# Inferring Risks of Coronavirus Transmission from Community Household Data: Tranche 9 Update

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## Headline results

This document presents an updated analysis for the following time period:

- **Tranche 9:** 15 October 2021 to 3 December 2021; high prevalence; schools open; Delta variant dominant; over 50 million first, 46 million second and 19 million third doses distributed by end of time period.

Properties of this Tranche are given in Table 1; the histogram and age density plots are in Figure 1; the pair and residual plots are in Figure 2; and the output from the fitted model is shown in Figure 3, Figure 4 and Table 2.

These results continue the previously seen patterns of elevated external infection risk for children of school age, and reduced risk for those working in patient-facing roles, which is consistent with the expected impact of vaccination policy. More difficult to interpret is that less reduction in transmission is now associated with PCR gene positivity pattern, and more is associated with being in the 12-16 age group. This would be consistent with the hypothesis that there is some reduction of transmission from children, which is mainly mediated via viral load, but testing this hypothesis requires additional analysis.

|  | Tranche 9 | All |
|---|---|---|
| Number of participants | 351092 | 447983 |
| Number of households | 183719 | 221181 |
| Number of positive individuals | 6817 | 40938 |
| Households with 1+ positive | 5107 | 29616 |
| Children <12 | 23900 | 35252 |
| Children 12–16 | 19708 | 24669 |
| OR+N+S positives | 6373 | 25482 |
| OR+N positives | 144 | 9463 |
| Patient-facing participants | 11626 | 17358 |

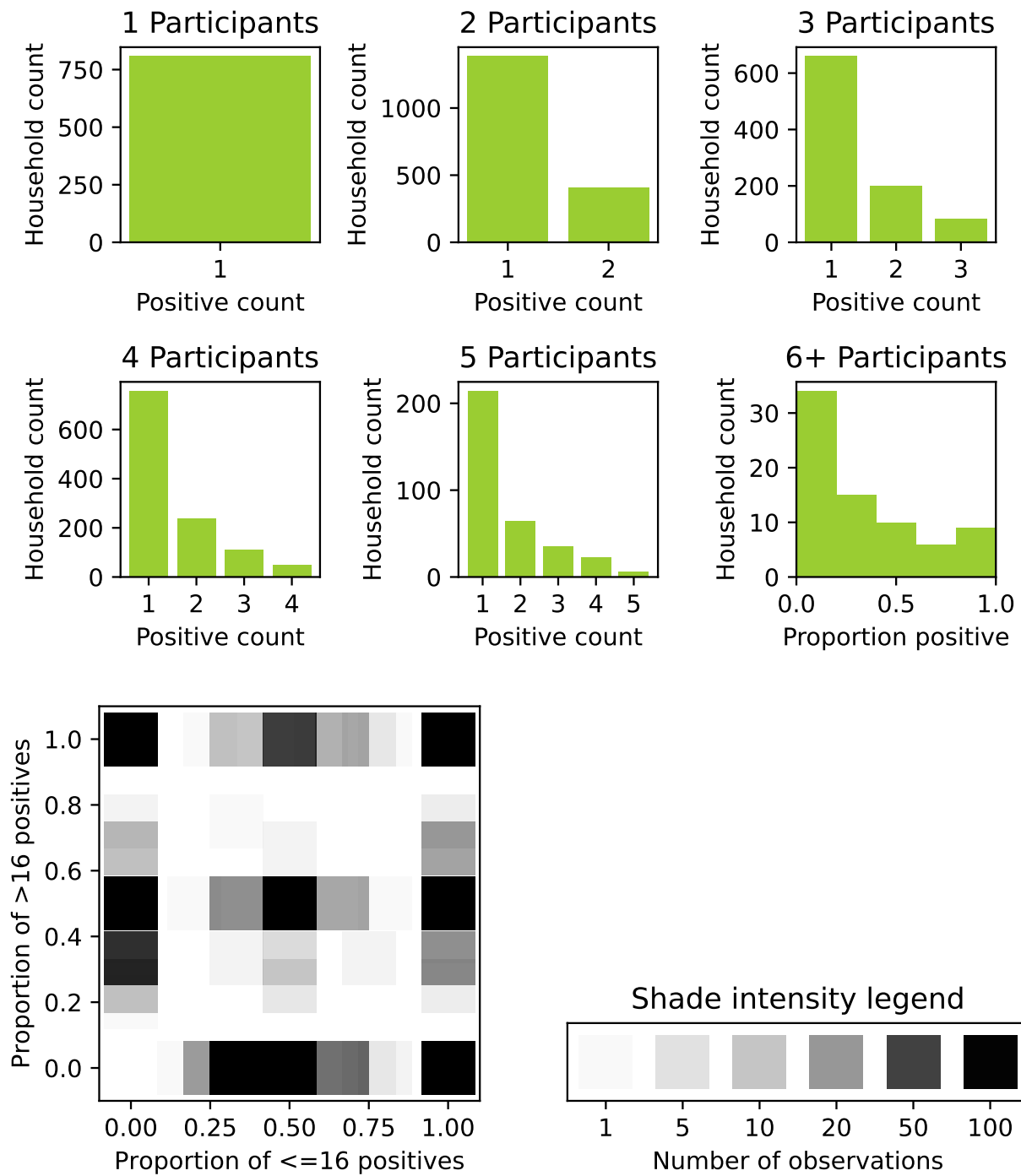Table 1: Tranche 9 sample properties.

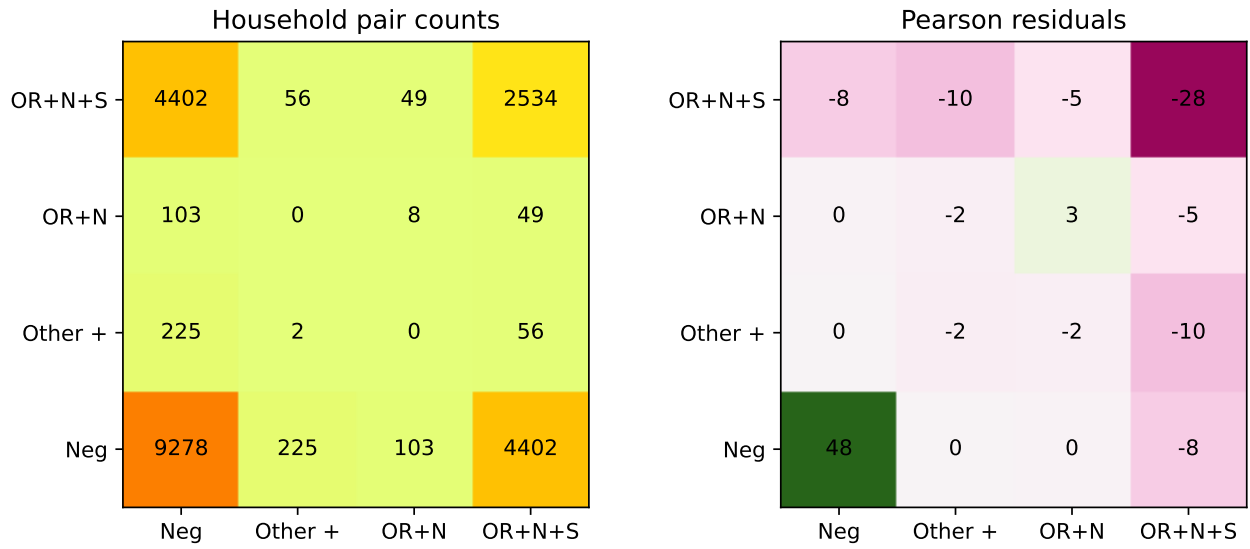Figure 1: Top: histogram and Bottom: density plot for Tranche 9 data

Figure 2: Left: pair count and Right: Pearson residual plots for Tranche 9 data
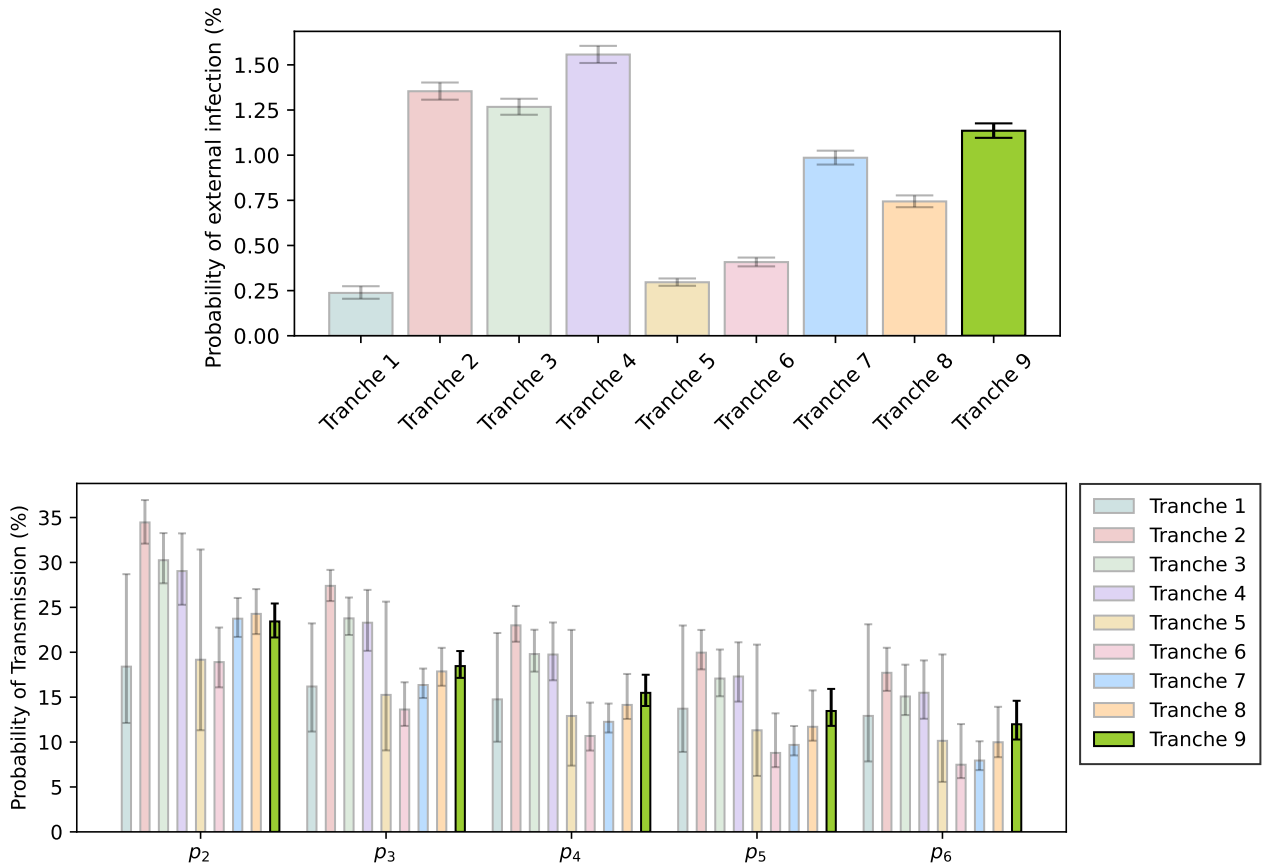


Figure 3: Visualisation of the fitted model. Top: Baseline probability of infection from outside. Bottom: Per-pair baseline probabilities of secondary transmission within the household, not including tertiary transmission effects.
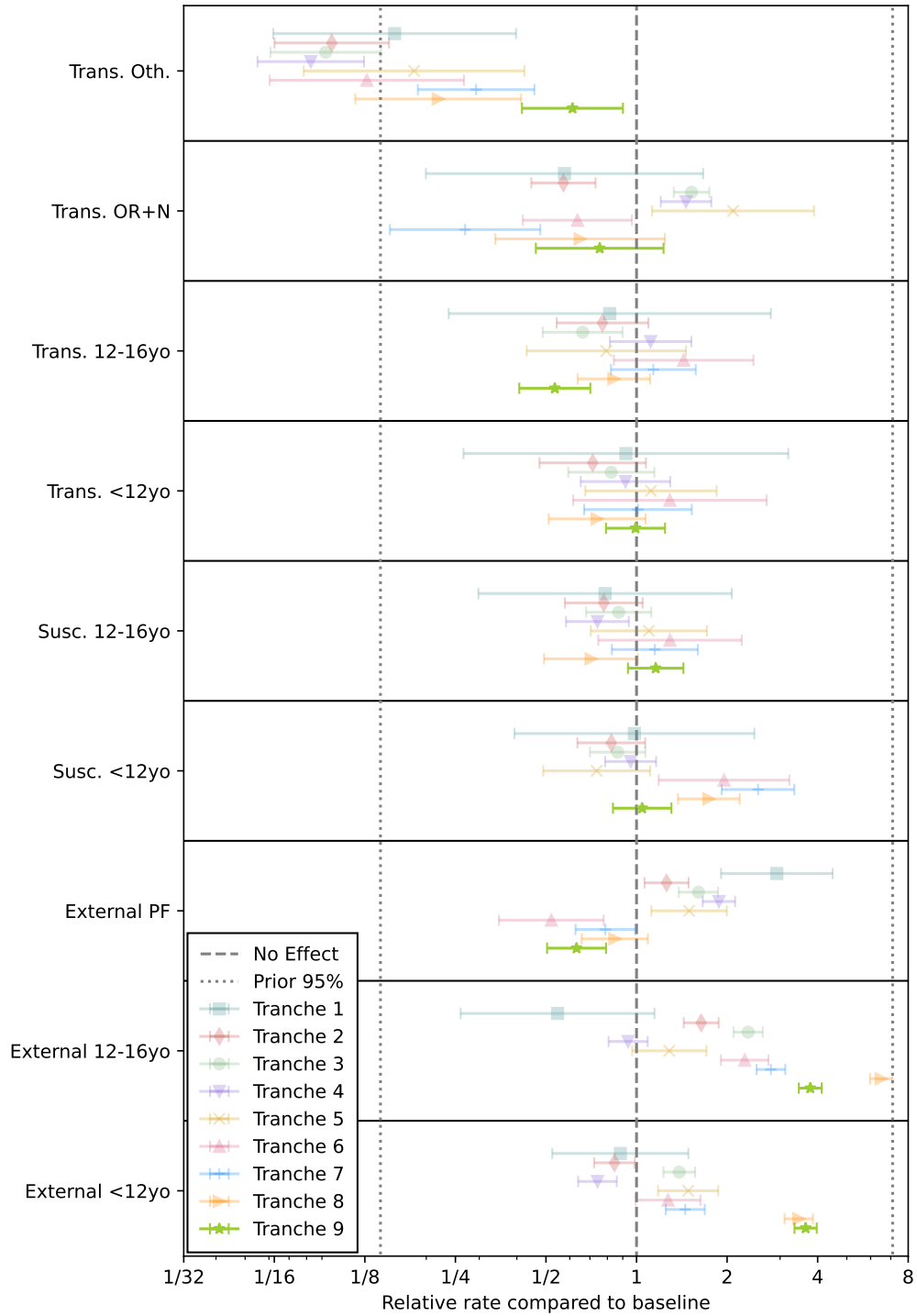
Figure 4: Visualisation of the fitted model. Relative effects on transmission, susceptibility and external exposure compared to baseline of an adult not working in a patient-facing role with OR+N+S maximal PCR gene positivity pattern if positive. 'Trans.' stands for relative transmissibility, 'Susc.' for relative susceptibility, and 'External' for relative external exposure.

| | Tranche 9 |
|---|---|
| $1 - q$ | 1.14 (1.1,1.18) % |
| $p_2$ | 23.4 (21.6,25.4) % |
| $p_3$ | 18.5 (17.1,20.1) % |
| $p_4$ | 15.5 (14.0,17.5) % |
| $p_5$ | 13.5 (11.8,15.9) % |
| $p_6$ | 12.0 (10.3,14.6) % |
| $\exp(\alpha_{2\text{-}11})$ | 3.65 (3.35,3.97) |
| $\exp(\alpha_{12\text{-}16})$ | 3.78 (3.46,4.13) |
| $\exp(\alpha_{\text{PF}})$ | 0.632 (0.504,0.792) |
| $\exp(\beta_{2\text{-}11})$ | 1.04 (0.835,1.31) |
| $\exp(\beta_{12\text{-}16})$ | 1.16 (0.937,1.43) |
| $\exp(\gamma_{2\text{-}11})$ | 0.992 (0.792,1.24) |
| $\exp(\gamma_{12\text{-}16})$ | 0.535 (0.408,0.702) |
| $\exp(\gamma_{\text{OR+N}})$ | 0.754 (0.463,1.23) |
| $\exp(\gamma_{\text{CT-oth}})$ | 0.612 (0.416,0.901) |

Table 2: Tranche 9 parameter point estimates and CIs.