the spread of measles in general, CORI 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.

- People with confirmed or suspected measles should isolate themselves from others without immunity to measles until after the fourth day of rash onset.
- Individuals without measles immunity who are exposed to the virus should receive post-exposure prophylaxis with the measles vaccine within 72 hours or immunoglobulin within 6 days, or they may need to quarantine to prevent further spread.

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.

Currently, the Center for Outbreak Response Innovation (CORI) judges the measles outbreak in the United States to be in Scenario 4.

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 (3-9 related cases) to medium (10-49 related cases) outbreak.
- **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.
- ***UPDATED:*** **Scenario 4 – Development of 3+ large outbreaks or at least one extra-large outbreak:** In this situation, three or more large outbreaks (50+ cases) occur across different communities or there is report of an extra-large outbreak (300+ cases). These outbreaks may or may not be accompanied by reports of small-to-medium outbreaks and/or sporadic cases and do not result in sustained transmission beyond 12 months. Large outbreaks may emerge independently, driven by localized drops in vaccination coverage, mass gatherings, or travel-related introductions, while an extra-large outbreak results from continued

transmission within a single expanding outbreak. 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. We are evaluating the potential risks to human health based on the scenarios outlined. In cases where multiple scenarios are occurring simultaneously nationally, we will highlight the highest-level scenario. Readers should refer to the scenario that applies to their specific region and neighboring areas. 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 or at least one extra-large outbreak	High	High	Low-Moderate	Moderate
Scenario 5 – Sustained transmission beyond 12 months leading to loss of	High	High	Low-Moderate	Moderate

measles elimination status				

Our overall **confidence** in these risk scores is moderate 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.

Human Health Risk Scale				
Low	Low-Moderate	Moderate	Moderate-High	High

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