

Supplementary information for

**The effect of strict lockdown on Omicron SARS-CoV-2 variant transmission in
Shanghai**

Supplementary Table S1. Calculating sub-index scores for indicators of metrics.

Name	Coding	Score
C1(School closing)	0 - no measures	0
	1 - recommend closing or all schools open with alterations resulting in significant differences compared to non-Covid-19 operations	33.33
	2 - require closing (only some levels or categories, eg just high school, or just public schools)	66.67
	3 - require closing all levels	100
C2(Workplace closing)	0 - no measures	0
	1 - recommend closing (or recommend work from home) or all businesses open with alterations resulting in significant differences compared to non-Covid-19 operation	33.33
	2 - require closing (or work from home) for some sectors or categories of workers	66.67
	3 - require closing (or work from home) for all-but-essential workplaces (eg grocery stores, doctors)	100
C3(Cancel public events)	0 - no measures	0
	1 - recommend cancelling	50
	2 - require cancelling	100
C4(Restrictions on gatherings)	0 - no restrictions	0
	1 - restrictions on very large gatherings (the limit is above 1000 people)	25
	2 - restrictions on gatherings between 101-1000 people	50
	3 - restrictions on gatherings between 11-100 people	75
	4 - restrictions on gatherings of 10 people or less	100
C5(Close public transport)	0 - no measures	0
	1 - recommend closing (or significantly reduce volume/route/means of transport available)	50
	2 - require closing (or prohibit most citizens from using it)	100
C6(Stay at home requirements)	0 - no measures	0
	1 - recommend not leaving house	33.33
	2 - require not leaving house with exceptions for daily exercise, grocery shopping, and 'essential' trips	66.67
	3 - require not leaving house with minimal exceptions (eg allowed to leave once a week, or only one person can leave at a time, etc)	100
C7(Restrictions on internal movement)	0 - no measures	0
	1 - recommend not to travel between regions/cities	50
	2 - internal movement restrictions in place	100
C8(International travel controls)	0 - no restrictions	0
	1 - screening arrivals	25
	2 - quarantine arrivals from some or all regions	50
	3 - ban arrivals from some regions	75

The scores of each indicator are calculated by the equation described in the website link (https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/index_methodology.md).

Supplementary Table S2. Stringency indices of lockdown policies implemented by different countries.

Country	C1	C2	C3	C4	C5	C6	C7	C8	Stringency indices
India	100	100	100	100	100	100	100	100	100
Italy	100	100	100	100	100	100	100	75	96.88
Shanghai, China	100	100	100	100	100	100	100	75	96.88
Germany	100	100	100	100	50	100	100	75	90.62
France	100	100	100	100	50	100	100	75	90.62
United States	100	100	100	100	50	100	100	75	90.62
Australia	100	66.67	100	100	50	100	100	100	89.58
Canada	100	100	100	100	0	100	100	100	87.5
Spain	100	100	100	100	50	100	50	100	87.5
Netherland	100	100	100	100	50	100	50	75	84.37
United Kingdom	100	100	100	100	50	100	100	0	81.25
Singapore	100	100	100	100	0	66.67	100	75	80.21
South Korea	100	100	100	100	0	66.67	100	75	80.21
Norway	100	66.67	100	100	50	0	100	100	77.08
Finland	66.67	66.67	100	100	0	33.33	100	100	70.83
Denmark	100	66.67	50	100	50	33.33	50	100	68.75
Sweden	66.67	66.67	100	100	50	33.33	50	75	67.71
Japan	66.67	66.67	100	50	0	33.33	50	100	58.33

Stringency indices are simple averages of the individual component indicators.

Supplementary Table S3. Daily new infections in Shanghai from March 1st to April 30th, 2022.

Date	Daily symptomatic cases	Daily asymptomatic cases	Daily new infections
Mar 01, 2022	1	18	19
Mar 02, 2022	3	24	27
Mar 03, 2022	2	35	37
Mar 04, 2022	3	26	29
Mar 05, 2022	0	38	38
Mar 06, 2022	3	61	64
Mar 07, 2022	4	61	65
Mar 08, 2022	3	72	75
Mar 09, 2022	4	92	96
Mar 10, 2022	11	74	85
Mar 11, 2022	5	87	92
Mar 12, 2022	1	65	66
Mar 13, 2022	41	130	171
Mar 14, 2022	9	133	142
Mar 15, 2022	5	198	203
Mar 16, 2022	8	156	164
Mar 17, 2022	57	205	262
Mar 18, 2022	8	372	380
Mar 19, 2022	17	494	511
Mar 20, 2022	24	736	760
Mar 21, 2022	31	868	899
Mar 22, 2022	4	981	985
Mar 23, 2022	4	982	986
Mar 24, 2022	29	1587	1616
Mar 25, 2022	38	2233	2271
Mar 26, 2022	45	2633	2678
Mar 27, 2022	50	3454	3504
Mar 28, 2022	96	4382	4478
Mar 29, 2022	326	5658	5984
Mar 30, 2022	355	5299	5654
Mar 31, 2022	358	4145	4503
Apr 01, 2022	260	6051	6311
Apr 02, 2022	438	7789	8227
Apr 03, 2022	425	8585	9010
Apr 04, 2022	268	13088	13356
Apr 05, 2022	311	16767	17078
Apr 06, 2022	322	19661	19983
Apr 07, 2022	824	20401	21225
Apr 08, 2022	1015	22611	23626
Apr 09, 2022	1006	23939	24945
Apr 10, 2022	914	25173	26087
Apr 11, 2022	994	22349	23343

Apr 12, 2022	1189	25141	26330
Apr 13, 2022	2573	25147	27720
Apr 14, 2022	3200	19873	23073
Apr 15, 2022	3590	19925	23515
Apr 16, 2022	3238	21582	24820
Apr 17, 2022	2417	19831	22248
Apr 18, 2022	3084	17334	20418
Apr 19, 2022	2494	16408	18902
Apr 20, 2022	2634	15863	18497
Apr 21, 2022	1931	15698	17629
Apr 22, 2022	2736	20635	23371
Apr 23, 2022	1401	19657	21058
Apr 24, 2022	2472	16984	19456
Apr 25, 2022	1661	15319	16980
Apr 26, 2022	1606	11956	13562
Apr 27, 2022	1292	9330	10622
Apr 28, 2022	5487	9547	15034
Apr 29, 2022	1249	8932	10181
Apr 30, 2022	788	7086	7874

Daily new infections are the sum of symptomatic and asymptomatic cases.

Supplementary Table S4. Daily stringency index in Shanghai.

Date	C1	C2	C3	C4	C5	C6	C7	C8	Stringency index
Mar 01, 2022	0	0	0	0	0	0	0	75	9.38
Mar 02, 2022	0	0	0	0	0	0	0	75	9.38
Mar 03, 2022	0	0	0	0	0	0	0	75	9.38
Mar 04, 2022	0	0	0	0	0	0	0	75	9.38
Mar 05, 2022	0	0	0	0	0	0	0	75	9.38
Mar 06, 2022	0	0	0	0	0	0	0	75	9.38
Mar 07, 2022	0	0	0	0	0	0	0	75	9.38
Mar 08, 2022	0	0	0	0	0	0	0	75	9.38
Mar 09, 2022	0	0	0	0	0	0	0	75	9.38
Mar 10, 2022	0	0	0	0	0	0	0	75	9.38
Mar 11, 2022	0	0	0	0	0	0	0	75	9.38
Mar 12, 2023	0	0	0	0	0	0	0	75	9.38
Mar 13, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 14, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 15, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 16, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 17, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 18, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 19, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 20, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 21, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 22, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 23, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 24, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 25, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 26, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 27, 2022	66.67	33.33	50	50	50	33.33	0	75	44.79
Mar 28, 2022	83.33	50	75	62.50	75	83.33	25	75	66.15
Mar 29, 2022	83.33	50	75	62.50	75	83.33	25	75	66.15
Mar 30, 2022	83.33	50	75	62.50	75	83.33	25	75	66.15
Mar 31, 2022	83.33	50	75	62.50	75	83.33	25	75	66.15
Apr 01, 2022	100	100	100	100	100	100	100	75	96.88
Apr 02, 2022	100	100	100	100	100	100	100	75	96.88
Apr 03, 2022	100	100	100	100	100	100	100	75	96.88
Apr 04, 2022	100	100	100	100	100	100	100	75	96.88
Apr 05, 2022	100	100	100	100	100	100	100	75	96.88
Apr 06, 2022	100	100	100	100	100	100	100	75	96.88
Apr 07, 2022	100	100	100	100	100	100	100	75	96.88
Apr 08, 2022	100	100	100	100	100	100	100	75	96.88
Apr 09, 2022	100	100	100	100	100	100	100	75	96.88
Apr 10, 2022	100	100	100	100	100	100	100	75	96.88
Apr 11, 2022	100	100	100	100	100	100	100	75	96.88

Apr 12, 2022	100	100	100	100	100	100	100	75	96.88
Apr 13, 2022	100	100	100	100	100	100	100	75	96.88
Apr 14, 2022	100	100	100	100	100	100	100	75	96.88
Apr 15, 2022	100	100	100	100	100	100	100	75	96.88
Apr 16, 2022	100	100	100	100	100	100	100	75	96.88
Apr 17, 2022	100	100	100	100	100	100	100	75	96.88
Apr 18, 2022	100	100	100	100	100	100	100	75	96.88
Apr 19, 2022	100	100	100	100	100	100	100	75	96.88
Apr 20, 2022	100	100	100	100	100	100	100	75	96.88
Apr 21, 2022	100	100	100	100	100	100	100	75	96.88
Apr 22, 2022	100	100	100	100	100	100	100	75	96.88
Apr 23, 2022	100	100	100	100	100	100	100	75	96.88
Apr 24, 2022	100	100	100	100	100	100	100	75	96.88
Apr 25, 2022	100	100	100	100	100	100	100	75	96.88
Apr 26, 2022	100	100	100	100	100	100	100	75	96.88
Apr 27, 2022	100	100	100	100	100	100	100	75	96.88
Apr 28, 2022	100	100	100	100	100	100	100	75	96.88
Apr 29, 2022	100	100	100	100	100	100	100	75	96.88
Apr 30, 2022	100	100	100	100	100	100	100	75	96.88

Supplementary Table S5. Daily new infections in the 16 districts of Shanghai.

Date	Jingan	Huangpu	Pudong	Hongkou	Changning	Putuo	Xuhui	Yangpu
Mar 01	0	0	0	0	0	1	0	0
Mar 02	0	0	0	0	0	6	0	0
Mar 03	0	0	0	0	0	9	0	0
Mar 04	0	1	0	0	0	1	0	0
Mar 05	0	1	2	0	0	1	3	0
Mar 06	1	1	2	0	0	5	5	0
Mar 07	0	0	2	0	0	0	20	1
Mar 08	2	0	3	0	1	2	9	0
Mar 09	5	2	10	1	1	1	7	2
Mar 10	2	1	10	6	1	4	8	0
Mar 11	3	3	9	3	1	0	12	0
Mar 12	1	3	35	0	2	1	1	0
Mar 13	14	13	37	4	1	7	18	3
Mar 14	0	2	1	1	0	0	3	0
Mar 15	0	0	2	0	0	0	2	0
Mar 16	3	9	43	10	4	4	7	2
Mar 17	5	23	35	6	1	11	35	3
Mar 18	13	15	65	19	7	22	41	8
Mar 19	15	37	135	7	12	25	60	14
Mar 20	0	2	1	0	1	0	1	0
Mar 21	45	48	170	23	26	32	133	10
Mar 22	28	59	237	13	20	21	86	3
Mar 23	48	20	217	26	11	34	108	11
Mar 24	71	102	195	29	59	38	167	21
Mar 25	2	23	1915	4	4	9	3	11
Mar 26	108	159	323	49	29	69	332	24
Mar 27	70	56	1424	27	46	71	280	35
Mar 28	103	283	2502	8	115	82	92	49
Mar 29	180	112	2187	73	36	112	1088	98
Mar 30	100	363	2198	84	130	148	400	99
Mar 31	162	124	2404	126	258	17	226	174
Apr 01	189	247	2597	60	38	249	631	135
Apr 02	326	658	2056	344	100	389	1035	275
Apr 03	344	827	3669	189	104	325	498	374
Apr 04	60	981	6993	609	39	259	1231	225
Apr 05	317	663	8054	411	92	489	925	626
Apr 06	543	1050	8447	670	359	1035	1106	633
Apr 07	382	1382	9041	594	854	958	2073	601
Apr 08	665	2607	7286	378	614	1094	1629	701
Apr 09	602	548	11130	349	757	653	1150	1080
Apr 10	603	1761	6732	1238	405	1001	3185	1877
Apr 11	552	2223	8306	1375	393	1878	1771	1420

Apr 12	1056	1804	11049	931	1133	1170	1108	1159
Apr 13	220	1408	15027	1488	957	475	1492	1185
Apr 14	266	2013	11656	930	998	264	1342	817
Apr 15	433	1384	10282	1497	752	426	1689	1411
Apr 16	1134	1565	10791	1027	706	1331	1532	860
Apr 17	842	1896	7740	1166	739	1225	1553	887
Apr 18	1010	3323	8831	1092	680	371	572	481
Apr 19	1733	3084	5646	753	618	528	1608	766
Apr 20	1130	3097	4465	832	726	555	1447	2005
Apr 21	2064	1752	4655	885	496	489	1366	543
Apr 22	786	2843	7961	997	713	523	1275	1356
Apr 23	471	1959	7626	819	727	478	1722	1277
Apr 24	1702	1755	6181	655	749	477	1396	1235
Apr 25	1016	2671	3912	1270	534	418	1341	1244
Apr 26	1394	1228	2745	1136	419	365	904	1106
Apr 27	1089	1452	2993	1091	208	301	552	526
Apr 28	1364	2656	3472	1374	647	235	1580	808
Apr 29	1267	1399	2028	925	377	141	602	767
Apr 30	996	1156	1625	591	181	114	488	342

Date	Chongming	Minhang	Jinshan	Baoshan	Songjiang	Qingpu	Jiading	Fengxian
Mar 01	0	0	0	0	0	0	1	0
Mar 02	0	0	0	1	0	0	1	0
Mar 03	0	0	0	2	5	0	0	0
Mar 04	0	1	0	1	6	2	7	0
Mar 05	0	6	0	2	7	1	4	1
Mar 06	0	7	0	6	7	0	12	2
Mar 07	0	10	1	5	3	0	13	0
Mar 08	0	12	0	11	14	3	8	0
Mar 09	0	23	0	2	9	0	16	1
Mar 10	0	15	0	11	9	4	4	0
Mar 11	0	20	4	8	5	2	12	1
Mar 12	0	11	4	3	1	0	3	0
Mar 13	0	28	7	4	7	4	20	2
Mar 14	0	1	0	0	1	0	0	0
Mar 15	0	1	0	0	0	0	0	0
Mar 16	0	18	0	11	4	1	40	2
Mar 17	3	79	1	10	10	1	34	3
Mar 18	0	60	17	27	13	16	44	7
Mar 19	23	53	3	17	16	5	81	6
Mar 20	0	18	0	0	0	0	1	0
Mar 21	40	120	16	66	38	5	102	22
Mar 22	19	306	3	16	31	20	111	8
Mar 23	54	254	5	69	34	10	69	13

Mar 24	82	489	12	87	92	13	130	24
Mar 25	41	206	1	4	15	13	18	0
Mar 26	27	970	4	153	82	20	242	85
Mar 27	237	616	14	94	190	43	252	45
Mar 28	68	369	19	312	95	56	209	115
Mar 29	56	986	26	362	234	84	253	95
Mar 30	195	780	33	507	248	78	160	130
Mar 31	43	389	43	17	190	98	54	177
Apr 01	84	1029	50	46	507	87	200	162
Apr 02	111	822	61	480	573	224	614	158
Apr 03	144	937	103	463	264	220	424	121
Apr 04	49	1381	53	268	569	320	247	70
Apr 05	78	2940	82	555	801	400	491	153
Apr 06	63	2408	79	662	783	469	1408	267
Apr 07	262	2255	128	416	754	495	934	93
Apr 08	170	2854	90	2821	771	342	1505	97
Apr 09	171	4624	68	2261	500	557	369	124
Apr 10	55	3189	57	1839	1825	877	1405	38
Apr 11	57	3007	38	1024	691	331	208	68
Apr 12	86	4245	39	295	712	524	986	33
Apr 13	63	2939	34	651	657	319	721	83
Apr 14	60	2378	28	417	761	304	803	35
Apr 15	92	2037	31	1323	773	536	741	106
Apr 16	49	3060	21	1293	410	305	685	51
Apr 17	52	2402	24	1450	905	369	978	20
Apr 18	26	1372	7	1030	762	257	588	14
Apr 19	80	1602	9	957	325	389	743	60
Apr 20	65	1686	25	833	676	280	641	32
Apr 21	120	2563	30	978	493	385	776	34
Apr 22	117	1305	26	2033	2568	359	500	8
Apr 23	208	877	44	2886	773	424	751	16
Apr 24	95	1229	68	2506	548	251	601	7
Apr 25	474	717	22	1786	641	379	543	12
Apr 26	467	749	28	1976	287	311	434	13
Apr 27	199	321	41	1115	231	208	292	3
Apr 28	38	422	28	1243	402	269	488	6
Apr 29	269	516	19	1197	134	156	268	26
Apr 30	308	431	11	1133	105	128	259	4

Supplementary Table S6. The Omicron cases peaking date、EI and population of each district in Shanghai.

District	the date of peaking	Effective Interval (EI)	Population (*10000)
Jingan	Apr 21, 2022	20	97.57
Huangpu	Apr 20, 2022	19	66.2
Pudong	Apr 13, 2022	16	568.15
Hongkou	Apr 14, 2022	13	75.75
Changning	Apr 12, 2022	11	69.31
Putuo	Apr 11, 2022	10	123.98
Xuhui	Apr 11, 2022	10	111.31
Yangpu	Apr 11, 2022	10	124.25
Chongming	Apr 07, 2022	10	63.79
Minhang	Apr 11, 2022	10	265.35
Jinshan	Apr 06, 2022	9	82.28
Baoshan	Apr 09, 2022	8	223.52
Songjiang	Apr 09, 2022	8	190.97
Qingpu	Apr 09, 2022	8	127.14
Jiading	Apr 08, 2022	7	183.43
Fengxian	Apr 03, 2022	6	114.09

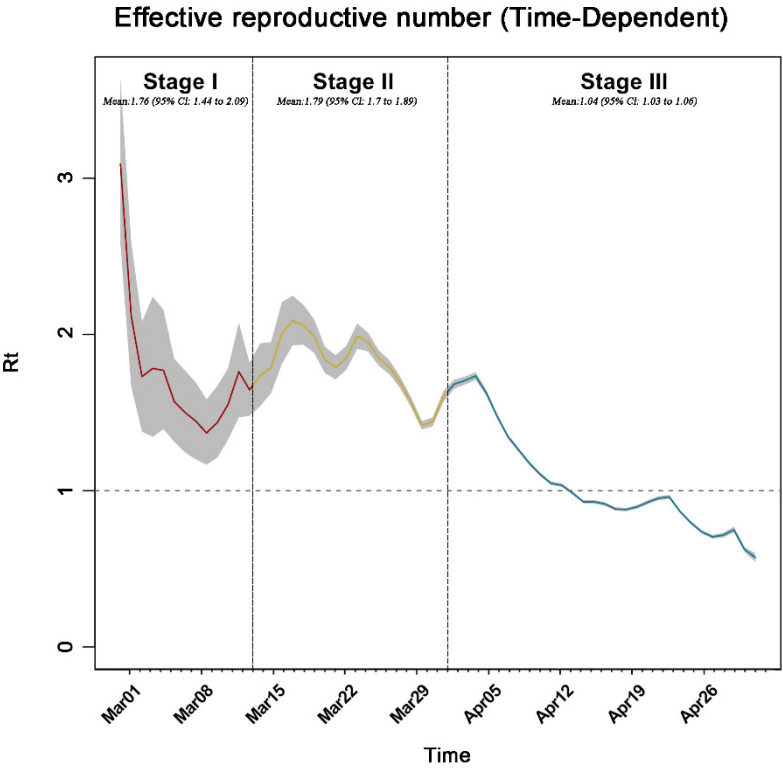
Population information is from the seventh national population census

Supplementary Table S7. Daily subway ridership of each district in Shanghai.

District	Daily subway ridership				
	Apr 18, 2015	Apr 19, 2015	Apr 22, 2015	Apr 23, 2015	Apr 24, 2015
	Saturday	Sunday	Wednesday	Thursday	Friday
Pudong	1377457	1152531	1973473	1962125	2071716
Xuhui	886461	734761	1211410	1191835	1264453
Jingan	681097	597587	941280	942166	996443
Huangpu	782415	627119	893713	886328	953056
Minhang	663753	597381	831994	823760	893802
Changning	500679	412097	739678	732458	768845
Putuo	436150	366340	595978	593085	613605
Baoshan	399426	338882	520456	517868	541181
Hongkou	361236	300660	492646	493499	513425
Yangpu	323327	266286	388740	386820	415962
Songjiang	217269	186576	250004	246818	269363
 Jiading	203319	177323	232934	232032	247363
Qingpu	56896	57773	106088	102790	110319
Fengxian	0	0	0	0	0
Jinshan	0	0	0	0	0
Chongming	0	0	0	0	0

Subway ridership dataset of Shanghai was shared by Chinese Software Developer Network.

Supplementary Figure S1. The change of time-dependent effective reproductive number in Shanghai’s Omicron wave.



Supplementary Figure S2. Distribution of subway stations whose daily ridership on five days in April, 2015 were used for population mobility calculation in each district.

