

# Effect of Vaccination on Household Transmission of SARS-CoV-2

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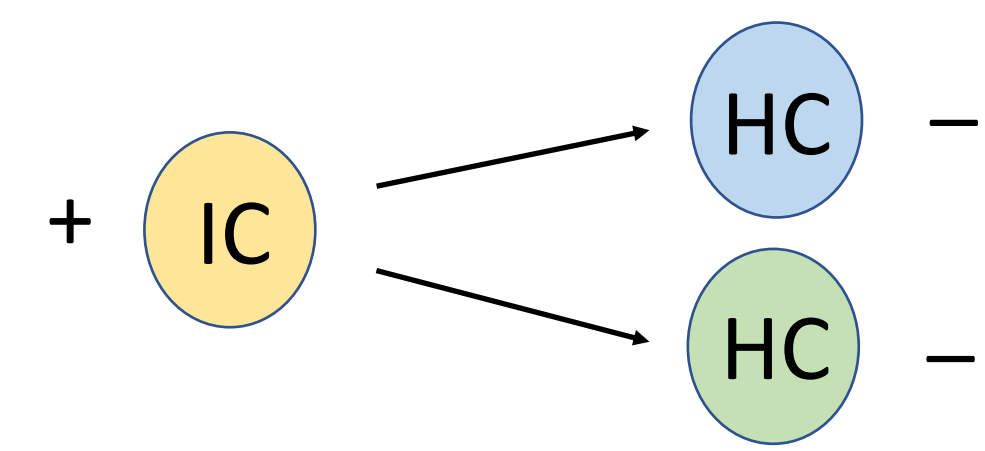
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## Background & Objectives

- Understanding how COVID-19 vaccination affects transmission of SARS-CoV-2 within households may affect policy and healthcare decisions.
- We hypothesized that vaccination reduces transmission and viral load in vaccinated household members.

## Methods

- Prospectively enrolled March 2020 – October 2021. Index cases (IC) eligible if tested positive for SARS-CoV-2 within previous 10 days and did not have household contacts (HC) who had tested positive or had symptoms of COVID-19.



- Participants self-collected anterior nares swabs daily for SARS-CoV-2 RT-PCR for at least 21 days, or once every household member had 7 consecutive negative tests.
- Baseline data included demographics and self-reported COVID-19 vaccination status.
- Household transmission analyzed via STATA 14.2 using logistic regression with robust standard error clustered by household. SARS-CoV-2 cycle threshold graphed by day of study using lowess smoothing.

## Enrollment

- 60 ICs + 103 HCs = 163 participants
- 50 ICs had at least 1 HC (median 2, max 7)
- ICs had median age 41.5 years (range 1–86) with 9 (18.0%) < 18 years
- HCs had median age 34 years (range 0–87) with 32 (31.1%) < 18 years
- Overall, 33 (20.2%) participants received at least one COVID-19 vaccine dose

### COVID-19 vaccination status prior to enrollment

- Completely vaccinated:** Received primary series (2 doses Pfizer or Moderna, or 1 dose Johnson & Johnson)
- Incompletely vaccinated:** Received 1 dose Pfizer or Moderna
- Unvaccinated:** No COVID-19 vaccines

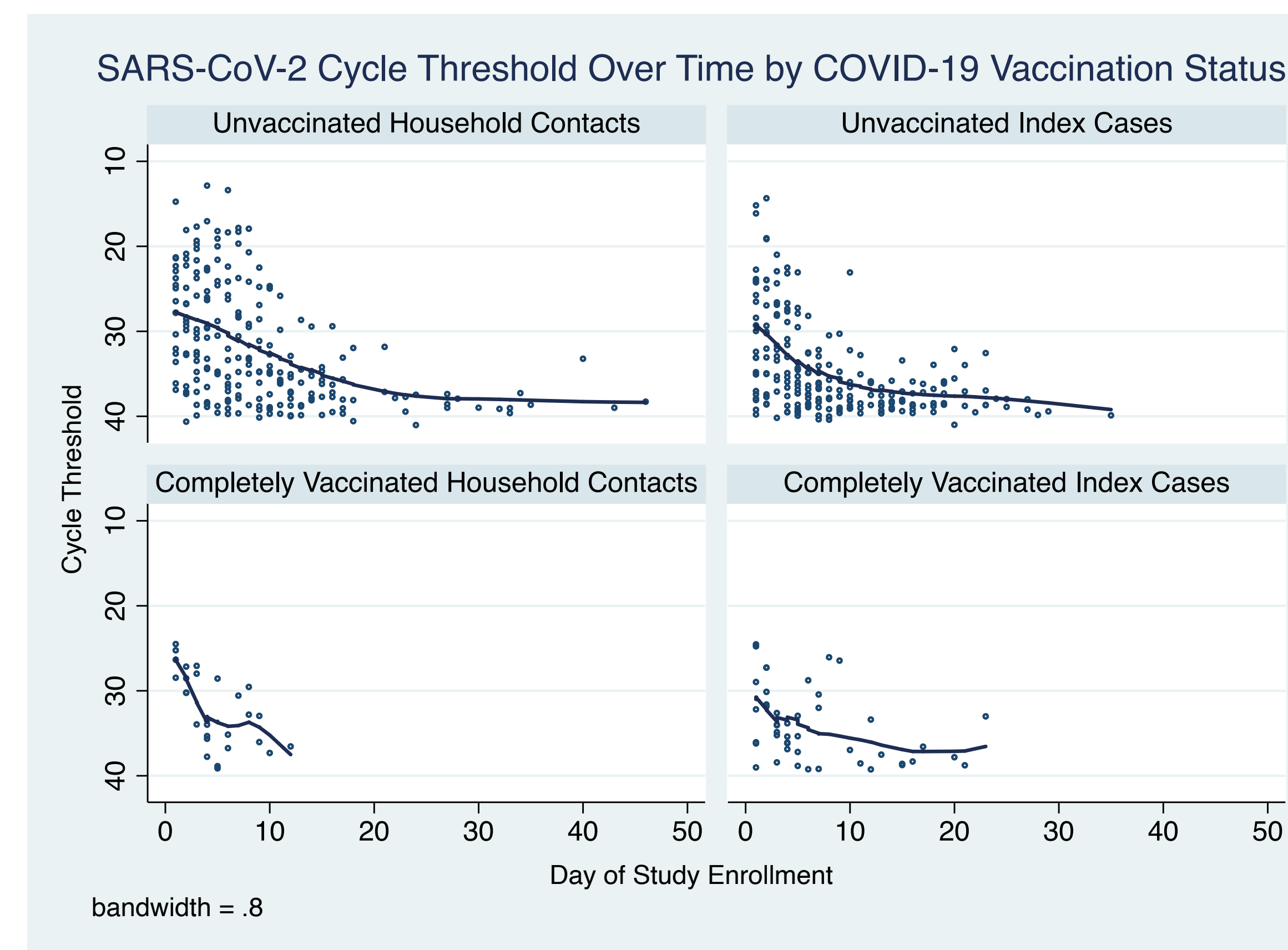
**Table 1.** Household Transmission By COVID-19 Vaccination Status Prior to Study Enrollment (among households with ≥ 1 HC)

	Total number of HCs	SARS-CoV-2 positive	SARS-CoV-2 negative	Odds of transmission* (95% CI)	p-value
<b>Household Contact (HC) (n=103)</b>					
Unvaccinated	84	39	45	0.53 (0.17 – 1.64)	0.27
Incompletely or Completely Vaccinated	19	6	13		
Unvaccinated or Incompletely Vaccinated	88	39	49	0.84 (0.26 – 2.65)	0.76
Completely Vaccinated	15	6	9		
Unvaccinated, Incompletely Vaccinated, or Completely Vaccinated < 14 days prior to enrollment	89	40	49	0.68 (0.20 – 2.3)	0.54
Completely Vaccinated ≥ 14 days prior to enrollment	14	5	9		
	Total number of ICs	SARS-CoV-2 transmission	No SARS-CoV-2 transmission	Odds of transmission* (95% CI)	p-value
<b>Index Case (IC) (n=50)</b>					
Unvaccinated	37	19	18	2.13 (0.55 – 8.27)	0.27
Incompletely or Completely Vaccinated	13	9	4		
Unvaccinated or Incompletely Vaccinated	41	22	19	1.72 (0.37 – 7.99)	0.48
Completely Vaccinated	9	6	3		
Unvaccinated, Incompletely Vaccinated, or Completely Vaccinated < 14 days prior to enrollment	41	22	19	1.72 (0.37 – 7.99)	0.48
Completely Vaccinated ≥ 14 days prior to enrollment	9	6	3		

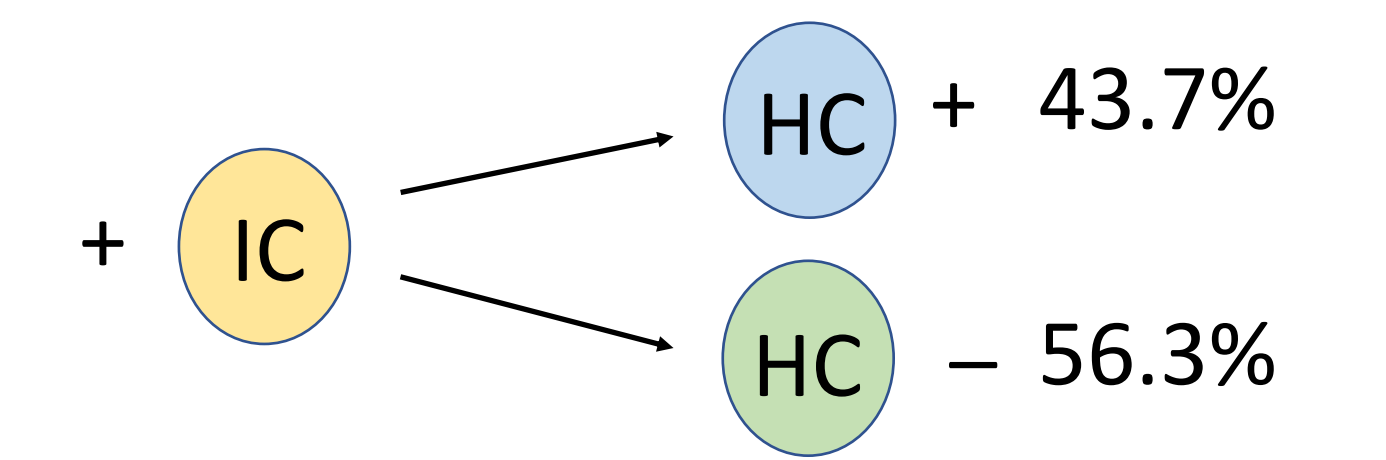
\*Using logistic regression with robust standard error, clustered by household. Reference is top group listed in each comparison (includes unvaccinated). CI: Confidence Interval

## Results

**Figure 1.** SARS-CoV-2 Cycle Threshold Over Time by COVID-19 Vaccination Status



- SARS-CoV-2 transmission occurred in 45 HCs.



- Odds of transmission was lower in HCs who were vaccinated prior to study enrollment, though this finding was not statistically significant (Table 1).
- There were 507 positive SARS-CoV-2 tests collected among 74 participants (Figure 1).

## Conclusions

- Vaccination of HCs may be protective against household SARS-CoV-2 transmission. However, analyses were limited due to low numbers of vaccinated study participants.
- Study enrollment is ongoing, and future analyses will include transmission dynamics during the 2022 Omicron surge, and daily symptom data which has been collected.

## References

- Grijalva CG, Rolles MA, Zhu Y, et al. Transmission of SARS-CoV-2 Infections in Households - Tennessee and Wisconsin, April-September 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69(44):1631-1634. Published 2020 Nov 6.
- McLean HQ, Grijalva CG, Hanson KE, et al. Household Transmission and Clinical Features of SARS-CoV-2 Infections. *Pediatrics.* 2022;149(3):e2021054178.
- Singanayagam A, Hakki S, Dunning J, et al. Community transmission and viral load kinetics of the SARS-CoV-2 delta (B.1.617.2) variant in vaccinated and unvaccinated individuals in the UK: a prospective, longitudinal, cohort study [published correction appears in *Lancet Infect Dis.* 2021 Dec;21(12):e363]. *Lancet Infect Dis.* 2022;22(2):183-195.

