## Supplementary Materials

**Table S1.** Literature search terms used for PubMed. The final search strategy applied to conduct this meta-analysis is reported at step #15.

| # | **Search strategy** |
|---|---|
| 1 | COVID19[tiab] OR COVID-19[tiab] OR COVID2019[tiab] OR COVID-2019[tiab] |
| 2 | SARS-CoV-2[tiab] OR sarscov2[tiab] |
| 3 | #1 OR #2 |
| 4 | vaccin*[tiab] OR immun*[tiab] |
| 5 | #3 AND #4 (46840) |
| 6 | "COVID-19 Vaccines"[Mesh] |
| 7 | #5 OR #6 (48166) |
| 8 | boost*[tiab] OR third[tiab] |
| 9 | #7 AND #8 (2759) |
| 10 | variant*[tiab] OR mutation*[tiab] |
| 11 | wild type[tiab] OR alpha[tiab] OR beta[tiab] OR gamma[tiab] OR delta[tiab] OR omicron[tiab] |
| 12 | #10 OR #11 |
| 13 | #9 AND #12 (563) |
| 14 | Humans[Mesh] OR human*[tiab] OR volunteer*[tiab] OR participant*[tiab] OR subject*[tiab] OR people[tiab] |
| 15 | #13 AND #14 (433) |

**Table S2.** Literature search terms used for the Cochrane Library. The final search strategy applied to conduct this meta-analysis is reported at step #20.

| # | **Search strategy** |
|---|---|
| 1 | MeSH descriptor: [COVID-19] explode all trees |
| 2 | (COVID19):ti,ab,kw OR (COVID 19):ti,ab,kw OR (COVID 2019):ti,ab,kw |
| 3 | MeSH descriptor: [SARS-CoV-2] explode all trees |
| 4 | (SARS CoV 2):ti,ab,kw OR (sarscov2):ti,ab,kw |
| 5 | #1 OR #2 OR #3 OR #4 |
| 6 | MeSH descriptor: [Immunogenicity, Vaccine] explode all trees |
| 7 | (vaccin*):ti,ab,kw OR (immun*):ti,ab,kw OR (inocul*):ti,ab,kw |
| 8 | #6 OR #7 |
| 9 | #5 AND #8 (2542) |
| 10 | MeSH descriptor: [COVID-19 Vaccines] explode all trees |
| 11 | #9 OR #10 (2542) |
| 12 | (boost*):ti,ab,kw OR (third):ti,ab,kw |
| 13 | #11 AND #12 (291) |
| 14 | (wild type):ti,ab,kw OR (alpha):ti,ab,kw OR (beta):ti,ab,kw OR (gamma):ti,ab,kw OR (delta):ti,ab,kw OR (omicron):ti,ab,kw |
| 15 | (variant*):ti,ab,kw OR (mutation*):ti,ab,kw |
| 16 | #14 OR #15 |
| 17 | #13 AND #16 (63) |
| 18 | (human*):ti,ab,kw OR (volunteer*):ti,ab,kw OR (participant*):ti,ab,kw OR (subject*):ti,ab,kw OR (people*):ti,ab,kw |
| 19 | #17 AND #18 (62) |
| 20 | trial: 61 |

**Table S3.** Literature search terms used for Embase. The final search strategy applied to conduct this meta-analysis is reported at step #18.

| # | **Search strategy** |
|---|---|
| 1 | 'coronavirus disease 2019'/exp OR 'coronavirus disease 2019' OR 'covid-19' OR covid19 OR sarscov2 OR 'covid-2019' OR covid2019 |
| 2 | 'severe acute respiratory syndrome coronavirus 2'/exp OR 'ncov' OR 'sars-cov-2' |
| 3 | #1 OR #2 |
| 4 | 'vaccine'/exp OR vaccin*:ti,ab,kw |
| 5 | 'immunization'/exp OR immun*:ti,ab,kw |
| 6 | inocul*:ti,ab,kw |
| 7 | #4 OR #5 OR #6 |
| 8 | #3 AND #7 (53201) |
| 9 | 'sars-cov-2 vaccine'/exp OR 'sars-cov-2 vaccine' OR "covid19 vaccin*" OR "covid 19 vaccin*" |
| 10 | #8 OR #9 (53309) |
| 11 | boost*:ti,ab,kw OR third:ti,ab,kw |
| 12 | #10 AND #11 (2931) |
| 13 | 'wild type':ti,ab,kw OR alpha:ti,ab,kw OR beta:ti,ab,kw OR gamma:ti,ab,kw OR delta:ti,ab,kw OR omicron:ti,ab,kw |
| 14 | variant*:ti,ab,kw OR mutation*:ti,ab,kw |
| 15 | #13 OR #14 |
| 16 | #12 AND #15 (599) |
| 17 | 'human'/exp OR human:ti,ab,kw OR volunteer*:ti,ab,kw OR participant*:ti,ab,kw OR subject*:ti,ab,kw OR people:ti,ab,kw |
| 18 | #16 AND #17 (538) |

**Table S4.** Literature search terms used for Medrxiv, Wanfang and CNKI.

| **Database** | **Search strategy** |
|---|---|
| Medrxiv | COVID-19 AND vaccin* AND (boost* OR third) AND (variant*) (491) |
| Wanfang | (Theme:(COVID-19) or Theme:(SARS-CoV-2)) and Theme:(Vaccine*) and (Theme:(boost*) or Theme:( boost immunity) or Theme:(third dose)) and Theme:(variant*) (27) |
| CNKI | TKA=('COVID-19'+'SARS-CoV-2') and TKA=('vaccine*') and TKA=('boost*'+'third dose') and TKA=('variant*') (23) |

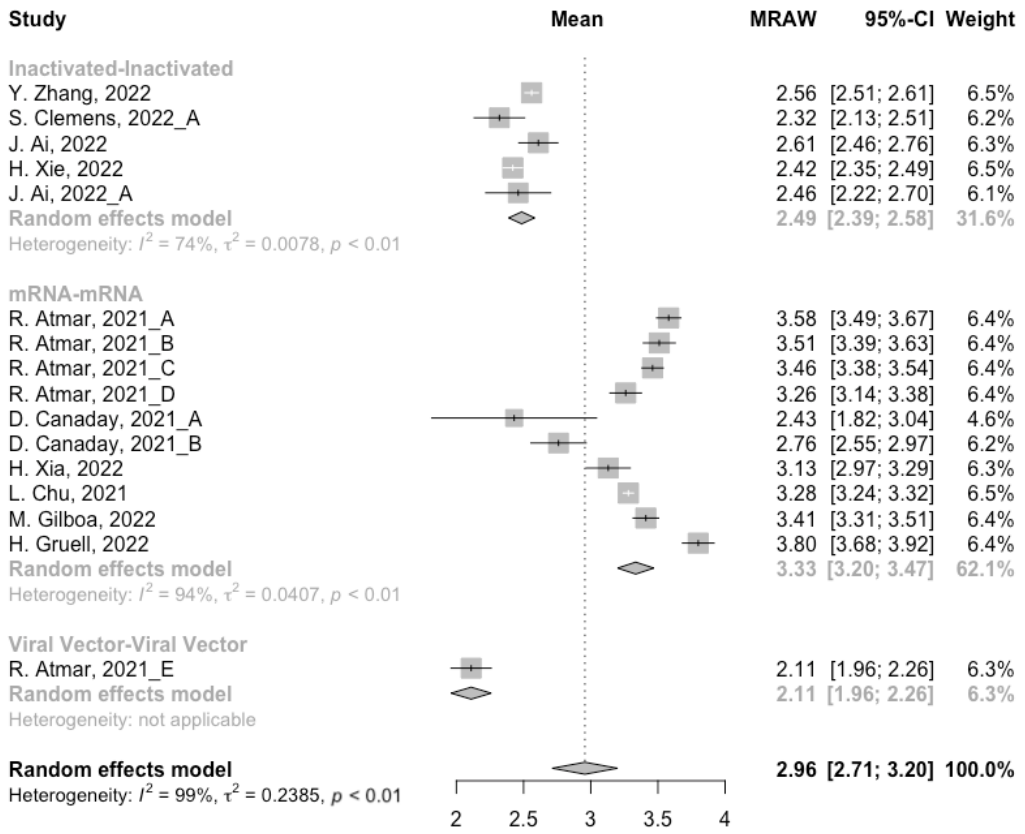


**Figure S1.** Forest plot of the pooled log-transformed neutralization titers against the wild type after homologous booster vaccination.

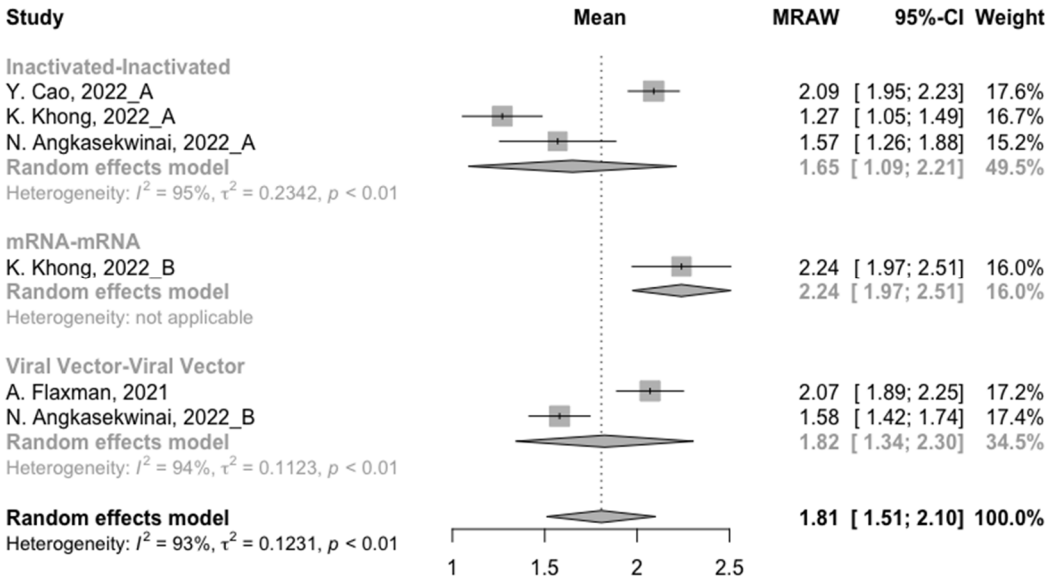


**Figure S2.** Forest plot of the pooled log-transformed neutralization titers against the Beta variant after homologous booster vaccination.

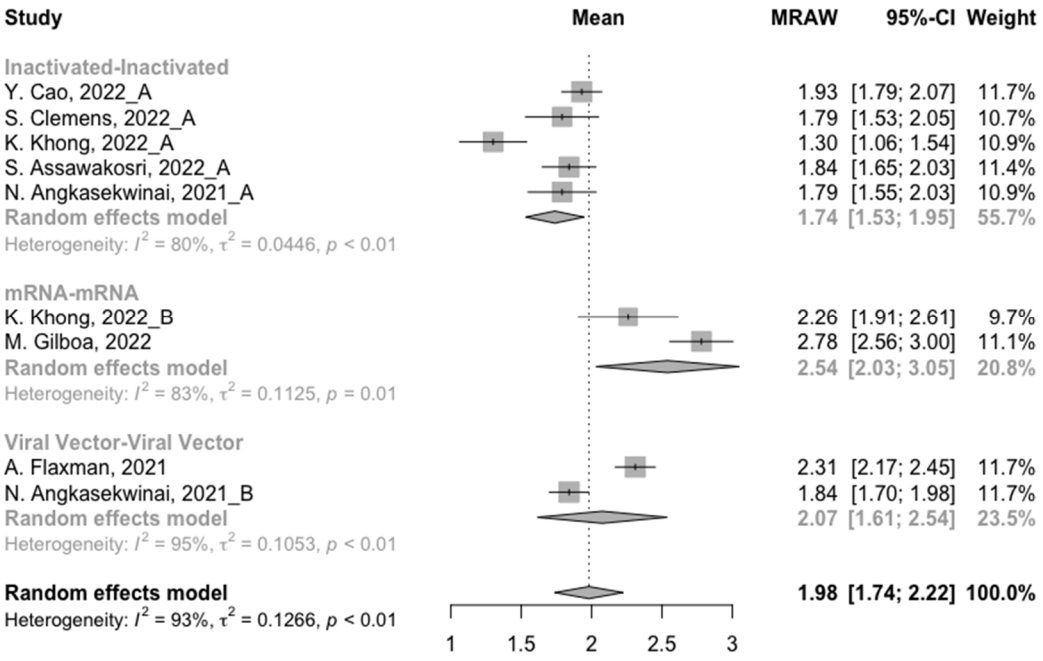


**Figure S3.** Forest plot of the pooled log-transformed neutralization titers against the Delta variant after homologous booster vaccination.

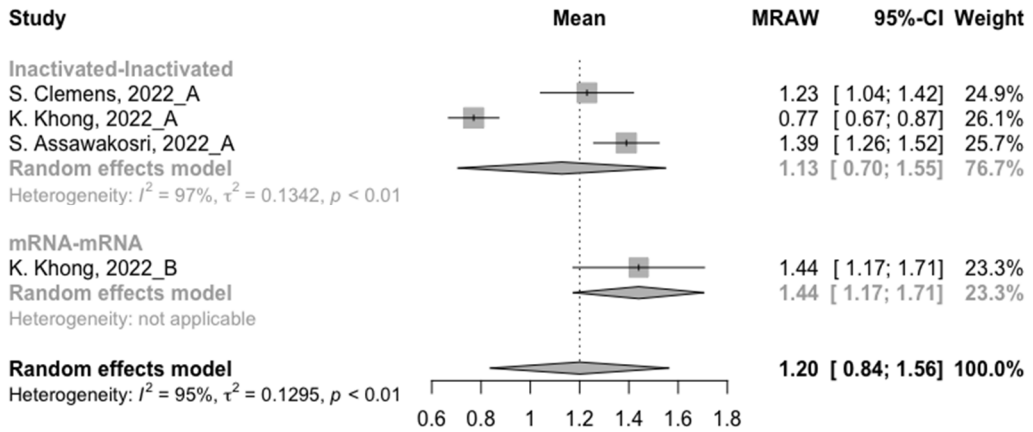


**Figure S4.** Forest plot of the pooled log-transformed neutralization titers against the Omicron variant after homologous booster vaccination.

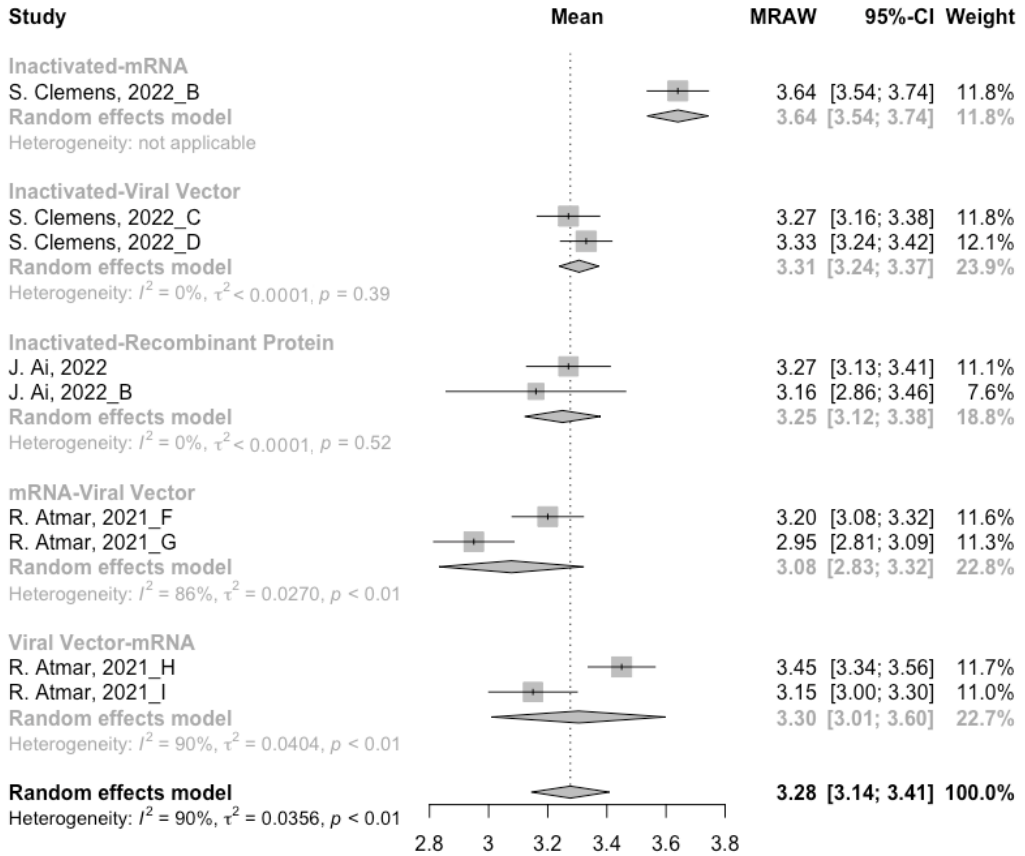


**Figure S5.** Forest plot of the pooled log-transformed neutralization titers against the wild type after heterogenous booster vaccination.

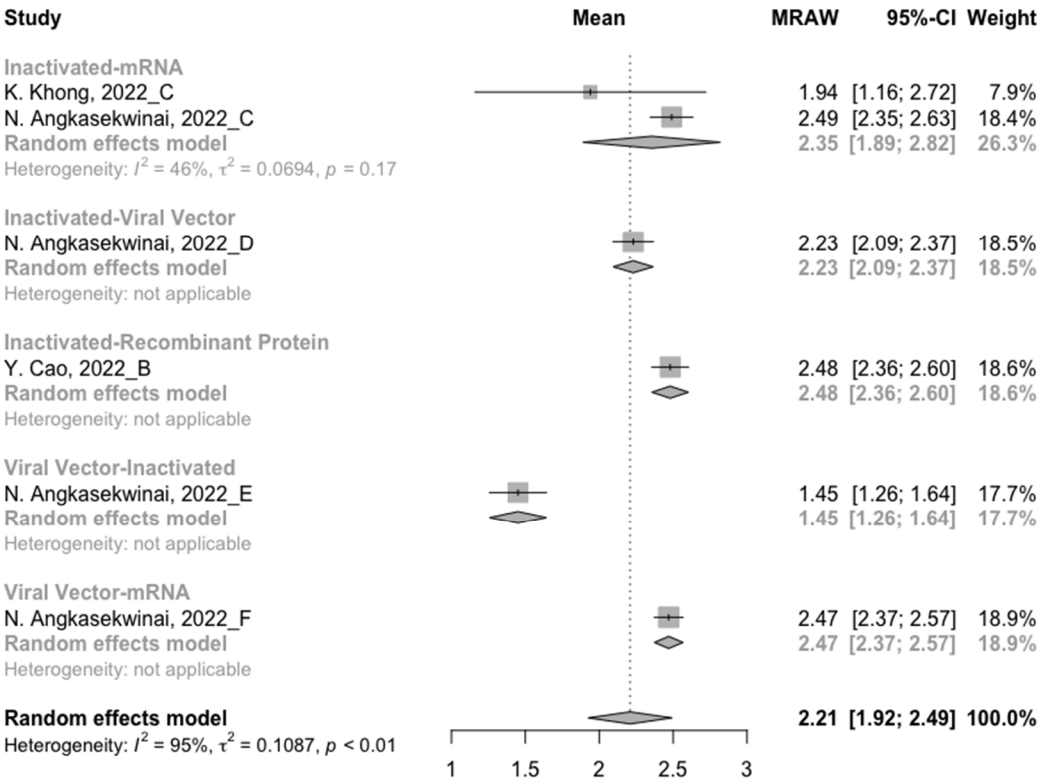


**Figure S6.** Forest plot of the pooled log-transformed neutralization titers against the Beta variant after heterogenous booster vaccination.

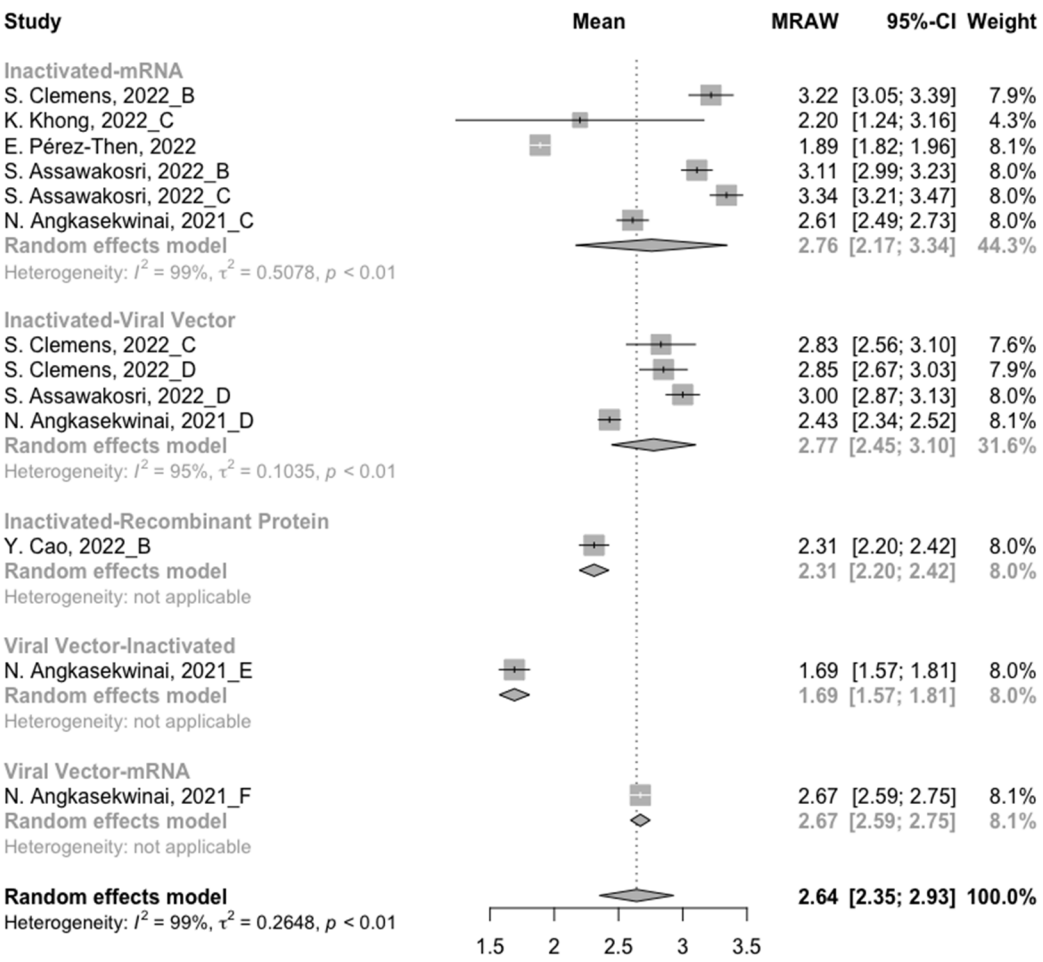


**Figure S7.** Forest plot of the pooled log-transformed neutralization titers against the Delta variant after heterogenous booster vaccination.

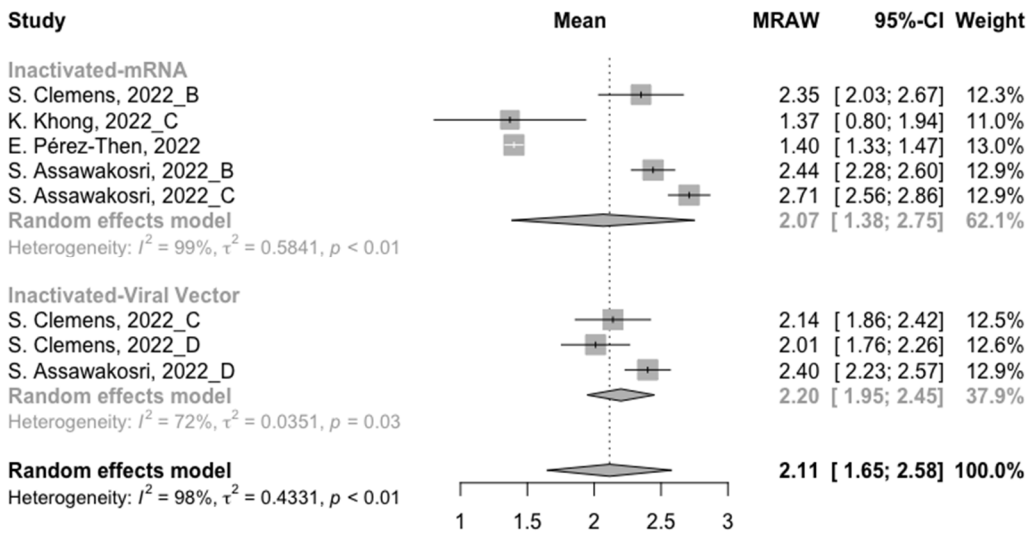


**Figure S8.** Forest plot of the pooled log-transformed neutralization titers against the Omicron variant after heterogenous booster vaccination.