

Impact of the COVID-19 Pandemic on Vaccination Rates in New York City

Marisa Langdon-Embry, MSc
Special Assistant to the Assistant Commissioner
Bureau of Immunization
New York City Department of Health and Mental Hygiene

2022 AIRA National Meeting
April 26, 2022

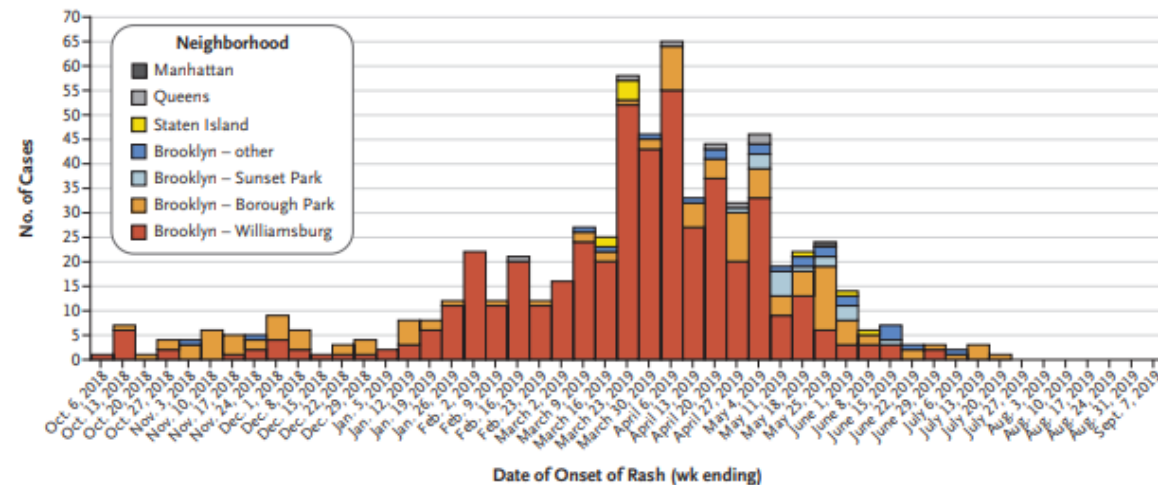
Background

- The COVID-19 pandemic has raised concerns about decreasing vaccination rates globally and within the United States
- An estimated 23 million children worldwide missed routine vaccinations in 2020, placing millions of children at risk of life-threatening vaccine-preventable diseases

Background

- In New York City (NYC), declining vaccination is of concern in light of recent outbreaks of VPDs
 - In the last decade, NYC has experienced periodic outbreaks of mumps, pertussis, varicella and measles
 - Maintaining high population immunity is critically important

Measles Outbreak, NYC, 2018-2019

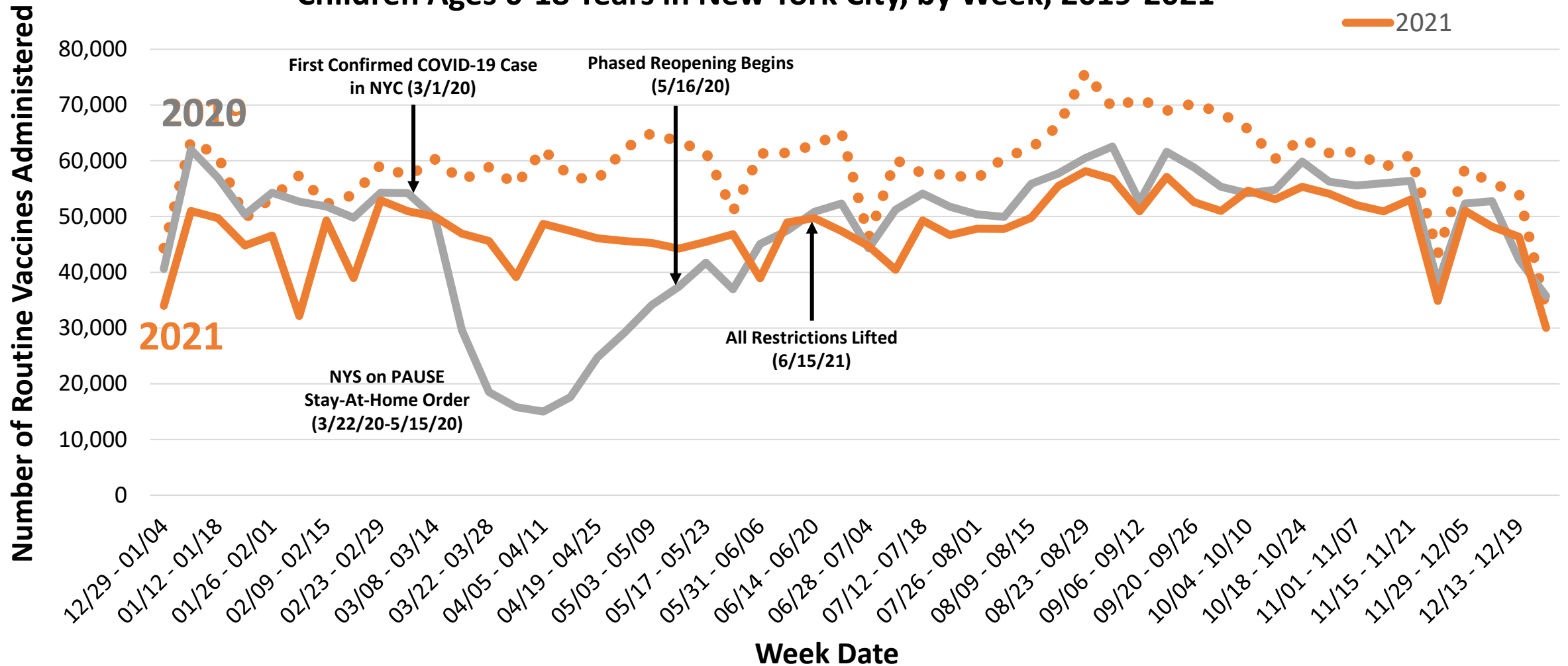


Largest measles outbreak in U.S. since 1992
(n=649 cases)

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 >13.8 million patient records and >147 million immunizations
 - Timely; ~81% of immunizations reported in ≤ 1 day; 96% reported within 1 month of administration

Routine Pediatric Vaccines Administered to Children Ages 0-18 Years in New York City, by Week, 2019-2021



In 2021, the aggregate number of routine vaccines administered to children aged 0-18 years was **16%** lower compared to 2019. There were 450,000 fewer pediatric doses administered (2.45 million in 2021 compared to 2.9 million in 2019)

Source: NYC DOHMH Citywide Immunization Registry; data run on 2/1/2022

*Excludes influenza vaccines, COVID-19 vaccines and immunizations administered in pharmacies and nurseries

Objectives

- To better understand the effect of the COVID-19 pandemic on childhood and adolescent vaccination rates in New York City

UTD Coverage for 19-35-Month-Olds: 4:3:1:3:3:1:4 Vaccine Series

| Vaccine | No. of Doses | Timing of doses | | | | | | | |
|---|--------------|----------------------|----------------------|----------------------|----------------------|----------------------|-------|----------------------|----------------------|
| | | Birth | 1 mo | 2 mos | 4 mos | 6 mos | 9 mos | 12 mos | 15 mos |
| Diphtheria, tetanus & acellular pertussis (DTaP) | 4 | | | 1 st dose | 2 nd dose | 3 rd dose | | | 4 th dose |
| Inactivated poliovirus (IPV) | 3 | | | 1 st dose | 2 nd dose | 3 rd dose | | | |
| Measles, mumps, rubella (MMR) | 1 | | | | | | | 1 st dose | |
| <i>Haemophilus influenzae</i> type B (Hib) | 3 or 4* | | | 1 st dose | 2 nd dose | | | 3 rd dose | |
| Hepatitis B (Hep B) | 3 | 1 st dose | 2 nd dose | | | 3 rd dose | | | |
| Varicella | 1 | | | | | | | 1 st dose | |
| Pneumococcal conjugate (PCV13) | 4 | | | 1 st dose | 2 nd dose | 3 rd dose | | 4 th dose | |

Source: [Birth-18 Years Immunization Schedule | CDC](#)

*The Hib vaccine series can be completed with 3 or 4 doses depending on the vaccine product administered

UTD Coverage for 13-17-Year-Olds

1:1:3 Vaccine Series

| Vaccine | No. of Doses | Timing of doses | | |
|--|--------------|----------------------|-----------|----------|
| | | 11-12 yrs | 13-15 yrs | 16-18yrs |
| Tetanus, diphtheria & acellular pertussis (Tdap) | 1 | 1 st dose | | |
| Meningococcal (MenACWY) | 1 | 1 st dose | | Booster |
| Human papillomavirus (HPV) | 2 or 3* | 2 or 3-dose series | | |

Source: [Birth-18 Years Immunization Schedule | CDC](#)

**The HPV vaccine series can be completed with 2 or 3 doses depending on the age of initiation and the amount of time elapsed between the first two doses*

Methods

- Quarterly vaccine coverage estimates from 12/31/2019 to 12/31/2021 were calculated using data from CIR and US Census population estimates
 - For 19-35-month-olds: UTD coverage with the 4:3:1:3:3:1:4 series and individual vaccines assessed
 - For 13-17-year-olds: UTD coverage with the 1:1:3 series
- Numerator: Children who received all valid doses of vaccine series; current address in NYC; met age criteria; MOGE* excluded (based on CIR)

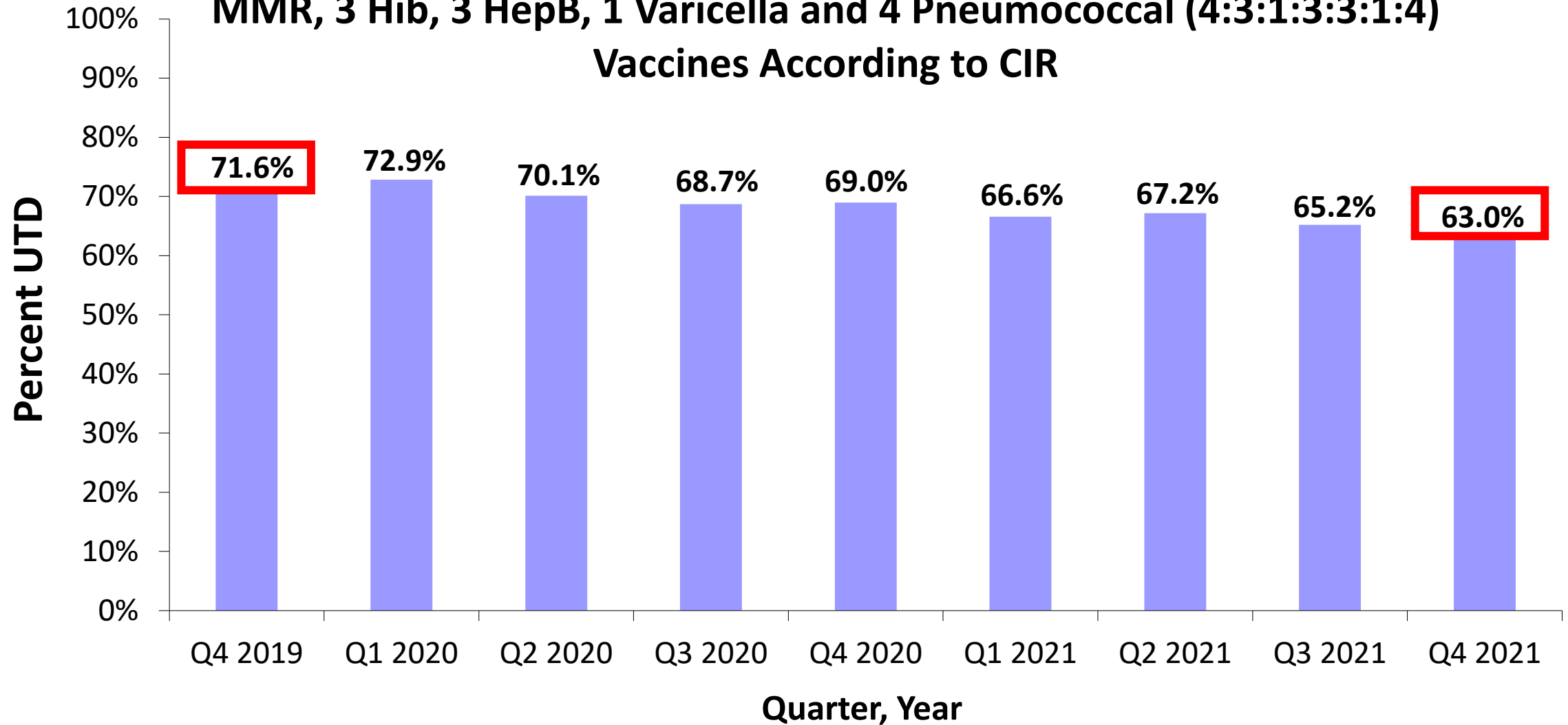
*Moved or gone elsewhere

Methods (cont.)

- Denominator: 2021 Vintage population estimates for 2019-2020
 - Intercensal estimates produced by the U.S. Census Bureau and adjusted by the NYC Department of City Planning and NYC DOHMH to account for neighborhood-level population changes
 - Updated each year
 - Used by NYC DOHMH as population denominators to calculate rates
- Data were analyzed by race/ethnicity and NYC ZIP code of residence

Results

Percent* of Children Aged 19-35 Months UTD with 4 DTaP, 3 Polio, 1 MMR, 3 Hib, 3 HepB, 1 Varicella and 4 Pneumococcal (4:3:1:3:3:1:4) Vaccines According to CIR



Numerator: Number of children aged 19-35 months with last known address in NYC who completed 4:3:1:3:3:1:4 series;

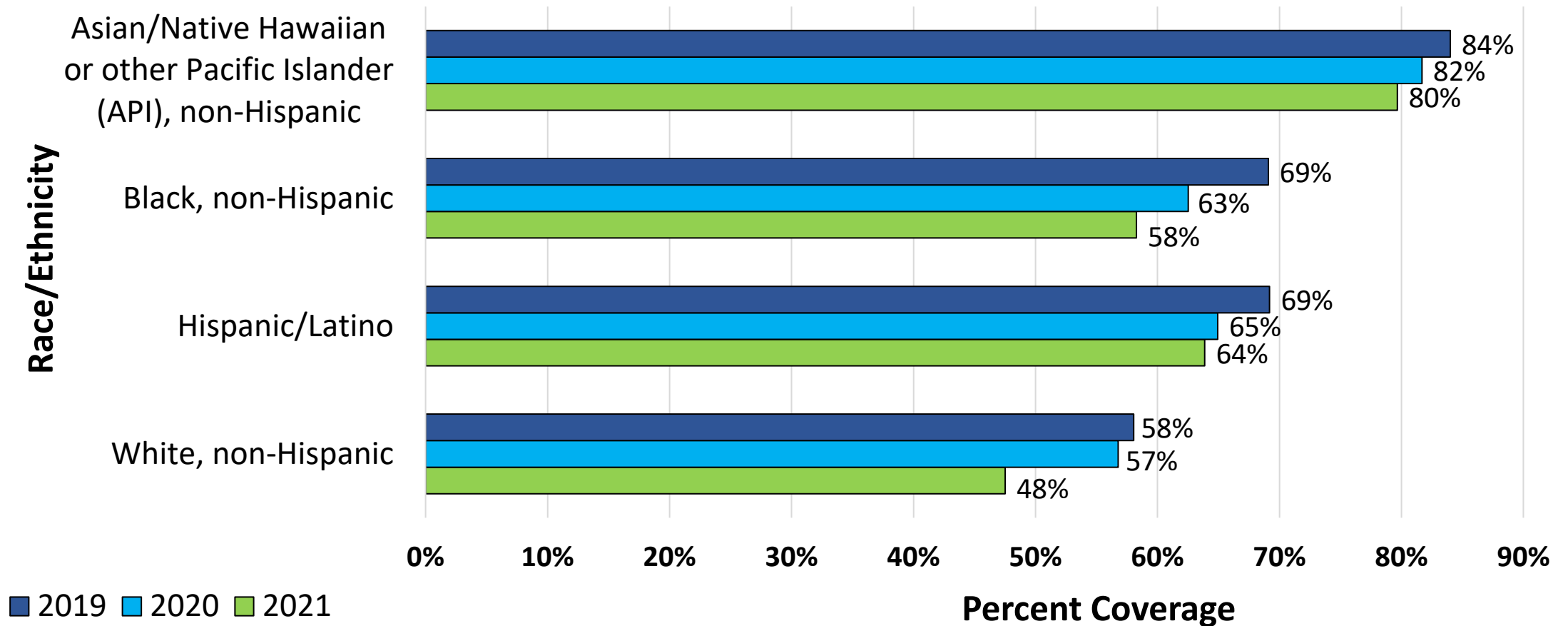
Denominator: Number of children aged 19-35 months according to DOHMH neighborhood population estimates, modified from US Census (2019-2020)

UTD Coverage Rates among 19-35-Month-Olds, by Vaccine

| Vaccine | Pre-Pandemic Coverage (as of 12/31/2019) | Current Coverage (as of 12/31/2021) | Percentage Point Difference | Percent Change |
|------------------------|---|--|-----------------------------|----------------|
| 4:3:1:3:3:1:4 Series | 71.6% | 63.0% | -8.6 | -12% |
| DTaP (4 doses) | 77.6% | 68.5% | -9.0 | -12% |
| Polio (3 doses) | 90.5% | 84.1% | -6.4 | -7% |
| MMR (1 dose) | 90.9% | 80.8% | -10.1 | -11% |
| Hib (3-4 doses) | 86.0% | 77.1% | -8.9 | -10% |
| Hep B (3 doses) | 88.4% | 81.8% | -6.6 | -7% |
| Varicella (1 dose) | 88.7% | 80.5% | -8.2 | -9% |
| Pneumococcal (4 doses) | 83.4% | 74.9% | -8.5 | -10% |

Source: NYC Citywide Immunization Registry (numerators); 2021 Vintage population estimates for 2019-2020 (denominators)

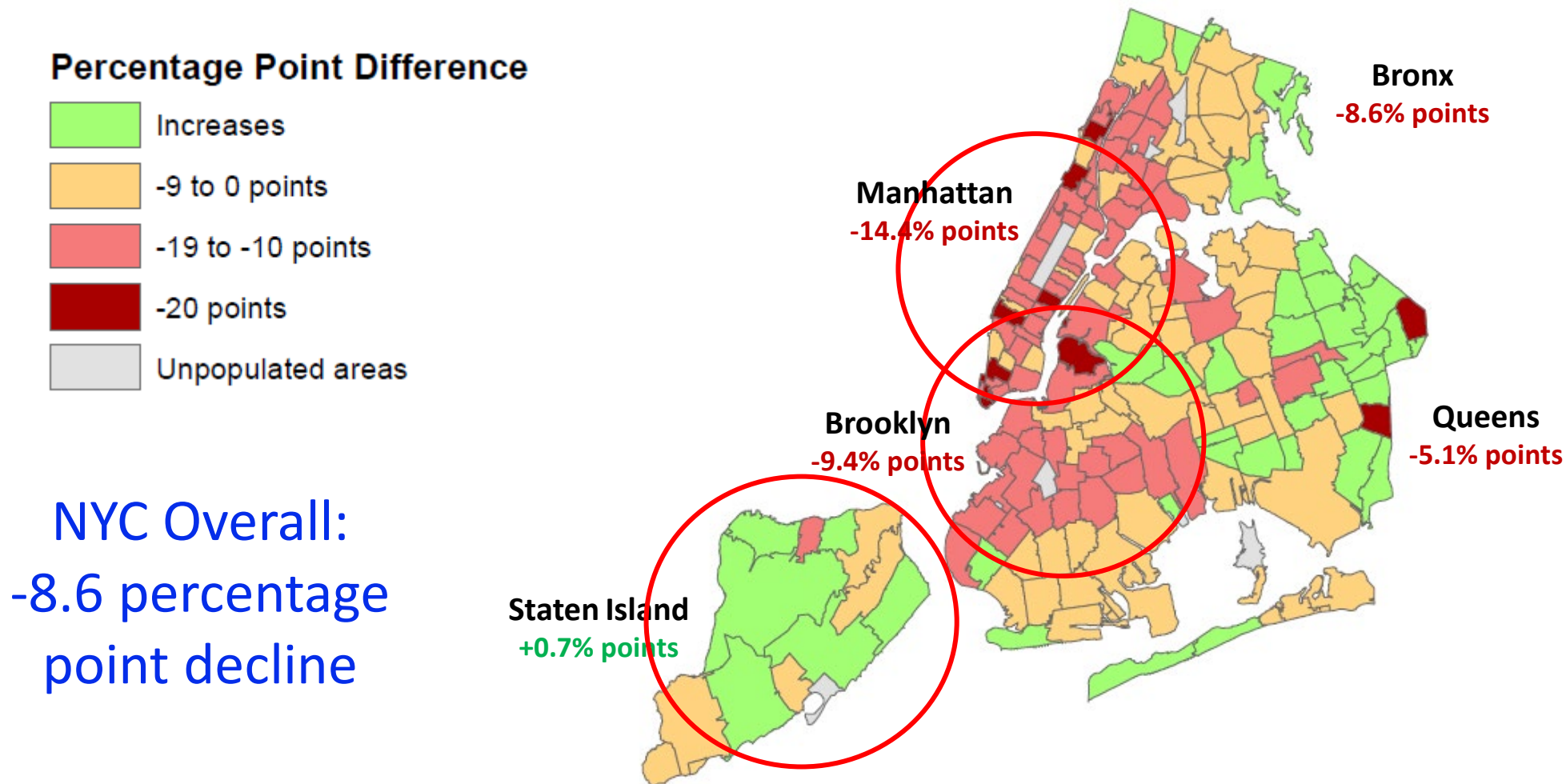
4:3:1:3:3:1:4 Series UTD Coverage, by Race/Ethnicity



Source: NYC Citywide Immunization Registry (numerators); 2021 Vintage population estimates for 2019-2020 (denominators)

Note: Vaccination rates for children with unknown race/ethnicity or who identify as other categories, including two or more races, are not available. The Hispanic/Latino category includes children of any race. Race/ethnicity information was missing in 6-7% of CIR records for each year.

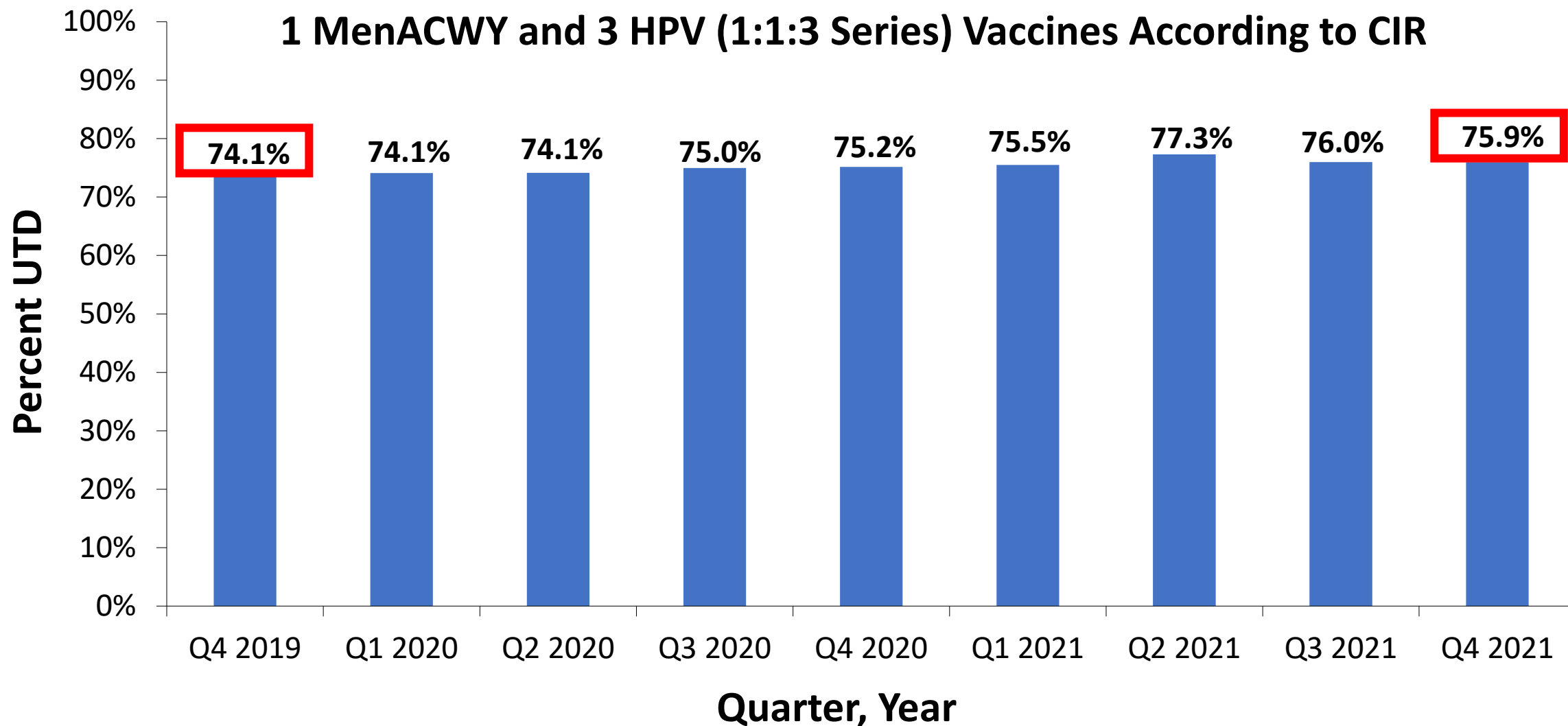
Percentage Point Change in UTD Coverage for 19-35-Month-Olds, by NYC ZIP Code, Q4 2021 vs Q4 2019



Source: NYC Citywide Immunization Registry (numerators); Vintage 2021 Population Estimates for 2019-2020 (denominator)

†Data restricted to children with a current address in a valid NYC ZIP code; MOGE excluded.

Percent* of Adolescents Aged 13-17 Years UTD with 1 Tdap, 1 MenACWY and 3 HPV (1:1:3 Series) Vaccines According to CIR



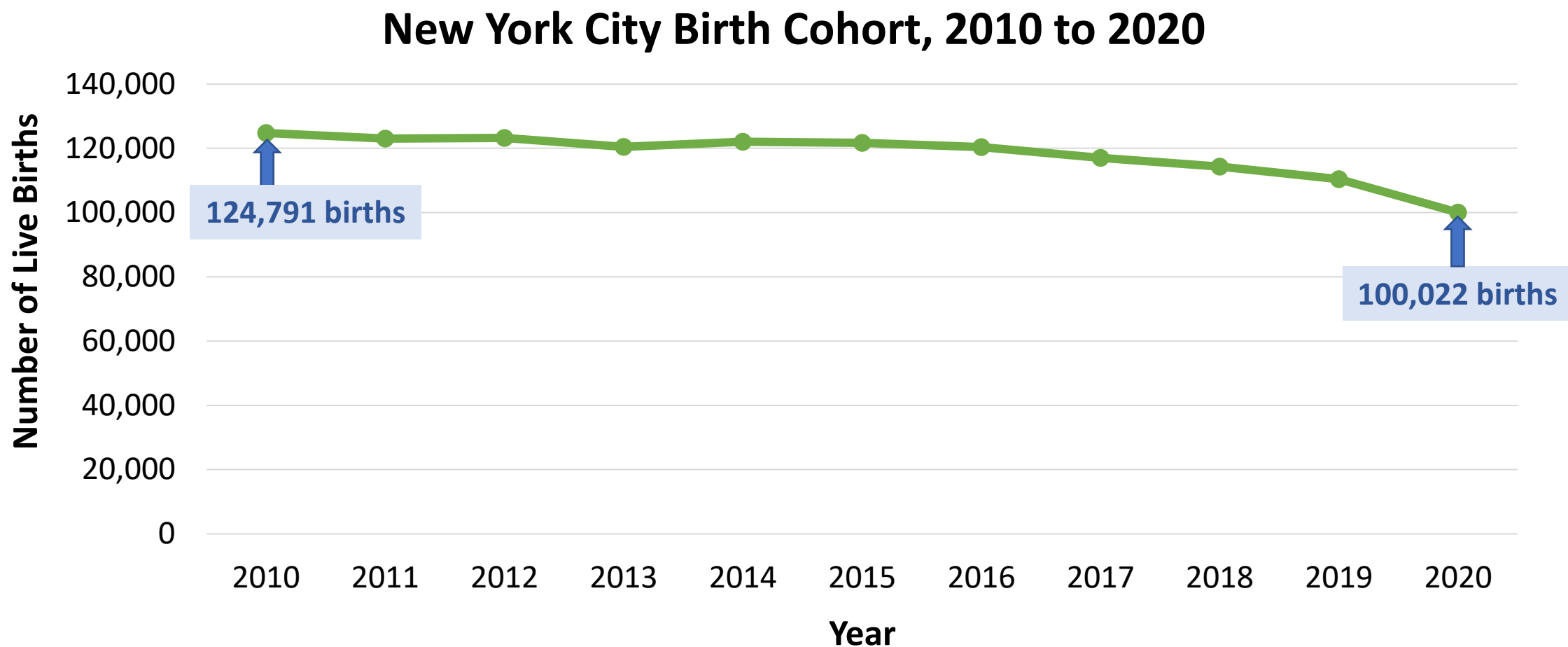
Numerator: Number of adolescents aged 13-17 years with last known address in NYC who completed 1:1:3 series

Denominator: Number of adolescents aged 13-17 years according to DOHMH neighborhood population estimates, modified from US Census (2019-2020)

Reasons for the Decline Among Younger Children:

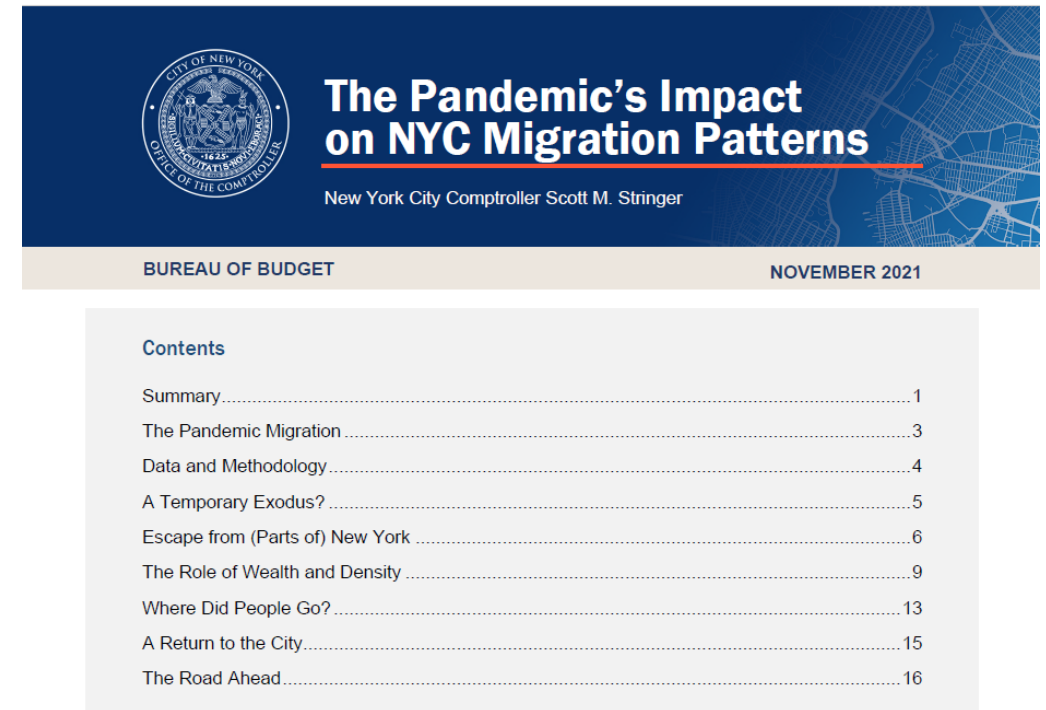
- Decreased in-person well-care visits during the COVID-19 pandemic
 - Clinic closures
 - Reduced operating hours
 - Increased use of telemedicine
- Fear of exposure to COVID-19
- Remote learning; school immunization requirements in place during pandemic, but exclusions not enforced for remote-only students
- Increase in vaccine hesitancy due to COVID-19 vaccine hesitancy?

Reasons for the Decline: Data Artifact?



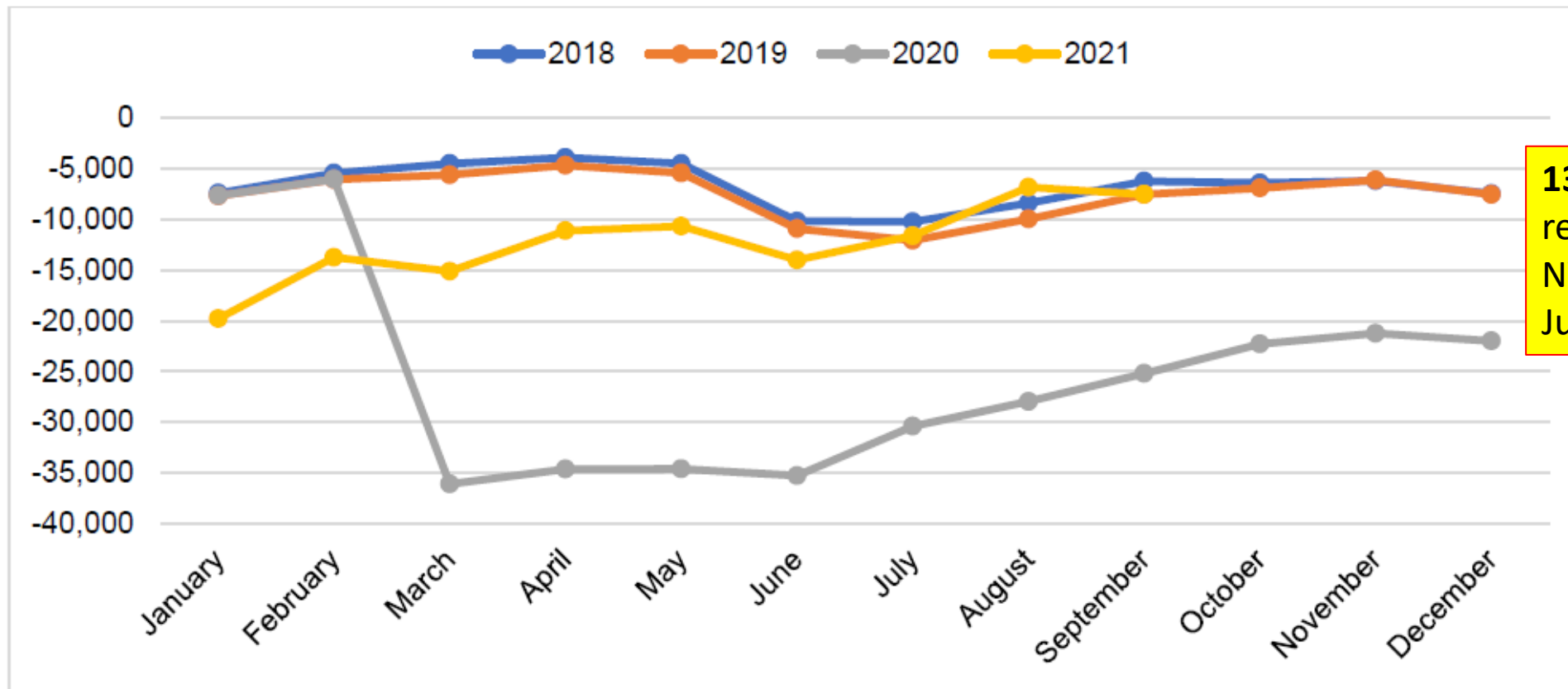
Reasons for the Decline: Data Artifact? Out-Migration From NYC

- In November 2021, the NYC Comptroller's Office released an analysis on the pandemic's impact on monthly migration patterns in NYC
 - Based on data published by the United States Postal Service (USPS)
- change of address forms
- Compared monthly number of change of address request forms filed in NYC compared to pre-pandemic period



Reasons for the Decline: Data Artifact? Out-Migration From NYC

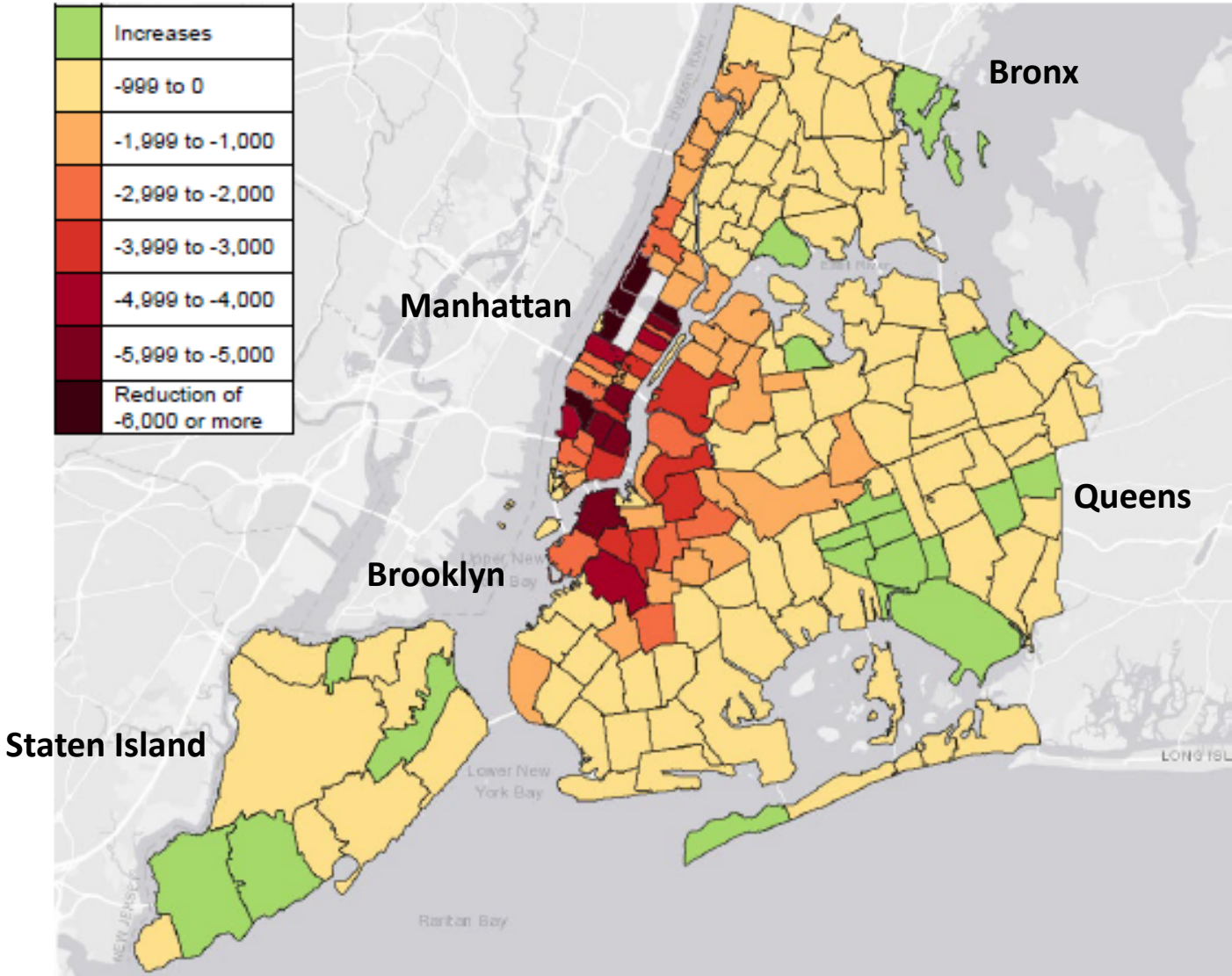
Monthly Net Residential Moves to and from New York City, 2018-2021



130,837 additional residents moved out of NYC during March 2020-June 2021

SOURCE: NYC Comptroller's Office analysis of United States Postal Service, "Change of Address Stats," <https://about.usps.com/who/legal/foia/library.htm>.
Note: Includes temporary and permanent moves.

Change in Net Residential Moves from Pre-Pandemic Trend in 2020 by ZIP Code (Change in Net Residential Moves in 2020, as Compared to 2019)



SOURCE: NYC Comptroller's Office analysis of United States Postal Service, "Change of Address Stats," <https://about.usps.com/who/legal/foia/library.htm>.

Note: Includes temporary and permanent moves. Data is not adjusted for population.

Conclusion

- Routine vaccination rates among younger children in NYC have been severely impacted by the COVID-19 pandemic, while rates for adolescents are relatively unchanged
- Many pandemic-related factors contributed to the decline
- Decrease may also be attributed to a data artifact caused by out-migration from NYC during the pandemic and the declining birth cohort
- Catching up children on routine vaccinations is critically important to prevent future outbreaks of VPDs

Next Steps

- Updating vaccine coverage estimates once the 2020 U.S. Census estimates are released
- Preparing for COVID-19 vaccine availability for children aged <5 years, with an emphasis on engaging pediatricians
 - Recommending co-administration of COVID vaccines and routine vaccinations
- Preparing for 'back-to-school' rush later this summer
 - Working closely with schools and daycares to increase compliance with school immunization requirements
- Media and promotion to catch up children on routine vaccinations missed during the pandemic

Thank you!

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