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Research Article

Cracks in Coverage: U.S. Measles Outbreak 2024-25

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ABSTRACT

The 2024–25 measles outbreak in the United States marks the largest resurgence since the disease was declared eliminated in 2000. With over 1,000 confirmed cases across 25 states— primarily centered in Texas—this outbreak highlights critical vulnerabilities in national immunization infrastructure. This narrative review synthesizes recent data from the Centers for Disease Control and Prevention (CDC), peer-reviewed studies, and risk models to examine the multifactorial drivers of the outbreak. Vaccine hesitancy, inconsistent state-level exemption policies, reduced MMR coverage, and delays in outbreak detection collectively contributed to sustained transmission. Approximately 92% of confirmed cases were unvaccinated or undervaccinated, with rising rates of nonmedical exemptions concentrated in politically permissive jurisdictions. Despite improved federal surge response, actions remained largely reactive. Realtime modeling, culturally informed communication, and closure of exemption loopholes are essential to reestablish herd immunity. The resurgence of measles in a post-elimination setting underscores the need for renewed public health vigilance, national policy harmonization, and sustained community engagement to prevent future vaccine-preventable disease outbreaks.

Keywords: Measles, Vaccine Hesitancy, MMR Vaccine, Public Health Policy, Immunization, Outbreak, Herd Immunity, United States, Infectious Disease

Abbreviations

MMR: Measles, Mumps, and Rubella, CDC: Centers for Disease Control and Prevention, WHO: World Health Organization, AAP: American Academy of Pediatrics

INTRODUCTION

Despite the elimination of endemic measles transmission in the United States in 2000, the ongoing 2024–2025 outbreak—driven chiefly by a Texas epicenter—has exposed major weaknesses in vaccination coverage, infectious-disease surveillance and crisis communication systems [1]. Under-immunized pockets created by nonmedical exemptions, misinformation and policy delays allowed more than a thousand confirmed cases to spread across 25 states, including two pediatric deaths [1]. Building on CDC surveillance data, state exemption registries and recent risk-projection models [2], this narrative review examines how vaccine hesitancy, legal frameworks and public-health readiness interacted to produce the current crisis.

METHODOLOGY

• Search Strategy

A structured search of PubMed, medRxiv, Google Scholar, CDC and WHO databases was performed 15 March – 10 April 2025 using combinations of "measles outbreak United States 2025," "MMR vaccine hesitancy," "nonmedical exemptions" and "CDC measles response." • Inclusion Criteria

- Only English-language U.S. sources published from January 2024 to April 2025.
- Empirical or modeling studies, surveillance reports or policy analyses addressing U.S.

measles epidemiology, vaccination uptake, exemption patterns or outbreak response during 2024–2025.
- CDC or state-level line-list or registry data.
- Exclusion Criteria
- Non-U.S. settings, data collected before 2024, opinion pieces, or sources lacking transparent methodology.

Authors independently extracted data on case counts, vaccination status, exemption rates, timeliness of detection and public-health actions. Source credibility was verified through author affiliation, peer-review status and concordance with CDC datasets.

RESULTS

By 1 May 2025, 1088 laboratory-confirmed measles cases were reported nationwide; Texas accounted for 765 cases (70%) with the largest single cluster in Seminole County schools [1]. Table 1 summarises the epidemiologic profile of the five most affected states. As shown in Table 1, hospitalisation rates approximated 10% of reported cases, and two deaths occurred in unvaccinated children [1].

Table 1. Epidemiologic Profile of the 2024–2025 U.S. Measles Outbreak (Top Five States) [1,3]

State	Confirmed Cases	Hospitalisations	Deaths	Median Two-Dose MMR Coverage 2024
Texas	765	82	1	88%
Ohio	85	7	0	90%
California	60	5	0	92%
New York	55	4	0	94%
Florida	30	2	1	89%

Overall, 92% of patients were unvaccinated or under immunised [1]. Median two-dose MMR coverage in kindergarten cohorts fell from 94% in 2019 to 91% in 2024 [3]. Figure-based modelling indicates that when local immunity dips below 90%, a single imported case can ignite sustained community transmission [2].

Twenty-one states continue to allow philosophical or religious exemptions; exemption filings have nearly doubled in several of these jurisdictions since 2019 [3][5]. Table 2 details exemption policies and 2024 exemption rates for the highest-incidence states.

Table 2. Nonmedical-Exemption Policy Landscape and 2024 Exemption Rates[3,5]

State	Allowed Exemption Types	Exemption Rate Kindergarten 2024
Texas	Religious, Philosophical	3.1%
Ohio	Religious	2.8%
Florida	Religious	4.0%
California	Medical only	0.2%
New York	Medical only (since 2019)	0.3%

In Texas, an unvaccinated traveller seeded a thirty-eight-case school cluster before clinicians recognised the index rash, illustrating diagnostic unfamiliarity and contact-tracing delays [1].

Survey studies reveal that safety concerns, mistrust of institutions and politicised messaging strongly predict parental refusal or delay of the MMR vaccine [6][7]. Table 3 synthesises key determinants of hesitancy identified across recent U.S. studies.

Table 3. Principal Determinants of Measles Vaccine Hesitancy Documented 2024–2025

Determinant	Illustrative Findings
Safety concerns	Perceived link to autism cited by 38% of hesitant parents[6]
Institutional mistrust	Lower confidence in CDC guidance doubled odds of refusal[7]
Political ideology	Counties with higher 2024 exemption growth aligned with partisan shifts[5]
Religious beliefs	Faith-based schools account for 29% of Texas cases[1]
Access barriers	Rural clinic shortages correlated with delayed vaccination[4]

DISCUSSION

The 2024–2025 resurgence underscores the fragility of U.S. measles elimination when high coverage is not actively maintained [1]. Under immunisation, more than vaccine failure, has fuelled transmission chains. States permitting easy exemption access demonstrate both rising refusal rates and disproportionately high case burdens, emphasising the policy dimension of disease risk [3][5].

The rapid-spread scenario projected by Bidari et al. accurately foreshadowed the Texas cascade, validating the utility of dynamic importation-risk models for real-time preparedness [2]. Yet public-health actions remained predominantly reactive: CDC surge teams, expanded laboratory capacity and emergency communication campaigns were deployed only after case counts escalated [1].

Eliminating nonmedical exemptions where politically feasible, tightening school-entry verification and sustaining culturally tailored education are indispensable. New York's 2019 removal of nonmedical exemptions offers encouraging evidence; kindergarten coverage rebounded to 98% within two years and measles incidence fell to zero in 2024 [8].

CONCLUSION

The current outbreak is a preventable failure of policy, communication and vigilance. Achieving and sustaining MMR coverage above 95% demands:

- National harmonisation of school-entry vaccination mandates and closure of nonmedical-exemption loopholes
- Culturally responsive and trust-building communication that counters misinformation
- Standardised, real-time surveillance with rapid contact-tracing capability
- Routine scenario modelling to anticipate importation threats

With concerted investment and policy alignment, the United States can restore and secure measles elimination.

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