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Article

The rise and fall of Omicron BA.1 variant as seen in wastewater supports epidemiological model predictions

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In order to calculate the copy number in the RT-qPCR assay, calibration curves were performed on a known-positive dsDNA gene block as previously described [1,2]. Copy number calculations were calculated using the following Equation (S1). The Equation for RNA copy number per Liter of wastewater for raw samples calculation.

(S1) $\left(\dfrac{RNA\ copy\ number}{Liter\ of\ wastewater}\right) =$

$$\dfrac{10^{calibration\ curve} \times Elution\ volume}{RTqPCR\ reaction\ volume \times volume\ taken\ from\ wastewater\ for\ RNA\ extraction}$$
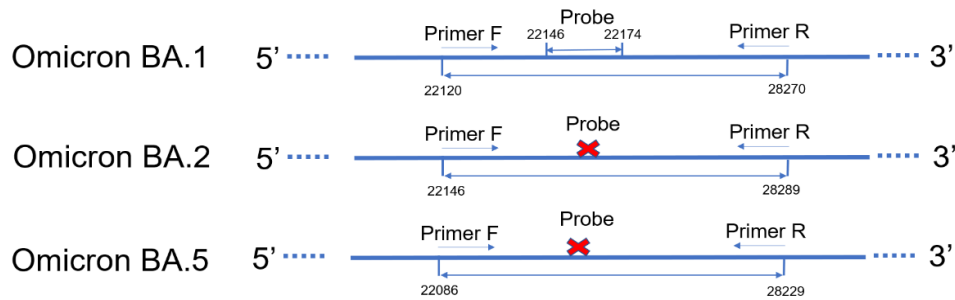

Figure S1: Primer and probe illustration in Omicron Variants. Note: Sequences of BA.1, BA.2 and NA.5 are from NCBI NC_045512.2NA.1, OX315675.1, and OP164797.1, respectively.
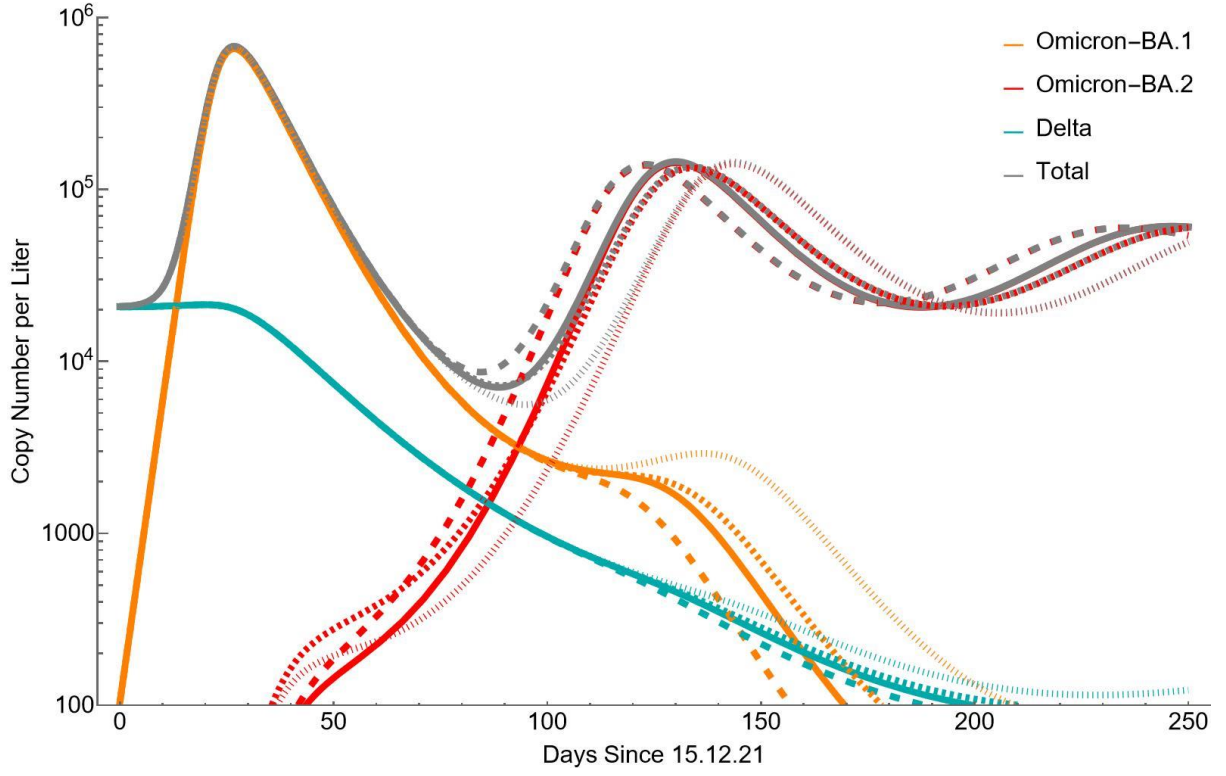
Figure S2: Sensitivity analysis to the basic reproduction number of BA.2, $R_0^{(B)}$: long dashed lines – $R_0^{(B)} = 1.6\,R_0^{(O)}$, full lines – $R_0^{(B)} = 1.5\,R_0^{(O)}$ (same as for Figure 2 in the main text), short dashed lines – $R_0^{(B)} = 1.4\,R_0^{(O)}$, shorter dashed ("dotted") lines – $R_0^{(B)} = 1.3.\,R_0^{(O)}$. All other parameters are the same as reported in Figure 2 in the main text. Weak effects are observed for BA.1 and BA.2, and negligible effects for Delta.
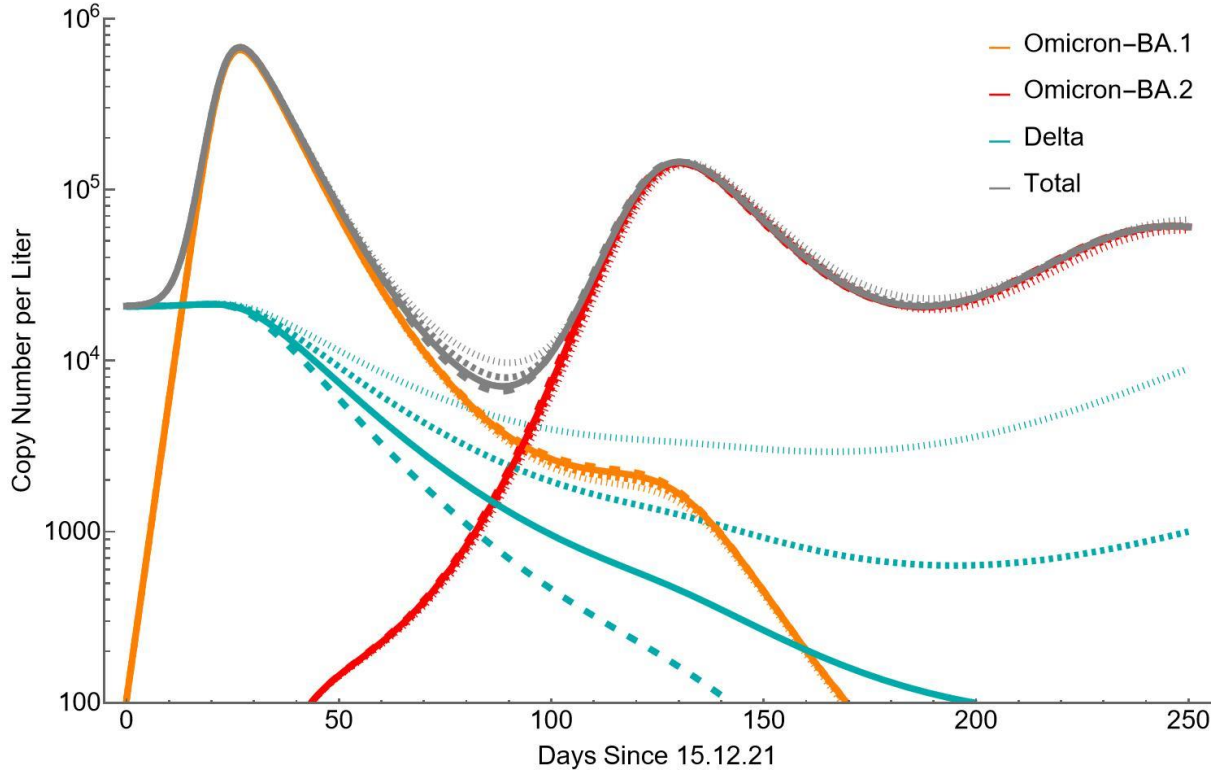
Figure S3: Sensitivity analysis to the Delta—BA.1 and Delta—BA.2 pairs cross-immunity parameters $q_{DO}=q_{DB}$, relative to $q_{OD}=q_{BD}$: long dashed lines – $q_{DO} = 0.7\,q_{OD}$, full lines – $q_{DO} = 0.6\,q_{OD}$ (same as for Figure 2 in the main text), short dashed lines – $q_{DO} = 0.5\,q_{OD}$, shorter dashed ("dotted") lines – $q_{DO} = 0.4\,q_{OD}$. All other parameters are the same as reported in Figure 2 in the main text. Negligible effects are observed for BA.1 and BA.2, and strong effects for Delta.
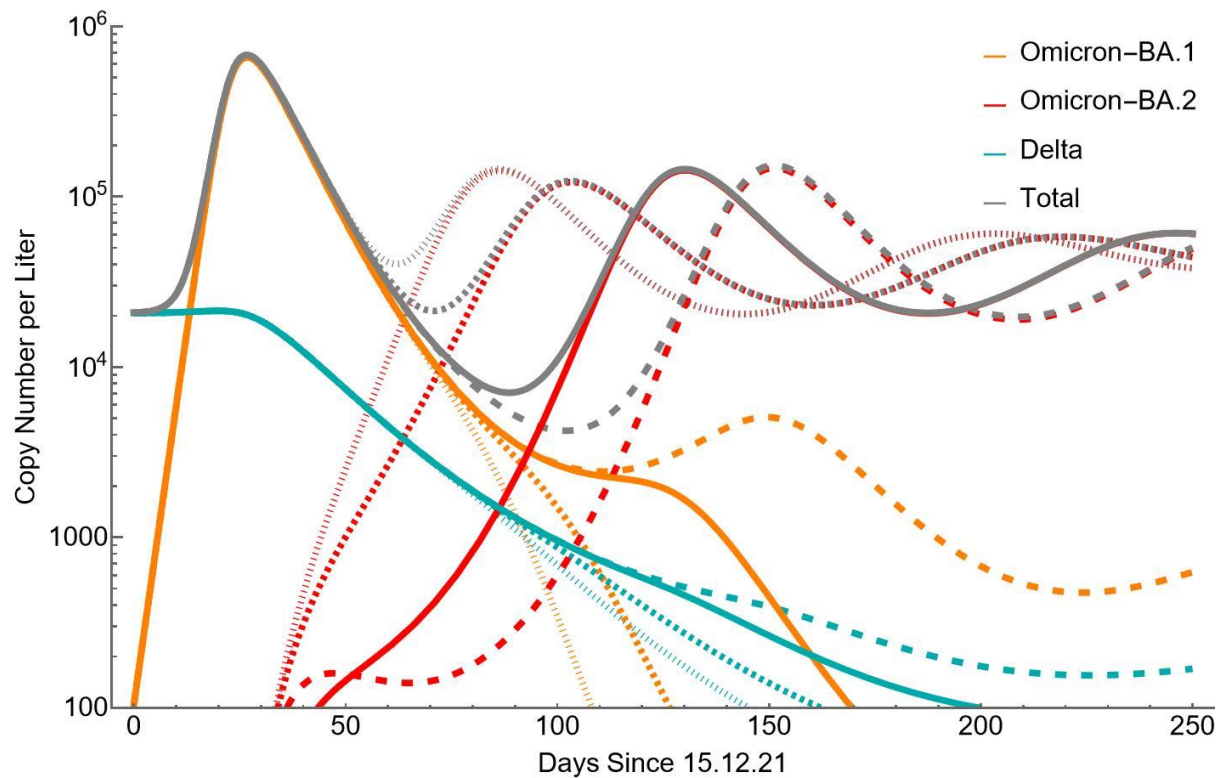
Figure S4: Sensitivity analysis to the BA.1—BA.2 pair cross-immunity parameter q_{BO}, relative to $q_{OB} = 0.8$: long dashed lines – $q_{BO} = 1.175$ $q_{OB} = 0.94$, full lines – $q_{BO} = 1.0875 \times q_{OB} = 0.87$ (same as for figure 2 in the main text), short dashed lines – $q_{BO} = q_{OB} = 0.8$, shorter dashed ("dotted") lines – $q_{BO} = 0.9125$ $q_{OB} = 0.73$. All other parameters are the same as reported in figure 2 in the main text. Strong effects are observed for BA.1 and BA.2, and weaker effects for Delta. In particular, the timing of the BA.2 wave is very sensitive to this value, influencing the shoulder/peak in BA.1.

References

1. Yaniv, K.; Ozer, E.; Lewis, Y.; Kushmaro, A. RT-QPCR Assays for SARS-CoV-2 Variants of Concern in Wastewater Reveals Compromised Vaccination-Induced Immunity. *Water Res.* **2021**, *207*, 117808, doi:10.1016/j.watres.2021.117808.
2. Yaniv, K.; Ozer, E.; Shagan, M.; Paitan, Y.; Granek, R.; Kushmaro, A. Managing an Evolving Pandemic: Cryptic Circulation of the Delta Variant during the Omicron Rise. *Sci. Total Environ.* **2022**, *836*, 155599, doi:10.1016/j.scitotenv.2022.155599.