

Differential impact of non-pharmaceutical public health interventions on COVID-19 epidemics in the United States

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Supplemental Tables

Table 1. Execution dates of the selected main NPIs among 50 states in the US from February 29 to April 19

No.	State	Abbr	Declaration of Emergency	School Closure	Gathering Ban (more than 10)	Gathering Ban (more than 50)	Initial Business Closure	Non-essential Business Closure	Interstate Travel Restriction	Stay-at-home
1	Alabama	AL	2020/3/13	2020/3/19	NA ^a	2020/3/19	2020/3/19	2020/3/28	NA	2020/4/4
2	Alaska	AK	2020/3/11	2020/3/16	2020/3/24	NA	2020/3/18	2020/3/28	2020/3/25	2020/3/28
3	Arizona	AZ	2020/3/11	2020/3/16	2020/3/17	NA	2020/3/20	2020/3/31	2020/4/9	2020/3/31
4	Arkansas	AR	2020/3/11	2020/4/4	2020/3/26	NA	2020/4/4	2020/4/4	NA	NA
5	California	CA	2020/3/4	2020/3/19	NA	NA	2020/3/17	2020/3/19	NA	2020/3/19
6	Colorado	CO	2020/3/10	2020/3/23	2020/3/18	2020/3/15	2020/3/17	2020/3/22	NA	2020/3/26
7	Connecticut	CT	2020/3/10	2020/3/17	2020/3/23	2020/3/16	2020/3/16	2020/3/23	NA	2020/3/23
8	Delaware	DE	2020/3/12	2020/3/16	2020/4/1	2020/3/16	2020/3/16	2020/3/19	2020/3/30	NA
9	Florida	FL	2020/3/1	2020/3/16	2020/3/17	NA	2020/3/17	2020/4/3	2020/3/24	2020/4/3
10	Georgia	GA	2020/3/14	2020/3/18	2020/3/24	NA	2020/3/24	2020/4/3	NA	2020/4/3
11	Hawaii	HI	2020/3/4	2020/3/16	2020/3/17	NA	2020/3/17	2020/3/24	2020/3/17	2020/3/25
12	Idaho	ID	2020/3/13	2020/3/16	2020/3/18	NA	2020/3/19	2020/3/25	2020/3/25	2020/3/25
13	Illinois	IL	2020/3/9	2020/3/17	2020/3/21	2020/3/16	2020/3/18	2020/3/21	NA	2020/3/21
14	Indiana	IN	2020/3/6	2020/3/19	2020/3/25	2020/3/16	2020/3/16	2020/3/25	NA	2020/3/25
15	Iowa	IA	2020/3/9	2020/3/15	2020/3/17	NA	2020/3/17	2020/3/17	NA	NA
16	Kansas	KS	2020/3/12	2020/3/18	NA	2020/3/17	2020/3/17	2020/3/30	2020/3/18	2020/3/30
17	Kentucky	KY	2020/3/6	2020/3/16	2020/3/19	NA	2020/3/17	2020/3/23	2020/3/30	2020/3/26
18	Louisiana	LA	2020/3/11	2020/3/16	NA	2020/3/16	2020/3/16	2020/3/23	NA	2020/3/23
19	Maine	ME	2020/3/15	2020/3/16	2020/3/18	NA	2020/3/18	2020/3/25	2020/4/3	2020/4/2
20	Maryland	MD	2020/3/5	2020/3/16	NA	2020/3/16	2020/3/16	2020/3/23	2020/3/30	2020/3/30
21	Massachusetts	MA	2020/3/10	2020/3/17	NA	2020/3/17	2020/3/17	2020/3/23	2020/3/27	2020/3/24

No.	State	Abbr	Declaration of Emergency	School Closure	Gathering Ban (more than 10)	Gathering Ban (more than 50)	Initial Business Closure	Non-essential Business Closure	Interstate Travel Restriction	Stay-at-home
22	Michigan	MI	2020/3/10	2020/3/16	NA	2020/3/17	2020/3/16	2020/3/24	NA	2020/3/24
23	Minnesota	MN	2020/3/13	2020/3/15	2020/3/25	NA	2020/3/16	2020/3/27	NA	2020/3/27
24	Mississippi	MS	2020/3/14	2020/3/20	2020/3/24	NA	2020/3/24	2020/3/25	NA	2020/4/3
25	Missouri	MO	2020/3/13	2020/3/23	2020/3/23	2020/3/15	2020/3/23	NA	NA	2020/4/6
26	Montana	MT	2020/3/12	2020/3/16	NA	2020/3/15	2020/3/20	NA	2020/3/30	2020/3/28
27	Nebraska	NE	2020/3/13	2020/3/23	2020/4/3	2020/3/16	2020/3/17	2020/4/9	2020/3/24	2020/4/9
28	Nevada	NV	2020/3/13	2020/3/16	2020/3/24	NA	2020/3/17	2020/3/20	NA	2020/4/1
29	New Hampshire	NH	2020/3/13	2020/3/16	2020/3/23	2020/3/16	2020/3/16	2020/3/26	2020/3/28	2020/3/26
30	New Jersey	NJ	2020/3/9	2020/3/18	NA	2020/3/16	2020/3/16	2020/3/17	NA	2020/3/21
31	New Mexico	NM	2020/3/11	2020/3/16	2020/3/19	2020/3/12	2020/3/19	2020/3/19	2020/3/27	2020/3/24
32	New York	NY	2020/3/7	2020/3/18	NA	2020/3/16	2020/3/16	2020/3/20	NA	2020/3/22
33	North Carolina	NC	2020/3/10	2020/3/16	NA	2020/3/25	2020/3/17	NA	NA	2020/3/30
34	North Dakota	ND	2020/3/13	2020/3/16	NA	2020/3/13	2020/3/19	2020/3/28	2020/3/28	NA
35	Ohio	OH	2020/3/9	2020/3/17	NA	2020/3/16	2020/3/15	NA	NA	2020/3/23
36	Oklahoma	OK	2020/3/16	2020/3/16	2020/3/24	NA	2020/3/25	NA	2020/3/29	NA
37	Oregon	OR	2020/3/8	2020/3/16	NA	2020/3/17	2020/3/17	2020/3/23	NA	2020/3/23
38	Pennsylvania	PA	2020/3/6	2020/3/16	2020/3/17	NA	2020/3/17	2020/3/17	NA	2020/4/1
39	Rhode Island	RI	2020/3/9	2020/3/23	2020/3/28	2020/3/17	2020/3/17	2020/3/28	NA	2020/3/28

No.	State	Abbr	Declaration of Emergency	School Closure	Gathering Ban (more than 10)	Gathering Ban (more than 50)	Initial Business Closure	Non-essential Business Closure	Interstate Travel Restriction	Stay-at-home
40	South Carolina	SC	2020/3/13	2020/3/16	2020/3/23	2020/3/18	2020/3/18	2020/4/1	2020/3/27	2020/4/7
41	South Dakota	SD	2020/3/13	2020/3/16	2020/3/31	NA	NA	NA	NA	NA
42	Tennessee	TN	2020/3/19	2020/3/20	2020/3/23	NA	2020/3/23	2020/3/31	NA	2020/3/31
43	Texas	TX	2020/3/13	2020/3/23	2020/3/21	NA	2020/3/21	NA	2020/3/26	2020/4/2
44	Utah	UT	2020/3/6	2020/3/16	NA	NA	NA	NA	NA	2020/3/27
45	Vermont	VT	2020/3/13	2020/3/18	2020/3/21	2020/3/16	2020/3/17	2020/3/25	2020/3/30	2020/3/25
46	Virginia	VA	2020/3/12	2020/3/16	2020/3/24	NA	2020/3/25	2020/3/25	NA	2020/3/30
47	Washington	WA	2020/2/29	2020/3/17	2020/3/23	2020/3/15	2020/3/16	2020/3/23	NA	2020/3/23
48	West Virginia	WV	2020/3/15	2020/3/16	NA	NA	2020/3/18	2020/3/19	2020/3/31	2020/3/22
49	Wisconsin	WI	2020/3/12	2020/3/18	2020/3/17	NA	2020/3/25	2020/3/25	NA	2020/3/25
50	Wyoming	WY	2020/3/13	2020/3/16	2020/4/3	NA	2020/3/19	NA	NA	NA

a, NA represents that the state has not executed the intervention.

Table 2. Source of information for the dates of interventions.

No.	Source of information
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Table 3. Dates of symptom onset of infector-infectee pairs

No.	Country	Infector.onset.lowbound	Infector.onset.upbound	Infectee.onset
1	China	1/1/2020	1/4/2020	1/8/2020
2	China	1/10/2020	1/10/2020	1/15/2020
3	China	1/10/2020	1/10/2020	1/17/2020
4	China	1/12/2020	1/12/2020	1/25/2020
5	China	1/12/2020	1/15/2020	1/22/2020
6	China	1/14/2020	1/15/2020	1/24/2020
7	China	1/15/2020	1/15/2020	1/24/2020
8	China	1/15/2020	1/18/2020	1/18/2020
9	China	1/16/2020	1/16/2020	1/25/2020
10	China	1/17/2020	1/17/2020	1/31/2020
11	China	1/17/2020	1/17/2020	1/28/2020
12	Vietnam	1/17/2020	1/17/2020	1/20/2020
13	China	1/18/2020	1/18/2020	1/22/2020
14	China	1/18/2020	1/18/2020	1/22/2020
15	China	1/18/2020	1/18/2020	1/25/2020
16	China	1/18/2020	1/18/2020	1/24/2020
17	China	1/18/2020	1/18/2020	1/25/2020
18	China	1/19/2020	1/19/2020	2/4/2020
19	China	1/20/2020	1/20/2020	1/24/2020
20	China	1/20/2020	1/20/2020	1/22/2020
21	China	1/20/2020	1/20/2020	1/23/2020
22	China	1/20/2020	1/20/2020	1/25/2020
23	China	1/20/2020	1/20/2020	1/26/2020
24	China	1/20/2020	1/20/2020	2/6/2020
25	South Korea	1/20/2020	1/20/2020	1/29/2020
26	Germany	1/21/2020	1/21/2020	1/24/2020
27	Germany	1/21/2020	1/21/2020	1/24/2020
28	China	1/21/2020	1/21/2020	2/2/2020
29	China	1/21/2020	1/21/2020	1/27/2020
30	China	1/22/2020	1/22/2020	1/24/2020

No.	Country	Infector.onset.lowbound	Infector.onset.upbound	Infectee.onset
31	China	1/22/2020	1/22/2020	1/30/2020
32	China	1/22/2020	1/22/2020	1/19/2020
33	China	1/22/2020	1/22/2020	1/28/2020
34	South Korea	1/22/2020	1/22/2020	1/26/2020
35	United States	1/22/2020	1/23/2020	1/28/2020
36	China	1/22/2020	1/25/2020	1/28/2020
37	China	1/22/2020	1/30/2020	2/4/2020
38	China	1/22/2020	1/22/2020	1/28/2020
39	China	1/22/2020	1/22/2020	1/25/2020
40	China	1/22/2020	1/22/2020	1/24/2020
41	China	1/22/2020	1/22/2020	1/22/2020
42	China	1/22/2020	1/22/2020	1/24/2020
43	China	1/23/2020	1/23/2020	2/3/2020
44	China	1/21/2020	1/23/2020	1/27/2020
45	China	1/21/2020	1/23/2020	1/27/2020
46	Germany	1/24/2020	1/24/2020	1/26/2020
47	Germany	1/24/2020	1/24/2020	1/26/2020
48	China	1/24/2020	1/24/2020	2/1/2020
49	China	1/24/2020	1/24/2020	1/25/2020
50	China	1/24/2020	1/24/2020	1/31/2020
51	China	1/24/2020	1/24/2020	2/1/2020
52	China	1/24/2020	1/24/2020	1/26/2020
53	China	1/24/2020	1/24/2020	1/26/2020
54	China	1/24/2020	1/24/2020	1/25/2020
55	China	1/24/2020	1/26/2020	2/5/2020
56	China	1/24/2020	1/26/2020	2/5/2020
57	China	1/25/2020	1/25/2020	1/28/2020
58	China	1/25/2020	1/25/2020	1/27/2020
59	China	1/25/2020	1/25/2020	2/3/2020
60	China	1/25/2020	1/25/2020	1/26/2020

No.	Country	Infector.onset.lowbound	Infector.onset.upbound	Infectee.onset
61	Vietnam	1/25/2020	1/25/2020	1/31/2020
62	Vietnam	1/25/2020	1/25/2020	2/3/2020
63	Vietnam	1/25/2020	1/25/2020	2/3/2020
64	China	1/25/2020	1/28/2020	1/31/2020
65	China	1/25/2020	1/31/2020	1/28/2020
66	China	1/25/2020	1/31/2020	1/26/2020
67	China	1/25/2020	1/31/2020	1/25/2020
68	China	1/25/2020	1/31/2020	1/25/2020
69	China	1/25/2020	1/31/2020	1/28/2020
70	China	1/25/2020	1/31/2020	1/27/2020
71	China	1/26/2020	1/26/2020	1/30/2020
72	China	1/26/2020	1/26/2020	2/5/2020
73	South Korea	1/26/2020	1/26/2020	1/30/2020
74	South Korea	1/26/2020	1/26/2020	1/29/2020
75	South Korea	1/26/2020	1/26/2020	1/30/2020
76	South Korea	1/26/2020	1/26/2020	1/30/2020
77	China	1/26/2020	1/26/2020	1/26/2020
78	China	1/10/2020	1/29/2020	1/22/2020
79	China	1/23/2020	1/26/2020	1/30/2020
80	China	1/26/2020	1/26/2020	2/2/2020
81	China	1/27/2020	1/27/2020	1/31/2020
82	China	1/27/2020	1/28/2020	2/1/2020
83	China	1/27/2020	1/28/2020	1/28/2020
84	China	1/27/2020	1/28/2020	1/31/2020
85	China	1/28/2020	1/28/2020	1/24/2020
86	Singapore	1/28/2020	1/28/2020	1/31/2020
87	China	1/28/2020	2/3/2020	2/8/2020
88	China	1/29/2020	1/29/2020	2/1/2020
89	China	1/29/2020	1/29/2020	2/1/2020
90	Malaysia	1/29/2020	1/29/2020	2/1/2020
91	Malaysia	1/29/2020	1/29/2020	2/1/2020

No.	Country	Infector.onset.lowbound	Infector.onset.upbound	Infectee.onset
92	Malaysia	1/29/2020	1/29/2020	2/5/2020
93	China	1/29/2020	1/29/2020	2/1/2020
94	China	1/29/2020	1/29/2020	2/6/2020
95	China	1/29/2020	1/29/2020	2/3/2020
96	China	1/29/2020	1/29/2020	2/3/2020
97	China	1/29/2020	1/29/2020	2/5/2020
98	Singapore	1/29/2020	1/29/2020	2/1/2020
99	Singapore	1/29/2020	1/29/2020	2/2/2020
100	China	1/30/2020	1/30/2020	2/3/2020
101	China	1/30/2020	1/30/2020	2/2/2020
102	China	1/30/2020	1/30/2020	2/1/2020
103	Vietnam	1/31/2020	1/31/2020	2/6/2020
104	China	1/4/2020	1/4/2020	1/11/2020
105	China	1/4/2020	1/4/2020	1/12/2020
106	China	1/4/2020	1/12/2020	1/25/2020
107	China	12/12/2019	12/12/2019	12/19/2019
108	China	12/20/2019	12/20/2019	12/25/2019
109	China	12/20/2019	12/20/2019	12/29/2019
110	China	12/21/2019	12/21/2019	12/24/2019
111	China	12/27/2019	12/27/2019	1/3/2020
112	South Korea	2/1/2020	2/1/2020	2/5/2020
113	China	2/12/2020	2/12/2020	2/12/2020
114	China	2/12/2020	2/12/2020	2/16/2020
115	China	2/13/2020	2/13/2020	2/25/2020
116	China	2/13/2020	2/13/2020	2/29/2020
117	Japan	2/13/2020	2/13/2020	2/15/2020
118	Japan	2/13/2020	2/13/2020	2/25/2020
119	Japan	2/13/2020	2/13/2020	2/17/2020
120	Japan	2/15/2020	2/15/2020	2/17/2020
121	Japan	2/15/2020	2/15/2020	2/17/2020
122	Japan	2/17/2020	2/17/2020	2/19/2020

No.	Country	Infector.onset.lowbound	Infector.onset.upbound	Infectee.onset
123	Japan	2/17/2020	2/17/2020	2/19/2020
124	Japan	2/20/2020	2/20/2020	2/20/2020
125	Japan	2/20/2020	2/20/2020	3/3/2020
126	Japan	2/24/2020	2/24/2020	2/29/2020
127	Japan	2/29/2020	2/29/2020	3/4/2020
128	Japan	2/3/2020	2/3/2020	2/17/2020
129	China	2/6/2020	2/6/2020	2/24/2020
130	China	2/9/2020	2/9/2020	2/12/2020
131	China	2/9/2020	2/9/2020	2/10/2020
132	China	2/9/2020	2/9/2020	2/10/2020
133	Japan	2/3/2020	2/9/2020	2/24/2020

Table 4. Risk Ratios (RR) of each variable to the response variable R_t

Independent variables	RR^a (95% CI)	RR^b (95% CI)
Stay-at-home	0.8(0.76,0.84)	0.49(0.43,0.54)
Gathering Ban (more than 10 people)	0.86(0.83,0.9)	0.81(0.76,0.86)
Non-essential Business Closure	0.94(0.89,0.98)	0.84(0.79,0.9)
Declaration of Emergency	0.87(0.83,0.92)	0.87(0.83,0.92)
Interstate Travel Restriction	0.89(0.84,0.95)	0.89(0.84,0.95)
School Closure	0.9(0.87,0.93)	0.9(0.87,0.93)
Initial Business Closure	0.9(0.86,0.94)	0.9(0.86,0.94)
Gathering Ban (more than 50 people)	0.94(0.89,0.98)	0.94(0.89,0.98)
Population Density	1.24(1.17,1.32)	1.24(1.17,1.32)

a, the raw risk ratios from the GLM model; b, the actual risk ratios recalculated based on the inclusion relation of some interventions.