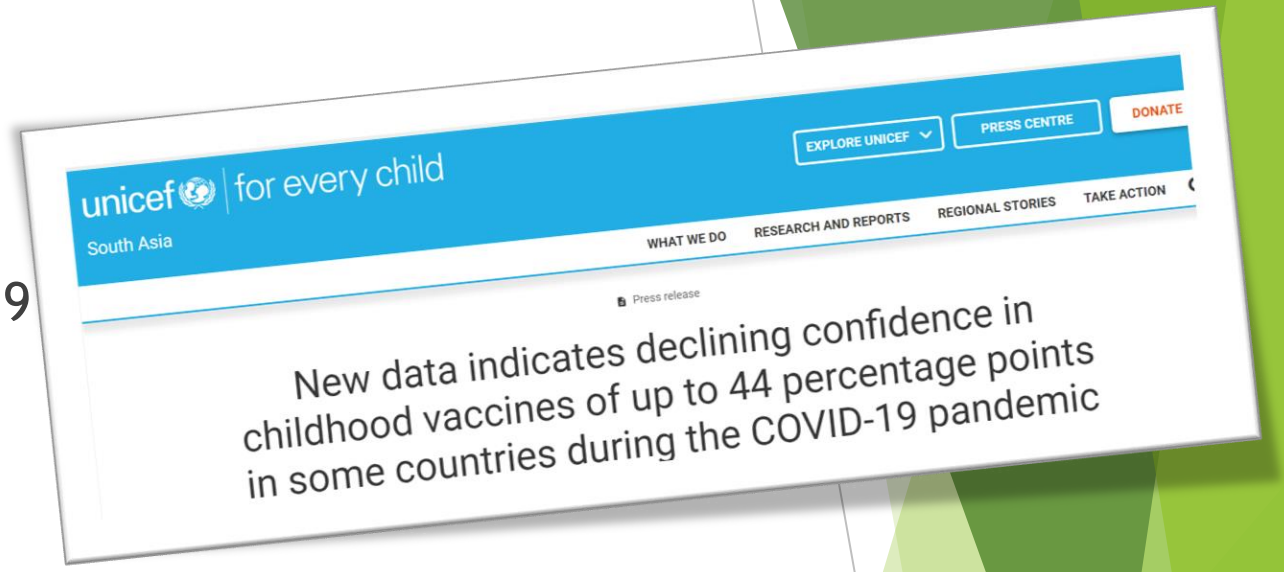
Did Covid-19 Vaccine Hesitancy Affect Routine Childhood Immunizations?

Farnaaz Sheikh, MBBS MS; John McClure; Arundhati Bakshi, PhD

Special thanks to Annie Truong and Suryatapa Kar

Background

- Nationally, routine childhood vaccination rates dropped during the Covid-19 pandemic
- Parental hesitancy towards pediatric Covid-19 vaccines continue
- Concern within public health that Covid-19 vaccine hesitancy may spill over into routine childhood vaccinations (UNICEF, 2023)



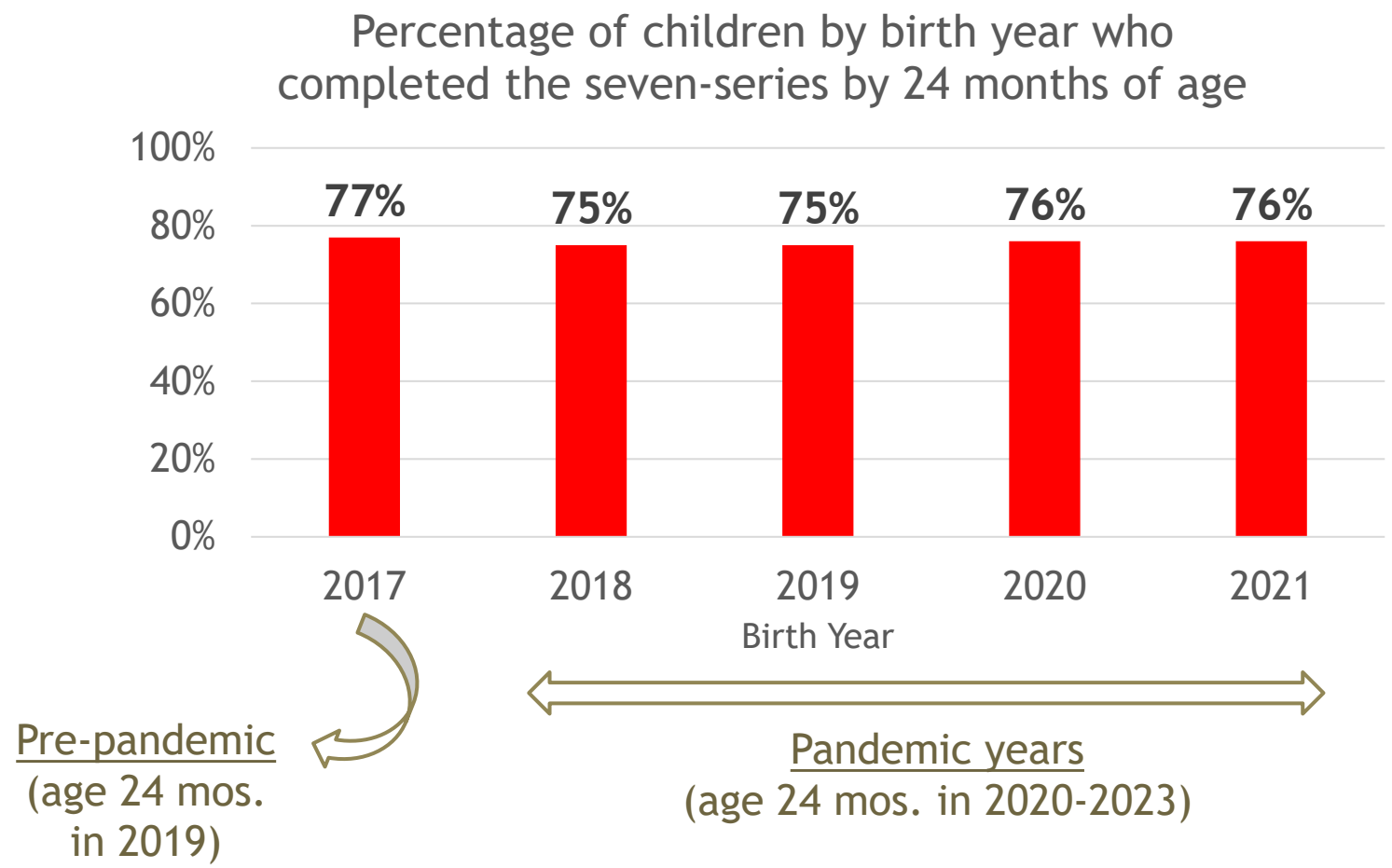
Objective

- **Investigate possible relationship between seven-vaccine series completion and Covid-19 primary series completion among children born 2017-2021 in Louisiana**

Recommendations for combined seven-vaccine series

- The combined seven-vaccine series (4:3:1:3:3:1:4) includes:
  - ≥4 doses of DTaP vaccine;
  - ≥3 doses of poliovirus vaccine;
  - ≥1 dose of measles-containing vaccine;
  - ≥3 or ≥4 doses (depending upon product type) of Hib;
  - ≥3 doses of HepB;
  - ≥1 dose of VAR; and
  - ≥4 doses of PCV
- Recommended completion by age 24 months (CDC)

Seven-series vaccination landscape in Louisiana (as of 12/31/2023)

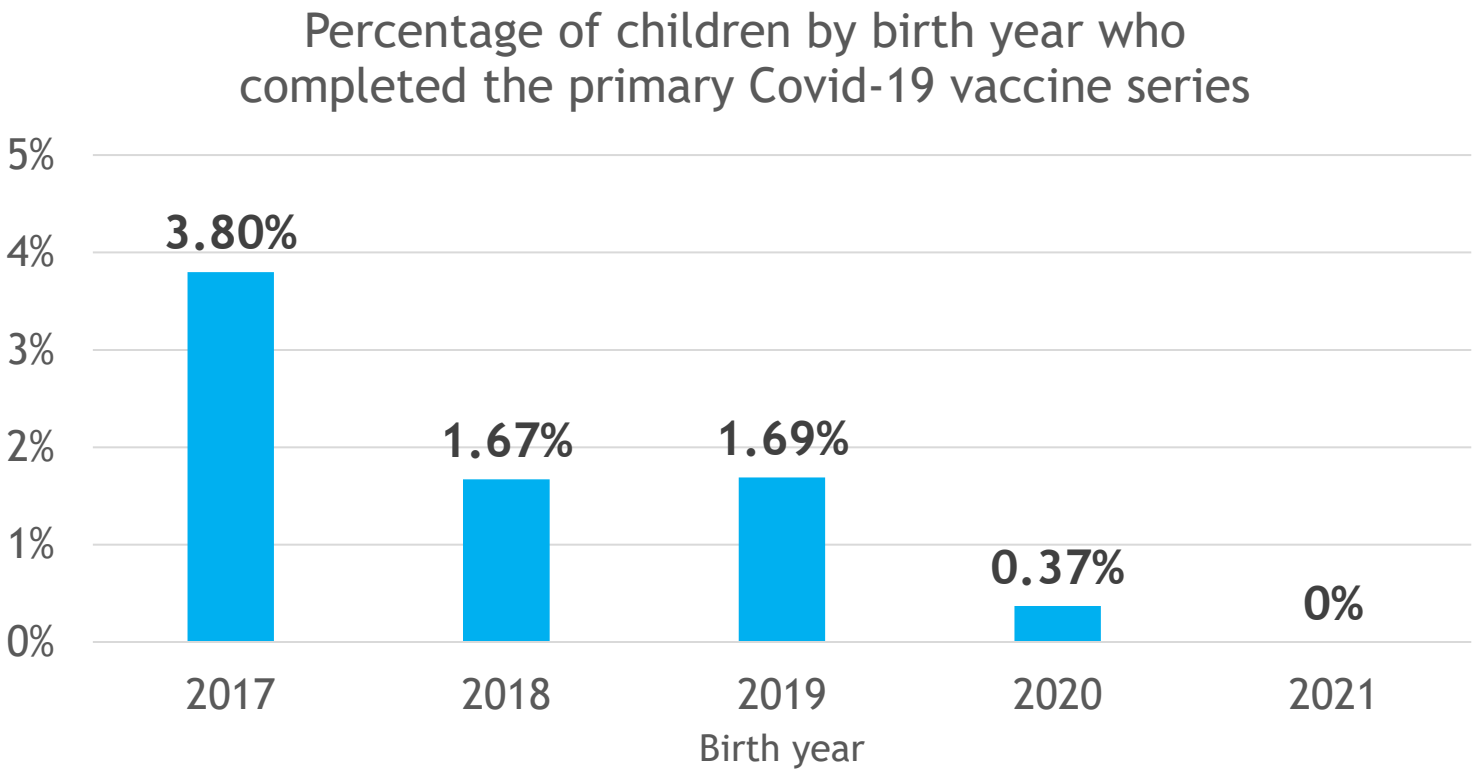


COVID-19 pandemic may have disrupted routine childhood vaccinations in Louisiana. Seven-series completion by age 24 months was 1-2% lower for kids born 2018-2021 compared to kids born 2017, who turned 2 years old in 2019, before the pandemic.

Recommendations for pediatric Covid-19 vaccine

- Evolving guidelines on what constitutes ‘primary series’
- Currently approved for all children older than 6 months of age.
- **Pfizer-BioNTech (ages 6 months to 4 years):** Three doses of COVID-19 vaccine are administered, the first two doses are administered 3-8 weeks apart and the third dose administered at least 8 weeks after the 2nd dose
- **Moderna (ages 6 months to 4 years):** 2 doses in the primary series, administered 4-8 weeks apart
- **Pfizer & Moderna (ages 5-11 years):** Current recommendation, 1 dose of updated 2023-2024 formula. Earlier recommendation, 2 doses
- **Janssen:** 1 dose

Covid-19 vaccination landscape in Louisiana (as of 12/31/2023)



The younger the child is (as of 2023), the less likely they are to be vaccinated. Vaccination rates are under 5% even for relatively older children (eg: 2017 birth cohort, 6 years old as of 2023).

Methods

- Extract data for all unique individuals born between 2017 and 2021 and represented in Louisiana's IIS
- Identify their seven-vaccine series completion and age-dependent Covid-19 primary series completion status
- Create a 2x2 table and evaluate:
  - Risk of incomplete seven-vaccine series based on Covid-19 vaccination status (primary series complete or incomplete)
  - Risk of incomplete Covid-19 primary series based on seven-series completion status (complete or incomplete)

	Covid-19 complete	Covid-19 incomplete
7-series complete		
7-series incomplete		

Hypothesis

If Covid-19 vaccine hesitancy was spilling over into routine childhood vaccinations, we would expect to see:

- **Combined seven-vaccine series completion rate LOWER among children who did NOT complete the Covid-19 primary series than those who did**

AND

- **The % children who did NOT complete the seven-vaccine series in the 'Covid-19 incomplete' group would INCREASE over time.**

Earlier birth cohorts (2017-2019) had an opportunity to complete their routine vaccinations before the Covid-19 vaccine controversy and widespread hesitancy. So, COVID-19 vaccine hesitancy would not play a role in their decision to complete the 7-series or not.

Risk of NOT completing seven-series based on Covid-19 vaccination status

	Covid-19 complete	Covid-19 incomplete	Total by 7-series
7-series complete	5104	261,776	266,880
7-series incomplete	597	185,915	186,512
Total by Covid-19	5701	447,691	453,392

- Risk of 7-series NOT complete among Covid-19 primary series incomplete cohort = 41.53%
- Risk of 7-series NOT complete among Covid-19 primary series complete cohort = 10.47 %
- **Risk Ratio (95% CI) = 3.9656 (3.6755 to 4.2787) // P < 0.0001**

Among children not vaccinated for Covid-19, risk of not completing the seven-series is 4X as high as children who did. But 60% children who did not take the Covid-19 vaccine nonetheless completed the seven-series.

Risk of NOT completing Covid-19 primary series based on seven-series completion status

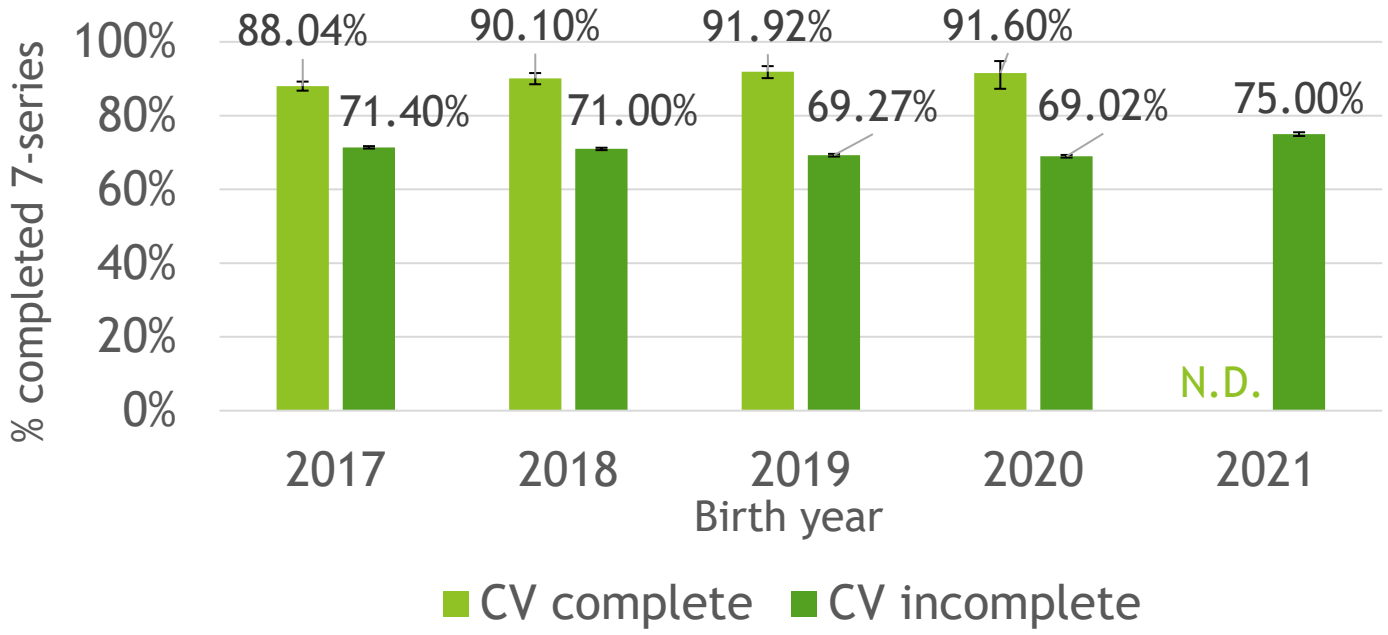
	Covid-19 complete	Covid-19 incomplete	Total by 7-series
7-series complete	5104	261,776	266,880
7-series incomplete	597	185,915	186,512
Total by Covid-19	5701	447,691	453,392

- Risk of Covid-19 series NOT complete in 7-series incomplete cohort = 99.67%
- Risk of Covid-19 series NOT complete in the 7-series complete cohort = 98.08%
- **Risk Ratio (95% CI) = 1.0162 (1.0156 to 1.0168) // P < 0.0001**

Statistically significant but perhaps not practically meaningful given the extremely low rates of Covid-19 vaccination rates regardless of seven-series completion status.

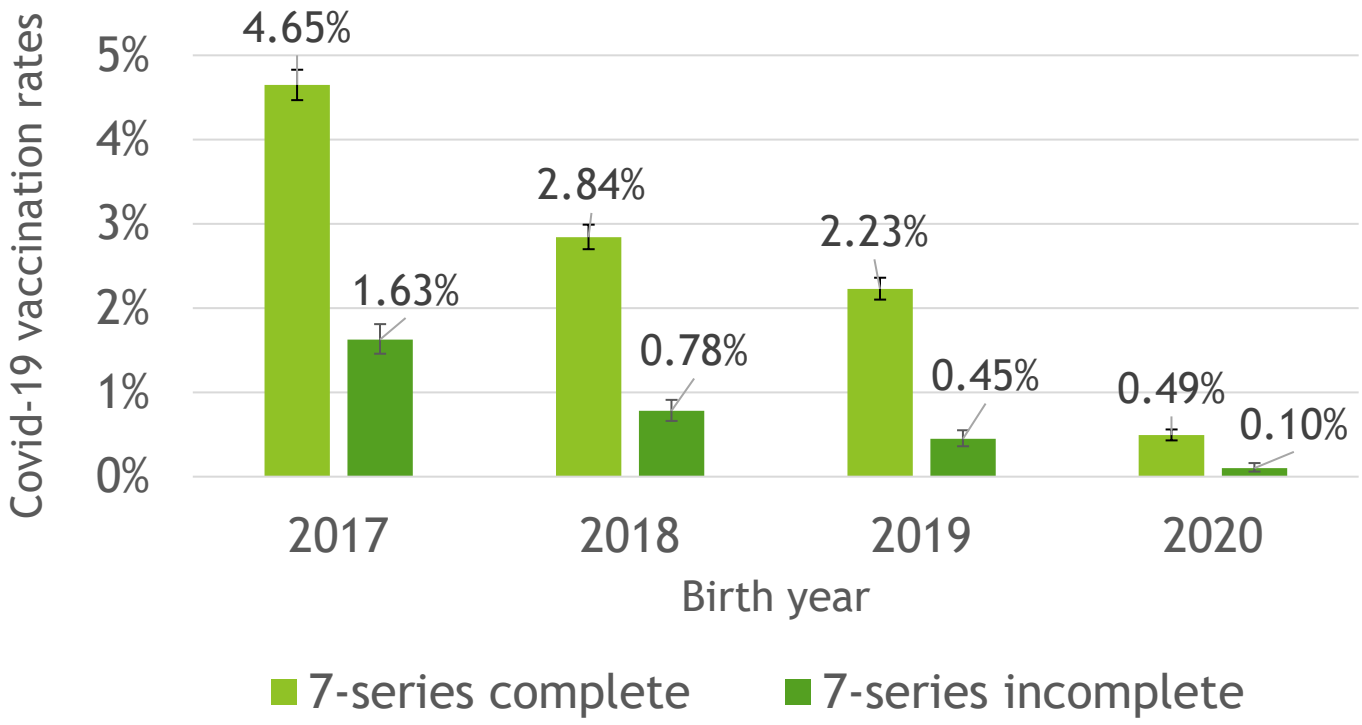
Let’s look at this another way:

Seven-series completion rates based on Covid-19 vaccination status



- Percent children who completed their seven-vaccine series significantly lower in the ‘Covid-19 incomplete’ cohort compared to ‘Covid-19 complete’ cohort.
- No sustained declining trend in seven-series completion rates in the ‘Covid-19 incomplete’ cohort.

Covid-19 vaccination rates based on seven-series completion status



- Covid-19 primary series completion rates are low regardless of seven-series completion status, but even lower in the 'seven-series incomplete' cohort compared to 'complete'.
- Decreasing trend in Covid-19 vaccination rates in both cohorts. Only 1 child born in 2021 received the Covid-19 vaccine.

Age of seven-vaccine series completion

- So far, data suggest that Covid-19 vaccine hesitancy is not spilling over into routine childhood vaccinations.
- But are parents only getting the vaccinating their kids for the routine shots because of school requirements?

Hypothesis

- If that were the case, then we would expect:
  - **ON-TIME seven-series completion in the 'Covid-19 complete' cohort (by age 24 months)**

    AND
  - **DELAYED seven-series completion in the 'Covid-19 incomplete' cohort (closer to school age, 4-5 years)**

Age of seven-series completion is independent of Covid-19 vaccination status

Birth Cohorts:	Covid-19 primary series	Age (months) of seven-series completion		Number of children
		Median (95% CI)	Mean ± SD	
2017	Complete	49 (48-64)	51 ± 5	2,436
	Incomplete	49 (16-68)	49 ± 11	49,963
2018	Complete	49 (48-61)	50 ± 5	1,402
	Incomplete	49 (15-64)	48 ± 11	47,912
2019	Complete	49 (16-55)	47 ± 9	1,047
	Incomplete	49 (15-56)	43 ± 13	45,968
2020	Complete	18 (13-43)	25 ± 14	218
	Incomplete	18 (13-49)	22 ± 11	44,088
2021	Complete	-	-	1
	Incomplete	16 (13, 28)	18 ± 4	41,844

Age of seven-vaccine series completion lower for 2020-2021 birth cohorts and independent of Covid-19 vaccination status.

Takeaways

- The ‘norm’ in Louisiana was for kids to not be vaccinated for Covid-19.
- ~90% of children who completed the Covid-19 primary series also completed the 7-series. This cohort is likely capturing a very vaccine confident group, considering 1-2% kids were vaccinated for Covid-19.
- But ~60% of children who did not complete the Covid-19 primary series still completed the 7-series, which means many people are still getting the routine shots for their kids even if they are Covid-19 vaccine hesitant.
- The age at which seven-series was completed did not differ based on Covid-19 vaccination status, and was lower for 2020-2021 birth cohorts compared to 2017-2019.

Conclusions

- Covid-19 vaccine hesitancy did not spill over routine childhood immunizations in Louisiana

- Need effective strategies to improve Covid-19 vaccine confidence among parents of young children