

Use of the Citywide Immunization Registry in New York City's Measles Outbreak Response

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Outline

- Background of NYC's measles outbreak
- Overview of the Citywide Immunization Registry
- Two examples of use of the CIR in NYC's measles outbreak response
 - Household contact investigations
 - Monitoring MMR vaccination uptake and vaccine coverage
- Conclusion

Measles Background

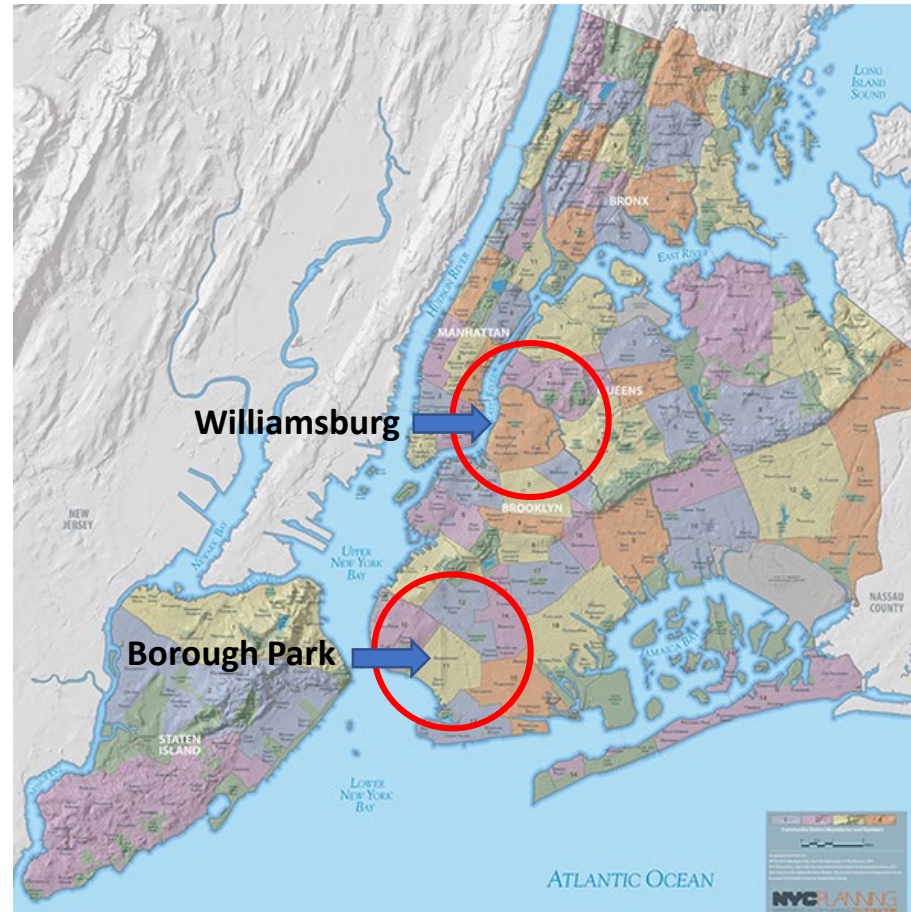
- Highly contagious viral infection
- Airborne and droplet transmission
- Incubation period (time from exposure to illness): 7 to 21 days
- Infectious period: 4 days before through 4 days after rash onset



Measles Outbreak in NYC, 2018-19

- Measles was declared eliminated in the U.S. in 2000
- NYC has experienced periodic measles outbreaks due to importation of the virus by people who become infected while traveling outside of the US
- Current outbreak in NYC
 - Began on September 30, 2018 with an unvaccinated child from Brooklyn who acquired measles in Israel
 - Fueled by multiple importations and under-vaccination of young children leading to communitywide transmission
 - 642 cases as of August 6, 2019; >21,000 people exposed
- Concentrated in Orthodox Jewish communities of Williamsburg (460 cases) and Borough Park (123 cases) in Brooklyn, NY

Measles Outbreak in NYC, 2018-19



Citywide Immunization Registry (CIR)

- NYC's Immunization Information System (IIS)
 - Implemented citywide in 1997
- Population-based
 - Birth certificates loaded into CIR twice a week
- Mandatory reporting of immunizations for children 0-18 years
 - Reporting for adults ≥ 19 years requires consent
- Contains >7 million patient records and >104 million immunizations
 - Timely; ~80% of immunizations reported in ≤ 1 day; 96% reported within 1 month of administration

Maven

- A disease surveillance database used by several US jurisdictions and multiple bureaus in NYC Health Department
- Implemented in the Bureau of Immunization in 2011
- Used by the Surveillance Unit to manage cases and contacts during case investigations and outbreaks of vaccine preventable diseases, including measles, mumps, rubella, pertussis, varicella and invasive pneumococcal disease

CIR-Maven Linkage

- CIR was linked to Maven in 2011
- Linkage enables surveillance staff to:
 - Directly query the CIR in Maven
 - Upload immunizations from the CIR directly to Maven in real-time
 - Request CIR staff to add immunizations missing from the CIR

Use of CIR During Measles Outbreak Response

- Assist with case and contact investigations
 - Determine immunity status
 - Identify medical providers
 - Find additional demographic information
- Monitor MMR vaccine uptake and coverage
- Identify unvaccinated children in measles-affected zip codes
- Facilitate ordering, distribution of additional MMR vaccine to facilities in affected areas
- Identify facilities in affected zip codes with low MMR coverage and assisted with recall of children via letter or text message
- Send blast email alerts to providers citywide

Objectives

- To provide two examples of how the CIR was used in NYC's measles outbreak response:
 - 1) Household contact investigations
 - 2) Monitoring MMR vaccine uptake in the affected community

1. Household Contact Investigations

Importance of Household Contact Investigations

- Non-immune contacts are at increased risk for contracting measles
 - 90% of non-immune contacts will get sick
- Infants <12 months, pregnant women and immunocompromised people are at high-risk for severe illness and complications
- Critical to identify exposed household members and determine immunity status so we can anticipate who will get sick → need to home quarantine for 21 days

Post-Exposure Prophylaxis (PEP) for Household Contacts

- Too late for MMR PEP
- PEP with immunoglobulin (IG) can be given to high-risk contacts to prevent or limit severity of measles infection
- Narrow window for IG
 - Needs to be given ≤ 6 days of initial exposure
 - If we identified a household contact of a case on the day of their rash onset, the contact is on day 5 of exposure



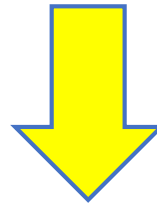
Critical to quickly determine if there are high-risk persons in home who need IG

*Dosing and criteria: www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm

**MMR preferred over IG for infants ages 6-11 months when possible

Household Contact Investigations

- 1) Identify household contacts of a confirmed (or high suspicion) measles index case
- 2) Determine immunity status of household contacts
 - Immune: 2 valid MMR doses or IgG+ titers
 - Not immune: 0 MMR doses or IgG- titers → stay home for 21 days through incubation period
 - Unknown immunity or 1 valid MMR dose → refer for titers



Arrange for titers, prophylaxis and/or home isolation as needed

Challenges Faced and Why the CIR is Useful for Household Contact Investigations

- Challenges: families are large, need to obtain list of household contacts and their vaccination history, time consuming, parents were often not forthcoming
- Value added of CIR
 - Allows for rapid identification of household members
 - Staff can directly query the CIR for MMR immunization records of household contacts to determine immunity status
 - Importing vaccination data from CIR into Maven reduces the need for manual data entry and chance for error

Demo: Use of CIR-Maven for Household Contact Investigations

New York City Vaccine Preventable Disease Surveillance System

Event Summary

Basic Information	
Event ID:	100103632
Disease:	Measles
Person:	John Smith Birth Date (mm/dd/yyyy): 01/01/2010 (Male) Phone: (212) 555-5555
Address:	1 McLane, Brooklyn, NY 11206
Dates:	Create Date: 10/19/2018
Investigation Status:	Closed
Linked Events/Contacts:	10 linked event(s)/contact(s) View
Attachments:	3 attachment(s) View
Notifications:	Event is in workflows View List
	Email:
	Disease Status: Case
	Event Date: 10/25/2018
	Close Date: 01/16/2019
	Classification Status: Confirmed
	Age at Event: 8 years 9 months 24 days
	Assigned PHA
	Assigned Supervisor:
	View CIR
	Meets case definition: Unspecified

Demo: Use of CIR for Household Contact Investigations

EDRI - Patient Lookup

Demographic History (10)

All Messages (12)

External Data Source Lookup

CIR

Threshold:

Low

Lookup

	CIR ID	Probability	First Name	Middle Name	Last Name	DOB	Sex	Mother's Maiden Name	Mother's DOB	Address
<input type="radio"/>	<div>90770278</div>	0.9696295	JOHN		SMITH	01/01/2010	M	SIMPSON	12/12/1979	1 MCLANE, BROOKLYN, NY 11206

Send To EDRI

Demo: Use of CIR-Maven Connection

Vaccination History Close

	MAVEN	CIR
Patient First Name:	JAMES	JAMES
Patient Middle Name:		
Patient Last Name:	SMITH	SMITH
Alias First Name:		
Alias Last Name:		
Patient Sex:	M	M
Date of Birth:	01/01/2010	01/01/2010
Mother's Last Name:		SMITH
Mother's First Name:		JASMINE
Mother's Middle Name:		
Mother's Maiden Name:	SIMPSON	SIMPSON
Mother's Date of Birth:		12/12/1979
Address:	1 MCLANE, BROOKLYN, NY 11206	1 MCLANE, BROOKLYN, NY 11206
Phone:	212-555-5555	212-555-5555

Last Vaccinating Facility:

James Adams, MD ||
2121112222 || 5 West 5th Street, New York,
NY 10001 || 02/01/2019

Last Vaccine Received:
MMR || Varicella

[Collapse All] [Expand All]

⊕ DTP (Number of Vaccinations: 1) Next Due Vaccine: DTaP
Next Due Date: 09/14/2018

⊖ MMR (Number of Vaccinations: 1) Next Due Vaccine: MMR
Next Due Date: 10/28/2019

Vaccine Name	Vaccine Date	Facility Name	Facility Address	Facility Phone
MMR	02/27/2019	ABC Pediatrics	5 West 5 th Street, New York, NY 10001	2121112222

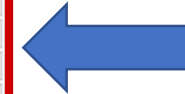
Last vaccinating facility



MMR vaccination history



Identify contact information, including mother's information, address, phone number

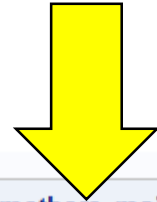


Demo: Use of CIR for Household Contact Investigations

The SAS System

Household Members Identified in CIR

Obs	patient_id	last_name	first_name	dob	gender	mothers_maiden_name	mothers_dob	alt_last_name	alt_first_name	house_nbr	street	city_name	borough_code	zipcode	phone_number
1	334320175	SMITH	JOHN	01JAN2010	M	SIMPSON	12DEC1979			1	MCLANE	BROOKLYN	9	11206	2125555555
2	334320175	SMITH	DEBBIE	01FEB2008	F	SIMPSON	12DEC1979			1	MCLANE	BROOKLYN	9	11206	2125555555
3	334320175	SMITH	ANNE	01MAR2009	F	SIMPSON	12DEC1979			1	MCLANE	BROOKLYN	9	11206	2125555555
4	334320175	SMITH	CATHERINE	01APR2012	F	SIMPSON	12DEC1979			1	MCLANE	BROOKLYN	9	11206	2125555555
5	407933548	SMITH	PETER	01NOV2013	M	SIMPSON	12DEC1979			1	MCLANE	BROOKLYN	9	11206	2125555555



MMR Vaccination History Identified in CIR

Obs	patient_id	last_name	first_name	dob	gender	mothers_maiden_name	mothers_dob	vaccine_date	vaccine_type
1	334320175	SMITH	JOHN	01JAN2010	M	SIMPSON	12DEC1979	27FEB2013	MMR
2	334320175	SMITH	DEBBIE	01FEB2008	F	SIMPSON	12DEC1979	14OCT2009	MMR
3	407933548	SMITH	DEBBIE	01FEB2008	F	SIMPSON	12DEC1979	27FEB2013	MMR
4	407933548	SMITH	ANNE	01MAR2009	F	SIMPSON	12DEC1979	14NOV2010	MMR
5	483257136	SMITH	ANNE	01MAR2009	F	SIMPSON	12DEC1979	27FEB2013	MMR-Varicella
6	483257136	SMITH	CATHERINE	01APR2012	F	SIMPSON	12DEC1979	27FEB2013	MMR
7	579808124	SMITH	PETER	01NOV2013	M	SIMPSON	12DEC1979	27FEB2013	MMR

Results of Household Contact Investigation During 2018-19 Measles Outbreak

- 2,099 household contacts identified

Number of measles-containing vaccine doses received by household members of measles cases prior to exposure as of 8/7/2019

MMR Doses	Infants < 1 year	Children ages 1-18 years	Adults ages 19+ years	Total
0 or Unknown	55 (100%)	377 (32%)	650 (76%)	1082 (52%)
1	0 (0%)	219 (18%)	45 (5%)	264 (13%)
2	0 (0%)	591 (50%)	162 (19%)	753 (36%)
Total	55 (100%)	1187 (100%)	857 (100%)	2099 (100%)

Lessons Learned

- Using CIR for household contact investigations increased efficiency
- CIR enabled us to reach high-risk contacts with post-exposure prophylaxis within narrow window; many would otherwise not have received PEP
- Mother's information was a critical starting point for finding household members in CIR
- Incomplete capture of adult immunizations in CIR → difficult to find adult household members and determine immunity status
 - Adult contacts often had to fax their immunization records or get IgG titers

2. Monitoring MMR Vaccine Uptake

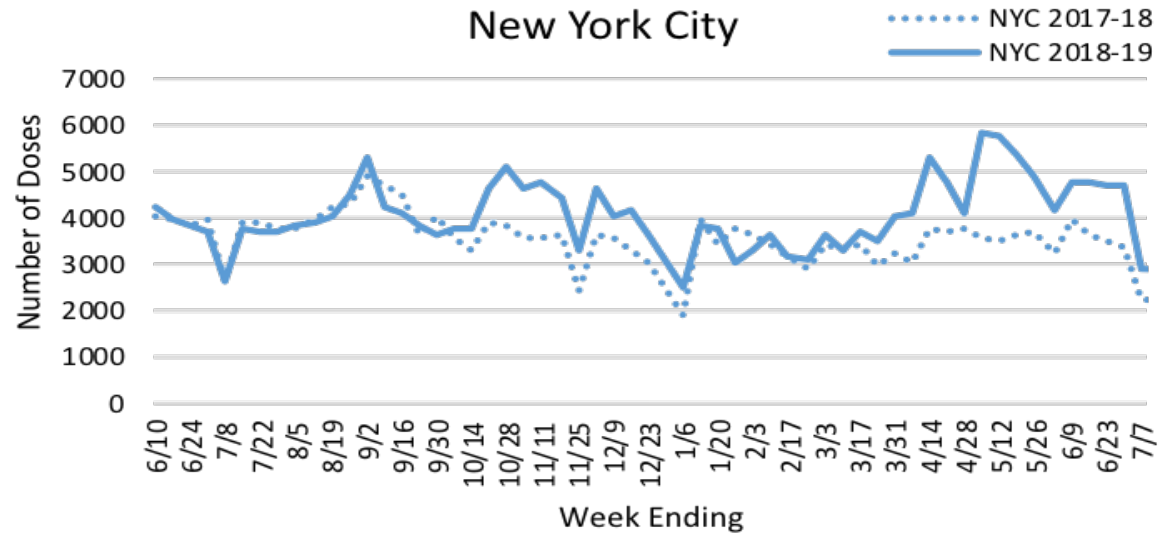
Use of CIR to Monitor Impact of Health Department Outbreak Response Measures

- CIR was used to monitor vaccine uptake in measles-affected neighborhoods to assess impact of NYC Health Dept outbreak response activities
- Methodology:
 - Assessed number of MMR vaccine doses administered to children 18 and under during the 2018-19 measles outbreak in NYC, Williamsburg and Borough Park by week compared to same time period previous year

NYC Health Department Outbreak Response: Key Dates and Events

- October 2018: Measles Outbreak Declared in NYC
 - NYC Health Department issued 3 Health Alerts to NYC provider network
 - Press/media coverage
 - School audits in affected zip codes
- December 7, 2018: Notified schools and child care centers in affected zip codes to exclude unvaccinated students with medical/religious exemptions
 - School exclusion letters sent on 12/7, 12/23 and 1/9
- April 9, 2019: Measles Public Health Emergency Declared in Williamsburg
 - Commissioner issued an Emergency Order requiring all persons in 4 affected zip codes to be vaccinated against measles or face \$1,000 fine

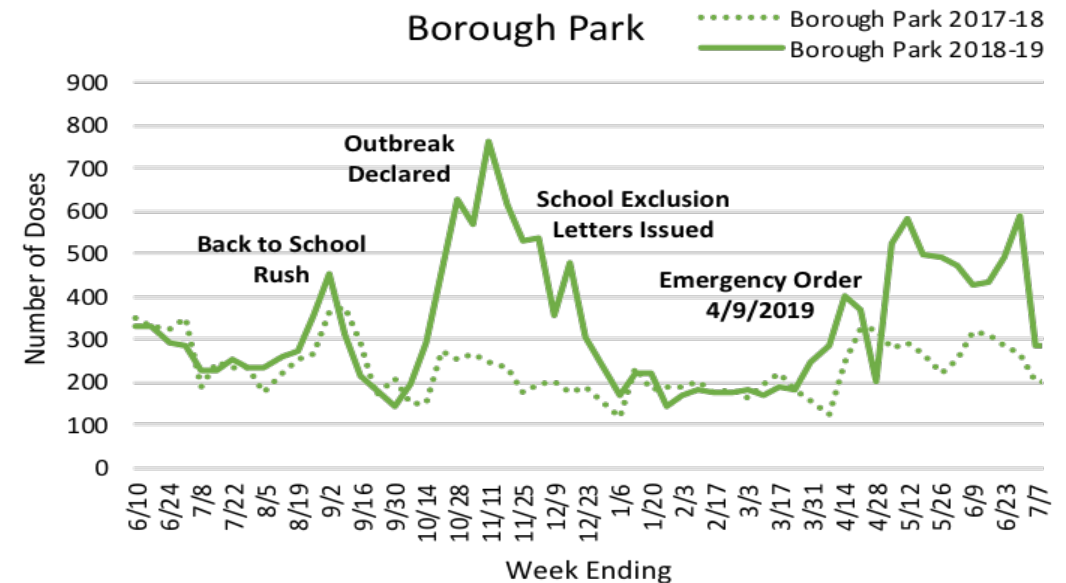
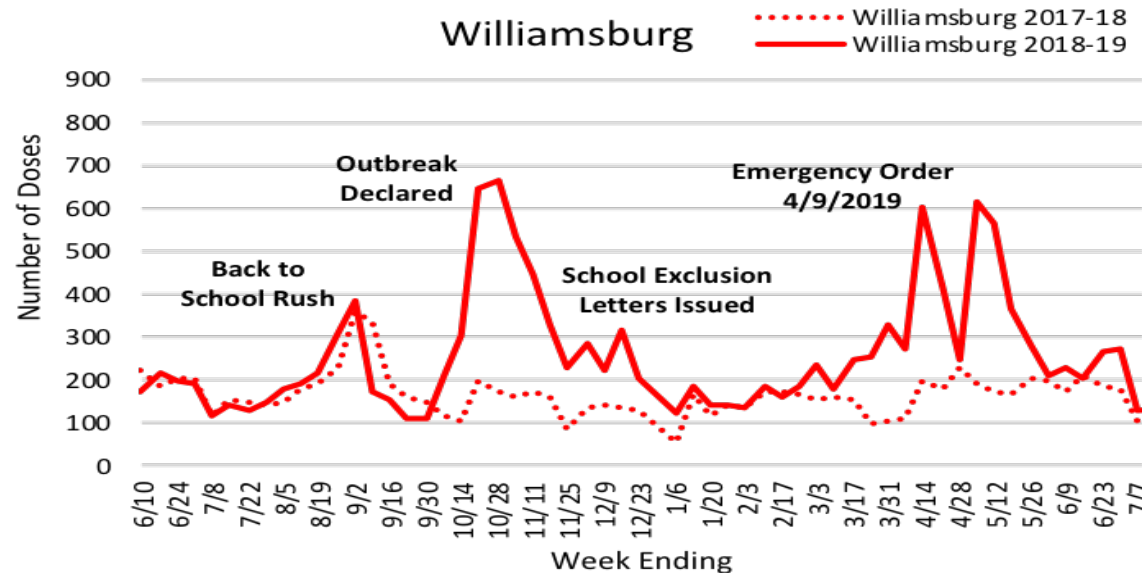
MMR Vaccine Uptake Among Children Ages 6 to 59 Months as of 7/7/2019



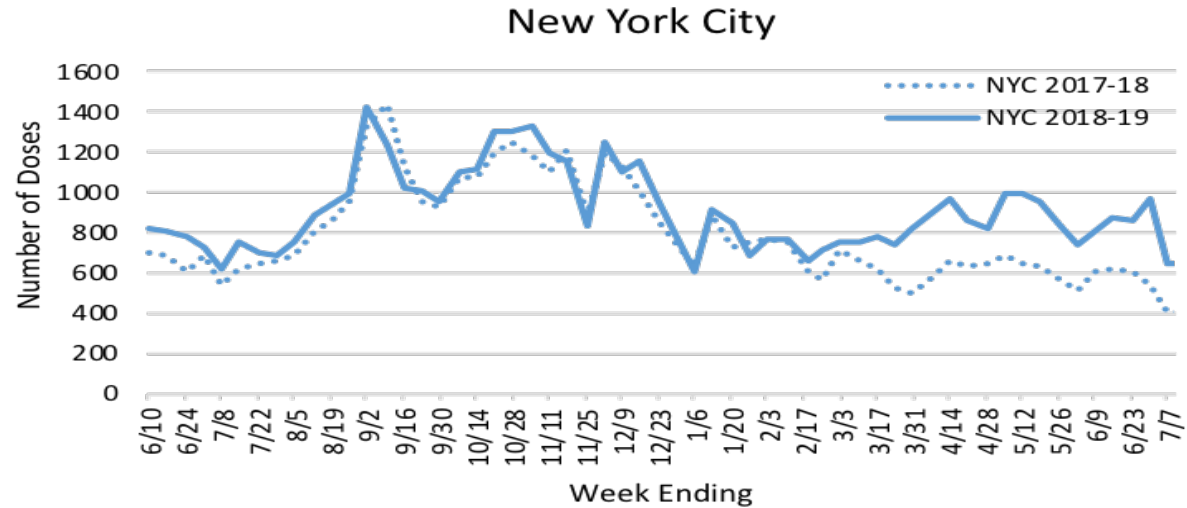
Since October 1, 2018, an additional

- ~**30,000** doses in NYC (165k vs 135k, **↑22%**)
- ~**6,000** doses in Williamsburg (12k vs 6k, **↑92%**)
- ~**6,000** doses in Borough Park (15k vs 9k, **↑66%**)

have been given to children 6 to 59 months compared to the same time period last year.



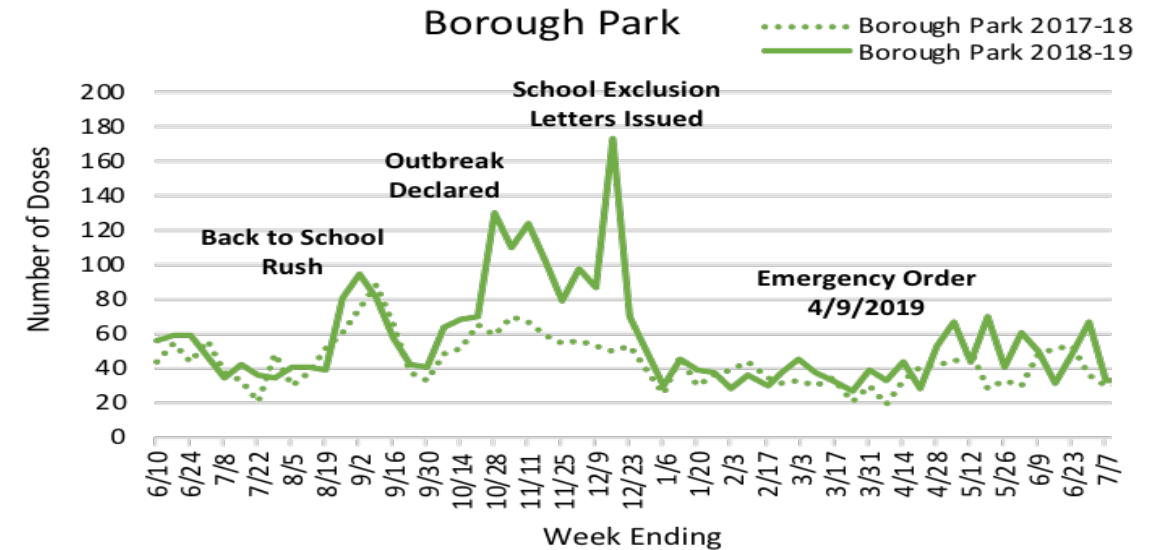
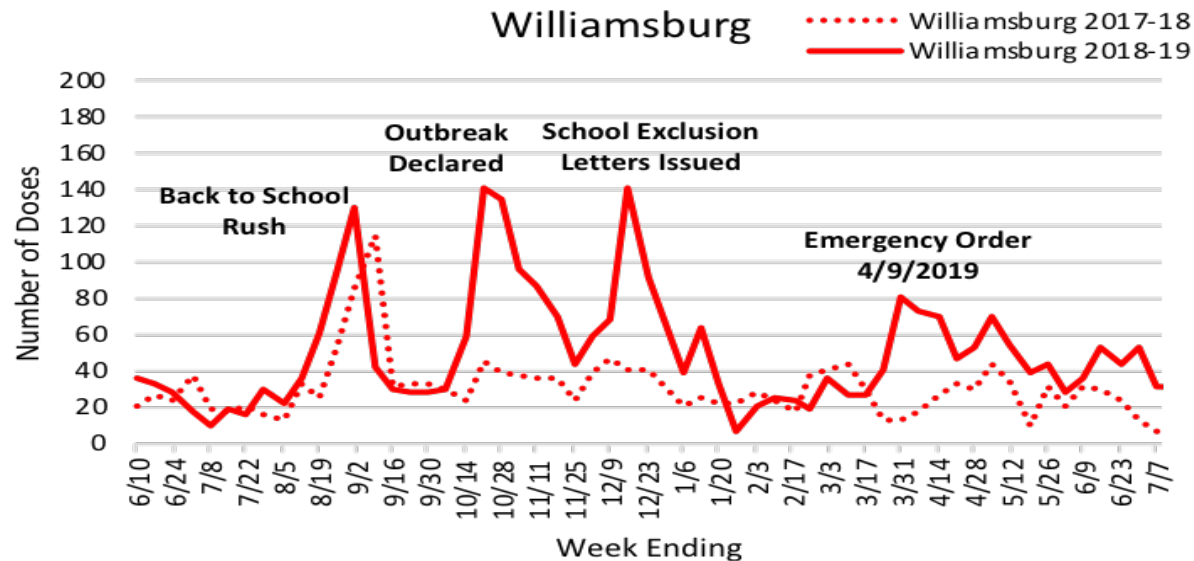
MMR Vaccine Uptake Among Children Ages 5 to 18 Years as of 7/7/2019



Since October 1, 2018, an additional

- ~**6,000** doses in NYC (37k vs 31k, ↑ 19%)
- ~**1,000** doses in Williamsburg (2k vs 1k, ↑ 92%)
- ~**600** doses in Borough Park (2.3k vs 1.7k, ↑ 39%)

have been given to children 5 to 18 years compared to the same time period last year.



Conclusion

- Using CIR enabled NYC Health Dept to rapidly identify the immunity status of exposed household contacts
- CIR enabled the Health Dept to monitor outbreak response efforts in measles-affected neighborhoods by measuring MMR vaccine uptake
- NYC experience further supports United States Preventive Task Force conclusion that IISs are an evidence-based strategy to increase vaccine coverage
 - IIS is also a critical component of outbreak control

Thank you!

- Contact info:
 - mlangdonembry@health.nyc.gov
 - (347)-396-2596
- Acknowledgments
 - NYC Department Of Health and Mental Hygiene
 - Bureau of Immunization, Vaccine Preventable Disease Surveillance Unit
 - Bureau of Immunization, Citywide Immunization Registry