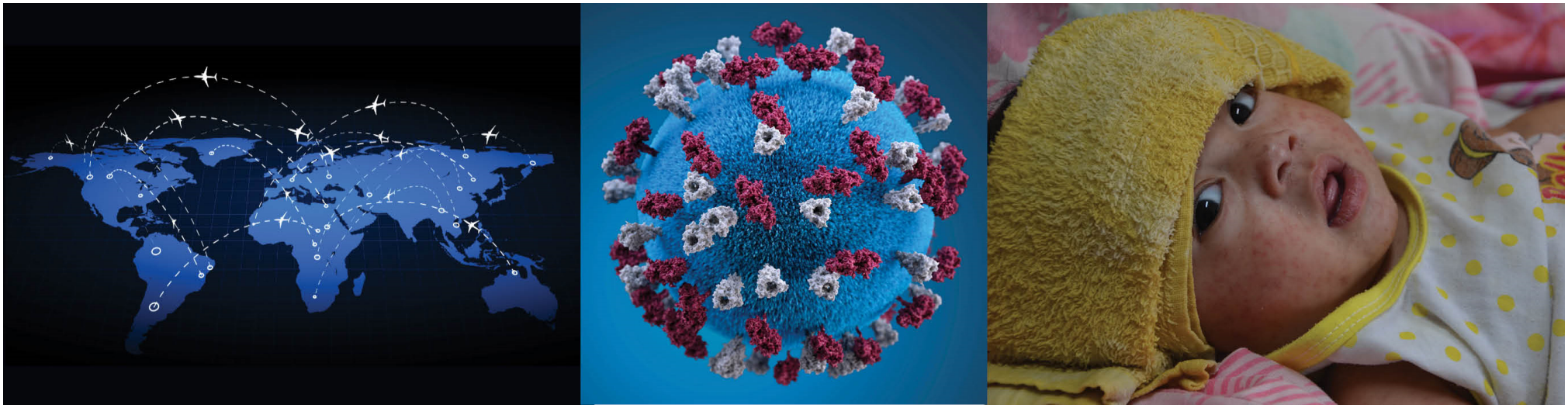
CDC PUBLIC HEALTH GRAND ROUNDS

Measles – Maintaining Disease Elimination and Enhancing Vaccine Confidence



Accessible version: https://www.youtube.com/watch?v=YJPabiGf1TE

Tuesday, February 18, 2020

1:00 p.m. – 2:00 p.m. (ET)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

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Acknowledgements to: ***Debra Blog, Sarah Brazzell, Dylsia Cruz, Paula Erikson, Adriana Joseph, Brenda Holmes, Marissa Langdon-Embry, Luis Luque, Kerri McManhan, Holly Patrick, Allison Schneider, Jacki Silva, Tiffany Smith, Jeanette St. Pierre, Barbara Sutton, & Jane Zucker***

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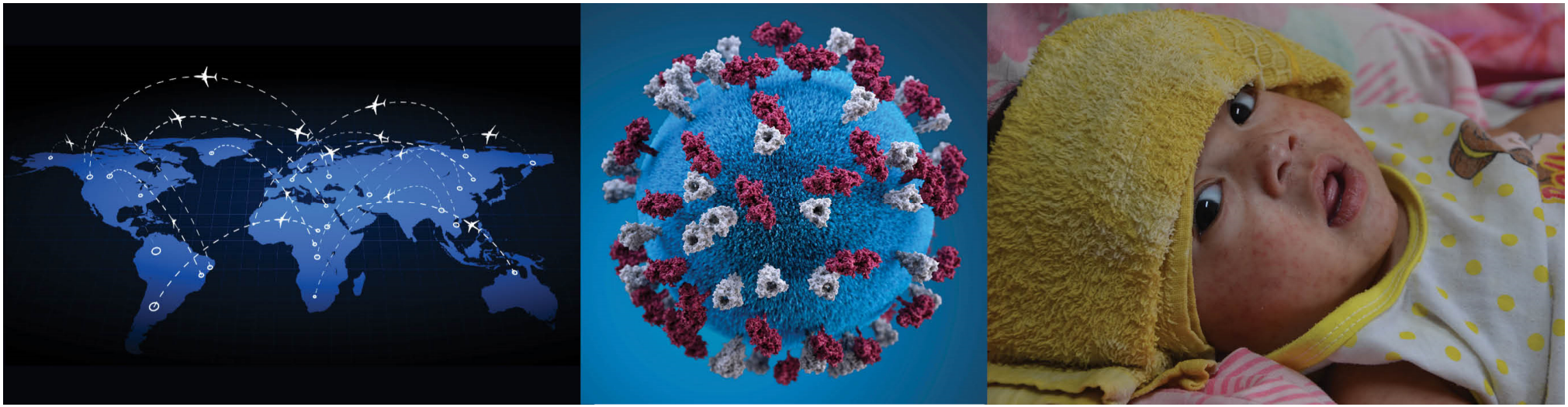

Rebecca Bunnell, PhD, MEd
Director – Office of Science

U.S. Department of Health and Human Services
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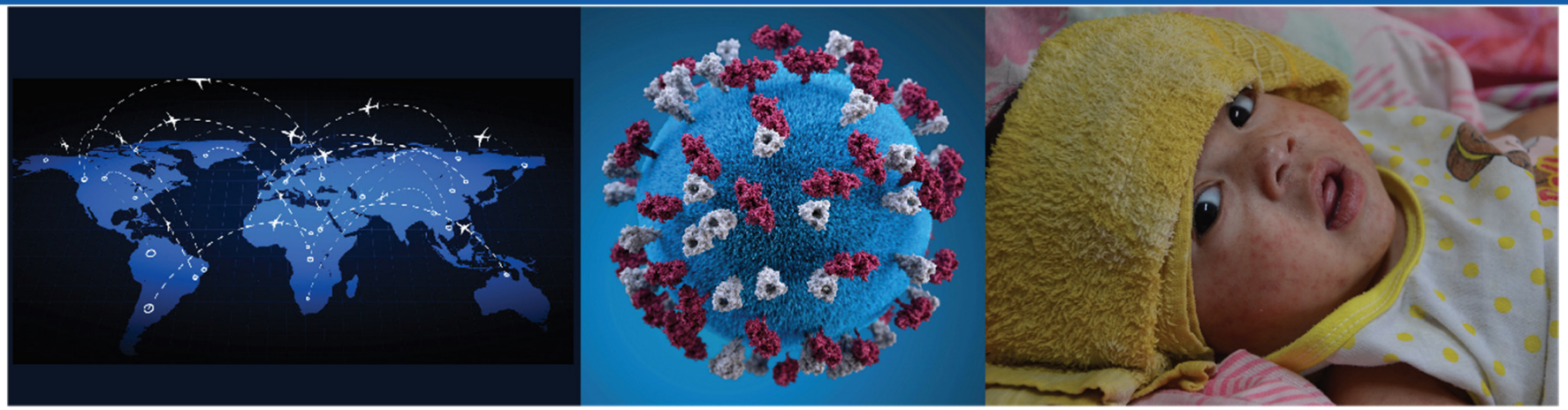
Measles in the United States



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Centers for Disease Control and Prevention

Characteristics of Measles

- **Most contagious of the vaccine preventable diseases (R_0 = 12–16)**
- **Acute viral rash illness**
  - High fever, cough, coryza, conjunctivitis
- **<u>Incubation period:</u> 10–14 days**
- **<u>Infectious period:</u> 4 days prior through 4 days after rash onset**

Measles complications

- Diarrhea (8%)
- Otitis media (7%–9%)
- Pneumonia (1%–6%)
- Hospitalized (10%–25%)
- Encephalitis (1 per 1,000)
- Death (1–3 per 1,000)
- Subacute sclerosing panencephalitis (1 per 5,000–10,000)

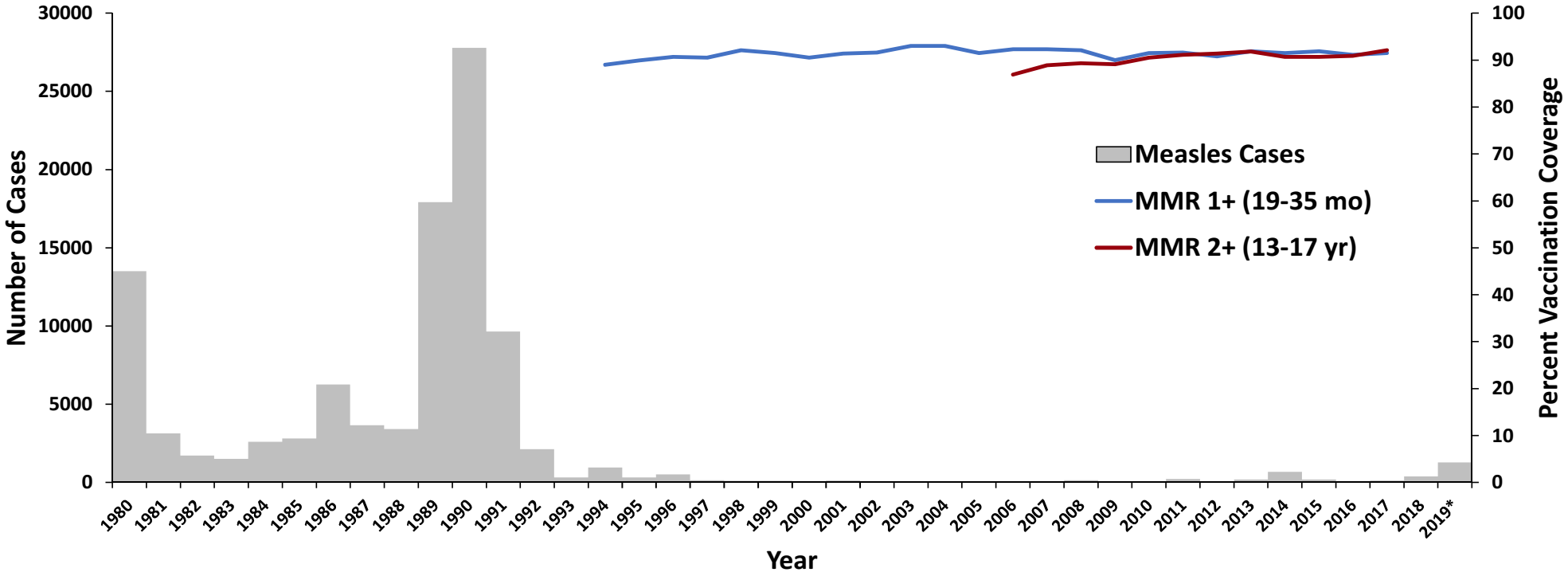
Measles, Mumps, Rubella (MMR) Vaccine

- **Vaccine effectiveness (VE)**
  - 1 dose of MMR: ~93%
  - 2 doses of MMR: ~97%
- **Excellent safety profile over past 50 years**
  - Common side effects are usually mild and resolve spontaneously
  - Serious adverse events are extremely rare

Measles, Mumps, Rubella (MMR) Vaccine Recommendations

- **Children and adolescents need TWO doses of MMR**
  - First dose at 12 to 15 months of age, and second dose at 4 to 6 years of age
- **Most adults need only ONE dose of MMR**
  - Two doses are recommended for adults at HIGH RISK for exposure, including healthcare personnel, post-high school students, international travelers
- **Infants 6–11 months of age traveling internationally need ONE dose**

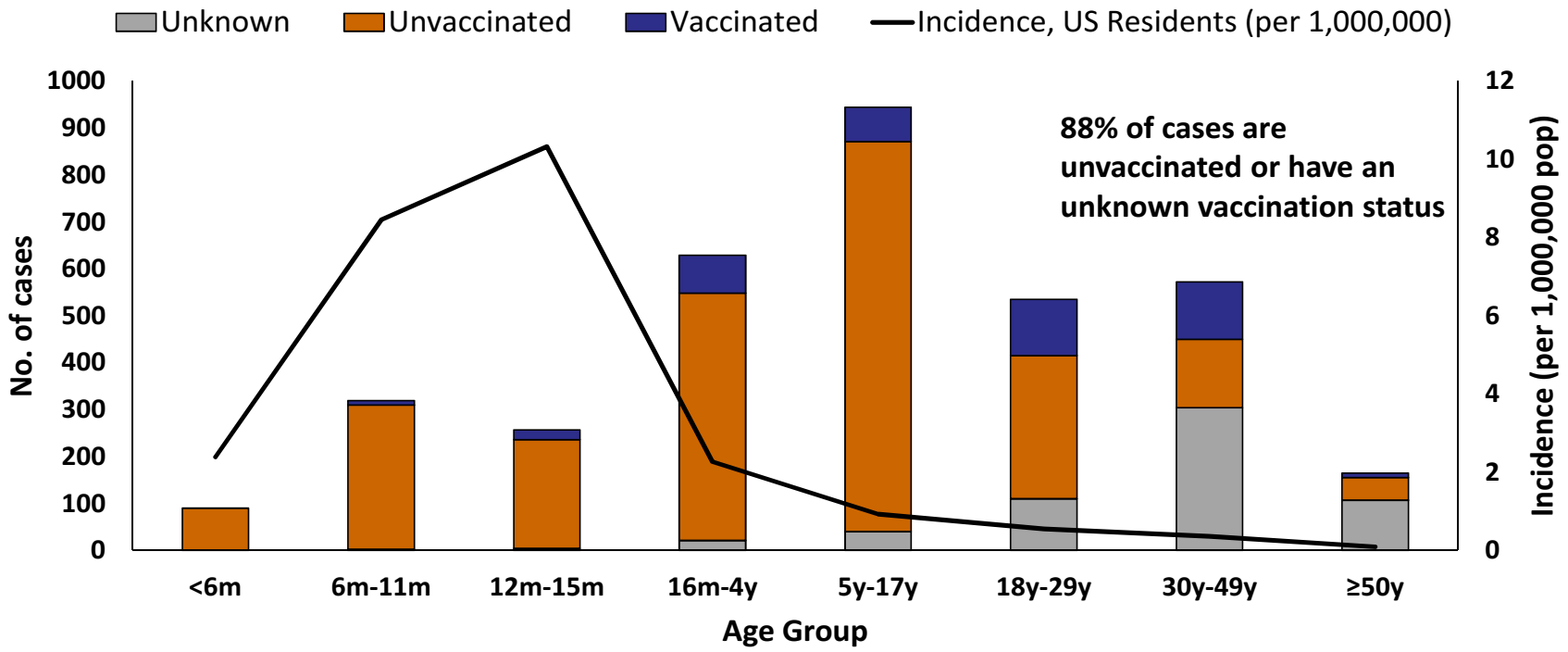
High MMR coverage in the United States led to elimination of measles in 2000



*Source: National Notifiable Diseases Surveillance System (passive surveillance); data as of January 31, 2020; National Immunization Survey, CDC

Most measles cases in the United States are among unvaccinated people

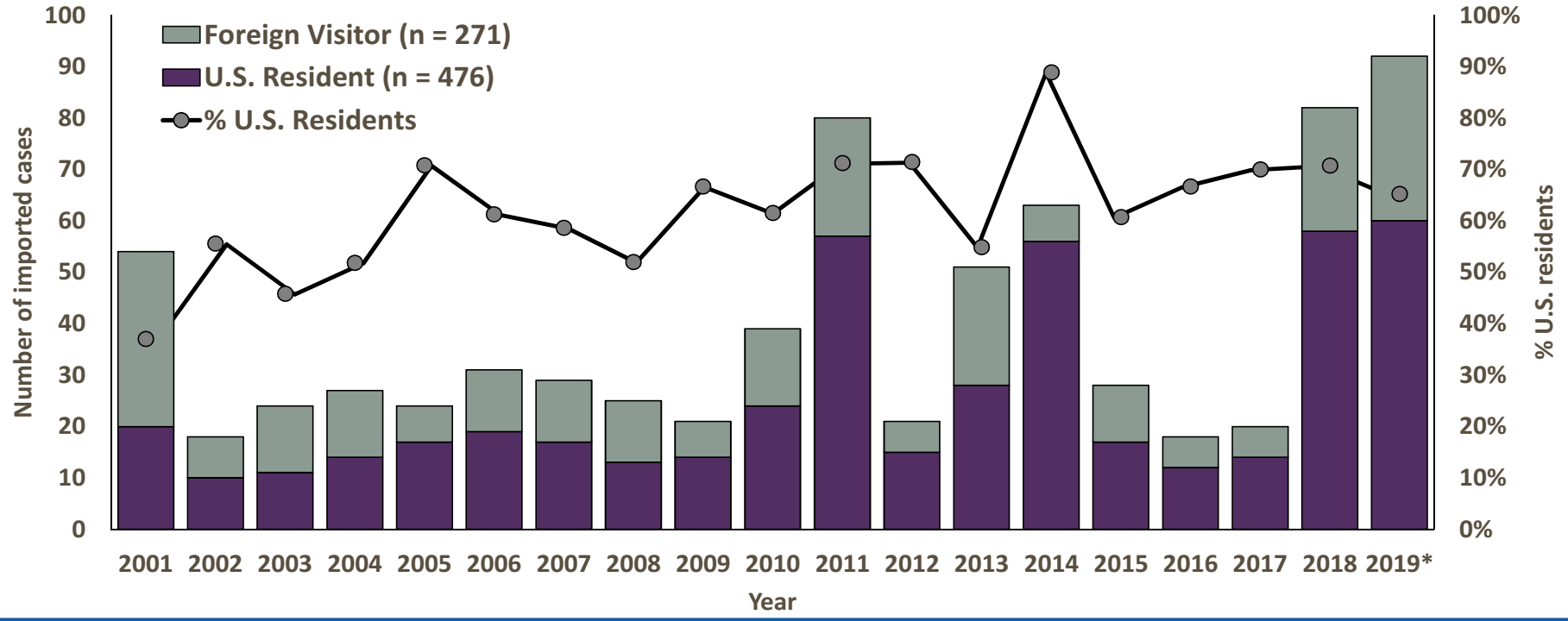
Measles cases by vaccination status and incidence rate, United States, 2001–2019 (N=3,881)



*Source: National Notifiable Diseases Surveillance System (passive surveillance); data as of January 31, 2020

Majority of measles importations are among U.S residents who traveled abroad

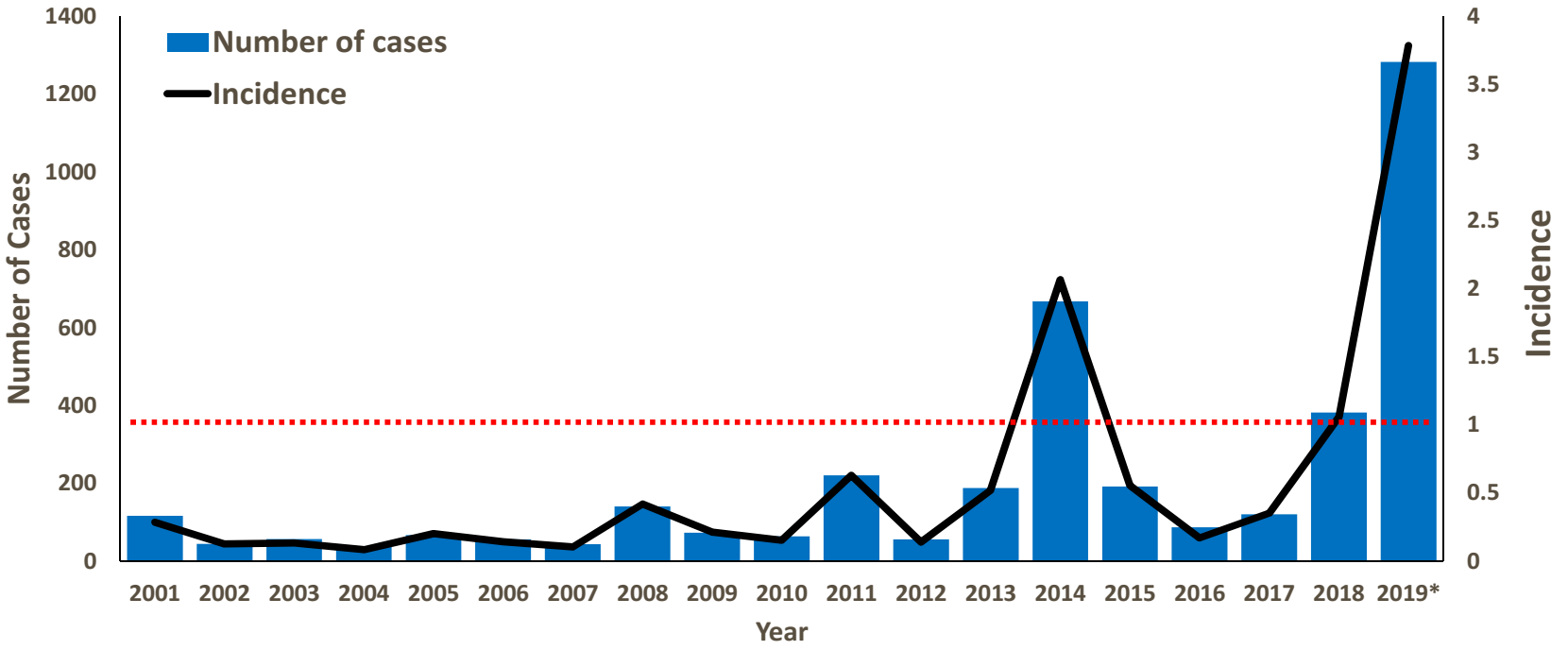
Measles cases by residential status, United States, 2001–2019 (N=747)



*Source: National Notifiable Diseases Surveillance System (passive surveillance); data as of January 31, 2020

The United States has seen a recent increase in measles

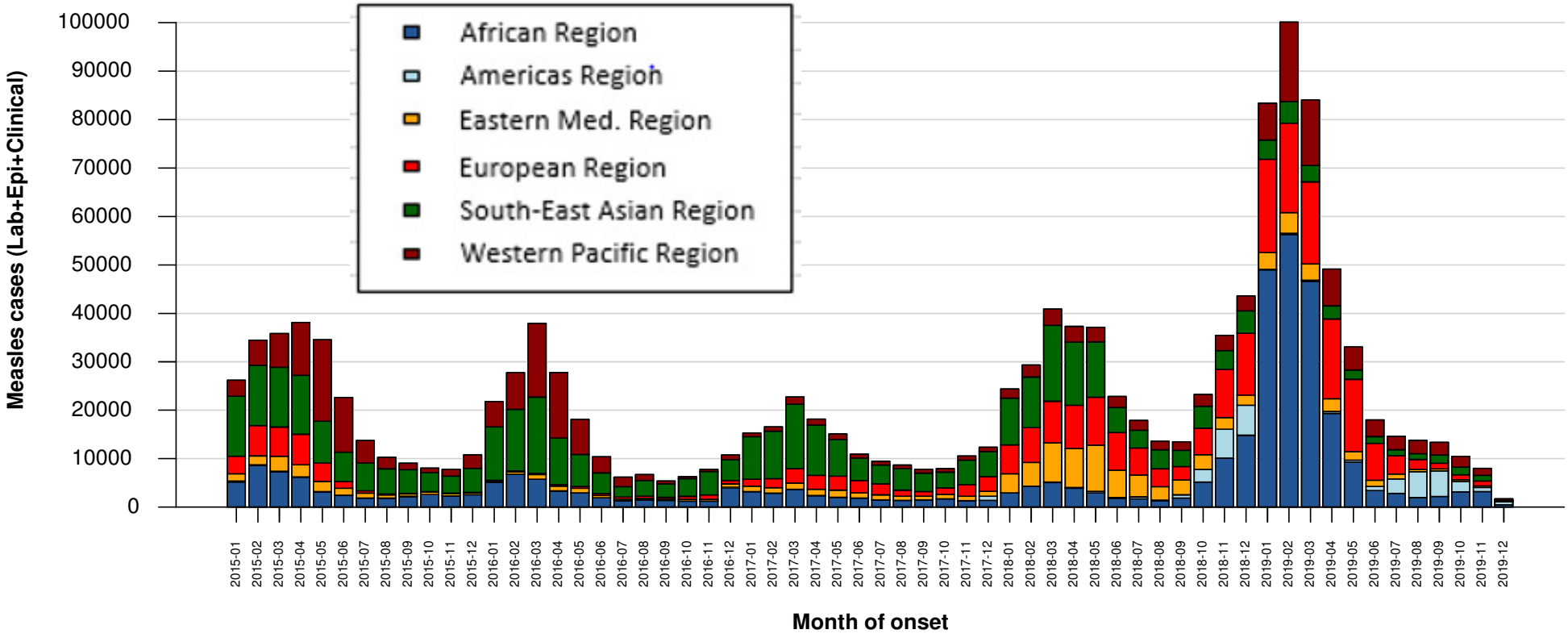
Number of reported measles cases, United States, 2001–2019* (N=3,881)



Median of 86 cases/year (range: 37–1,282)

*Source: National Notifiable Diseases Surveillance System (passive surveillance); data as of January 31, 2020

Global measles cases tripled in 2019



*Source: WHO: https://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/

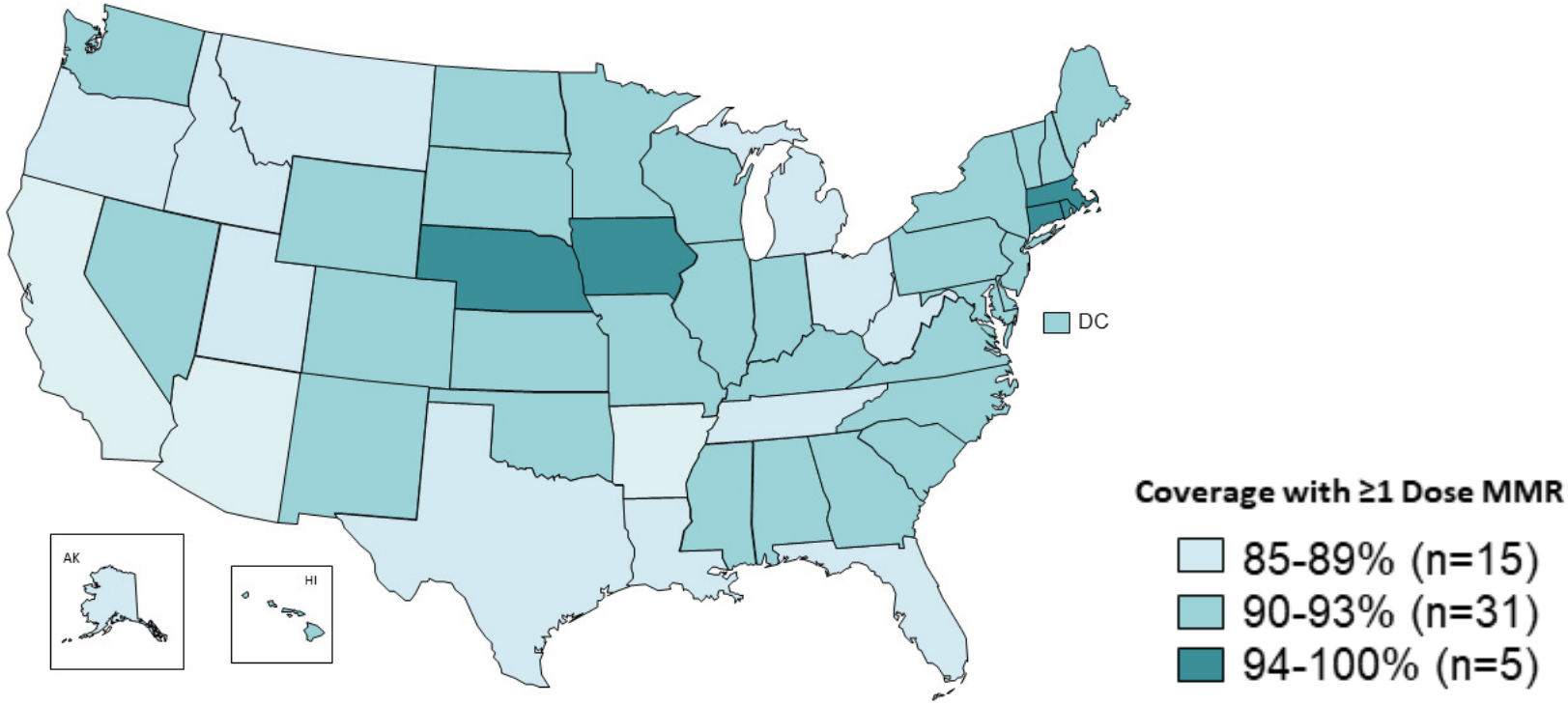
Wide geographic distribution of measles importations, United States, 2001–2019 (N=747)

Median of 28 importations/year (range, 18 to 92)

*Source: National Notifiable Diseases Surveillance System (passive surveillance); data as of January 31, 2020

Variability in state and local MMR vaccine coverage can result in populations at risk for measles outbreaks

≥1 Dose MMR Vaccination Coverage by 24 Months, NIS-Child, U.S. 2013 to 2014 Combined Birth Years



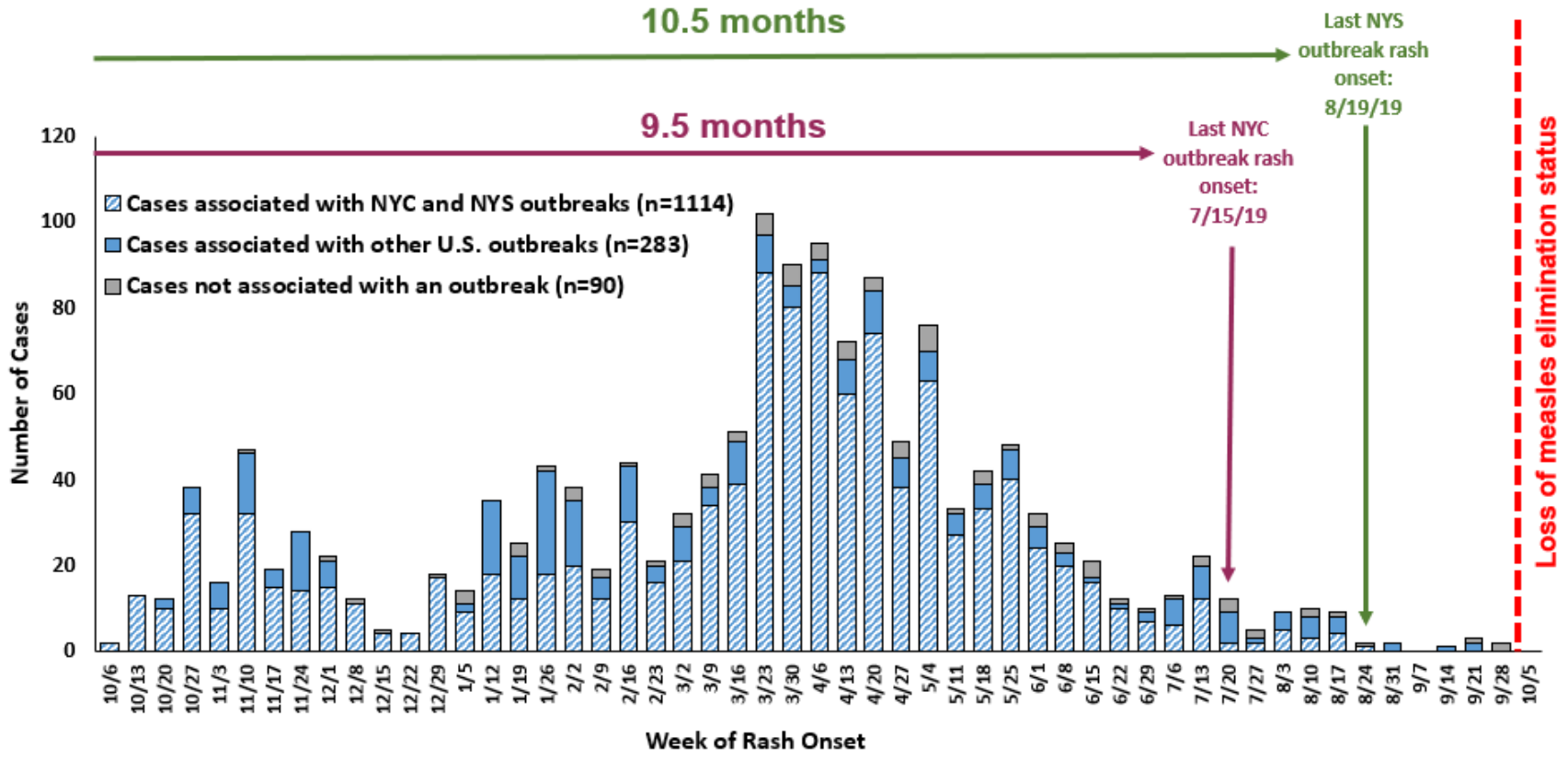
Source: National Immunization Survey

Largest measles outbreaks occurred within undervaccinated close-knit communities

Year	State	Source (genotype)	Community	Cases	Duration (months)
2013	NYC	UK (D8)	Orthodox Jewish	59	2.9
2014	OH	Philippines (D9)	Amish	383	4
2017	MN	Unknown (B3)	Somali	75	3.8
2014/2015	CA + 7 states	Unknown (B3)	Various	147	2.3
2018/2019	WA + 2 states	Ukraine (D8)	Ukrainian Russian Moldovan	78	2.5
2018/2019	NY, NYC + 4 states	Israel/Ukraine (D8)	Orthodox Jewish	1,114	10

Measles outbreaks in New York threatened measles elimination status in the United States

Number of reported measles cases (N=1,487), by week of rash onset, United States, September 30, 2018—October 1, 2019

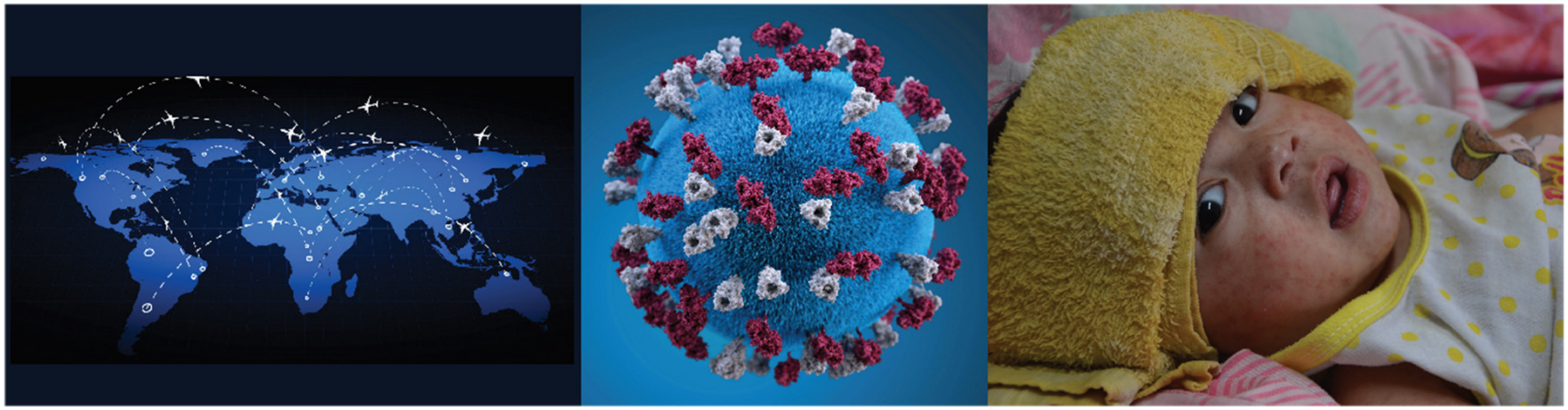


*Source: National update on Measles Cases and Outbreaks – United States, January 1 – October 1, 2019, MMWR, October 4, 2019

Summary

- **Endemic measles has been eliminated in the United States since 2000**
  - However, measles cases continue to occur through global importations
  - Most importations are U.S. travelers who are not vaccinated
- **Recent epidemiology suggests larger and more sustained outbreaks compared to earlier post-elimination years**
- **Measles exploits pockets of undervaccination**
  - Multidisciplinary local response needed to prevent measles outbreaks

The 2018–2019 Measles Epidemic in New York State: Successes and Challenges



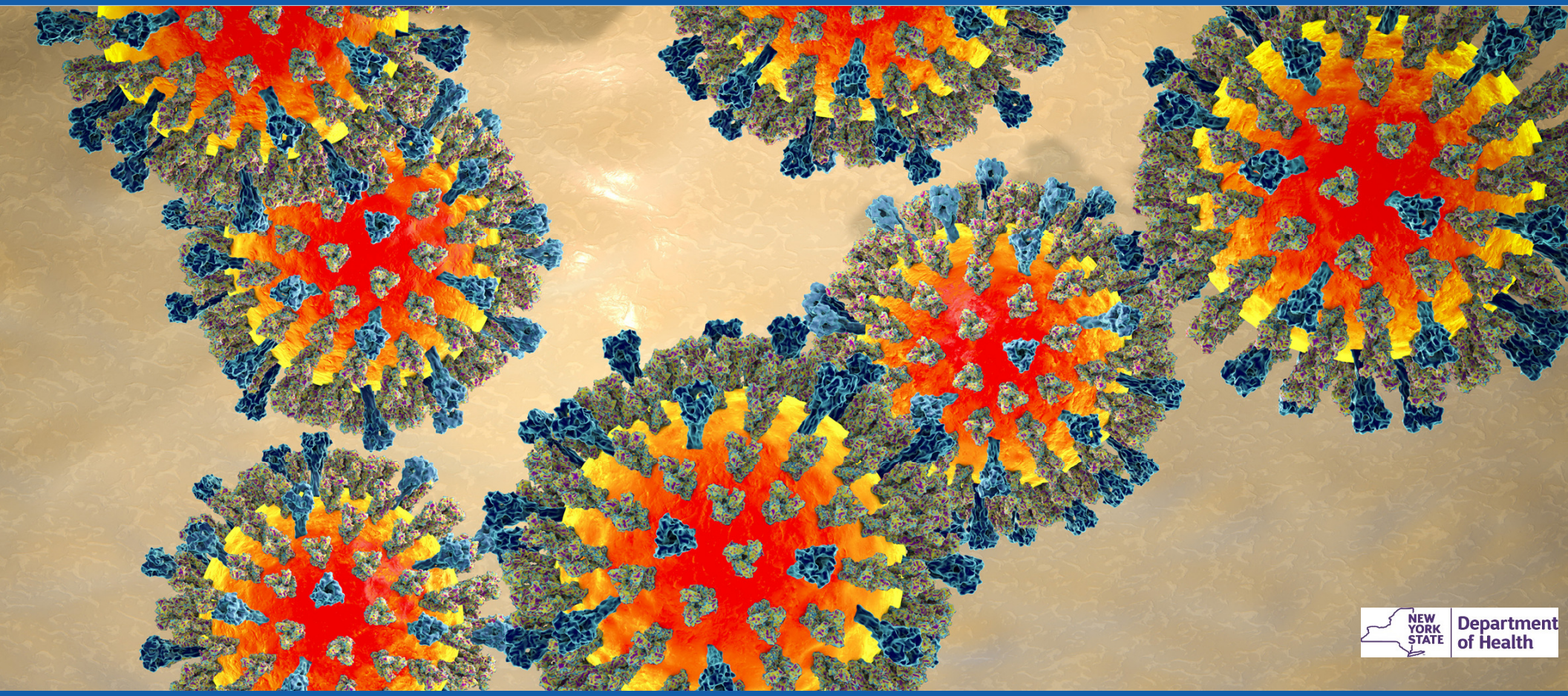
Howard A. Zucker, M.D., J.D.

Commissioner

New York State Department of Health

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

1. Measles and Public Health in New York State



New York's Leadership in Disease Prevention

- **1912:** U.S. begins routine reporting of measles cases; an average of 6,000 measles-related deaths are reported each year over next decade.
- **1914:** New York state's Antitoxin Laboratory designated as Division of Laboratories and Research, facilities that will later become known as **Wadsworth Center**.
- **1926:** Wadsworth develops nation's first system of standardized laboratory analysis for the diagnosis of human disease.
- **pre-1963:** Before licensing of measles vaccine, an estimated 400–500 U.S. residents died of measles each year.

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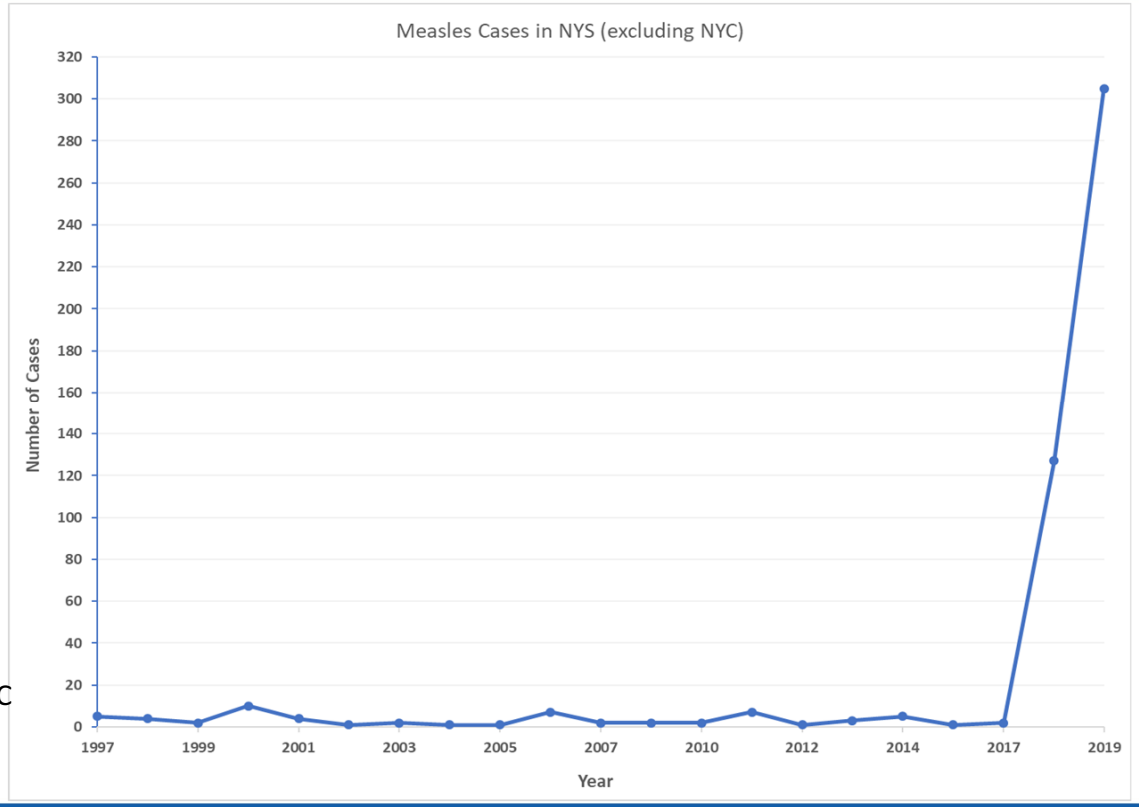
Measles Cases in New York State, 1997–2019*



*As of 12/17/2019; excluding NYC

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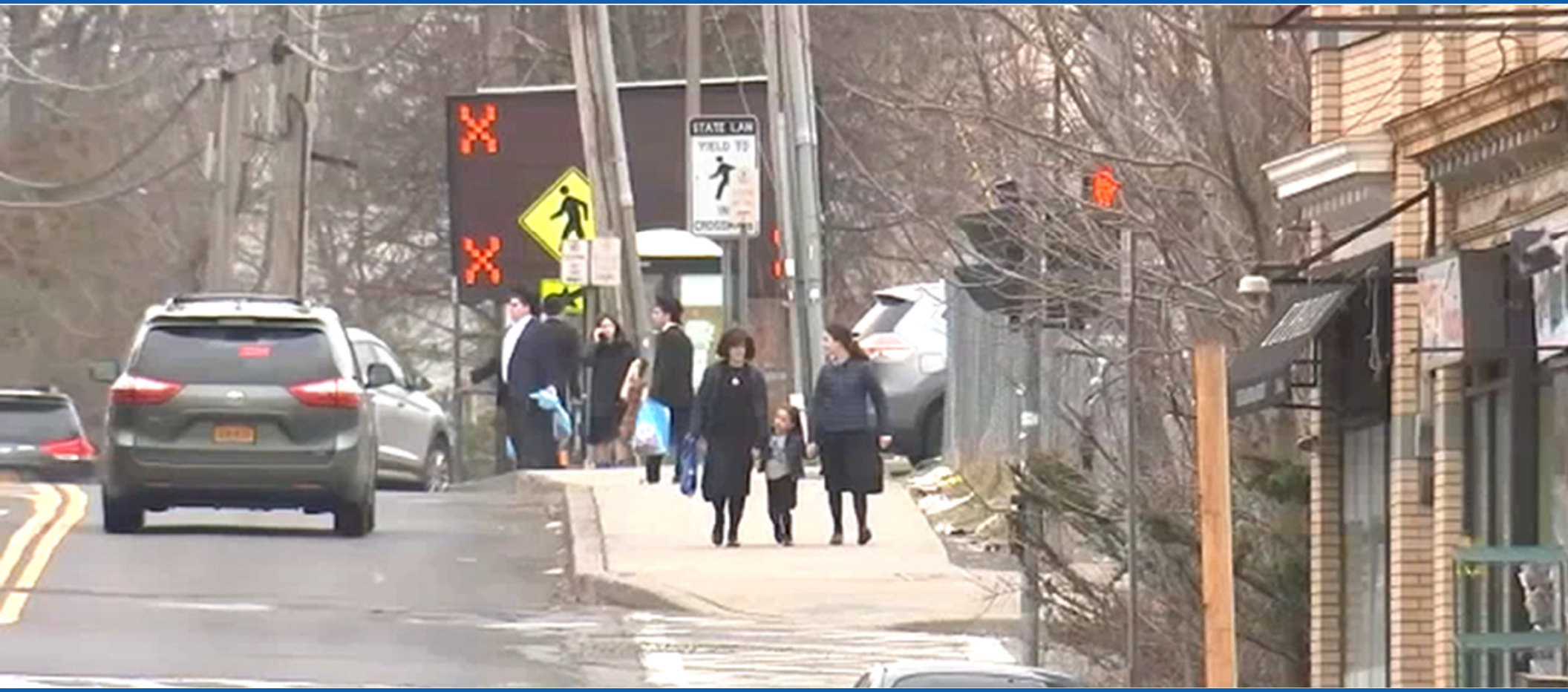
2. The 2018–2019 Outbreak



Initial Cases in the Lower Hudson

- **October 1, 2018:** Measles outbreak outside New York City begins in Rockland County when teenager visiting from Israel falls ill during services at local synagogue.
- **October 2018:** Six additional measles cases imported from Israel, including 4 people from one family who become ill at roughly the same time.
- **December 2018–April 2, 2019:** Three further measles importations bring internationally imported cases to 10 during outbreak.
- Outbreak encompasses **4 counties** outside of New York City, all of which have Orthodox Jewish communities.

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Measles Outbreak Overview

- **October 1, 2018–October 3, 2019:** A total of **406 people** infected with measles in Rockland (312), Orange (57), Sullivan (19), and Westchester (18) counties.
- Most cases reported in under-vaccinated, close-knit Orthodox Jewish communities.
- **October 1, 2018–October 3, 2019:** county providers administered nearly **85,000 MMR vaccinations**, a 77% increase from the same period during the prior year.
- **October 2019:** County health officials and New York State Department of Health declare outbreak concluded in all 4 counties.

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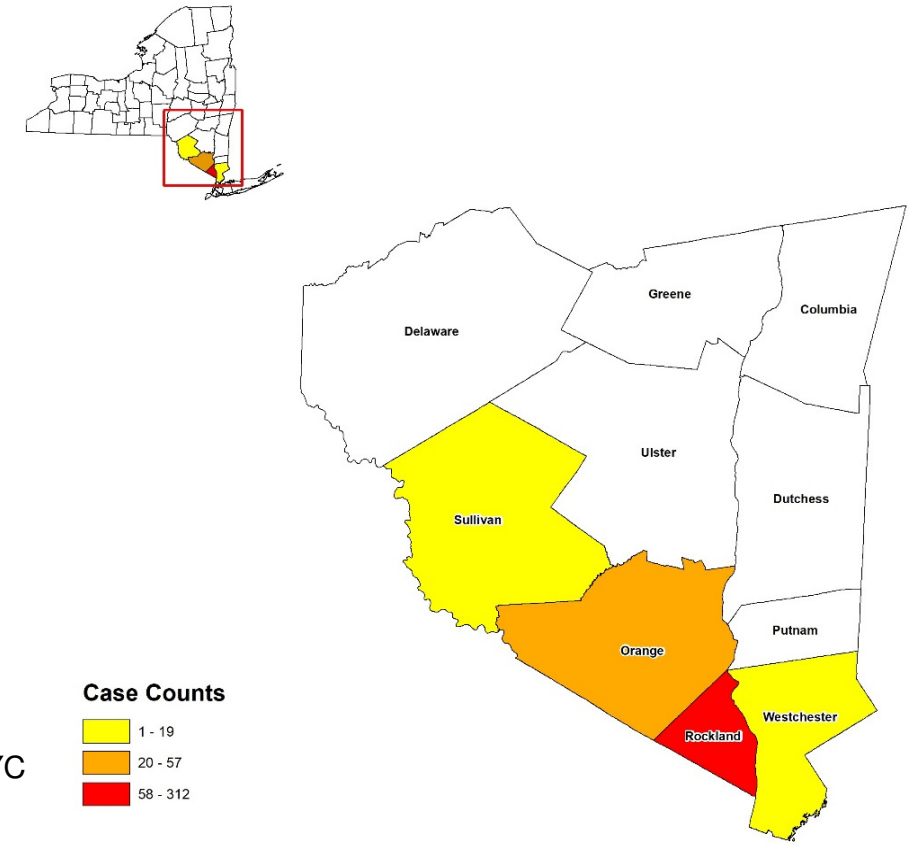
Measles Outbreak Cases by County*



* 10/1/2018 – 8/19/2019; excluding NYC

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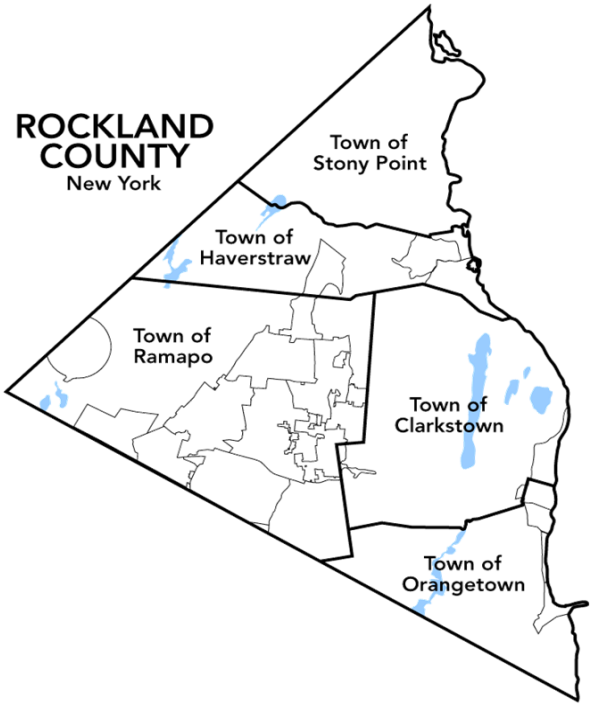
Rockland County as Measles Ground Zero

- **312 cases** confirmed—about 1 in every 1,000 residents.
- Most cases were unvaccinated individuals.
- Nearly **30,000 doses of MMR vaccine** administered during outbreak—3X rate from the same period in the prior year.



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Local Heroes: Rockland County Department of Health

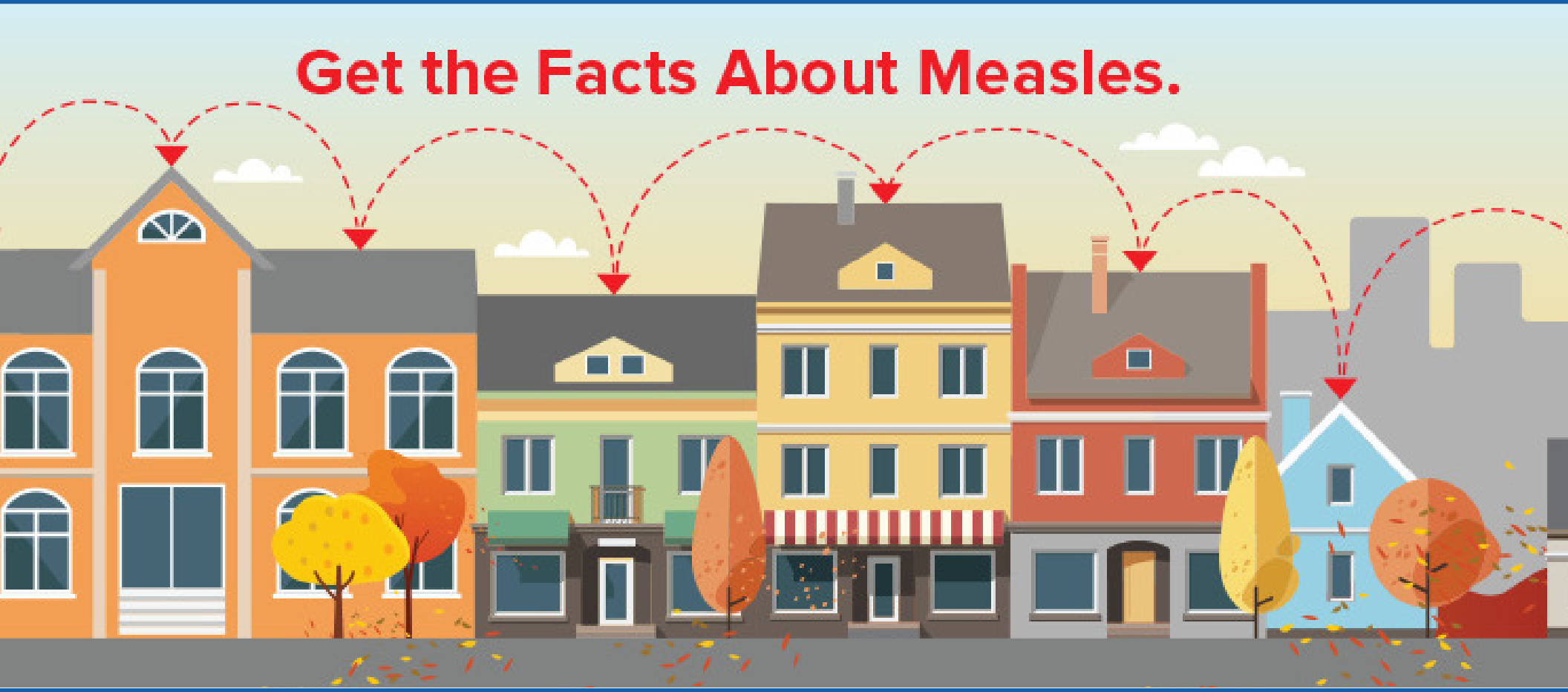
"In the beginning, it was a 24/7 operation. The weekends, the nights, the holidays—it didn't matter.
We lived and breathed measles. We fell asleep thinking of measles, and we woke up thinking of measles."

— **Dr. Patricia Ruppert**,
Rockland County Health Commissioner

Local Heroes: Refuah Health Center

- Federally Qualified Health Center (FQHC) that provides healthcare to many in Rockland County's Orthodox Jewish community.
- Treated the Israeli boy who was outbreak's index case.
- Doctors and nurses worked closely with department and county officials to vaccinate the unvaccinated.

3. The New York State Response



Department of Health Mobilization Strategy

- Department's **Incident Management System** activated from start of outbreak
- Healthcare Outreach and Communication
- Community Education and Outreach
- Preventing Spread in Schools and at Summer Camps
- New York State Legislative Action

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Healthcare Outreach and Communication

- Issued advisories, held conference calls and forums
- Made detailing visits to more than 30 medical practices, urgent care centers, and hospitals
- Provided vaccine to affected counties
- Coordinated specimen lab testing at Wadsworth Center
- Distributed educational materials for patients and families
- Collaborated with Refuah FQHC in Rockland County throughout outbreak

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Community Education and Outreach

Printed Educational Materials

- Developed flyers, posters, information postings at malls and highway rest stops, and articles in local publications because digital communication was deemed ineffective for reaching affected demographic.
- Ensured that printed materials were available in English and Yiddish.
- Printed and mailed 90,000 copies of booklets on measles and vaccination to households in affected ZIP codes.
- Distributed 55,000 door hangers to households in affected ZIP codes.

Meetings, Forums, and Conference Calls

- Held conference calls with women in affected communities.
- Met with community, religious and educational leaders in affected counties.

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Preventing Spread among Children

In Schools

- Unvaccinated children not admitted to schools or day care centers in outbreak areas, some for entire outbreak.
- Each school in outbreak areas required to confirm compliance weekly. Most schools audited and several fined for noncompliance.
- Rockland County denied unvaccinated children admittance to all schools near schools with measles cases.
- At peak of outbreak, Rockland denied 6,000 unvaccinated children entry to 60 schools.

At Summer Camps

- Unvaccinated campers not admitted in high-risk counties.
- Summer population in Sullivan County swells to about 300,000 (from 67,000) because of primarily Orthodox vacationers and campers from NYC.
- Despite this increase, all 300 camps in affected counties were audited.

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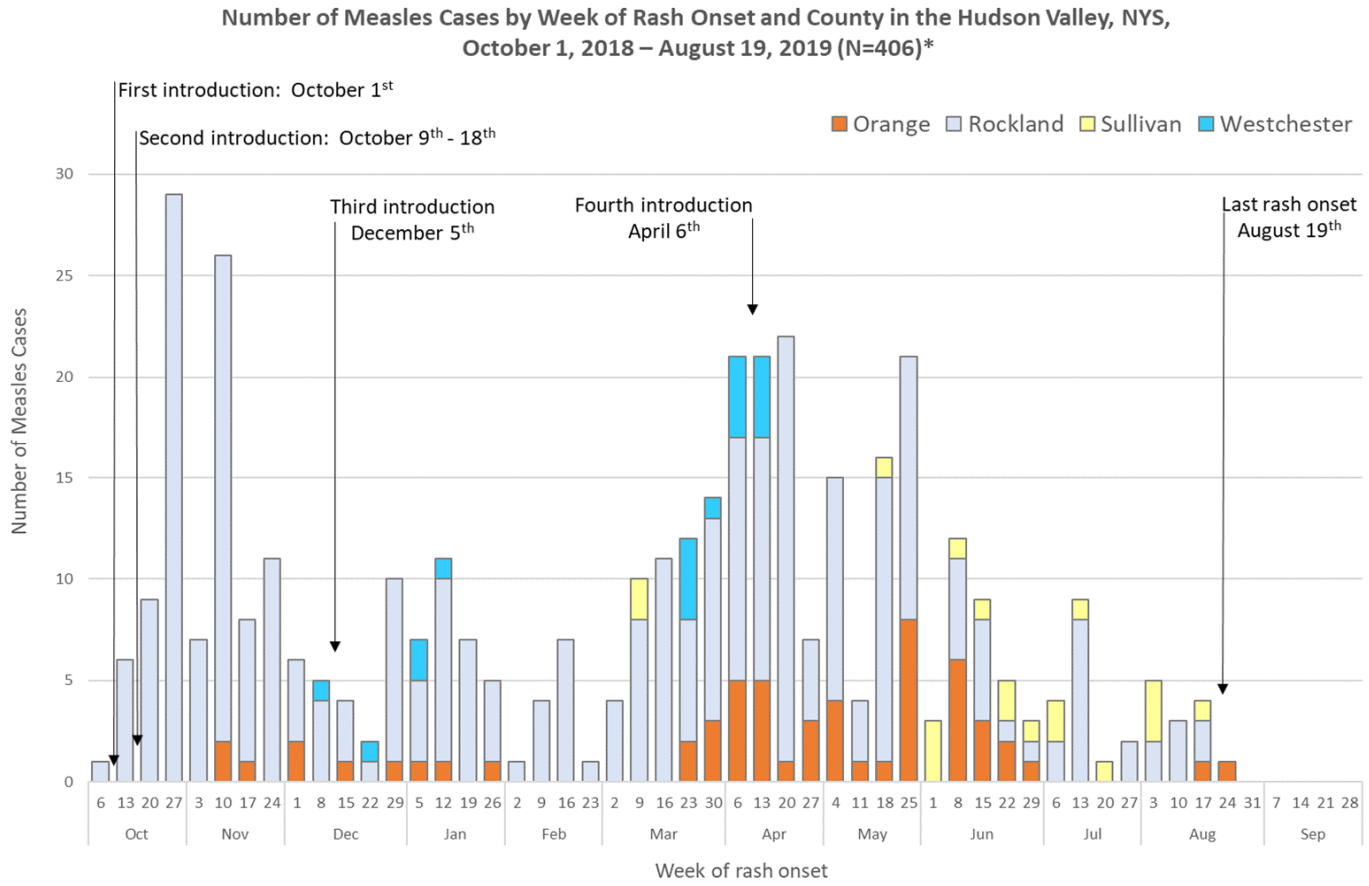
New York State Legislative Action

- On June 13, 2019, Governor Cuomo signed legislation (S.2994A/A.2371) **removing nonmedical exemptions** from school vaccination requirements for New York state children.
- In August, the Department of Health joined the Office of Children and Family Services to issue **emergency regulations** providing physicians with clear, evidence-based guidance on determining when immunization may be detrimental to a child's health.

4. Data Analysis

Measles Outbreak Cases by Week of Rash Onset and County



Rates of Vaccination

- New York state has high MMR immunization coverage overall—96% among school-age children.
- Before outbreak, vaccination coverage for children age 1–18 in 4 most affected ZIP codes was **87.3%**.
- Vaccinations during outbreak primarily administered in private practices and FQHCs and public health–held clinics.
- By August 1, 2019, vaccination coverage for children age 1–18 in those ZIP codes increased to **98.3%**.

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Measles Outbreak Cases by Age and Vaccination Status*

Age Group	Number of MMR Doses				
	0	1	2	Unknown	Total
<6 months	17	0	0	0	17 (4%)
6-11 months	31	3	0	0	34 (8%)
1-4 years	110	14	3	7	134 (33%)
5-17 years	125	3	2	9	139 (34%)
18+ years	34	4	10	34	82 (20%)
Total	317 (78%)	24 (6%)	15 (4%)	50 (12%)	406

* 10/1/2018 – 8/19/2019; excluding NYC

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Measles-Associated Complications in Outbreak

- No deaths or documented cases of encephalitis.
- 28 (7%) patients diagnosed with pneumonia.
- 28 (7%) patients hospitalized; 20 of them (71%) were children, with 6 (30%) (ranging in age from 1 day to 7 years) admitted to ICU.
- Two women who had measles while pregnant gave birth to preterm infants at 34 and 25 weeks' gestation. Both infants had congenital measles infection confirmed by measles PCR testing.

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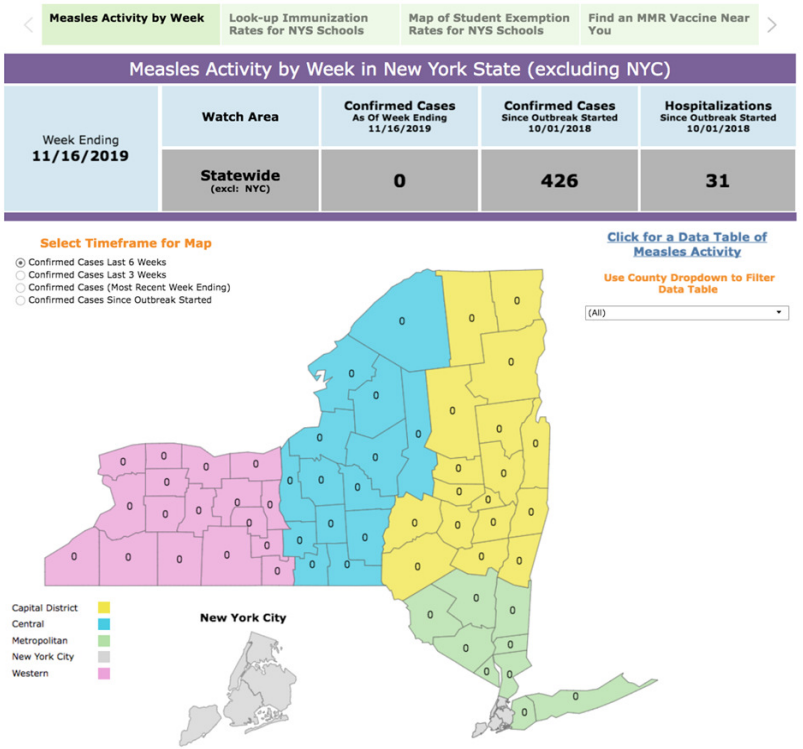
5. What We Learned

Factors Contributing to Outbreak

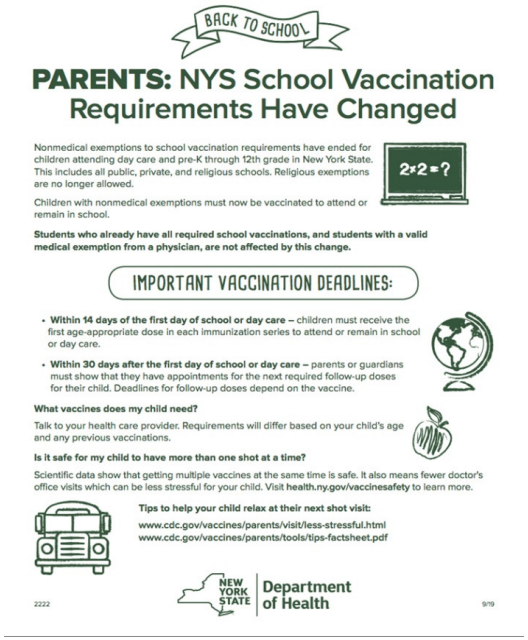
- Vaccine hesitancy
- Targeted anti-vaccine activity and misinformation
- Multiple importations following large outbreak in Israel
- Large gatherings
- Close-knit communities
- Large families
- Underreporting and unidentified transmission
- Families did not always seek medical care
- Lab testing limitations

Department Action on Measles

New York State Measles Watch



Critical Steps to Prevent Future Outbreaks



BACK TO SCHOOL

PARENTS: NYS School Vaccination Requirements Have Changed

Nonmedical exemptions to school vaccination requirements have ended for children attending day care and pre-K through 12th grade in New York State. This includes all public, private, and religious schools. Religious exemptions are no longer allowed.

2+2=?

Children with nonmedical exemptions must now be vaccinated to attend or remain in school.

Students who already have all required school vaccinations, and students with a valid medical exemption from a physician, are not affected by this change.

IMPORTANT VACCINATION DEADLINES:

- **Within 14 days of the first day of school or day care –** children must receive the first age-appropriate dose in each immunization series to attend or remain in school or day care.
- **Within 30 days after the first day of school or day care –** parents or guardians must show that they have appointments for the next required follow-up doses for their child. Deadlines for follow-up doses depend on the vaccine.

What vaccines does my child need?

Talk to your health care provider. Requirements will differ based on your child's age and any previous vaccinations.

Is it safe for my child to have more than one shot at a time?

Scientific data show that getting multiple vaccines at the same time is safe. It also means fewer doctor's office visits which can be less stressful for your child. Visit **health.ny.gov/vaccinesafety** to learn more.

Tips to help your child relax at their next shot visit:

www.cdc.gov/vaccines/parents/visit/less-stressful.html
www.cdc.gov/vaccines/parents/tools/tips-factsheet.pdf

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2222 9/19

- Ongoing **vigilance** regarding vaccine hesitancy
- Strong **partnerships** and communication channels with county health departments and local healthcare providers
- Removing **nonmedical exemptions** from school vaccination requirements across New York state

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Outbreak All-Stars

New York State Department of Health

Debra Blog, Dina Hoefer, Elizabeth Rausch-Phung, Elizabeth Dufort, Patrick Bryant, Nina Ahmad, Lou Smith, Rachel Wester, Kirsten St. George, Jamie Sommer, Karen Southwick, Candace Noonan-Toly, Kimberly Carrasco, Dylan Johns, Stephanie Ostrowski, Eleanor Adams, Brad Hutton

Rockland County Department of Health

Patricia Ruppert, Maria Souto, Kevin McKay, Tatiana Dolinsky

Orange County Department of Health

Lissette McNulty, Irina Gelman, Debbie Fagan

Westchester County Department of Health

Ada Huang, Toby Levin, Sherlita Amler

Sullivan County Department of Health

Nancy McGraw

CDC

Manisha Patel, Paul Gastanaduy, Robert McDonald

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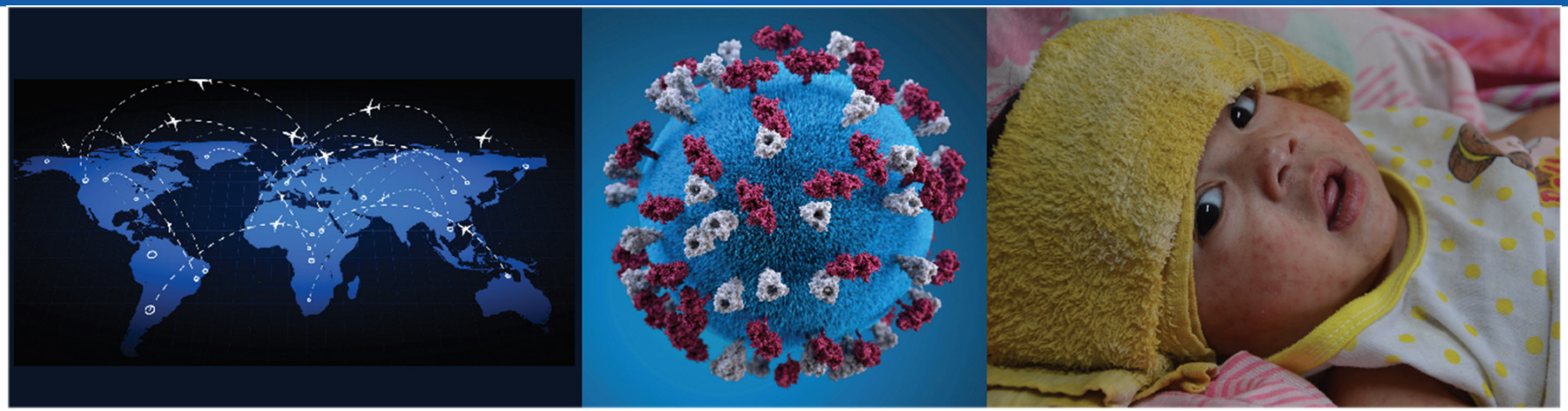
2018–2019 measles outbreak: The New York City experience



Oxiris Barbot, MD

Commissioner

New York City Department of Health and Mental Hygiene

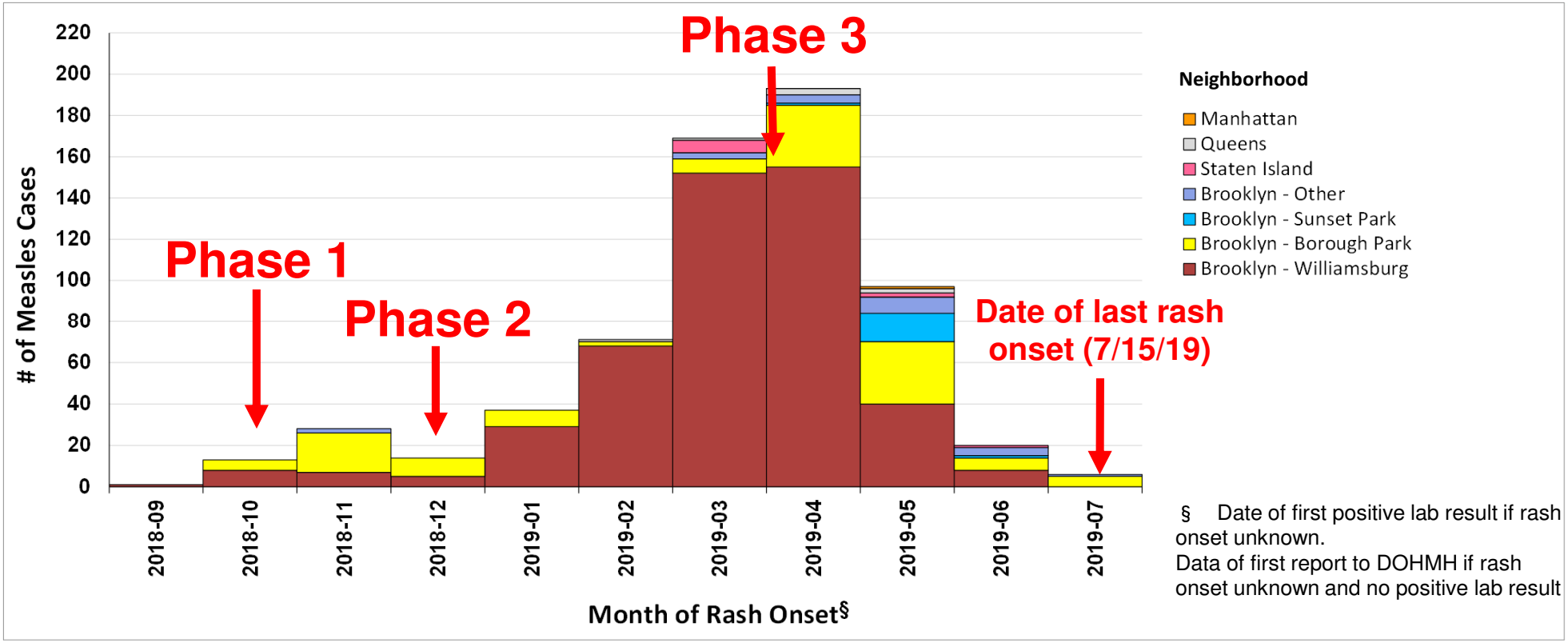
OVERVIEW

- Geographic distribution and demographic description of cases
- Complications among affected persons
- Factors that led to the outbreak
- Twofold DOHMH response:
  - Measles virus
  - Vaccine misinformation
- Lessons learned
- Future challenges

Locations of Measles Outbreaks

- First case had rash onset on Sept. 30, 2018
  - Unvaccinated child who returned from Israel
- Centered in two Orthodox Jewish neighborhoods in Brooklyn

MEASLES CASES BY DATE OF RASH & NEIGHBORHOOD (N=649)



§ Date of first positive lab result if rash onset unknown.
Data of first report to DOHMH if rash onset unknown and no positive lab result

Source: NYC DOHMH surveillance data, as of 9/25/19.

Demographics of Cases (N=649)

Characteristics	n (%)
Age Category:	
<1 year	102 (16)
1 to 4 years	277 (43)
5 to 19 years	146 (22)
≥18 years	124 (19)

Vaccination Status of Cases (N=649)

- Unvaccinated: 476 (86%)*
  - Age <12 months: 100
  - Age ≥12 months: 376 Preventable Cases
- Vaccinated: 79 (14%)*
  - 1 prior MMR: 46
  - 2 prior MMR: 33
- Unknown vaccination history (primarily adults): 94

*% among cases with known vaccination status, as of December 20, 2019

Persons Experiencing Complications

- Hospitalizations: 49 (8%)
  - 20 ICU admissions
- Pneumonia: 37 (6%)
- Otitis media: 63 (10%)
- Diarrhea: 92 (14%)
- No cases of encephalitis or deaths have occurred

As of December 20, 2019

Why Did This Outbreak Occur?

- **Low herd immunity in a densely populated, relatively closed community with large young households**
  - Existing coverage low, vaccination delay until school enrollment
  - Religious exemptions have almost tripled in past 6 years
    - Citywide from 0.5% in 2012–13 to 1.5% in 2018–19
    - In Orthodox Jewish schools, from 0.7% in 2012–13 to 2.7% in 2018–19; some schools had religious exemptions as high as 28%

What Made This Response So Complex?

- Multiple importations (Israel, UK, Ukraine, NY, NJ)
- Multiple exposures (>20,000 exposures) and chains of transmission (>100 chains)
- Vaccine hesitancy fueled by vaccine misinformation cloaked in religious terms
- Parents not bringing children for care or providing exposure information, precluding control measures

DOHMH Response: Measles outbreaks

1. Clinical
2. School or day care
3. Legal
4. Communication

DOHMH Response: Measles Outbreaks

Clinical

- Clinical and infection control consultation
- Technical assistance to facilities or providers serving the affected communities
- Assist with postexposure prophylaxis for exposed persons

School and Child Care

- Exclusion of unvaccinated students with medical or religious exemptions from schools, communities with active measles cases

April 9, 2019: Public Health Emergency Declared

- Every adult and child who lives, works, or resides in Williamsburg and has not received the MMR vaccine must be vaccinated
- Exception: People who demonstrate they are immune from measles or have a valid medical exemption
- Last public health emergency ordered people to get vaccinated against smallpox ~1901

DOHMH Response: Measles outbreaks

Legal

- Five parents challenged vaccination order
- On April 18, 2019, Justice Lawrence Knipel denied motion for an injunction and dismissed their challenge finding:
  - Williamsburg at “the epicenter” of “the most significant spike in incidences in the United States in many years”
  - Petitioners unable to offer better, less restrictive alternative
  - Medical objections not supported by science
- Appellate Division denied temporary restraining order on April 30, 2019, and motion for preliminary injunction on May 13, 2019

DOHMH Response: Vaccination Misinformation

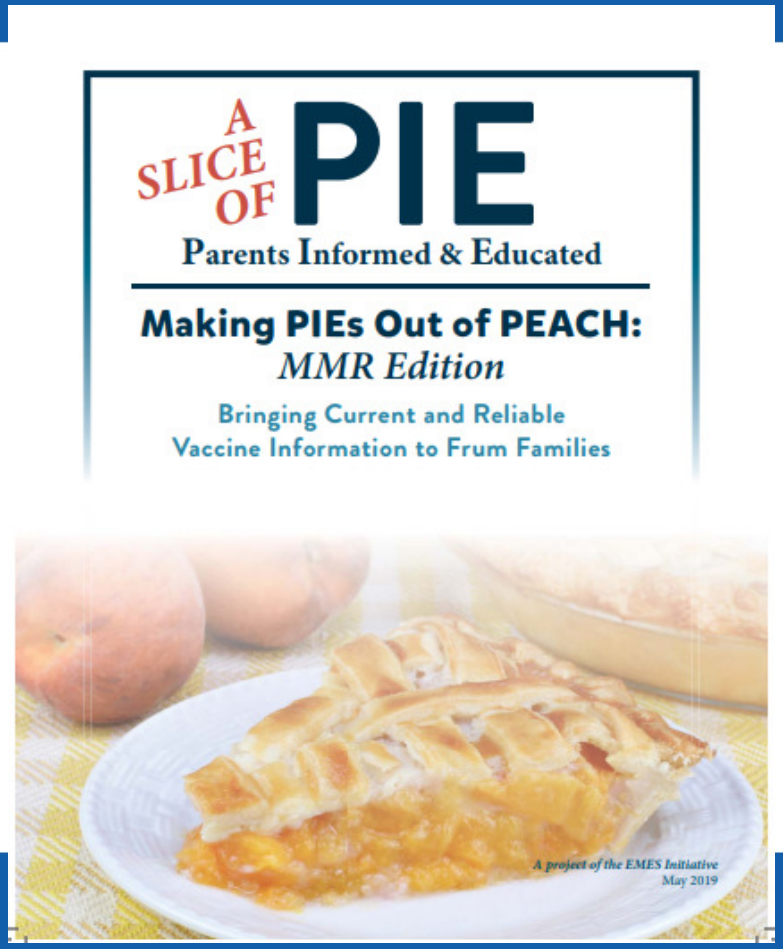
Communication

- Community collaboration
  - Religious leaders
    - Met with rabbinical and community leaders, elected officials
  - Medical partnerships
    - Jewish Orthodox Women's Medical Association and Vaccine Task Force
    - Pediatric care practices
- Information disseminated through various outlets

DOHMH Response: Vaccination Misinformation

- WHO declared vaccine hesitancy as top 10 threat to global health
- Anti-vaxxers infiltrated ultra-Orthodox Jewish community
  - Robocalls and flyers conveying false information spread throughout community
  - **P**arents **E**ducating and **A**dvocating for **C**hildren's **H**ealth, an anti-vaccine organization, led efforts to intensify vaccine hesitancy

DOHMH RESPONSE: "*A SLICE OF PIE*"



VACCINE SAFETY

How Do I Know Vaccines Are Safe?
Just like all drugs, vaccines undergo a lot of scrutiny before being approved. It takes many years, from the application process, all the way through all the stages of testing, to receive approval for use on humans. Once a vaccine is approved, that is not the end of the monitoring. Several organizations oversee the manufacturing, and continually gather information on all vaccines to ensure safety and effectiveness.

Here are some organizations that monitor vaccine safety:
The following organizations monitor vaccine safety: the Food and Drug Administration, Centers for Disease Control and Prevention, National Institutes of Health, and the Department of Defense, among others. There are surveillance systems to identify vaccine safety concerns, including: Vaccine Adverse Event Reporting System (VAERS), Vaccine Safety Datalink (VSD), Post-Licensure Rapid Immunization Safety Monitoring (PRISM), and the Clinical Immunization Safety Assessment (CISA) Project.

Anti-Vaxx Myth: There are no safety studies or any real way to know if vaccines are safe.

PIE: False. Vaccines are studied and monitored from the very beginning and go through years of safety testing in labs and clinical trials before they go to market. Once the vaccine is approved, the manufacturer tests batches of the vaccine for quality and safety before the FDA can recommend it for use. Once the vaccine goes to market, multiple agencies monitor its safety and provide additional checks. ***Source:*** HHS, 2017b

Anti-Vaxx Myth: "It is rare for a vaccine to be removed from circulation, no matter how much damage it is causing."

PIE: False. As with any drug, not all adverse effects will occur during clinical trials. Therefore, once a vaccine is made available to the public, information is continually gathered to identify problems after marketing begins. Although vaccines rarely cause long-term harm, there have been a few cases where a specific vaccine was found to be unsafe once they were already in use. In these cases, the vaccine was immediately removed from circulation.
Source: HHS, 2017b; Offit, 2005; CDC, 2015

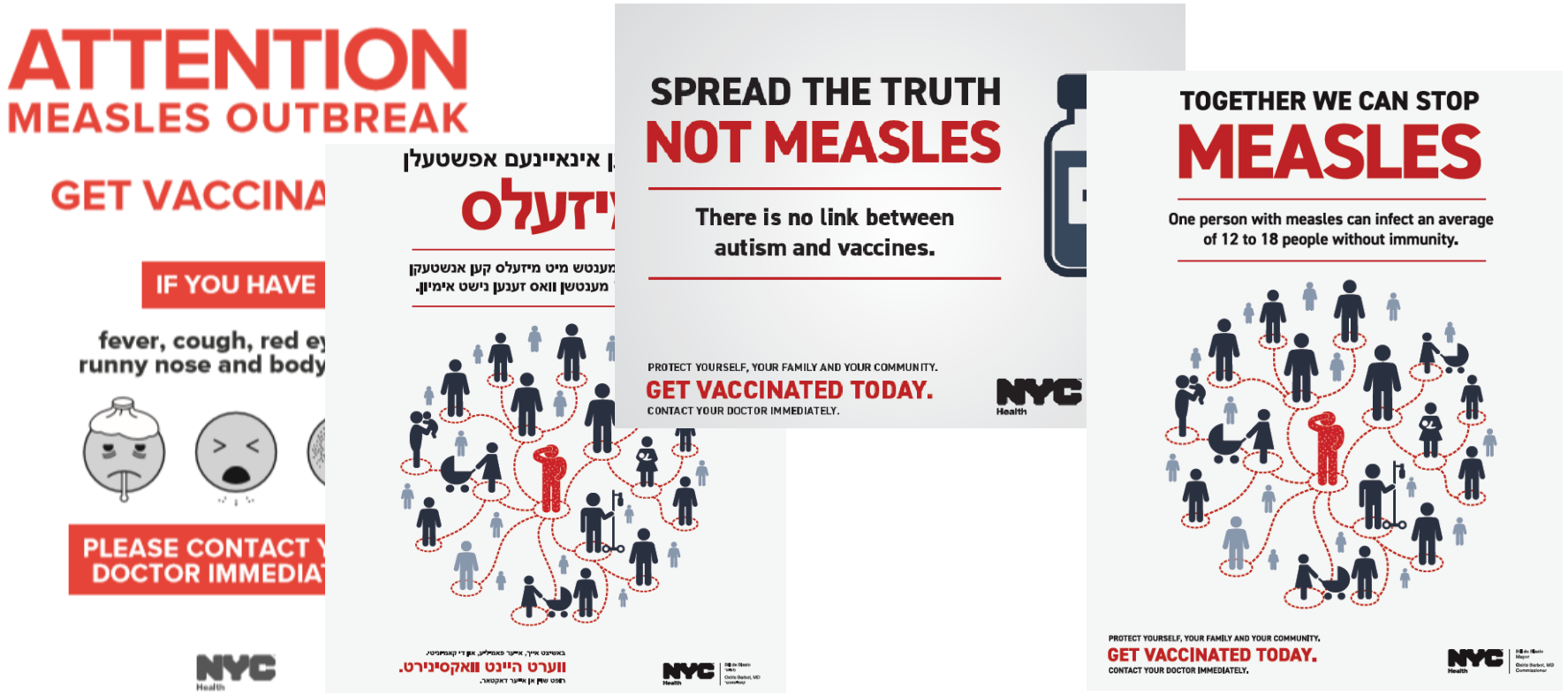
Is there any connection between autism and vaccines?

In 1998, a study by Andrew Wakefield, then a consultant gastroenterologist, was published in the Lancet, a British medical journal. He studied 12 children whose parents claimed they noticed behavioral regression and gastrointestinal symptoms after their children received the MMR vaccine . After publishing his study, Wakefield then held a press conference where he stated that the MMR vaccine was unsafe, and advocated the use of single-antigen vaccines (i.e., separating the measles, mumps, and rubella into three separate vaccines).
Source: Dyer 2010; Wakefield, 1998

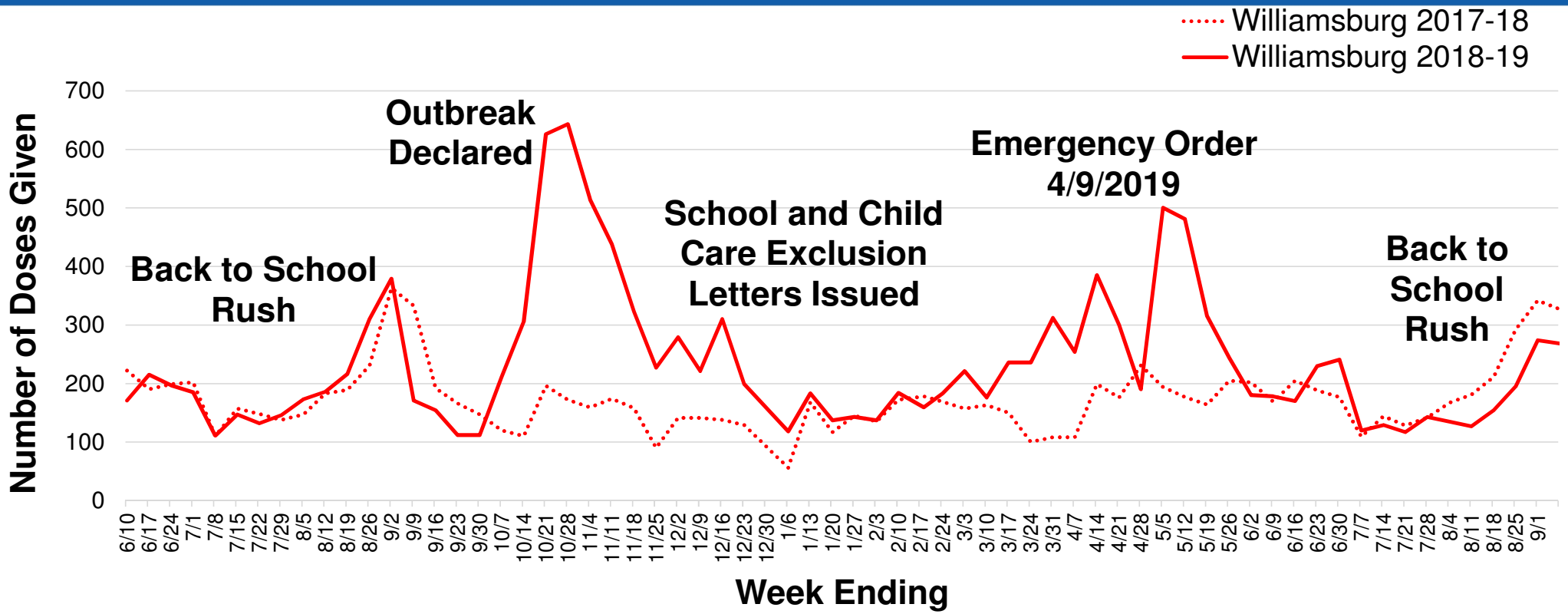
Wakefield's study, however, never concluded that MMR caused either autism or the gastrointestinal problems. To the contrary, Wakefield actually made the following statement in his study: **"We did not prove an association between measles, mumps, and rubella vaccine and the syndrome described."** He also concluded that, "A genetic predisposition to autistic-spectrum disorders is suggested by over-representation in boys and a greater concordance rate in monozygotic [identical] than in dizygotic [fraternal/non-identical] twins."
Source: Dyer 2010; Wakefield, 1998

https://www1.nyc.gov/assets/doh/downloads/pdf/a-slice-of-pie

DOHMH Response: Media Campaigns



DOHMH Response: MMR Vaccine Uptake



Source: NYC DOHMH Citywide Immunization Registry, data as of 9/1/2019, run on 9/3/2019

DOHMH Response: by Numbers

- ~ 560 DOHMH staff deployed
- ~ 104,000 person-hours spent
- 2,279 suspect cases of measles investigated
- >3,200 diagnostic tests performed by DOHMH labs
- Agency spent $8.4 million to end outbreak
  - Actual cost to community much greater

Lessons Learned

- Decades old public health victories cannot be taken for granted
- More granular surveillance and immunization coverage data key to early identification of susceptible populations
- Leverage community relationships to build new alliances

Future Challenges

- Vaccine hesitancy requires resources for continued education in vulnerable communities
- Ongoing risk of international importation
- Implementation of state law removing religious exemptions and NYC health code changes requiring DOHMH review of all medical exemptions

SPECIAL THANKS TO…

- **Division of Disease Control**

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- **Office of General Counsel**

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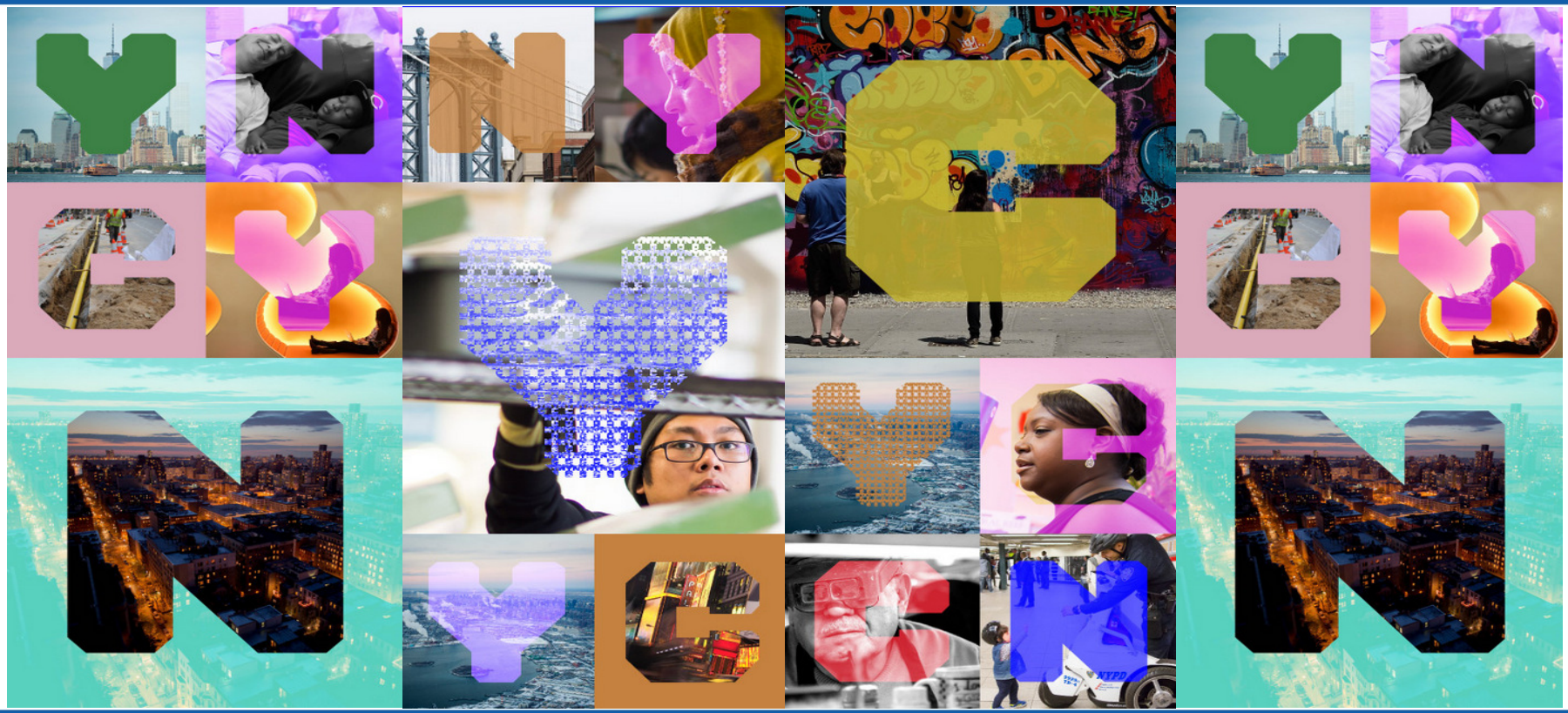
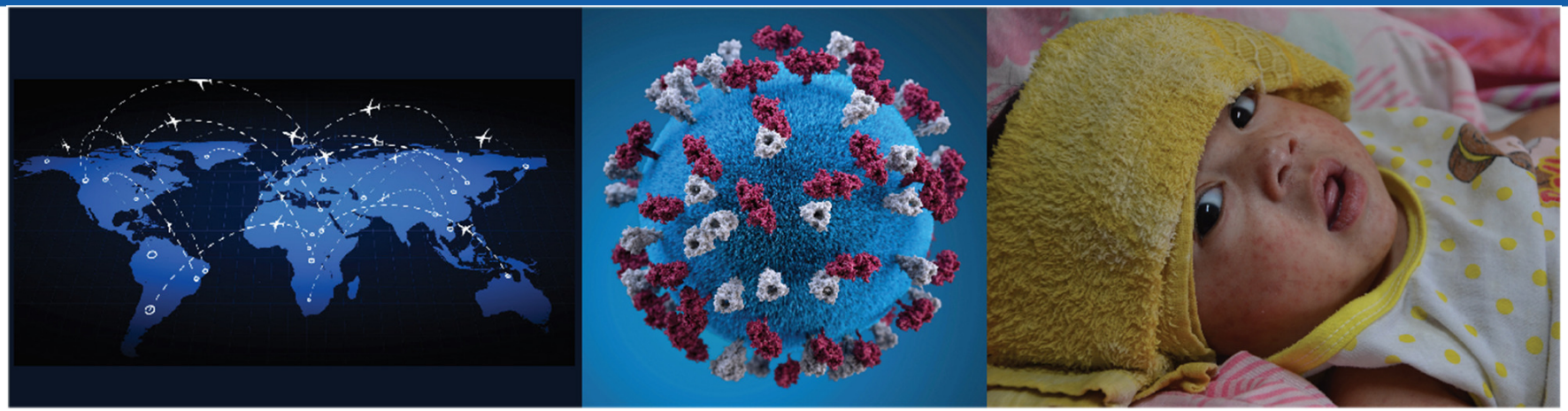
- **Office of Exernal Affairs**

Maura Kennelly, M.P.H.

Thank You!



Strengthening Confidence in Vaccines



Amanda Cohn, MD (CAPT, USPHS)

Chief Medical Officer

National Center for Immunization and Respiratory Diseases

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Vaccine coverage is high in the United States

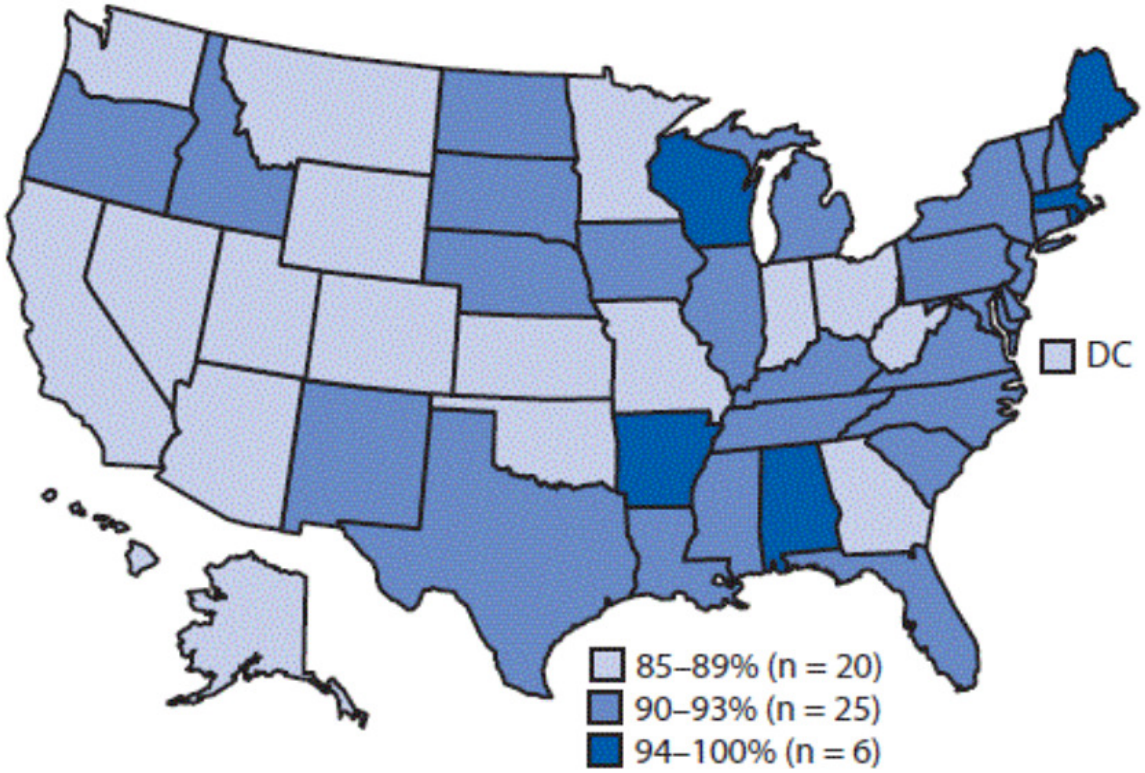
- **Nearly 99% of U.S. children have received some vaccines by the age of 2 years**
- **Over 94% of kindergarteners have received 2 doses of measles, mumps, and rubella vaccine (MMR) and the state-required number of doses of diphtheria, tetanus, and acellular pertussis (DTaP) and varicella vaccines**

Seither et al, MMWR, October 17, 2019

Figure adapted from Gabriele Malaspina, the Noun Project

Some children remain unprotected

≥1 Dose MMR vaccination coverage by 24 months among children born in 2015–2016



Nationwide coverage: 90.4%

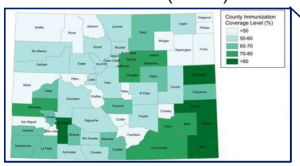
Lower in children who are:

- Uninsured/underinsured
- Reside in rural area
- Live below poverty level

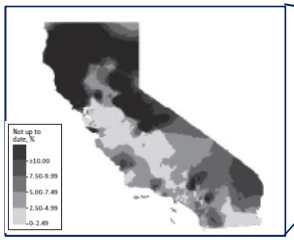
Source: National Immunization Survey

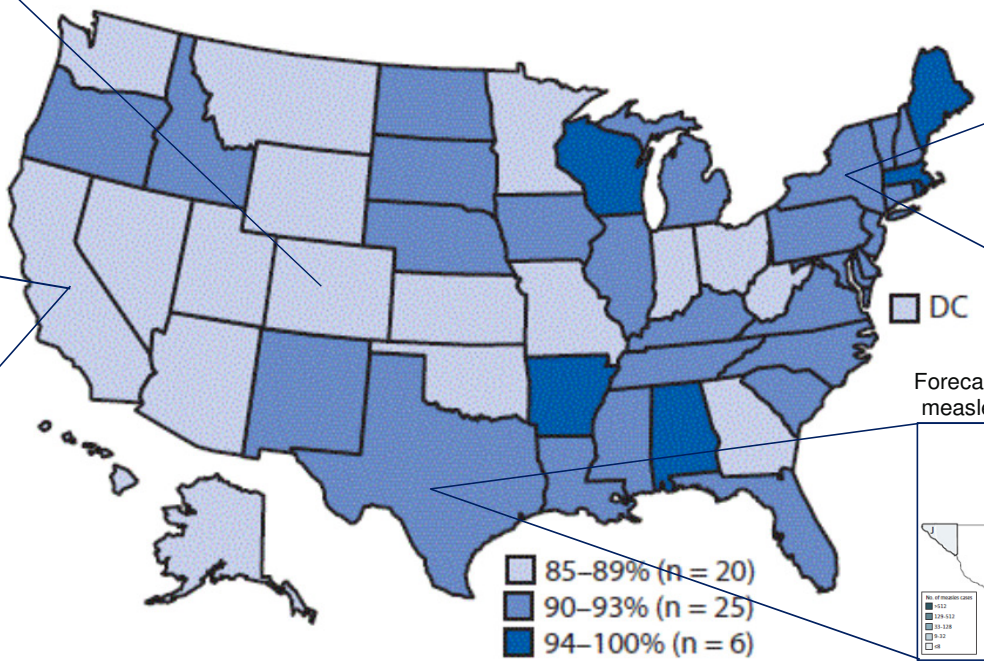
Pockets of low vaccination threaten communities

Vaccine coverage in 19- to 35-month-olds (2016)

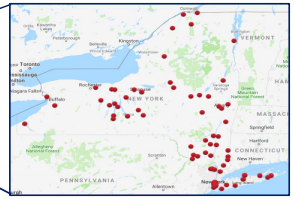


Proportion of kindergarteners not up to date (2017)

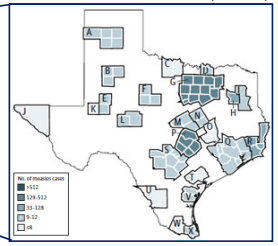




Schools with <75% MMR coverage (2017–2018)



Forecasted size of potential measles outbreaks (2018)



Source: National Immunization Survey
New York State Student Identification System
Sinclair D, et al. JAMA network open. 2019
Pingali S, JAMA. 2019

Characteristics of Low Vaccination Pockets

- **Each community is unique,** with distinct factors affecting vaccination:
  - Close-knit
  - Isolation or insularity
  - Access issues
  - Distrust of public authorities
  - Localized misinformation

Myths and misinformation

- Myths have always been part of the vaccine landscape
- But **rapid dissemination and sophistication** of misinformation present new challenges
  - Internet access
  - Social media
  - Talk radio and television
- Misinformation plays a clear role in eroding vaccine confidence and puts our programs at risk

Vaccine misinformation can be tailored for specific communities

Vaccinate with Confidence

Protect communities. Empower families. Stop myths.

CDC's strategic framework for strengthening vaccine confidence and preventing outbreaks of vaccine-preventable diseases in the United States

Vaccinate with **Confidence**

Protect communities. Empower families. Stop myths.

Protect communities

Use every tool available to find and protect communities at risk using tailored, targeted approaches

Empower families

Ensure parents are confident in decision to vaccinate by strengthening provider-parent vaccine conversations

Stop myths

Use local partners and trusted messengers, establish new partnerships to contain the spread of misinformation, and educate critical stakeholders about vaccines

Vaccinate with **Confidence**

Protect **communities**

- ✓ Leverage immunization data to find and respond to communities at risk
- ✓ Work with trusted local partners to reach at-risk communities before outbreaks
- ✓ Ensure vaccines are available, affordable, and easy to get in every community

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Empower **families**

- ✓ Expand resources for healthcare professionals to help them have effective vaccine conversations with parents
- ✓ Work with partners to start conversations before the first vaccine appointment
- ✓ Help providers foster a culture of immunization in their practices

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- ✓ Help providers foster a culture of immunization confidence in their practices

Stop **myths**

- ✓ Work with local partners and trusted messengers to improve confidence in vaccines among key, at-risk groups
- ✓ Work with social media outlets to promote trustworthy vaccine information
- ✓ Provide accurate, accessible information on vaccines to state policy makers
- ✓ Engage state and local health officials to advance effective local responses to misinformation

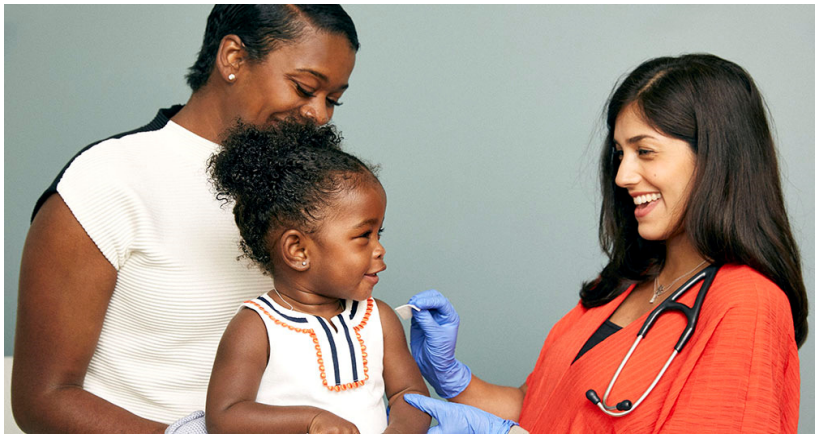
Here is What CDC is Doing!

Picture courtesy of AAP and SELF Magazine.

- Leverage diverse data sources to find and protect communities at risk
- Expand resources for working with communities
- Build and foster a culture of immunization in healthcare practices
- Provide technical assistance to funded partners
- Strengthen communication strategies
- Further invest in our vital partners

Partnership is key

- To truly keep Americans safe, every generation, community, and child needs to be appropriately immunized
- Together, we can protect our communities, empower families, and stop myths



Picture courtesy of AAP and SELF Magazine.

Thank you

Vaccinate with **Confidence**

Protect communities. Empower families. Stop myths.

For more information, contact CDC

1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348 **www.cdc.gov**

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Upcoming Programs of Interest

March 17, 2020
Public Health Grand Rounds
Laboratory Response Network

April 21, 2020
Public Health Grand Rounds
Predictive Analytics and Public Health

May 19, 2020
Public Health Grand Rounds
Smoking Cessation: New Insights and Future Directions