

**Supplementary Table 1.** Definition of history of chronic diseases included in the analysis

Disease	ICD codes*	Other elements of the definition
Acute myocardial infarction	I2100, I2110, I2120, I2130, I2140, I2190, I2191, I2200, I2210, I2280, I2290, I2300, I2310, I2320, I2330, I2340, I2350, I2360, I2380, I2400, I2490	
Angina	I20	
Chronic heart failure	I50, I42, I110, J81	
Peripheral arterial disease	I70	
Stroke	I61, I6290, I63, I64, I74	
Asthma bronchiale	J40-44, J47	the time lag between the first and second occurrences 30-365 days
COPD	J45, 46	the time lag between the first and second occurrences 30-365 days
Diabetes mellitus	a) E10-14 or b) not required and polycystic ovary syndrome (E282) or gestational diabetes (O24)	at least 1 prescription of antidiabetic treatment (ATC A10) at least 2 prescriptions of antidiabetic treatment (ATC A10)
Type 1		only insulin or maximum 3 oral antidiabetic prescriptions together with insulin prescriptions in the first half year of treatment
Type 2		not Type 1 diabetes
Chronic kidney disease	N02, N03, N04, N05, N06, N07, N08, N11, N12, N14, N15, N16, N18, N19, N26, N27, N28, N29	
Neoplasms	All ICD codes starting with C	
Transplantation	All patients from registry of transplantation	
Immunosuppression	D5900, D5910, D6920, D8690, E05, E0630, G61, G70, I73, K50, K51, K52, K7430, K90, L10, L40, L9590, M0690, M30, M31, M32, M33, M35, M36	

COPD: chronic obstructive pulmonary disease; ICD: International Classification of Diseases; ATC: Anatomical Therapeutic Chemical

\* Two occurrences of ICD-10 codes in outpatient or inpatient claims data since 1 January 2013

**Supplementary Table 2.** Incidence, crude and adjusted effectiveness of vaccine combinations against registered SARS-CoV-2 **infection** during the Delta wave in the *18-64 years old* Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	148 198	1 992.85	67.60 (67.26; 67.95)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	3 664	289.27	11.51 (11.14; 11.89)	83.0 (82.4; 83.5)	70.3 (69.2; 71.3)
primary 121-180 days	24 917	549.89	41.19 (40.68; 41.71)	39.1 (38.2; 39.9)	48.8 (47.8; 49.7)
primary 181-240 days	20 629	240.00	78.14 (77.08; 79.21)	-15.6 (-17.3; -13.9)	22.5 (20.9; 24.0)
primary >240 days	6 722	63.85	95.70 (93.43; 98.02)	-41.6 (-45.1; -38.1)	0.6 (-2.3; 3.4)
Pfizer booster 14-120 days	3 240	191.11	15.41 (14.89; 15.95)	77.2 (76.4; 78.0)	82.2 (81.5; 82.8)
Moderna booster 14-120 days	91	6.65	12.45 (10.02; 15.28)	81.6 (77.4; 85.2)	85.8 (82.6; 88.4)
Sinopharm booster 14-120 days	307	4.56	61.19 (54.54; 68.43)	9.5 (-1.2; 19.3)	24.5 (15.4; 32.5)
Janssen booster 14-120 days	118	7.08	15.16 (12.55; 18.16)	77.6 (73.1; 81.4)	82.4 (78.9; 85.3)
<b>Moderna</b>					
primary 14-120 days	191	33.48	5.19 (4.48; 5.98)	92.3 (91.2; 93.4)	76.9 (73.3; 80.0)
primary 121-180 days	2 899	97.15	27.13 (26.15; 28.13)	59.9 (58.4; 61.3)	63.6 (62.2; 65.1)
primary 181-240 days	2 820	46.40	55.26 (53.24; 57.33)	18.3 (15.2; 21.3)	49.4 (47.3; 51.4)
primary >240 days	104	1.33	71.30 (58.26; 86.39)	-5.5 (-27.8; 13.8)	22.6 (6.1; 36.2)
Pfizer booster 14-120 days	102	8.62	10.76 (8.77; 13.06)	84.1 (80.7; 87.0)	87.7 (85.1; 88.4)
Moderna booster 14-120 days	145	14.15	9.31 (7.86; 10.96)	86.2 (83.8; 88.4)	88.9 (86.9; 90.6)
Sinopharm booster 14-120 days	19	0.69	25.15 (15.14; 39.27)	62.8 (41.9; 77.6)	69.5 (52.1; 80.5)
Janssen booster 14-120 days	23	1.35	14.06 (8.91; 21.10)	77.1 (65.7; 85.5)	82.1 (73.0; 88.1)
<b>Sputnik</b>					
primary 14-120 days	386	26.38	13.30 (12.01; 14.70)	80.3 (78.3; 82.2)	38.3 (31.8; 44.3)
primary 121-180 days	8 642	275.34	28.53 (27.94; 29.14)	57.8 (56.9; 58.7)	23.3 (21.3; 25.3)
primary 181-240 days	25 412	229.77	100.54 (99.31; 101.79)	-48.7 (-50.7; -46.8)	10.6 (8.8; 12.4)
primary >240 days	796	11.13	65.03 (60.59; 69.71)	3.8 (-3.1; 10.4)	-4.6 (-12.5; 2.9)
Pfizer booster 14-120 days	1 826	122.90	13.51 (12.89; 14.14)	80.0 (79.1; 80.9)	83.6 (82.8; 84.4)
Moderna booster 14-120 days	184	12.42	13.46 (11.59; 15.55)	80.1 (77.0; 82.9)	84.0 (81.5; 86.2)
Sinopharm booster 14-120 days	66	1.31	45.95 (35.54; 58.46)	32.0 (13.5; 47.4)	38.9 (22.2; 52.0)

Janssen booster 14-120 days	337	6.58	46.57 (41.73; 51.82)	31.1 (23.3; 38.3)	47.2 (41.2; 52.6)
<b>Astra-Zeneca</b>					
primary 14-120 days	2 205	120.53	16.63 (15.94; 17.34)	75.4 (74.3; 76.4)	39.2 (36.4; 41.9)
primary 121-180 days	13 200	167.84	71.50 (70.28; 72.73)	-5.8 (-7.7; -3.9)	25.6 (23.9; 27.3)
primary 181-240 days	3 995	50.16	72.40 (70.17; 74.68)	-7.1 (-10.5; -3.8)	-0.5 (-4.0; 2.8)
primary >240 days	1 374	8.12	153.79 (145.76; 162.14)	-127.5 (-139.9; -115.6)	-14.0 (-20.5; -7.9)
Pfizer booster 14-120 days	1 372	82.96	15.03 (14.25; 15.85)	77.8 (76.5; 78.9)	82.9 (81.9; 83.8)
Moderna booster 14-120 days	141	9.11	14.08 (11.85; 16.60)	79.2 (75.4; 82.5)	84.1 (81.2; 86.5)
Sinopharm booster 14-120 days	46	0.76	55.21 (40.42; 73.64)	18.3 (-8.9; 40.2)	35.8 (14.2; 51.9)
<b>Sinopharm</b>					
primary 14-120 days	1 991	77.95	23.22 (22.21; 24.26)	65.7 (64.1; 67.2)	10.9 (6.7; 15.0)
primary 121-180 days	17 492	220.47	72.13 (71.06; 73.20)	-6.7 (-8.4; -5.0)	4.9 (2.8; 7.0)
primary 181-240 days	10 819	101.82	96.60 (94.79; 98.44)	-42.9 (-45.7; -40.1)	-6.1 (-8.7; -3.4)
primary >240 days	448	4.24	96.03 (87.34; 105.35)	-42.0 (-55.9; -29.2)	-19.9 (-31.9; -9.0)
Pfizer booster 14-120 days	1 007	98.82	9.26 (8.70; 9.85)	86.3 (85.4; 87.1)	88.0 (87.2; 88.7)
Moderna booster 14-120 days	54	6.69	7.33 (5.51; 9.57)	89.2 (85.8; 91.9)	91.0 (88.2; 93.1)
Sinopharm booster 14-120 days	138	3.90	32.16 (27.01; 37.99)	52.4 (43.8; 60.0)	60.6 (53.4; 66.7)
Janssen booster 14-120 days	187	9.22	18.43 (15.88; 21.27)	72.7 (68.5; 76.5)	78.1 (74.7; 81.0)
<b>Janssen</b>					
primary 14-120 days	1 571	37.27	38.32 (36.45; 40.26)	43.3 (40.4; 46.1)	39.3 (36.1; 42.4)
primary 121-180 days	1 866	42.90	39.55 (37.77; 41.38)	41.5 (38.8; 44.1)	45.7 (43.0; 48.2)
primary 181-240 days	1 547	21.65	64.97 (61.77; 68.29)	3.9 (-1.0; 8.6)	35.9 (32.5; 39.2)
Pfizer booster 14-120 days	14	1.81	7.02 (3.84; 11.78)	89.6 (82.6; 94.3)	90.9 (84.6; 94.6)
Janssen booster 14-120 days	4	0.38	9.58 (2.61; 24.54)	85.8 (63.7; 96.1)	86.3 (63.5; 94.9)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.

**Supplementary Table 3.** Incidence, crude and adjusted effectiveness of vaccine combinations against registered SARS-CoV-2 **infection** during the Delta wave in the *65-100 years old* Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	15 011	249.19	54.76 (53.89; 55.65)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	518	34.54	13.63 (12.49; 14.86)	75.1 (72.8; 77.2)	67.0 (63.9; 69.8)
primary 121-180 days	2 268	158.13	13.04 (12.51; 13.59)	76.2 (75.1; 77.2)	58.8 (56.8; 60.7)
primary 181-240 days	6 377	144.51	40.12 (39.14; 41.11)	26.7 (24.6; 28.9)	46.8 (45.0; 48.5)
primary >240 days	1 687	23.59	65.02 (61.96; 68.20)	-18.7 (-24.9; -12.8)	31.6 (27.9; 35.1)
Pfizer booster 14-120 days	2 267	220.59	9.34 (8.96; 9.74)	82.9 (82.2; 83.7)	88.1 (87.6; 88.7)
Moderna booster 14-120 days	39	5.71	6.21 (4.42; 8.49)	88.7 (84.5; 91.9)	92.2 (89.4; 94.3)
Sinopharm booster 14-120 days	342	5.88	52.90 (47.44; 58.82)	3.4 (-7.5; 13.5)	26.5 (18.1; 34.0)
Janssen booster 14-120 days	110	7.26	13.78 (11.32; 16.61)	74.8 (69.7; 79.3)	81.3 (77.4; 84.5)
<b>Moderna</b>					
primary 14-120 days	25	5.38	4.22 (2.73; 6.23)	92.3 (88.6; 95.0)	79.1 (69.0; 85.9)
primary 121-180 days	332	23.16	13.03 (11.67; 14.51)	76.2 (73.5; 78.7)	67.4 (63.6; 70.8)
primary 181-240 days	604	22.40	24.52 (22.60; 26.55)	55.2 (51.4; 58.8)	66.0 (63.1; 68.7)
primary >240 days	175	3.14	50.62 (43.40; 58.71)	7.6 (-7.3; 20.8)	47.3 (38.8; 54.7)
Pfizer booster 14-120 days	87	12.63	6.26 (5.02; 7.72)	88.6 (85.9; 90.8)	92.2 (90.4; 93.7)
Moderna booster 14-120 days	76	12.88	5.36 (4.23; 6.71)	90.2 (87.7; 92.3)	93.3 (91.5; 94.6)
Sinopharm booster 14-120 days	33	1.24	24.25 (16.69; 34.05)	55.7 (37.8; 69.5)	68.2 (55.2; 77.4)
Janssen booster 14-120 days	23	1.97	9.63 (6.10; 14.45)	80.7 (71.0; 87.7)	86.1 (79.0; 90.8)
<b>Sputnik</b>					
primary 14-120 days	13	0.67	17.65 (9.40; 30.18)	67.8 (44.9; 82.8)	32.8 (-15.8; 61.0)
primary 121-180 days	193	28.27	6.21 (5.36; 7.15)	88.7 (86.9; 90.2)	50.1 (42.3; 56.8)
primary 181-240 days	1 817	38.08	43.37 (41.40; 45.42)	20.8 (16.8; 24.6)	41.1 (37.9; 44.2)
primary >240 days	194	4.35	40.56 (35.06; 46.69)	25.9 (14.7; 36.0)	40.2 (30.9; 48.2)
Pfizer booster 14-120 days	273	47.44	5.23 (4.63; 5.89)	90.4 (89.2; 91.6)	92.5 (91.6; 93.4)
Moderna booster 14-120 days	17	3.43	4.51 (2.63; 7.22)	91.8 (86.8; 95.2)	93.5 (89.6; 96.0)
Sinopharm booster 14-120 days	8	0.44	16.58 (7.16; 32.67)	69.7 (40.3; 86.9)	75.3 (50.6; 87.7)

Janssen booster 14-120 days	12	0.58	18.83 (9.73; 32.89)	65.6 (39.9; 82.2)	72.9 (52.3; 84.6)
<b>Astra-Zeneca</b>					
primary 14-120 days	114	23.69	4.37 (3.61; 5.26)	92.0 (90.4; 93.4)	63.1 (55.6; 69.4)
primary 121-180 days	1 811	48.49	33.95 (32.40; 35.55)	38.0 (34.9; 41.0)	49.7 (47.0; 52.2)
primary 181-240 days	485	8.51	51.79 (47.28; 56.61)	5.4 (-3.5; 13.8)	38.9 (33.0; 44.3)
primary >240 days	7	0.04	148.46 (59.69; 305.89)	-171.1 (-458.7; -9.0)	-61.5 (-238.9; 23.0)
Pfizer booster 14-120 days	194	26.85	6.57 (5.68; 7.56)	88.0 (86.2; 89.6)	92.0 (90.8; 93.1)
Moderna booster 14-120 days	9	2.24	3.65 (1.67; 6.92)	93.3 (87.4; 97.0)	95.6 (91.4; 97.7)
Sinopharm booster 14-120 days	7	0.20	31.38 (12.62; 64.65)	42.7 (-18.1; 77.0)	60.8 (17.7; 81.3)
<b>Sinopharm</b>					
primary 14-120 days	109	6.11	16.22 (13.32; 19.57)	70.4 (64.2; 75.7)	29.8 (15.2; 41.9)
primary 121-180 days	884	49.32	16.29 (15.24; 17.40)	70.2 (68.2; 72.2)	25.4 (19.9; 30.5)
primary 181-240 days	3 703	65.18	51.65 (50.00; 53.34)	5.7 (2.2; 9.0)	15.5 (12.0; 18.8)
primary >240 days	920	11.21	74.62 (69.87; 79.60)	-36.3 (-45.6; -27.3)	12.5 (6.1; 18.4)
Pfizer booster 14-120 days	2 037	231.33	8.01 (7.66; 8.36)	85.4 (84.7; 86.0)	88.2 (87.6; 88.7)
Moderna booster 14-120 days	75	10.78	6.33 (4.98; 7.93)	88.4 (85.5; 90.9)	90.9 (88.6; 92.8)
Sinopharm booster 14-120 days	80	2.58	28.23 (22.38; 35.13)	48.5 (35.8; 59.2)	60.2 (50.4; 68.0)
Janssen booster 14-120 days	79	6.08	11.81 (9.35; 14.72)	78.4 (73.1; 82.9)	82.4 (78.0; 85.9)
<b>Janssen</b>					
primary 14-120 days	150	3.17	43.08 (36.46; 50.55)	21.3 (7.6; 33.5)	17.8 (3.4; 30.1)
primary 121-180 days	112	3.86	26.36 (21.71; 31.72)	51.9 (42.0; 60.4)	49.1 (38.6; 57.7)
primary 181-240 days	107	1.92	50.55 (41.42; 61.08)	7.7 (-11.6; 24.4)	42.1 (29.9; 52.2)
Pfizer booster 14-120 days	4	0.44	8.31 (2.26; 21.28)	84.8 (61.1; 95.9)	88.8 (70.0; 95.8)
Janssen booster 14-120 days	0	0.06	0.00 (0.00; 55.01)	100.0 (-0.5; 100.0)	100.0 (NA)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.

**Supplementary Table 4.** Incidence, crude and adjusted effectiveness of vaccine combinations against COVID-19 related **hospitalization** during the Delta wave in the 18-64 years old Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	12 738	2 213.67	5.23 (5.14; 5.32)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	236	360.42	0.60 (0.52; 0.68)	88.6 (87.1; 90.0)	82.6 (80.1; 84.7)
primary 121-180 days	748	636.89	1.07 (0.99; 1.15)	79.6 (78.0; 81.1)	82.6 (81.2; 83.9)
primary 181-240 days	671	281.14	2.17 (2.01; 2.34)	58.5 (55.2; 61.7)	78.5 (76.7; 80.2)
primary >240 days	194	73.72	2.39 (2.07; 2.75)	54.3 (47.3; 60.5)	69.6 (64.9; 73.6)
Pfizer booster 14-120 days	160	217.58	0.67 (0.57; 0.78)	87.2 (85.1; 89.1)	94.3 (93.3; 95.1)
Moderna booster 14-120 days	6	7.57	0.72 (0.26; 1.57)	86.2 (70.0; 94.9)	93.3 (85.2; 97.0)
Sinopharm booster 14-120 days	16	5.36	2.71 (1.55; 4.41)	48.1 (15.7; 70.4)	76.0 (60.9; 85.3)
Janssen booster 14-120 days	3	8.06	0.34 (0.07; 0.99)	93.5 (81.1; 98.7)	96.8 (90.0; 99.0)
<b>Moderna</b>					
primary 14-120 days	16	40.74	0.36 (0.20; 0.58)	93.2 (88.9; 96.1)	84.9 (75.4; 90.8)
primary 121-180 days	147	110.34	1.21 (1.02; 1.42)	76.8 (72.8; 80.5)	81.5 (78.2; 84.3)
primary 181-240 days	117	52.23	2.04 (1.68; 2.44)	61.1 (53.3; 67.8)	81.6 (77.9; 84.7)
primary >240 days	11	1.65	6.07 (3.03; 10.86)	-16.0 (-107.7; 42.1)	42.5 (-4.0; 68.2)
Pfizer booster 14-120 days	4	9.63	0.38 (0.10; 0.97)	92.8 (81.5; 98)	97.3 (92.7; 99)
Moderna booster 14-120 days	7	15.92	0.40 (0.16; 0.82)	92.4 (84.2; 96.9)	96.5 (92.5; 98.3)
Sinopharm booster 14-120 days	1	0.85	1.07 (0.03; 5.95)	79.6 (-13.7; 99.5)	92.0 (43.0; 98.9)
Janssen booster 14-120 days	0	1.52	0.00 (0.00; 2.01)	100.0 (57.8; 100.0)	100.0 (NA)
<b>Sputnik</b>					
primary 14-120 days	6	30.90	0.18 (0.06; 0.38)	96.6 (92.7; 98.8)	90.4 (78.5; 95.7)
primary 121-180 days	241	295.38	0.74 (0.65; 0.84)	85.8 (83.9; 87.6)	74.3 (70.7; 77.5)
primary 181-240 days	758	253.36	2.72 (2.53; 2.92)	48.0 (44.0; 51.7)	72.1 (69.9; 74.2)
primary >240 days	28	13.30	1.91 (1.27; 2.77)	63.4 (47.1; 75.7)	78.7 (69.1; 85.4)
Pfizer booster 14-120 days	30	130.59	0.21 (0.14; 0.30)	96.0 (94.3; 97.3)	98.0 (97.1; 98.6)
Moderna booster 14-120 days	4	13.27	0.27 (0.07; 0.70)	94.8 (86.6; 98.6)	97.0 (92.1; 98.9)
Sinopharm booster 14-120 days	5	1.42	3.20 (1.04; 7.46)	38.9 (-42.6; 80.2)	66.8 (20.1; 86.2)

Janssen booster 14-120 days	3	7.23	0.38 (0.08; 1.10)	92.8 (78.9; 98.5)	95.1 (84.8; 98.4)
<b>Astra-Zeneca</b>					
primary 14-120 days	89	128.46	0.63 (0.51; 0.78)	88.0 (85.2; 90.3)	76.2 (70.6; 80.7)
primary 121-180 days	493	183.32	2.44 (2.23; 2.67)	53.3 (48.9; 57.4)	75.4 (73.0; 77.6)
primary 181-240 days	255	55.78	4.16 (3.66; 4.70)	20.6 (10.1; 30.1)	59.5 (54.0; 64.2)
primary >240 days	111	9.55	10.57 (8.69; 12.72)	-102.0 (-143.5; -66.0)	48.8 (38.2; 57.6)
Pfizer booster 14-120 days	68	88.58	0.70 (0.54; 0.88)	86.7 (83.1; 89.6)	95.1 (93.8; 96.2)
Moderna booster 14-120 days	2	9.77	0.19 (0.02; 0.67)	96.4 (87.1; 99.6)	98.5 (93.9; 99.6)
Sinopharm booster 14-120 days	2	0.82	2.23 (0.27; 8.06)	57.4 (-54.1; 94.8)	84.7 (38.9; 96.2)
<b>Sinopharm</b>					
primary 14-120 days	106	87.74	1.10 (0.90; 1.33)	79.0 (74.6; 82.8)	53.8 (43.9; 61.9)
primary 121-180 days	655	239.02	2.49 (2.30; 2.69)	52.4 (48.5; 56.0)	49.8 (45.6; 53.8)
primary 181-240 days	584	114.32	4.64 (4.27; 5.04)	11.2 (3.5; 18.4)	47.0 (42.3; 51.4)
primary >240 days	65	4.93	12.00 (9.26; 15.29)	-129.4 (-192.5; -76.9)	40.9 (24.4; 53.8)
Pfizer booster 14-120 days	89	105.07	0.77 (0.62; 0.95)	85.3 (81.9; 88.2)	94.6 (93.3; 95.6)
Moderna booster 14-120 days	5	7.18	0.63 (0.21; 1.48)	87.9 (71.7; 96.1)	94.8 (87.6; 97.9)
Sinopharm booster 14-120 days	10	4.23	2.15 (1.03; 3.95)	58.9 (24.5; 80.3)	77.5 (58.2; 87.9)
Janssen booster 14-120 days	5	10.01	0.45 (0.15; 1.06)	91.3 (79.7; 97.2)	95.3 (88.7; 98.0)
<b>Janssen</b>					
primary 14-120 days	140	44.57	2.86 (2.40; 3.37)	45.4 (35.5; 54.1)	43.2 (32.9; 52.0)
primary 121-180 days	121	49.03	2.24 (1.86; 2.68)	57.1 (48.7; 64.4)	58.2 (49.9; 65.1)
primary 181-240 days	91	24.97	3.31 (2.67; 4.07)	36.7 (22.2; 49.1)	59.4 (50.1; 67.0)
Pfizer booster 14-120 days	2	2.46	0.74 (0.09; 2.67)	85.9 (49.0; 98.3)	92.2 (68.8; 98.0)
Janssen booster 14-120 days	1	0.48	1.90 (0.05; 10.61)	63.6 (-102.9; 99.1)	76.7 (-65.7; 96.7)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.

**Supplementary Table 5.** Incidence, crude and adjusted effectiveness of vaccine combinations against COVID-19 related **hospitalization** during the Delta wave in the 65-100 years old Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	8 269	261.16	28.78 (28.17; 29.41)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	243	40.88	5.40 (4.75; 6.13)	81.2 (78.7; 83.5)	76.6 (73.3; 79.4)
primary 121-180 days	949	167.53	5.15 (4.83; 5.49)	82.1 (80.9; 83.3)	72.7 (70.7; 74.6)
primary 181-240 days	2 082	150.66	12.56 (12.03; 13.11)	56.4 (54.2; 58.4)	67.8 (66.2; 69.4)
primary >240 days	639	25.26	23.00 (21.25; 24.86)	20.1 (13.4; 26.4)	59.2 (55.6; 62.4)
Pfizer booster 14-120 days	794	232.40	3.11 (2.89; 3.33)	89.2 (88.4; 90.0)	93.0 (92.5; 93.5)
Moderna booster 14-120 days	12	5.95	1.83 (0.95; 3.20)	93.6 (88.9; 96.7)	95.8 (92.6; 97.6)
Sinopharm booster 14-120 days	115	6.51	16.06 (13.26; 19.27)	44.2 (32.9; 54.0)	62.6 (55.0; 68.9)
Janssen booster 14-120 days	29	7.66	3.44 (2.30; 4.94)	88.0 (82.8; 92.0)	91.9 (88.3; 94.4)
<b>Moderna</b>					
primary 14-120 days	16	6.66	2.18 (1.25; 3.55)	92.4 (87.7; 95.7)	83.8 (73.5; 90.1)
primary 121-180 days	139	25.45	4.96 (4.17; 5.86)	82.8 (79.6; 85.5)	78.6 (74.7; 82.0)
primary 181-240 days	229	23.33	8.92 (7.81; 10.16)	69.0 (64.6; 72.9)	76.6 (73.3; 79.5)
primary >240 days	67	3.31	18.42 (14.28; 23.40)	36.0 (18.6; 50.4)	69.3 (60.9; 75.9)
Pfizer booster 14-120 days	28	13.33	1.91 (1.27; 2.76)	93.4 (90.4; 95.6)	96.0 (94.1; 97.2)
Moderna booster 14-120 days	29	13.69	1.93 (1.29; 2.77)	93.3 (90.4; 95.5)	95.7 (93.8; 97)
Sinopharm booster 14-120 days	17	1.39	11.15 (6.50; 17.86)	61.3 (37.9; 77.4)	75.9 (61.2; 85.0)
Janssen booster 14-120 days	7	2.06	2.81 (1.13; 5.79)	89.3 (77.8; 95.7)	93.0 (85.4; 96.7)
<b>Sputnik</b>					
primary 14-120 days	3	0.89	3.06 (0.63; 8.93)	89.4 (69.0; 97.8)	78.3 (32.7; 93.0)
primary 121-180 days	92	29.25	2.86 (2.30; 3.51)	90.1 (87.8; 92.0)	66.0 (58.1; 72.4)
primary 181-240 days	402	39.25	9.31 (8.42; 10.27)	67.7 (64.2; 70.8)	70.7 (67.5; 73.6)
primary >240 days	57	4.68	11.08 (8.39; 14.35)	61.5 (50.1; 70.9)	61.6 (50.0; 70.5)
Pfizer booster 14-120 days	40	48.72	0.75 (0.53; 1.02)	97.4 (96.5; 98.1)	97.6 (96.7; 98.2)
Moderna booster 14-120 days	2	3.52	0.52 (0.06; 1.86)	98.2 (93.5; 99.8)	98.3 (93.1; 99.6)
Sinopharm booster 14-120 days	2	0.46	3.95 (0.48; 14.25)	86.3 (50.5; 98.3)	86.7 (46.9; 96.7)



Janssen booster 14-120 days	0	0.61	0.00 (0.00; 5.51)	100.0 (80.9; 100.0)	100.0 (NA)
<b>Astra-Zeneca</b>					
primary 14-120 days	63	24.54	2.33 (1.79; 2.99)	91.9 (89.6; 93.8)	73.8 (66.4; 79.7)
primary 121-180 days	588	50.15	10.66 (9.81; 11.56)	63.0 (59.7; 66.0)	68.1 (65.2; 70.7)
primary 181-240 days	152	9.02	15.32 (12.98; 17.96)	46.8 (37.5; 55.0)	63.0 (56.5; 68.6)
primary >240 days	2	0.05	39.67 (4.80; 143.32)	-37.8 (-398.1; 83.3)	24.2 (-203.1; 81.1)
Pfizer booster 14-120 days	57	27.75	1.87 (1.41; 2.42)	93.5 (91.6; 95.1)	95.3 (93.9; 96.4)
Moderna booster 14-120 days	3	2.31	1.18 (0.24; 3.45)	95.9 (88.0; 99.2)	97.0 (90.6; 99)
Sinopharm booster 14-120 days	4	0.21	17.18 (4.68; 43.99)	40.3 (-52.9; 83.7)	57.1 (-14.4; 83.9)
<b>Sinopharm</b>					
primary 14-120 days	60	7.14	7.64 (5.83; 9.84)	73.4 (65.8; 79.8)	45.7 (30.0; 57.9)
primary 121-180 days	393	52.06	6.86 (6.20; 7.58)	76.2 (73.6; 78.5)	48.5 (42.8; 53.6)
primary 181-240 days	1 358	67.36	18.33 (17.37; 19.33)	36.3 (32.6; 39.9)	40.1 (36.4; 43.6)
primary >240 days	341	12.07	25.69 (23.04; 28.57)	10.7 (0.5; 20.1)	38.0 (30.6; 44.5)
Pfizer booster 14-120 days	579	237.05	2.22 (2.04; 2.41)	92.3 (91.6; 92.9)	93.4 (92.8; 94.0)
Moderna booster 14-120 days	22	11.07	1.81 (1.13; 2.74)	93.7 (90.5; 96.1)	94.8 (92.1; 96.6)
Sinopharm booster 14-120 days	26	2.68	8.83 (5.77; 12.94)	69.3 (55; 80.0)	74.6 (62.7; 82.7)
Janssen booster 14-120 days	22	6.27	3.19 (2.00; 4.83)	88.9 (83.2; 93.1)	90.0 (84.8; 93.4)
<b>Janssen</b>					
primary 14-120 days	77	3.53	19.83 (15.65; 24.78)	31.1 (13.8; 45.7)	26.4 (7.9; 41.3)
primary 121-180 days	53	4.44	10.86 (8.14; 14.21)	62.3 (50.6; 71.8)	59.0 (46.2; 68.7)
primary 181-240 days	52	2.17	21.81 (16.29; 28.6)	24.2 (0.5; 43.5)	46.7 (29.9; 59.5)
Pfizer booster 14-120 days	2	0.62	2.92 (0.35; 10.56)	89.8 (63.3; 98.8)	92.1 (68.5; 98.0)
Janssen booster 14-120 days	0	0.07	0 (0.00; 45.92)	100.0 (-59.6; 100.0)	100.0 (NA)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.

**Supplementary Table 6.** Incidence, crude and adjusted effectiveness of vaccine combinations against COVID-19 related **mortality** during the Delta wave in the 18-64 years old Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	1 928	2 228.48	0.79 (0.75; 0.82)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	26	366.56	0.06 (0.04; 0.09)	91.8 (87.9; 94.7)	87.4 (81.5; 91.5)
primary 121-180 days	59	640.70	0.08 (0.06; 0.11)	89.4 (86.2; 91.9)	90.3 (87.4; 92.5)
primary 181-240 days	111	281.95	0.36 (0.29; 0.43)	54.5 (44.9; 62.8)	82.8 (79.1; 85.8)
primary >240 days	26	73.90	0.32 (0.21; 0.47)	59.3 (40.2; 73.5)	73.6 (61.1; 82.1)
Pfizer booster 14-120 days	23	218.63	0.10 (0.06; 0.14)	87.8 (81.7; 92.3)	96.8 (95.2; 97.9)
Moderna booster 14-120 days	1	7.61	0.12 (0.00; 0.67)	84.8 (15.3; 99.6)	95.5 (67.9; 99.4)
Sinopharm booster 14-120 days	0	5.38	0.00 (0.00; 0.62)	100.0 (20.7; 100.0)	100.0 (NA)
Janssen booster 14-120 days	0	8.09	0.00 (0.00; 0.41)	100.0 (47.2; 100.0)	100.0 (NA)
<b>Moderna</b>					
primary 14-120 days	3	41.33	0.07 (0.01; 0.19)	91.6 (75.4; 98.3)	77.7 (30.7; 92.8)
primary 121-180 days	19	111.11	0.16 (0.09; 0.24)	80.2 (69.0; 88.1)	84.1 (75.0; 89.9)
primary 181-240 days	22	52.40	0.38 (0.24; 0.58)	51.5 (26.3; 69.7)	83.3 (74.6; 89.0)
primary >240 days	1	1.66	0.55 (0.01; 3.06)	30.2 (-289.4; 98.2)	79.7 (-44.3; 97.1)
Pfizer booster 14-120 days	0	9.72	0.00 (0.00; 0.35)	100.0 (56.1; 100.0)	100.0 (NA)
Moderna booster 14-120 days	0	16.03	0.00 (0.00; 0.21)	100.0 (73.4; 100.0)	100.0 (NA)
Sinopharm booster 14-120 days	1	0.86	1.05 (0.03; 5.86)	-33.6 (-645.4; 96.6)	70.7 (-107.9; 95.9)
Janssen booster 14-120 days	1	1.53	0.54 (0.01; 3.01)	24.5 (-321.4; 98.1)	84.1 (-12.6; 97.8)
<b>Sputnik</b>					
primary 14-120 days	0	31.19	0.00 (0.00; 0.11)	100.0 (86.3; 100.0)	100.0 (NA)
primary 121-180 days	10	295.81	0.03 (0.01; 0.06)	96.1 (92.8; 98.1)	89.3 (79.9; 94.3)
primary 181-240 days	62	253.79	0.22 (0.17; 0.28)	71.8 (63.6; 78.4)	86.5 (82.7; 89.6)
primary >240 days	9	13.37	0.61 (0.28; 1.16)	22.2 (-48.0; 64.5)	79.1 (59.8; 89.2)
Pfizer booster 14-120 days	3	130.74	0.02 (0.00; 0.06)	97.3 (92.2; 99.5)	99.2 (97.4; 99.7)
Moderna booster 14-120 days	0	13.28	0.00 (0.00; 0.25)	100.0 (67.9; 100.0)	100.0 (NA)
Sinopharm booster 14-120 days	0	1.43	0.00 (0.00; 2.35)	100.0 (-199.1; 100.0)	100.0 (NA)

Janssen booster 14-120 days	0	7.24	0.00 (0.00; 0.46)	100.0 (41.0; 100.0)	100.0 (NA)
<b>Astra-Zeneca</b>					
primary 14-120 days	4	128.71	0.03 (0.01; 0.07)	96.4 (90.8; 99.0)	90.1 (73.5; 96.3)
primary 121-180 days	57	183.79	0.28 (0.21; 0.37)	64.2 (53.4; 73.0)	83.6 (78.7; 87.4)
primary 181-240 days	48	56.01	0.78 (0.57; 1.03)	0.9 (-31.9; 27.2)	65.0 (53.3; 73.7)
primary >240 days	23	9.64	2.17 (1.38; 3.26)	-175.9 (-315.2; -74.5)	57.1 (35.2; 71.6)
Pfizer booster 14-120 days	6	88.79	0.06 (0.02; 0.13)	92.2 (83.0; 97.1)	98.4 (96.5; 99.3)
Moderna booster 14-120 days	0	9.79	0.00 (0.00; 0.34)	100.0 (56.4; 100.0)	100.0 (NA)
Sinopharm booster 14-120 days	0	0.82	0.00 (0.00; 4.11)	100.0 (-422.8; 100.0)	100.0 (NA)
<b>Sinopharm</b>					
primary 14-120 days	10	88.32	0.10 (0.05; 0.19)	86.9 (75.9; 93.7)	67.4 (39.2; 82.5)
primary 121-180 days	57	239.80	0.22 (0.16; 0.28)	72.5 (64.2; 79.3)	63.9 (53.0; 72.3)
primary 181-240 days	81	114.78	0.64 (0.51; 0.80)	18.4 (-1.9; 35.5)	61.2 (51.6; 69.0)
primary >240 days	18	5.01	3.27 (1.94; 5.17)	-315.6 (-558.7; -145.8)	50.7 (21.4; 69.1)
Pfizer booster 14-120 days	17	105.50	0.15 (0.09; 0.23)	81.4 (70.1; 89.2)	95.9 (93.4; 97.5)
Moderna booster 14-120 days	0	7.21	0.00 (0.00; 0.46)	100.0 (40.8; 100.0)	100.0 (NA)
Sinopharm booster 14-120 days	1	4.27	0.21 (0.01; 1.19)	72.9 (-51.1; 99.3)	91.1 (36.4; 98.7)
Janssen booster 14-120 days	1	10.03	0.09 (0.00; 0.50)	88.5 (35.7; 99.7)	95.8 (70.0; 99.4)
<b>Janssen</b>					
primary 14-120 days	17	45.12	0.34 (0.20; 0.55)	56.5 (30.1; 74.7)	59.8 (35.2; 75.1)
primary 121-180 days	13	49.41	0.24 (0.13; 0.41)	69.6 (47.9; 83.8)	67.1 (43.2; 81.0)
primary 181-240 days	11	25.14	0.40 (0.20; 0.71)	49.4 (9.3; 74.8)	76.1 (56.7; 86.8)
Pfizer booster 14-120 days	0	2.53	0.00 (0.00; 1.33)	100.0 (-68.6; 100.0)	100.0 (NA)
Janssen booster 14-120 days	0	0.48	0.00 (0.00; 6.93)	100.0 (-782.6; 100.0)	100.0 (NA)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.

**Supplementary Table 7.** Incidence, crude and adjusted effectiveness of vaccine combinations against COVID-19 related **mortality** during the Delta wave in the 65-100 years old Hungarian population

Vaccination	Number of cases	Average population size (1000 persons)	Incidence rate (per 100 000 person-days) (95% CI)	Crude vaccine efficacy (%) (95% CI)	Adjusted vaccine efficacy (%) (95% CI)
<b>Unvaccinated</b>	3 366	266.84	11.47 (11.08; 11.86)	reference	reference
<b>Pfizer-BionTech</b>					
primary 14-120 days	77	43.96	1.59 (1.26; 1.99)	86.1 (82.6; 89.1)	81.5 (76.8; 85.3)
primary 121-180 days	195	169.79	1.04 (0.90; 1.20)	90.9 (89.5; 92.2)	79.9 (76.8; 82.7)
primary 181-240 days	625	151.89	3.74 (3.45; 4.05)	67.4 (64.5; 70.1)	74.6 (72.3; 76.8)
primary >240 days	321	25.73	11.34 (10.13; 12.65)	1.1 (-10.9; 12.1)	60.2 (55.2; 64.6)
Pfizer booster 14-120 days	226	234.09	0.88 (0.77; 1.00)	92.3 (91.2; 93.3)	95.8 (95.2; 96.3)
Moderna booster 14-120 days	4	5.98	0.61 (0.17; 1.56)	94.7 (86.4; 98.6)	97.0 (92.1; 98.9)
Sinopharm booster 14-120 days	36	6.57	4.98 (3.49; 6.89)	56.6 (39.8; 69.6)	73.9 (63.8; 81.2)
Janssen booster 14-120 days	6	7.71	0.71 (0.26; 1.54)	93.8 (86.6; 97.7)	96.2 (91.6; 98.3)
<b>Moderna</b>					
primary 14-120 days	2	7.15	0.25 (0.03; 0.92)	97.8 (92.0; 99.7)	93.2 (72.6; 98.3)
primary 121-180 days	29	26.14	1.01 (0.68; 1.45)	91.2 (87.3; 94.1)	86.4 (80.4; 90.6)
primary 181-240 days	68	23.54	2.63 (2.04; 3.33)	77.1 (70.9; 82.3)	81.7 (76.7; 85.6)
primary >240 days	35	3.37	9.45 (6.58; 13.15)	17.6 (-14.9; 42.7)	71.9 (60.7; 79.9)
Pfizer booster 14-120 days	13	13.49	0.88 (0.47; 1.50)	92.4 (86.9; 95.9)	96.2 (93.5; 97.8)
Moderna booster 14-120 days	6	13.87	0.39 (0.14; 0.86)	96.6 (92.5; 98.7)	98.2 (96.1; 99.2)
Sinopharm booster 14-120 days	7	1.41	4.51 (1.81; 9.28)	60.7 (18.9; 84.2)	79.3 (56.6; 90.1)
Janssen booster 14-120 days	1	2.08	0.40 (0.01; 2.22)	96.2 (78.7; 99.9)	97.9 (84.9; 99.7)
<b>Sputnik</b>					
primary 14-120 days	0	0.98	0.00 (0.00; 3.41)	100.0 (70.2; 100.0)	100.0 (NA)
primary 121-180 days	7	29.40	0.22 (0.09; 0.45)	98.1 (96.1; 99.2)	86.4 (71.4; 93.6)
primary 181-240 days	86	39.43	1.98 (1.59; 2.45)	82.7 (78.6; 86.2)	80.7 (76.0; 84.4)
primary >240 days	29	4.75	5.55 (3.72; 7.98)	51.6 (30.3; 67.6)	63.0 (46.6; 74.4)
Pfizer booster 14-120 days	13	48.85	0.24 (0.13; 0.41)	97.9 (96.4; 98.9)	98.1 (96.6; 98.9)
Moderna booster 14-120 days	1	3.54	0.26 (0.01; 1.43)	97.8 (87.5; 99.9)	97.9 (85.1; 99.7)
Sinopharm booster 14-120 days	1	0.46	1.97 (0.05; 10.96)	82.8 (4.3; 99.6)	84.2 (-12.1; 97.8)

Janssen booster 14-120 days	0	0.61	0.00 (0.00; 5.49)	100.0 (52.1; 100.0)	100.0 (NA)
<b>Astra-Zeneca</b>					
primary 14-120 days	7	24.70	0.26 (0.1; 0.53)	97.8 (95.4; 99.1)	84.8 (67.8; 92.8)
primary 121-180 days	144	50.48	2.59 (2.19; 3.05)	77.4 (73.3; 81.0)	76.1 (71.7; 79.8)
primary 181-240 days	71	9.17	7.04 (5.5; 8.88)	38.6 (22.3; 52.2)	66.7 (57.8; 73.7)
primary >240 days	0	0.05	0.00 (0.00; 71.37)	100.0 (-522.7; 100.0)	100.0 (NA)
Pfizer booster 14-120 days	22	27.87	0.72 (0.45; 1.09)	93.7 (90.5; 96.1)	96.2 (94.2; 97.5)
Moderna booster 14-120 days	1	2.31	0.39 (0.01; 2.19)	96.6 (80.9; 99.9)	97.9 (84.8; 99.7)
Sinopharm booster 14-120 days	2	0.21	8.50 (1.03; 30.70)	25.9 (-167.9; 91)	55.3 (-78.9; 88.8)
<b>Sinopharm</b>					
primary 14-120 days	16	7.68	1.90 (1.08; 3.08)	83.5 (73.1; 90.6)	58.6 (32.3; 74.7)
primary 121-180 days	74	52.92	1.27 (1.00; 1.6)	88.9 (86.0; 91.3)	65.2 (56.0; 72.4)
primary 181-240 days	379	68.04	5.06 (4.57; 5.6)	55.8 (50.9; 60.4)	49.0 (43.2; 54.3)
primary >240 days	187	12.40	13.71 (11.82; 15.83)	-19.6 (-38.6; -2.7)	36.4 (26.0; 45.3)
Pfizer booster 14-120 days	158	238.30	0.60 (0.51; 0.70)	94.7 (93.8; 95.5)	95.4 (94.6; 96.1)
Moderna booster 14-120 days	5	11.14	0.41 (0.13; 0.95)	96.4 (91.7; 98.8)	97.1 (93.1; 98.8)
Sinopharm booster 14-120 days	6	2.70	2.02 (0.74; 4.40)	82.4 (61.6; 93.5)	86.8 (70.6; 94.1)
Janssen booster 14-120 days	5	6.30	0.72 (0.23; 1.68)	93.7 (85.3; 98.0)	94.2 (86.0; 97.6)
<b>Janssen</b>					
primary 14-120 days	21	3.73	5.12 (3.17; 7.83)	55.3 (31.6; 72.4)	53.3 (28.2; 69.6)
primary 121-180 days	18	4.64	3.53 (2.09; 5.57)	69.2 (51.3; 81.8)	57.6 (32.5; 73.3)
primary 181-240 days	30	2.25	12.13 (8.18; 17.31)	-5.7 (-51.2; 28.8)	39.5 (13.3; 57.8)
Pfizer booster 14-120 days	0	0.69	0.00 (0.00; 4.89)	100.0 (57.4; 100.0)	100.0 (NA)
Janssen booster 14-120 days	0	0.08	0.00 (0.00; 42.2)	100.0 (-268.2; 100.0)	100.0 (NA)

CI: confidence interval

Vaccine combinations with less than 3,000 persons on 31 December 2021 and less than 300 registered cases since the start of the epidemic were not analyzed.