

The Measles Outbreaks of 2018/2019: Perspectives from Local Communities

Capitol Hill Briefing

September 23, 2019

American Academy
of Pediatrics



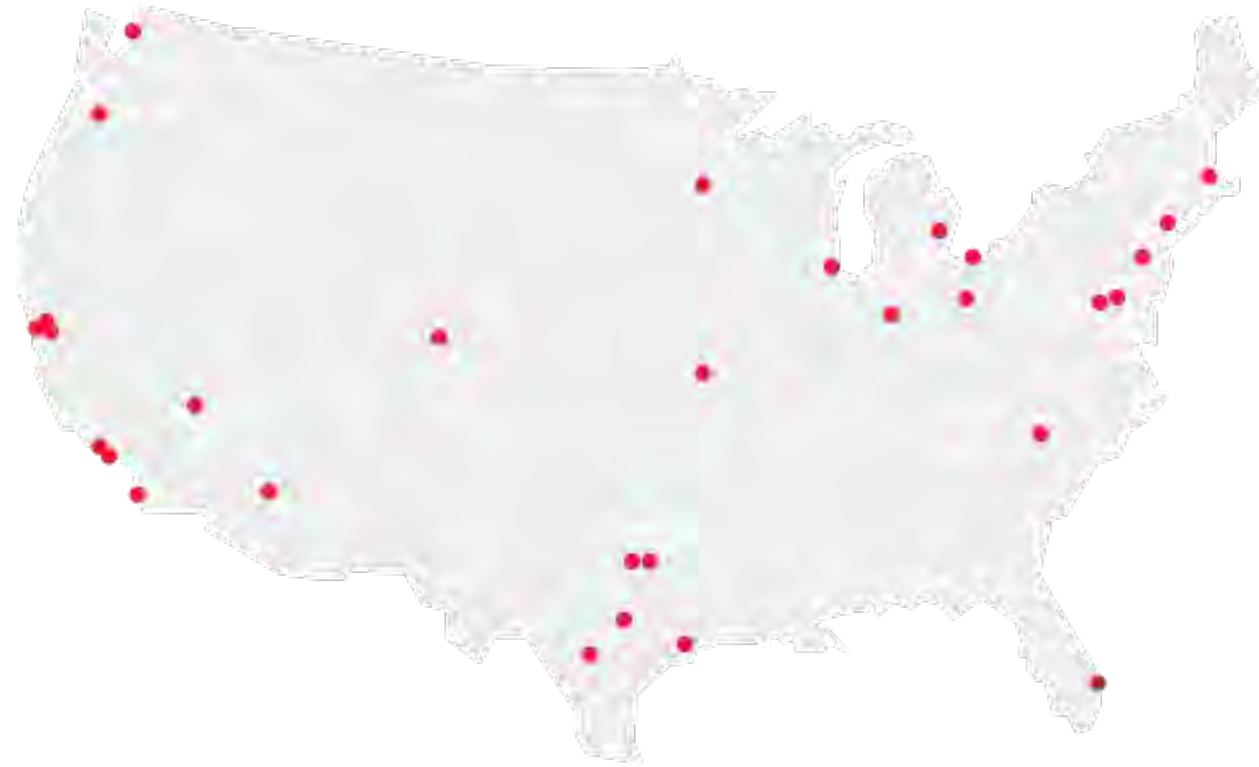
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The Big Cities Health Coalition (BCHC) is a forum for the leaders of America's largest metropolitan health departments to exchange strategies and jointly address issues to promote and protect the health and safety of their residents.



30 Cities – **62 Million** Served by Member LHDs



- Austin
- Baltimore
- Boston
- Charlotte (Mecklenburg Cty)
- Chicago
- Cleveland
- Columbus
- Dallas (Cty)
- Denver
- Detroit
- Fort Worth (Tarrant Cty)
- Houston
- Indianapolis (Marion Cty)
- Kansas City
- Las Vegas (S. NV Hlth District)
- Los Angeles (Cty)
- Long Beach
- Miami (Miami-Dade Cty)
- Minneapolis
- New York City
- Oakland (Alameda Cty)
- Philadelphia
- Phoenix (Maricopa Cty)
- Portland (Multnomah Cty)
- San Antonio
- San Diego (Cty)
- San Francisco
- San Jose (Santa Clara Cty)
- Seattle (Seattle-King Cty)
- Washington, D.C.



Speakers



- Chrissie Juliano, Executive Director, Big Cities Health Coalition
- Dr. Colleen Kraft, Immediate Past President, American Academy of Pediatrics
- Dr. Oxiris Barbot, Commissioner, New York City Department of Health and Mental Hygiene
- Dr. Jeffrey Gunzenhauser, Chief Medical Officer, Los Angeles County Department of Public Health

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Measles Outbreak 101: What, Why, Where, When

*Capitol Hill Briefing
September 23, 2019*

Collen Kraft, MD, FAAP
Immediate Past President
American Academy of Pediatrics

American Academy of Pediatrics
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AMERICAN ACADEMY OF PEDIATRICS

- Non-profit professional organization of more than 67,000 primary care pediatricians, pediatric medical subspecialists, and pediatric surgical specialists
- Dedicated to the health, safety, and well-being of all infants, children, adolescents, and young adults
- AAP publishes annual recommended childhood and adolescent immunization schedules in tandem with ACIP, CDC, AAFP and ACOG

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Recommended Childhood and Adolescent
Immunization Schedules: United States, 2019

COMMITTEE ON INFECTIOUS DISEASES



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HISTORY OF MEASLES IN THE UNITED STATES

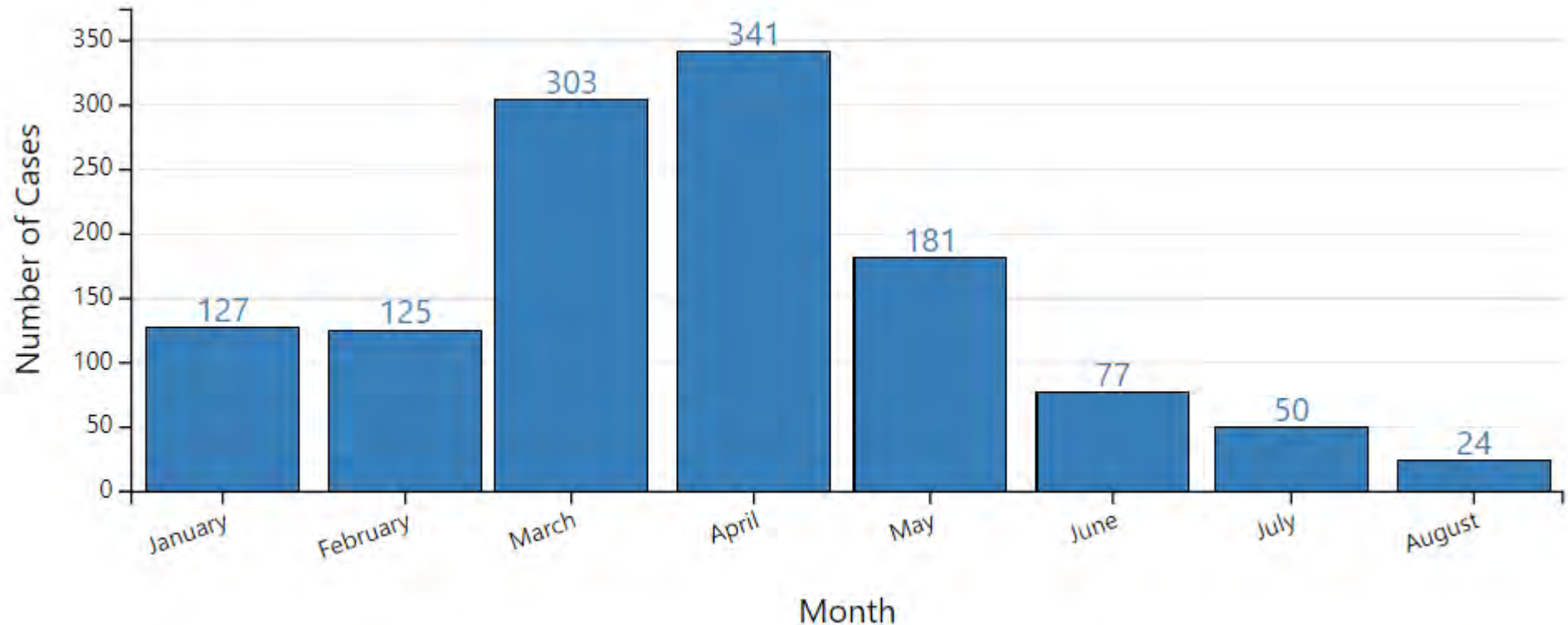
- In 1963 the measles vaccine was licensed in the United States, and, in 1968, measles vaccine began to be distributed.
- **Measles was declared eliminated from the United States in 2000.**
 - Elimination means there was no continuous disease transmission for more than 12 months.
 - This was possible thanks to a highly effective vaccination program and better measles control in the Americas region.
- However.....



Measles Cases in 2019

From January 1 to September 12, 2019, 1,241** individual cases of measles have been confirmed in 31 states. No new cases were reported September 6 – 12, 2019.

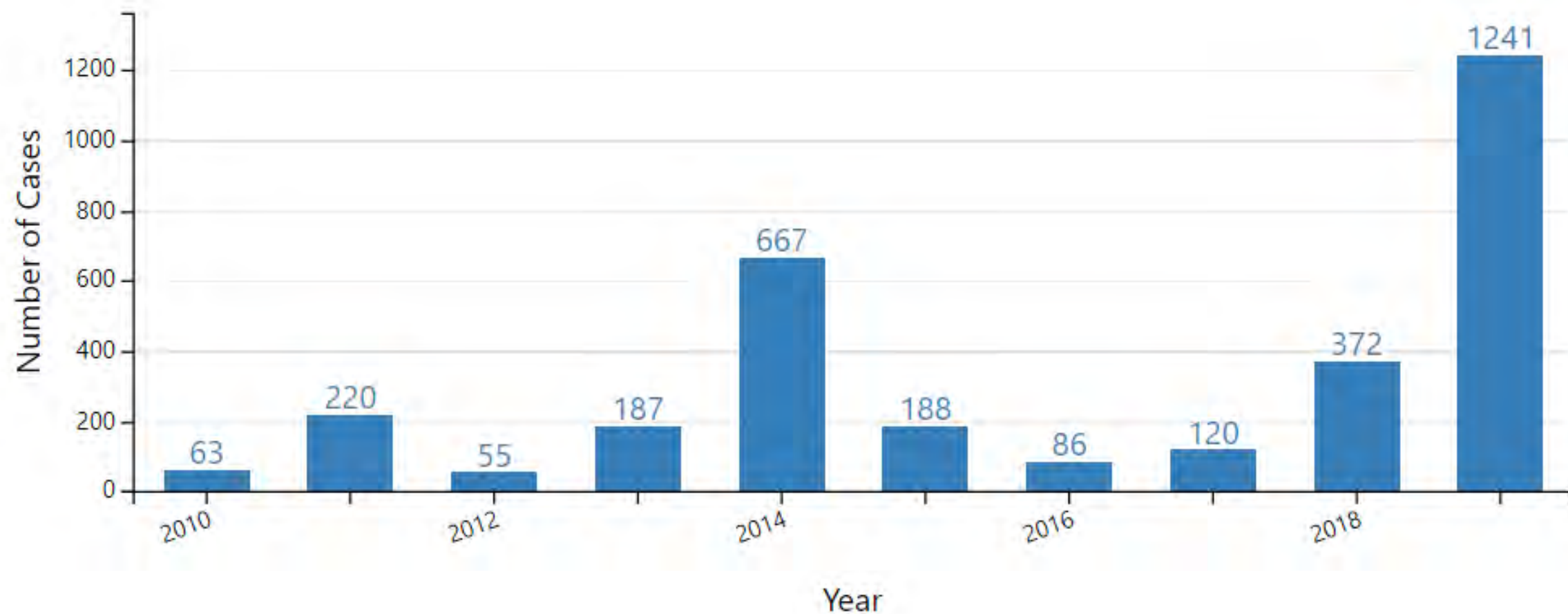
Measles Cases Reported by Month in 2019



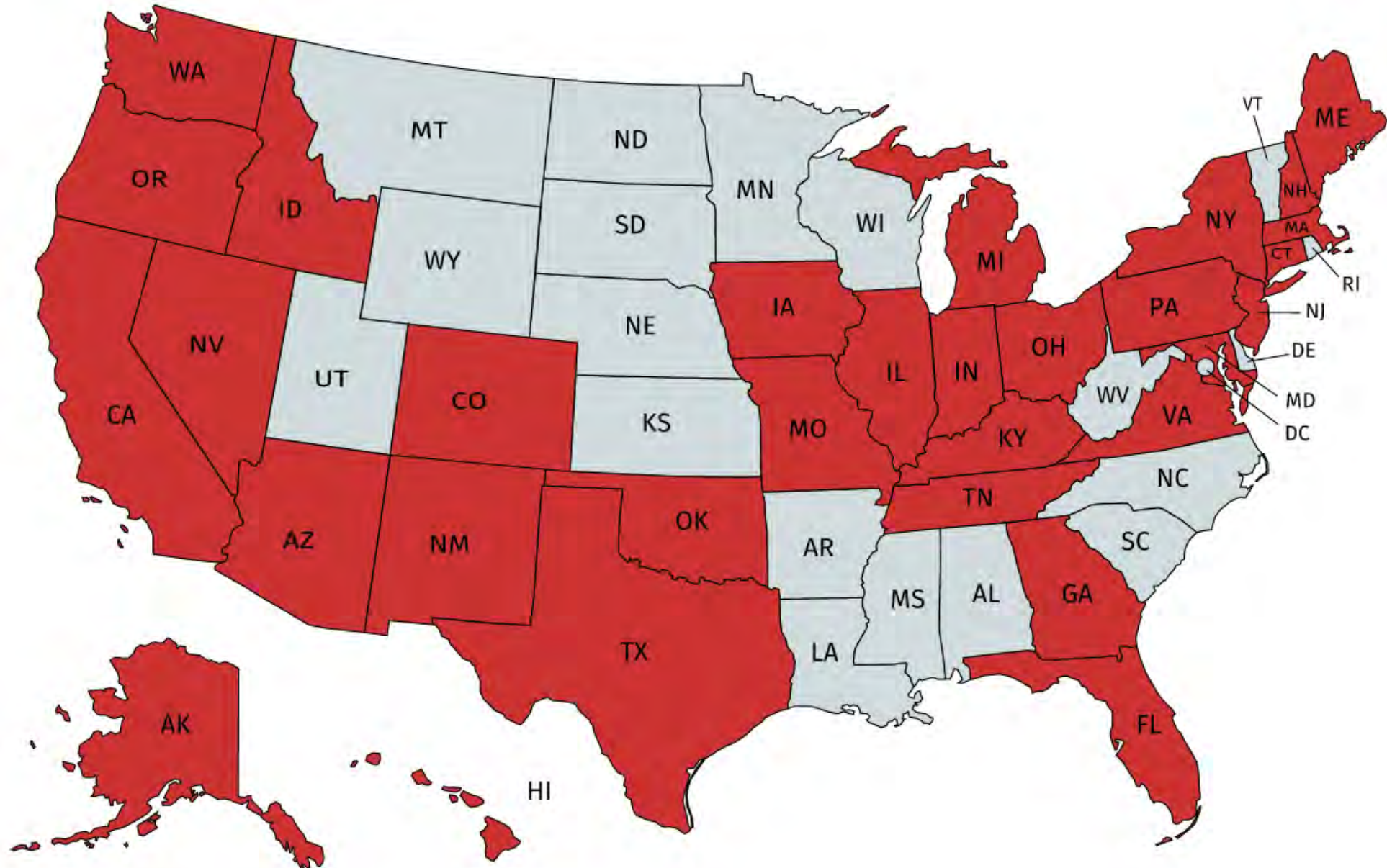
Source: CDC Measles Page – <https://www.cdc.gov/measles/cases-outbreaks.html>

Number of Measles Cases Reported by Year

2010-2019**(as of September 12, 2019)



States with Reported Cases of Measles in 2019



Reported measles cases in 2019, as of 09/12/19

Source: CDC Measles Page – <https://www.cdc.gov/measles/cases-outbreaks.html>

WHAT IS MEASLES?

- Measles is an acute viral disease characterized by fever, cough, runny nose, red eyes and sore throat, followed by a red or brownish blotchy rash beginning on the face and spreading throughout the body.
- Common complications of measles include otitis media, broncopneumonia, croup, and diarrhea.
- About 1 in 4 people who contract measles will be hospitalized.



SEVERE COMPLICATIONS FROM MEASLES

- As of September 12, 2019, 130 of the people who got measles this year were hospitalized, and 65 reported having complications, including pneumonia and encephalitis. (CDC)
- Acute encephalitis, which often results in permanent brain damage, occurs in approximately 1 of every 1,000 cases.
- In the post elimination era, death, predominantly resulting from respiratory and neurologic complications, has occurred in 1 to 3 of every 1,000 cases reported in the United States.



MEASLES IS EXTREMELY CONTAGIOUS

MEASLES



is **highly contagious** and spreads through the air when an infected person **coughs or sneezes**.



It is so contagious that if one person has it, **9 out of 10 people** of all ages around him or her will also become infected if they are not protected.



HOW IS MEASLES SPREAD?

- Once a child is exposed to and infected with the measles virus, his first symptoms will not appear for 8 to 12 days (the incubation period).
- Infected children tend to be contagious for 1 to 2 days before symptoms finally emerge and 3 to 5 days before the rash breaks out.
- This contagious period continues for 4 days after the rash appears.



MEASLES IS A PLANE RIDE AWAY



- The majority of people who got measles in 2019 were unvaccinated.
- Measles is still common in many parts of the world.
- Travelers with measles continue to bring the disease into the U.S.
- The main outbreaks have been associated with travelers who brought measles back from Israel, Ukraine, and the Philippines.

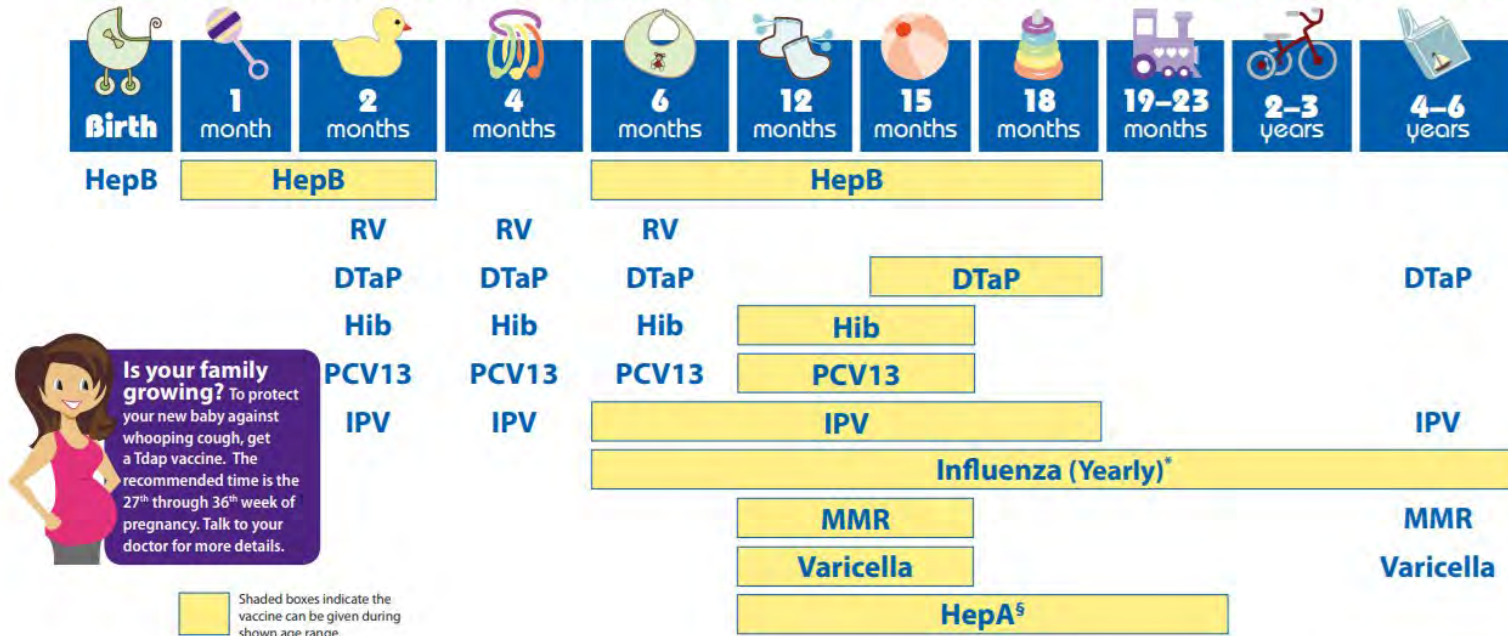


WHO IS MOST AT-RISK FOR MEASLES?

- Infants and children aged less than 5 years
- Adults aged more than 20 years
- Pregnant women
- People with compromised immune systems, such as from cancer, chemotherapy, or HIV infection



2019 Recommended Immunizations for Children from Birth Through 6 Years Old



NOTE:

If your child misses a shot, you don't need to start over. Just go back to your child's doctor for the next shot. Talk with your child's doctor if you have questions about vaccines.

FOOTNOTES:

* Two doses given at least four weeks apart are recommended for children age 6 months through 8 years of age who are getting an influenza (flu) vaccine for the first time and for some other children in this age group.

§ Two doses of HepA vaccine are needed for lasting protection. The first dose of HepA vaccine should be given between 12 months and 23 months of age. The second dose should be given 6 months after the last dose. HepA vaccination may be given to any child 12 months and older to protect against hepatitis A. Children and adolescents who did not receive the HepA vaccine and are at high risk should be vaccinated against hepatitis A.

If your child has any medical conditions that put him at risk for infection or is traveling outside the United States, talk to your child's doctor about additional vaccines that he or she may need.

See back page for more information on vaccine-preventable diseases and the vaccines that prevent them.

For more information, call toll-free
1-800-CDC-INFO (1-800-232-4636)
or visit
www.cdc.gov/vaccines/parents



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



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VACCINE RECOMMENDATIONS DURING OUTBREAKS



- During an outbreak, MMR vaccine should be offered to all people exposed or in the outbreak setting who lack evidence of measles immunity.
- During an outbreak that affects infants, MMR vaccine has been shown to be effective in preventing symptoms after exposure and may be recommended for infants 6 through 11 months of age.



What is **herd immunity**? how it works



Healthy,
non-vaccinated

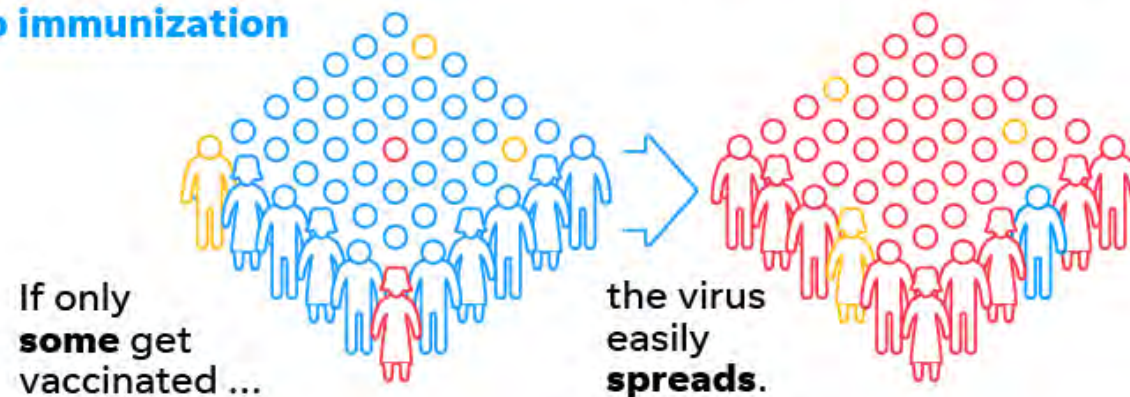


Healthy,
vaccinated

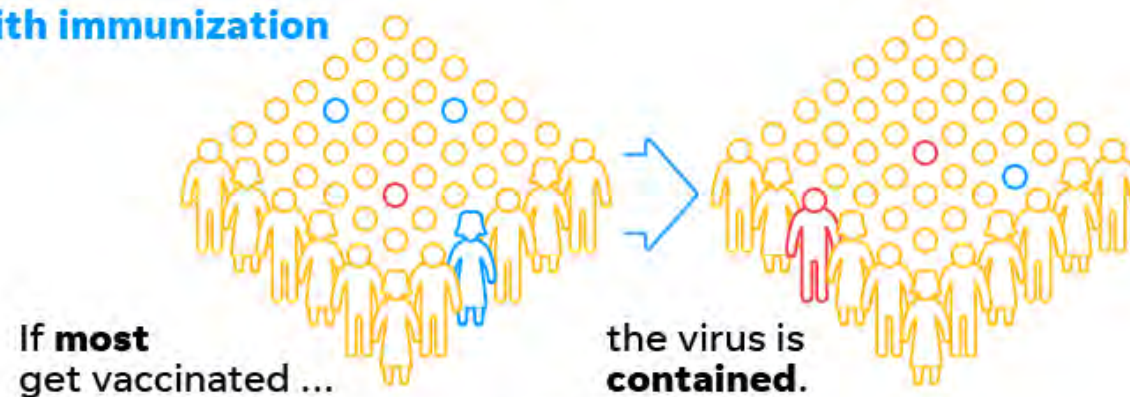


Not vaccinated,
contagious

No immunization



With immunization



SOURCE Centers for Disease Control and Prevention



FEDERAL LEGISLATION: VACCINES ACT

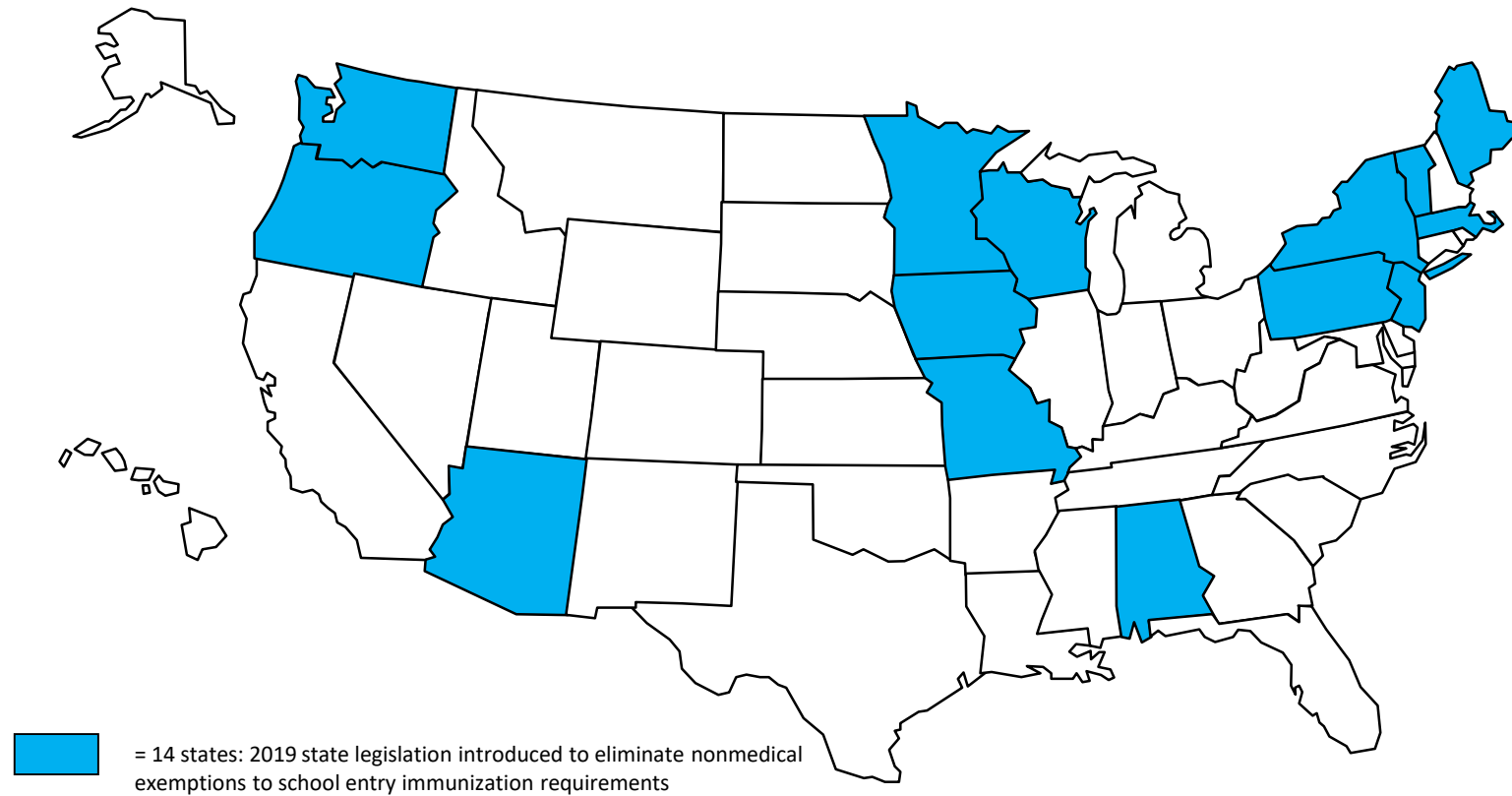
- Introduced by Rep. Kim Schrier (D-WA), a pediatrician, and Rep. Mike Burgess (R-TX), an obstetrician.
- The bill authorizes an evidence-based public awareness campaign on the importance of vaccinations



- The bill also:
 - Allows data collected to be used to identify communities with low vaccination utilization or where vaccine misinformation may be targeted.
 - Authorizes research grants to better understand vaccine hesitancy, attitudes towards vaccines, and develop strategies to address nonadherence to the recommended use of vaccines.



CHILDHOOD IMMUNIZATIONS: 2019 STATE LEGISLATION



REMINDER...

- Before the measles vaccination program started in 1963:
 - an estimated 3 to 4 million people got measles each year in the United States;
 - of these, approximately 500,000 cases were reported each year to CDC;
 - of these, 400 to 500 died, 48,000 were hospitalized, and 1,000 developed encephalitis (brain swelling) from measles.
- Since then, widespread use of measles vaccine has led to a greater than 99% reduction in measles cases compared with the pre-vaccine era.
- We still need to educate families and communities on the importance of vaccines.



RESOURCES

AAP Red Book

- **Red Book Online – Measles – 2019 Outbreaks Webpage**
- **Red Book – Measles chapter**
 - Clinical Manifestations
 - Diagnostic Tests
 - Treatment
 - Control Measures
 - Prevention

AAP.org and HealthyChildren.org

CDC



Chrissie Juliano

Executive Director

Big Cities Health Coalition



Role of Big City/Local Health Departments

Front lines of preventing and responding to outbreaks

- **Investigate** every suspected case
- Have **legal authority** to quarantine, issue emergency orders
- Ensure community is sufficiently **vaccinated**, providing them when necessary
- Provide clear, simple, accurate **messaging** on vaccination – or work with **partners** to do so





Role of the Federal Government

Can extend **capacity** of health departments, share subject matter expertise, when needed

Bully pulpit (i.e., the **Surgeon General**)

Reliable, Dedicated **Funding**



IMMUNIZATION PROGRAM



EPIDEMIOLOGY AND
LABORATORY CAPACITY



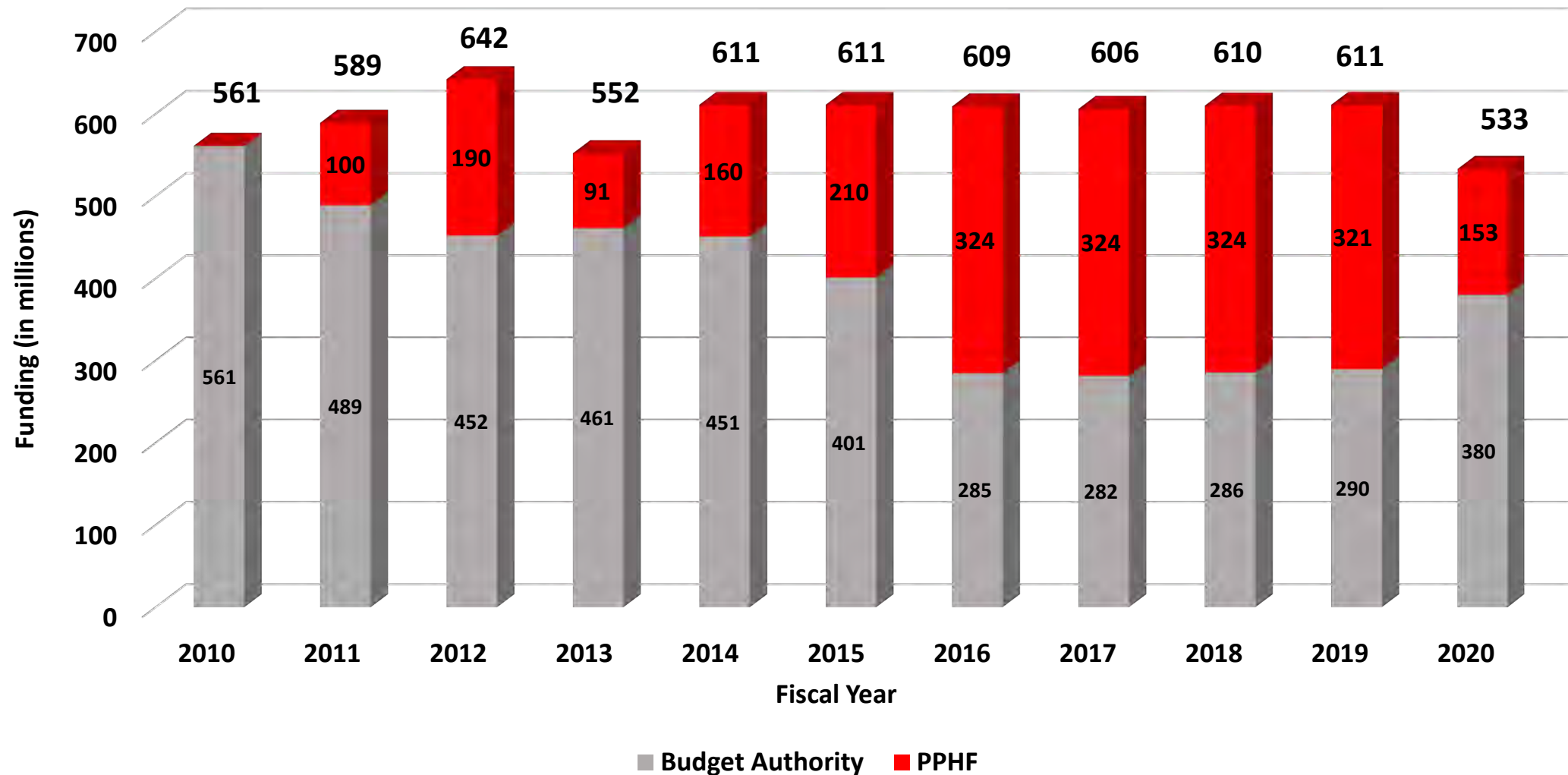
PUBLIC HEALTH EMERGENCY
PREPAREDNESS FUNDING



**PREVENTION
& PUBLIC
HEALTH FUND**



CDC Immunization Program 10-Yr Funding History



Source: CDC FY 20 CDC Budget Justification

How Congress Can Help Move the Needle

Support activities that on **prevention** end of spectrum, not just response

- National system for **surveillance** of vaccine rates
- Increase **research** on vaccine hesitancy
- National **campaign** to increase awareness of benefits of vaccines and combat misinformation
- Assess **impact** of social media in accelerating or mitigating public health crises

*Should any be enacted, **appropriations** will be needed to support them*





Measles Outbreaks: The Los Angeles County Experience

*Big Cities Health Coalition Briefing
September 23, 2019*

Jeffrey D. Gunzenhauser, MD, MPH

*Chief Medical Officer and Director, Disease Control Bureau
Los Angeles County Department of Public Health*



- Los Angeles County overview
- Recent measles outbreaks in Los Angeles County
- California state legislation
 - Senate Bill 277: Elimination of personal belief exemptions
 - Senate Bill 276: Review and approval of medical exemptions by the California Department of Public Health
- Challenges and Successes



Los Angeles County

- More than 10 million residents
 - 27% of California's population
 - Largest population of any county in the nation
 - 3 local public health departments
- 4,000+ square miles
- 88 incorporated cities
- 200+ languages spoken



Los Angeles County Department of Public Health

- Resources: \$1.3B annual budget and nearly 5,000 employees
- Vision: Healthy People in Healthy Communities
- Mission: Advance the conditions that support optimal health and well-being for all



Recent Measles Outbreaks in Los Angeles County



2015 Measles Outbreak

On January 7, 2015, the California Department of Public Health released a Health Advisory announcing the outbreak

- Measles had been confirmed in 7 California and 2 Utah residents
- All cases had visited Disneyland or California Adventure between December 17 and 20, 2014
- Additional residents who visited Disneyland during this period were being tested for measles

Providers encouraged to suspect measles when evaluating patients of any age with a fever and rash

LA County DPH issued its first Health Alert on January 8, 2015

The California Department of Public Health (CDPH) issued a Health Advisory on January 7; Measles Update: 7 Confirmed Measles Cases in the State of California in 2015—Look for Signs of this Highly Contagious Disease. The full CDPH Health Advisory is embedded below.

LAC DPH is alerting Los Angeles County providers as several of the measles cases occurred in neighboring jurisdictions (Orange, Pasadena, Riverside, and San Diego Counties) and all were associated with visits to Disneyland/Disney California Adventure Park between December 17 and 20, 2014. In addition, LAC DPH is currently investigating several suspect measles cases that might also be linked to a Disneyland exposure. Because the incubation period for measles is up to 21 days, individuals who were exposed at the parks may still develop symptoms and present for care. An index case has not been identified at the parks.

LAC DPH requests the following of providers:

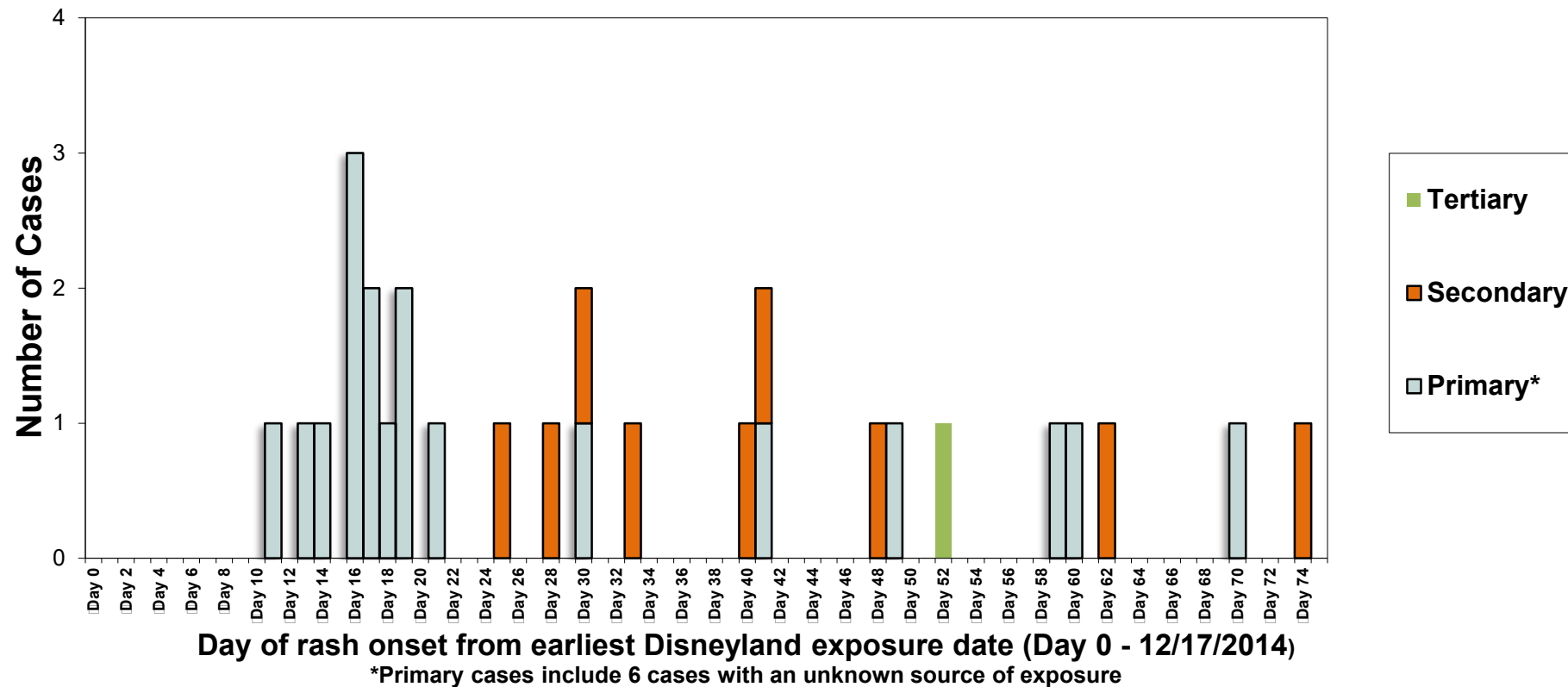
- ✓ Consider measles when evaluating any patient who has an acute rash illness with fever (fever, cough, coryza, and conjunctivitis usually begin 2 to 4 days before the rash appears).
- ✓ Institute respiratory and airborne precautions immediately for all patients with a measles-like rash and fever.
- ✓ Obtain specimens for confirmation of the diagnosis.
- ✓ IMMEDIATELY report any suspect cases in Los Angeles County to the Morbidity Central Reporting Unit by phoning 888-397-3993 (after 5:00 pm or weekends call 213-974-1234). To report suspect cases residing in the cities of Long Beach or Pasadena, contact the local health department (Long Beach Health and Human Services: 562-570-4302 or Pasadena Health Department: 626-744-6043.)
- ✓ **Do NOT wait for laboratory confirmation before reporting a suspect case.**
- ✓ Review the CDPH advisory below as it provides specific guidance on the handling suspect measles cases and includes clinic posters and flyers

CDPH HEALTH ADVISORY – January 7, 2015

Measles Update: 7 Confirmed Measles Cases in the State of California in 2015 Look for Signs of this Highly Contagious Disease

Measles has been confirmed in seven California residents in 2015 and two Utah residents; all visited Disneyland or Disney California Adventure Park between December 17th and 20th, 2014. Testing is underway on three additional California residents who also visited Disneyland during this same time period. The California confirmed cases reside in five local health jurisdictions and range in age from 8 months to 21 years. Of the seven confirmed cases, six cases were unvaccinated for measles (2 were too young to be vaccinated, and 1 had received appropriate vaccination (two doses of MMR vaccine)). Several large contact investigations are ongoing.

Epidemic Curve for 2015 Measles Outbreak – Los Angeles County



2016-2017 Measles Outbreak



On December 22, 2016, Los Angeles County Department of Public Health announced an increase in measles cases via press release

- Measles had been confirmed in 8 people who were linked to one other
- The cases occurred in a religious/social group
- Cases linked to the outbreak also occurred in Ventura and Santa Barbara counties

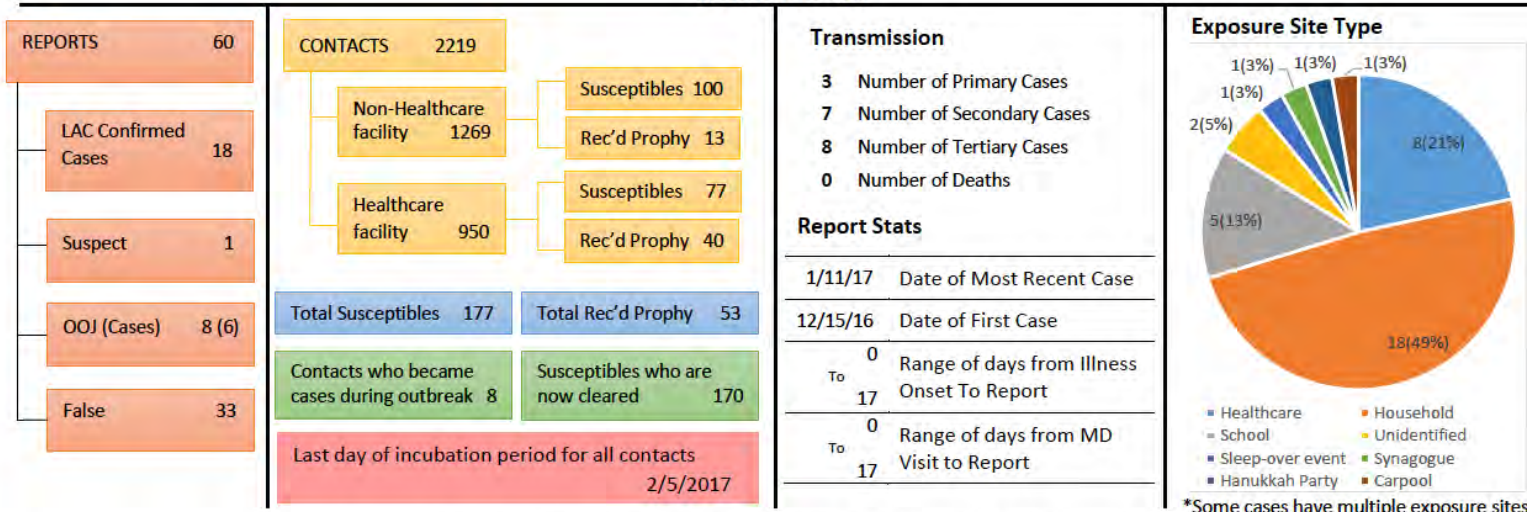
2016-2017 Measles Outbreak, LA County



MEASLES OUTBREAK SUMMARY REPORT

January 30, 2017

Measles 2016-2017

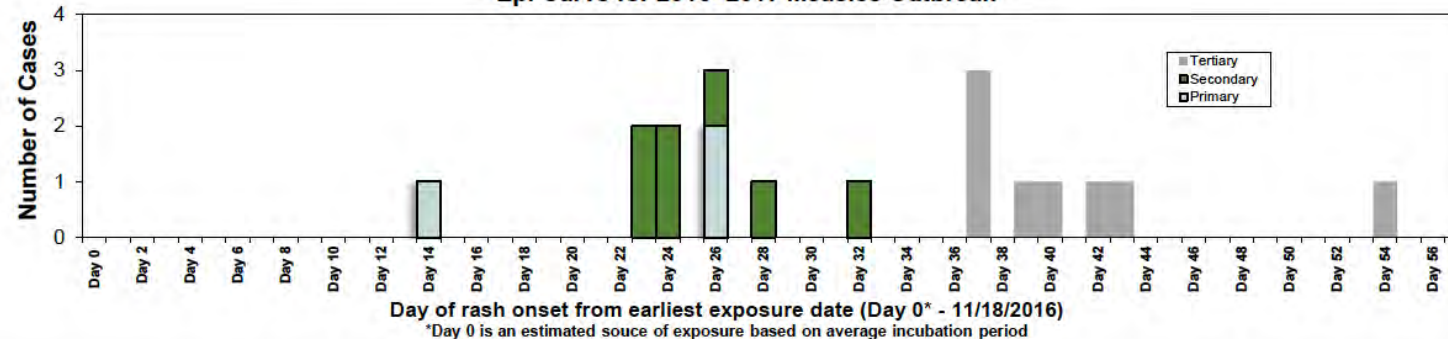


Case Distribution By Age And Immunity Status At Time Of Report*

	Received 1 Dose	Received 2 Doses	Unvaccinated	Self-Reported Vaccination	Self-Reported hx of Disease	Total
< 12 Months	0	0	0	0	0	0
1 Year Old – 17 Years Old	0	0	14	0	0	14
18 Years Old and Older	0	0	1	3	0	4
Total	0	0	15	3	0	18

*MMR not received as a post-exposure prophylaxis after outbreak was declared.

Epi Curve for 2016 -2017 Measles Outbreak

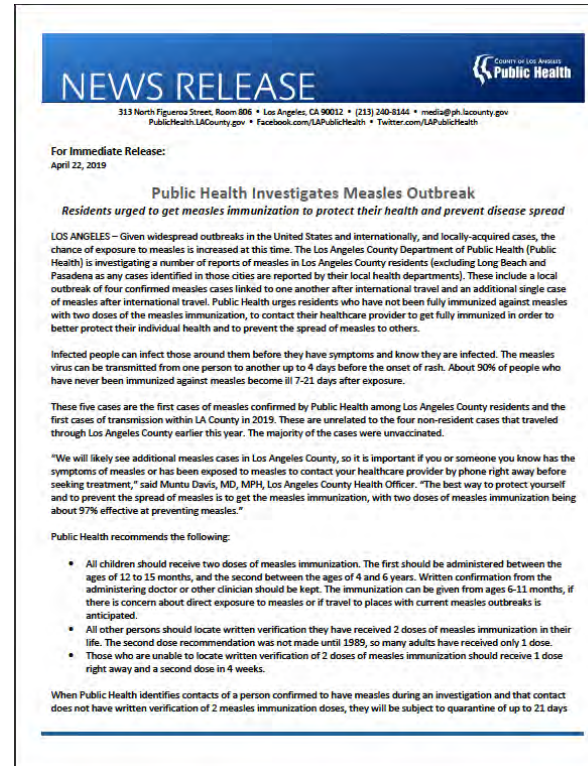


2019 Traveler-Associated Measles Outbreak

2019 - an extraordinary year due to multiple importations of measles into LA County

- As of 9/20/19: a total of 27 cases of measles in LA County in 2019
 - 16 cases occurred in LA County residents
 - 8 were imported
 - 8 were a result of local transmission
 - 11 additional cases have occurred in non-residents who visited or travelled through LA County in 2019
- Nearly 4,000 contacts have been identified
- More than 300 persons have been issued legal orders to remain in quarantine or exclusion

LA County DPH issued a
Press Release on
April 22, 2019



Three Measles Outbreaks: Lessons Learned

- A worst-case scenario can happen (a single case causing an explosive outbreak)
- High levels of herd immunity can limit spread
- A single case in a highly non-vaccinated community can lead to sustained propagation that is difficult to interrupt
- Changing vaccine-related behavior in the midst of an outbreak can be difficult and have minimal impact
- Traditional communicable disease control methods are resource-intensive and may have modest impact
- Among possible interventions to prevent spread, increasing the baseline of herd immunity must be a high priority



California State Legislation



Senate Bill 277: Elimination of Personal Belief Exemptions

The Issue

- Pre-2016, personal belief exemption (PBE) rates had increased steadily, leaving under- and unvaccinated students at risk for vaccine-preventable diseases

The Bill

- Eliminates PBEs for child care and school immunization requirements
 - Does not apply to homeschooled or independent study students who do not participate in classroom-based activities
 - Does not apply to vaccines required by the California Department of Public Health
 - Allows for medical exemptions

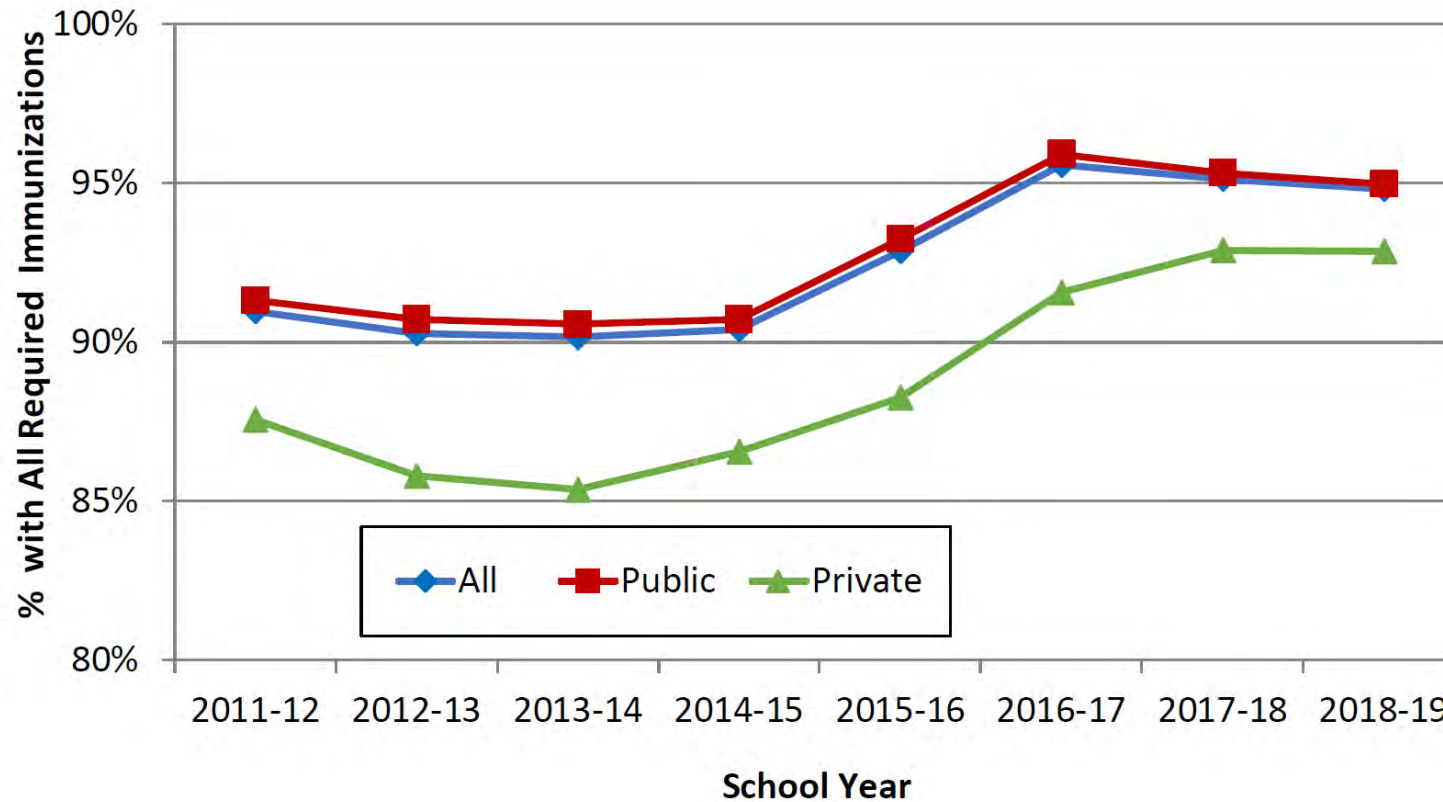


LAC Kindergarten Enrollee Immunization Status, Pre vs. Post PBE Law (SB277) Enactment

	SCHOOL YEAR										Percent Change (Pre 277 vs. Post 277)
	Pre SB 277				Post SB 277						
	2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		
	n	%	n	%	n	%	n	%	n	%	%
Total Number of Schools	1,671		1,687		1,773		1,993		2,001		↑ 14.5%
Student Enrollment	129,494		133,398		140,269		140,822		136,036		↑ 5.8%
Up to Date	111,343	86.0%	120,108	90.0%	133,310	95.0%	133,718	95.0%	128,618	94.5%	↑ 7.7%
PBE/Religious Exemption	2,074	1.6%	1,941	1.5%	657	0.5%	N/A		N/A		↓ 69.3%
Conditional Entrance	15,908	12.3%	11,011	8.3%	2,752	2.0%	2,390	1.7%	2,252	1.7%	↓ 82.30%
PME	169	0.1%	163	0.1%	515	0.4%	709	0.5%	783	0.6%	↑ 281.0%
*Others lacking required immunizations	N/A		N/A		N/A		1,601	1.1%	1,746	1.3%	
**Overdue							2,402	1.7%	2,640	1.9%	
*Includes students reported as attending independent study who did not receive classroom-based instruction or home-based private schools or receiving IEP services											
*Overdue for one or more immunizations											

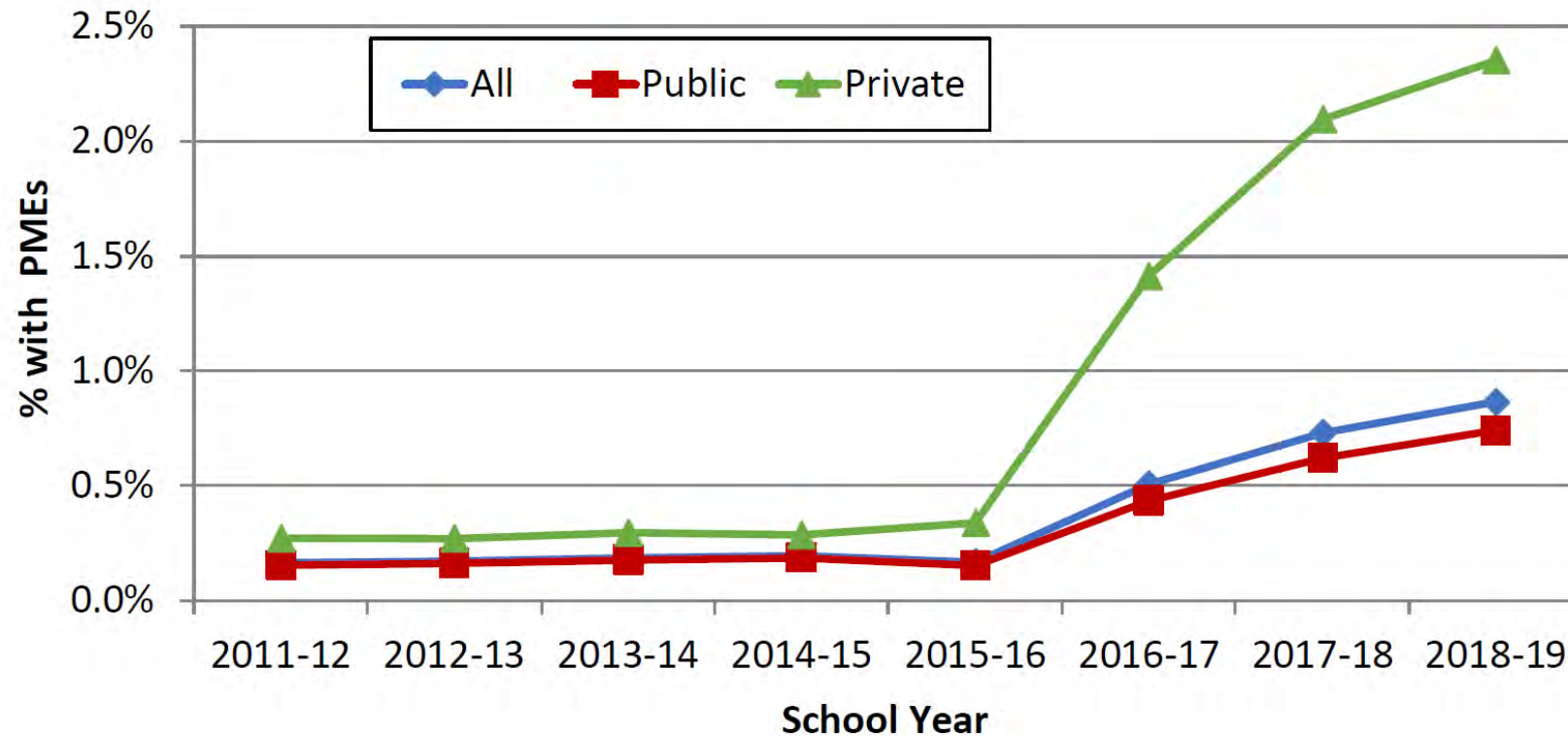
Source: 2014-2015 through 2018-2019 Kindergarten Immunization Assessment – Executive Summaries

Percentage of Kindergarten Students with All Required Immunizations by School Type and Year 2011-2012 thru 2018-2019



Source: 2018-2019 Kindergarten Immunization Assessment – Executive Summary
<http://eziz.org/assets/docs/shotsforschool/2018-19CAKindergartenSummaryReport.pdf>

Percentage of Kindergarten Students with Permanent Medical Exemptions (PMEs) by School Type and Year, 2011-2012 thru 2018-2019



Source: 2018-2019 Kindergarten Immunization Assessment – Executive Summary
<http://eziz.org/assets/docs/shotsforschool/2018-19CAKindergartenSummaryReport.pdf>

The Mercury News

June 20, 2019

California's vaccine battle: Here are the doctors behind Bay Area students' medical exemptions

Five doctors signed more than half the exemptions in a Bay Area News Group survey of local school districts



Senate Bill 276: Review of Medical Exemptions



The Issue

- Medical exemptions more than tripled after the passage of SB 277
- Physicians monetizing the granting of likely fraudulent medical exemptions

The Bill

- Standardizes the medical exemption form and requires transmittal through the State's electronic California Immunization Registry
- Requires the reason for the medical exemption, the physician's name, license number, and a statement certifying the clinician conducted a physical examination of the child
- Requires the State to annually monitor immunization levels and rates of medical exemptions in schools and child care/nursery schools
- Medical exemptions from schools with overall immunization rates under 95% or from physicians who submit 5+ exemptions per year must be reviewed by the California Department of Public Health per CDC, ACIP, or AAP criteria and may be revoked if determined to be invalid.



Challenges and Successes



- Current worldwide outbreaks pose a serious threat of continuous importation
- Even a few cases of measles require a high level of resources to mount an appropriate public health response
 - Cost estimate: One travel case w/o propagation = \$30,000
 - Cost estimate: Each contact in a local outbreak = \$500 - \$1000
- Current vaccination laws will take time to assure a high level of immunity among children; in the meantime, more than a million adults in LA County are un- or under-immunized
 - Should providers assess adult vaccination status?
 - Should some adults receive 2 doses?
 - Should 2-dose MMR requirements be extended to all colleges and universities (students, staff, and faculty)?
- Growing distrust of vaccines and their need in today's society

- Partnering with legislators to develop laws that improve vaccination rates
- Funding provided through the CDC's Public Health Emergency Preparedness (PHEP) Cooperative Agreement has been invaluable in supporting LA County's ability to respond to measles and other public health emergencies
- Funds provided through the Prevention and Public Health Fund (PPHF) to support the Section 317 Immunization Program has been invaluable in providing immediate access to vaccines and is one of the most cost-effective interventions.





Thank you!

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DOHMH RESPONSE TO NYC 2018-2019 MEASLES OUTBREAK



OXIRIS BARBOT, MD

COMMISSIONER

NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL
HYGIENE

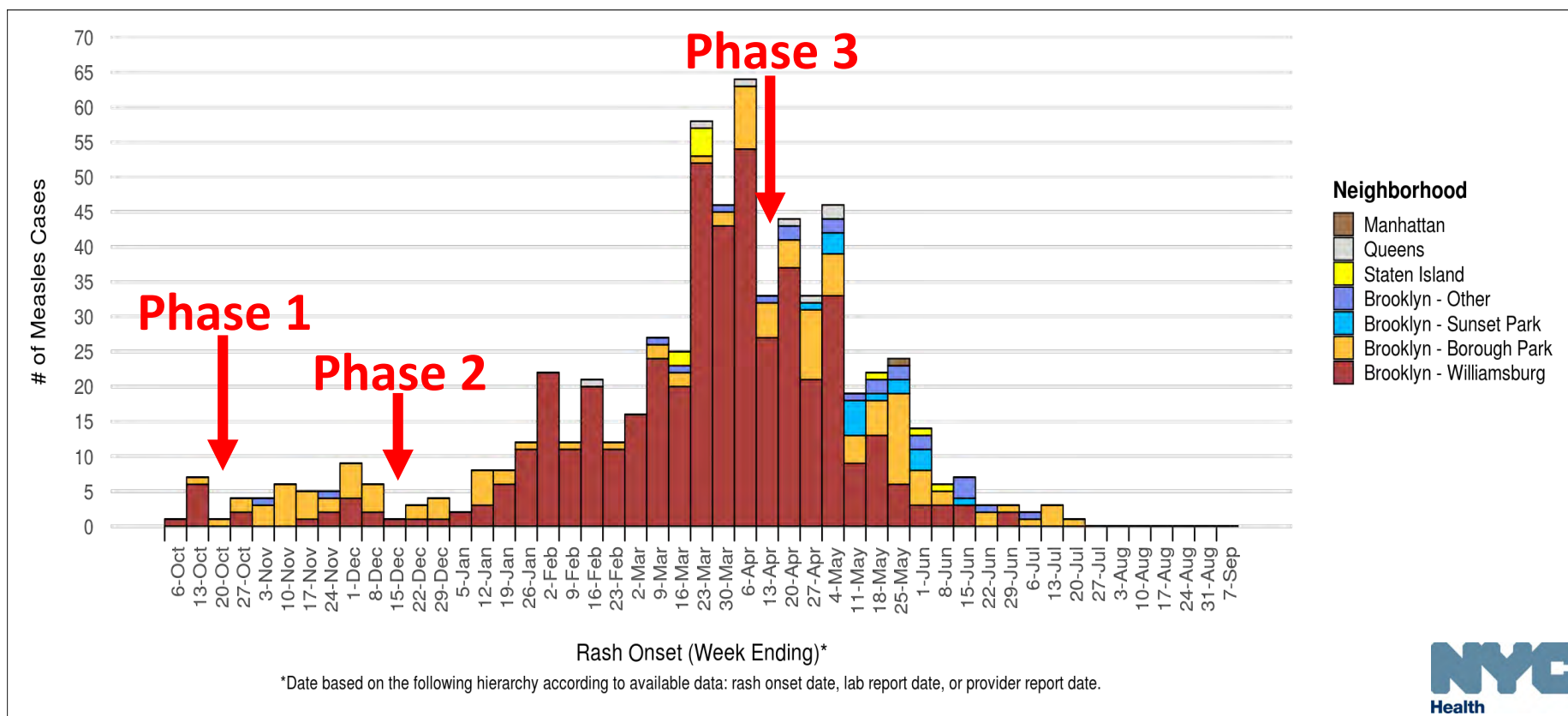
OVERVIEW:

- Recap of epidemiology of outbreak & final case counts
- Two fronts of DOHMH response:
 - Measles virus
 - Vaccine misinformation
- Funds used during outbreak
- Lessons learned
- Future challenges

EPI: LOCATIONS OF MEASLES OUTBREAK



EPI: MEASLES CASES BY DATE OF RASH & NEIGHBORHOOD (N=654)



EPI: DEMOGRAPHICS OF CASES (N=654)

Characteristics	n (%)
Age Category:	
<1 year	102 (15.7)
1 to 4 years	277 (42.7)
5 to 19 years	148 (22.8)
<u>≥</u> 19 years	122 (18.8)

EPI: VACCINATION STATUS OF CASES

- Unvaccinated: 477 (73.5%)*
 - Age <12 months: 100
 - Age ≥12 months: 377
- Vaccinated: 78 (12%)*
 - 1 prior MMR: 47
 - 2 prior MMR: 31
- Unknown Vaccination History (primarily adults): 94 (14.5%)

Preventable Cases

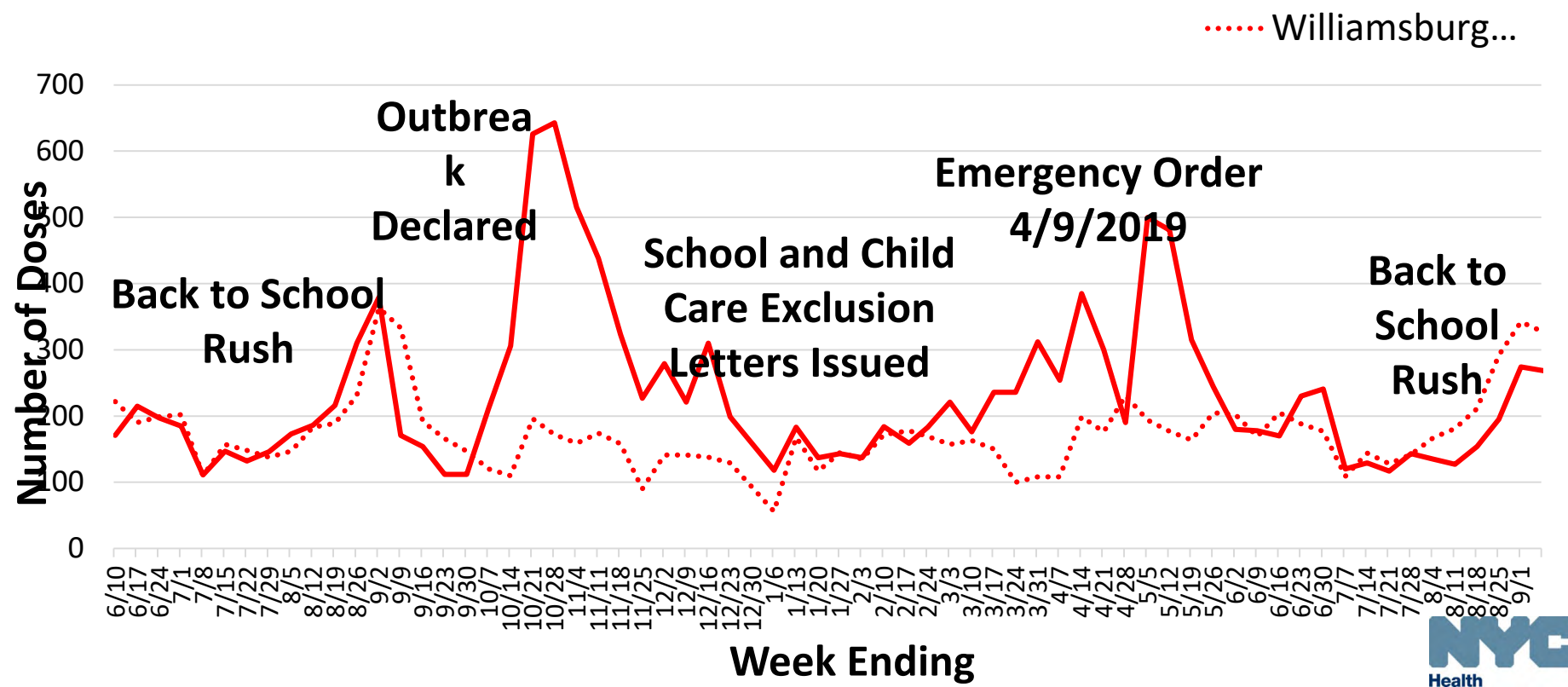
*% among cases with known vaccination status
As of September 6, 2019

DOHMH RESPONSE: MEASLES VIRUS

Provider Outreach:

- Multiple health alerts and presentations to clinicians
- Reminders to recall unvaccinated patients
- Clinical and infection control consultation
- Technical assistance to facilities/providers in affected communities
- Distribute posters and pamphlets in English and Yiddish to medical facilities
- Assist with post-exposure prophylaxis for exposed persons
- Ensure providers have enough MMR vaccine on hand

DOHMH RESPONSE: MMR VACCINE UPTAKE



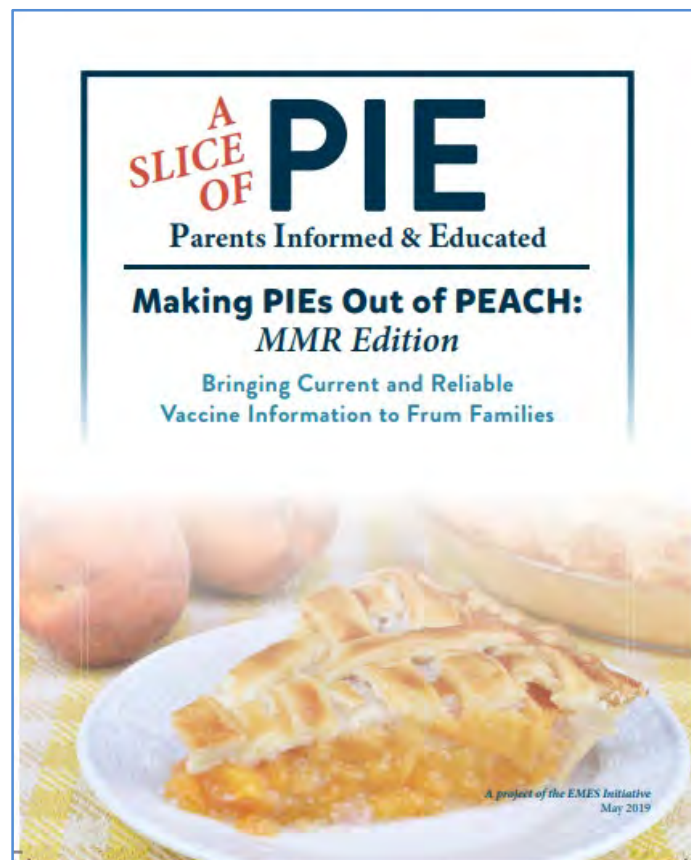
DOHMH RESPONSE: VACCINATION MISINFORMATION

Community Collaboration:

- Print ads and social media specific to Orthodox community
- Met with rabbinical and community leaders, elected officials
- Partner with Jewish Orthodox Women's Medical Association and Vaccine Task Force on educational outreach
- Distribute 29,000 copies of pro-vaccination booklets geared to Orthodox community
- Letters to parents through schools
- Multiple rounds of robocalls (30,000 households per round)
- 3,000+ letters sent to families with unvaccinated children in Williamsburg
- Telephone hotline
- Attended community health fairs

DOHMH RESPONSE: VACCINATION MISINFORMATION

- WHO declared Vaccine Hesitancy as top 10 threat to Global Health
- Anti-vaxxers infiltrated into ultra-Orthodox Jewish community
 - Robocalls and flyers conveying false information spread throughout community
 - *P.E.A.C.H.*, an anti-vaxx organization, led efforts to intensify vaccine hesitancy



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.

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

**SPREAD THE TRUTH
NOT MEASLES**

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autism and vaccines.



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GET VACCINATED TODAY.
CONTACT YOUR DOCTOR IMMEDIATELY.

NYC Health | Dr. Mark
Meyer
Chief Medical Officer
Commissioner

מיר קענען אינאיינעם אפשטעלן
מיזעלס

אן אייבערלע מענטש מיט מיזעלס קען אנשטעלן
פון 12 ביז 18 מענטשן וואס זענען נישט אימון.



ווערט היינט וואקסירט.
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One person with measles can infect an average
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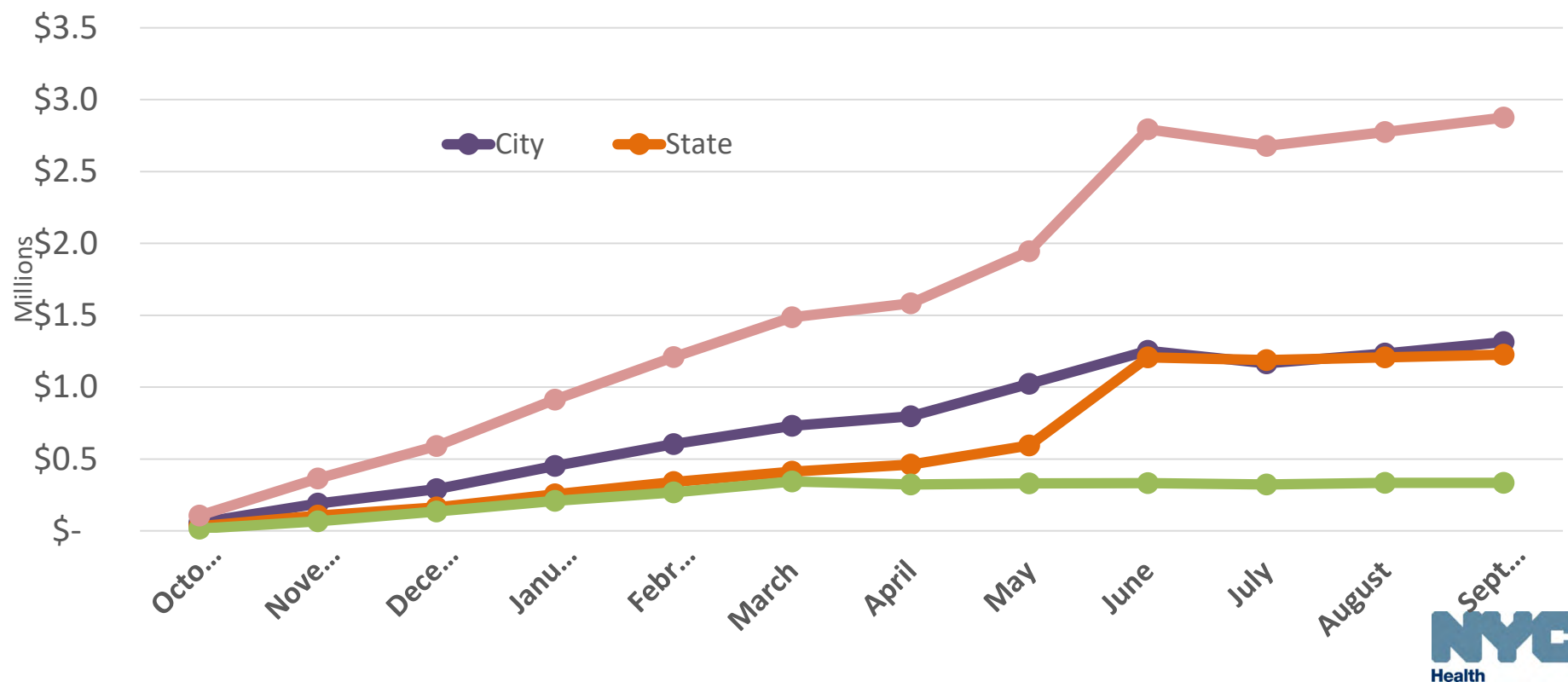
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DOHMH RESPONSE: BY NUMBERS

- 547 DOHMH staff deployed
- 104,000 person hours spent
- 21,000 individuals tracked down to confirm exposure and immunity statuses
- 2,100 cases of measles investigated
- 1,600+ diagnostic tests performed by DOHMH labs
- \$6 million to end outbreak

DOHMH RESPONSE: 2018-2019 Measles Outbreak Response Costs by Funding Source



LESSONS LEARNED

- Decades old public health victories should not be taken for granted
- More granular surveillance key to early identification of susceptible populations
- Leverage community relationships to build new alliances

FUTURE CHALLENGES

- Vaccine hesitancy
- Continued education to prevent spreading misinformation to vulnerable communities
- On-going funding is essential to sustain educational and response efforts related to deadly outbreaks

DOHMH RESPONSE TO NYC 2018-2019 MEASLES OUTBREAK



OXIRIS BARBOT, MD

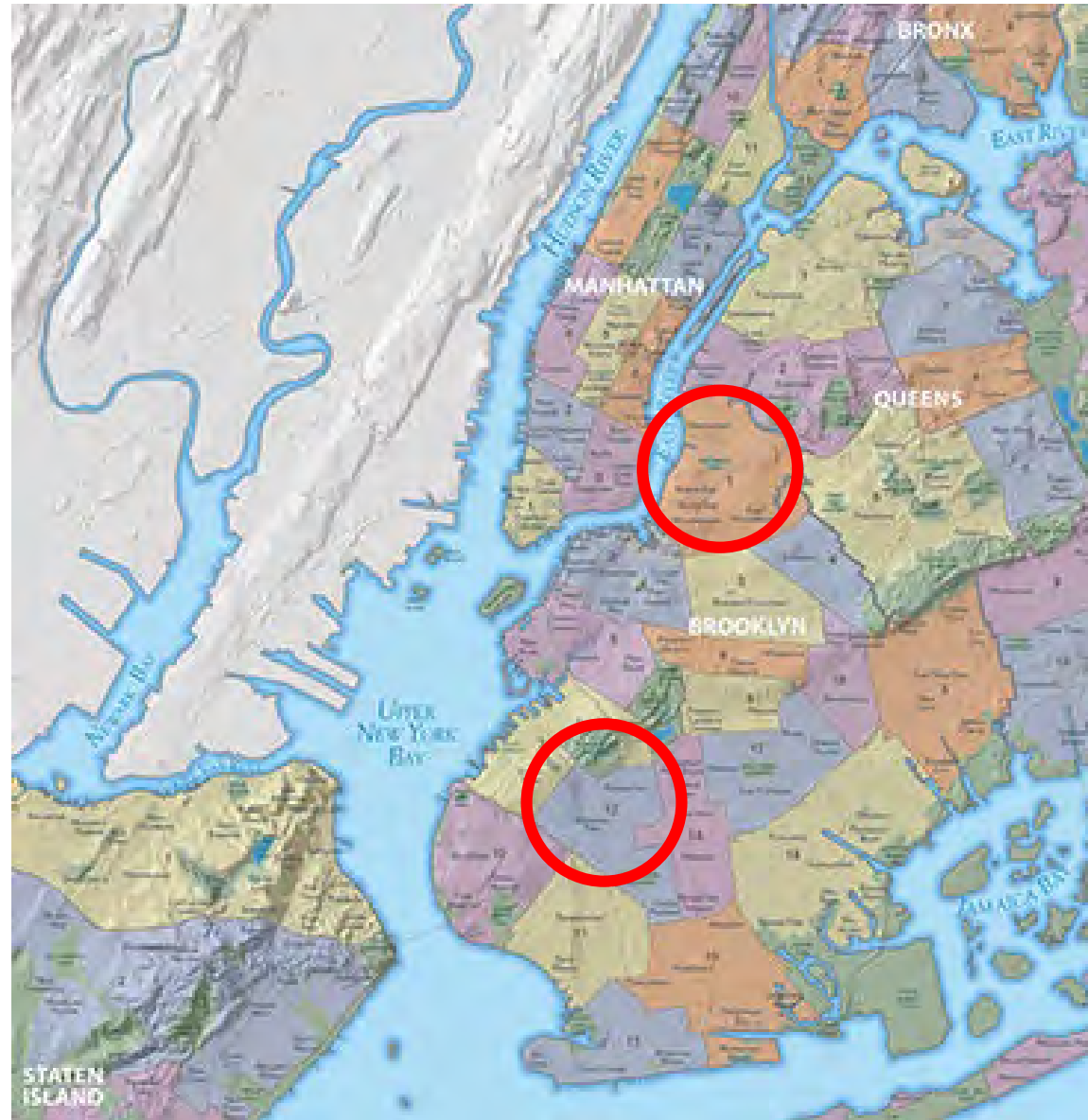
COMMISSIONER

NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE

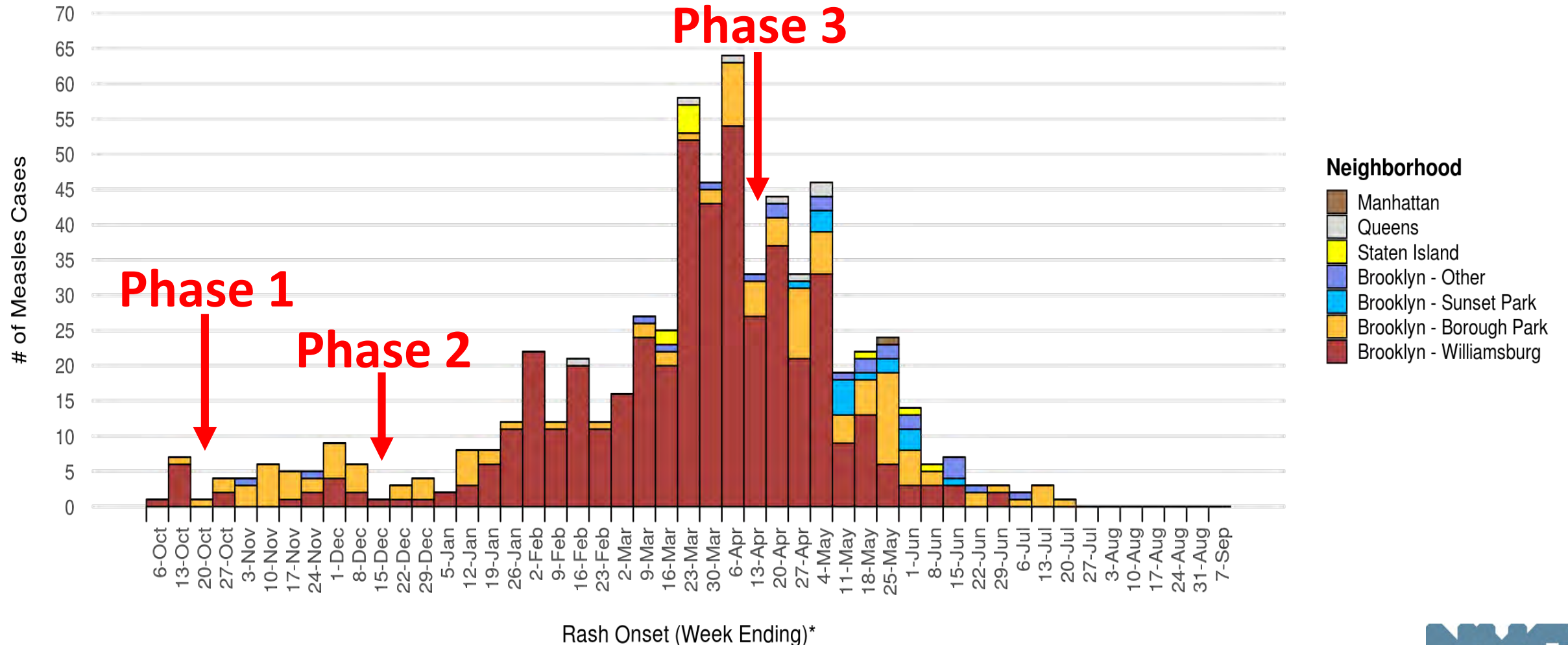
OVERVIEW:

- Recap of epidemiology of outbreak & final case counts
- Two fronts of DOHMH response:
 - Measles virus
 - Vaccine misinformation
- Funds used during outbreak
- Lessons learned
- Future challenges

EPI: LOCATIONS OF MEASLES OUTBREAK



EPI: MEASLES CASES BY DATE OF RASH & NEIGHBORHOOD (N=654)



*Date based on the following hierarchy according to available data: rash onset date, lab report date, or provider report date.

EPI: DEMOGRAPHICS OF CASES (N=654)

Characteristics	n (%)
Age Category:	
<1 year	102 (15.7)
1 to 4 years	277 (42.7)
5 to 19 years	148 (22.8)
≥19 years	122 (18.8)

EPI: VACCINATION STATUS OF CASES

- Unvaccinated: 477 (73.5%)*
 - Age <12 months: 100
 - Age \geq 12 months: 377 Preventable Cases
- Vaccinated: 78 (12%)*
 - 1 prior MMR: 47
 - 2 prior MMR: 31
- Unknown Vaccination History (primarily adults):
94 (14.5%)

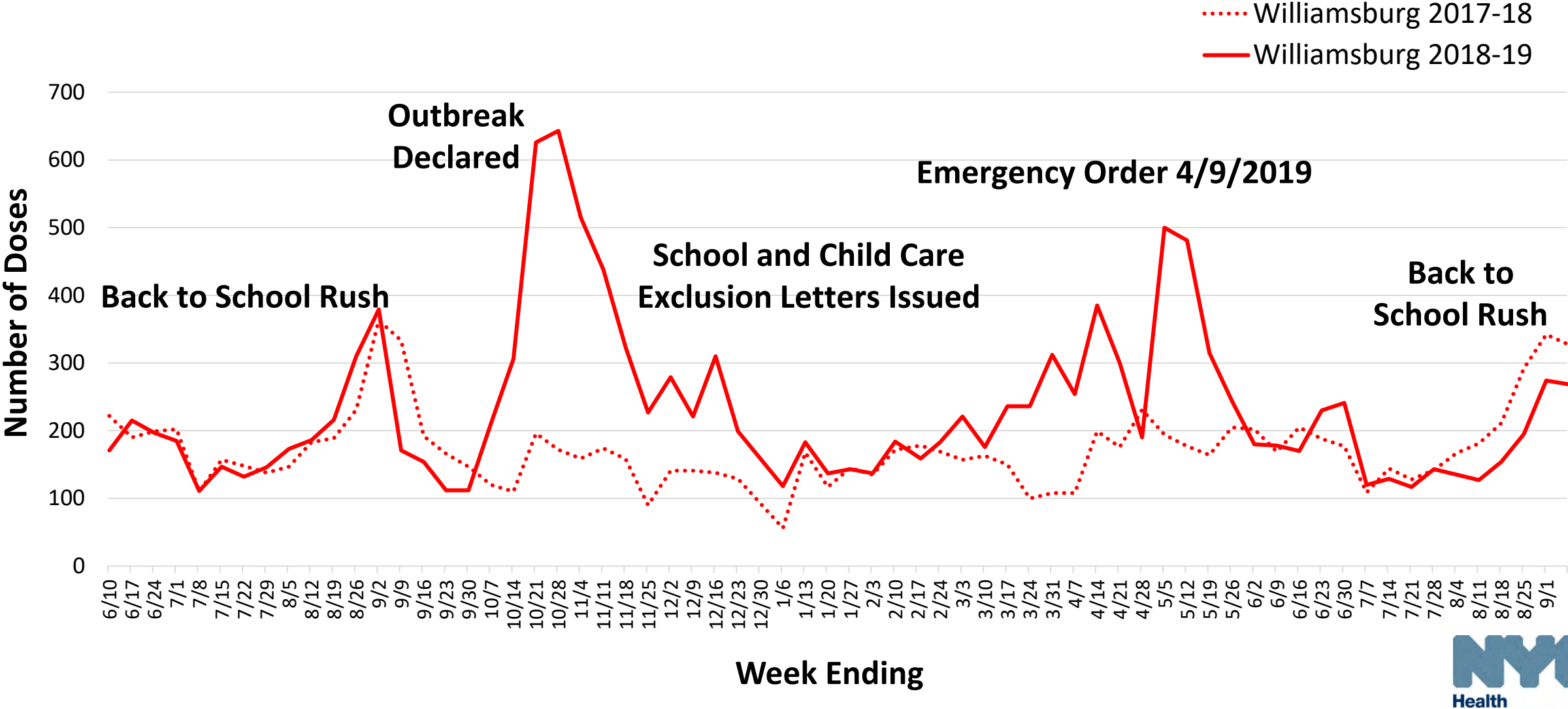
*% among cases with known vaccination status
As of September 6, 2019

DOHMH RESPONSE: MEASLES VIRUS

Provider Outreach:

- Multiple health alerts and presentations to clinicians
- Reminders to recall unvaccinated patients
- Clinical and infection control consultation
- Technical assistance to facilities/providers in affected communities
- Distribute posters and pamphlets in English and Yiddish to medical facilities
- Assist with post-exposure prophylaxis for exposed persons
- Ensure providers have enough MMR vaccine on hand

DOHMH RESPONSE: MMR VACCINE UPTAKE



DOHMH RESPONSE: VACCINATION MISINFORMATION

Community Collaboration:

- Print ads and social media specific to Orthodox community
- Met with rabbinical and community leaders, elected officials
- Partner with Jewish Orthodox Women's Medical Association and Vaccine Task Force on educational outreach
- Distribute 29,000 copies of pro-vaccination booklets geared to Orthodox community
- Letters to parents through schools
- Multiple rounds of robocalls (30,000 households per round)
- 3,000+ letters sent to families with unvaccinated children in Williamsburg
- Telephone hotline
- Attended community health fairs

DOHMH RESPONSE: VACCINATION MISINFORMATION

- WHO declared Vaccine Hesitancy as top 10 threat to Global Health
- Anti-vaxxers infiltrated into ultra-Orthodox Jewish community
 - Robocalls and flyers conveying false information spread throughout community
 - *P.E.A.C.H.*, an anti-vaxx organization, led efforts to intensify vaccine hesitancy

A SLICE OF PIE

Parents Informed & Educated

Making PIEs Out of PEACH: MMR Edition

Bringing Current and Reliable
Vaccine Information to Frum Families



A project of the EMES Initiative
May 2019

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:

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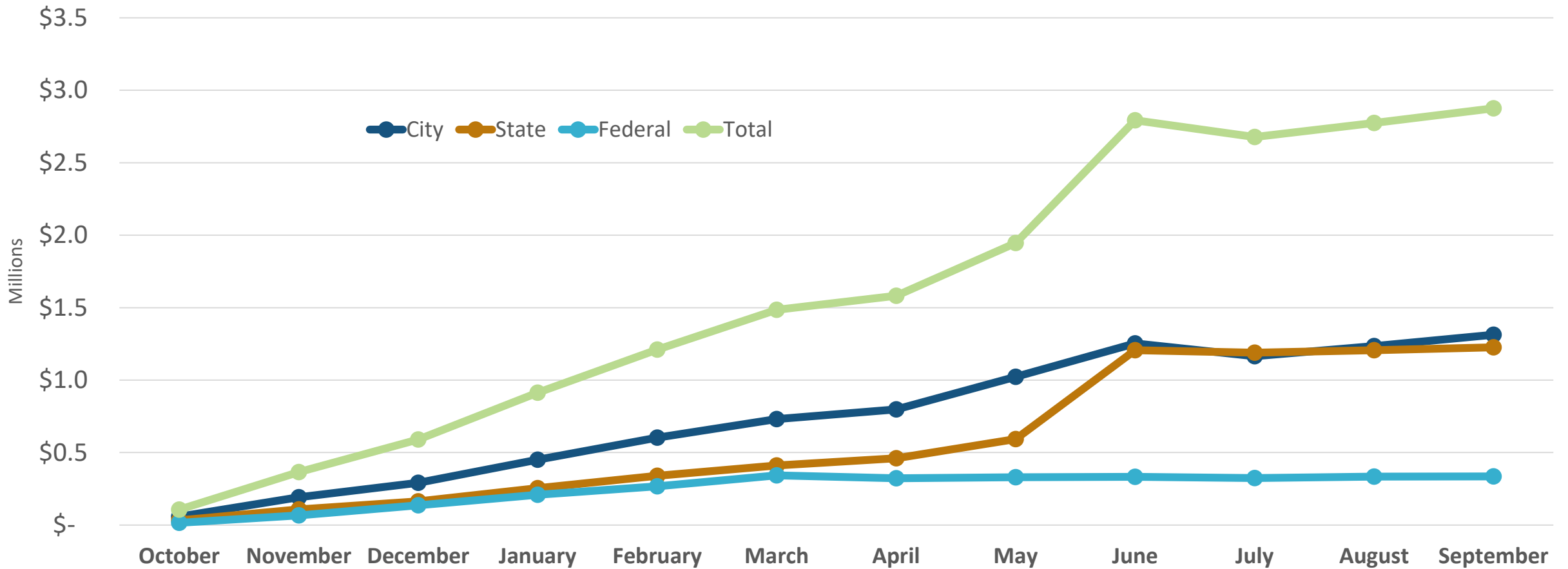
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