



ZOE COVID Study

Weekly COVID Vaccines Report

24 November 2021

Analysis by ZOE and King's College London

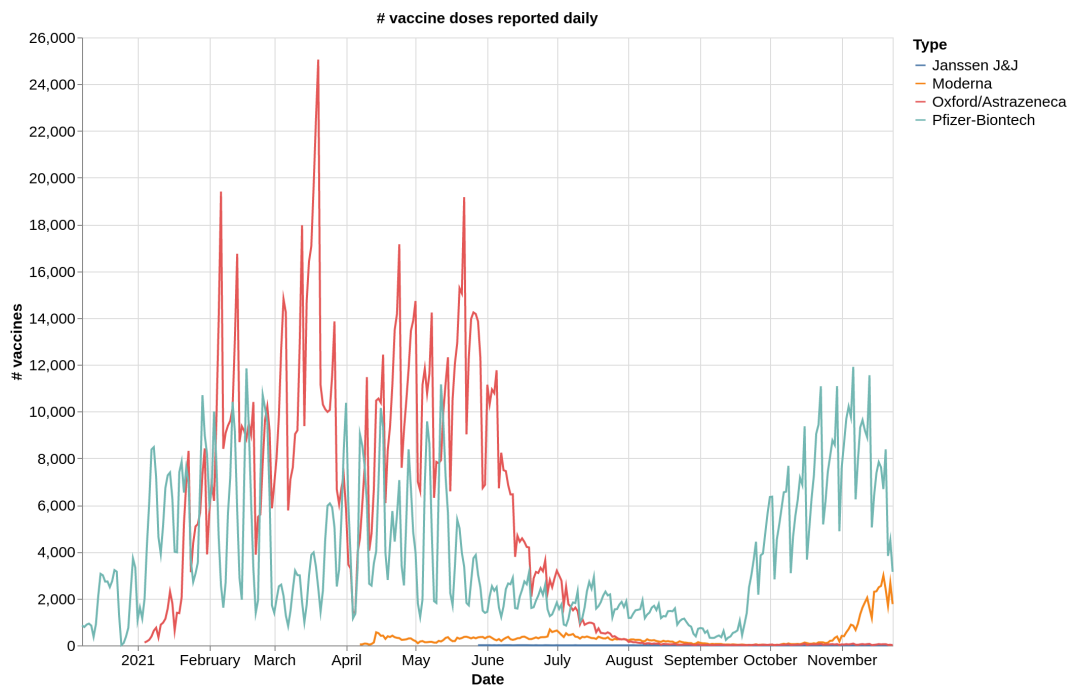
covid.joinzoe.com

Total number of users who logged a vaccine dose in the UK

Users have been logging their vaccines since the 8th of December 2020 when the national rollout was initiated. The first type of vaccine which was administered to the population was the Pfizer-BioNTech one. From the 4th of January 2021, Oxford/Astrazeneca vaccines were also supplied nationally. The national rollout of Moderna vaccines was also initiated on the 7th of April 2021. All the data provided in this report is up to date with respect to the types of vaccines we collect. The *Unspecified Brand* label refers to vaccines whose type was not explicitly declared by the user.

Breakdown of vaccines' types among vaccinated users

Type	# of Vaccines
Janssen J&J	198
Moderna	62,363
Oxford/Astrazeneca	796,674
Pfizer-BioNTech	725,965
Unspecified Brand	526,640
Total	2,111,840



Infections after vaccination

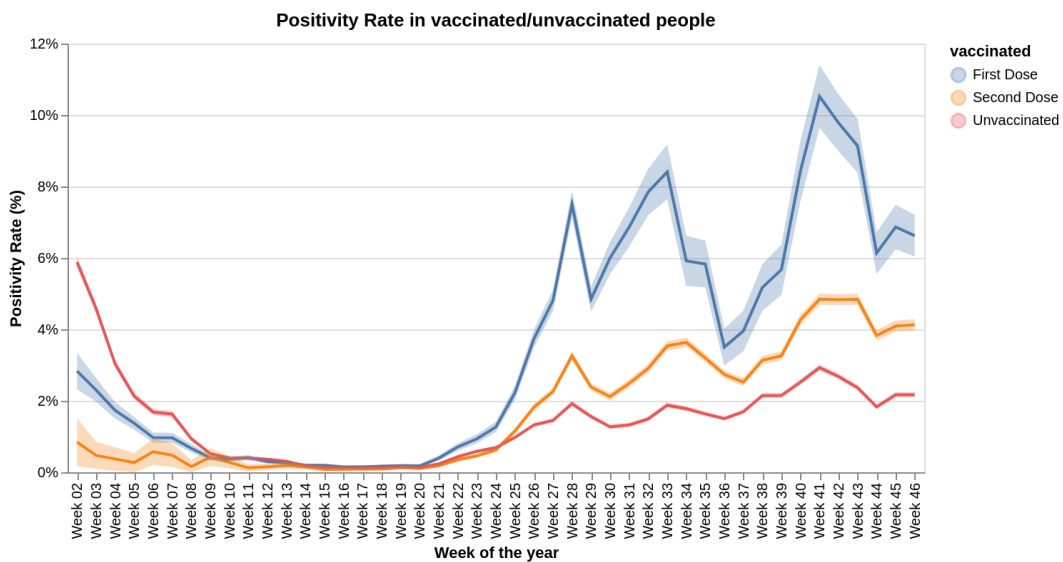
In this section of the report, the raw numbers for post-vaccine infections are presented. These are related to the number of tested and COVID positive users in both unvaccinated and vaccinated users. Moreover, the vaccinated cohort refers to the set of vaccinated users who received their first dose (of any vaccine type) more than 12 days ago or their second dose more than 7 days ago. In this case, there is no breakdown on vaccines types; therefore, the vaccinated cohort may have received one of the types listed previously. A weekly breakdown of these numbers is provided for these cohorts.

These figures do not take into account:

- *False positive rate of tests*
- *Population differences between the vaccinated and the unvaccinated group*

Cohort	Unvaccinated			Vaccinated - 1st Dose			Vaccinated - Both Doses		
	#positives	#tests	positivity(%)	#positives	#tests	positivity(%)	#positives	#tests	positivity(%)
Week									
2021 - 02	5,615	95,386	5.89	117	4,129	2.83	6	712	0.84
2021 - 03	3,873	84,506	4.58	183	7,945	2.30	6	1,268	0.47
2021 - 04	2,739	90,313	3.03	216	12,478	1.73	5	1,341	0.37
2021 - 05	2,023	94,833	2.13	230	16,754	1.37	4	1,491	0.27
2021 - 06	1,500	89,032	1.68	181	18,703	0.97	9	1,568	0.57
2021 - 07	1,212	74,565	1.63	186	19,277	0.96	8	1,685	0.47
2021 - 08	738	78,668	0.94	137	20,429	0.67	3	1,869	0.16
2021 - 09	514	98,688	0.52	94	23,145	0.41	11	2,611	0.42
2021 - 10	502	124,848	0.40	99	26,824	0.37	10	3,601	0.28
2021 - 11	495	125,735	0.39	121	29,638	0.41	6	4,873	0.12
2021 - 12	426	116,988	0.36	91	29,962	0.30	10	6,559	0.15
2021 - 13	313	102,001	0.31	81	30,646	0.26	15	7,980	0.19
2021 - 14	195	106,774	0.18	71	36,006	0.20	17	11,344	0.15
2021 - 15	183	132,602	0.14	84	43,441	0.19	12	14,568	0.08
2021 - 16	177	134,389	0.13	63	42,152	0.15	14	17,412	0.08
2021 - 17	157	126,989	0.12	59	39,196	0.15	18	19,036	0.09
2021 - 18	174	128,258	0.14	66	39,115	0.17	21	23,212	0.09
2021 - 19	202	128,716	0.16	68	37,109	0.18	36	27,338	0.13
2021 - 20	184	133,870	0.14	62	34,928	0.18	35	33,089	0.11
2021 - 21	289	123,793	0.23	111	28,138	0.39	65	35,396	0.18
2021 - 22	531	122,184	0.43	175	24,640	0.71	150	42,999	0.35
2021 - 23	730	124,495	0.59	214	22,907	0.93	224	48,835	0.46
2021 - 24	908	131,662	0.69	291	22,951	1.27	358	57,344	0.62
2021 - 25	1,314	135,019	0.97	496	22,282	2.23	728	63,190	1.15

Cohort	Unvaccinated			Vaccinated - 1st Dose			Vaccinated - Both Doses		
	#positives	#tests	positivity(%)	#positives	#tests	positivity(%)	#positives	#tests	positivity(%)
Week									
2021 - 26	1,873	141,504	1.32	835	22,348	3.74	1,304	71,690	1.82
2021 - 27	2,018	139,234	1.45	980	20,378	4.81	1,676	74,164	2.26
2021 - 28	2,753	143,389	1.92	1,367	18,221	7.50	2,601	79,830	3.26
2021 - 29	2,201	141,228	1.56	695	14,336	4.85	1,883	78,940	2.39
2021 - 30	1,659	130,556	1.27	643	10,717	6.00	1,536	72,623	2.12
2021 - 31	1,682	127,158	1.32	573	8,350	6.86	1,761	70,836	2.49
2021 - 32	1,927	129,036	1.49	517	6,589	7.85	2,100	72,242	2.91
2021 - 33	2,485	132,424	1.88	423	5,032	8.41	2,596	73,402	3.54
2021 - 34	2,463	138,379	1.78	257	4,343	5.92	2,769	76,164	3.64
2021 - 35	2,532	155,084	1.63	288	4,940	5.83	2,718	84,930	3.20
2021 - 36	2,334	155,233	1.50	173	4,939	3.50	2,201	80,375	2.74
2021 - 37	2,689	158,809	1.69	180	4,550	3.96	1,995	79,040	2.52
2021 - 38	3,423	159,617	2.14	230	4,446	5.17	2,471	78,848	3.13
2021 - 39	3,359	156,365	2.15	236	4,160	5.67	2,464	75,574	3.26
2021 - 40	3,847	152,375	2.52	350	4,148	8.44	3,045	71,394	4.27
2021 - 41	4,591	156,832	2.93	493	4,686	10.52	3,486	71,969	4.84
2021 - 42	4,487	167,343	2.68	527	5,388	9.78	3,639	75,313	4.83
2021 - 43	3,775	159,517	2.37	515	5,637	9.14	3,420	70,648	4.84
2021 - 44	2,864	156,526	1.83	396	6,454	6.14	2,608	68,130	3.83
2021 - 45	3,312	152,576	2.17	439	6,393	6.87	2,632	64,321	4.09
2021 - 46	3,241	149,510	2.17	456	6,885	6.62	2,547	61,679	4.13
Total	84,509	5,807,009	1.46	14,069	805,735	1.75	53,223	1,981,433	2.69



Infections after natural infection

In this section of the report, the raw numbers for re-infections are presented. A re-infection is defined to be an infection (PCR positive test) which occurs 90 days after the primary PCR positive test. Two groups are presented in the table. The first includes users who were not previously infected while the second is related to users who got infected once from the start of the pandemic. Positive PCR tests between these two groups are monitored monthly.

These figures do not take into account:

- *False positive rate of tests*
- *Population differences between the two cohorts*

Cohort	Not previously infected			Previously infected		
	#positives	#tests	positivity(%)	#positives	#tests	positivity(%)
Month						
2020 - 8	502	149,011	0.34	9	1,096	0.82
2020 - 9	2,189	173,421	1.26	19	1,858	1.02
2020 - 10	7,167	189,404	3.78	41	1,939	2.11
2020 - 11	6,009	186,503	3.22	43	2,359	1.82
2020 - 12	10,383	314,140	3.31	89	4,734	1.88
2021 - 1	7,211	420,817	1.71	115	8,582	1.34
2021 - 2	1,532	425,182	0.36	67	12,013	0.56
2021 - 3	593	739,365	0.08	41	25,858	0.16
2021 - 4	250	808,274	0.03	56	38,955	0.14
2021 - 5	379	920,417	0.04	63	49,020	0.13
2021 - 6	1,822	976,846	0.19	199	53,614	0.37
2021 - 7	3,675	1,139,818	0.32	383	60,323	0.63
2021 - 8	2,606	1,023,818	0.25	411	57,955	0.71
2021 - 9	2,400	1,156,093	0.21	479	69,151	0.69
2021 - 10	3,288	1,168,903	0.28	680	75,725	0.90
2021 - 11	1,866	842,982	0.22	418	61,359	0.68
Total	51,872	10,634,994	0.49	3,113	524,541	0.59

Symptoms logged after vaccination

In this section of the report, symptoms logged after vaccination are collected and ranked according to their frequency of occurrence in active users. These symptoms can be divided into two groups: systemic and local ones. The first are also called whole-body symptoms since they are not strictly related to the local response of the body to the injection. The latter are related to local reactions on the site of the injection.

Top 10 most frequent systemic symptoms for vaccines types

The 10 most frequent systemic symptoms for each vaccine type are ranked according to their frequency of occurrence in descending order. These symptoms were collected from the reports completed by vaccinated active users in the first week after any injection (either first or second dose).

	Pfizer-BioNTech	Oxford/Astrazeneca	Moderna	Janssen J&J	Unspecified Brand
#1 systemic symptom	Fatigue	Fatigue	Fatigue	Fatigue	Fatigue
#2 systemic symptom	Headache	Headache	Headache	Headache	Headache
#3 systemic symptom	Arthralgia	Chills Or Shivers	Chills Or Shivers	Arthralgia	Runny Nose
#4 systemic symptom	Chills Or Shivers	Arthralgia	Arthralgia	Chills Or Shivers	Sore Throat
#5 systemic symptom	Dizzy Light Headed	Fever	Fever	Sore Throat	Sneezing
#6 systemic symptom	Runny Nose	Dizzy Light Headed	Myalgia	Fever	Arthralgia
#7 systemic symptom	Myalgia	Myalgia	Dizzy Light Headed	Myalgia	Chills Or Shivers
#8 systemic symptom	Sore Throat	Nausea	Nausea	Dizzy Light Headed	Dizzy Light Headed
#9 systemic symptom	Fever	Brain Fog	Sore Throat	Runny Nose	Myalgia
#10 systemic symptom	Nausea	Runny Nose	Runny Nose	Delirium	Persistent Cough

Ranked local effects for vaccines types

Users are asked daily for a week whether they are experiencing some local reactions on the site of injection. These users can choose among the following local reactions: tenderness, redness, local pain, swelling, swollen armpit glands, bruising, warmth, itch or other reasons (text field).

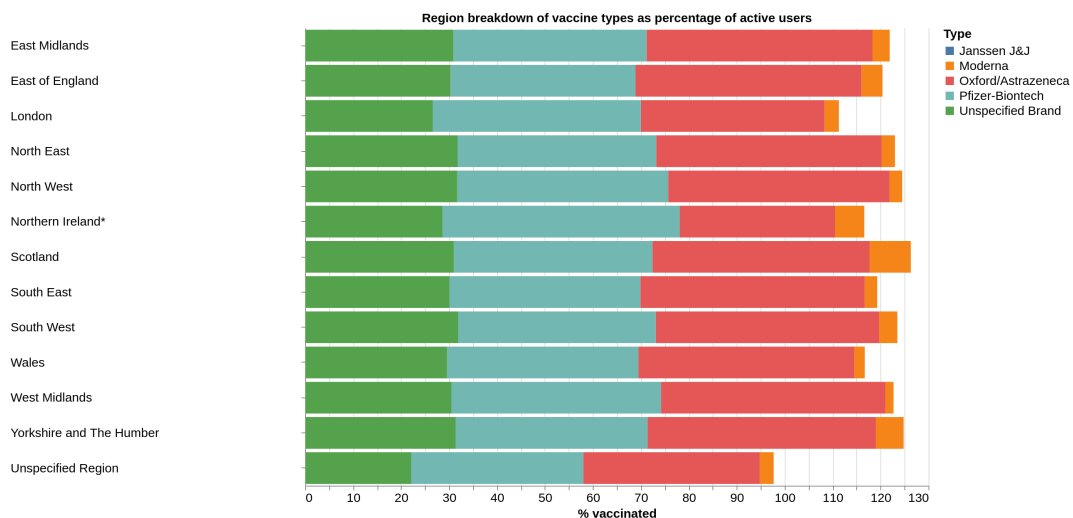
	Oxford/Astrazeneca	Pfizer-BioNTech	Moderna	Janssen J&J	Unspecified Brand
#1 local symptom	Tenderness	Tenderness	Tenderness	Tenderness	Tenderness
#2 local symptom	Pain	Pain	Pain	Pain	Pain
#3 local symptom	Warmth	Warmth	Swelling	Swelling	Warmth
#4 local symptom	Swelling	Swelling	Warmth	Warmth	Swelling
#5 local symptom	Bruising	Redness	Redness	Bruising	Redness
#6 local symptom	Redness	Bruising	Bruising	Swollen Armpit Glands	Bruising
#7 local symptom	Swollen Armpit Glands	Swollen Armpit Glands	Swollen Armpit Glands	Redness	Swollen Armpit Glands

Breakdown of vaccinated active users

In the following sections, different breakdowns are provided for vaccinated active users. A user is defined to be active if she/he has logged either one vaccine, a test or an assessment from the beginning of December. As of today, our dataset contains 1,780,254 active users. These breakdowns are split for vaccines types. Absolute values for each stratum are provided together with percentages. The latter are related to the percentage of active users in that stratum who were vaccinated with a specific vaccine type. Therefore, rates will add up horizontally but not vertically (through different strata).

Regional breakdown of vaccine types for active users

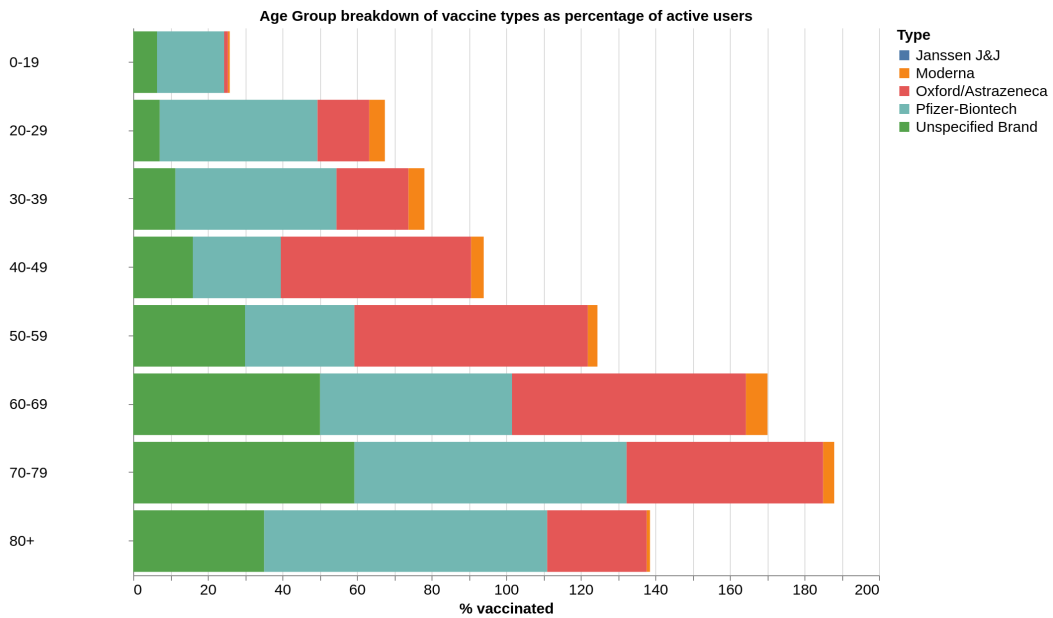
	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
Region						
East Midlands	5 (0.0%)	3,694 (3.6%)	48,325 (47.1%)	41,417 (40.3%)	31,738 (30.9%)	125,179 (78.5%)
East of England	21 (0.0%)	8,678 (4.4%)	92,221 (47.1%)	75,601 (38.6%)	59,406 (30.3%)	235,927 (76.9%)
London	50 (0.0%)	7,003 (3.0%)	89,087 (38.3%)	100,943 (43.4%)	61,832 (26.6%)	258,915 (75.2%)
North East	4 (0.0%)	1,297 (2.8%)	21,399 (47.0%)	18,862 (41.4%)	14,495 (31.8%)	56,057 (78.7%)
North West	11 (0.0%)	3,378 (2.6%)	60,321 (46.2%)	57,525 (44.0%)	41,409 (31.7%)	162,644 (79.2%)
Northern Ireland*	0 (0.0%)	662 (6.1%)	3,542 (32.4%)	5,400 (49.5%)	3,126 (28.6%)	12,730 (77.5%)
Scotland	17 (0.0%)	7,716 (8.6%)	40,819 (45.3%)	37,332 (41.4%)	27,929 (31.0%)	113,813 (79.9%)
South East	33 (0.0%)	9,291 (2.6%)	169,406 (46.8%)	144,158 (39.8%)	108,808 (30.1%)	431,696 (76.7%)
South West	20 (0.0%)	7,408 (3.8%)	89,926 (46.6%)	79,467 (41.2%)	61,462 (31.9%)	238,283 (78.5%)
Wales	3 (0.0%)	1,764 (2.2%)	35,677 (45.0%)	31,656 (39.9%)	23,508 (29.6%)	92,608 (78.5%)
West Midlands	11 (0.0%)	1,756 (1.7%)	48,714 (46.8%)	45,456 (43.7%)	31,726 (30.5%)	127,663 (78.8%)
Yorkshire and The Humber	6 (0.0%)	5,951 (5.8%)	49,174 (47.6%)	41,310 (40.0%)	32,399 (31.4%)	128,840 (79.1%)
Unspecified Region	17 (0.0%)	3,765 (2.9%)	48,063 (36.8%)	46,838 (35.9%)	28,802 (22.1%)	127,485 (67.9%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)



(*) The number of active users in Northern Ireland is low compared to other region. Numbers could be less reliable in this nation.

Age group breakdown of vaccine types for active users

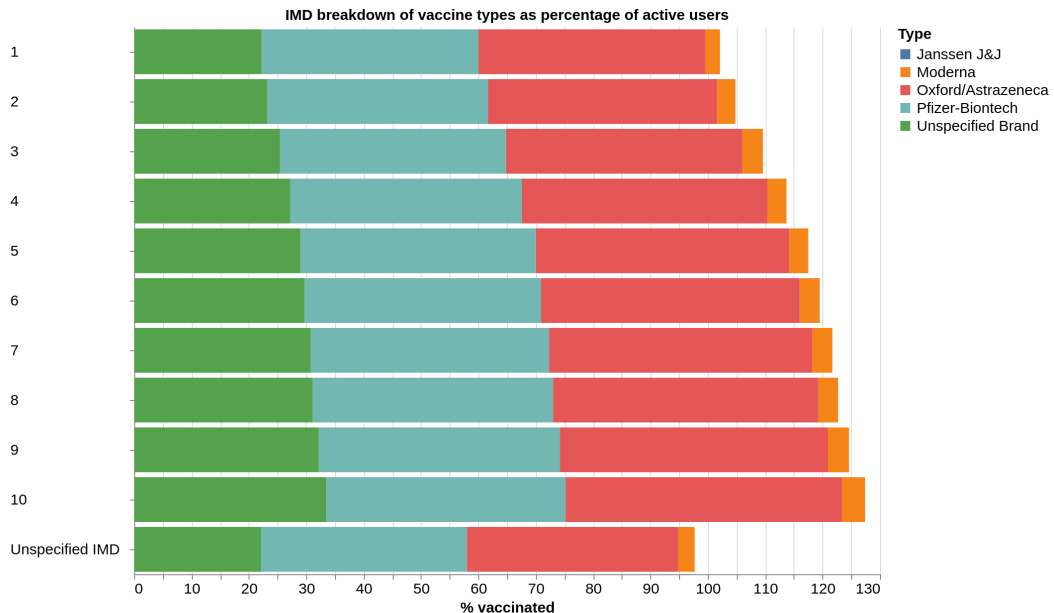
	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
Age Group						
0-19	8 (0.0%)	839 (0.5%)	1,628 (1.0%)	29,088 (18.0%)	10,305 (6.4%)	41,868 (22.9%)
20-29	46 (0.0%)	4,957 (4.2%)	16,211 (13.9%)	49,459 (42.3%)	8,256 (7.1%)	78,929 (61.1%)
30-39	26 (0.0%)	8,917 (4.3%)	39,970 (19.3%)	89,732 (43.2%)	23,458 (11.3%)	162,103 (66.8%)
40-49	27 (0.0%)	9,933 (3.4%)	149,444 (51.0%)	69,060 (23.6%)	46,897 (16.0%)	275,361 (76.0%)
50-59	28 (0.0%)	9,664 (2.6%)	236,712 (62.6%)	110,755 (29.3%)	113,296 (30.0%)	470,455 (84.9%)
60-69	28 (0.0%)	21,225 (5.8%)	228,576 (62.7%)	187,569 (51.5%)	182,558 (50.1%)	619,956 (92.0%)
70-79	30 (0.0%)	6,412 (3.0%)	111,430 (52.7%)	154,180 (73.0%)	125,177 (59.3%)	397,229 (94.2%)
80+	5 (0.0%)	416 (0.9%)	12,703 (26.7%)	36,122 (75.9%)	16,693 (35.1%)	65,939 (93.1%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)



IMD (Index of Multiple Deprivation) breakdown of vaccine types for active users

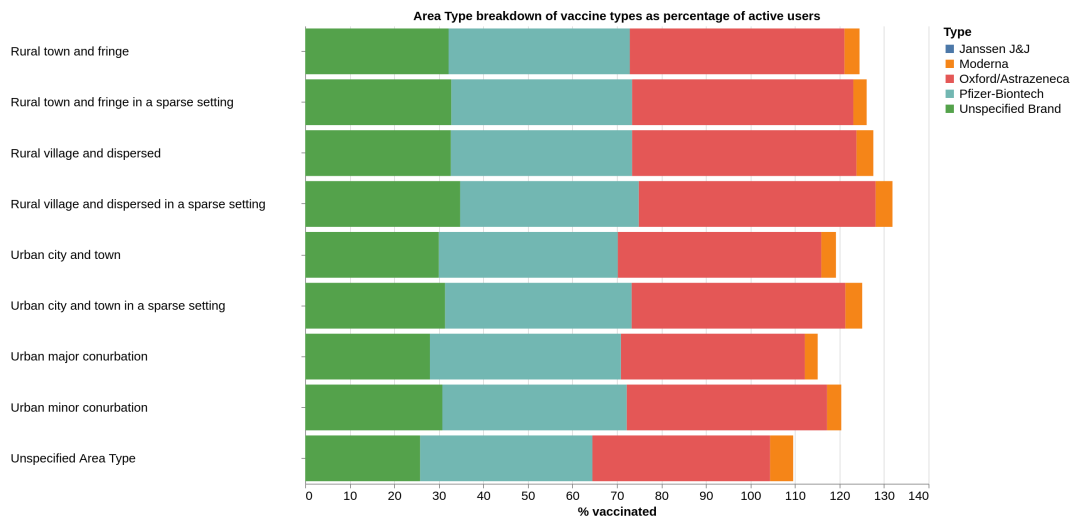
The Index of Multiple Deprivation (IMD) is a measure of the socio-economic class of a user based on his/her *Lower Layer Super Output Areas* of residence. The higher the IMD, the higher is the socio-economic status of a user. In this breakdown, we report vaccination levels across the 10 different deciles of the IMD distribution.

	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
IMD						
1	6 (0.0%)	983 (2.5%)	15,506 (39.6%)	14,802 (37.8%)	8,675 (22.2%)	39,972 (72.9%)
2	10 (0.0%)	2,080 (3.2%)	26,295 (39.9%)	25,401 (38.5%)	15,298 (23.2%)	69,084 (73.6%)
3	16 (0.0%)	3,374 (3.6%)	39,073 (41.2%)	37,388 (39.4%)	24,073 (25.4%)	103,924 (75.0%)
4	16 (0.0%)	4,120 (3.3%)	53,376 (42.8%)	50,366 (40.4%)	33,944 (27.2%)	141,822 (76.0%)
5	19 (0.0%)	5,125 (3.3%)	67,762 (44.2%)	62,826 (41.0%)	44,470 (29.0%)	180,202 (77.2%)
6	27 (0.0%)	6,523 (3.5%)	83,336 (45.1%)	76,068 (41.2%)	54,875 (29.7%)	220,829 (77.6%)
7	11 (0.0%)	7,220 (3.5%)	94,465 (45.9%)	85,397 (41.5%)	63,307 (30.8%)	250,400 (78.1%)
8	24 (0.0%)	7,464 (3.4%)	103,157 (46.3%)	93,236 (41.9%)	69,279 (31.1%)	273,160 (78.3%)
9	26 (0.0%)	9,172 (3.7%)	116,379 (46.7%)	104,556 (42.0%)	80,094 (32.2%)	310,227 (78.6%)
10	26 (0.0%)	12,537 (4.0%)	149,262 (48.2%)	129,087 (41.7%)	103,823 (33.5%)	394,735 (79.1%)
Unspecified IMD	17 (0.0%)	3,765 (2.9%)	48,063 (36.8%)	46,838 (35.9%)	28,802 (22.1%)	127,485 (67.9%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)



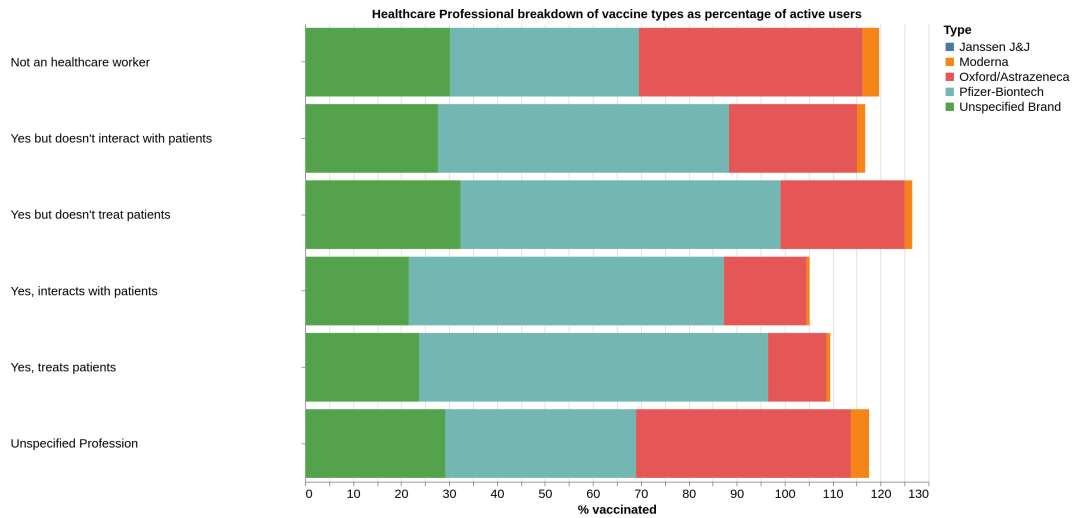
Area type (rural - urban) breakdown of vaccine types for active users

Area Type	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
Rural town and fringe	10 (0.0%)	6,252 (3.4%)	87,851 (48.2%)	74,257 (40.7%)	58,784 (32.2%)	227,154 (78.5%)
Rural town and fringe in a sparse setting	0 (0.0%)	249 (3.0%)	4,172 (49.7%)	3,407 (40.6%)	2,753 (32.8%)	10,581 (80.0%)
Rural village and dispersed	12 (0.0%)	7,124 (3.8%)	95,322 (50.4%)	77,037 (40.7%)	61,856 (32.7%)	241,351 (80.0%)
Rural village and dispersed in a sparse setting	3 (0.0%)	691 (3.8%)	9,637 (53.2%)	7,271 (40.1%)	6,300 (34.8%)	23,902 (82.1%)
Urban city and town	65 (0.0%)	22,702 (3.3%)	317,545 (45.7%)	279,117 (40.2%)	208,286 (30.0%)	827,715 (77.1%)
Urban city and town in a sparse setting	0 (0.0%)	124 (3.8%)	1,572 (48.0%)	1,372 (41.9%)	1,027 (31.4%)	4,095 (81.0%)
Urban major conurbation	70 (0.0%)	11,965 (2.9%)	172,685 (41.3%)	179,690 (42.9%)	117,201 (28.0%)	481,611 (76.2%)
Urban minor conurbation	4 (0.0%)	1,113 (3.2%)	15,466 (45.0%)	14,244 (41.4%)	10,576 (30.8%)	41,403 (78.1%)
Unspecified Area Type	34 (0.0%)	12,143 (5.2%)	92,424 (39.9%)	89,570 (38.7%)	59,857 (25.8%)	254,028 (73.0%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)



Healthcare worker breakdown of vaccine types for active users

	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
Healthcare Professional						
Not an healthcare worker	126 (0.0%)	39,985 (3.5%)	526,612 (46.6%)	444,966 (39.4%)	340,574 (30.2%)	1,352,263 (76.2%)
Yes but doesn't interact with patients	0 (0.0%)	495 (1.7%)	7,714 (26.7%)	17,495 (60.7%)	7,989 (27.7%)	33,693 (84.1%)
Yes but doesn't treat patients	0 (0.0%)	132 (1.6%)	2,118 (25.9%)	5,465 (66.7%)	2,653 (32.4%)	10,368 (87.2%)
Yes, interacts with patients	4 (0.0%)	292 (0.7%)	7,419 (17.2%)	28,399 (65.7%)	9,342 (21.6%)	45,456 (84.0%)
Yes, treats patients	0 (0.0%)	64 (0.8%)	1,020 (12.2%)	6,081 (72.7%)	1,989 (23.8%)	9,154 (85.7%)
Unspecified Profession	68 (0.0%)	21,395 (3.8%)	251,791 (44.8%)	223,559 (39.8%)	164,093 (29.2%)	660,906 (77.2%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)



Ethnicity breakdown of vaccine types for active users

	Janssen J&J	Moderna	Oxford/Astrazeneca	Pfizer-BioNTech	Unspecified Brand	Total
Ethnicity						
Asian	1 (0.0%)	579 (2.1%)	9,411 (34.3%)	10,362 (37.8%)	4,865 (17.7%)	25,218 (69.1%)
Black	2 (0.0%)	205 (2.6%)	2,980 (37.9%)	2,644 (33.6%)	1,372 (17.4%)	7,203 (68.2%)
Chinese	2 (0.0%)	227 (3.8%)	2,130 (36.1%)	2,248 (38.1%)	1,253 (21.2%)	5,860 (72.4%)
Middle Eastern	0 (0.0%)	114 (2.2%)	1,922 (36.7%)	2,027 (38.7%)	1,027 (19.6%)	5,090 (71.0%)
Mixed Other	5 (0.0%)	562 (2.7%)	5,848 (28.1%)	6,670 (32.1%)	3,509 (16.9%)	16,594 (59.6%)
Mixed White Black	0 (0.0%)	215 (2.3%)	2,528 (26.8%)	2,840 (30.1%)	1,407 (14.9%)	6,990 (55.8%)
White	183 (0.0%)	59,972 (3.6%)	765,408 (45.5%)	693,326 (41.2%)	509,408 (30.3%)	2,028,297 (77.7%)
Prefer Not to Say	2 (0.0%)	168 (2.7%)	2,417 (38.9%)	2,042 (32.9%)	1,314 (21.1%)	5,943 (66.1%)
Other	3 (0.0%)	248 (3.2%)	3,185 (41.7%)	2,940 (38.5%)	1,802 (23.6%)	8,178 (74.9%)
Unspecified Ethnicity	0 (0.0%)	73 (1.1%)	845 (12.3%)	866 (12.6%)	683 (10.0%)	2,467 (22.4%)
Total	198 (0.0%)	62,363 (3.5%)	796,674 (44.8%)	725,965 (40.8%)	526,640 (29.6%)	2,111,840 (118.6%)

