Supplementary Appendix

Supplement to: Hammerman A, Sergienko R, Friger M, et al. Effectiveness of the BNT162b2 vaccine after recovery from Covid-19. N Engl J Med. DOI: 10.1056/NEJMoa2119497

This appendix has been provided by the authors to give readers additional information about the work.

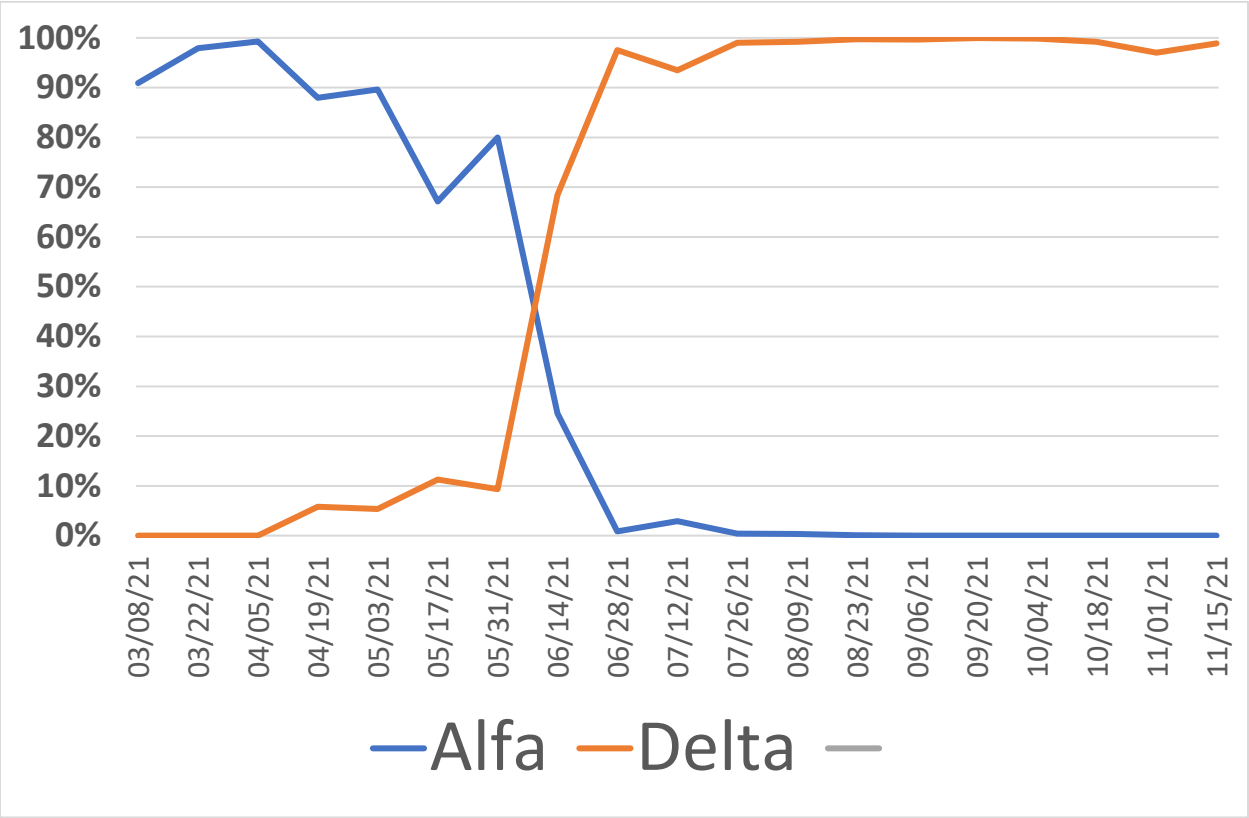
Supplementary Material

Contents

Study Oversight

All the authors participated in the study design. Data was extracted by Ms. Tanya Beckenstein. Dr. Yaron and Dr. Peretz oversaw the data gathering; Ruslan Sergienko analyzed the data with the guidance of Prof. Friger. All authors vouch for the data and analysis. Dr. Hammerman wrote the initial manuscript. All authors contributed to the writing and critical review of the manuscript and decided to submit it for publication. The study was approved by the CHS Community Helsinki committee and the CHS data utilization committee.

Figure S1: Dominant Covid-19 Strains In Israel During The Study Period



Based on data extracted on Dec 29, 2021, from the Our World in Data website:

SARS-CoV-2 variants in analyzed sequences, Israel

Figure S2: Confirmed SARS-Cov2 Infections in Israel During the Study Period

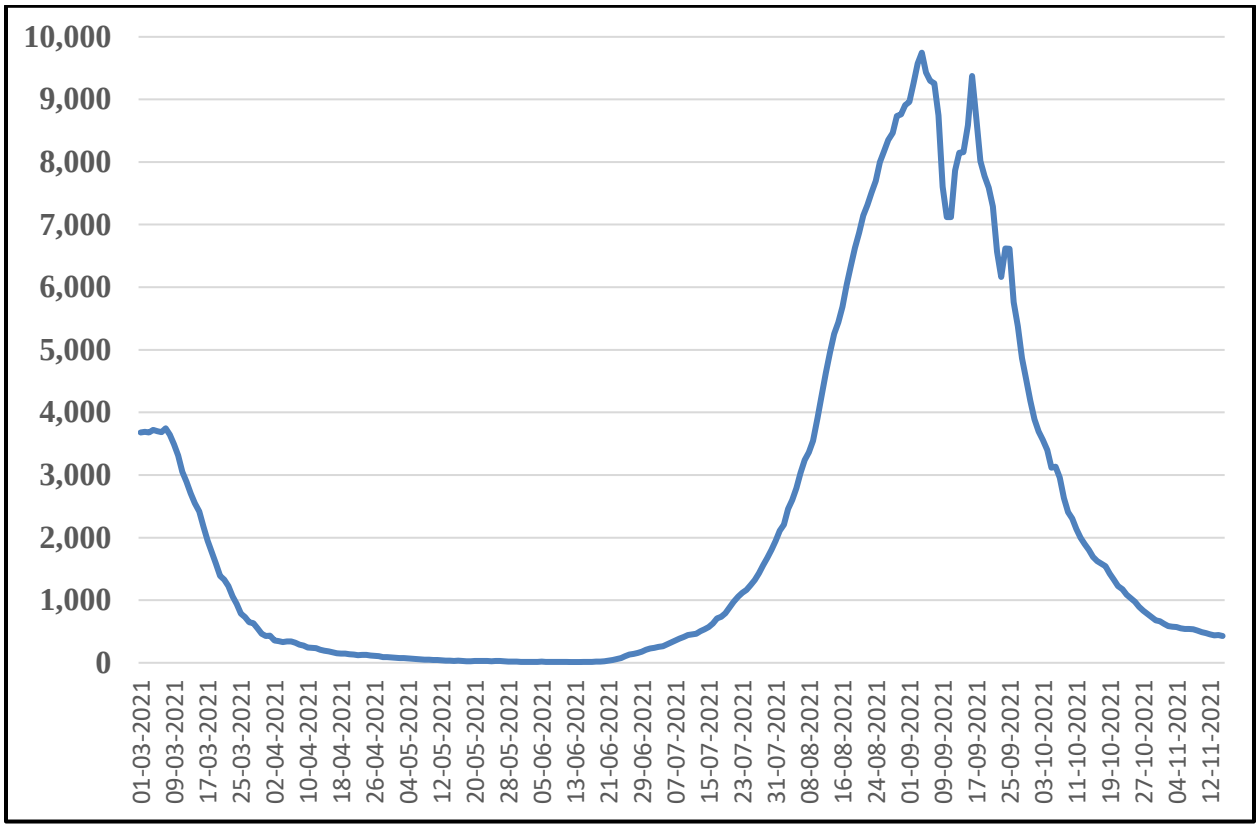


Figure S3: Study timeline

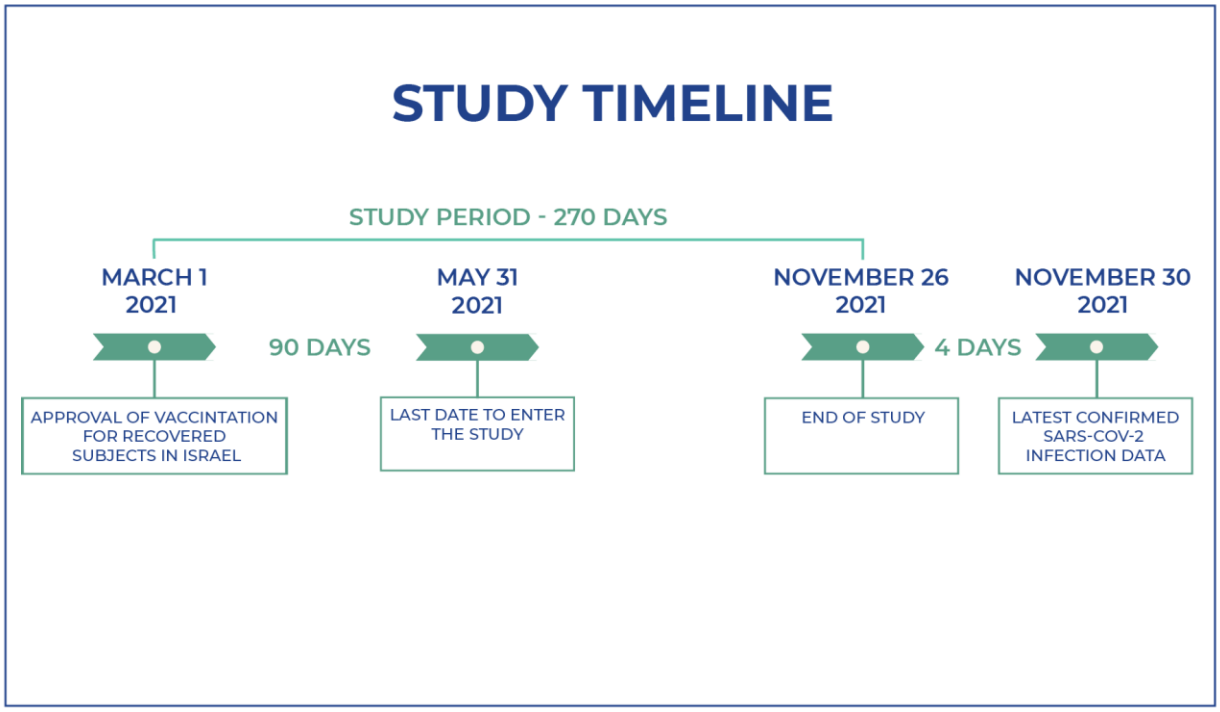
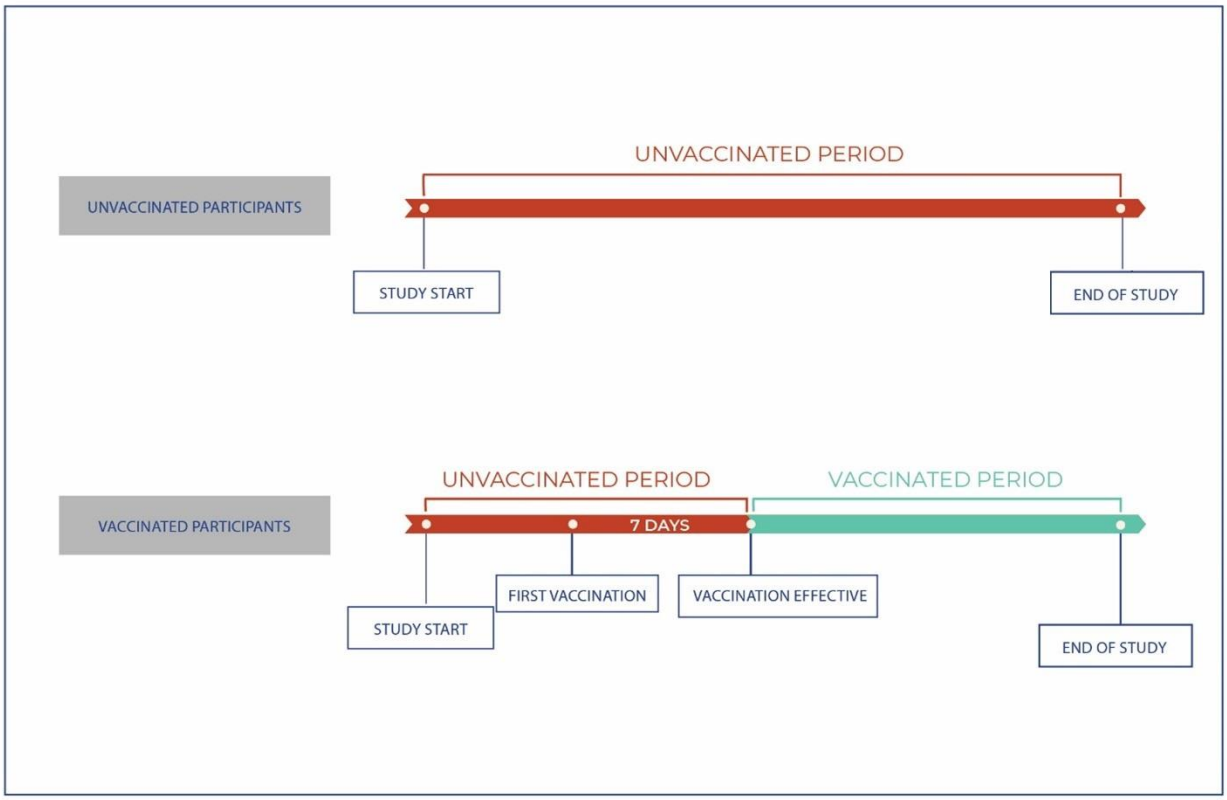


Figure S4: Transition from unvaccinated to vaccinated status



Data Sources

Data in this study comes from the electronic medical records of Clalit Health Services (CHS). CHS is the largest of four integrated payer-provider health care organizations that provide mandatory health care coverage in Israel. CHS covers approximately 52% of the population of Israel (4.7 million persons). The dropout rate from CHS is 1- 2% yearly (2).

CHS pools the data from its many operational systems into a unified central data warehouse used for policy and research. This data repository includes detailed primary and secondary care information on hospitalizations, medications, laboratory results, and imaging tests. Due to the early adoption of electronic medical records and the low yearly dropout rate, CHS has good long-term follow-up of patients, ranging from the year 2000 (3).

Since the COVID-19 pandemic, the Israeli Ministry of Health (MOH) has centrally collected all COVID-19 related data. These include complete data on PCR testing, vaccination status, hospitalizations, and COVID-19 related deaths, as reported daily to the MOH by all Israeli hospitals. The MOH transfers this data daily to the Israeli HMOs (4).

This combination enabled the integration of background medical information with vaccination status and COVID-19 related outcomes for the entire CHS patient population. The integrated data was used to generate the dataset for this study.

Explanation on the Socio-Economic Status (SES) Measure

SES was based on the small statistical areas (SSA) used in the 2008 Israeli census. SSAs contain 3,000–4,000 people and are created to maintain homogeneity in terms of the sociodemographic composition of the population (5). The Israeli Central Bureau of Statistics (CBS) utilized demography, education, employment, housing conditions, and income to define the SSAs, and these were grouped into 20 categories. This data was updated by the POINTS Location Intelligence Company (6) to improve the accuracy of the SES measure, using up-to-date sociodemographic, commercial, and housing data (7). The entire CHS population was grouped into ten categories, ranging from 1 (lowest) to 10 (highest).

Table S1: Schoenfeld's Global test results - Ages 16-64.

Variable	**chisq**	**df**	**p-value**
Vaccination Group	2.89552	1	0.09
SEX	1.03635	1	0.31
SOCIO GRADE POINTS	3.02297	1	0.08
Ultra Orthodox Jewish	2.07728	1	0.15
COPD	0.00173	1	0.97
Diabetes	0.32706	1	0.57
Obesity	0.03841	1	0.85
GLOBAL	9.69611	7	0.21

Table S2: Schoenfeld's Global test results - Ages 65+.

Variable	**chisq**	**df**	**p-value**
Vaccination Group	0.7976	1	0.37
SEX	0.1450	1	0.70
SOCIO GRADE POINTS	1.0192	1	0.31
Ultra Orthodox Jewish	1.3440	1	0.25
COPD	0.4180	1	0.52
Diabetes	0.0276	1	0.87
Obesity	0.1384	1	0.71
GLOBAL	3.2375	7	0.86

Table S3: Cox proportional-hazards regression model results: two doses versus one

	Sig.	Exp(B)	95.0% CI for Exp(B)	
			Lower	Upper
Vaccination Dose Group	0.941	0.98	0.64	1.50
Sex	0.099	0.84	0.68	1.03
AGE_GROUP_65_UP	0.001	0.52	0.35	0.77
Socioeconomic score	0.022	1.06	1.01	1.11

Table S4: PCR testing rates in vaccinated versus unvaccinated person-days

	Vaccinated	Unvaccinated
person- days at risk	14,417,273	21,232,648
PCR tests	89,313	118,339
Person-days per test	161	179

References

1. https://ourworldindata.org/grapher/covid-variants-area?country=~ISR; Data extracted on Dec 29, 2021.
2. Dagan N, Barda N, Kepten E, et al. BNT162b2 mRNA Covid-19 Vaccine in a Nationwide Mass Vaccination Setting. N Engl J Med. 2021;384(15):1412-1423. doi:10.1056/NEJMoa2101765.
3. Barda, N., Dagan, N., Ben-Shlomo, Y., Kepten, E., Waxman, J., Ohana, R., Hernán, M.A., Lipsitch, M., Kohane, I., Netzer, D. and Reis, B.Y., 2021. Safety of the BNT162b2 mRNA Covid-19 vaccine in a nationwide setting. New England Journal of Medicine, 385(12), pp.1078-1090.
4. Bar-On YM, Goldberg Y, Mandel M, et al. Protection of BNT162b2 Vaccine Booster against Covid-19 in Israel [published online ahead of print, 2021 Sep 15. N Engl J Med. 2021; NEJMoa2114255. doi:10.1056/NEJMoa2114255
5. Central Bureau of Statistics Israel. Characterization and classification of geographical units by the socio-economic level of the population 2008. Jerusalem, 2013.
6. Points location intelligence, 2021. https://points.co.il/en/points-location-intelligence/[Accessed Oct 3, 2021].
7. Weisband, Y.L., Kaufman-Shriqui, V., Sagy, Y.W., Krieger, M., Ahmad, W.A. and Manor, O., 2020. Area-level socio-economic disparity trends in nutritional status among 5–6-year-old children in Israel. Archives of disease in childhood, 105(11), pp.1049-1054.