

SUPPLEMENTARY DATA OF PAPER

**Mathematical modeling of COVID-19 fatality trends:
death kinetics law versus infection-to-death delay rule**

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Table 1: Data recorded in Algeria

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 25	1	1	1	1	0	0	0	0
Feb 26	1	0	1	0	0	0	0	0
Feb 27	1	0	1	0	0	0	0	0
Feb 28	1	0	1	0	0	0	0	0
Feb 29	1	0	1	0	0	0	0	0
Mar 1	3	2	3	2	0	0	0	0
Mar 2	5	2	5	2	0	0	0	0
Mar 3	8	3	8	3	0	0	0	0
Mar 4	17	9	17	9	0	0	0	0
Mar 5	17	0	17	0	0	0	0	0
Mar 6	17	0	17	0	0	0	0	0
Mar 7	19	2	19	2	0	0	0	0
Mar 8	20	1	20	1	0	0	0	0
Mar 9	20	0	20	0	0	0	0	0
Mar 10	20	0	20	0	0	0	0	0
Mar 11	20	0	12	-8	0	0	8	8
Mar 12	26	6	14	2	2	2	10	2
Mar 13	26	0	14	0	2	0	10	0
Mar 14	39	13	26	12	3	1	10	0
Mar 15	54	15	40	14	4	1	10	0
Mar 16	60	6	46	6	4	0	10	0
Mar 17	61	1	46	0	5	1	10	0
Mar 18	75	14	36	-10	7	2	32	22
Mar 19	90	15	49	13	9	2	32	0
Mar 20	94	4	51	2	11	2	32	0
Mar 21	139	45	59	8	15	4	65	33
Mar 22	201	62	119	60	17	2	65	0
Mar 23	230	29	148	29	17	0	65	0
Mar 24	264	34	221	73	19	2	24	-41
Mar 25	302	38	216	-5	21	2	65	41
Mar 26	367	65	313	97	25	4	29	-36
Mar 27	409	42	354	41	26	1	29	0
Mar 28	454	45	394	40	29	3	31	2
Mar 29	511	57	449	55	31	2	31	0
Mar 30	584	73	512	63	35	4	37	6
Mar 31	716	132	626	114	44	9	46	9
Apr 1	847	131	728	102	58	14	61	15
Apr 2	986	139	839	111	86	28	61	0
Apr 3	1171	185	1004	165	105	19	62	1
Apr 4	1251	80	1031	27	130	25	90	28
Apr 5	1320	69	1078	47	152	22	90	0
Apr 6	1423	103	1160	82	173	21	90	0
Apr 7	1468	45	1162	2	193	20	113	23
Apr 8	1572	104	1130	-32	205	12	237	124
Apr 9	1666	94	1084	-46	235	30	347	110
Apr 10	1761	95	1100	16	256	21	405	58
Apr 11	1825	64	1090	-10	275	19	460	55
Apr 12	1914	89	1030	-60	293	18	591	131
Apr 13	1983	69	1069	39	313	20	601	10
Apr 14	2070	87	1053	-16	326	13	691	90
Apr 15	2160	90	1116	63	336	10	708	17
Apr 16	2268	108	1137	21	348	12	783	75
Apr 17	2418	150	1208	71	364	16	846	63
Apr 18	2534	116	1273	65	367	3	894	48
Apr 19	2629	95	1207	-66	375	8	1047	153
Apr 20	2718	89	1235	28	384	9	1099	52
Apr 21	2811	93	1267	32	392	8	1152	53
Apr 22	2910	99	1304	37	402	10	1204	52
Apr 23	3007	97	1245	-59	407	5	1355	151
Apr 24	3127	120	1304	59	415	8	1408	53
Apr 25	3256	129	1358	54	419	4	1479	71
Apr 26	3382	126	1449	91	425	6	1508	29

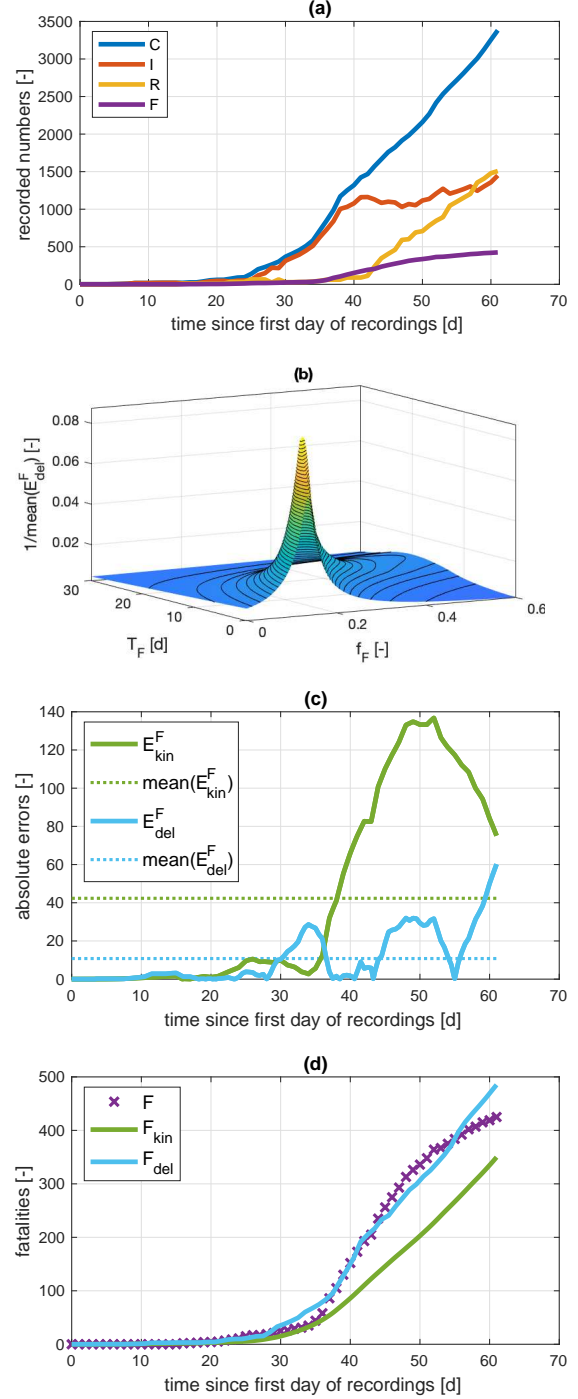


Figure 1: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Algeria

Table 2: Data recorded in Argentina

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 3	1	1	1	1	0	0	0	0
Mar 4	1	0	1	0	0	0	0	0
Mar 5	2	1	2	1	0	0	0	0
Mar 6	8	6	8	6	0	0	0	0
Mar 7	9	1	8	0	1	1	0	0
Mar 8	12	3	11	3	1	0	0	0
Mar 9	17	5	16	5	1	0	0	0
Mar 10	19	2	18	2	1	0	0	0
Mar 11	21	2	20	2	1	0	0	0
Mar 12	31	10	30	10	1	0	0	0
Mar 13	34	3	32	2	2	1	0	0
Mar 14	45	11	43	11	2	0	0	0
Mar 15	56	11	51	8	2	0	3	3
Mar 16	65	9	60	9	2	0	3	0
Mar 17	79	14	74	14	2	0	3	0
Mar 18	97	18	92	18	2	0	3	0
Mar 19	128	31	122	30	3	1	3	0
Mar 20	158	30	152	30	3	0	3	0
Mar 21	158	0	151	-1	4	1	3	0
Mar 22	266	108	235	84	4	0	27	24
Mar 23	301	35	246	11	4	0	51	24
Mar 24	387	86	329	83	6	2	52	1
Mar 25	502	115	442	113	8	2	52	0
Mar 26	589	87	505	63	12	4	72	20
Mar 27	589	0	504	-1	13	1	72	0
Mar 28	745	156	654	150	19	6	72	0
Mar 29	820	75	709	55	20	1	91	19
Mar 30	820	0	569	-140	23	3	228	137
Mar 31	1054	234	787	218	27	4	240	12
Apr 1	1133	79	853	66	32	5	248	8
Apr 2	1265	132	973	120	36	4	256	8
Apr 3	1353	88	1045	72	42	6	266	10
Apr 4	1451	98	1129	84	43	1	279	13
Apr 5	1554	103	1228	99	46	3	280	1
Apr 6	1628	74	1250	22	53	7	325	45
Apr 7	1715	87	1317	67	60	7	338	13
Apr 8	1795	80	1372	55	65	5	358	20
Apr 9	1894	99	1450	78	79	14	365	7
Apr 10	1975	81	1518	68	82	3	375	10
Apr 11	2142	167	1613	95	89	7	440	65
Apr 12	2142	0	1584	-29	90	1	468	28
Apr 13	2277	135	1664	80	98	8	515	47
Apr 14	2277	0	1616	-48	102	4	559	44
Apr 15	2571	294	1863	247	112	10	596	37
Apr 16	2669	98	1916	53	122	10	631	35
Apr 17	2669	0	1880	-36	123	1	666	35
Apr 18	2839	170	2022	142	132	9	685	19
Apr 19	2941	102	2098	76	134	2	709	24
Apr 20	3031	90	2152	54	142	8	737	28
Apr 21	3144	113	2153	1	151	9	840	103
Apr 22	3288	144	2257	104	159	8	872	32
Apr 23	3435	147	2351	94	165	6	919	47
Apr 24	3607	172	2455	104	176	11	976	57
Apr 25	3780	173	2565	110	185	9	1030	54
Apr 26	3892	112	2593	28	192	7	1107	77

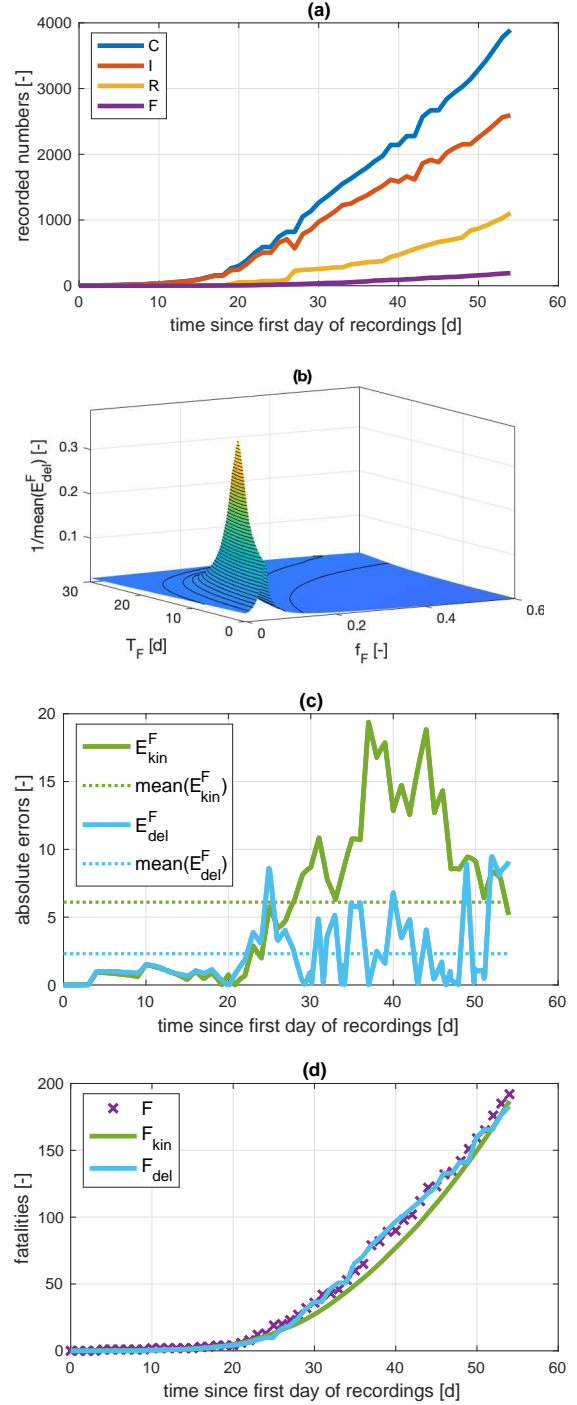


Figure 2: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Argentina

Table 3: Data recorded in Australia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	15	15	5	5	0	0	10	10
Feb 16	15	0	5	0	0	0	10	0
Feb 17	15	0	5	0	0	0	10	0
Feb 18	15	0	5	0	0	0	10	0
Feb 19	15	0	5	0	0	0	10	0
Feb 20	17	2	6	1	0	0	11	1
Feb 21	19	2	8	2	0	0	11	0
Feb 22	21	2	10	2	0	0	11	0
Feb 23	22	1	11	1	0	0	11	0
Feb 24	22	0	11	0	0	0	11	0
Feb 25	22	0	7	-4	0	0	15	4
Feb 26	23	1	8	1	0	0	15	0
Feb 27	23	0	8	0	0	0	15	0
Feb 28	25	2	10	2	0	0	15	0
Feb 29	25	0	10	0	0	0	15	0
Mar 1	29	4	13	3	1	1	15	0
Mar 2	33	4	17	4	1	0	15	0
Mar 3	39	6	17	0	1	0	21	6
Mar 4	53	14	30	13	2	1	21	0
Mar 5	60	7	36	6	2	0	22	1
Mar 6	63	3	39	3	2	0	22	0
Mar 7	74	11	49	10	3	1	22	0
Mar 8	83	9	58	9	3	0	22	0
Mar 9	93	10	68	10	3	0	22	0
Mar 10	116	23	91	23	3	0	22	0
Mar 11	128	12	101	10	3	0	24	2
Mar 12	156	28	127	26	3	0	26	2
Mar 13	199	43	170	43	3	0	26	0
Mar 14	248	49	218	48	3	0	27	1
Mar 15	300	52	268	50	5	2	27	0
Mar 16	401	101	369	101	5	0	27	0
Mar 17	455	54	423	54	5	0	27	0
Mar 18	596	141	547	124	6	1	43	16
Mar 19	756	160	703	156	7	1	46	3
Mar 20	928	172	875	172	7	0	46	0
Mar 21	1072	144	1019	144	7	0	46	0
Mar 22	1609	537	1514	495	7	0	88	42
Mar 23	1887	278	1762	248	7	0	118	30
Mar 24	2317	430	2191	429	8	1	118	0
Mar 25	2676	359	2547	356	11	3	118	0
Mar 26	3050	374	2867	320	13	2	170	52
Mar 27	3378	328	3195	328	13	0	170	0
Mar 28	3635	257	3451	256	14	1	170	0
Mar 29	4163	528	3902	451	17	3	244	74
Mar 30	4460	297	4197	295	19	2	244	0
Mar 31	4763	303	4398	201	20	1	345	101
Apr 1	5048	285	4680	282	23	3	345	0
Apr 2	5314	266	4704	24	25	2	585	240
Apr 3	5454	140	4841	137	28	3	585	0
Apr 4	5550	96	4935	94	30	2	585	0
Apr 5	5750	200	4633	-302	37	7	1080	495
Apr 6	5895	145	3418	-1215	45	8	2432	1352
Apr 7	5988	93	3392	-26	49	4	2547	115
Apr 8	6052	64	3189	-203	50	1	2813	266
Apr 9	6152	100	3114	-75	51	1	2987	174
Apr 10	6238	86	3043	-71	54	3	3141	154
Apr 11	6303	65	2982	-61	56	2	3265	124
Apr 12	6313	10	2916	-66	59	3	3338	73
Apr 13	6359	46	2804	-112	61	2	3494	156
Apr 14	6400	41	2741	-63	61	0	3598	104
Apr 15	6447	47	2698	-43	63	2	3686	88
Apr 16	6468	21	2658	-40	63	0	3747	61
Apr 17	6533	65	2647	-11	65	2	3821	74
Apr 18	6586	53	2349	-298	70	5	4167	346
Apr 19	6612	26	2311	-38	71	1	4230	63
Apr 20	6625	13	2296	-15	71	0	4258	28
Apr 21	6645	20	1889	-407	71	0	4685	427
Apr 22	6649	4	1655	-234	74	3	4920	235
Apr 23	6667	18	1547	-108	75	1	5045	125
Apr 24	6675	8	1460	-87	79	4	5136	91
Apr 25	6695	20	1243	-217	80	1	5372	236
Apr 26	6716	21	1073	-170	83	3	5560	188

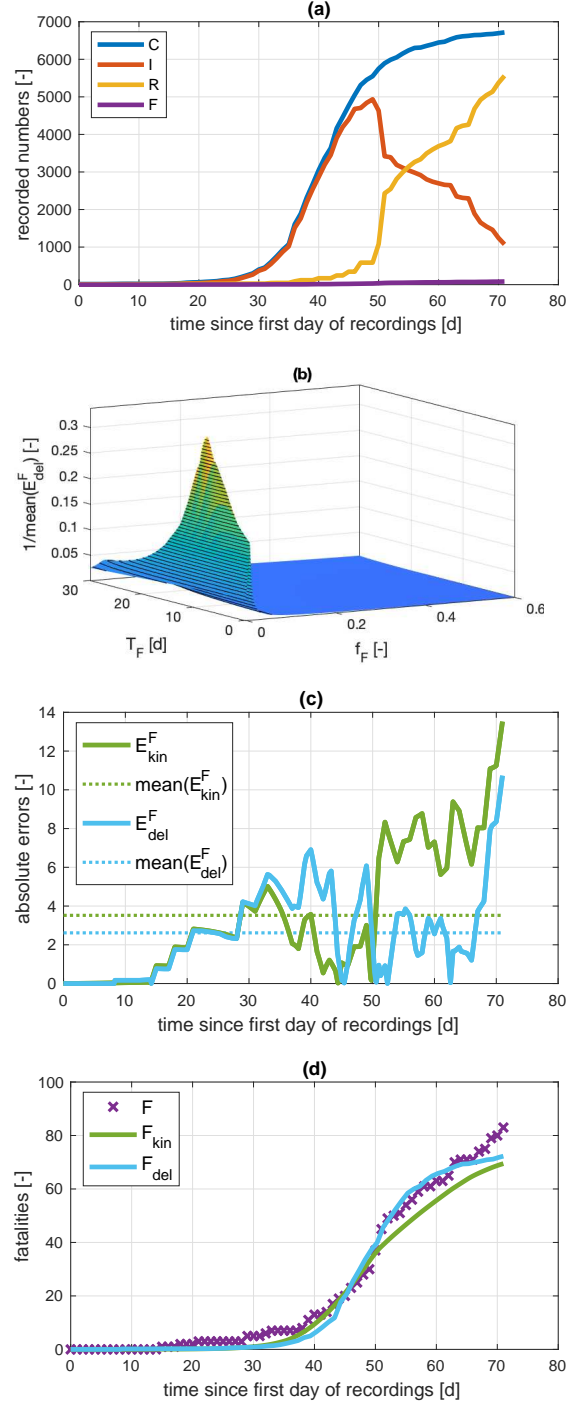


Figure 3: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Australia

Table 4: Data recorded in Austria

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 25	2	2	2	2	0	0	0	0
Feb 26	2	0	2	0	0	0	0	0
Feb 27	5	3	5	3	0	0	0	0
Feb 28	7	2	7	2	0	0	0	0
Feb 29	10	3	10	3	0	0	0	0
Mar 1	14	4	14	4	0	0	0	0
Mar 2	18	4	18	4	0	0	0	0
Mar 3	24	6	24	6	0	0	0	0
Mar 4	29	5	29	5	0	0	0	0
Mar 5	43	14	41	12	0	0	2	2
Mar 6	66	23	64	23	0	0	2	0
Mar 7	81	15	79	15	0	0	2	0
Mar 8	104	23	102	23	0	0	2	0
Mar 9	131	27	129	27	0	0	2	0
Mar 10	182	51	178	49	0	0	4	2
Mar 11	246	64	242	64	0	0	4	0
Mar 12	361	115	356	114	1	1	4	0
Mar 13	504	143	497	141	1	0	6	2
Mar 14	655	151	648	151	1	0	6	0
Mar 15	860	205	853	205	1	0	6	0
Mar 16	1018	158	1007	154	3	2	8	2
Mar 17	1332	314	1319	312	4	1	9	1
Mar 18	1646	314	1633	314	4	0	9	0
Mar 19	2179	533	2164	531	6	2	9	0
Mar 20	2649	470	2634	470	6	0	9	0
Mar 21	2992	343	2975	341	8	2	9	0
Mar 22	3582	590	3557	582	16	8	9	0
Mar 23	4474	892	4444	887	21	5	9	0
Mar 24	5283	809	5246	802	28	7	9	0
Mar 25	5588	305	5548	302	31	3	9	0
Mar 26	6909	1321	6748	1200	49	18	112	103
Mar 27	7697	788	7414	666	58	9	225	113
Mar 28	8271	574	7978	564	68	10	225	0
Mar 29	8788	517	8223	245	86	18	479	254
Mar 30	9618	830	8874	651	108	22	636	157
Mar 31	10180	562	8957	83	128	20	1095	459
Apr 1	10711	531	9129	172	146	18	1436	341
Apr 2	11129	418	9222	93	158	12	1749	313
Apr 3	11524	395	9334	112	168	10	2022	273
Apr 4	11781	257	9088	-246	186	18	2507	485
Apr 5	12051	270	8849	-239	204	18	2998	491
Apr 6	12297	246	8614	-235	220	16	3463	465
Apr 7	12639	342	8350	-264	243	23	4046	583
Apr 8	12942	303	8157	-193	273	30	4512	466
Apr 9	13244	302	7709	-448	295	22	5240	728
Apr 10	13560	316	7177	-532	319	24	6064	824
Apr 11	13806	246	6865	-312	337	18	6604	540
Apr 12	13945	139	6608	-257	350	13	6987	383
Apr 13	14041	96	6330	-278	368	18	7343	356
Apr 14	14226	185	6209	-121	384	16	7633	290
Apr 15	14350	124	5859	-350	393	9	8098	465
Apr 16	14476	126	5080	-779	410	17	8986	888
Apr 17	14595	119	4460	-620	431	21	9704	718
Apr 18	14671	76	4014	-446	443	12	10214	510
Apr 19	14749	78	3796	-218	452	9	10501	287
Apr 20	14795	46	3694	-102	470	18	10631	130
Apr 21	14873	78	3411	-283	491	21	10971	340
Apr 22	14925	52	3087	-324	510	19	11328	357
Apr 23	15002	77	2786	-301	522	12	11694	366
Apr 24	15071	69	2669	-117	530	8	11872	178
Apr 25	15148	77	2509	-160	536	6	12103	231
Apr 26	15225	77	2401	-108	542	6	12282	179

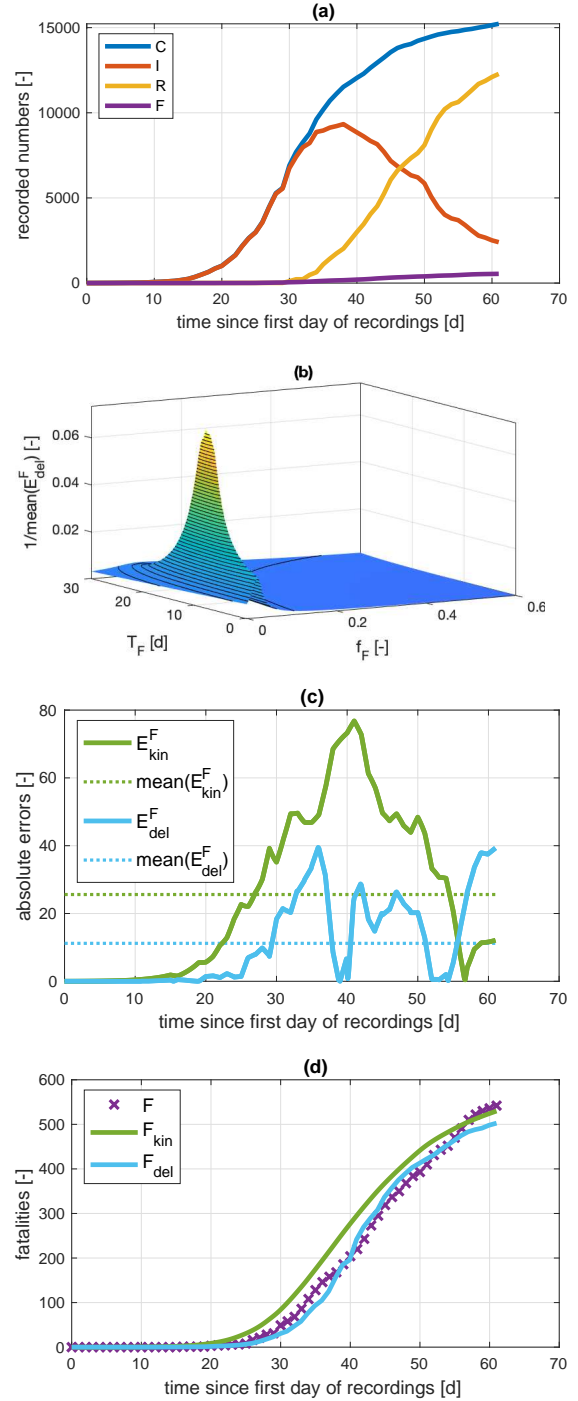


Figure 4: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Austria

Table 5: Data recorded in Bangladesh

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 8	3	3	3	3	0	0	0	0
Mar 9	3	0	3	0	0	0	0	0
Mar 10	3	0	3	0	0	0	0	0
Mar 11	3	0	3	0	0	0	0	0
Mar 12	3	0	3	0	0	0	0	0
Mar 13	3	0	2	-1	0	0	1	1
Mar 14	5	2	3	1	0	0	2	1
Mar 15	5	0	3	0	0	0	2	0
Mar 16	8	3	5	2	0	0	3	1
Mar 17	10	2	7	2	0	0	3	0
Mar 18	14	4	10	3	1	1	3	0
Mar 19	18	4	14	4	1	0	3	0
Mar 20	20	2	16	2	1	0	3	0
Mar 21	24	4	19	3	2	1	3	0
Mar 22	27	3	22	3	2	0	3	0
Mar 23	33	6	25	3	3	1	5	2
Mar 24	39	6	30	5	4	1	5	0
Mar 25	39	0	27	-3	5	1	7	2
Mar 26	44	5	28	1	5	0	11	4
Mar 27	48	4	32	4	5	0	11	0
Mar 28	48	0	28	-4	5	0	15	4
Mar 29	48	0	28	0	5	0	15	0
Mar 30	49	1	25	-3	5	0	19	4
Mar 31	51	2	21	-4	5	0	25	6
Apr 1	54	3	23	2	6	1	25	0
Apr 2	56	2	25	2	6	0	25	0
Apr 3	61	5	29	4	6	0	26	1
Apr 4	70	9	32	3	8	2	30	4
Apr 5	88	18	46	14	9	1	33	3
Apr 6	123	35	78	32	12	3	33	0
Apr 7	164	41	114	36	17	5	33	0
Apr 8	218	54	165	51	20	3	33	0
Apr 9	330	112	276	111	21	1	33	0
Apr 10	424	94	364	88	27	6	33	0
Apr 11	482	58	416	52	30	3	36	3
Apr 12	621	139	548	132	34	4	39	3
Apr 13	803	182	722	174	39	5	42	3
Apr 14	1012	209	924	202	46	7	42	0
Apr 15	1231	219	1132	208	50	4	49	7
Apr 16	1572	341	1463	331	60	10	49	0
Apr 17	1838	266	1705	242	75	15	58	9
Apr 18	2144	306	1994	289	84	9	66	8
Apr 19	2456	312	2290	296	91	7	75	9
Apr 20	2948	492	2762	472	101	10	85	10
Apr 21	3382	434	3185	423	110	9	87	2
Apr 22	3772	390	3560	375	120	10	92	5
Apr 23	4186	414	3951	391	127	7	108	16
Apr 24	4689	503	4446	495	131	4	112	4
Apr 25	4998	309	4745	299	140	9	113	1
Apr 26	5416	418	5149	404	145	5	122	9

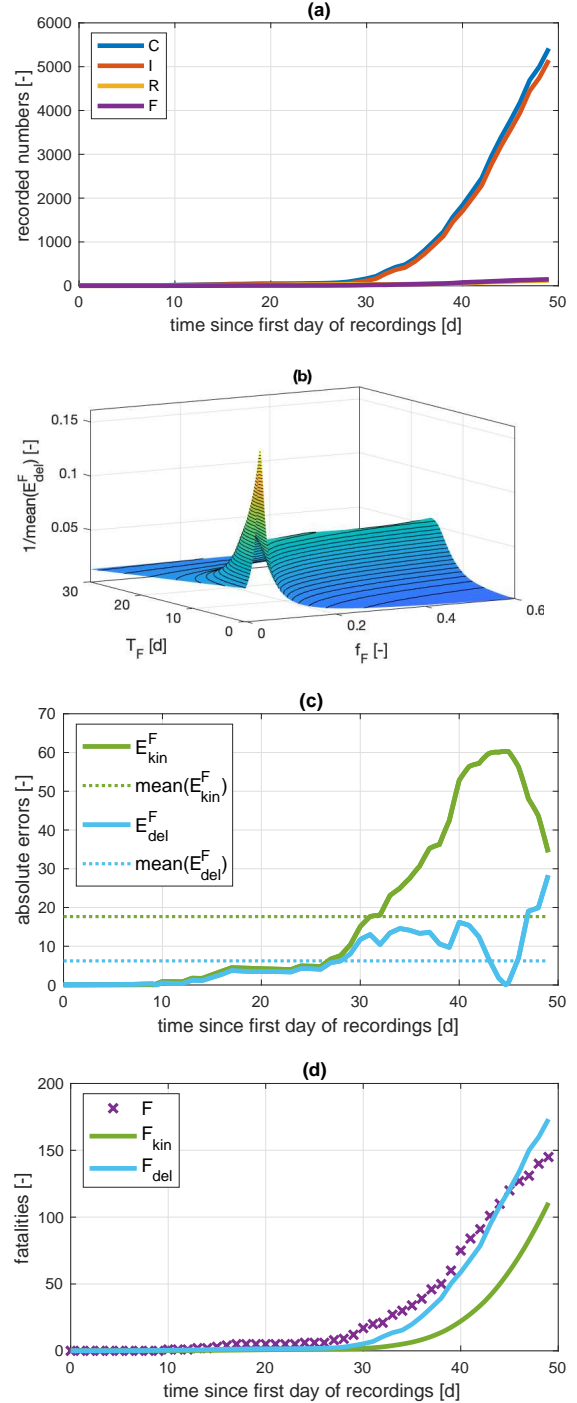


Figure 5: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Bangladesh

Table 6: Data recorded in Belgium

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	1	1	0	0	0	0	1	1
Feb 16	1	0	0	0	0	0	1	0
Feb 17	1	0	0	0	0	0	1	0
Feb 18	1	0	0	0	0	0	1	0
Feb 19	1	0	0	0	0	0	1	0
Feb 20	1	0	0	0	0	0	1	0
Feb 21	1	0	0	0	0	0	1	0
Feb 22	1	0	0	0	0	0	1	0
Feb 23	1	0	0	0	0	0	1	0
Feb 24	1	0	0	0	0	0	1	0
Feb 25	1	0	0	0	0	0	1	0
Feb 26	1	0	0	0	0	0	1	0
Feb 27	1	0	0	0	0	0	1	0
Feb 28	1	0	0	0	0	0	1	0
Feb 29	1	0	0	0	0	0	1	0
Mar 1	2	1	1	1	0	0	1	0
Mar 2	8	6	7	6	0	0	1	0
Mar 3	15	7	14	7	0	0	1	0
Mar 4	23	8	22	8	0	0	1	0
Mar 5	50	27	49	27	0	0	1	0
Mar 6	109	59	108	59	0	0	1	0
Mar 7	169	60	168	60	0	0	1	0
Mar 8	200	31	199	31	0	0	1	0
Mar 9	239	39	238	39	0	0	1	0
Mar 10	267	28	266	28	0	0	1	0
Mar 11	314	47	310	44	3	3	1	0
Mar 12	399	85	395	85	3	0	1	0
Mar 13	559	160	555	160	3	0	1	0
Mar 14	689	130	684	129	4	1	1	0
Mar 15	886	197	881	197	4	0	1	0
Mar 16	1058	172	1047	166	10	6	1	0
Mar 17	1243	185	1219	172	10	0	14	13
Mar 18	1486	243	1441	222	14	4	31	17
Mar 19	1795	309	1609	168	21	7	165	134
Mar 20	2257	462	2016	407	37	16	204	39
Mar 21	2815	558	2485	469	67	30	263	59
Mar 22	3401	586	3063	578	75	8	263	0
Mar 23	3743	342	3254	191	88	13	401	138
Mar 24	4269	526	3686	432	122	34	461	60
Mar 25	4937	668	4212	526	178	56	547	86
Mar 26	6235	1298	5340	1128	220	42	675	128
Mar 27	7284	1049	6137	797	289	69	858	183
Mar 28	9134	1850	7718	1581	353	64	1063	205
Mar 29	10836	1702	9046	1328	431	78	1359	296
Mar 30	11899	1063	9859	813	513	82	1527	168
Mar 31	12775	876	10374	515	705	192	1696	169
Apr 1	13964	1189	11004	630	828	123	2132	436
Apr 2	15348	1384	11842	838	1011	183	2495	363
Apr 3	16770	1422	12755	913	1143	132	2872	377
Apr 4	18431	1661	13901	1146	1283	140	3247	375
Apr 5	19691	1260	14493	592	1447	164	3751	504
Apr 6	20814	1123	15196	703	1632	185	3986	235
Apr 7	22194	1380	16002	806	2035	403	4157	171
Apr 8	23403	1209	16482	480	2240	205	4681	524
Apr 9	24983	1580	17296	814	2523	283	5164	483
Apr 10	26667	1684	18080	784	3019	496	5568	404
Apr 11	28018	1351	18686	606	3346	327	5986	418
Apr 12	29647	1629	19584	898	3600	254	6463	477
Apr 13	30589	942	19979	395	3903	303	6707	244
Apr 14	31119	530	20094	115	4157	254	6868	161
Apr 15	33573	2454	22026	1932	4440	283	7107	239
Apr 16	34809	1236	22390	364	4857	417	7562	455
Apr 17	36138	1329	23014	624	5163	306	7961	399
Apr 18	37183	1045	23382	368	5453	290	8348	387
Apr 19	38496	1313	24056	674	5683	230	8757	409
Apr 20	39983	1487	25260	1204	5828	145	8895	138
Apr 21	40956	973	25956	696	5998	170	9002	107
Apr 22	41889	933	26194	238	6262	264	9433	431
Apr 23	42797	908	26507	313	6490	228	9800	367
Apr 24	44293	1496	27492	985	6679	189	10122	322
Apr 25	45325	1032	27991	499	6917	238	10417	295
Apr 26	46134	809	28255	264	7094	177	10785	368

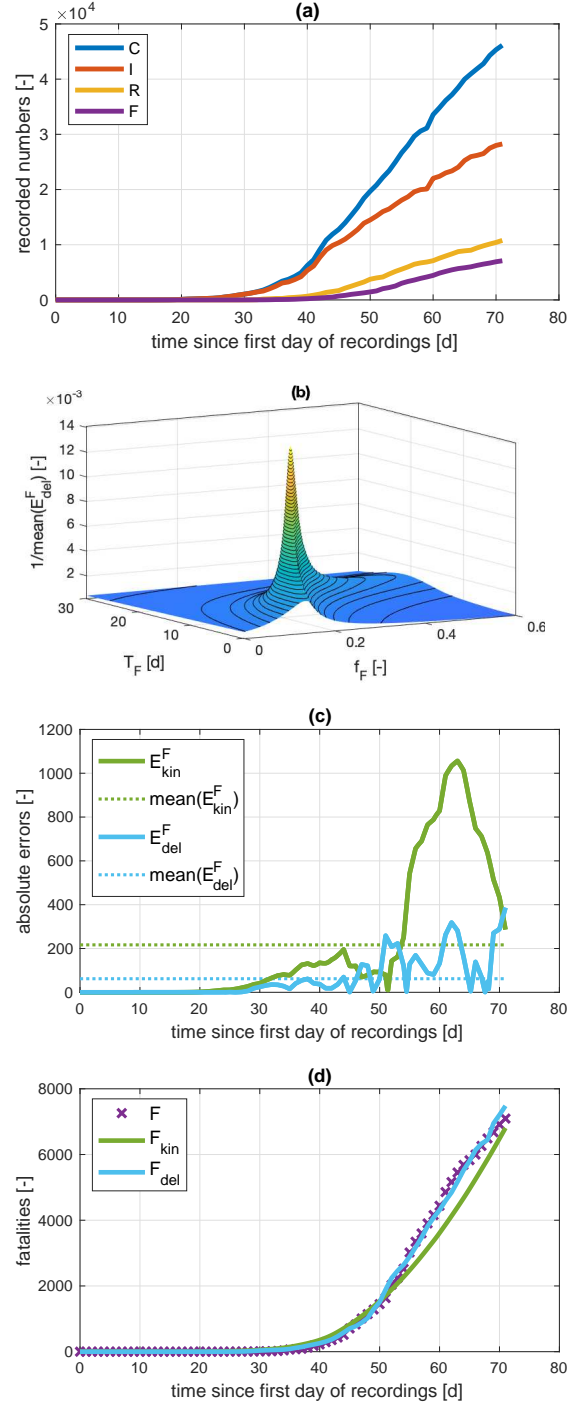


Figure 6: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Belgium

Table 7: Data recorded in Brazil

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 25	1	1	1	1	0	0	0	0
Feb 26	1	0	1	0	0	0	0	0
Feb 27	1	0	1	0	0	0	0	0
Feb 28	1	0	1	0	0	0	0	0
Feb 29	2	1	2	1	0	0	0	0
Mar 1	2	0	2	0	0	0	0	0
Mar 2	2	0	2	0	0	0	0	0
Mar 3	2	0	2	0	0	0	0	0
Mar 4	3	1	3	1	0	0	0	0
Mar 5	8	5	8	5	0	0	0	0
Mar 6	13	5	13	5	0	0	0	0
Mar 7	19	6	19	6	0	0	0	0
Mar 8	25	6	25	6	0	0	0	0
Mar 9	25	0	25	0	0	0	0	0
Mar 10	34	9	34	9	0	0	0	0
Mar 11	52	18	52	18	0	0	0	0
Mar 12	77	25	77	25	0	0	0	0
Mar 13	151	74	150	73	0	0	1	1
Mar 14	151	0	150	0	0	0	1	0
Mar 15	200	49	198	48	0	0	2	1
Mar 16	234	34	232	34	0	0	2	0
Mar 17	346	112	343	111	1	1	2	0
Mar 18	529	183	523	180	4	3	2	0
Mar 19	640	111	631	108	7	3	2	0
Mar 20	970	330	957	326	11	4	2	0
Mar 21	1178	208	1158	201	18	7	2	0
Mar 22	1546	368	1519	361	25	7	2	0
Mar 23	1924	378	1888	369	34	9	2	0
Mar 24	2247	323	2199	311	46	12	2	0
Mar 25	2554	307	2493	294	59	13	2	0
Mar 26	2985	431	2902	409	77	18	6	4
Mar 27	3417	432	3319	417	92	15	6	0
Mar 28	3904	487	3784	465	114	22	6	0
Mar 29	4256	352	4114	330	136	22	6	0
Mar 30	4630	374	4347	233	163	27	120	114
Mar 31	5717	1087	5389	1042	201	38	127	7
Apr 1	6880	1163	6511	1122	242	41	127	0
Apr 2	8044	1164	7593	1082	324	82	127	0
Apr 3	9194	1150	8704	1111	363	39	127	0
Apr 4	10360	1166	9788	1084	445	82	127	0
Apr 5	11254	894	10641	853	486	41	127	0
Apr 6	12183	929	11492	851	564	78	127	0
Apr 7	14034	1851	13221	1729	686	122	127	0
Apr 8	16188	2154	15241	2020	820	134	127	0
Apr 9	18145	1957	17018	1777	954	134	173	46
Apr 10	19789	1644	18548	1530	1068	114	173	0
Apr 11	20962	1173	19649	1101	1140	72	173	0
Apr 12	22192	1230	20796	1147	1223	83	173	0
Apr 13	23430	1238	21929	1133	1328	105	173	0
Apr 14	25262	1832	9704	-12225	1532	204	14026	13853
Apr 15	28610	3348	12827	3123	1757	225	14026	0
Apr 16	30683	2073	14710	1883	1947	190	14026	0
Apr 17	33682	2999	17515	2805	2141	194	14026	0
Apr 18	36722	3040	20335	2820	2361	220	14026	0
Apr 19	38654	1932	14062	-6273	2462	101	22130	8104
Apr 20	40743	2089	16026	1964	2587	125	22130	0
Apr 21	43079	2336	16013	-13	2741	154	24325	2195
Apr 22	45757	2678	17533	1520	2906	165	25318	993
Apr 23	49492	3735	19606	2073	3313	407	26573	1255
Apr 24	52995	3503	21670	2064	3670	357	27655	1082
Apr 25	59196	6201	25991	4321	4045	375	29160	1505
Apr 26	62859	3663	28436	2445	4271	226	30152	992

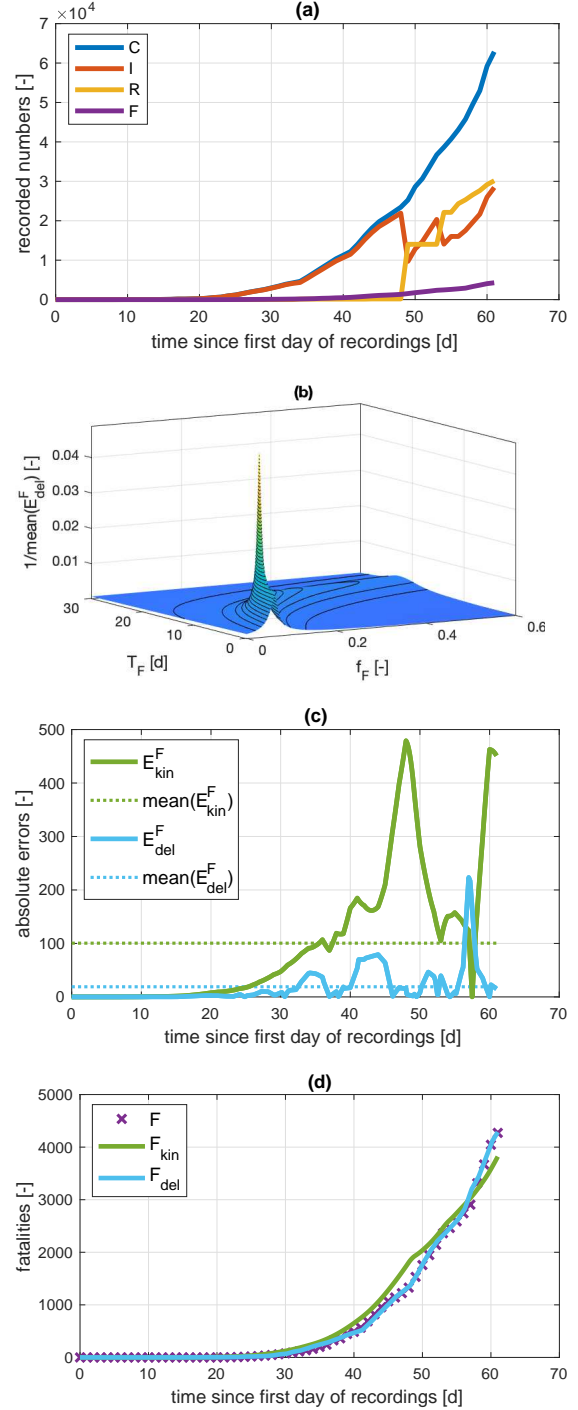


Figure 7: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Brazil

Table 8: Data recorded in Canada

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	8	8	7	7	0	0	1	1
Feb 16	8	0	7	0	0	0	1	0
Feb 17	8	0	7	0	0	0	1	0
Feb 18	8	0	7	0	0	0	1	0
Feb 19	8	0	7	0	0	0	1	0
Feb 20	8	0	6	-1	0	0	2	1
Feb 21	9	1	6	0	0	0	3	1
Feb 22	9	0	6	0	0	0	3	0
Feb 23	10	1	7	1	0	0	3	0
Feb 24	11	1	8	1	0	0	3	0
Feb 25	11	0	8	0	0	0	3	0
Feb 26	12	1	9	1	0	0	3	0
Feb 27	14	2	11	2	0	0	3	0
Feb 28	15	1	12	1	0	0	3	0
Feb 29	20	5	16	4	0	0	4	1
Mar 1	24	4	20	4	0	0	4	0
Mar 2	27	3	20	0	0	0	7	3
Mar 3	30	3	23	3	0	0	7	0
Mar 4	34	4	27	4	0	0	7	0
Mar 5	37	3	29	2	0	0	8	1
Mar 6	54	17	46	17	0	0	8	0
Mar 7	60	6	52	6	0	0	8	0
Mar 8	66	6	58	6	0	0	8	0
Mar 9	77	11	68	10	1	1	8	0
Mar 10	95	18	86	18	1	0	8	0
Mar 11	110	15	100	14	1	0	9	1
Mar 12	142	32	130	30	1	0	11	2
Mar 13	198	56	186	56	1	0	11	0
Mar 14	252	54	240	54	1	0	11	0
Mar 15	341	89	329	89	1	0	11	0
Mar 16	441	100	426	97	4	3	11	0
Mar 17	598	157	578	152	8	4	12	1
Mar 18	727	129	706	128	9	1	12	0
Mar 19	873	146	850	144	12	3	11	-1
Mar 20	1087	214	1061	211	12	0	14	3
Mar 21	1328	241	1295	234	19	7	14	0
Mar 22	1470	142	1436	141	20	1	14	0
Mar 23	2091	621	1747	311	24	4	320	306
Mar 24	2792	701	2654	907	26	2	112	-208
Mar 25	3409	617	3188	534	36	10	185	73
Mar 26	4043	634	3776	588	39	3	228	43
Mar 27	4757	714	4348	572	55	16	354	126
Mar 28	5655	898	5199	851	60	5	396	42
Mar 29	6320	665	5682	483	65	5	573	177
Mar 30	7448	1128	6266	584	89	24	1093	520
Mar 31	8612	1164	7269	1003	101	12	1242	149
Apr 1	9731	1119	7881	612	114	13	1736	494
Apr 2	11283	1552	9131	1250	173	59	1979	243
Apr 3	12375	1092	9981	850	208	35	2186	207
Apr 4	13912	1537	11086	1105	231	23	2595	409
Apr 5	15512	1600	12290	1204	280	49	2942	347
Apr 6	16667	1155	12728	438	323	43	3616	674
Apr 7	17897	1230	13488	760	381	58	4028	412
Apr 8	19438	1541	14463	975	427	46	4548	520
Apr 9	20765	1327	14945	482	509	82	5311	763
Apr 10	22148	1383	15566	621	569	60	6013	702
Apr 11	23318	1170	16237	671	653	84	6428	415
Apr 12	24383	1065	16494	257	717	64	7172	744
Apr 13	25680	1297	17144	650	780	63	7756	584
Apr 14	27063	1383	17925	781	903	123	8235	479
Apr 15	28379	1316	18390	465	1010	107	8979	744
Apr 16	30106	1727	19182	792	1195	185	9729	750
Apr 17	31927	1821	20074	892	1310	115	10543	814
Apr 18	33383	1456	20706	632	1470	160	11207	664
Apr 19	35056	1673	21626	920	1587	117	11843	636
Apr 20	36829	1773	22553	927	1690	103	12586	743
Apr 21	38422	1593	23400	847	1834	144	13188	602
Apr 22	40190	1768	24230	830	1974	140	13986	798
Apr 23	42110	1920	25202	972	2147	173	14761	775
Apr 24	43888	1778	26117	915	2302	155	15469	708
Apr 25	45354	1466	26464	347	2465	163	16425	956
Apr 26	46895	1541	27014	550	2560	95	17321	896

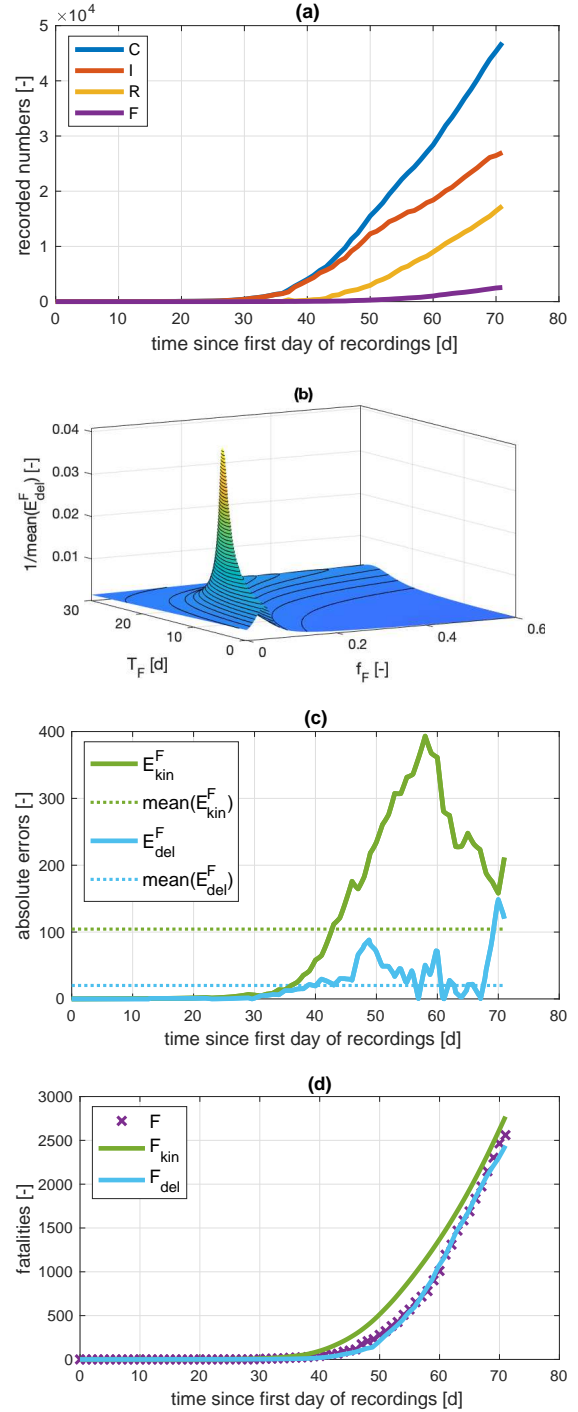


Figure 8: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Canada

Table 9: Data recorded in Chile

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 3	1	1	1	1	0	0	0	0
Mar 4	3	2	3	2	0	0	0	0
Mar 5	4	1	4	1	0	0	0	0
Mar 6	5	1	5	1	0	0	0	0
Mar 7	7	2	7	2	0	0	0	0
Mar 8	10	3	10	3	0	0	0	0
Mar 9	13	3	13	3	0	0	0	0
Mar 10	17	4	17	4	0	0	0	0
Mar 11	23	6	23	6	0	0	0	0
Mar 12	33	10	33	10	0	0	0	0
Mar 13	43	10	43	10	0	0	0	0
Mar 14	61	18	61	18	0	0	0	0
Mar 15	75	14	75	14	0	0	0	0
Mar 16	156	81	156	81	0	0	0	0
Mar 17	201	45	201	45	0	0	0	0
Mar 18	238	37	238	37	0	0	0	0
Mar 19	342	104	342	104	0	0	0	0
Mar 20	434	92	428	86	0	0	6	6
Mar 21	537	103	528	100	1	1	8	2
Mar 22	632	95	623	95	1	0	8	0
Mar 23	746	114	733	110	2	1	11	3
Mar 24	922	176	903	170	2	0	17	6
Mar 25	1142	220	1117	214	3	1	22	5
Mar 26	1306	164	1280	163	4	1	22	0
Mar 27	1610	304	1562	282	5	1	43	21
Mar 28	1909	299	1842	280	6	1	61	18
Mar 29	2139	230	2057	215	7	1	75	14
Mar 30	2449	310	2285	228	8	1	156	81
Mar 31	2738	289	2570	285	12	4	156	0
Apr 1	3031	293	2781	211	16	4	234	78
Apr 2	3404	373	3051	270	18	2	335	101
Apr 3	3737	333	3288	237	22	4	427	92
Apr 4	4161	424	3606	318	27	5	528	101
Apr 5	4471	310	3819	213	34	7	618	90
Apr 6	4815	344	4050	231	37	3	728	110
Apr 7	5116	301	4175	125	43	6	898	170
Apr 8	5546	430	4383	208	48	5	1115	217
Apr 9	5972	426	4641	258	57	9	1274	159
Apr 10	6501	529	4865	224	65	8	1571	297
Apr 11	6927	426	4990	125	73	8	1864	293
Apr 12	7213	286	5074	84	80	7	2059	195
Apr 13	7525	312	5076	2	82	2	2367	308
Apr 14	7917	392	5179	103	92	10	2646	279
Apr 15	8273	356	5242	63	94	2	2937	291
Apr 16	8807	534	5403	161	105	11	3299	362
Apr 17	9252	445	5515	112	116	11	3621	322
Apr 18	9730	478	5569	54	126	10	4035	414
Apr 19	10088	358	5617	48	133	7	4338	303
Apr 20	10507	419	5692	75	139	6	4676	338
Apr 21	10832	325	5716	24	147	8	4969	293
Apr 22	11296	464	5750	34	160	13	5386	417
Apr 23	11812	516	5840	90	168	8	5804	418
Apr 24	12306	494	5805	-35	174	6	6327	523
Apr 25	12858	552	5931	126	181	7	6746	419
Apr 26	13331	473	6118	187	189	8	7024	278

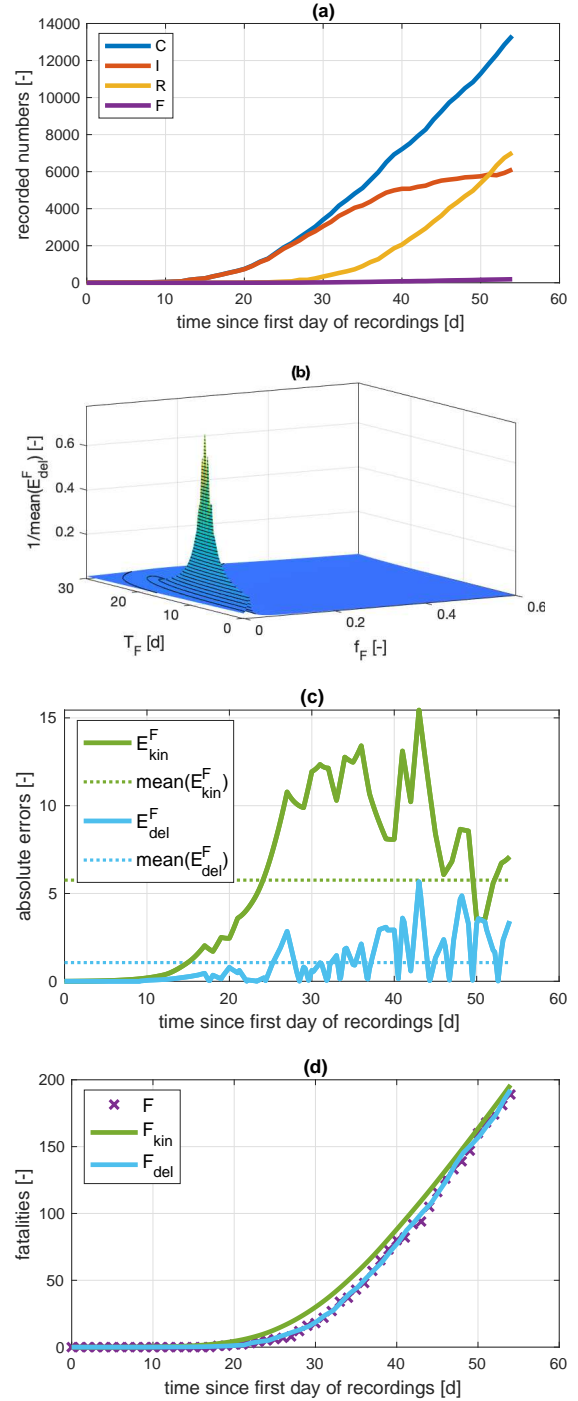


Figure 9: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Chile

Table 10: Data recorded in China

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Jan 22	571	571	554	554	17	17	0	0
Jan 23	830	259	771	217	25	8	34	34
Jan 24	1287	457	1208	437	41	16	38	4
Jan 25	1975	688	1870	662	56	15	49	11
Jan 26	2744	769	2613	743	80	24	51	2
Jan 27	4515	1771	4349	1736	106	26	60	9
Jan 28	5974	1459	5739	1390	132	26	103	43
Jan 29	7711	1737	7417	1678	170	38	124	21
Jan 30	9692	1981	9308	1891	213	43	171	47
Jan 31	11791	2099	11289	1981	259	46	243	72
Feb 1	14380	2589	13748	2459	304	45	328	85
Feb 2	17205	2825	16369	2621	361	57	475	147
Feb 3	20440	3235	19383	3014	425	64	632	157
Feb 4	24324	3884	22942	3559	490	65	892	260
Feb 5	28018	3694	26302	3360	563	73	1153	261
Feb 6	31161	3143	28985	2683	636	73	1540	387
Feb 7	34546	3385	31774	2789	722	86	2050	510
Feb 8	37198	2652	33738	1964	811	89	2649	599
Feb 9	40171	2973	35982	2244	908	97	3281	632
Feb 10	42638	2467	37626	1644	1016	108	3996	715
Feb 11	44653	2015	38791	1165	1113	97	4749	753
Feb 12	58761	14108	51591	12800	1259	146	5911	1162
Feb 13	63851	5090	55748	4157	1380	121	6723	812
Feb 14	66492	2641	56873	1125	1523	143	8096	1373
Feb 15	68500	2008	57416	543	1665	142	9419	1323
Feb 16	70548	2048	57934	518	1770	105	10844	1425
Feb 17	72436	1888	58016	82	1868	98	12552	1708
Feb 18	74185	1749	57805	-211	2004	136	14376	1824
Feb 19	74576	391	56301	-1504	2118	114	16157	1781
Feb 20	75465	889	54921	-1380	2236	118	18308	2151
Feb 21	76288	823	53284	-1637	2345	109	20659	2351
Feb 22	76936	648	52093	-1191	2442	97	22401	1742
Feb 23	77150	214	49824	-2269	2592	150	24734	2333
Feb 24	77658	508	47765	-2059	2663	71	27230	2496
Feb 25	78064	406	45600	-2165	2715	52	29749	2519
Feb 26	78497	433	43258	-2342	2744	29	32495	2746
Feb 27	78824	327	39919	-3339	2788	44	36117	3622
Feb 28	79251	427	37414	-2505	2835	47	39002	2885
Feb 29	79824	573	35129	-2285	2870	35	41825	2823
Mar 1	80026	202	32616	-2513	2912	42	44498	2673
Mar 2	80151	125	30004	-2612	2943	31	47204	2706
Mar 3	80270	119	27423	-2581	2981	38	49866	2662
Mar 4	80409	139	25353	-2070	3012	31	52044	2178
Mar 5	80552	143	23784	-1569	3042	30	53726	1682
Mar 6	80651	99	22179	-1605	3070	28	55402	1676
Mar 7	80695	44	20533	-1646	3097	27	57065	1663
Mar 8	80735	40	19016	-1517	3119	22	58600	1535
Mar 9	80754	19	17721	-1295	3136	17	59897	1297
Mar 10	80778	24	16136	-1585	3158	22	61484	1587
Mar 11	80793	15	14831	-1305	3169	11	62793	1309
Mar 12	80813	20	13524	-1307	3176	7	64113	1320
Mar 13	80824	11	12088	-1436	3189	13	65547	1434
Mar 14	80844	20	10733	-1355	3199	10	66912	1365
Mar 15	80860	16	9893	-840	3213	14	67754	842
Mar 16	80881	21	8967	-926	3226	13	68688	934
Mar 17	80894	13	8056	-911	3237	11	69601	913
Mar 18	80928	34	7263	-793	3245	8	70420	819
Mar 19	80967	39	6569	-694	3248	3	71150	730
Mar 20	81008	41	6013	-556	3255	7	71740	590
Mar 21	81054	46	5353	-660	3261	6	72440	700
Mar 22	81093	39	5120	-233	3270	9	72703	263
Mar 23	81171	78	4735	-385	3277	7	73159	456
Mar 24	81218	47	4287	-448	3281	4	73650	491
Mar 25	81285	67	3947	-340	3287	6	74051	401
Mar 26	81340	55	3460	-487	3292	5	74588	537
Mar 27	81394	54	3128	-332	3295	3	74971	383
Mar 28	81439	45	2691	-437	3300	5	75448	477
Mar 29	81439	0	2691	0	3300	0	75448	0
Mar 30	81518	79	2161	-530	3305	5	76052	604
Mar 31	81554	36	2004	-157	3312	7	76238	186
Apr 1	81589	35	1863	-141	3318	6	76408	170
Apr 2	81620	31	1727	-136	3322	4	76571	163
Apr 3	81639	19	1558	-169	3326	4	76755	184
Apr 4	81669	30	1376	-182	3329	3	76964	209
Apr 5	81708	39	1299	-77	3331	2	77078	114
Apr 6	81740	32	1242	-57	3331	0	77167	89
Apr 7	81802	62	1190	-52	3333	2	77279	112
Apr 8	81865	63	1160	-30	3335	2	77370	91
Apr 9	81907	42	1116	-44	3336	1	77455	85
Apr 10	81953	46	1089	-27	3339	3	77525	70
Apr 11	82052	99	1138	49	3339	0	77575	50
Apr 12	82160	108	1156	18	3341	2	77663	88
Apr 13	82249	89	1170	14	3341	0	77738	75
Apr 14	82295	46	1137	-33	3342	1	77816	78
Apr 15	82341	46	1107	-30	3342	0	77892	76
Apr 16	82367	26	1081	-26	3342	0	77944	52
Apr 17	82692	325	66	-1015	4632	1290	77994	50
Apr 18	82719	27	1058	992	4632	0	77029	-965
Apr 19	82735	16	1041	-17	4632	0	77062	33
Apr 20	82747	12	1031	-10	4632	0	77084	22
Apr 21	82758	11	1003	-28	4632	0	77123	39
Apr 22	82788	30	1005	2	4632	0	77151	28
Apr 23	82798	10	959	-46	4632	0	77207	56
Apr 24	82804	6	915	-44	4632	0	77257	50
Apr 25	82816	12	838	-77	4632	0	77346	89
Apr 26	82827	11	801	-37	4632	0	77394	48

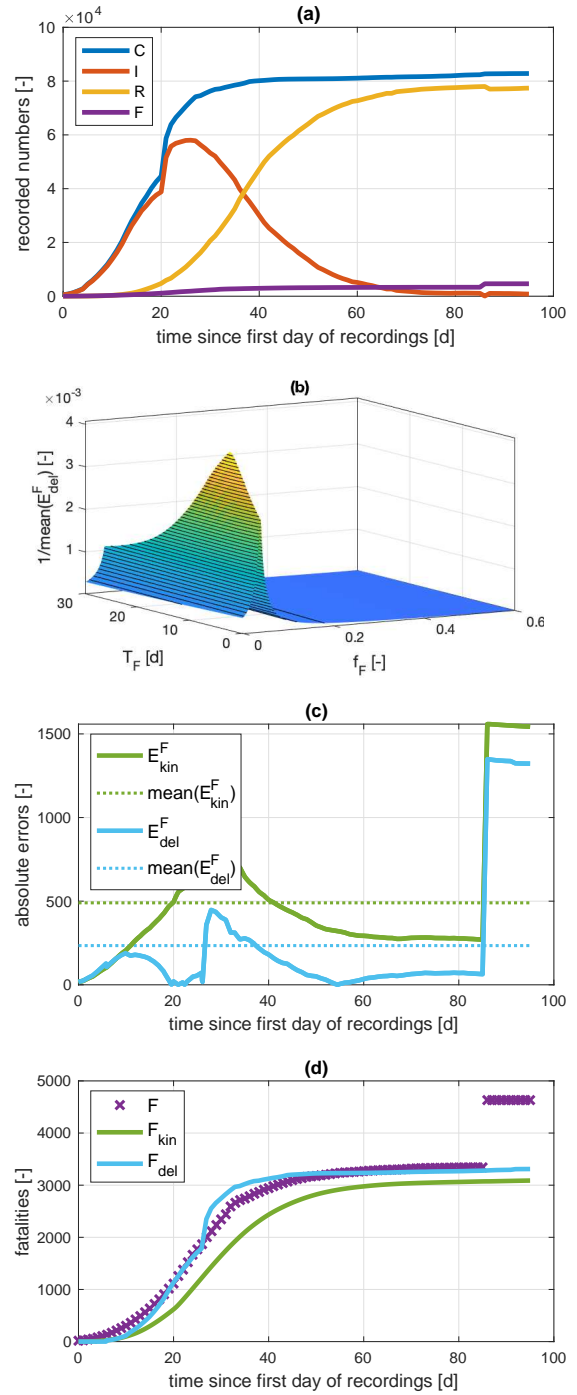


Figure 10: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for China

Table 11: Data recorded in Colombia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 6	1	1	1	1	0	0	0	0
Mar 7	1	0	1	0	0	0	0	0
Mar 8	1	0	1	0	0	0	0	0
Mar 9	3	2	3	2	0	0	0	0
Mar 10	3	0	3	0	0	0	0	0
Mar 11	9	6	9	6	0	0	0	0
Mar 12	9	0	9	0	0	0	0	0
Mar 13	16	7	16	7	0	0	0	0
Mar 14	24	8	24	8	0	0	0	0
Mar 15	34	10	34	10	0	0	0	0
Mar 16	54	20	53	19	0	0	1	1
Mar 17	65	11	64	11	0	0	1	0
Mar 18	93	28	92	28	0	0	1	0
Mar 19	108	15	107	15	0	0	1	0
Mar 20	145	37	144	37	0	0	1	0
Mar 21	196	51	195	51	0	0	1	0
Mar 22	231	35	226	31	2	2	3	2
Mar 23	277	46	271	45	3	1	3	0
Mar 24	378	101	369	98	3	0	6	3
Mar 25	470	92	458	89	4	1	8	2
Mar 26	491	21	477	19	6	2	8	0
Mar 27	539	48	523	46	6	0	10	2
Mar 28	608	69	592	69	6	0	10	0
Mar 29	702	94	682	90	10	4	10	0
Mar 30	798	96	769	87	14	4	15	5
Mar 31	906	108	859	90	16	2	31	16
Apr 1	1065	159	1009	150	17	1	39	8
Apr 2	1161	96	1087	78	19	2	55	16
Apr 3	1267	106	1187	100	25	6	55	0
Apr 4	1406	139	1289	102	32	7	85	30
Apr 5	1485	79	1362	73	35	3	88	3
Apr 6	1579	94	1445	83	46	11	88	0
Apr 7	1780	201	1630	185	50	4	100	12
Apr 8	2054	274	1876	246	55	5	123	23
Apr 9	2223	169	1980	104	69	14	174	51
Apr 10	2473	250	2196	216	80	11	197	23
Apr 11	2709	236	2395	199	100	20	214	17
Apr 12	2776	67	2397	2	109	9	270	56
Apr 13	2852	76	2421	24	112	3	319	49
Apr 14	2979	127	2498	77	127	15	354	35
Apr 15	3105	126	2522	24	131	4	452	98
Apr 16	3233	128	2539	17	144	13	550	98
Apr 17	3439	206	2652	113	153	9	634	84
Apr 18	3621	182	2764	112	166	13	691	57
Apr 19	3792	171	2902	138	179	13	711	20
Apr 20	3977	185	2984	82	189	10	804	93
Apr 21	4149	172	3149	165	196	7	804	0
Apr 22	4356	207	3280	131	206	10	870	66
Apr 23	4561	205	3419	139	215	9	927	57
Apr 24	4881	320	3653	234	225	10	1003	76
Apr 25	5142	261	3842	189	233	8	1067	64
Apr 26	5379	237	4002	160	244	11	1133	66

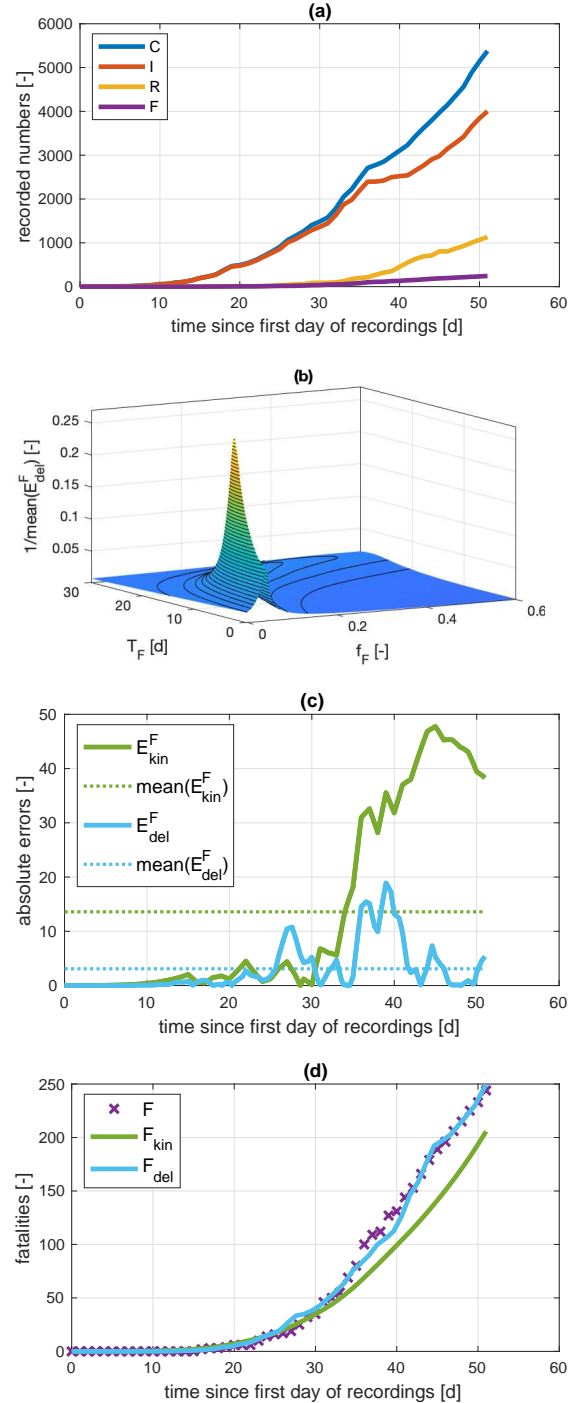


Figure 11: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Colombia

Table 12: Data recorded in Croatia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 25	1	1	1	1	0	0	0	0
Feb 26	3	2	3	2	0	0	0	0
Feb 27	3	0	3	0	0	0	0	0
Feb 28	5	2	5	2	0	0	0	0
Feb 29	6	1	6	1	0	0	0	0
Mar 1	7	1	7	1	0	0	0	0
Mar 2	8	1	8	1	0	0	0	0
Mar 3	9	1	9	1	0	0	0	0
Mar 4	10	1	10	1	0	0	0	0
Mar 5	10	0	10	0	0	0	0	0
Mar 6	11	1	11	1	0	0	0	0
Mar 7	12	1	12	1	0	0	0	0
Mar 8	12	0	12	0	0	0	0	0
Mar 9	13	1	13	1	0	0	0	0
Mar 10	15	2	15	2	0	0	0	0
Mar 11	19	4	19	4	0	0	0	0
Mar 12	27	8	26	7	0	0	1	1
Mar 13	32	5	31	5	0	0	1	0
Mar 14	39	7	37	6	0	0	2	1
Mar 15	49	10	47	10	0	0	2	0
Mar 16	57	8	54	7	0	0	3	1
Mar 17	69	12	64	10	0	0	5	2
Mar 18	89	20	84	20	0	0	5	0
Mar 19	110	21	104	20	1	1	5	0
Mar 20	130	20	124	20	1	0	5	0
Mar 21	206	76	200	76	1	0	5	0
Mar 22	254	48	248	48	1	0	5	0
Mar 23	315	61	309	61	1	0	5	0
Mar 24	382	67	376	67	1	0	5	0
Mar 25	442	60	419	43	1	0	22	17
Mar 26	495	53	470	51	3	2	22	0
Mar 27	586	91	546	76	3	0	37	15
Mar 28	657	71	607	61	5	2	45	8
Mar 29	713	56	652	45	6	1	55	10
Mar 30	790	77	717	65	6	0	67	12
Mar 31	867	77	794	77	6	0	67	0
Apr 1	963	96	884	90	6	0	73	6
Apr 2	1011	48	916	32	7	1	88	15
Apr 3	1079	68	979	63	8	1	92	4
Apr 4	1126	47	995	16	12	4	119	27
Apr 5	1182	56	1042	47	15	3	125	6
Apr 6	1222	40	1076	34	16	1	130	5
Apr 7	1282	60	1097	21	18	2	167	37
Apr 8	1343	61	1145	48	19	1	179	12
Apr 9	1407	64	1168	23	20	1	219	40
Apr 10	1495	88	1243	75	21	1	231	12
Apr 11	1534	39	1190	-53	21	0	323	92
Apr 12	1600	66	1204	14	23	2	373	50
Apr 13	1650	50	1225	21	25	2	400	27
Apr 14	1704	54	1258	33	31	6	415	15
Apr 15	1741	37	1235	-23	33	2	473	58
Apr 16	1791	50	1227	-8	35	2	529	56
Apr 17	1814	23	1178	-49	36	1	600	71
Apr 18	1832	18	1178	0	39	3	615	15
Apr 19	1871	39	1115	-63	47	8	709	94
Apr 20	1881	10	1063	-52	47	0	771	62
Apr 21	1908	27	1059	-4	48	1	801	30
Apr 22	1950	42	1033	-26	48	0	869	68
Apr 23	1981	31	1048	15	50	2	883	14
Apr 24	2009	28	976	-72	51	1	982	99
Apr 25	2016	7	928	-48	54	3	1034	52
Apr 26	2030	14	872	-56	55	1	1103	69

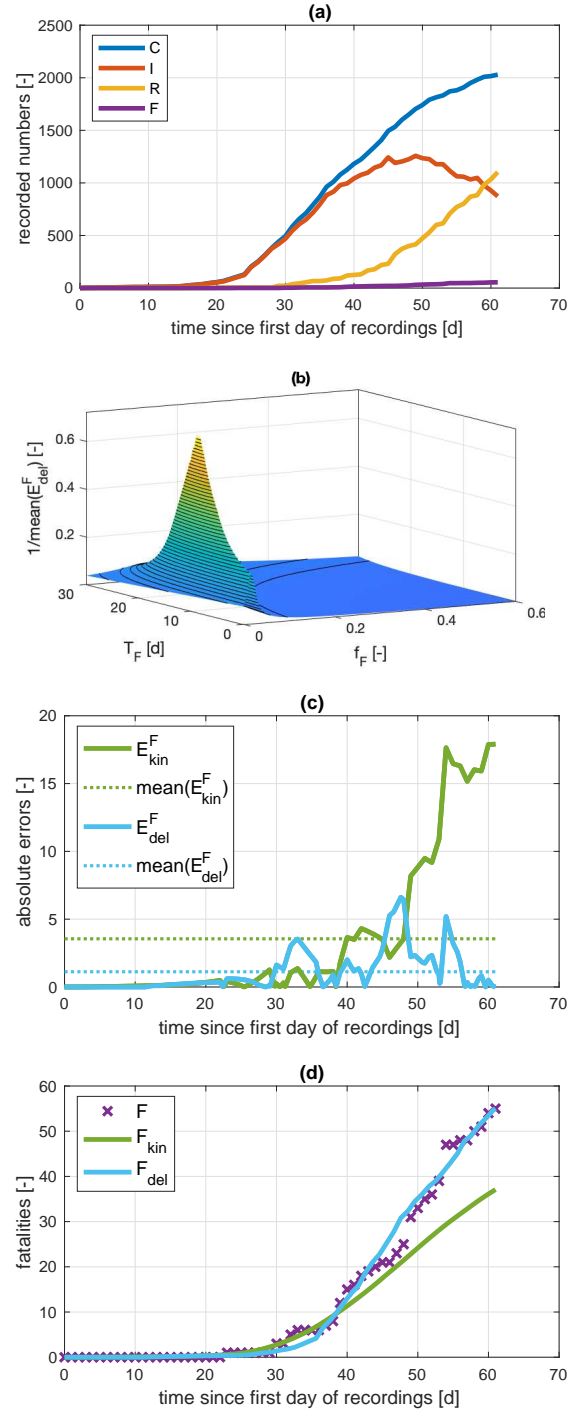


Figure 12: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Croatia

Table 13: Data recorded in Czech Republic

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 1	3	3	3	3	0	0	0	0
Mar 2	4	1	4	1	0	0	0	0
Mar 3	5	1	5	1	0	0	0	0
Mar 4	8	3	8	3	0	0	0	0
Mar 5	12	4	12	4	0	0	0	0
Mar 6	19	7	19	7	0	0	0	0
Mar 7	26	7	26	7	0	0	0	0
Mar 8	32	6	32	6	0	0	0	0
Mar 9	38	6	38	6	0	0	0	0
Mar 10	63	25	63	25	0	0	0	0
Mar 11	94	31	94	31	0	0	0	0
Mar 12	116	22	116	22	0	0	0	0
Mar 13	141	25	141	25	0	0	0	0
Mar 14	189	48	189	48	0	0	0	0
Mar 15	293	104	293	104	0	0	0	0
Mar 16	344	51	341	48	0	0	3	3
Mar 17	434	90	431	90	0	0	3	0
Mar 18	522	88	519	88	0	0	3	0
Mar 19	694	172	691	172	0	0	3	0
Mar 20	833	139	829	138	0	0	4	1
Mar 21	995	162	989	160	0	0	6	2
Mar 22	1120	125	1113	124	1	1	6	0
Mar 23	1236	116	1228	115	1	0	7	1
Mar 24	1394	158	1381	153	3	2	10	3
Mar 25	1654	260	1638	257	6	3	10	0
Mar 26	1925	271	1906	268	9	3	10	0
Mar 27	2279	354	2259	353	9	0	11	1
Mar 28	2631	352	2609	350	11	2	11	0
Mar 29	2817	186	2790	181	16	5	11	0
Mar 30	3001	184	2953	163	23	7	25	14
Mar 31	3308	307	3232	279	31	8	45	20
Apr 1	3589	281	3489	257	39	8	61	16
Apr 2	3858	269	3747	258	44	5	67	6
Apr 3	4190	332	4065	318	53	9	72	5
Apr 4	4472	282	4335	270	59	6	78	6
Apr 5	4587	115	4424	89	67	8	96	18
Apr 6	4822	235	4623	199	78	11	121	25
Apr 7	5017	195	4757	134	88	10	172	51
Apr 8	5312	295	4980	223	99	11	233	61
Apr 9	5569	257	5156	176	112	13	301	68
Apr 10	5732	163	5267	111	119	7	346	45
Apr 11	5902	170	5362	95	129	10	411	65
Apr 12	5991	89	5389	27	138	9	464	53
Apr 13	6059	68	5397	8	143	5	519	55
Apr 14	6111	52	5308	-89	161	18	642	123
Apr 15	6301	190	5316	8	166	5	819	177
Apr 16	6433	132	5292	-24	169	3	972	153
Apr 17	6549	116	5202	-90	173	4	1174	202
Apr 18	6606	57	5198	-4	181	8	1227	53
Apr 19	6746	140	5262	64	186	5	1298	71
Apr 20	6900	154	5147	-115	194	8	1559	261
Apr 21	7033	133	5079	-68	201	7	1753	194
Apr 22	7132	99	4935	-144	208	7	1989	236
Apr 23	7187	55	4825	-110	210	2	2152	163
Apr 24	7273	86	4688	-137	214	4	2371	219
Apr 25	7352	79	4681	-7	218	4	2453	82
Apr 26	7404	52	4639	-42	220	2	2545	92

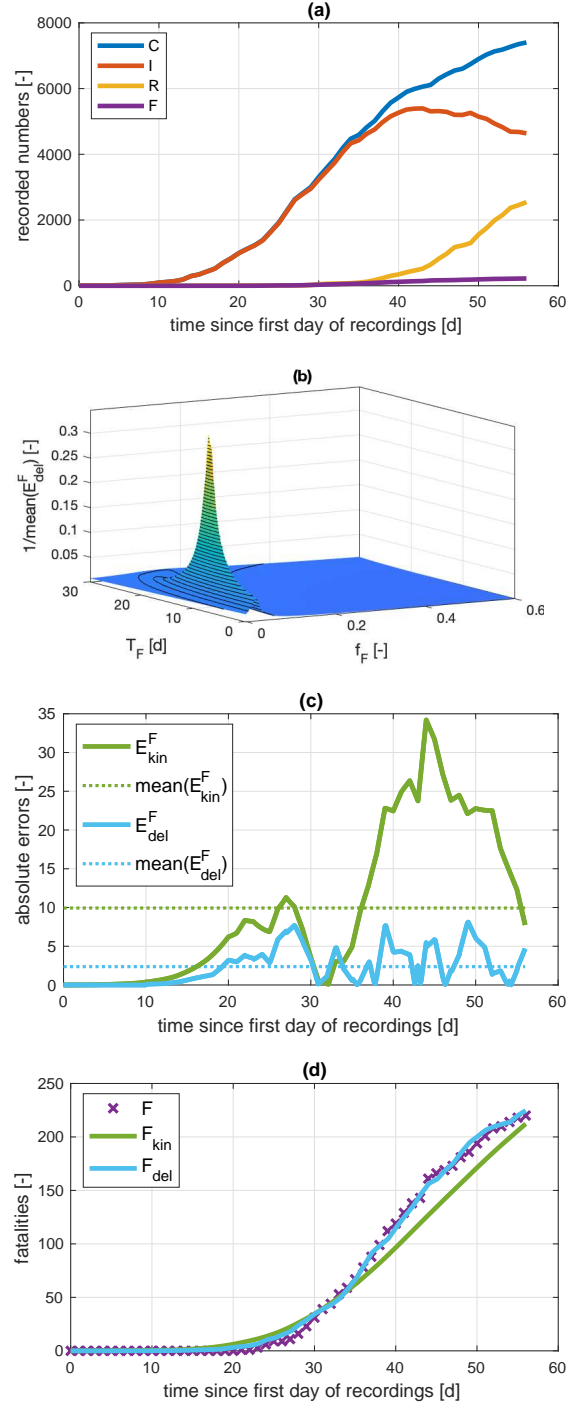


Figure 13: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Czech Republic

Table 14: Data recorded in Denmark

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 27	1	1	1	1	0	0	0	0
Feb 28	2	1	2	1	0	0	0	0
Feb 29	3	1	3	1	0	0	0	0
Mar 1	4	1	4	1	0	0	0	0
Mar 2	4	0	4	0	0	0	0	0
Mar 3	10	6	10	6	0	0	0	0
Mar 4	14	4	14	4	0	0	0	0
Mar 5	19	5	18	4	0	0	1	1
Mar 6	21	2	20	2	0	0	1	0
Mar 7	27	6	26	6	0	0	1	0
Mar 8	35	8	34	8	0	0	1	0
Mar 9	90	55	89	55	0	0	1	0
Mar 10	262	172	261	172	0	0	1	0
Mar 11	514	252	513	252	0	0	1	0
Mar 12	674	160	673	160	0	0	1	0
Mar 13	804	130	803	130	0	0	1	0
Mar 14	836	32	834	31	1	1	1	0
Mar 15	864	28	861	27	2	1	1	0
Mar 16	914	50	909	48	4	2	1	0
Mar 17	977	63	972	63	4	0	1	0
Mar 18	1057	80	1052	80	4	0	1	0
Mar 19	1151	94	1144	92	6	2	1	0
Mar 20	1255	104	1245	101	9	3	1	0
Mar 21	1326	71	1312	67	13	4	1	0
Mar 22	1395	69	1381	69	13	0	1	0
Mar 23	1460	65	1435	54	24	11	1	0
Mar 24	1591	131	1558	123	32	8	1	0
Mar 25	1724	133	1689	131	34	2	1	0
Mar 26	1877	153	1835	146	41	7	1	0
Mar 27	2046	169	1993	158	52	11	1	0
Mar 28	2201	155	2135	142	65	13	1	0
Mar 29	2395	194	2322	187	72	7	1	0
Mar 30	2577	182	2499	177	77	5	1	0
Mar 31	2860	283	2769	270	90	13	1	0
Apr 1	3107	247	2109	-660	104	14	894	893
Apr 2	3386	279	2174	65	123	19	1089	195
Apr 3	3757	371	2425	251	139	16	1193	104
Apr 4	4077	320	2633	208	161	22	1283	90
Apr 5	4369	292	2863	230	179	18	1327	44
Apr 6	4681	312	3116	253	187	8	1378	51
Apr 7	5071	390	3377	261	203	16	1491	113
Apr 8	5402	331	3563	186	218	15	1621	130
Apr 9	5635	233	3662	99	237	19	1736	115
Apr 10	5819	184	3799	137	247	10	1773	37
Apr 11	5996	177	3781	-18	260	13	1955	182
Apr 12	6174	178	3778	-3	273	13	2123	168
Apr 13	6318	144	3798	20	285	12	2235	112
Apr 14	6511	193	3697	-101	299	14	2515	280
Apr 15	6681	170	3624	-73	309	10	2748	233
Apr 16	6879	198	3535	-89	321	12	3023	275
Apr 17	7073	194	3348	-187	336	15	3389	366
Apr 18	7242	169	3049	-299	346	10	3847	458
Apr 19	7384	142	2888	-161	355	9	4141	294
Apr 20	7515	131	2839	-49	364	9	4312	171
Apr 21	7695	180	2625	-214	370	6	4700	388
Apr 22	7912	217	2441	-184	384	14	5087	387
Apr 23	8073	161	2295	-146	394	10	5384	297
Apr 24	8210	137	2281	-14	403	9	5526	142
Apr 25	8445	235	2358	77	418	15	5669	143
Apr 26	8575	130	2348	-10	422	4	5805	136

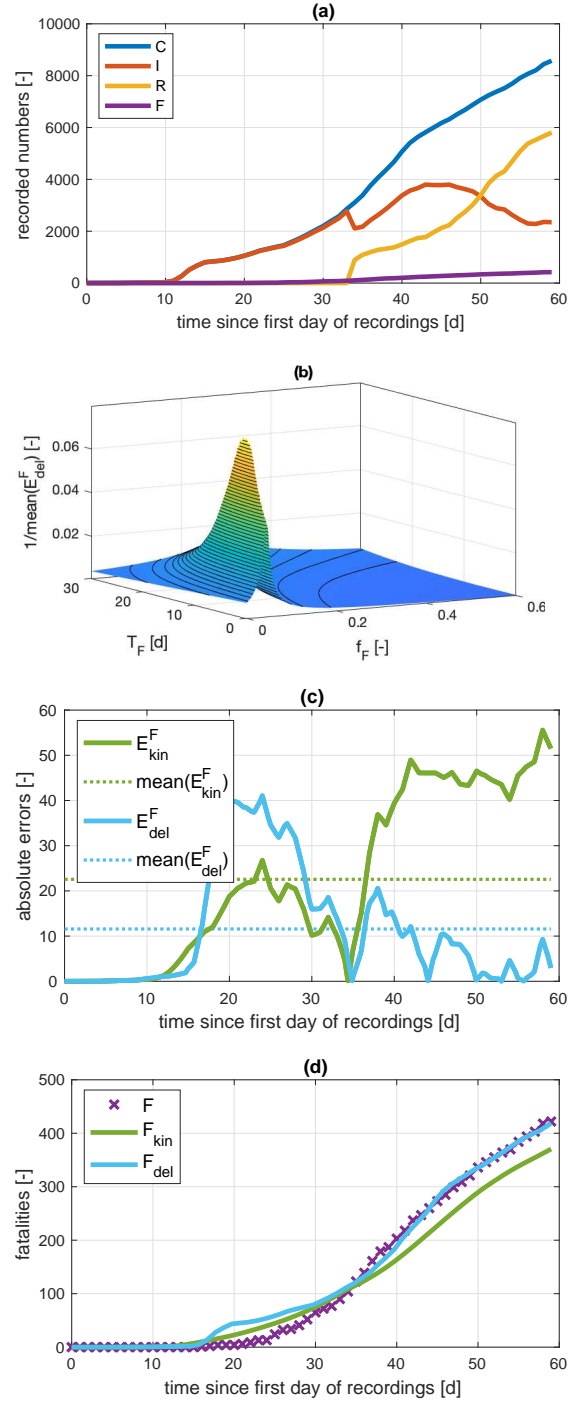


Figure 14: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Denmark

Table 15: Data recorded in Dominican Republic

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 1	1	1	1	1	0	0	0	0
Mar 2	1	0	1	0	0	0	0	0
Mar 3	1	0	1	0	0	0	0	0
Mar 4	1	0	1	0	0	0	0	0
Mar 5	1	0	1	0	0	0	0	0
Mar 6	2	1	2	1	0	0	0	0
Mar 7	2	0	2	0	0	0	0	0
Mar 8	5	3	5	3	0	0	0	0
Mar 9	5	0	5	0	0	0	0	0
Mar 10	5	0	5	0	0	0	0	0
Mar 11	5	0	5	0	0	0	0	0
Mar 12	5	0	5	0	0	0	0	0
Mar 13	5	0	5	0	0	0	0	0
Mar 14	11	6	11	6	0	0	0	0
Mar 15	11	0	11	0	0	0	0	0
Mar 16	21	10	20	9	1	1	0	0
Mar 17	21	0	20	0	1	0	0	0
Mar 18	34	13	32	12	2	1	0	0
Mar 19	34	0	32	0	2	0	0	0
Mar 20	72	38	70	38	2	0	0	0
Mar 21	112	40	109	39	3	1	0	0
Mar 22	202	90	199	90	3	0	0	0
Mar 23	245	43	239	40	3	0	3	3
Mar 24	312	67	303	64	6	3	3	0
Mar 25	392	80	379	76	10	4	3	0
Mar 26	488	96	475	96	10	0	3	0
Mar 27	581	93	558	83	20	10	3	0
Mar 28	719	138	688	130	28	8	3	0
Mar 29	859	140	817	129	39	11	3	0
Mar 30	901	42	855	38	42	3	4	1
Mar 31	1109	208	1053	198	51	9	5	1
Apr 1	1284	175	1218	165	57	6	9	4
Apr 2	1380	96	1304	86	60	3	16	7
Apr 3	1488	108	1404	100	68	8	16	0
Apr 4	1578	90	1484	80	77	9	17	1
Apr 5	1745	167	1646	162	82	5	17	0
Apr 6	1828	83	1709	63	86	4	33	16
Apr 7	1956	128	1822	113	98	12	36	3
Apr 8	2111	155	1953	131	108	10	50	14
Apr 9	2349	238	2151	198	118	10	80	30
Apr 10	2620	271	2396	245	126	8	98	18
Apr 11	2759	139	2516	120	135	9	108	10
Apr 12	2967	208	2663	147	173	38	131	23
Apr 13	3167	200	2838	175	177	4	152	21
Apr 14	3286	119	2941	103	183	6	162	10
Apr 15	3614	328	3217	276	189	6	208	46
Apr 16	3755	141	3344	127	196	7	215	7
Apr 17	4126	371	3658	314	200	4	268	53
Apr 18	4335	209	3806	148	217	17	312	44
Apr 19	4680	345	4091	285	226	9	363	51
Apr 20	4964	284	4313	222	235	9	416	53
Apr 21	5044	80	4336	23	245	10	463	47
Apr 22	5300	256	4459	123	260	15	581	118
Apr 23	5543	243	4697	238	265	5	581	0
Apr 24	5749	206	4719	22	267	2	763	182
Apr 25	5926	177	4831	112	273	6	822	59
Apr 26	6135	209	4947	116	278	5	910	88

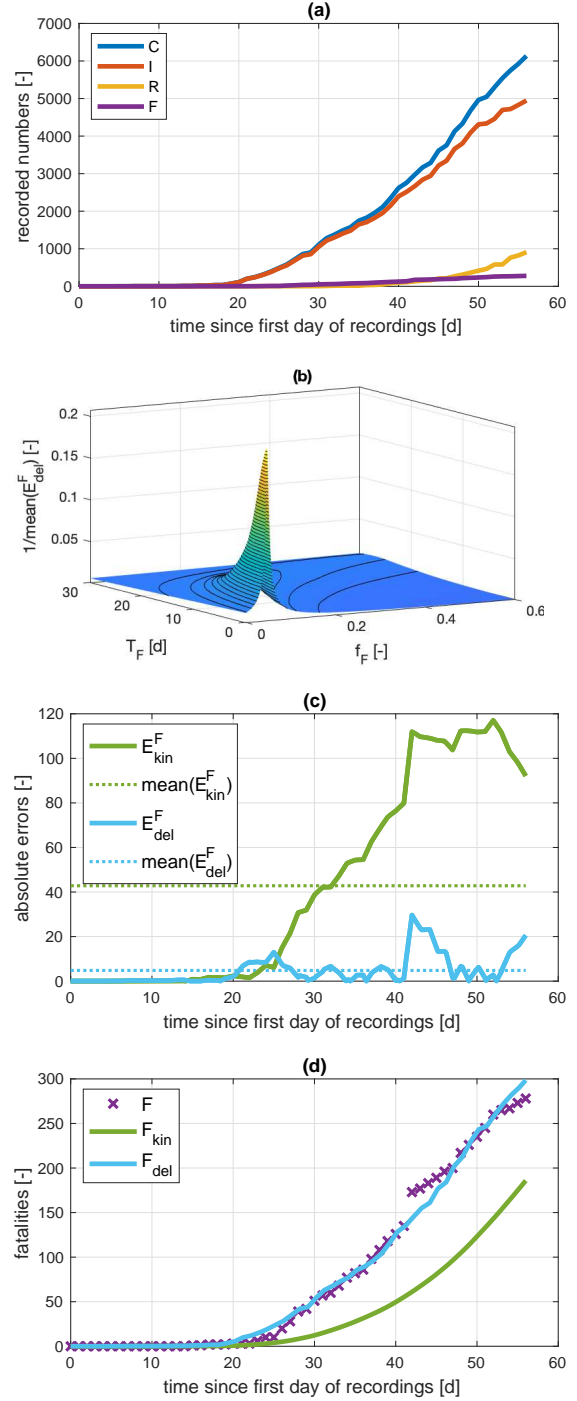


Figure 15: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Dominican Republic

Table 16: Data recorded in Ecuador

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 29	1	1	1	1	0	0	0	0
Mar 1	6	5	6	5	0	0	0	0
Mar 2	6	0	6	0	0	0	0	0
Mar 3	7	1	7	1	0	0	0	0
Mar 4	10	3	10	3	0	0	0	0
Mar 5	13	3	13	3	0	0	0	0
Mar 6	13	0	13	0	0	0	0	0
Mar 7	14	1	14	1	0	0	0	0
Mar 8	14	0	14	0	0	0	0	0
Mar 9	15	1	15	1	0	0	0	0
Mar 10	17	2	17	2	0	0	0	0
Mar 11	17	0	17	0	0	0	0	0
Mar 12	17	0	17	0	0	0	0	0
Mar 13	23	6	22	5	1	1	0	0
Mar 14	28	5	26	4	2	1	0	0
Mar 15	37	9	35	9	2	0	0	0
Mar 16	58	21	56	21	2	0	0	0
Mar 17	111	53	109	53	2	0	0	0
Mar 18	168	57	164	55	3	1	1	1
Mar 19	260	92	256	92	3	0	1	0
Mar 20	426	166	416	160	7	4	3	2
Mar 21	532	106	522	106	7	0	3	0
Mar 22	789	257	772	250	14	7	3	0
Mar 23	981	192	960	188	18	4	3	0
Mar 24	1082	101	1052	92	27	9	3	0
Mar 25	1211	129	1179	127	29	2	3	0
Mar 26	1403	192	1366	187	34	5	3	0
Mar 27	1627	224	1583	217	41	7	3	0
Mar 28	1823	196	1772	189	48	7	3	0
Mar 29	1924	101	1863	91	58	10	3	0
Mar 30	1966	42	1901	38	62	4	3	0
Mar 31	2302	336	2165	264	79	17	58	55
Apr 1	2758	456	2602	437	98	19	58	0
Apr 2	3163	405	2978	376	120	22	65	7
Apr 3	3368	205	3158	180	145	25	65	0
Apr 4	3465	97	3193	35	172	27	100	35
Apr 5	3646	181	3366	173	180	8	100	0
Apr 6	3747	101	3456	90	191	11	100	0
Apr 7	3995	248	3635	179	220	29	140	40
Apr 8	4450	455	4068	433	242	22	140	0
Apr 9	4965	515	4354	286	272	30	339	199
Apr 10	7161	2196	6496	2142	297	25	368	29
Apr 11	7257	96	6531	35	315	18	411	43
Apr 12	7466	209	6632	101	333	18	501	90
Apr 13	7529	63	6577	-55	355	22	597	96
Apr 14	7603	74	6538	-39	369	14	696	99
Apr 15	7858	255	6690	152	388	19	780	84
Apr 16	8225	367	6984	294	403	15	838	58
Apr 17	8450	225	7191	207	421	18	838	0
Apr 18	9022	572	7558	367	456	35	1008	170
Apr 19	9468	446	7933	375	474	18	1061	53
Apr 20	10128	660	8471	538	507	33	1150	89
Apr 21	10398	270	8671	200	520	13	1207	57
Apr 22	10850	452	9051	380	537	17	1262	55
Apr 23	11183	333	9295	244	560	23	1328	66
Apr 24	22719	11536	20777	11482	576	16	1366	38
Apr 25	22719	0	20777	0	576	0	1366	0
Apr 26	22719	0	20777	0	576	0	1366	0

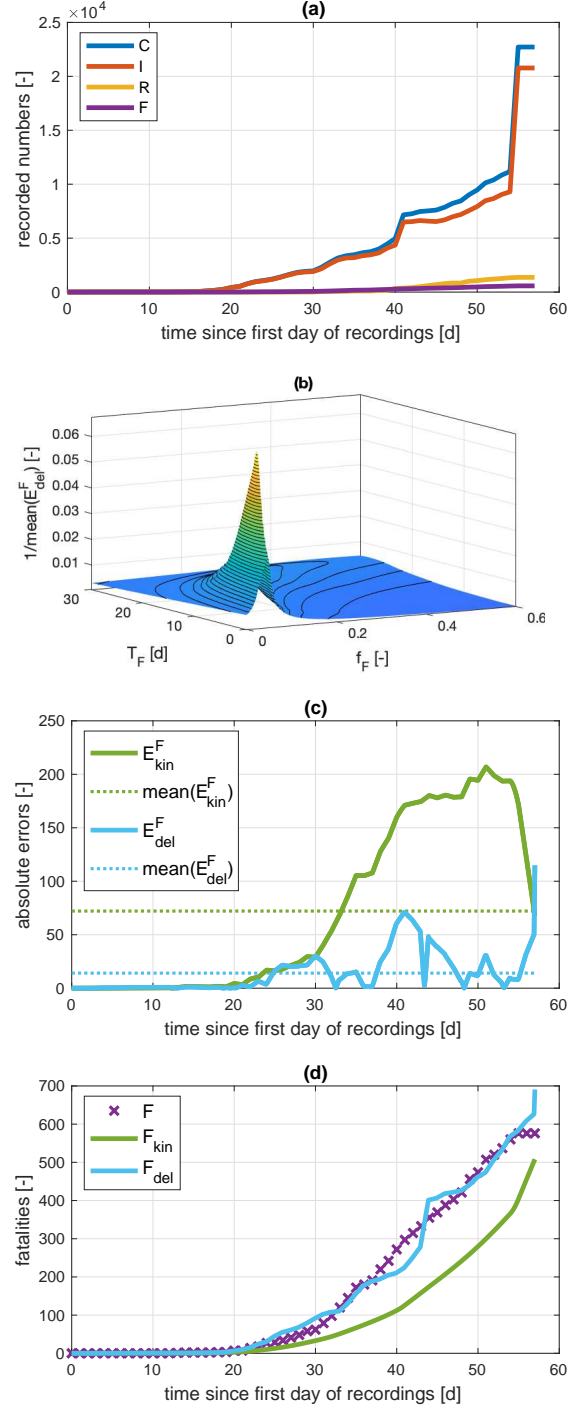


Figure 16: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Ecuador

Table 17: Data recorded in Egypt

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	1	1	1	1	0	0	0	0
Feb 16	1	0	1	0	0	0	0	0
Feb 17	1	0	1	0	0	0	0	0
Feb 18	1	0	1	0	0	0	0	0
Feb 19	1	0	1	0	0	0	0	0
Feb 20	1	0	0	-1	0	0	1	1
Feb 21	1	0	0	0	0	0	1	0
Feb 22	1	0	0	0	0	0	1	0
Feb 23	1	0	0	0	0	0	1	0
Feb 24	1	0	0	0	0	0	1	0
Feb 25	1	0	0	0	0	0	1	0
Feb 26	1	0	0	0	0	0	1	0
Feb 27	1	0	0	0	0	0	1	0
Feb 28	1	0	0	0	0	0	1	0
Feb 29	1	0	0	0	0	0	1	0
Mar 1	2	1	1	1	0	0	1	0
Mar 2	2	0	1	0	0	0	1	0
Mar 3	2	0	1	0	0	0	1	0
Mar 4	2	0	1	0	0	0	1	0
Mar 5	3	1	2	1	0	0	1	0
Mar 6	15	12	14	12	0	0	1	0
Mar 7	48	33	47	33	0	0	1	0
Mar 8	55	7	53	6	1	1	1	0
Mar 9	59	4	57	4	1	0	1	0
Mar 10	59	0	32	-25	1	0	26	25
Mar 11	67	8	39	7	1	0	27	1
Mar 12	80	13	51	12	2	1	27	0
Mar 13	93	13	64	13	2	0	27	0
Mar 14	110	17	81	17	2	0	27	0
Mar 15	126	16	92	11	2	0	32	5
Mar 16	166	40	130	38	4	2	32	0
Mar 17	196	30	164	34	6	2	26	-6
Mar 18	210	14	176	12	6	0	28	2
Mar 19	256	46	207	31	7	1	42	14
Mar 20	285	29	235	28	8	1	42	0
Mar 21	294	9	242	7	10	2	42	0
Mar 22	327	33	257	15	14	4	56	14
Mar 23	366	39	279	22	19	5	68	12
Mar 24	402	36	302	23	20	1	80	12
Mar 25	456	54	340	38	21	1	95	15
Mar 26	496	40	369	29	24	3	103	8
Mar 27	536	40	390	21	30	6	116	13
Mar 28	576	40	419	29	36	6	121	5
Mar 29	609	33	437	18	40	4	132	11
Mar 30	656	47	465	28	41	1	150	18
Mar 31	710	54	507	42	46	5	157	7
Apr 1	779	69	548	41	52	6	179	22
Apr 2	865	86	606	58	58	6	201	22
Apr 3	985	120	703	97	66	8	216	15
Apr 4	1070	85	758	55	71	5	241	25
Apr 5	1173	103	848	90	78	7	247	6
Apr 6	1322	149	978	130	85	7	259	12
Apr 7	1450	128	1080	102	94	9	276	17
Apr 8	1560	110	1152	72	103	9	305	29
Apr 9	1699	139	1233	81	118	15	348	43
Apr 10	1794	95	1275	42	135	17	384	36
Apr 11	1939	145	1367	92	146	11	426	42
Apr 12	2065	126	1317	-50	159	13	589	163
Apr 13	2190	125	1437	120	164	5	589	0
Apr 14	2350	160	1583	146	178	14	589	0
Apr 15	2505	155	1733	150	183	5	589	0
Apr 16	2673	168	1881	148	196	13	596	7
Apr 17	2844	171	1993	112	205	9	646	50
Apr 18	3032	188	2107	114	224	19	701	55
Apr 19	3144	112	2173	66	239	15	732	31
Apr 20	3333	189	2262	89	250	11	821	89
Apr 21	3490	157	2356	94	264	14	870	49
Apr 22	3659	169	2448	92	276	12	935	65
Apr 23	3891	232	2600	152	287	11	1004	69
Apr 24	4092	201	2723	123	294	7	1075	71
Apr 25	4319	227	2898	175	307	13	1114	39
Apr 26	4534	215	3041	143	317	10	1176	62

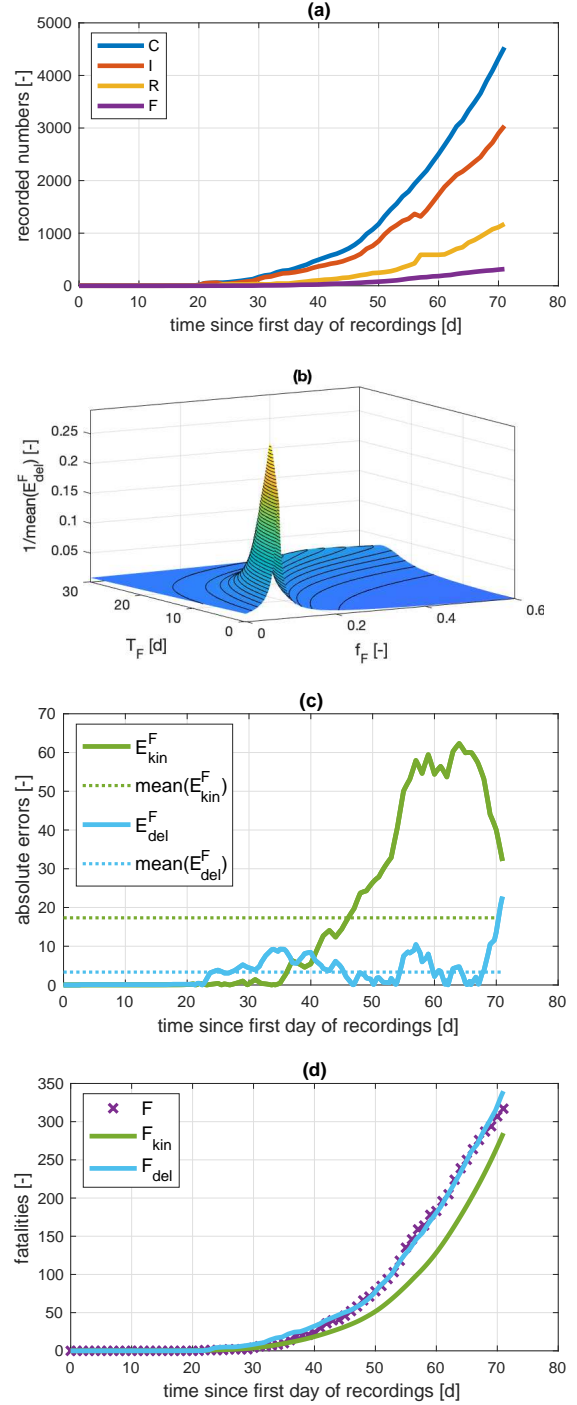


Figure 17: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Egypt

Table 18: Data recorded in Finland

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	1	1	0	0	0	0	1	1
Feb 16	1	0	0	0	0	0	1	0
Feb 17	1	0	0	0	0	0	1	0
Feb 18	1	0	0	0	0	0	1	0
Feb 19	1	0	0	0	0	0	1	0
Feb 20	1	0	0	0	0	0	1	0
Feb 21	1	0	0	0	0	0	1	0
Feb 22	1	0	0	0	0	0	1	0
Feb 23	1	0	0	0	0	0	1	0
Feb 24	1	0	0	0	0	0	1	0
Feb 25	1	0	0	0	0	0	1	0
Feb 26	2	1	1	1	0	0	1	0
Feb 27	2	0	1	0	0	0	1	0
Feb 28	3	1	2	1	0	0	1	0
Feb 29	3	0	2	0	0	0	1	0
Mar 1	6	3	5	3	0	0	1	0
Mar 2	7	1	6	1	0	0	1	0
Mar 3	7	0	6	0	0	0	1	0
Mar 4	7	0	6	0	0	0	1	0
Mar 5	12	5	11	5	0	0	1	0
Mar 6	15	3	14	3	0	0	1	0
Mar 7	19	4	18	4	0	0	1	0
Mar 8	25	6	24	6	0	0	1	0
Mar 9	33	8	32	8	0	0	1	0
Mar 10	40	7	39	7	0	0	1	0
Mar 11	65	25	64	25	0	0	1	0
Mar 12	109	44	108	44	0	0	1	0
Mar 13	155	46	154	46	0	0	1	0
Mar 14	225	70	215	61	0	0	10	9
Mar 15	244	19	234	19	0	0	10	0
Mar 16	278	34	268	34	0	0	10	0
Mar 17	322	44	312	44	0	0	10	0
Mar 18	359	37	349	37	0	0	10	0
Mar 19	400	41	390	41	0	0	10	0
Mar 20	450	50	440	50	0	0	10	0
Mar 21	523	73	512	72	1	1	10	0
Mar 22	626	103	615	103	1	0	10	0
Mar 23	700	74	689	74	1	0	10	0
Mar 24	792	92	781	92	1	0	10	0
Mar 25	880	88	867	86	3	2	10	0
Mar 26	958	78	943	76	5	2	10	0
Mar 27	1041	83	1024	81	7	2	10	0
Mar 28	1167	126	1148	124	9	2	10	0
Mar 29	1240	73	1219	71	11	2	10	0
Mar 30	1352	112	1329	110	13	2	10	0
Mar 31	1418	66	1391	62	17	4	10	0
Apr 1	1446	28	1419	28	17	0	10	0
Apr 2	1518	72	1199	-220	19	2	300	290
Apr 3	1615	97	1295	96	20	1	300	0
Apr 4	1882	267	1557	262	25	5	300	0
Apr 5	1927	45	1599	42	28	3	300	0
Apr 6	2176	249	1849	250	27	-1	300	0
Apr 7	2308	132	1974	125	34	7	300	0
Apr 8	2487	179	2147	173	40	6	300	0
Apr 9	2605	118	2263	116	42	2	300	0
Apr 10	2769	164	2421	158	48	6	300	0
Apr 11	2905	136	2556	135	49	1	300	0
Apr 12	2974	69	2618	62	56	7	300	0
Apr 13	3064	90	2705	87	59	3	300	0
Apr 14	3161	97	2797	92	64	5	300	0
Apr 15	3237	76	2865	68	72	8	300	0
Apr 16	3369	132	1594	-1271	75	3	1700	1400
Apr 17	3489	120	1707	113	82	7	1700	0
Apr 18	3681	192	1891	184	90	8	1700	0
Apr 19	3783	102	1989	98	94	4	1700	0
Apr 20	3868	85	1770	-219	98	4	2000	300
Apr 21	4014	146	1873	103	141	43	2000	0
Apr 22	4129	115	1980	107	149	8	2000	0
Apr 23	4284	155	2112	132	172	23	2000	0
Apr 24	4395	111	1718	-394	177	5	2500	500
Apr 25	4475	80	1789	71	186	9	2500	0
Apr 26	4576	101	1886	97	190	4	2500	0

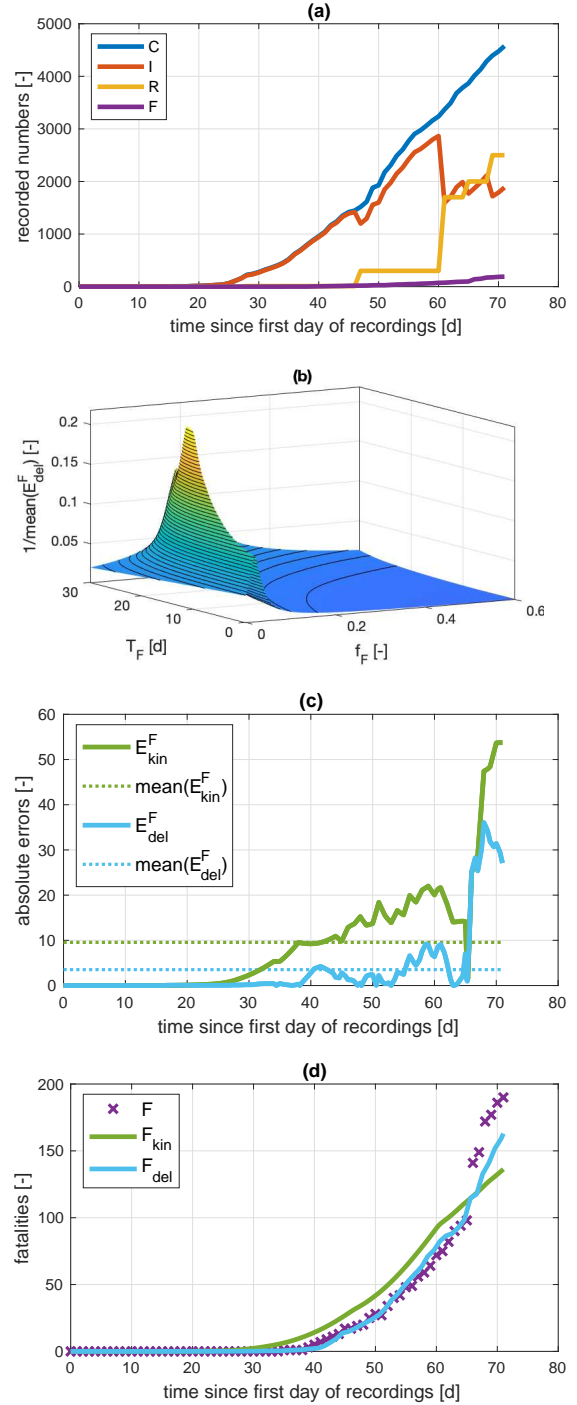


Figure 18: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Finland

Table 19: Data recorded in France

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	12	12	7	7	1	1	4	4
Feb 16	12	0	7	0	1	0	4	0
Feb 17	12	0	6	-1	1	0	5	1
Feb 18	12	0	4	-2	1	0	7	2
Feb 19	12	0	4	0	1	0	7	0
Feb 20	12	0	4	0	1	0	7	0
Feb 21	12	0	4	0	1	0	7	0
Feb 22	12	0	1	-3	1	0	10	3
Feb 23	12	0	1	0	1	0	10	0
Feb 24	12	0	0	-1	1	0	11	1
Feb 25	14	2	2	2	1	0	11	0
Feb 26	18	4	5	3	2	1	11	0
Feb 27	38	20	25	20	2	0	11	0
Feb 28	57	19	44	19	2	0	11	0
Feb 29	100	43	86	42	2	0	12	1
Mar 1	130	30	116	30	2	0	12	0
Mar 2	191	61	176	60	3	1	12	0
Mar 3	212	21	196	20	4	1	12	0
Mar 4	285	73	269	73	4	0	12	0
Mar 5	423	138	404	135	7	3	12	0
Mar 6	653	230	632	228	9	2	12	0
Mar 7	949	296	921	289	16	7	12	0
Mar 8	1209	260	1178	257	19	3	12	0
Mar 9	1412	203	1370	192	30	11	12	0
Mar 10	1784	372	1739	369	33	3	12	0
Mar 11	2281	497	2221	482	48	15	12	0
Mar 12	2876	595	2803	582	61	13	12	0
Mar 13	3661	785	3570	767	79	18	12	0
Mar 14	4499	838	4396	826	91	12	12	0
Mar 15	5423	924	5284	888	127	36	12	0
Mar 16	6633	1210	6473	1189	148	21	12	0
Mar 17	7730	1097	6953	480	175	27	602	590
Mar 18	9134	1404	8268	1315	264	89	602	0
Mar 19	10995	1861	9328	1060	372	108	1295	693
Mar 20	12612	1617	10575	1247	450	78	1587	292
Mar 21	14459	1847	12310	1735	562	112	1587	0
Mar 22	16018	1559	13144	834	674	112	2200	613
Mar 23	19856	3838	16796	3652	860	186	2200	0
Mar 24	22304	2448	17923	1127	1100	240	3281	1081
Mar 25	25233	2929	20002	2079	1331	231	3900	619
Mar 26	29155	3922	22511	2509	1696	365	4948	1048
Mar 27	32964	3809	25269	2758	1995	299	5700	752
Mar 28	37575	4611	29561	4292	2314	319	5700	0
Mar 29	40174	2599	30366	805	2606	292	7202	1502
Mar 30	44550	4376	33599	3233	3024	418	7927	725
Mar 31	52128	7578	39161	5562	3523	499	9444	1517
Apr 1	56989	4861	42022	2861	4032	509	10935	1491
Apr 2	59105	2116	41290	-732	5387	1355	12428	1493
Apr 3	76460	17355	55945	14655	6507	1120	14008	1580
Apr 4	83019	6559	60021	4076	7560	1053	15438	1430
Apr 5	87719	4700	63458	3437	8078	518	16183	745
Apr 6	90452	2733	64291	833	8911	833	17250	1067
Apr 7	99180	8728	69515	5224	10328	1417	19337	2087
Apr 8	103061	3881	70938	1423	10869	541	21254	1917
Apr 9	107696	4635	72280	1342	12210	1341	23206	1952
Apr 10	113927	6231	75798	3518	13197	987	24932	1726
Apr 11	118178	4251	77955	2157	13832	635	26391	1459
Apr 12	120633	2455	79054	1099	14393	561	27186	795
Apr 13	124298	3665	81613	2559	14967	574	27718	532
Apr 14	130253	5955	85719	4106	15729	762	28805	1087
Apr 15	133644	3391	85522	-197	17167	1438	30955	2150
Apr 16	140772	7128	90040	4518	17920	753	32812	1857
Apr 17	143116	2344	90015	-25	18681	761	34420	1608
Apr 18	146782	3666	91476	1461	19323	642	35983	1563
Apr 19	147844	1062	91548	72	19718	395	36578	595
Apr 20	150278	2434	92604	1056	20265	547	37409	831
Apr 21	153531	3253	93554	950	20796	531	39181	1772
Apr 22	155944	2413	93947	393	21340	544	40657	1476
Apr 23	158183	2239	94239	292	21856	516	42088	1431
Apr 24	159828	1645	94090	-149	22245	389	43493	1405
Apr 25	161488	1660	94280	190	22614	369	44594	1101
Apr 26	162100	612	91341	-2939	22856	242	47903	3309

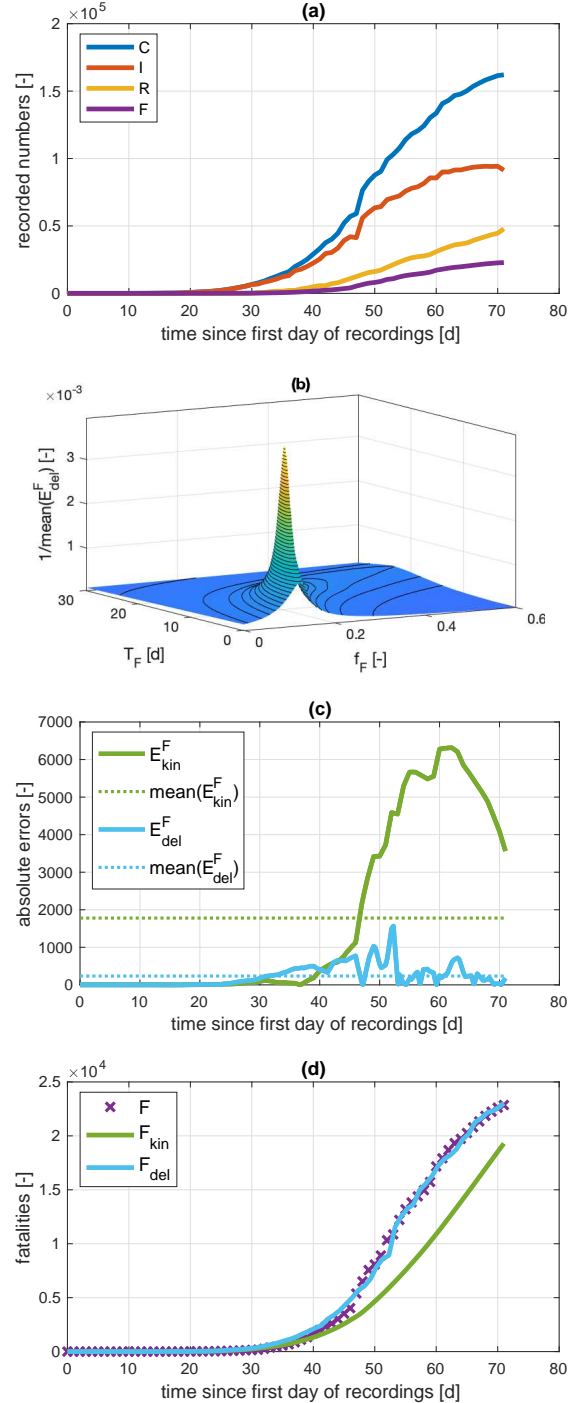


Figure 19: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for France

Table 20: Data recorded in Germany

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	16	16	13	13	0	0	3	3
Feb 16	16	0	13	0	0	0	3	0
Feb 17	16	0	9	-4	0	0	7	4
Feb 18	16	0	7	-2	0	0	9	2
Feb 19	16	0	7	0	0	0	9	0
Feb 20	16	0	3	-4	0	0	13	4
Feb 21	16	0	2	-1	0	0	14	1
Feb 22	16	0	2	0	0	0	14	0
Feb 23	16	0	2	0	0	0	14	0
Feb 24	16	0	2	0	0	0	14	0
Feb 25	18	2	3	1	0	0	15	1
Feb 26	26	8	11	8	0	0	15	0
Feb 27	48	22	32	21	0	0	16	1
Feb 28	74	26	58	26	0	0	16	0
Feb 29	79	5	63	5	0	0	16	0
Mar 1	130	51	114	51	0	0	16	0
Mar 2	165	35	149	35	0	0	16	0
Mar 3	203	38	187	38	0	0	16	0
Mar 4	262	59	246	59	0	0	16	0
Mar 5	545	283	528	282	0	0	17	1
Mar 6	670	125	652	124	0	0	18	1
Mar 7	800	130	782	130	0	0	18	0
Mar 8	1040	240	1022	240	0	0	18	0
Mar 9	1224	184	1204	182	2	2	18	0
Mar 10	1565	341	1545	341	2	0	18	0
Mar 11	1966	401	1938	393	3	1	25	7
Mar 12	2745	779	2714	776	6	3	25	0
Mar 13	3675	930	3621	907	8	2	46	21
Mar 14	4599	924	4544	923	9	1	46	0
Mar 15	5813	1214	5754	1210	13	4	46	0
Mar 16	7272	1459	7188	1434	17	4	67	21
Mar 17	9367	2095	9274	2086	26	9	67	0
Mar 18	12327	2960	12194	2920	28	2	105	38
Mar 19	15320	2993	15161	2967	44	16	115	10
Mar 20	19848	4528	19600	4439	68	24	180	65
Mar 21	22364	2516	22071	2471	84	16	209	29
Mar 22	24873	2509	24513	2442	94	10	266	57
Mar 23	29056	4183	28480	3967	123	29	453	187
Mar 24	32991	3935	29542	1062	159	36	3290	2837
Mar 25	37323	4332	33570	4028	206	47	3547	257
Mar 26	43938	6615	37998	4428	267	61	5673	2126
Mar 27	50871	6933	43862	5864	351	84	6658	985
Mar 28	57695	6824	48781	4919	433	82	8481	1823
Mar 29	62435	4740	52683	3902	541	108	9211	730
Mar 30	66885	4450	52740	57	645	104	13500	4289
Mar 31	71808	4923	54933	2193	775	130	16100	2600
Apr 1	77981	6173	58350	3417	931	156	18700	2600
Apr 2	84794	6813	61247	2897	1107	176	22440	3740
Apr 3	91159	6365	65309	4062	1275	168	24575	2135
Apr 4	96092	4933	68248	2939	1444	169	26400	1825
Apr 5	100123	4031	69839	1591	1584	140	28700	2300
Apr 6	103375	3252	72865	3026	1810	226	28700	0
Apr 7	107663	4288	69566	-3299	2016	206	36081	7381
Apr 8	113296	5633	64647	-4919	2349	333	46300	10219
Apr 9	118235	4939	63221	-1426	2607	258	52407	6107
Apr 10	122171	3936	65522	2301	2736	129	53913	1506
Apr 11	125452	3281	65181	-341	2871	135	57400	3487
Apr 12	127854	2402	64532	-649	3022	151	60300	2900
Apr 13	130072	2218	62578	-1954	3194	172	64300	4000
Apr 14	132210	2138	60515	-2063	3495	301	68200	3900
Apr 15	134753	2543	58349	-2166	3804	309	72600	4400
Apr 16	137698	2945	56646	-1703	4052	248	77000	4400
Apr 17	141397	3699	53931	-2715	4352	300	83114	6114
Apr 18	143724	2327	53786	-145	4538	186	85400	2286
Apr 19	145742	2018	53100	-686	4642	104	88000	2600
Apr 20	147065	1323	50703	-2397	4862	220	91500	3500
Apr 21	148453	1388	48167	-2536	5086	224	95200	3700
Apr 22	150648	2195	45933	-2234	5315	229	99400	4200
Apr 23	153129	2481	44254	-1679	5575	260	103300	3900
Apr 24	154999	1870	42439	-1815	5760	185	106800	3500
Apr 25	156513	1514	40836	-1603	5877	117	109800	3000
Apr 26	157770	1257	39794	-1042	5976	99	112000	2200

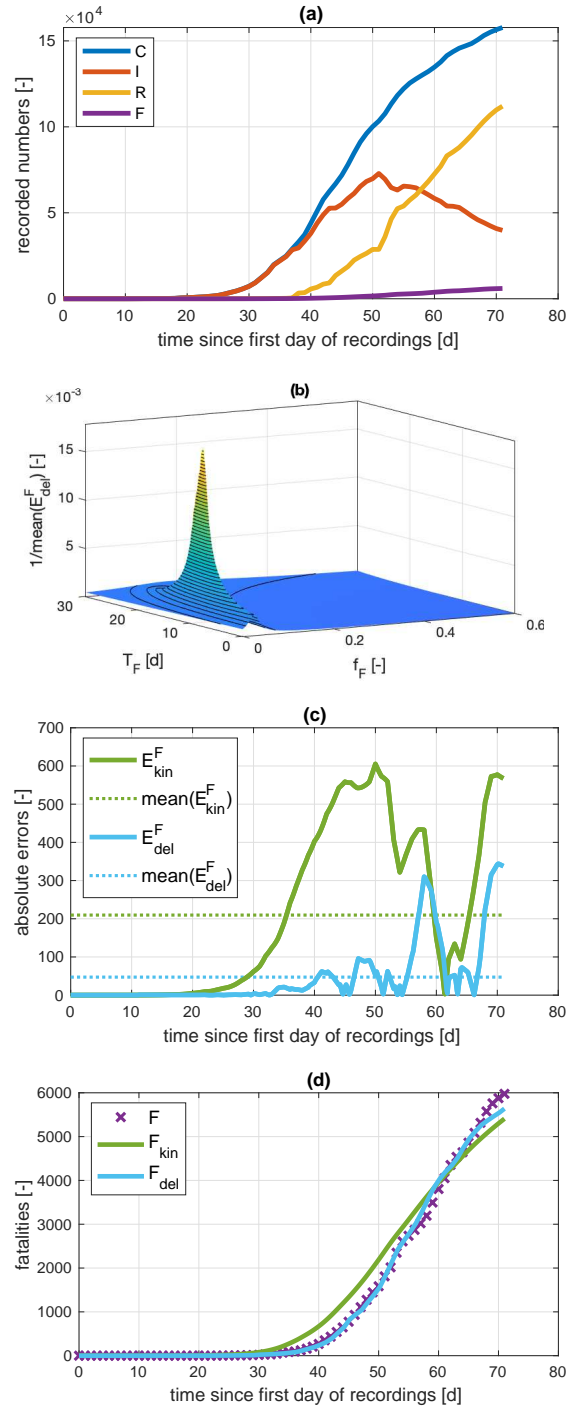


Figure 20: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Germany

Table 21: Data recorded in Greece

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 26	1	1	1	1	0	0	0	0
Feb 27	3	2	3	2	0	0	0	0
Feb 28	4	1	4	1	0	0	0	0
Feb 29	7	3	7	3	0	0	0	0
Mar 1	7	0	7	0	0	0	0	0
Mar 2	7	0	7	0	0	0	0	0
Mar 3	7	0	7	0	0	0	0	0
Mar 4	9	2	9	2	0	0	0	0
Mar 5	31	22	31	22	0	0	0	0
Mar 6	45	14	45	14	0	0	0	0
Mar 7	66	21	66	21	0	0	0	0
Mar 8	73	7	73	7	0	0	0	0
Mar 9	84	11	84	11	0	0	0	0
Mar 10	89	5	89	5	0	0	0	0
Mar 11	99	10	99	10	0	0	0	0
Mar 12	117	18	116	17	1	1	0	0
Mar 13	190	73	187	71	1	0	2	2
Mar 14	228	38	217	30	3	2	8	6
Mar 15	331	103	319	102	4	1	8	0
Mar 16	352	21	340	21	4	0	8	0
Mar 17	387	35	368	28	5	1	14	6
Mar 18	418	31	399	31	5	0	14	0
Mar 19	464	46	439	40	6	1	19	5
Mar 20	495	31	466	27	10	4	19	0
Mar 21	530	35	498	32	13	3	19	0
Mar 22	624	94	590	92	15	2	19	0
Mar 23	695	71	649	59	17	2	29	10
Mar 24	743	48	694	45	20	3	29	0
Mar 25	821	78	763	69	22	2	36	7
Mar 26	892	71	829	66	27	5	36	0
Mar 27	966	74	886	57	28	1	52	16
Mar 28	1061	95	977	91	32	4	52	0
Mar 29	1156	95	1065	88	39	7	52	0
Mar 30	1212	56	1114	49	46	7	52	0
Mar 31	1314	102	1213	99	49	3	52	0
Apr 1	1415	101	1312	99	51	2	52	0
Apr 2	1544	129	1430	118	53	2	61	9
Apr 3	1613	69	1472	42	63	10	78	17
Apr 4	1673	60	1527	55	68	5	78	0
Apr 5	1735	62	1584	57	73	5	78	0
Apr 6	1755	20	1407	-177	79	6	269	191
Apr 7	1832	77	1482	75	81	2	269	0
Apr 8	1884	52	1532	50	83	2	269	0
Apr 9	1955	71	1599	67	87	4	269	0
Apr 10	2011	56	1650	51	92	5	269	0
Apr 11	2081	70	1719	69	93	1	269	0
Apr 12	2114	33	1747	28	98	5	269	0
Apr 13	2145	31	1777	30	99	1	269	0
Apr 14	2170	25	1800	23	101	2	269	0
Apr 15	2192	22	1821	21	102	1	269	0
Apr 16	2207	15	1833	12	105	3	269	0
Apr 17	2224	17	1847	14	108	3	269	0
Apr 18	2235	11	1856	9	110	2	269	0
Apr 19	2235	0	1853	-3	113	3	269	0
Apr 20	2245	10	1860	7	116	3	269	0
Apr 21	2401	156	1703	-157	121	5	577	308
Apr 22	2408	7	1710	7	121	0	577	0
Apr 23	2463	55	1761	51	125	4	577	0
Apr 24	2490	27	1783	22	130	5	577	0
Apr 25	2506	16	1799	16	130	0	577	0
Apr 26	2517	11	1806	7	134	4	577	0

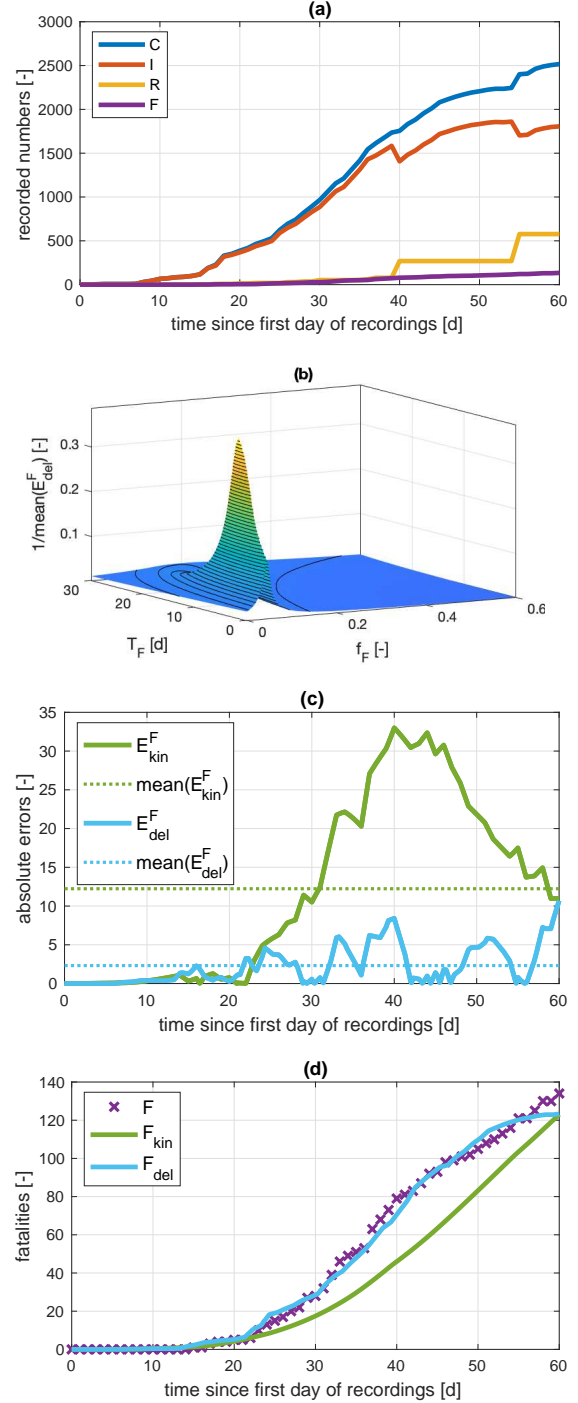


Figure 21: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Greece

Table 22: Data recorded in Hungary

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 4	2	2	2	2	0	0	0	0
Mar 5	4	2	4	2	0	0	0	0
Mar 6	4	0	4	0	0	0	0	0
Mar 7	5	1	5	1	0	0	0	0
Mar 8	7	2	7	2	0	0	0	0
Mar 9	9	2	9	2	0	0	0	0
Mar 10	12	3	12	3	0	0	0	0
Mar 11	13	1	13	1	0	0	0	0
Mar 12	16	3	16	3	0	0	0	0
Mar 13	19	3	18	2	0	0	1	1
Mar 14	30	11	29	11	0	0	1	0
Mar 15	32	2	30	1	1	1	1	0
Mar 16	39	7	36	6	1	0	2	1
Mar 17	50	11	47	11	1	0	2	0
Mar 18	58	8	55	8	1	0	2	0
Mar 19	73	15	70	15	1	0	2	0
Mar 20	85	12	74	4	4	3	7	5
Mar 21	103	18	92	18	4	0	7	0
Mar 22	131	28	109	17	6	2	16	9
Mar 23	167	36	138	29	8	2	21	5
Mar 24	187	20	157	19	9	1	21	0
Mar 25	226	39	195	38	10	1	21	0
Mar 26	261	35	223	28	10	0	28	7
Mar 27	300	39	256	33	10	0	34	6
Mar 28	343	43	298	42	11	1	34	0
Mar 29	408	65	361	63	13	2	34	0
Mar 30	447	39	398	37	15	2	34	0
Mar 31	492	45	439	41	16	1	37	3
Apr 1	525	33	465	26	20	4	40	3
Apr 2	585	60	522	57	21	1	42	2
Apr 3	623	38	554	32	26	5	43	1
Apr 4	678	55	588	34	32	6	58	15
Apr 5	733	55	633	45	34	2	66	8
Apr 6	744	11	639	6	38	4	67	1
Apr 7	817	73	699	60	47	9	71	4
Apr 8	895	78	743	44	58	11	94	23
Apr 9	980	85	818	75	66	8	96	2
Apr 10	1190	210	1001	183	77	11	112	16
Apr 11	1310	120	1110	109	85	8	115	3
Apr 12	1410	100	1193	83	99	14	118	3
Apr 13	1458	48	1229	36	109	10	120	2
Apr 14	1512	54	1268	39	122	13	122	2
Apr 15	1579	67	1253	-15	134	12	192	70
Apr 16	1652	73	1311	58	142	8	199	7
Apr 17	1763	111	1400	89	156	14	207	8
Apr 18	1834	71	1431	31	172	16	231	24
Apr 19	1916	82	1477	46	189	17	250	19
Apr 20	1984	68	1518	41	199	10	267	17
Apr 21	2098	114	1598	80	213	14	287	20
Apr 22	2168	70	1648	50	225	12	295	8
Apr 23	2284	116	1655	7	239	14	390	95
Apr 24	2383	99	1732	77	250	11	401	11
Apr 25	2443	60	1723	-9	262	12	458	57
Apr 26	2500	57	1743	20	272	10	485	27

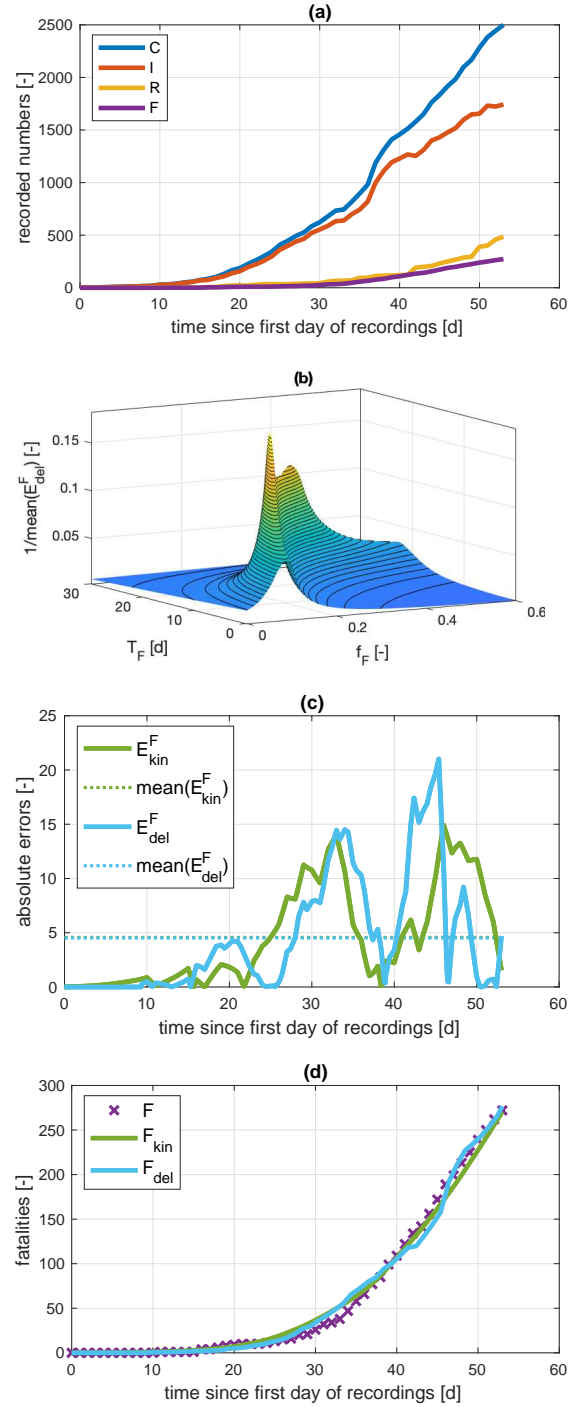


Figure 22: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Hungary

Table 23: Data recorded in Iceland

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 28	1	1	1	1	0	0	0	0
Feb 29	1	0	1	0	0	0	0	0
Mar 1	3	2	3	2	0	0	0	0
Mar 2	9	6	9	6	0	0	0	0
Mar 3	14	5	13	4	0	0	1	1
Mar 4	26	12	25	12	0	0	1	0
Mar 5	37	11	37	12	0	0	0	-1
Mar 6	45	8	44	7	0	0	1	1
Mar 7	50	5	49	5	0	0	1	0
Mar 8	58	8	57	8	0	0	1	0
Mar 9	65	7	64	7	0	0	1	0
Mar 10	81	16	80	16	0	0	1	0
Mar 11	85	4	85	5	0	0	0	-1
Mar 12	117	32	117	32	0	0	0	0
Mar 13	134	17	134	17	0	0	0	0
Mar 14	161	27	161	27	0	0	0	0
Mar 15	180	19	180	19	0	0	0	0
Mar 16	199	19	199	19	0	0	0	0
Mar 17	247	48	242	43	0	0	5	5
Mar 18	250	3	245	3	0	0	5	0
Mar 19	330	80	325	80	0	0	5	0
Mar 20	409	79	404	79	0	0	5	0
Mar 21	473	64	467	63	1	1	5	0
Mar 22	568	95	562	95	1	0	5	0
Mar 23	588	20	536	-26	1	0	51	46
Mar 24	648	60	595	59	2	1	51	0
Mar 25	737	89	679	84	2	0	56	5
Mar 26	802	65	718	39	2	0	82	26
Mar 27	890	88	791	73	2	0	97	15
Mar 28	963	73	847	56	2	0	114	17
Mar 29	1020	57	883	36	2	0	135	21
Mar 30	1086	66	927	44	2	0	157	22
Mar 31	1135	49	935	8	2	0	198	41
Apr 1	1220	85	982	47	2	0	236	38
Apr 2	1319	99	1031	49	4	2	284	48
Apr 3	1364	45	1051	20	4	0	309	25
Apr 4	1417	53	1017	-34	4	0	396	87
Apr 5	1486	69	1054	37	4	0	428	32
Apr 6	1562	76	1096	42	6	2	460	32
Apr 7	1586	24	1021	-75	6	0	559	99
Apr 8	1616	30	977	-44	6	0	633	74
Apr 9	1648	32	954	-23	6	0	688	55
Apr 10	1675	27	917	-37	7	1	751	63
Apr 11	1689	14	840	-77	8	1	841	90
Apr 12	1701	12	804	-36	8	0	889	48
Apr 13	1711	10	770	-34	8	0	933	44
Apr 14	1720	9	723	-47	8	0	989	56
Apr 15	1727	7	642	-81	8	0	1077	88
Apr 16	1739	12	587	-55	8	0	1144	67
Apr 17	1754	15	521	-66	9	1	1224	80
Apr 18	1760	6	460	-61	9	0	1291	67
Apr 19	1771	11	471	11	9	0	1291	0
Apr 20	1773	2	401	-70	10	1	1362	71
Apr 21	1778	5	351	-50	10	0	1417	55
Apr 22	1785	7	313	-38	10	0	1462	45
Apr 23	1789	4	270	-43	10	0	1509	47
Apr 24	1789	0	237	-33	10	0	1542	33
Apr 25	1790	1	210	-27	10	0	1570	28
Apr 26	1792	2	174	-36	10	0	1608	38

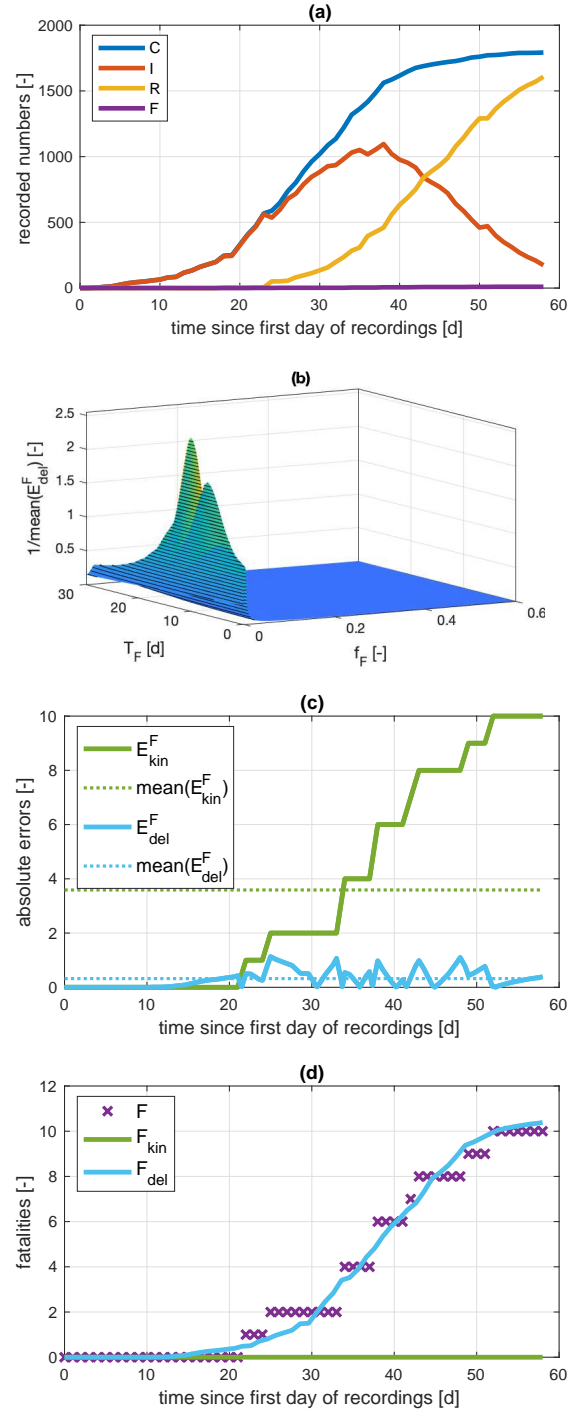


Figure 23: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Iceland

Table 24: Data recorded in India

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	3	3	0	0	0	0	3	3
Feb 16	3	0	0	0	0	0	3	0
Feb 17	3	0	0	0	0	0	3	0
Feb 18	3	0	0	0	0	0	3	0
Feb 19	3	0	0	0	0	0	3	0
Feb 20	3	0	0	0	0	0	3	0
Feb 21	3	0	0	0	0	0	3	0
Feb 22	3	0	0	0	0	0	3	0
Feb 23	3	0	0	0	0	0	3	0
Feb 24	3	0	0	0	0	0	3	0
Feb 25	3	0	0	0	0	0	3	0
Feb 26	3	0	0	0	0	0	3	0
Feb 27	3	0	0	0	0	0	3	0
Feb 28	3	0	0	0	0	0	3	0
Feb 29	3	0	0	0	0	0	3	0
Mar 1	3	0	0	0	0	0	3	0
Mar 2	6	3	3	3	0	0	3	0
Mar 3	7	1	4	1	0	0	3	0
Mar 4	29	22	26	22	0	0	3	0
Mar 5	30	1	27	1	0	0	3	0
Mar 6	31	1	28	1	0	0	3	0
Mar 7	34	3	31	3	0	0	3	0
Mar 8	40	6	37	6	0	0	3	0
Mar 9	47	7	43	6	0	0	4	1
Mar 10	62	15	58	15	0	0	4	0
Mar 11	62	0	58	0	0	0	4	0
Mar 12	74	12	69	11	1	1	4	0
Mar 13	82	8	70	1	2	1	10	6
Mar 14	100	18	88	18	2	0	10	0
Mar 15	114	14	99	11	2	0	13	3
Mar 16	129	15	114	15	2	0	13	0
Mar 17	143	14	126	12	3	1	14	1
Mar 18	169	26	152	26	3	0	14	0
Mar 19	194	25	170	18	4	1	20	6
Mar 20	249	55	221	51	5	1	23	3
Mar 21	332	83	304	83	5	0	23	0
Mar 22	396	64	365	61	7	2	24	1
Mar 23	499	103	455	90	10	3	34	10
Mar 24	536	37	486	31	10	0	40	6
Mar 25	657	121	602	116	12	2	43	3
Mar 26	727	70	662	60	20	8	45	2
Mar 27	887	160	794	132	20	0	73	28
Mar 28	987	100	879	85	24	4	84	11
Mar 29	1024	37	902	23	27	3	95	11
Mar 30	1251	227	1117	215	32	5	102	7
Mar 31	1397	146	1239	122	35	3	123	21
Apr 1	1998	601	1792	553	58	23	148	25
Apr 2	2543	545	2280	488	72	14	191	43
Apr 3	3059	516	2781	501	86	14	192	1
Apr 4	3588	529	3260	479	99	13	229	37
Apr 5	4289	701	3843	583	118	19	328	99
Apr 6	4778	489	4267	424	136	18	375	47
Apr 7	5351	573	4723	456	160	24	468	93
Apr 8	5916	565	5232	509	178	18	506	38
Apr 9	6725	809	5863	631	227	49	635	129
Apr 10	7600	875	6577	714	249	22	774	139
Apr 11	8446	846	7189	612	288	39	969	195
Apr 12	9205	759	7794	605	331	43	1080	111
Apr 13	10453	1248	8914	1120	358	27	1181	101
Apr 14	11487	1034	9735	821	393	35	1359	178
Apr 15	12370	883	10440	705	422	29	1508	149
Apr 16	13430	1060	11214	774	448	26	1768	260
Apr 17	14352	922	11825	611	486	38	2041	273
Apr 18	16365	2013	13381	1556	521	35	2463	422
Apr 19	17615	1250	14202	821	559	38	2854	391
Apr 20	18539	924	14674	472	592	33	3273	419
Apr 21	20080	1541	15460	786	645	53	3975	702
Apr 22	21370	1290	16319	859	681	36	4370	395
Apr 23	23039	1669	17306	987	721	40	5012	642
Apr 24	24447	1408	18171	865	780	59	5496	484
Apr 25	26283	1836	19519	1348	825	45	5939	443
Apr 26	27890	1607	20486	967	881	56	6523	584

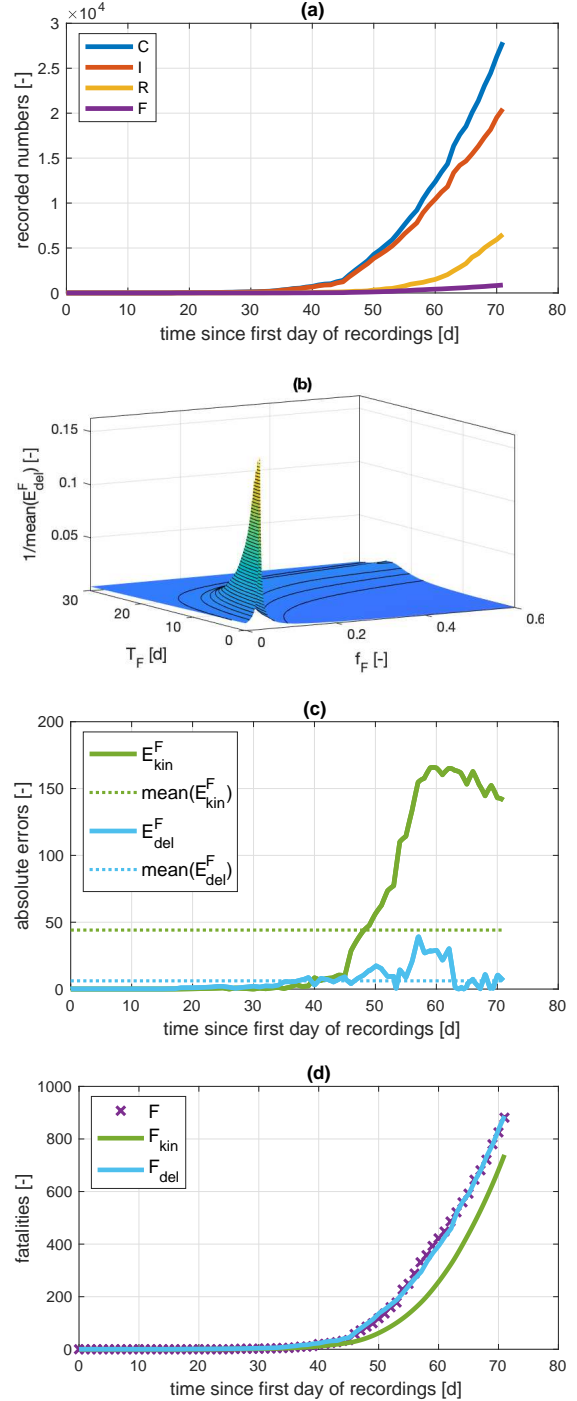


Figure 24: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for India

Table 25: Data recorded in Indonesia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 2	2	2	2	2	0	0	0	0
Mar 3	2	0	2	0	0	0	0	0
Mar 4	2	0	2	0	0	0	0	0
Mar 5	2	0	2	0	0	0	0	0
Mar 6	4	2	4	2	0	0	0	0
Mar 7	4	0	4	0	0	0	0	0
Mar 8	6	2	6	2	0	0	0	0
Mar 9	19	13	19	13	0	0	0	0
Mar 10	27	8	25	6	0	0	2	2
Mar 11	34	7	31	6	1	1	2	0
Mar 12	34	0	30	-1	1	0	3	1
Mar 13	69	35	60	30	4	3	5	2
Mar 14	96	27	83	23	5	1	8	3
Mar 15	117	21	104	21	5	0	8	0
Mar 16	134	17	121	17	5	0	8	0
Mar 17	172	38	156	35	7	2	9	1
Mar 18	227	55	197	41	19	12	11	2
Mar 19	309	82	269	72	25	6	15	4
Mar 20	369	60	320	51	32	7	17	2
Mar 21	450	81	392	72	38	6	20	3
Mar 22	514	64	437	45	48	10	29	9
Mar 23	579	65	500	63	49	1	30	1
Mar 24	686	107	601	101	55	6	30	0
Mar 25	790	104	701	100	58	3	31	1
Mar 26	893	103	780	79	78	20	35	4
Mar 27	1046	153	913	133	87	9	46	11
Mar 28	1155	109	994	81	102	15	59	13
Mar 29	1285	130	1107	113	114	12	64	5
Mar 30	1414	129	1217	110	122	8	75	11
Mar 31	1528	114	1311	94	136	14	81	6
Apr 1	1677	149	1417	106	157	21	103	22
Apr 2	1790	113	1508	91	170	13	112	9
Apr 3	1986	196	1671	163	181	11	134	22
Apr 4	2092	106	1751	80	191	10	150	16
Apr 5	2273	181	1911	160	198	7	164	14
Apr 6	2491	218	2090	179	209	11	192	28
Apr 7	2738	247	2313	223	221	12	204	12
Apr 8	2956	218	2494	181	240	19	222	18
Apr 9	3293	337	2761	267	280	40	252	30
Apr 10	3512	219	2924	163	306	26	282	30
Apr 11	3842	330	3229	305	327	21	286	4
Apr 12	4241	399	3509	280	373	46	359	73
Apr 13	4557	316	3778	269	399	26	380	21
Apr 14	4839	282	3954	176	459	60	426	46
Apr 15	5136	297	4221	267	469	10	446	20
Apr 16	5516	380	4472	251	496	27	548	102
Apr 17	5923	407	4796	324	520	24	607	59
Apr 18	6248	325	5082	286	535	15	631	24
Apr 19	6575	327	5307	225	582	47	686	55
Apr 20	6760	185	5423	116	590	8	747	61
Apr 21	7135	375	5677	254	616	26	842	95
Apr 22	7418	283	5870	193	635	19	913	71
Apr 23	7775	357	6168	298	647	12	960	47
Apr 24	8211	436	6520	352	689	42	1002	42
Apr 25	8607	396	6845	325	720	31	1042	40
Apr 26	8882	275	7032	187	743	23	1107	65

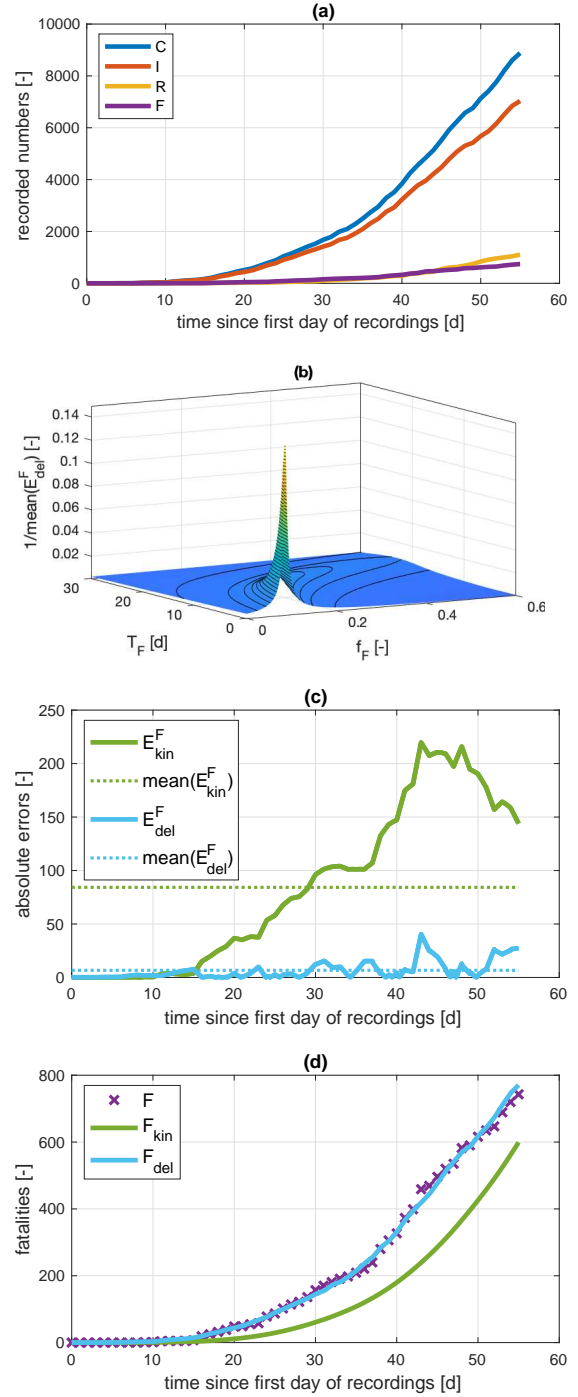


Figure 25: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Indonesia

Table 26: Data recorded in Iran

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 19	2	2	0	0	2	2	0	0
Feb 20	5	3	3	3	2	0	0	0
Feb 21	18	13	14	11	4	2	0	0
Feb 22	29	11	23	9	6	2	0	0
Feb 23	43	14	34	11	8	2	1	1
Feb 24	61	18	46	12	12	4	3	2
Feb 25	95	34	54	8	16	4	25	22
Feb 26	139	44	95	41	19	3	25	0
Feb 27	245	106	165	70	26	7	54	29
Feb 28	388	143	281	116	34	8	73	19
Feb 29	593	205	427	146	43	9	123	50
Mar 1	978	385	749	322	54	11	175	52
Mar 2	1501	523	1144	395	66	12	291	116
Mar 3	2336	835	1824	680	77	11	435	144
Mar 4	2922	586	2278	454	92	15	552	117
Mar 5	3513	591	2666	388	108	16	739	187
Mar 6	4747	1234	3710	1044	124	16	913	174
Mar 7	5823	1076	4009	299	145	21	1669	756
Mar 8	6566	743	4238	229	194	49	2134	465
Mar 9	7161	595	4530	292	237	43	2394	260
Mar 10	8042	881	5020	490	291	54	2731	337
Mar 11	9000	958	5687	667	354	63	2959	228
Mar 12	10075	1075	6370	683	429	75	3276	317
Mar 13	11364	1289	7321	951	514	85	3529	253
Mar 14	12729	1365	7779	458	611	97	4339	810
Mar 15	13938	1209	8624	845	724	113	4590	251
Mar 16	14991	1053	9142	518	853	129	4996	406
Mar 17	16169	1178	9792	650	988	135	5389	393
Mar 18	17361	1192	10516	724	1135	147	5710	321
Mar 19	18407	1046	11144	628	1284	149	5979	269
Mar 20	19644	1237	11466	322	1433	149	6745	766
Mar 21	20610	966	11419	-47	1556	123	7635	890
Mar 22	21638	1028	12040	621	1685	129	7913	278
Mar 23	23049	1411	12861	821	1812	127	8376	463
Mar 24	24811	1762	13964	1103	1934	122	8913	537
Mar 25	27017	2206	15315	1351	2077	143	9625	712
Mar 26	29406	2389	16715	1400	2234	157	10457	832
Mar 27	32332	2926	18821	2106	2378	144	11133	676
Mar 28	35408	3076	21212	2391	2517	139	11679	546
Mar 29	38309	2901	23278	2066	2640	123	12391	712
Mar 30	41495	3186	24827	1549	2757	117	13911	1520
Mar 31	44605	3110	27051	2224	2898	141	14656	745
Apr 1	47593	2988	29084	2033	3036	138	15473	817
Apr 2	50468	2875	30597	1513	3160	124	16711	1238
Apr 3	53183	2715	31954	1357	3294	134	17935	1224
Apr 4	55743	2560	32555	601	3452	158	19736	1801
Apr 5	58226	2483	32612	57	3603	151	22011	2275
Apr 6	60500	2274	32525	-87	3739	136	24236	2225
Apr 7	62589	2089	31678	-847	3872	133	27039	2803
Apr 8	64586	1997	30781	-897	3993	121	29812	2773
Apr 9	66220	1634	29801	-980	4110	117	32309	2497
Apr 10	68192	1972	28495	-1306	4232	122	35465	3156
Apr 11	70029	1837	23725	-4770	4357	125	41947	6482
Apr 12	71686	1657	23318	-407	4474	117	43894	1947
Apr 13	73303	1617	22735	-583	4585	111	45983	2089
Apr 14	74877	1574	22065	-670	4683	98	48129	2146
Apr 15	76389	1512	21679	-386	4777	94	49933	1804
Apr 16	77995	1606	20897	-782	4869	92	52229	2296
Apr 17	79494	1499	20472	-425	4958	89	54064	1835
Apr 18	80868	1374	19850	-622	5031	73	55987	1923
Apr 19	82211	1343	20070	220	5118	87	57023	1036
Apr 20	83505	1294	19023	-1047	5209	91	59273	2250
Apr 21	84802	1297	18540	-483	5297	88	60965	1692
Apr 22	85996	1194	17492	-1048	5391	94	63113	2148
Apr 23	87026	1030	16702	-790	5481	90	64843	1730
Apr 24	88194	1168	16021	-681	5574	93	66599	1756
Apr 25	89328	1134	15485	-536	5650	76	68193	1594
Apr 26	90481	1153	15114	-371	5710	60	69657	1464

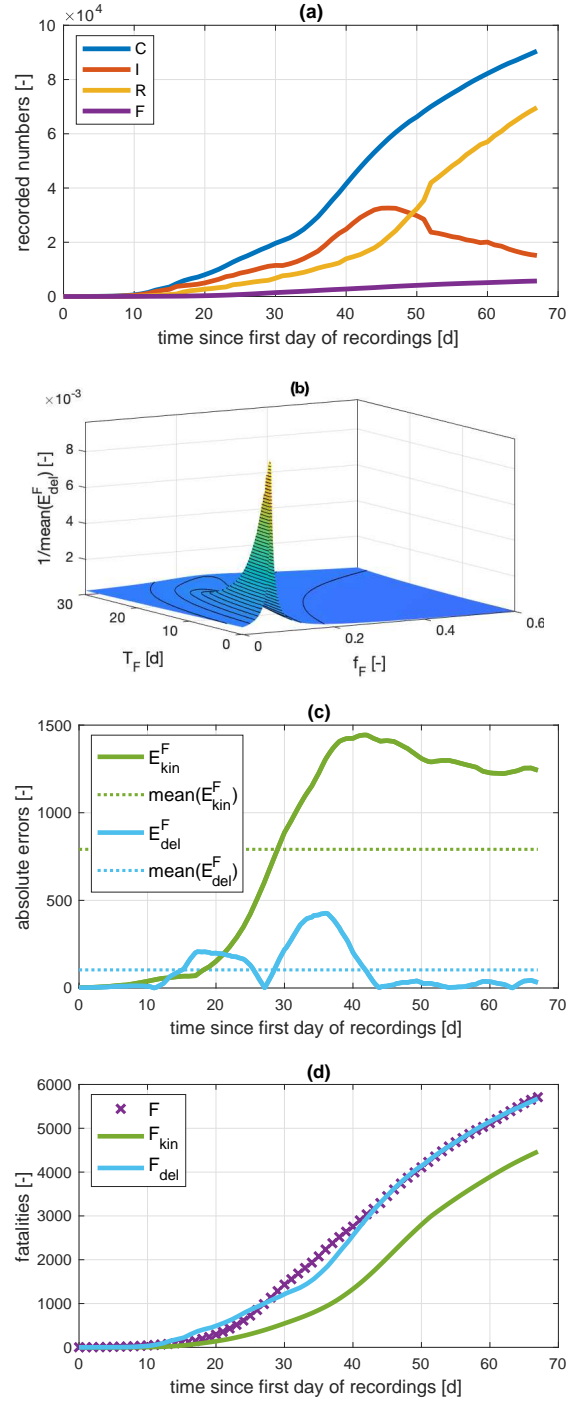


Figure 26: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Iran

Table 27: Data recorded in Iraq

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 22	1	1	1	1	0	0	0	0
Feb 23	1	0	1	0	0	0	0	0
Feb 24	1	0	1	0	0	0	0	0
Feb 25	5	4	5	4	0	0	0	0
Feb 26	5	0	5	0	0	0	0	0
Feb 27	7	2	7	2	0	0	0	0
Feb 28	8	1	8	1	0	0	0	0
Feb 29	13	5	13	5	0	0	0	0
Mar 1	19	6	19	6	0	0	0	0
Mar 2	27	8	27	8	0	0	0	0
Mar 3	32	5	32	5	0	0	0	0
Mar 4	37	5	35	3	2	2	0	0
Mar 5	40	3	37	2	3	1	0	0
Mar 6	46	6	41	4	4	1	1	1
Mar 7	54	8	49	8	4	0	1	0
Mar 8	65	11	58	9	6	2	1	0
Mar 9	71	6	61	3	7	1	3	2
Mar 10	71	0	49	-12	7	0	15	12
Mar 11	71	0	49	0	7	0	15	0
Mar 12	83	12	51	2	8	1	24	9
Mar 13	101	18	68	17	9	1	24	0
Mar 14	110	9	74	6	10	1	26	2
Mar 15	124	14	88	14	10	0	26	0
Mar 16	133	9	91	3	10	0	32	6
Mar 17	154	21	102	11	11	1	41	9
Mar 18	164	10	111	9	12	1	41	0
Mar 19	192	28	130	19	13	1	49	8
Mar 20	208	16	142	12	17	4	49	0
Mar 21	214	6	146	4	17	0	51	2
Mar 22	233	19	156	10	20	3	57	6
Mar 23	266	33	181	25	23	3	62	5
Mar 24	316	50	214	33	27	4	75	13
Mar 25	346	30	214	0	29	2	103	28
Mar 26	382	36	241	27	36	7	105	2
Mar 27	458	76	296	55	40	4	122	17
Mar 28	506	48	333	37	42	2	131	9
Mar 29	547	41	362	29	42	0	143	12
Mar 30	630	83	432	70	46	4	152	9
Mar 31	694	64	474	42	50	4	170	18
Apr 1	728	34	494	20	52	2	182	12
Apr 2	772	44	516	22	54	2	202	20
Apr 3	820	48	540	24	54	0	226	24
Apr 4	878	58	563	23	56	2	259	33
Apr 5	961	83	621	58	61	5	279	20
Apr 6	1031	70	623	2	64	3	344	65
Apr 7	1122	91	684	61	63	-1	375	31
Apr 8	1202	80	681	-3	69	6	452	77
Apr 9	1232	30	667	-14	69	0	496	44
Apr 10	1279	47	659	-8	70	1	550	54
Apr 11	1318	39	645	-14	72	2	601	51
Apr 12	1352	34	636	-9	76	4	640	39
Apr 13	1378	26	583	-53	78	2	717	77
Apr 14	1400	22	556	-27	78	0	766	49
Apr 15	1415	15	524	-32	79	1	812	46
Apr 16	1434	19	498	-26	80	1	856	44
Apr 17	1482	48	495	-3	81	1	906	50
Apr 18	1513	31	478	-17	82	1	953	47
Apr 19	1539	26	448	-30	82	0	1009	56
Apr 20	1574	35	449	1	82	0	1043	34
Apr 21	1602	28	423	-26	83	1	1096	53
Apr 22	1631	29	402	-21	83	0	1146	50
Apr 23	1677	46	423	21	83	0	1171	25
Apr 24	1708	31	418	-5	86	3	1204	33
Apr 25	1763	55	453	35	86	0	1224	20
Apr 26	1820	57	470	17	87	1	1263	39

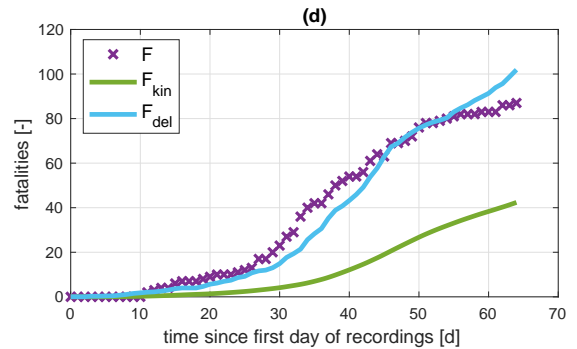
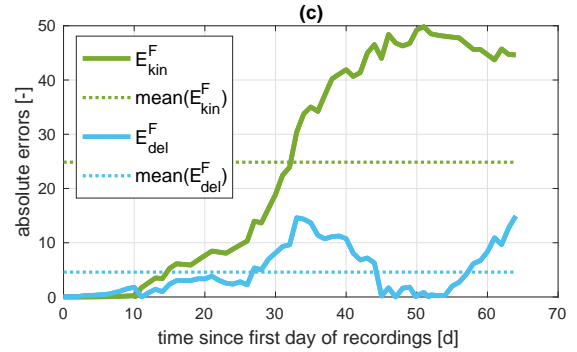
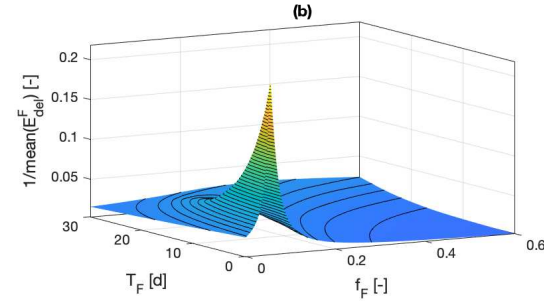
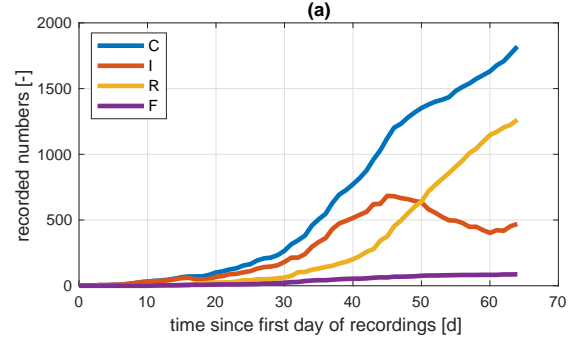


Figure 27: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Iraq

Table 28: Data recorded in Ireland

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 29	1	1	1	1	0	0	0	0
Mar 1	1	0	1	0	0	0	0	0
Mar 2	1	0	1	0	0	0	0	0
Mar 3	2	1	2	1	0	0	0	0
Mar 4	6	4	6	4	0	0	0	0
Mar 5	13	7	13	7	0	0	0	0
Mar 6	18	5	18	5	0	0	0	0
Mar 7	19	1	19	1	0	0	0	0
Mar 8	21	2	21	2	0	0	0	0
Mar 9	24	3	24	3	0	0	0	0
Mar 10	34	10	34	10	0	0	0	0
Mar 11	43	9	42	8	1	1	0	0
Mar 12	70	27	69	27	1	0	0	0
Mar 13	90	20	89	20	1	0	0	0
Mar 14	129	39	127	38	2	1	0	0
Mar 15	170	41	167	40	2	0	1	1
Mar 16	223	53	216	49	2	0	5	4
Mar 17	292	69	285	69	2	0	5	0
Mar 18	366	74	359	74	2	0	5	0
Mar 19	557	191	549	190	3	1	5	0
Mar 20	683	126	675	126	3	0	5	0
Mar 21	785	102	777	102	3	0	5	0
Mar 22	906	121	897	120	4	1	5	0
Mar 23	1125	219	1114	217	6	2	5	0
Mar 24	1329	204	1317	203	7	1	5	0
Mar 25	1564	235	1550	233	9	2	5	0
Mar 26	1819	255	1795	245	19	10	5	0
Mar 27	2121	302	2094	299	22	3	5	0
Mar 28	2415	294	2374	280	36	14	5	0
Mar 29	2615	200	2564	190	46	10	5	0
Mar 30	2910	295	2851	287	54	8	5	0
Mar 31	3235	325	3159	308	71	17	5	0
Apr 1	3447	212	3357	198	85	14	5	0
Apr 2	3849	402	3746	389	98	13	5	0
Apr 3	4273	424	4128	382	120	22	25	20
Apr 4	4604	331	4442	314	137	17	25	0
Apr 5	4994	390	4811	369	158	21	25	0
Apr 6	5364	370	5165	354	174	16	25	0
Apr 7	5709	345	5474	309	210	36	25	0
Apr 8	6074	365	5814	340	235	25	25	0
Apr 9	6574	500	6286	472	263	28	25	0
Apr 10	8089	1515	7777	1491	287	24	25	0
Apr 11	8928	839	8583	806	320	33	25	0
Apr 12	9655	727	9296	713	334	14	25	0
Apr 13	10647	992	10257	961	365	31	25	0
Apr 14	11479	832	11048	791	406	41	25	0
Apr 15	12547	1068	12026	978	444	38	77	52
Apr 16	13271	724	12708	682	486	42	77	0
Apr 17	13980	709	13373	665	530	44	77	0
Apr 18	14758	778	14110	737	571	41	77	0
Apr 19	15251	493	14564	454	610	39	77	0
Apr 20	15652	401	14888	324	687	77	77	0
Apr 21	16040	388	6077	-8811	730	43	9233	9156
Apr 22	16671	631	6669	592	769	39	9233	0
Apr 23	17607	936	7580	911	794	25	9233	0
Apr 24	18184	577	7937	357	1014	220	9233	0
Apr 25	18561	377	8265	328	1063	49	9233	0
Apr 26	19262	701	8942	677	1087	24	9233	0

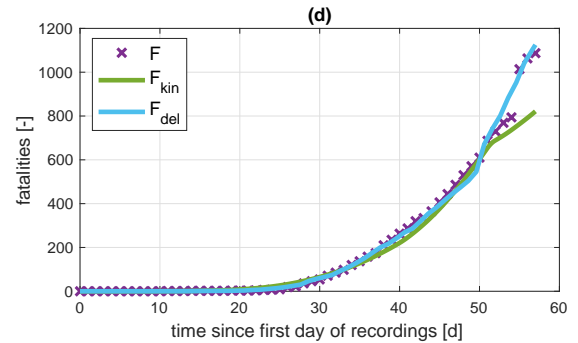
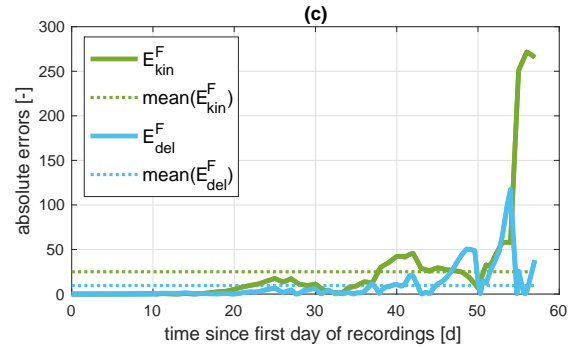
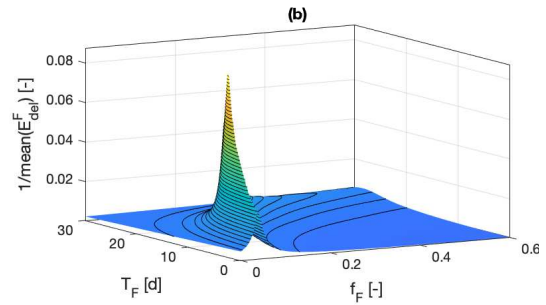
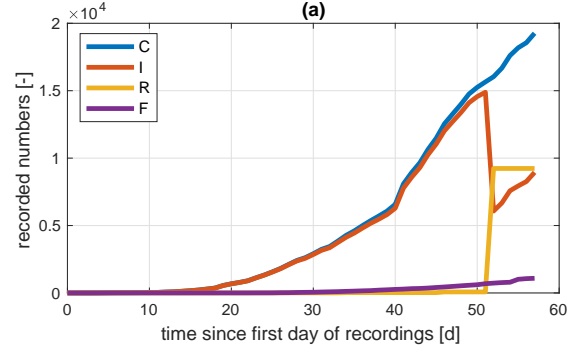


Figure 28: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Ireland

Table 29: Data recorded in Israel

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 21	1	1	1	1	0	0	0	0
Feb 22	1	0	1	0	0	0	0	0
Feb 23	2	1	2	1	0	0	0	0
Feb 24	2	0	2	0	0	0	0	0
Feb 25	2	0	2	0	0	0	0	0
Feb 26	2	0	2	0	0	0	0	0
Feb 27	3	1	3	1	0	0	0	0
Feb 28	7	4	6	3	0	0	1	1
Feb 29	7	0	6	0	0	0	1	0
Mar 1	10	3	9	3	0	0	1	0
Mar 2	12	2	11	2	0	0	1	0
Mar 3	12	0	11	0	0	0	1	0
Mar 4	15	3	14	3	0	0	1	0
Mar 5	17	2	15	1	0	0	2	1
Mar 6	21	4	19	4	0	0	2	0
Mar 7	25	4	22	3	0	0	3	1
Mar 8	39	14	36	14	0	0	3	0
Mar 9	50	11	46	10	0	0	4	1
Mar 10	75	25	71	25	0	0	4	0
Mar 11	97	22	93	22	0	0	4	0
Mar 12	109	12	105	12	0	0	4	0
Mar 13	143	34	139	34	0	0	4	0
Mar 14	193	50	189	50	0	0	4	0
Mar 15	213	20	209	20	0	0	4	0
Mar 16	298	85	294	85	0	0	4	0
Mar 17	337	39	326	32	0	0	11	7
Mar 18	433	96	422	96	0	0	11	0
Mar 19	677	244	663	241	0	0	14	3
Mar 20	705	28	689	26	1	1	15	1
Mar 21	883	178	846	157	1	0	36	21
Mar 22	1071	188	1033	187	1	0	37	1
Mar 23	1442	371	1400	367	1	0	41	4
Mar 24	1930	488	1874	474	3	2	53	12
Mar 25	2369	439	2306	432	5	2	58	5
Mar 26	2693	324	2617	311	8	3	68	10
Mar 27	3035	342	2944	327	12	4	79	11
Mar 28	3619	584	3518	574	12	0	89	10
Mar 29	4247	628	4100	582	15	3	132	43
Mar 30	4695	448	4518	418	16	1	161	29
Mar 31	5358	663	5114	596	20	4	224	63
Apr 1	6092	734	5825	711	26	6	241	17
Apr 2	6857	765	6483	658	36	10	338	97
Apr 3	7428	571	6985	502	40	4	403	65
Apr 4	7851	423	7380	395	44	4	427	24
Apr 5	8430	579	7904	524	49	5	477	50
Apr 6	8904	474	8262	358	57	8	585	108
Apr 7	9248	344	8413	151	65	8	770	185
Apr 8	9404	156	8530	117	73	8	801	31
Apr 9	9968	564	8871	341	86	13	1011	210
Apr 10	10408	440	9130	259	95	9	1183	172
Apr 11	10743	335	9301	171	101	6	1341	158
Apr 12	11145	402	9415	114	103	2	1627	286
Apr 13	11586	441	9615	200	116	13	1855	228
Apr 14	12046	460	9728	113	123	7	2195	340
Apr 15	12501	455	9808	80	130	7	2563	368
Apr 16	12758	257	9798	-10	142	12	2818	255
Apr 17	12982	224	9705	-93	151	9	3126	308
Apr 18	13265	283	9645	-60	164	13	3456	330
Apr 19	13491	226	9565	-80	172	8	3754	298
Apr 20	13713	222	9487	-78	177	5	4049	295
Apr 21	13942	229	9251	-236	184	7	4507	458
Apr 22	14498	556	9094	-157	189	5	5215	708
Apr 23	14803	305	9000	-94	192	3	5611	396
Apr 24	15058	255	8861	-139	194	2	6003	392
Apr 25	15298	240	8664	-197	199	5	6435	432
Apr 26	15443	145	8511	-153	201	2	6731	296

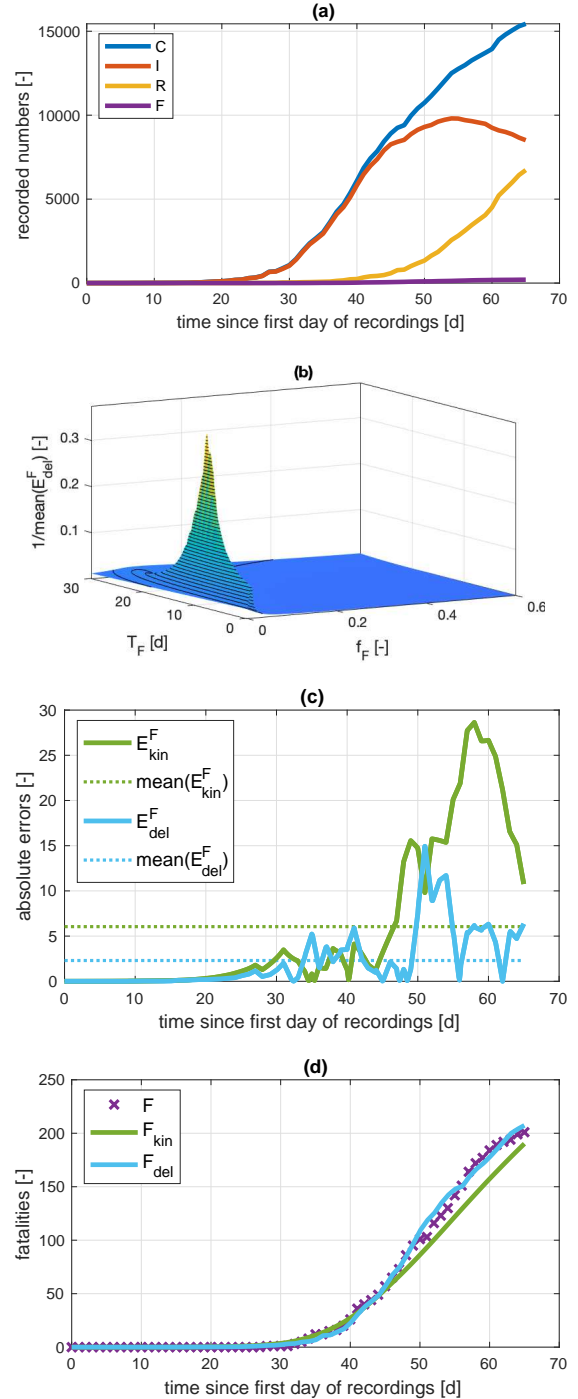


Figure 29: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Israel

Table 30: Data recorded in Italy

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	3	3	3	3	0	0	0	0
Feb 16	3	0	3	0	0	0	0	0
Feb 17	3	0	3	0	0	0	0	0
Feb 18	3	0	3	0	0	0	0	0
Feb 19	3	0	3	0	0	0	0	0
Feb 20	4	1	4	1	0	0	0	0
Feb 21	21	17	19	15	1	1	1	1
Feb 22	79	58	75	56	2	1	2	1
Feb 23	157	78	152	77	3	1	2	0
Feb 24	229	72	221	69	7	4	1	-1
Feb 25	323	94	310	89	11	4	2	1
Feb 26	470	147	455	145	12	1	3	1
Feb 27	655	185	593	138	17	5	45	42
Feb 28	889	234	822	229	21	4	46	1
Feb 29	1128	239	1049	227	29	8	50	4
Mar 1	1701	573	1577	528	41	12	83	33
Mar 2	2036	335	1835	258	52	11	149	66
Mar 3	2502	466	2263	428	79	27	160	11
Mar 4	3089	587	2706	443	107	28	276	116
Mar 5	3858	769	3296	590	148	41	414	138
Mar 6	4636	778	3916	620	197	49	523	109
Mar 7	5883	1247	5061	1145	233	36	589	66
Mar 8	7375	1492	6387	1326	366	133	622	33
Mar 9	9172	1797	7985	1598	463	97	724	102
Mar 10	10149	977	8514	529	631	168	1004	280
Mar 11	12462	2313	10590	2076	827	196	1045	41
Mar 12	15113	2651	12839	2249	1016	189	1258	213
Mar 13	17660	2547	14955	2116	1266	250	1439	181
Mar 14	21157	3497	17750	2795	1441	175	1966	527
Mar 15	24747	3590	20603	2853	1809	368	2335	369
Mar 16	27980	3233	23073	2470	2158	349	2749	414
Mar 17	31506	3526	26062	2989	2503	345	2941	192
Mar 18	35713	4207	28710	2648	2978	475	4025	1084
Mar 19	41035	5322	33190	4480	3405	427	4440	415
Mar 20	47021	5986	37860	4670	4032	627	5129	689
Mar 21	53578	6557	42681	4821	4825	793	6072	943
Mar 22	59138	5560	46638	3957	5476	651	7024	952
Mar 23	63927	4789	50418	3780	6077	601	7432	408
Mar 24	69176	5249	54030	3612	6820	743	8326	894
Mar 25	74386	5210	57521	3491	7503	683	9362	1036
Mar 26	80589	6203	62013	4492	8215	712	10361	999
Mar 27	86498	5909	66414	4401	9134	919	10950	589
Mar 28	92472	5974	70065	3651	10023	889	12384	1434
Mar 29	97689	5217	73880	3815	10779	756	13030	646
Mar 30	101739	4050	75528	1648	11591	812	14620	1590
Mar 31	105792	4053	77635	2107	12428	837	15729	1109
Apr 1	110574	4782	80572	2937	13155	727	16847	1118
Apr 2	115242	4668	83049	2477	13915	760	18278	1431
Apr 3	119827	4585	85388	2339	14681	766	19758	1480
Apr 4	124632	4805	88274	2886	15362	681	20996	1238
Apr 5	128948	4316	91246	2972	15887	525	21815	819
Apr 6	132547	3599	93187	1941	16523	636	22837	1022
Apr 7	135586	3039	94067	880	17127	604	24392	1555
Apr 8	139422	3836	95262	1195	17669	542	26491	2099
Apr 9	143626	4204	96877	1615	18279	610	28470	1979
Apr 10	147577	3951	98273	1396	18849	570	30455	1985
Apr 11	152271	4694	100269	1996	19468	619	32534	2079
Apr 12	156363	4092	102253	1984	19899	431	34211	1677
Apr 13	159516	3153	103616	1363	20465	566	35435	1224
Apr 14	162488	2972	104291	675	21067	602	37130	1695
Apr 15	165155	2667	105418	1127	21645	578	38092	962
Apr 16	168941	3786	106607	1189	22170	525	40164	2072
Apr 17	172434	3493	106962	355	22745	575	42727	2563
Apr 18	175925	3491	107771	809	23227	482	44927	2200
Apr 19	178972	3047	108257	486	23660	433	47055	2128
Apr 20	181228	2256	108237	-20	24114	454	48877	1822
Apr 21	183957	2729	107709	-528	24648	534	51600	2723
Apr 22	187327	3370	107699	-10	25085	437	54543	2943
Apr 23	189973	2646	106848	-851	25549	464	57576	3033
Apr 24	192994	3021	106527	-321	25969	420	60498	2922
Apr 25	195351	2357	105847	-680	26384	415	63120	2622
Apr 26	197675	2324	106103	256	26644	260	64928	1808

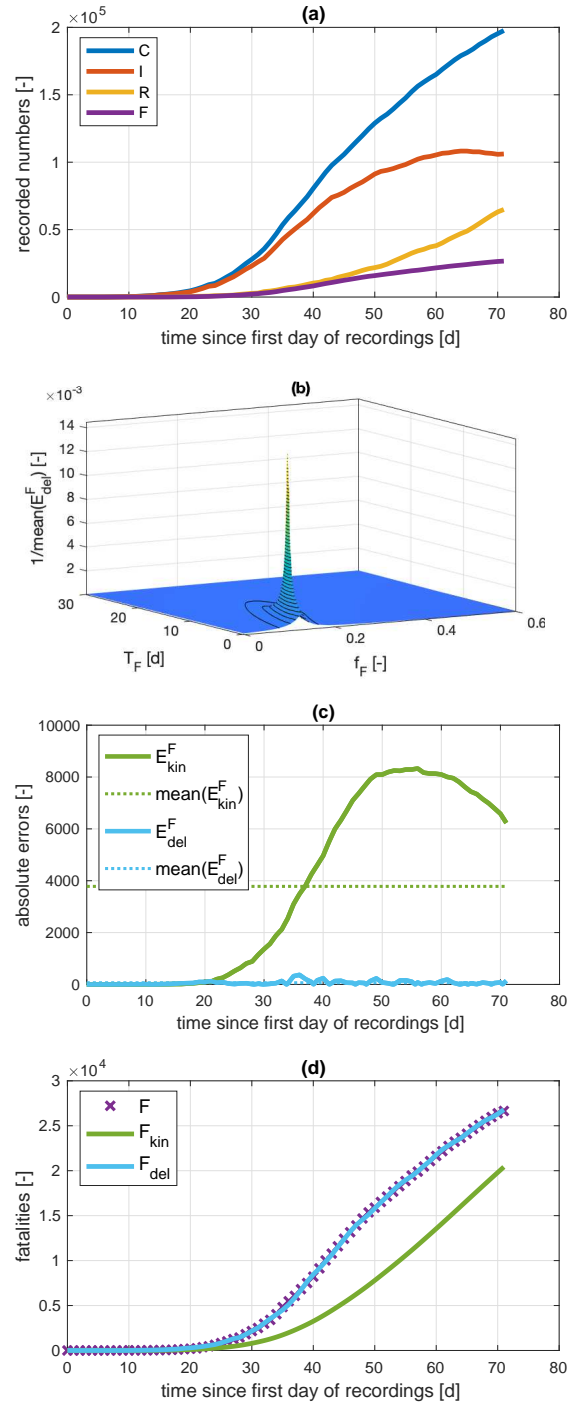


Figure 30: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Italy

Table 31: Data recorded in Japan

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	53	53	52	52	1	1	0	0
Feb 16	59	6	58	6	1	0	0	0
Feb 17	66	7	47	-11	1	0	18	18
Feb 18	74	8	53	6	1	0	20	2
Feb 19	84	10	63	10	1	0	20	0
Feb 20	94	10	73	10	1	0	20	0
Feb 21	109	15	86	13	1	0	22	2
Feb 22	134	25	111	25	1	0	22	0
Feb 23	146	12	122	11	1	0	23	1
Feb 24	159	13	135	13	1	0	23	0
Feb 25	161	2	137	2	1	0	23	0
Feb 26	172	11	146	9	1	0	25	2
Feb 27	214	42	178	32	3	2	33	8
Feb 28	233	19	196	18	4	1	33	0
Feb 29	241	8	204	8	5	1	32	-1
Mar 1	256	15	208	4	5	0	43	11
Mar 2	274	18	226	18	6	1	42	-1
Mar 3	293	19	244	18	6	0	43	1
Mar 4	331	38	282	38	6	0	43	0
Mar 5	364	33	315	33	6	0	43	0
Mar 6	420	56	365	50	6	0	49	6
Mar 7	461	41	379	14	6	0	76	27
Mar 8	502	41	419	40	7	1	76	0
Mar 9	530	28	437	18	9	2	84	8
Mar 10	587	57	473	36	12	3	102	18
Mar 11	639	52	506	33	15	3	118	16
Mar 12	691	52	554	48	19	4	118	0
Mar 13	734	43	595	41	21	2	118	0
Mar 14	804	70	638	43	22	1	144	26
Mar 15	833	29	665	27	24	2	144	0
Mar 16	850	17	678	13	28	4	144	0
Mar 17	878	28	705	27	29	1	144	0
Mar 18	914	36	694	-11	29	0	191	47
Mar 19	943	29	719	25	33	4	191	0
Mar 20	1007	64	757	38	35	2	215	24
Mar 21	1054	47	803	46	36	1	215	0
Mar 22	1101	47	825	22	41	5	235	20
Mar 23	1128	27	851	26	42	1	235	0
Mar 24	1193	65	865	14	43	1	285	50
Mar 25	1307	114	952	87	45	2	310	25
Mar 26	1387	80	981	29	47	2	359	49
Mar 27	1499	112	1078	97	49	2	372	13
Mar 28	1693	194	1237	159	52	3	404	32
Mar 29	1866	173	1388	151	54	2	424	20
Mar 30	1953	87	1473	85	56	2	424	0
Mar 31	2178	225	1697	224	57	1	424	0
Apr 1	2384	206	1855	158	57	0	472	48
Apr 2	2617	233	2082	227	63	6	472	0
Apr 3	2935	318	2352	270	69	6	514	42
Apr 4	3139	204	2548	196	77	8	514	0
Apr 5	3654	515	2994	446	85	8	575	61
Apr 6	3906	252	3222	228	92	7	592	17
Apr 7	4257	351	3542	320	93	1	622	30
Apr 8	4667	410	3941	399	94	1	632	10
Apr 9	5347	680	4563	622	99	5	685	53
Apr 10	6005	658	5221	658	99	0	685	0
Apr 11	6748	743	5878	657	108	9	762	77
Apr 12	7370	622	6463	585	123	15	784	22
Apr 13	7618	248	6676	213	143	20	799	15
Apr 14	7885	267	6886	210	146	3	853	54
Apr 15	8626	741	7547	661	178	32	901	48
Apr 16	9231	605	8106	559	190	12	935	34
Apr 17	9787	556	8662	556	190	0	935	0
Apr 18	10296	509	9005	343	222	32	1069	134
Apr 19	10797	501	9402	397	236	14	1159	90
Apr 20	11135	338	9633	231	263	27	1239	80
Apr 21	11512	377	9875	242	281	18	1356	117
Apr 22	11950	438	10227	352	299	18	1424	68
Apr 23	12368	418	10546	319	328	29	1494	70
Apr 24	12712	344	10837	291	345	17	1530	36
Apr 25	13231	519	11215	378	360	15	1656	126
Apr 26	13441	210	11260	45	372	12	1809	153

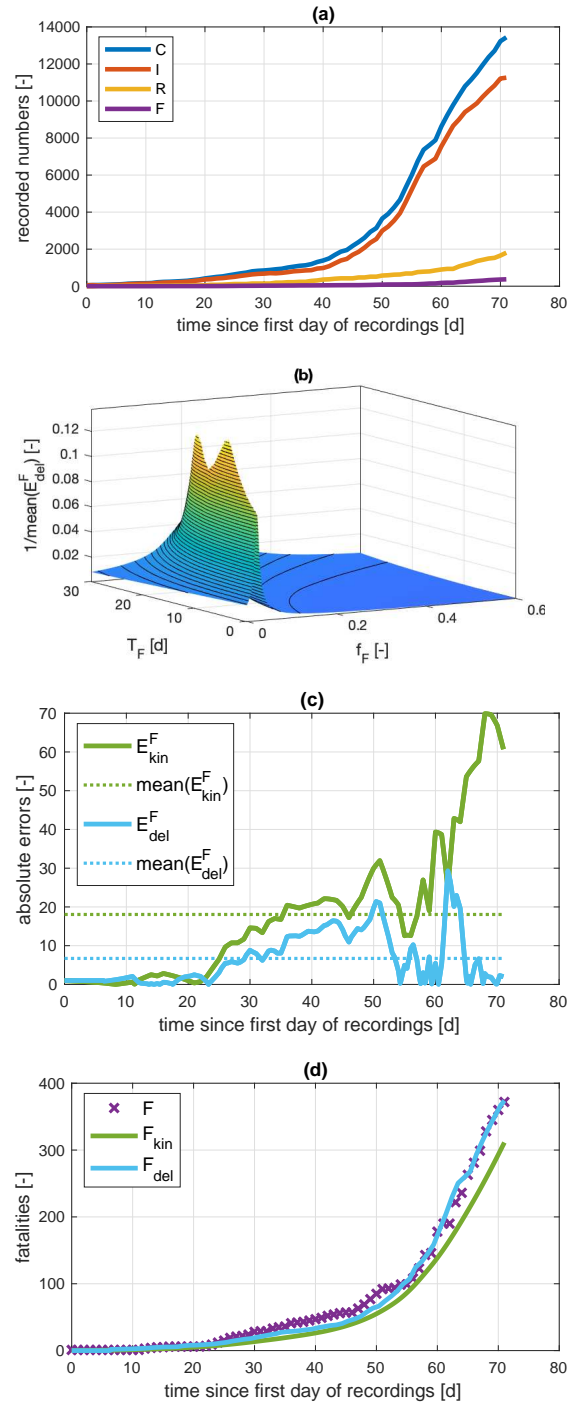


Figure 31: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Japan

Table 32: Data recorded in Luxembourg

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 29	1	1	0	0	0	0	1	1
Mar 1	1	0	1	1	0	0	0	-1
Mar 2	1	0	1	0	0	0	0	0
Mar 3	1	0	1	0	0	0	0	0
Mar 4	1	0	1	0	0	0	0	0
Mar 5	2	1	1	0	0	0	1	1
Mar 6	3	1	3	2	0	0	0	-1
Mar 7	4	1	4	1	0	0	0	0
Mar 8	5	1	5	1	0	0	0	0
Mar 9	5	0	5	0	0	0	0	0
Mar 10	7	2	7	2	0	0	0	0
Mar 11	7	0	7	0	0	0	0	0
Mar 12	26	19	26	19	0	0	0	0
Mar 13	38	12	37	11	1	1	0	0
Mar 14	51	13	50	13	1	0	0	0
Mar 15	77	26	76	26	1	0	0	0
Mar 16	81	4	80	4	1	0	0	0
Mar 17	140	59	139	59	1	0	0	0
Mar 18	203	63	201	62	2	1	0	0
Mar 19	335	132	325	124	4	2	6	6
Mar 20	484	149	473	148	5	1	6	0
Mar 21	670	186	656	183	8	3	6	0
Mar 22	798	128	784	128	8	0	6	0
Mar 23	875	77	861	77	8	0	6	0
Mar 24	1099	224	1085	224	8	0	6	0
Mar 25	1333	234	1319	234	8	0	6	0
Mar 26	1453	120	1438	119	9	1	6	0
Mar 27	1605	152	1550	112	15	6	40	34
Mar 28	1831	226	1773	223	18	3	40	0
Mar 29	1950	119	1889	116	21	3	40	0
Mar 30	1988	38	1926	37	22	1	40	0
Mar 31	2178	190	2075	149	23	1	80	40
Apr 1	2319	141	2210	135	29	6	80	0
Apr 2	2487	168	2377	167	30	1	80	0
Apr 3	2612	125	2081	-296	31	1	500	420
Apr 4	2729	117	2198	117	31	0	500	0
Apr 5	2804	75	2268	70	36	5	500	0
Apr 6	2843	39	2302	34	41	5	500	0
Apr 7	2970	127	2426	124	44	3	500	0
Apr 8	3034	64	2488	62	46	2	500	0
Apr 9	3115	81	2563	75	52	6	500	0
Apr 10	3223	108	2669	106	54	2	500	0
Apr 11	3270	47	2708	39	62	8	500	0
Apr 12	3281	11	2715	7	66	4	500	0
Apr 13	3292	11	2723	8	69	3	500	0
Apr 14	3307	15	2740	17	67	-2	500	0
Apr 15	3373	66	2778	38	69	2	526	26
Apr 16	3444	71	2823	45	69	0	552	26
Apr 17	3480	36	2829	6	72	3	579	27
Apr 18	3537	57	2864	35	72	0	601	22
Apr 19	3550	13	2850	-14	73	1	627	26
Apr 20	3558	8	2846	-4	75	2	637	10
Apr 21	3618	60	2870	24	78	3	670	33
Apr 22	3654	36	2863	-7	80	2	711	41
Apr 23	3665	11	2854	-9	83	3	728	17
Apr 24	3695	30	603	-2251	85	2	3007	2279
Apr 25	3711	16	538	-65	85	0	3088	81
Apr 26	3723	12	531	-7	88	3	3104	16

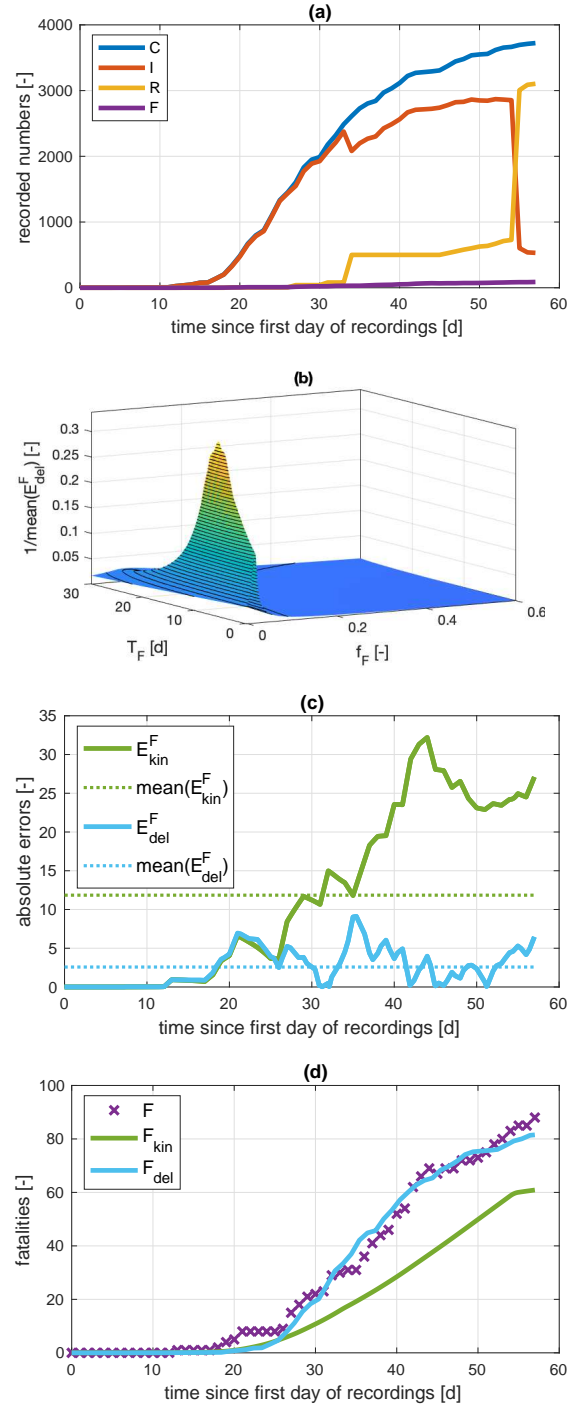


Figure 32: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Luxembourg

Table 33: Data recorded in Malaysia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	22	22	15	15	0	0	7	7
Feb 16	22	0	14	-1	0	0	8	1
Feb 17	22	0	13	-1	0	0	9	1
Feb 18	22	0	11	-2	0	0	11	2
Feb 19	22	0	7	-4	0	0	15	4
Feb 20	22	0	5	-2	0	0	17	2
Feb 21	22	0	5	0	0	0	17	0
Feb 22	22	0	5	0	0	0	17	0
Feb 23	22	0	4	-1	0	0	18	1
Feb 24	22	0	5	1	0	0	17	-1
Feb 25	22	0	2	-3	0	0	20	3
Feb 26	22	0	2	0	0	0	20	0
Feb 27	22	0	2	0	0	0	20	0
Feb 28	25	3	5	3	0	0	20	0
Feb 29	25	0	5	0	0	0	20	0
Mar 1	29	4	7	2	0	0	22	2
Mar 2	29	0	7	0	0	0	22	0
Mar 3	36	7	14	7	0	0	22	0
Mar 4	50	14	28	14	0	0	22	0
Mar 5	55	5	33	5	0	0	22	0
Mar 6	83	28	60	27	0	0	23	1
Mar 7	93	10	70	10	0	0	23	0
Mar 8	99	6	75	5	0	0	24	1
Mar 9	117	18	93	18	0	0	24	0
Mar 10	129	12	42	-51	0	0	87	63
Mar 11	149	20	123	81	0	0	26	-61
Mar 12	158	9	132	9	0	0	26	0
Mar 13	197	39	165	33	0	0	32	6
Mar 14	238	41	203	38	0	0	35	3
Mar 15	428	190	386	183	0	0	42	7
Mar 16	566	138	524	138	0	0	42	0
Mar 17	673	107	622	98	2	2	49	7
Mar 18	790	117	728	106	2	0	60	11
Mar 19	900	110	823	95	2	0	75	15
Mar 20	1030	130	940	117	3	1	87	12
Mar 21	1183	153	1061	121	8	5	114	27
Mar 22	1306	123	1157	96	10	2	139	25
Mar 23	1518	212	1345	188	14	4	159	20
Mar 24	1624	106	1425	80	16	2	183	24
Mar 25	1796	172	1577	152	20	4	199	16
Mar 26	2031	235	1793	216	23	3	215	16
Mar 27	2161	130	1876	83	26	3	259	44
Mar 28	2320	159	1973	97	27	1	320	61
Mar 29	2470	150	2047	74	35	8	388	68
Mar 30	2626	156	2110	63	37	2	479	91
Mar 31	2766	140	2186	76	43	6	537	58
Apr 1	2908	142	2218	32	45	2	645	108
Apr 2	3116	208	2299	81	50	5	767	122
Apr 3	3333	217	2453	154	53	3	827	60
Apr 4	3483	150	2511	58	57	4	915	88
Apr 5	3662	179	2596	85	61	4	1005	90
Apr 6	3793	131	2490	-106	62	1	1241	236
Apr 7	3963	170	2579	89	63	1	1321	80
Apr 8	4119	156	2567	-12	65	2	1487	166
Apr 9	4228	109	2553	-14	67	2	1608	121
Apr 10	4346	118	2446	-107	70	3	1830	222
Apr 11	4530	184	2462	16	73	3	1995	165
Apr 12	4683	153	2499	37	76	3	2108	113
Apr 13	4817	134	2464	-35	77	1	2276	168
Apr 14	4987	170	2427	-37	82	5	2478	202
Apr 15	5072	85	2342	-85	83	1	2647	169
Apr 16	5182	110	2332	-10	84	1	2766	119
Apr 17	5251	69	2198	-134	86	2	2967	201
Apr 18	5305	54	2115	-83	88	2	3102	135
Apr 19	5389	84	2103	-12	89	1	3197	95
Apr 20	5425	36	2041	-62	89	0	3295	98
Apr 21	5482	57	2041	0	92	3	3349	54
Apr 22	5532	50	1987	-54	93	1	3452	103
Apr 23	5603	71	1966	-21	95	2	3542	90
Apr 24	5691	88	1932	-34	96	1	3663	121
Apr 25	5742	51	1882	-50	98	2	3762	99
Apr 26	5780	38	1820	-62	98	0	3862	100

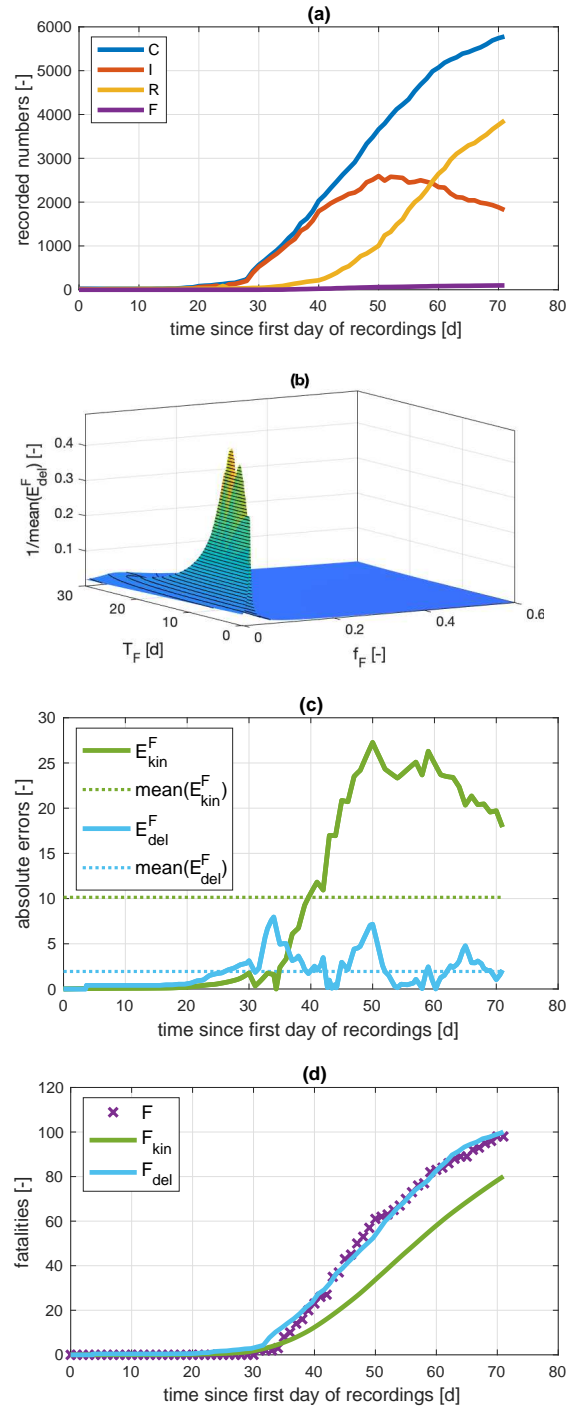


Figure 33: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Malaysia

Table 34: Data recorded in Mexico

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 28	2	2	2	2	0	0	0	0
Feb 29	4	2	4	2	0	0	0	0
Mar 1	5	1	5	1	0	0	0	0
Mar 2	6	1	6	1	0	0	0	0
Mar 3	6	0	5	-1	0	0	1	1
Mar 4	6	0	5	0	0	0	1	0
Mar 5	6	0	5	0	0	0	1	0
Mar 6	6	0	5	0	0	0	1	0
Mar 7	6	0	5	0	0	0	1	0
Mar 8	7	1	6	1	0	0	1	0
Mar 9	7	0	3	-3	0	0	4	3
Mar 10	7	0	3	0	0	0	4	0
Mar 11	11	4	7	4	0	0	4	0
Mar 12	12	1	8	1	0	0	4	0
Mar 13	15	3	11	3	0	0	4	0
Mar 14	26	11	22	11	0	0	4	0
Mar 15	43	17	39	17	0	0	4	0
Mar 16	53	10	49	10	0	0	4	0
Mar 17	82	29	78	29	0	0	4	0
Mar 18	93	11	89	11	0	0	4	0
Mar 19	118	25	113	24	1	1	4	0
Mar 20	164	46	159	46	1	0	4	0
Mar 21	203	39	197	38	2	1	4	0
Mar 22	251	48	245	48	2	0	4	0
Mar 23	316	65	309	64	3	1	4	0
Mar 24	367	51	359	50	4	1	4	0
Mar 25	405	38	396	37	5	1	4	0
Mar 26	475	70	465	69	6	1	4	0
Mar 27	585	110	573	108	8	2	4	0
Mar 28	717	132	701	128	12	4	4	0
Mar 29	848	131	797	96	16	4	35	31
Mar 30	993	145	938	141	20	4	35	0
Mar 31	1094	101	1031	93	28	8	35	0
Apr 1	1215	121	1151	120	29	1	35	0
Apr 2	1378	163	1306	155	37	8	35	0
Apr 3	1510	132	827	-479	50	13	633	598
Apr 4	1688	178	995	168	60	10	633	0
Apr 5	1890	202	1178	183	79	19	633	0
Apr 6	2143	253	1416	238	94	15	633	0
Apr 7	2439	296	1681	265	125	31	633	0
Apr 8	2785	346	2011	330	141	16	633	0
Apr 9	3181	396	2374	363	174	33	633	0
Apr 10	3441	260	2614	240	194	20	633	0
Apr 11	3844	403	2978	364	233	39	633	0
Apr 12	4219	375	2174	-804	273	40	1772	1139
Apr 13	4661	442	2522	348	296	23	1843	71
Apr 14	5014	353	2718	196	332	36	1964	121
Apr 15	5399	385	2868	150	406	74	2125	161
Apr 16	5847	448	3273	405	449	43	2125	0
Apr 17	6297	450	3686	413	486	37	2125	0
Apr 18	6875	578	4204	518	546	60	2125	0
Apr 19	7497	622	4220	16	650	104	2627	502
Apr 20	8261	764	4948	728	686	36	2627	0
Apr 21	8772	511	5433	485	712	26	2627	0
Apr 22	9501	729	6017	584	857	145	2627	0
Apr 23	10544	1043	6947	930	970	113	2627	0
Apr 24	11633	1089	7937	990	1069	99	2627	0
Apr 25	12872	1239	4502	-3435	1221	152	7149	4522
Apr 26	13842	970	5388	886	1305	84	7149	0

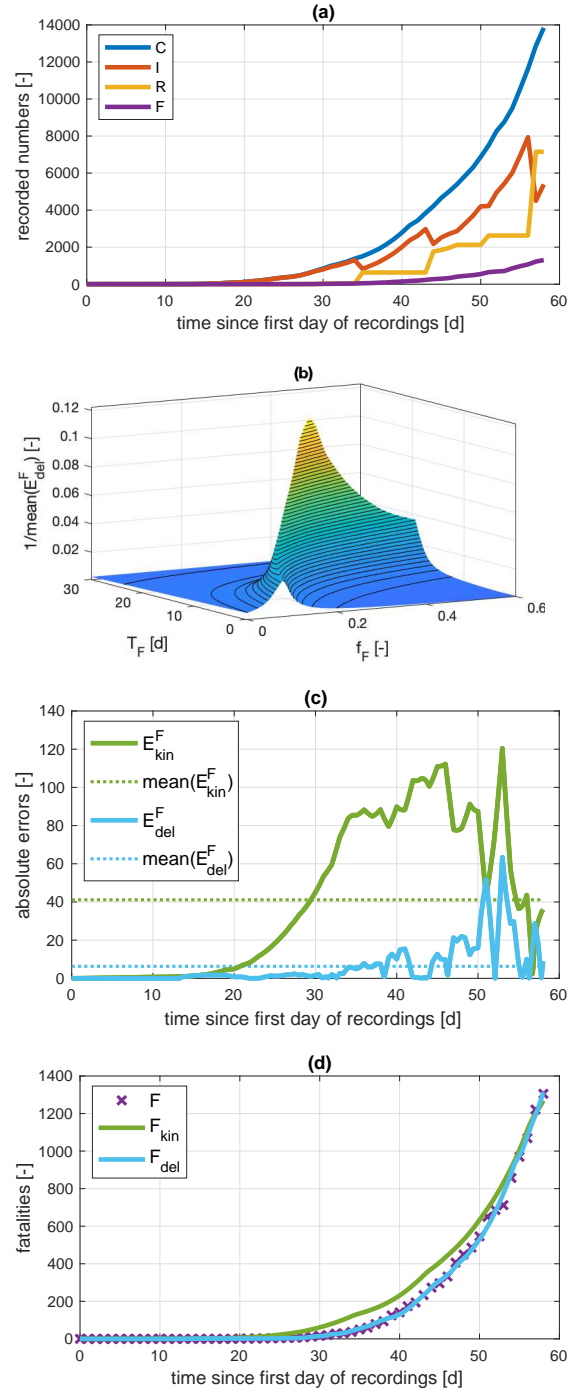


Figure 34: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Mexico

Table 35: Data recorded in Morocco

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 2	1	1	1	1	0	0	0	0
Mar 3	1	0	1	0	0	0	0	0
Mar 4	1	0	1	0	0	0	0	0
Mar 5	2	1	2	1	0	0	0	0
Mar 6	2	0	2	0	0	0	0	0
Mar 7	2	0	2	0	0	0	0	0
Mar 8	2	0	2	0	0	0	0	0
Mar 9	2	0	2	0	0	0	0	0
Mar 10	3	1	2	0	1	1	0	0
Mar 11	6	3	5	3	1	0	0	0
Mar 12	6	0	5	0	1	0	0	0
Mar 13	7	1	5	0	1	0	1	1
Mar 14	18	11	16	11	1	0	1	0
Mar 15	28	10	26	10	1	0	1	0
Mar 16	37	9	35	9	1	0	1	0
Mar 17	44	7	41	6	2	1	1	0
Mar 18	54	10	51	10	2	0	1	0
Mar 19	63	9	59	8	2	0	2	1
Mar 20	86	23	81	22	3	1	2	0
Mar 21	96	10	90	9	3	0	3	1
Mar 22	115	19	108	18	4	1	3	0
Mar 23	143	28	134	26	4	0	5	2
Mar 24	170	27	159	25	5	1	6	1
Mar 25	225	55	212	53	6	1	7	1
Mar 26	275	50	256	44	11	5	8	1
Mar 27	345	70	311	55	23	12	11	3
Mar 28	402	57	365	54	25	2	12	1
Mar 29	479	77	440	75	26	1	13	1
Mar 30	556	77	508	68	33	7	15	2
Mar 31	617	61	557	49	36	3	24	9
Apr 1	654	37	586	29	39	3	29	5
Apr 2	708	54	633	47	44	5	31	2
Apr 3	791	83	686	53	48	4	57	26
Apr 4	919	128	794	108	59	11	66	9
Apr 5	1021	102	875	81	70	11	76	10
Apr 6	1120	99	959	84	80	10	81	5
Apr 7	1184	64	1001	42	90	10	93	12
Apr 8	1275	91	1085	84	93	3	97	4
Apr 9	1374	99	1168	83	97	4	109	12
Apr 10	1448	74	1219	51	107	10	122	13
Apr 11	1545	97	1288	69	111	4	146	24
Apr 12	1661	116	1366	78	118	7	177	31
Apr 13	1763	102	1434	68	126	8	203	26
Apr 14	1888	125	1545	111	126	0	217	14
Apr 15	2024	136	1668	123	127	1	229	12
Apr 16	2283	259	1904	236	130	3	249	20
Apr 17	2564	281	2148	244	135	5	281	32
Apr 18	2685	121	2234	86	137	2	314	33
Apr 19	2855	170	2387	153	141	4	327	13
Apr 20	3046	191	2553	166	143	2	350	23
Apr 21	3209	163	2671	118	145	2	393	43
Apr 22	3446	237	2880	209	149	4	417	24
Apr 23	3568	122	2957	77	155	6	456	39
Apr 24	3758	190	3114	157	158	3	486	30
Apr 25	3897	139	3201	87	159	1	537	51
Apr 26	4065	168	3311	110	161	2	593	56

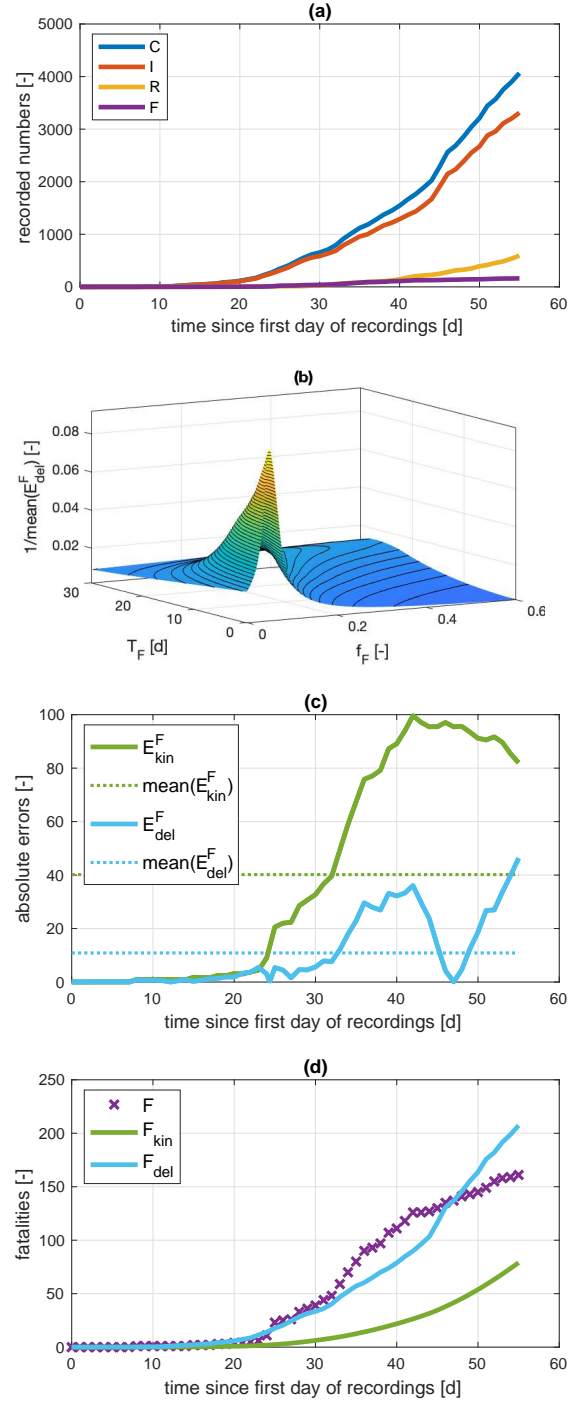


Figure 35: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Morocco

Table 36: Data recorded in Netherlands

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 27	1	1	1	1	0	0	0	0
Feb 28	2	1	2	1	0	0	0	0
Feb 29	7	5	7	5	0	0	0	0
Mar 1	10	3	10	3	0	0	0	0
Mar 2	18	8	18	8	0	0	0	0
Mar 3	23	5	23	5	0	0	0	0
Mar 4	38	15	38	15	0	0	0	0
Mar 5	82	44	82	44	0	0	0	0
Mar 6	128	46	127	45	1	1	0	0
Mar 7	188	60	187	60	1	0	0	0
Mar 8	265	77	262	75	3	2	0	0
Mar 9	321	56	317	55	4	1	0	0
Mar 10	382	61	378	61	4	0	0	0
Mar 11	503	121	498	120	5	1	0	0
Mar 12	614	111	607	109	5	0	2	2
Mar 13	804	190	792	185	10	5	2	0
Mar 14	959	155	945	153	12	2	2	0
Mar 15	1135	176	1113	168	20	8	2	0
Mar 16	1413	278	1387	274	24	4	2	0
Mar 17	1705	292	1660	273	43	19	2	0
Mar 18	2051	346	1991	331	58	15	2	0
Mar 19	2460	409	2382	391	76	18	2	0
Mar 20	2994	534	2886	504	106	30	2	0
Mar 21	3631	637	3493	607	136	30	2	0
Mar 22	4204	573	4023	530	179	43	2	0
Mar 23	4749	545	4534	511	213	34	2	0
Mar 24	5560	811	5282	748	276	63	2	0
Mar 25	6412	852	6053	771	356	80	3	1
Mar 26	7431	1019	6994	941	434	78	3	0
Mar 27	8603	1172	8054	1060	546	112	3	0
Mar 28	9762	1159	9120	1066	639	93	3	0
Mar 29	10866	1104	9845	725	771	132	250	247
Mar 30	11750	884	10636	791	864	93	250	0
Mar 31	12595	845	11306	670	1039	175	250	0
Apr 1	13614	1019	12191	885	1173	134	250	0
Apr 2	14697	1083	13108	917	1339	166	250	0
Apr 3	15723	1026	13986	878	1487	148	250	0
Apr 4	16627	904	14726	740	1651	164	250	0
Apr 5	17851	1224	15835	1109	1766	115	250	0
Apr 6	18803	952	16686	851	1867	101	250	0
Apr 7	19580	777	17229	543	2101	234	250	0
Apr 8	20549	969	18051	822	2248	147	250	0
Apr 9	21762	1213	19116	1065	2396	148	250	0
Apr 10	23097	1335	20336	1220	2511	115	250	0
Apr 11	24413	1316	21520	1184	2643	132	250	0
Apr 12	25587	1174	22600	1080	2737	94	250	0
Apr 13	26551	964	23478	878	2823	86	250	0
Apr 14	27419	868	24224	746	2945	122	250	0
Apr 15	28153	734	24769	545	3134	189	250	0
Apr 16	29214	1061	25649	880	3315	181	250	0
Apr 17	30449	1235	26740	1091	3459	144	250	0
Apr 18	31589	1140	27738	998	3601	142	250	0
Apr 19	32655	1066	28721	983	3684	83	250	0
Apr 20	33405	750	29404	683	3751	67	250	0
Apr 21	34134	729	29968	564	3916	165	250	0
Apr 22	34842	708	30538	570	4054	138	250	0
Apr 23	35729	887	31302	764	4177	123	250	0
Apr 24	36535	806	31996	694	4289	112	250	0
Apr 25	37190	655	32531	535	4409	120	250	0
Apr 26	37846	656	33120	589	4475	66	251	1

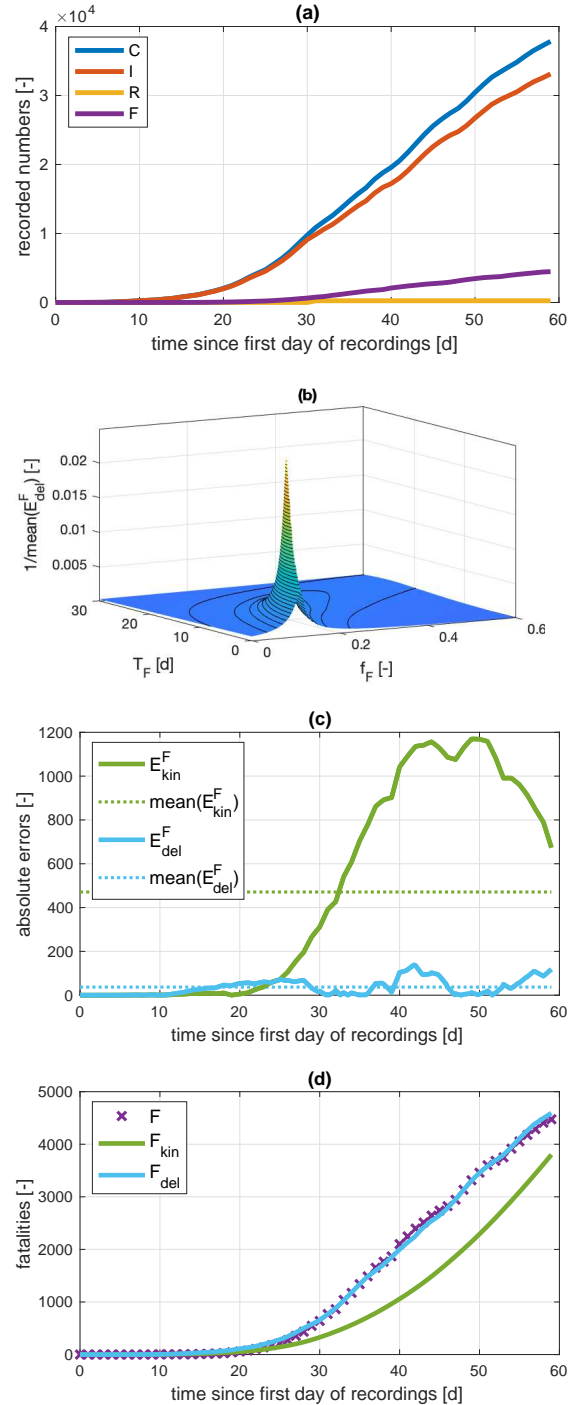


Figure 36: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Netherlands

Table 37: Data recorded in New Zealand

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 28	1	1	1	1	0	0	0	0
Feb 29	1	0	1	0	0	0	0	0
Mar 1	1	0	1	0	0	0	0	0
Mar 2	1	0	1	0	0	0	0	0
Mar 3	3	2	2	1	0	0	1	1
Mar 4	3	0	3	1	0	0	0	-1
Mar 5	4	1	4	1	0	0	0	0
Mar 6	4	0	4	0	0	0	0	0
Mar 7	5	1	5	1	0	0	0	0
Mar 8	5	0	5	0	0	0	0	0
Mar 9	5	0	5	0	0	0	0	0
Mar 10	5	0	5	0	0	0	0	0
Mar 11	5	0	5	0	0	0	0	0
Mar 12	5	0	5	0	0	0	0	0
Mar 13	6	1	6	1	0	0	0	0
Mar 14	8	2	8	2	0	0	0	0
Mar 15	8	0	8	0	0	0	0	0
Mar 16	8	0	8	0	0	0	0	0
Mar 17	20	12	20	12	0	0	0	0
Mar 18	20	0	20	0	0	0	0	0
Mar 19	28	8	28	8	0	0	0	0
Mar 20	52	24	52	24	0	0	0	0
Mar 21	52	0	52	0	0	0	0	0
Mar 22	102	50	102	50	0	0	0	0
Mar 23	102	0	102	0	0	0	0	0
Mar 24	205	103	183	81	0	0	22	22
Mar 25	283	78	256	73	0	0	27	5
Mar 26	368	85	331	75	0	0	37	10
Mar 27	368	0	331	0	0	0	37	0
Mar 28	514	146	457	126	1	1	56	19
Mar 29	514	0	457	0	1	0	56	0
Mar 30	589	75	525	68	1	0	63	7
Mar 31	647	58	572	47	1	0	74	11
Apr 1	708	61	624	52	1	0	83	9
Apr 2	797	89	704	80	1	0	92	9
Apr 3	868	71	764	60	1	0	103	11
Apr 4	950	82	822	58	1	0	127	24
Apr 5	1039	89	882	60	1	0	156	29
Apr 6	1106	67	929	47	1	0	176	20
Apr 7	1160	54	918	-11	1	0	241	65
Apr 8	1210	50	927	9	1	0	282	41
Apr 9	1239	29	921	-6	1	0	317	35
Apr 10	1283	44	908	-13	2	1	373	56
Apr 11	1312	29	886	-22	4	2	422	49
Apr 12	1330	18	855	-31	4	0	471	49
Apr 13	1349	19	798	-57	5	1	546	75
Apr 14	1366	17	729	-69	9	4	628	82
Apr 15	1386	20	649	-80	9	0	728	100
Apr 16	1401	15	622	-27	9	0	770	42
Apr 17	1409	8	582	-40	11	2	816	46
Apr 18	1422	13	544	-38	11	0	867	51
Apr 19	1431	9	507	-37	12	1	912	45
Apr 20	1440	9	545	38	12	0	883	-29
Apr 21	1445	5	426	-119	13	1	1006	123
Apr 22	1448	3	398	-28	14	1	1036	30
Apr 23	1451	3	370	-28	16	2	1065	29
Apr 24	1456	5	344	-26	17	1	1095	30
Apr 25	1461	5	325	-19	18	1	1118	23
Apr 26	1469	8	309	-16	18	0	1142	24

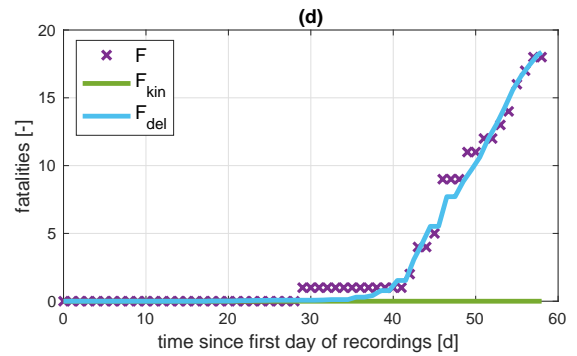
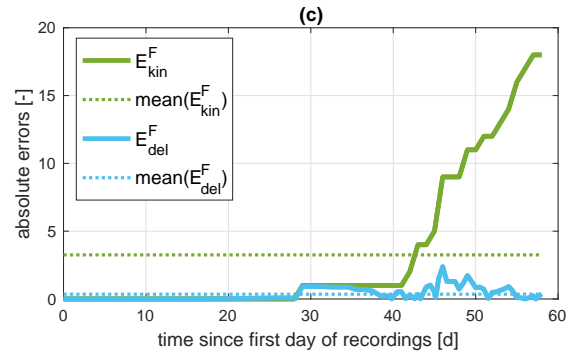
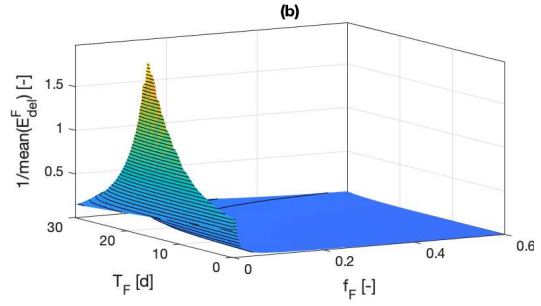
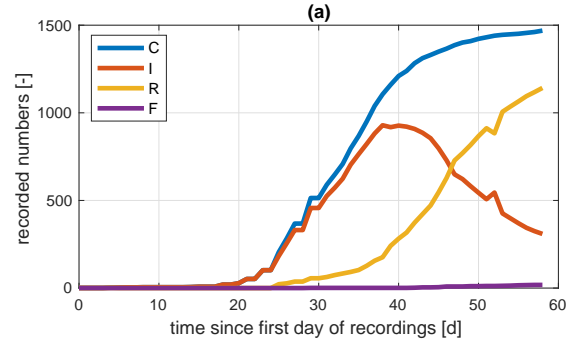


Figure 37: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for New Zealand

Table 38: Data recorded in Norway

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 26	1	1	1	1	0	0	0	0
Feb 27	4	3	4	3	0	0	0	0
Feb 28	6	2	6	2	0	0	0	0
Feb 29	15	9	15	9	0	0	0	0
Mar 1	19	4	19	4	0	0	0	0
Mar 2	25	6	25	6	0	0	0	0
Mar 3	33	8	33	8	0	0	0	0
Mar 4	59	26	59	26	0	0	0	0
Mar 5	94	35	94	35	0	0	0	0
Mar 6	127	33	126	32	0	0	1	1
Mar 7	156	29	156	30	0	0	0	-1
Mar 8	176	20	175	19	0	0	1	1
Mar 9	227	51	226	51	0	0	1	0
Mar 10	400	173	399	173	0	0	1	0
Mar 11	629	229	628	229	0	0	1	0
Mar 12	800	171	798	170	1	1	1	0
Mar 13	996	196	994	196	1	0	1	0
Mar 14	1109	113	1105	111	3	2	1	0
Mar 15	1256	147	1252	147	3	0	1	0
Mar 16	1348	92	1344	92	3	0	1	0
Mar 17	1471	123	1467	123	3	0	1	0
Mar 18	1591	120	1584	117	6	3	1	0
Mar 19	1790	199	1782	198	7	1	1	0
Mar 20	1959	169	1951	169	7	0	1	0
Mar 21	2164	205	2151	200	7	0	6	5
Mar 22	2385	221	2372	221	7	0	6	0
Mar 23	2625	240	2609	237	10	3	6	0
Mar 24	2866	241	2848	239	12	2	6	0
Mar 25	3084	218	3064	216	14	2	6	0
Mar 26	3372	288	3352	288	14	0	6	0
Mar 27	3771	399	3745	393	19	5	7	1
Mar 28	4015	244	3985	240	23	4	7	0
Mar 29	4284	269	4251	266	26	3	7	0
Mar 30	4445	161	4401	150	32	6	12	5
Mar 31	4641	196	4589	188	39	7	13	1
Apr 1	4877	236	4820	231	44	5	13	0
Apr 2	5147	270	5065	245	50	6	32	19
Apr 3	5370	223	5279	214	59	9	32	0
Apr 4	5550	180	5456	177	62	3	32	0
Apr 5	5687	137	5584	128	71	9	32	0
Apr 6	5865	178	5757	173	76	5	32	0
Apr 7	6086	221	5965	208	89	13	32	0
Apr 8	6042	-44	5909	-56	101	12	32	0
Apr 9	6219	177	6079	170	108	7	32	0
Apr 10	6314	95	6169	90	113	5	32	0
Apr 11	6409	95	6258	89	119	6	32	0
Apr 12	6525	116	6365	107	128	9	32	0
Apr 13	6603	78	6437	72	134	6	32	0
Apr 14	6623	20	6452	15	139	5	32	0
Apr 15	6797	174	6615	163	150	11	32	0
Apr 16	6905	108	6721	106	152	2	32	0
Apr 17	6937	32	6744	23	161	9	32	0
Apr 18	7036	99	6840	96	164	3	32	0
Apr 19	7078	42	6881	41	165	1	32	0
Apr 20	7156	78	6943	62	181	16	32	0
Apr 21	7241	85	7027	84	182	1	32	0
Apr 22	7338	97	7119	92	187	5	32	0
Apr 23	7401	63	7175	56	194	7	32	0
Apr 24	7463	62	7232	57	199	5	32	0
Apr 25	7493	30	7260	28	201	2	32	0
Apr 26	7527	34	7294	34	201	0	32	0

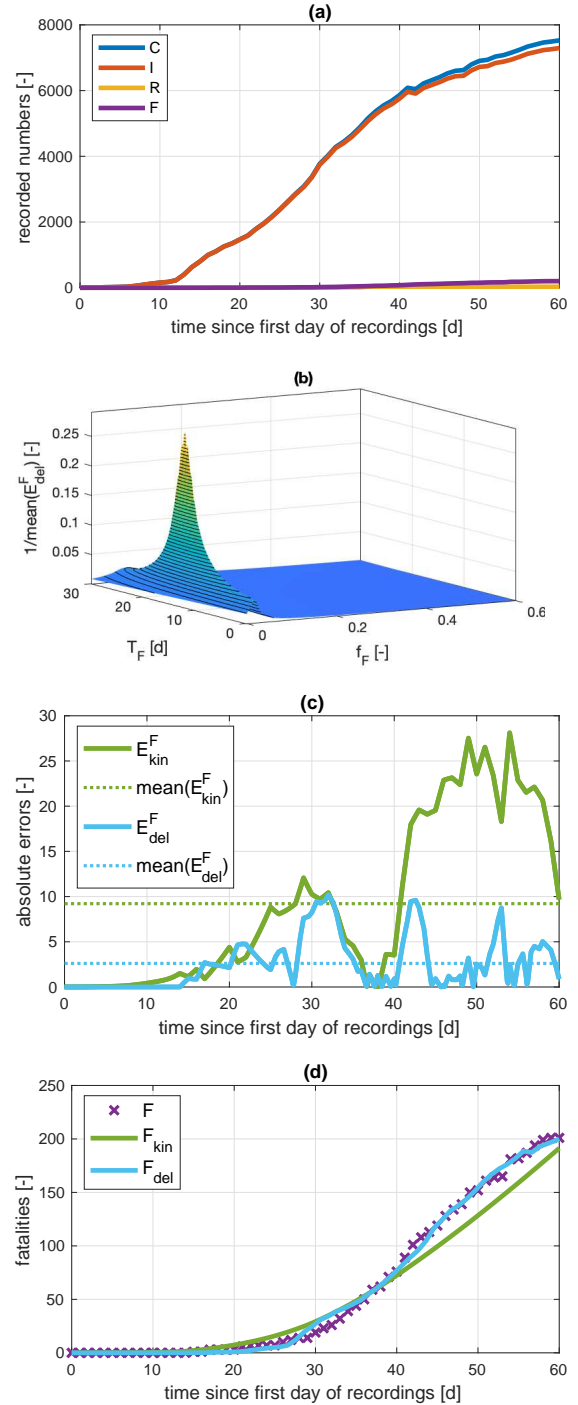


Figure 38: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Norway

Table 39: Data recorded in Pakistan

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 26	2	2	2	2	0	0	0	0
Feb 27	2	0	2	0	0	0	0	0
Feb 28	2	0	2	0	0	0	0	0
Feb 29	4	2	4	2	0	0	0	0
Mar 1	4	0	4	0	0	0	0	0
Mar 2	4	0	4	0	0	0	0	0
Mar 3	5	1	5	1	0	0	0	0
Mar 4	5	0	5	0	0	0	0	0
Mar 5	5	0	5	0	0	0	0	0
Mar 6	6	1	5	0	0	0	1	1
Mar 7	6	0	5	0	0	0	1	0
Mar 8	7	1	6	1	0	0	1	0
Mar 9	16	9	15	9	0	0	1	0
Mar 10	19	3	17	2	0	0	2	1
Mar 11	20	1	18	1	0	0	2	0
Mar 12	21	1	19	1	0	0	2	0
Mar 13	28	7	26	7	0	0	2	0
Mar 14	33	5	31	5	0	0	2	0
Mar 15	53	20	51	20	0	0	2	0
Mar 16	184	131	182	131	0	0	2	0
Mar 17	247	63	245	63	0	0	2	0
Mar 18	307	60	292	47	2	2	13	11
Mar 19	454	147	439	147	2	0	13	0
Mar 20	501	47	485	46	3	1	13	0
Mar 21	645	144	629	144	3	0	13	0
Mar 22	776	131	758	129	5	2	13	0
Mar 23	875	99	856	98	6	1	13	0
Mar 24	972	97	947	91	7	1	18	5
Mar 25	1063	91	1034	87	8	1	21	3
Mar 26	1201	138	1171	137	9	1	21	0
Mar 27	1373	172	1339	168	11	2	23	2
Mar 28	1495	122	1454	115	12	1	29	6
Mar 29	1597	102	1554	100	14	2	29	0
Mar 30	1717	120	1620	66	21	7	76	47
Mar 31	1938	221	1836	216	26	5	76	0
Apr 1	2118	180	1997	161	27	1	94	18
Apr 2	2421	303	2262	265	34	7	125	31
Apr 3	2686	265	2520	258	40	6	126	1
Apr 4	2818	132	2646	126	41	1	131	5
Apr 5	3157	339	2899	253	47	6	211	80
Apr 6	3766	609	3454	555	53	6	259	48
Apr 7	4035	269	3549	95	57	4	429	170
Apr 8	4263	228	3735	186	61	4	467	38
Apr 9	4489	226	3852	117	65	4	572	105
Apr 10	4695	206	3902	50	66	1	727	155
Apr 11	5011	316	4163	261	86	20	762	35
Apr 12	5230	219	4111	-52	91	5	1028	266
Apr 13	5496	266	4308	197	93	2	1095	67
Apr 14	5837	341	4363	55	96	3	1378	283
Apr 15	6383	546	4826	463	111	15	1446	68
Apr 16	6919	536	5146	320	128	17	1645	199
Apr 17	7025	106	5125	-21	135	7	1765	120
Apr 18	7638	613	5663	538	143	8	1832	67
Apr 19	8348	710	6312	649	168	25	1868	36
Apr 20	8892	544	6746	434	176	8	1970	102
Apr 21	9565	673	7291	545	201	25	2073	103
Apr 22	10076	511	7708	417	212	11	2156	83
Apr 23	11057	981	8485	777	235	23	2337	181
Apr 24	11940	883	8932	447	253	18	2755	418
Apr 25	12723	783	9588	656	269	16	2866	111
Apr 26	13328	605	10111	523	281	12	2936	70

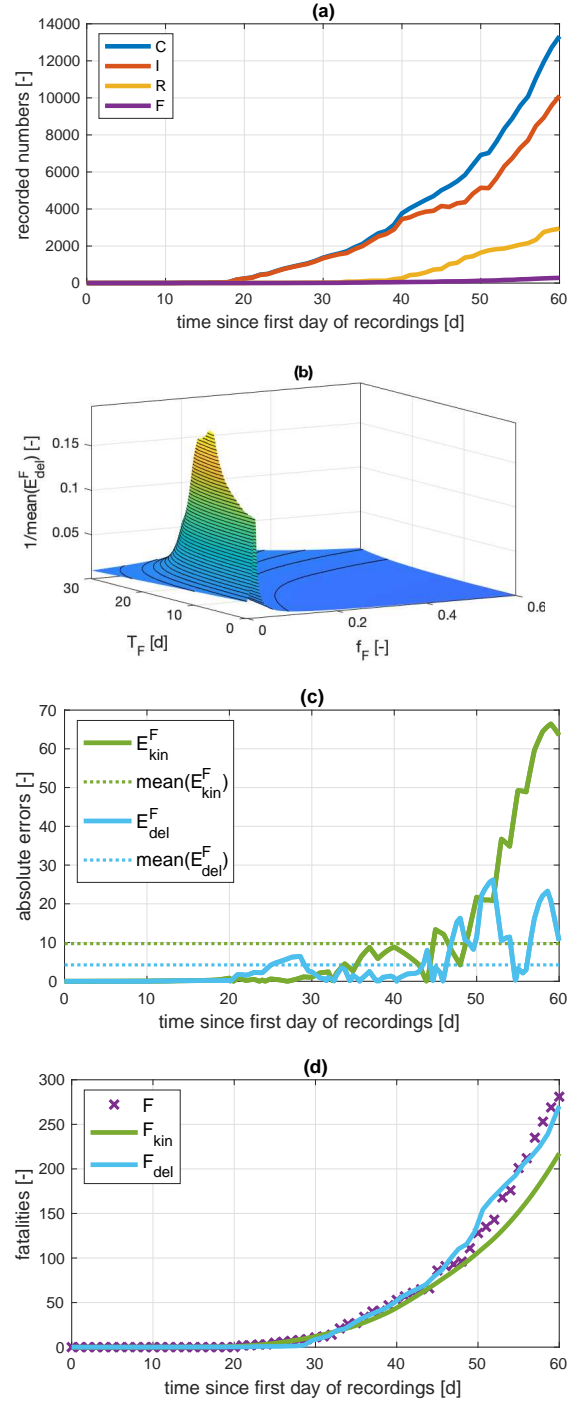


Figure 39: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Pakistan

Table 40: Data recorded in Panama

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 10	1	1	1	1	0	0	0	0
Mar 11	14	13	13	12	1	1	0	0
Mar 12	14	0	13	0	1	0	0	0
Mar 13	27	13	26	13	1	0	0	0
Mar 14	43	16	42	16	1	0	0	0
Mar 15	55	12	54	12	1	0	0	0
Mar 16	69	14	68	14	1	0	0	0
Mar 17	69	0	68	0	1	0	0	0
Mar 18	109	40	108	40	1	0	0	0
Mar 19	137	28	135	27	1	0	1	1
Mar 20	200	63	198	63	1	0	1	0
Mar 21	245	45	241	43	3	2	1	0
Mar 22	313	68	309	68	3	0	1	0
Mar 23	345	32	338	29	6	3	1	0
Mar 24	443	98	436	98	6	0	1	0
Mar 25	558	115	548	112	8	2	2	1
Mar 26	674	116	663	115	9	1	2	0
Mar 27	786	112	770	107	14	5	2	0
Mar 28	901	115	880	110	17	3	4	2
Mar 29	989	88	961	81	24	7	4	0
Mar 30	1075	86	1039	78	27	3	9	5
Mar 31	1181	106	1142	103	30	3	9	0
Apr 1	1317	136	1276	134	32	2	9	0
Apr 2	1475	158	1429	153	37	5	9	0
Apr 3	1673	198	1622	193	41	4	10	1
Apr 4	1801	128	1742	120	46	5	13	3
Apr 5	1801	0	1742	0	46	0	13	0
Apr 6	2100	299	2031	289	55	9	14	1
Apr 7	2100	0	2031	0	55	0	14	0
Apr 8	2528	428	2449	418	63	8	16	2
Apr 9	2752	224	2670	221	66	3	16	0
Apr 10	2974	222	2883	213	74	8	17	1
Apr 11	3234	260	3132	249	79	5	23	6
Apr 12	3400	166	3284	152	87	8	29	6
Apr 13	3472	72	3317	33	94	7	61	32
Apr 14	3574	102	3407	90	95	1	72	11
Apr 15	3751	177	3573	166	103	8	75	3
Apr 16	3751	0	3573	0	103	0	75	0
Apr 17	4016	265	3809	236	109	6	98	23
Apr 18	4210	194	3972	163	116	7	122	24
Apr 19	4273	63	4013	41	120	4	140	18
Apr 20	4467	194	4176	163	126	6	165	25
Apr 21	4658	191	4318	142	136	10	204	39
Apr 22	4821	163	4449	131	141	5	231	27
Apr 23	4992	171	4593	144	144	3	255	24
Apr 24	5166	174	4749	156	146	2	271	16
Apr 25	5338	172	4865	116	154	8	319	48
Apr 26	5538	200	5041	176	159	5	338	19

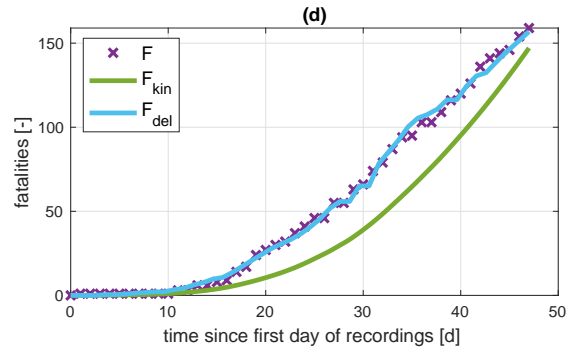
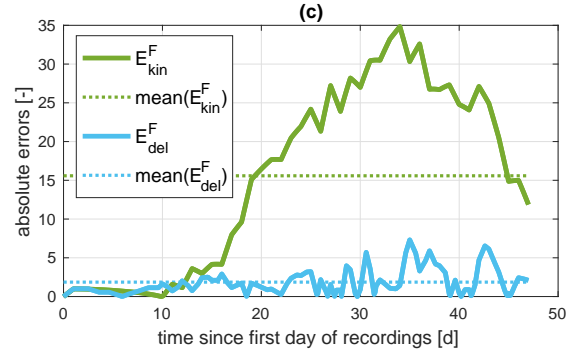
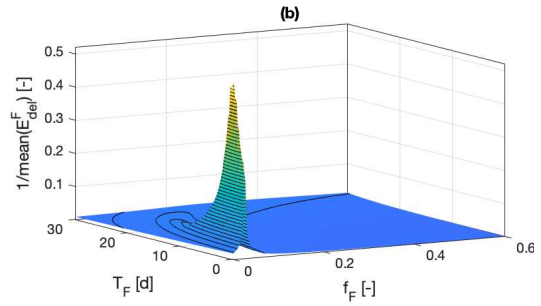
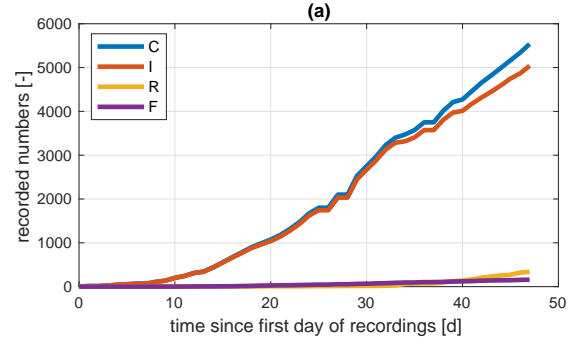


Figure 40: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Panama

Table 41: Data recorded in Peru

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 6	1	1	1	1	0	0	0	0
Mar 7	6	5	6	5	0	0	0	0
Mar 8	7	1	7	1	0	0	0	0
Mar 9	9	2	9	2	0	0	0	0
Mar 10	11	2	11	2	0	0	0	0
Mar 11	17	6	17	6	0	0	0	0
Mar 12	22	5	22	5	0	0	0	0
Mar 13	38	16	38	16	0	0	0	0
Mar 14	43	5	43	5	0	0	0	0
Mar 15	71	28	71	28	0	0	0	0
Mar 16	86	15	85	14	0	0	1	1
Mar 17	117	31	116	31	0	0	1	0
Mar 18	145	28	144	28	0	0	1	0
Mar 19	234	89	232	88	1	1	1	0
Mar 20	263	29	258	26	4	3	1	0
Mar 21	318	55	312	54	5	1	1	0
Mar 22	363	45	357	45	5	0	1	0
Mar 23	395	32	389	32	5	0	1	0
Mar 24	416	21	408	19	7	2	1	0
Mar 25	480	64	470	62	9	2	1	0
Mar 26	580	100	557	87	9	0	14	13
Mar 27	635	55	608	51	11	2	16	2
Mar 28	671	36	639	31	16	5	16	0
Mar 29	852	181	818	179	18	2	16	0
Mar 30	950	98	873	55	24	6	53	37
Mar 31	1065	115	641	-232	30	6	394	341
Apr 1	1323	258	891	250	38	8	394	0
Apr 2	1414	91	822	-69	55	17	537	143
Apr 3	1595	181	997	175	61	6	537	0
Apr 4	1746	151	759	-238	73	12	914	377
Apr 5	2281	535	1209	450	83	10	989	75
Apr 6	2561	280	1472	263	92	9	997	8
Apr 7	2954	393	1546	74	107	15	1301	304
Apr 8	4342	1388	2888	1342	121	14	1333	32
Apr 9	5256	914	3680	792	138	17	1438	105
Apr 10	5897	641	4159	479	169	31	1569	131
Apr 11	6848	951	4928	769	181	12	1739	170
Apr 12	7519	671	5528	600	193	12	1798	59
Apr 13	9784	2265	6926	1398	216	23	2642	844
Apr 14	10303	519	7204	278	230	14	2869	227
Apr 15	11475	1172	8113	909	254	24	3108	239
Apr 16	12491	1016	6097	-2016	274	20	6120	3012
Apr 17	13489	998	6648	551	300	26	6541	421
Apr 18	14420	931	7388	740	348	48	6684	143
Apr 19	15628	1208	8417	1029	400	52	6811	127
Apr 20	16325	697	8912	495	445	45	6968	157
Apr 21	17837	1512	10371	1459	484	39	6982	14
Apr 22	19250	1413	11693	1322	530	46	7027	45
Apr 23	20914	1664	12920	1227	572	42	7422	395
Apr 24	21648	734	13518	598	634	62	7496	74
Apr 25	25331	3683	16834	3316	700	66	7797	301
Apr 26	27517	2186	18701	1867	728	28	8088	291

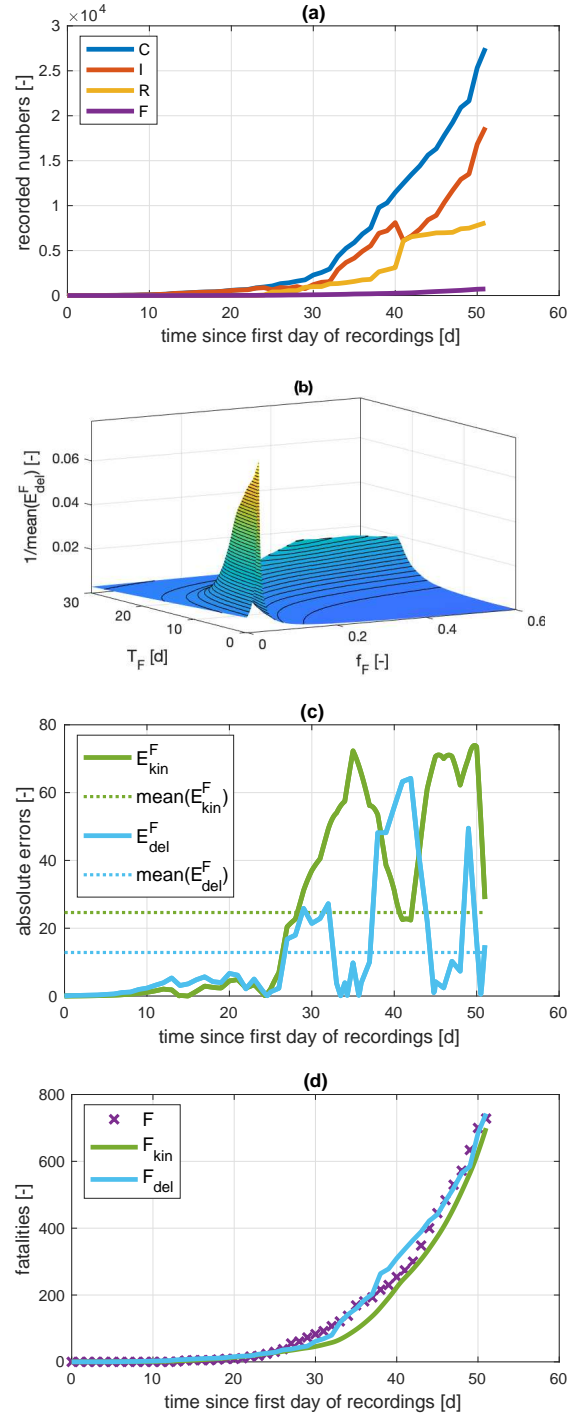


Figure 41: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Peru

Table 42: Data recorded in Philippines

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	3	3	0	0	1	1	2	2
Feb 16	3	0	0	0	1	0	2	0
Feb 17	3	0	0	0	1	0	2	0
Feb 18	3	0	0	0	1	0	2	0
Feb 19	3	0	0	0	1	0	2	0
Feb 20	3	0	0	0	1	0	2	0
Feb 21	3	0	0	0	1	0	2	0
Feb 22	3	0	0	0	1	0	2	0
Feb 23	3	0	0	0	1	0	2	0
Feb 24	3	0	0	0	1	0	2	0
Feb 25	3	0	0	0	1	0	2	0
Feb 26	3	0	0	0	1	0	2	0
Feb 27	3	0	0	0	1	0	2	0
Feb 28	3	0	0	0	1	0	2	0
Feb 29	3	0	0	0	1	0	2	0
Mar 1	3	0	0	0	1	0	2	0
Mar 2	3	0	0	0	1	0	2	0
Mar 3	3	0	0	0	1	0	2	0
Mar 4	3	0	0	0	1	0	2	0
Mar 5	3	0	0	0	1	0	2	0
Mar 6	5	2	2	2	1	0	2	0
Mar 7	6	1	3	1	1	0	2	0
Mar 8	10	4	7	4	1	0	2	0
Mar 9	24	14	21	14	1	0	2	0
Mar 10	33	9	30	9	1	0	2	0
Mar 11	49	16	45	15	2	1	2	0
Mar 12	52	3	45	0	5	3	2	0
Mar 13	64	12	57	12	5	0	2	0
Mar 14	111	47	101	44	8	3	2	0
Mar 15	140	29	126	25	12	4	2	0
Mar 16	142	2	127	1	12	0	3	1
Mar 17	187	45	169	42	14	2	4	1
Mar 18	202	15	178	9	17	3	7	3
Mar 19	217	15	192	14	17	0	8	1
Mar 20	230	13	204	12	18	1	8	0
Mar 21	307	77	275	71	19	1	13	5
Mar 22	380	73	340	65	25	6	15	2
Mar 23	462	82	411	71	33	8	18	3
Mar 24	552	90	497	86	35	2	20	2
Mar 25	636	84	572	75	38	3	26	6
Mar 26	707	71	634	62	45	7	28	2
Mar 27	803	96	718	84	54	9	31	3
Mar 28	1075	272	972	254	68	14	35	4
Mar 29	1418	343	1305	333	71	3	42	7
Mar 30	1546	128	1426	121	78	7	42	0
Mar 31	2084	538	1947	521	88	10	49	7
Apr 1	2311	227	2165	218	96	8	50	1
Apr 2	2633	322	2475	310	107	11	51	1
Apr 3	3018	385	2830	355	136	29	52	1
Apr 4	3094	76	2893	63	144	8	57	5
Apr 5	3246	152	3030	137	152	8	64	7
Apr 6	3660	414	3424	394	163	11	73	9
Apr 7	3764	104	3503	79	177	14	84	11
Apr 8	3870	106	3592	89	182	5	96	12
Apr 9	4076	206	3749	157	203	21	124	28
Apr 10	4195	119	3834	85	221	18	140	16
Apr 11	4428	233	4024	190	247	26	157	17
Apr 12	4648	220	4154	130	297	50	197	40
Apr 13	4932	284	4375	221	315	18	242	45
Apr 14	5223	291	4593	218	335	20	295	53
Apr 15	5453	230	4751	158	349	14	353	58
Apr 16	5660	207	4863	112	362	13	435	82
Apr 17	5878	218	5004	141	387	25	487	52
Apr 18	6087	209	5174	170	397	10	516	29
Apr 19	6259	172	5278	104	409	12	572	56
Apr 20	6459	200	5418	140	428	19	613	41
Apr 21	6599	140	5508	90	437	9	654	41
Apr 22	6710	111	5571	63	446	9	693	39
Apr 23	6981	271	5797	226	462	16	722	29
Apr 24	7192	211	5953	156	477	15	762	40
Apr 25	7294	102	6008	55	494	17	792	30
Apr 26	7579	285	6216	208	501	7	862	70

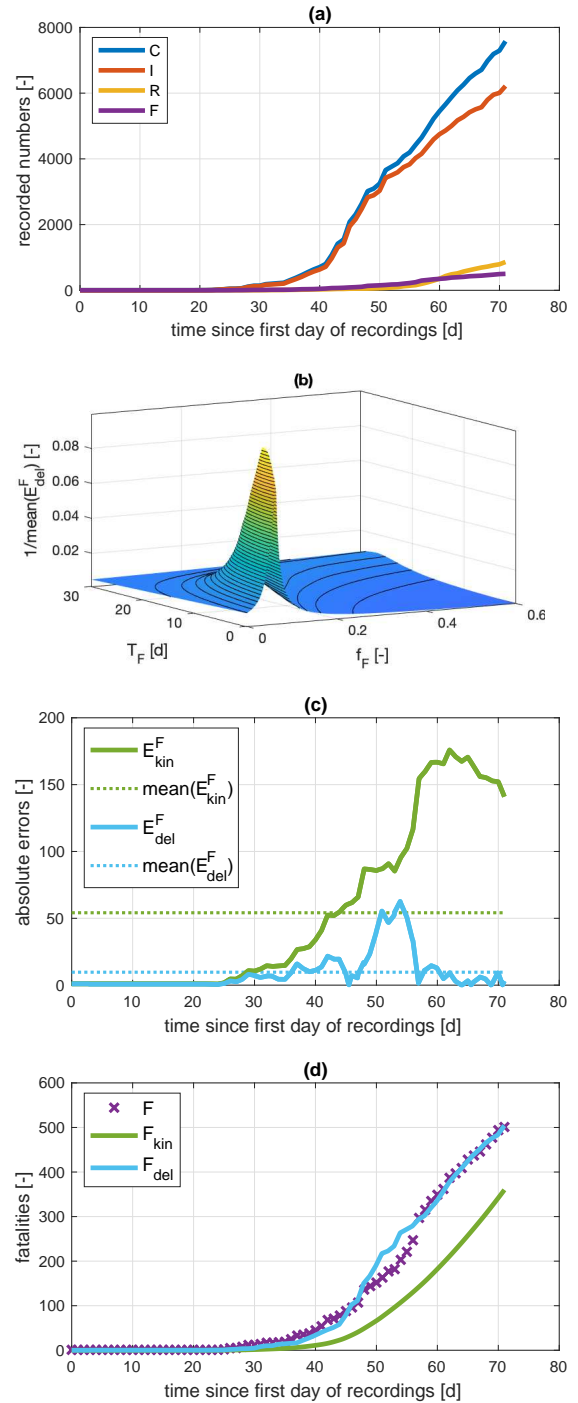


Figure 42: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Philippines

Table 43: Data recorded in Poland

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 4	1	1	1	1	0	0	0	0
Mar 5	1	0	1	0	0	0	0	0
Mar 6	5	4	5	4	0	0	0	0
Mar 7	6	1	6	1	0	0	0	0
Mar 8	11	5	11	5	0	0	0	0
Mar 9	17	6	17	6	0	0	0	0
Mar 10	22	5	22	5	0	0	0	0
Mar 11	31	9	31	9	0	0	0	0
Mar 12	51	20	50	19	1	1	0	0
Mar 13	68	17	66	16	2	1	0	0
Mar 14	104	36	88	22	3	1	13	13
Mar 15	125	21	109	21	3	0	13	0
Mar 16	177	52	160	51	4	1	13	0
Mar 17	238	61	220	60	5	1	13	0
Mar 18	287	49	269	49	5	0	13	0
Mar 19	355	68	337	68	5	0	13	0
Mar 20	425	70	407	70	5	0	13	0
Mar 21	536	111	518	111	5	0	13	0
Mar 22	634	98	614	96	7	2	13	0
Mar 23	749	115	728	114	8	1	13	0
Mar 24	901	152	890	162	10	2	1	-12
Mar 25	1051	150	1030	140	14	4	7	6
Mar 26	1221	170	1198	168	16	2	7	0
Mar 27	1389	168	1366	168	16	0	7	0
Mar 28	1638	249	1613	247	18	2	7	0
Mar 29	1862	224	1833	220	22	4	7	0
Mar 30	2055	193	2017	184	31	9	7	0
Mar 31	2311	256	2271	254	33	2	7	0
Apr 1	2554	243	2455	184	43	10	56	49
Apr 2	2946	392	2833	378	57	14	56	0
Apr 3	3383	437	3256	423	71	14	56	0
Apr 4	3627	244	3432	176	79	8	116	60
Apr 5	4102	475	3874	442	94	15	134	18
Apr 6	4413	311	4144	270	107	13	162	28
Apr 7	4848	435	4528	384	129	22	191	29
Apr 8	5205	357	4824	296	159	30	222	31
Apr 9	5575	370	5117	293	174	15	284	62
Apr 10	5955	380	5456	339	181	7	318	34
Apr 11	6356	401	5773	317	208	27	375	57
Apr 12	6674	318	6003	230	232	24	439	64
Apr 13	6934	260	6202	199	245	13	487	48
Apr 14	7202	268	6321	119	263	18	618	131
Apr 15	7582	380	6628	307	286	23	668	50
Apr 16	7918	336	6830	202	314	28	774	106
Apr 17	8379	461	7181	351	332	18	866	92
Apr 18	8742	363	7414	233	347	15	981	115
Apr 19	9287	545	7887	473	360	13	1040	59
Apr 20	9593	306	8080	193	380	20	1133	93
Apr 21	9856	263	8158	78	401	21	1297	164
Apr 22	10169	313	8230	72	426	25	1513	216
Apr 23	10511	342	8317	87	454	28	1740	227
Apr 24	10892	381	8454	137	494	40	1944	204
Apr 25	11273	381	8623	169	524	30	2126	182
Apr 26	11617	344	8817	194	535	11	2265	139

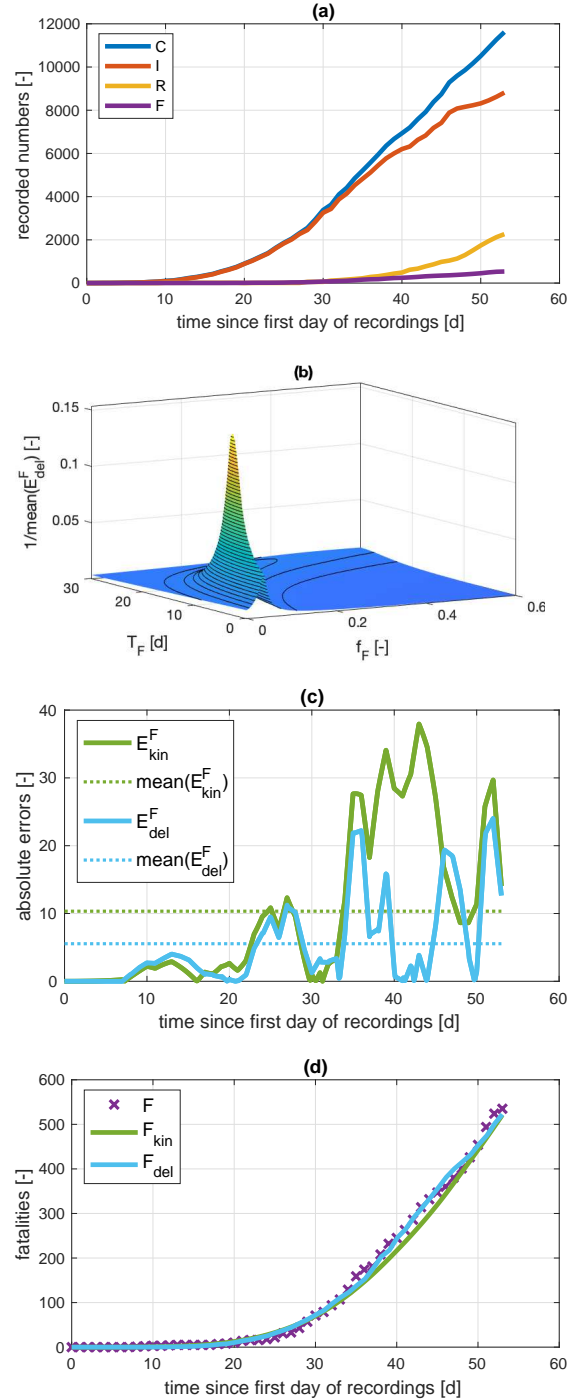


Figure 43: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Poland

Table 44: Data recorded in Portugal

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 2	2	2	2	2	0	0	0	0
Mar 3	4	2	4	2	0	0	0	0
Mar 4	6	2	6	2	0	0	0	0
Mar 5	9	3	9	3	0	0	0	0
Mar 6	13	4	13	4	0	0	0	0
Mar 7	21	8	21	8	0	0	0	0
Mar 8	30	9	30	9	0	0	0	0
Mar 9	39	9	39	9	0	0	0	0
Mar 10	41	2	41	2	0	0	0	0
Mar 11	61	20	61	20	0	0	0	0
Mar 12	78	17	77	16	0	0	1	1
Mar 13	112	34	111	34	0	0	1	0
Mar 14	169	57	167	56	0	0	2	1
Mar 15	245	76	242	75	0	0	3	1
Mar 16	331	86	327	85	1	1	3	0
Mar 17	448	117	444	117	1	0	3	0
Mar 18	642	194	636	192	2	1	4	1
Mar 19	786	144	778	142	4	2	4	0
Mar 20	1020	234	1009	231	6	2	5	1
Mar 21	1280	260	1263	254	12	6	5	0
Mar 22	1600	320	1581	318	14	2	5	0
Mar 23	2060	460	2023	442	23	9	14	9
Mar 24	2362	302	2307	284	33	10	22	8
Mar 25	2995	633	2930	623	43	10	22	0
Mar 26	3544	549	3441	511	60	17	43	21
Mar 27	4268	724	4149	708	76	16	43	0
Mar 28	5170	902	5027	878	100	24	43	0
Mar 29	5962	792	5800	773	119	19	43	0
Mar 30	6408	446	6225	425	140	21	43	0
Mar 31	7443	1035	7240	1015	160	20	43	0
Apr 1	8251	808	8021	781	187	27	43	0
Apr 2	9034	783	8757	736	209	22	68	25
Apr 3	9886	852	9572	815	246	37	68	0
Apr 4	10524	638	10183	611	266	20	75	7
Apr 5	11278	754	10908	725	295	29	75	0
Apr 6	11730	452	11279	371	311	16	140	65
Apr 7	12442	712	11913	634	345	34	184	44
Apr 8	13141	699	12565	652	380	35	196	12
Apr 9	13956	815	13342	777	409	29	205	9
Apr 10	15472	1516	14804	1462	435	26	233	28
Apr 11	15987	515	15251	447	470	35	266	33
Apr 12	16585	598	15804	553	504	34	277	11
Apr 13	16934	349	16122	318	535	31	277	0
Apr 14	17448	514	16534	412	567	32	347	70
Apr 15	18091	643	17109	575	599	32	383	36
Apr 16	18841	750	17719	610	629	30	493	110
Apr 17	19022	181	17846	127	657	28	519	26
Apr 18	19685	663	18388	542	687	30	610	91
Apr 19	20206	521	18882	494	714	27	610	0
Apr 20	20863	657	19518	636	735	21	610	0
Apr 21	21379	516	19700	182	762	27	917	307
Apr 22	21982	603	20054	354	785	23	1143	226
Apr 23	22353	371	20332	278	820	35	1201	58
Apr 24	22797	444	20715	383	854	34	1228	27
Apr 25	23392	595	21235	520	880	26	1277	49
Apr 26	23864	472	21632	397	903	23	1329	52

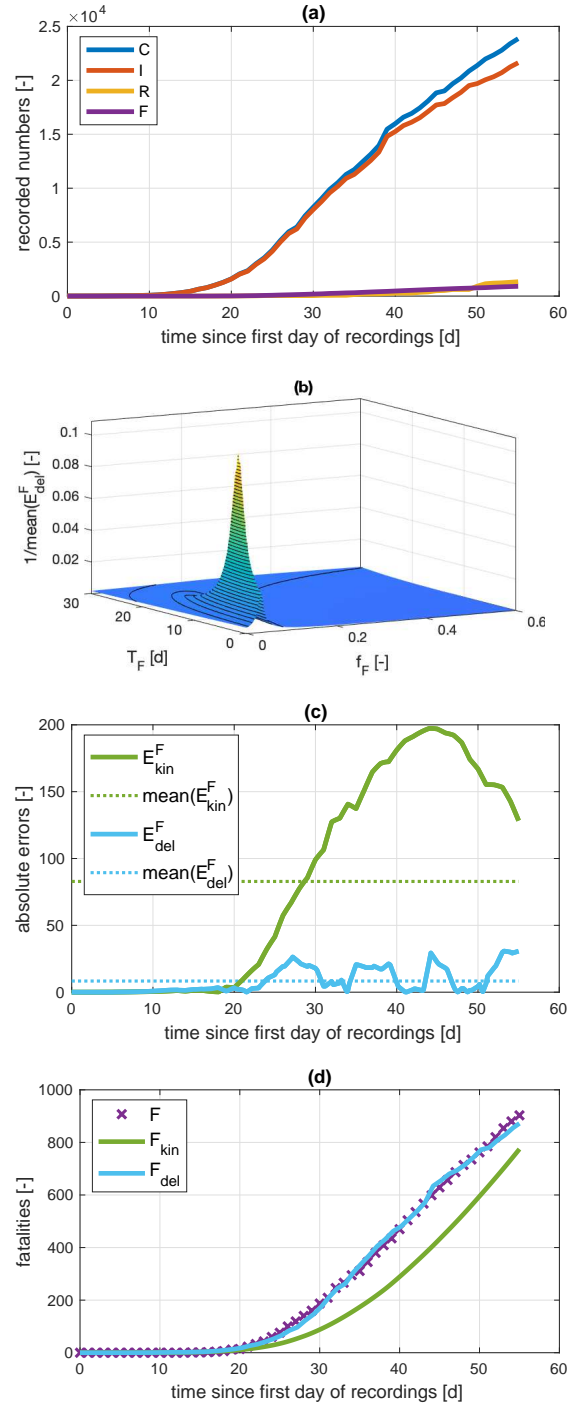


Figure 44: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Portugal

Table 45: Data recorded in Romania

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 26	1	1	1	1	0	0	0	0
Feb 27	1	0	1	0	0	0	0	0
Feb 28	3	2	2	1	0	0	1	1
Feb 29	3	0	2	0	0	0	1	0
Mar 1	3	0	2	0	0	0	1	0
Mar 2	3	0	2	0	0	0	1	0
Mar 3	4	1	3	1	0	0	1	0
Mar 4	6	2	5	2	0	0	1	0
Mar 5	6	0	3	-2	0	0	3	2
Mar 6	9	3	6	3	0	0	3	0
Mar 7	13	4	10	4	0	0	3	0
Mar 8	15	2	10	0	0	0	5	2
Mar 9	17	2	12	2	0	0	5	0
Mar 10	29	12	24	12	0	0	5	0
Mar 11	47	18	41	17	0	0	6	1
Mar 12	59	12	52	11	0	0	7	1
Mar 13	95	36	88	36	0	0	7	0
Mar 14	123	28	114	26	0	0	9	2
Mar 15	134	11	130	16	0	0	4	-5
Mar 16	168	34	159	29	0	0	9	5
Mar 17	217	49	198	39	0	0	19	10
Mar 18	260	43	241	43	0	0	19	0
Mar 19	277	17	252	11	0	0	25	6
Mar 20	308	31	277	25	0	0	31	6
Mar 21	367	59	315	38	0	0	52	21
Mar 22	433	66	366	51	3	3	64	12
Mar 23	576	143	496	130	7	4	73	9
Mar 24	794	218	703	207	12	5	79	6
Mar 25	906	112	803	100	17	5	86	7
Mar 26	1029	123	912	109	23	6	94	8
Mar 27	1292	263	1151	239	26	3	115	21
Mar 28	1452	160	1276	125	37	11	139	24
Mar 29	1815	363	1566	290	43	6	206	67
Mar 30	2109	294	1835	269	65	22	209	3
Mar 31	2245	136	1943	108	82	17	220	11
Apr 1	2460	215	2116	173	92	10	252	32
Apr 2	2738	278	2356	240	115	23	267	15
Apr 3	3183	445	2767	411	133	18	283	16
Apr 4	3613	430	3138	371	146	13	329	46
Apr 5	3864	251	3339	201	151	5	374	45
Apr 6	4057	193	3475	136	176	25	406	32
Apr 7	4417	360	3760	285	197	21	460	54
Apr 8	4761	344	4013	253	220	23	528	68
Apr 9	5202	441	4307	294	248	28	647	119
Apr 10	5467	265	4468	161	270	22	729	82
Apr 11	5990	523	4941	473	291	21	758	29
Apr 12	6300	310	5132	191	316	25	852	94
Apr 13	6633	333	5388	256	331	15	914	62
Apr 14	6879	246	5477	89	351	20	1051	137
Apr 15	7216	337	5627	150	372	21	1217	166
Apr 16	7707	491	5958	331	392	20	1357	140
Apr 17	8067	360	6148	190	411	19	1508	151
Apr 18	8418	351	6267	119	421	10	1730	222
Apr 19	8746	328	6403	136	451	30	1892	162
Apr 20	8936	190	6441	38	478	27	2017	125
Apr 21	9242	306	6591	150	498	20	2153	136
Apr 22	9710	468	6780	189	524	26	2406	253
Apr 23	10096	386	7073	293	545	21	2478	72
Apr 24	10417	321	7033	-40	567	22	2817	339
Apr 25	10635	218	7144	111	601	34	2890	73
Apr 26	11036	401	7363	219	619	18	3054	164

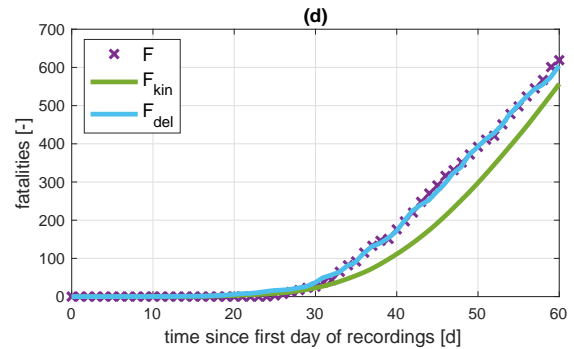
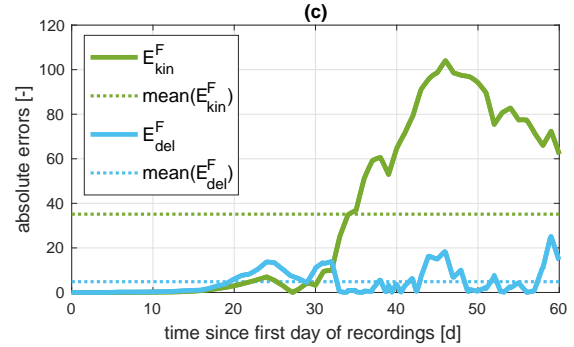
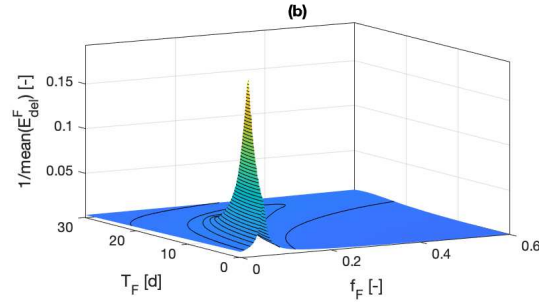
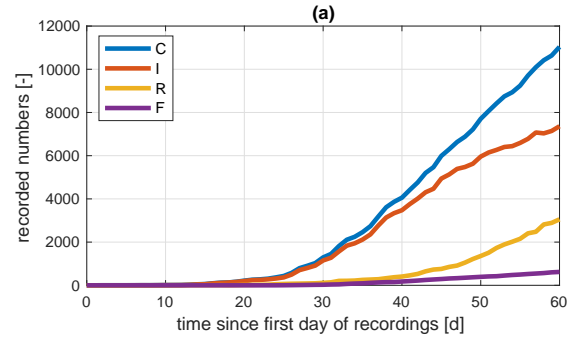


Figure 45: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Romania

Table 46: Data recorded in Russia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	2	2	0	0	0	0	2	2
Feb 16	2	0	0	0	0	0	2	0
Feb 17	2	0	0	0	0	0	2	0
Feb 18	2	0	0	0	0	0	2	0
Feb 19	2	0	0	0	0	0	2	0
Feb 20	2	0	0	0	0	0	2	0
Feb 21	2	0	0	0	0	0	2	0
Feb 22	2	0	0	0	0	0	2	0
Feb 23	2	0	0	0	0	0	2	0
Feb 24	2	0	0	0	0	0	2	0
Feb 25	2	0	0	0	0	0	2	0
Feb 26	2	0	0	0	0	0	2	0
Feb 27	2	0	0	0	0	0	2	0
Feb 28	2	0	0	0	0	0	2	0
Feb 29	2	0	0	0	0	0	2	0
Mar 1	2	0	0	0	0	0	2	0
Mar 2	3	1	1	1	0	0	2	0
Mar 3	3	0	1	0	0	0	2	0
Mar 4	3	0	1	0	0	0	2	0
Mar 5	7	4	5	4	0	0	2	0
Mar 6	13	6	11	6	0	0	2	0
Mar 7	14	1	11	0	0	0	3	1
Mar 8	17	3	14	3	0	0	3	0
Mar 9	20	3	17	3	0	0	3	0
Mar 10	20	0	17	0	0	0	3	0
Mar 11	28	8	25	8	0	0	3	0
Mar 12	34	6	31	6	0	0	3	0
Mar 13	45	11	37	6	0	0	8	5
Mar 14	59	14	51	14	0	0	8	0
Mar 15	63	4	55	4	0	0	8	0
Mar 16	93	30	85	30	0	0	8	0
Mar 17	114	21	106	21	0	0	8	0
Mar 18	147	33	139	33	0	0	8	0
Mar 19	199	52	190	51	1	1	8	0
Mar 20	253	54	240	50	1	0	12	4
Mar 21	306	53	289	49	1	0	16	4
Mar 22	367	61	350	61	1	0	16	0
Mar 23	438	71	420	70	1	0	17	1
Mar 24	495	57	472	52	1	0	22	5
Mar 25	658	163	626	154	3	2	29	7
Mar 26	840	182	799	173	3	0	38	9
Mar 27	1036	196	987	188	4	1	45	7
Mar 28	1264	228	1211	224	4	0	49	4
Mar 29	1534	270	1462	251	8	4	64	15
Mar 30	1836	302	1761	299	9	1	66	2
Mar 31	2337	501	2199	438	17	8	121	55
Apr 1	2777	440	2563	364	24	7	190	69
Apr 2	3548	771	3283	720	30	6	235	45
Apr 3	4149	601	3834	551	34	4	281	46
Apr 4	4731	582	4355	521	43	9	333	52
Apr 5	5389	658	4989	634	45	2	355	22
Apr 6	6343	954	5890	901	47	2	406	51
Apr 7	7497	1154	6945	1055	58	11	494	88
Apr 8	8672	1175	8029	1084	63	5	580	86
Apr 9	10131	1459	9357	1328	76	13	698	118
Apr 10	11917	1786	11028	1671	94	18	795	97
Apr 11	13584	1667	12433	1405	106	12	1045	250
Apr 12	15770	2186	14349	1916	130	24	1291	246
Apr 13	18328	2558	16710	2361	148	18	1470	179
Apr 14	21102	2774	19238	2528	170	22	1694	224
Apr 15	24490	3388	22306	3068	198	28	1986	292
Apr 16	27938	3448	25402	3096	232	34	2304	318
Apr 17	32008	4070	29145	3743	273	41	2590	286
Apr 18	36793	4785	33423	4278	313	40	3057	467
Apr 19	42853	6060	39201	5778	361	48	3291	234
Apr 20	47121	4268	43270	4069	405	44	3446	155
Apr 21	52763	5642	48434	5164	456	51	3873	427
Apr 22	57999	5236	53066	4632	513	57	4420	547
Apr 23	62773	4774	57327	4261	555	42	4891	471
Apr 24	68622	5849	62439	5112	615	60	5568	677
Apr 25	74588	5966	67657	5218	681	66	6250	682
Apr 26	80949	6361	73435	5778	747	66	6767	517

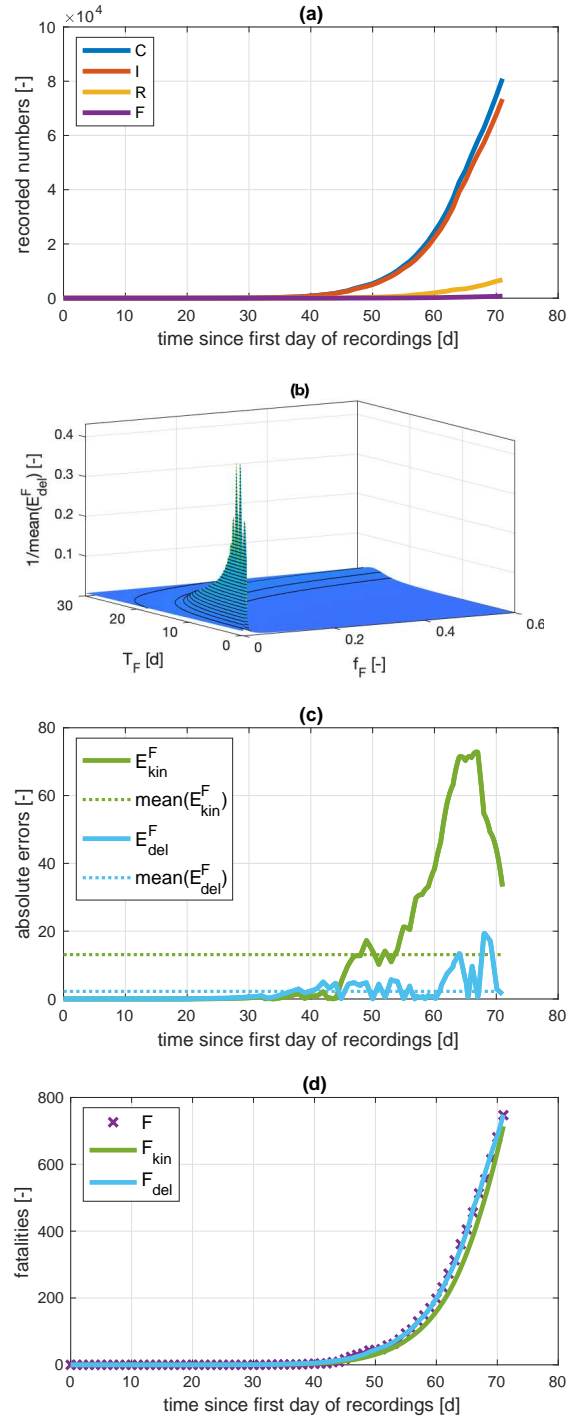


Figure 46: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Russia

Table 47: Data recorded in Saudi Arabia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 2	1	1	1	1	0	0	0	0
Mar 3	1	0	1	0	0	0	0	0
Mar 4	2	1	2	1	0	0	0	0
Mar 5	5	3	4	2	0	0	1	1
Mar 6	5	0	4	0	0	0	1	0
Mar 7	7	2	6	2	0	0	1	0
Mar 8	11	4	10	4	0	0	1	0
Mar 9	20	9	19	9	0	0	1	0
Mar 10	20	0	19	0	0	0	1	0
Mar 11	45	25	44	25	0	0	1	0
Mar 12	45	0	44	0	0	0	1	0
Mar 13	86	41	85	41	0	0	1	0
Mar 14	103	17	102	17	0	0	1	0
Mar 15	118	15	115	13	0	0	3	2
Mar 16	133	15	127	12	0	0	6	3
Mar 17	171	38	165	38	0	0	6	0
Mar 18	238	67	232	67	0	0	6	0
Mar 19	274	36	266	34	0	0	8	2
Mar 20	344	70	336	70	0	0	8	0
Mar 21	392	48	376	40	0	0	16	8
Mar 22	511	119	494	118	0	0	17	1
Mar 23	562	51	543	49	0	0	19	2
Mar 24	767	205	738	195	1	1	28	9
Mar 25	900	133	869	131	2	1	29	1
Mar 26	1012	112	976	107	3	1	33	4
Mar 27	1104	92	1066	90	3	0	35	2
Mar 28	1203	99	1162	96	4	1	37	2
Mar 29	1299	96	1225	63	8	4	66	29
Mar 30	1453	154	1330	105	8	0	115	49
Mar 31	1563	110	1388	58	10	2	165	50
Apr 1	1720	157	1440	52	16	6	264	99
Apr 2	1885	165	1536	96	21	5	328	64
Apr 3	2039	154	1663	127	25	4	351	23
Apr 4	2179	140	1730	67	29	4	420	69
Apr 5	2402	223	1880	150	34	5	488	68
Apr 6	2605	203	2016	136	38	4	551	63
Apr 7	2795	190	2139	123	41	3	615	64
Apr 8	2932	137	2260	121	41	0	631	16
Apr 9	3287	355	2577	317	44	3	666	35
Apr 10	3651	364	2919	342	47	3	685	19
Apr 11	4033	382	3261	342	52	5	720	35
Apr 12	4462	429	3642	381	59	7	761	41
Apr 13	4934	472	4064	422	65	6	805	44
Apr 14	5369	435	4407	343	73	8	889	84
Apr 15	5862	493	4852	445	79	6	931	42
Apr 16	6380	518	5307	455	83	4	990	59
Apr 17	7142	762	6006	699	87	4	1049	59
Apr 18	8274	1132	6853	847	92	5	1329	280
Apr 19	9362	1088	7867	1014	97	5	1398	69
Apr 20	10484	1122	8891	1024	103	6	1490	92
Apr 21	11631	1147	9882	991	109	6	1640	150
Apr 22	12772	1141	10846	964	114	5	1812	172
Apr 23	13930	1158	11884	1038	121	7	1925	113
Apr 24	15102	1172	12926	1042	127	6	2049	124
Apr 25	16299	1197	13948	1022	136	9	2215	166
Apr 26	17522	1223	15026	1078	139	3	2357	142

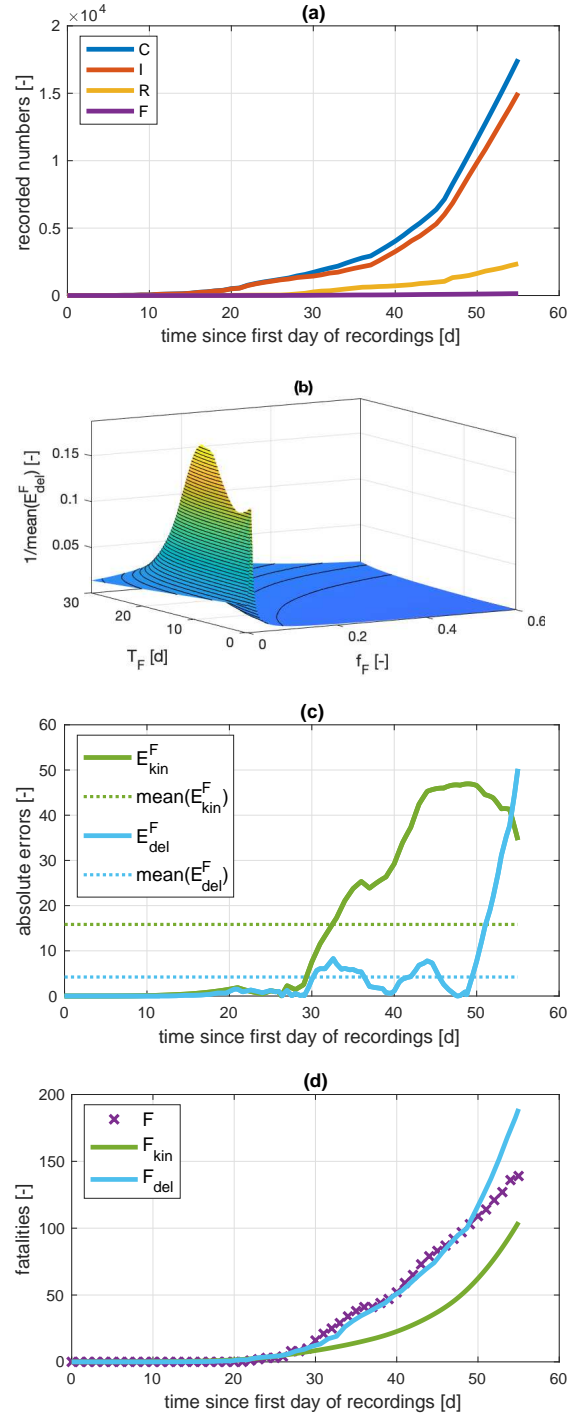


Figure 47: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Saudi Arabia

Table 48: Data recorded in Serbia

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 6	1	1	1	1	0	0	0	0
Mar 7	1	0	1	0	0	0	0	0
Mar 8	1	0	1	0	0	0	0	0
Mar 9	2	1	2	1	0	0	0	0
Mar 10	5	3	5	3	0	0	0	0
Mar 11	18	13	18	13	0	0	0	0
Mar 12	24	6	24	6	0	0	0	0
Mar 13	35	11	35	11	0	0	0	0
Mar 14	46	11	46	11	0	0	0	0
Mar 15	48	2	47	1	0	0	1	1
Mar 16	57	9	56	9	0	0	1	0
Mar 17	72	15	71	15	0	0	1	0
Mar 18	89	17	88	17	0	0	1	0
Mar 19	103	14	102	14	0	0	1	0
Mar 20	135	32	132	30	1	1	2	1
Mar 21	171	36	168	36	1	0	2	0
Mar 22	222	51	218	50	2	1	2	0
Mar 23	249	27	243	25	3	1	3	1
Mar 24	303	54	285	42	3	0	15	12
Mar 25	384	81	365	80	4	1	15	0
Mar 26	457	73	435	70	7	3	15	0
Mar 27	528	71	478	43	8	1	42	27
Mar 28	659	131	607	129	10	2	42	0
Mar 29	741	82	686	79	13	3	42	0
Mar 30	785	44	727	41	16	3	42	0
Mar 31	900	115	835	108	23	7	42	0
Apr 1	1060	160	990	155	28	5	42	0
Apr 2	1171	111	1098	108	31	3	42	0
Apr 3	1476	305	1383	285	39	8	54	12
Apr 4	1624	148	1526	143	44	5	54	0
Apr 5	1908	284	1803	277	51	7	54	0
Apr 6	2200	292	2024	221	58	7	118	64
Apr 7	2447	247	2268	244	61	3	118	0
Apr 8	2666	219	2483	215	65	4	118	0
Apr 9	2867	201	2683	200	66	1	118	0
Apr 10	3105	238	2916	233	71	5	118	0
Apr 11	3380	275	3188	272	74	3	118	0
Apr 12	3630	250	3150	-38	80	6	400	282
Apr 13	4054	424	3569	419	85	5	400	0
Apr 14	4465	411	3971	402	94	9	400	0
Apr 15	4873	408	4374	403	99	5	400	0
Apr 16	5318	445	4772	398	103	4	443	43
Apr 17	5690	372	5046	274	110	7	534	91
Apr 18	5994	304	5240	194	117	7	637	103
Apr 19	6318	324	5443	203	122	5	753	116
Apr 20	6630	312	5635	192	125	3	870	117
Apr 21	6890	260	5783	148	130	5	977	107
Apr 22	7114	224	5955	172	134	4	1025	48
Apr 23	7276	162	6074	119	139	5	1063	38
Apr 24	7483	207	6245	171	144	5	1094	31
Apr 25	7779	296	6476	231	151	7	1152	58
Apr 26	8042	263	6704	228	156	5	1182	30

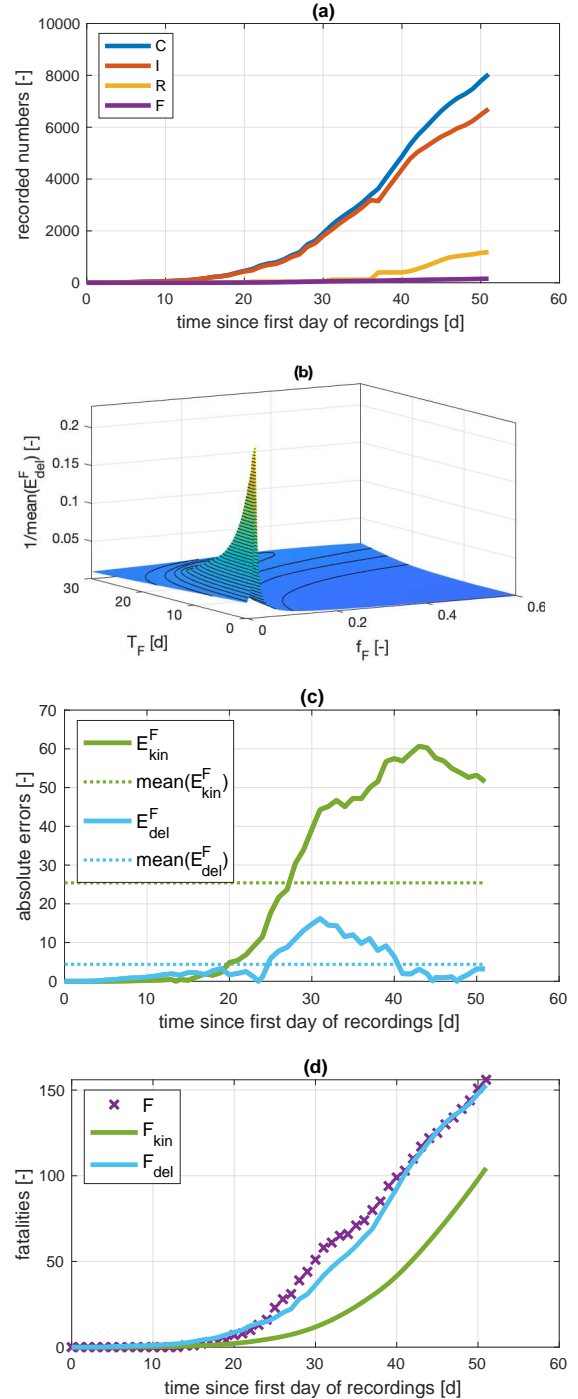


Figure 48: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Serbia

Table 49: Data recorded in South Africa

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 5	1	1	1	1	0	0	0	0
Mar 6	1	0	1	0	0	0	0	0
Mar 7	2	1	2	1	0	0	0	0
Mar 8	3	1	3	1	0	0	0	0
Mar 9	7	4	7	4	0	0	0	0
Mar 10	7	0	7	0	0	0	0	0
Mar 11	13	6	13	6	0	0	0	0
Mar 12	16	3	16	3	0	0	0	0
Mar 13	24	8	24	8	0	0	0	0
Mar 14	38	14	38	14	0	0	0	0
Mar 15	61	23	61	23	0	0	0	0
Mar 16	64	3	64	3	0	0	0	0
Mar 17	85	21	85	21	0	0	0	0
Mar 18	116	31	116	31	0	0	0	0
Mar 19	150	34	150	34	0	0	0	0
Mar 20	202	52	202	52	0	0	0	0
Mar 21	240	38	238	36	0	0	2	2
Mar 22	274	34	272	34	0	0	2	0
Mar 23	402	128	398	126	0	0	4	2
Mar 24	554	152	550	152	0	0	4	0
Mar 25	709	155	697	147	0	0	12	8
Mar 26	927	218	915	218	0	0	12	0
Mar 27	1170	243	1138	223	1	1	31	19
Mar 28	1187	17	1155	17	1	0	31	0
Mar 29	1280	93	1247	92	2	1	31	0
Mar 30	1326	46	1292	45	3	1	31	0
Mar 31	1353	27	1317	25	5	2	31	0
Apr 1	1380	27	1325	8	5	0	50	19
Apr 2	1462	82	1407	82	5	0	50	0
Apr 3	1505	43	1401	-6	9	4	95	45
Apr 4	1585	80	1481	80	9	0	95	0
Apr 5	1655	70	1549	68	11	2	95	0
Apr 6	1686	31	1579	30	12	1	95	0
Apr 7	1749	63	1641	62	13	1	95	0
Apr 8	1845	96	1732	91	18	5	95	0
Apr 9	1934	89	1821	89	18	0	95	0
Apr 10	2003	69	1569	-252	24	6	410	315
Apr 11	2028	25	1593	24	25	1	410	0
Apr 12	2173	145	1738	145	25	0	410	0
Apr 13	2272	99	1835	97	27	2	410	0
Apr 14	2415	143	1978	143	27	0	410	0
Apr 15	2506	91	2062	84	34	7	410	0
Apr 16	2605	99	1654	-408	48	14	903	493
Apr 17	2783	178	1830	176	50	2	903	0
Apr 18	3034	251	2079	249	52	2	903	0
Apr 19	3158	124	2201	122	54	2	903	0
Apr 20	3300	142	2187	-14	58	4	1055	152
Apr 21	3465	165	2352	165	58	0	1055	0
Apr 22	3635	170	2515	163	65	7	1055	0
Apr 23	3953	318	2405	-110	75	10	1473	418
Apr 24	4220	267	2668	263	79	4	1473	0
Apr 25	4361	141	2802	134	86	7	1473	0
Apr 26	4546	185	2986	184	87	1	1473	0

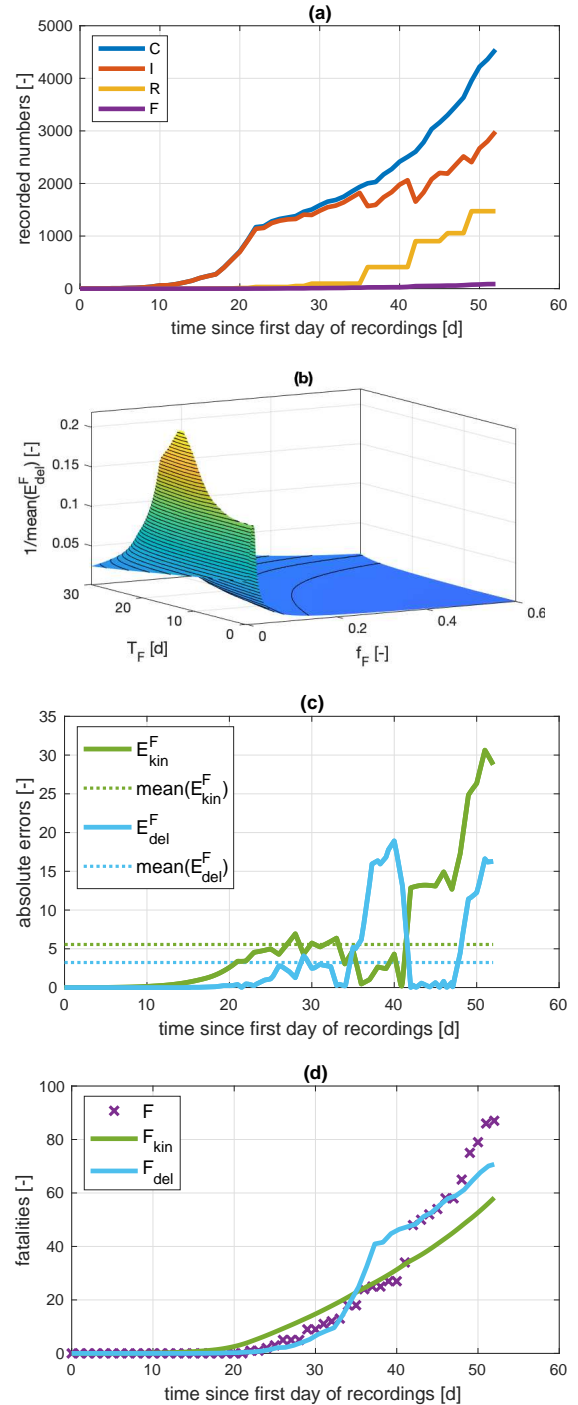


Figure 49: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for South Africa

Table 50: Data recorded in South Korea

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	28	28	19	19	0	0	9	9
Feb 16	29	1	20	1	0	0	9	0
Feb 17	30	1	20	0	0	0	10	1
Feb 18	31	1	19	-1	0	0	12	2
Feb 19	58	27	42	23	0	0	16	4
Feb 20	111	53	94	52	1	1	16	0
Feb 21	209	98	190	96	2	1	17	1
Feb 22	436	227	416	226	2	0	18	1
Feb 23	602	166	578	162	6	4	18	0
Feb 24	833	231	803	225	8	2	22	4
Feb 25	977	144	944	141	11	3	22	0
Feb 26	1261	284	1225	281	12	1	24	2
Feb 27	1766	505	1729	504	13	1	24	0
Feb 28	2337	571	2297	568	16	3	24	0
Feb 29	3150	813	3109	812	17	1	24	0
Mar 1	3736	586	3685	576	21	4	30	6
Mar 2	4335	599	4277	592	28	7	30	0
Mar 3	5186	851	5120	843	32	4	34	4
Mar 4	5621	435	5498	378	35	3	88	54
Mar 5	6284	663	6107	609	42	7	135	47
Mar 6	6593	309	6415	308	43	1	135	0
Mar 7	7041	448	6875	460	48	5	118	-17
Mar 8	7313	272	7097	222	50	2	166	48
Mar 9	7478	165	7178	81	53	3	247	81
Mar 10	7513	35	7165	-13	60	7	288	41
Mar 11	7755	242	7362	197	61	1	332	44
Mar 12	7869	114	7293	-69	66	5	510	178
Mar 13	7979	110	7198	-95	67	1	714	204
Mar 14	8086	107	7180	-18	72	5	834	120
Mar 15	8162	76	7253	73	75	3	834	0
Mar 16	8236	74	7024	-229	76	1	1136	302
Mar 17	8320	84	6838	-186	81	5	1401	265
Mar 18	8413	93	6789	-49	84	3	1540	139
Mar 19	8565	152	6527	-262	91	7	1947	407
Mar 20	8652	87	6325	-202	94	3	2233	286
Mar 21	8766	114	6085	-240	102	8	2579	346
Mar 22	8897	131	5884	-201	104	2	2909	330
Mar 23	8961	64	5684	-200	111	7	3166	257
Mar 24	9037	76	5410	-274	120	9	3507	341
Mar 25	9137	100	5281	-129	126	6	3730	223
Mar 26	9241	104	4966	-315	131	5	4144	414
Mar 27	9332	91	4665	-301	139	8	4528	384
Mar 28	9478	146	4523	-142	144	5	4811	283
Mar 29	9583	105	4398	-125	152	8	5033	222
Mar 30	9661	78	4275	-123	158	6	5228	195
Mar 31	9786	125	4216	-59	162	4	5408	180
Apr 1	9887	101	4155	-61	165	3	5567	159
Apr 2	9976	89	3979	-176	169	4	5828	261
Apr 3	10062	86	3867	-112	174	5	6021	193
Apr 4	10156	94	3654	-213	177	3	6325	304
Apr 5	10237	81	3591	-63	183	6	6463	138
Apr 6	10284	47	3500	-91	186	3	6598	135
Apr 7	10331	47	3445	-55	192	6	6694	96
Apr 8	10384	53	3408	-37	200	8	6776	82
Apr 9	10423	39	3246	-162	204	4	6973	197
Apr 10	10450	27	3125	-121	208	4	7117	144
Apr 11	10480	30	3026	-99	211	3	7243	126
Apr 12	10512	32	2930	-96	214	3	7368	125
Apr 13	10537	25	2873	-57	217	3	7447	79
Apr 14	10564	27	2808	-65	222	5	7534	87
Apr 15	10591	27	2750	-58	225	3	7616	82
Apr 16	10613	22	2627	-123	229	4	7757	141
Apr 17	10635	22	2576	-51	230	1	7829	72
Apr 18	10653	18	2484	-92	232	2	7937	108
Apr 19	10661	8	2385	-99	234	2	8042	105
Apr 20	10674	13	2324	-61	236	2	8114	72
Apr 21	10683	9	2233	-91	237	1	8213	99
Apr 22	10694	11	2179	-54	238	1	8277	64
Apr 23	10702	8	2051	-128	240	2	8411	134
Apr 24	10708	6	1967	-84	240	0	8501	90
Apr 25	10718	10	1843	-124	240	0	8635	134
Apr 26	10728	10	1769	-74	242	2	8717	82

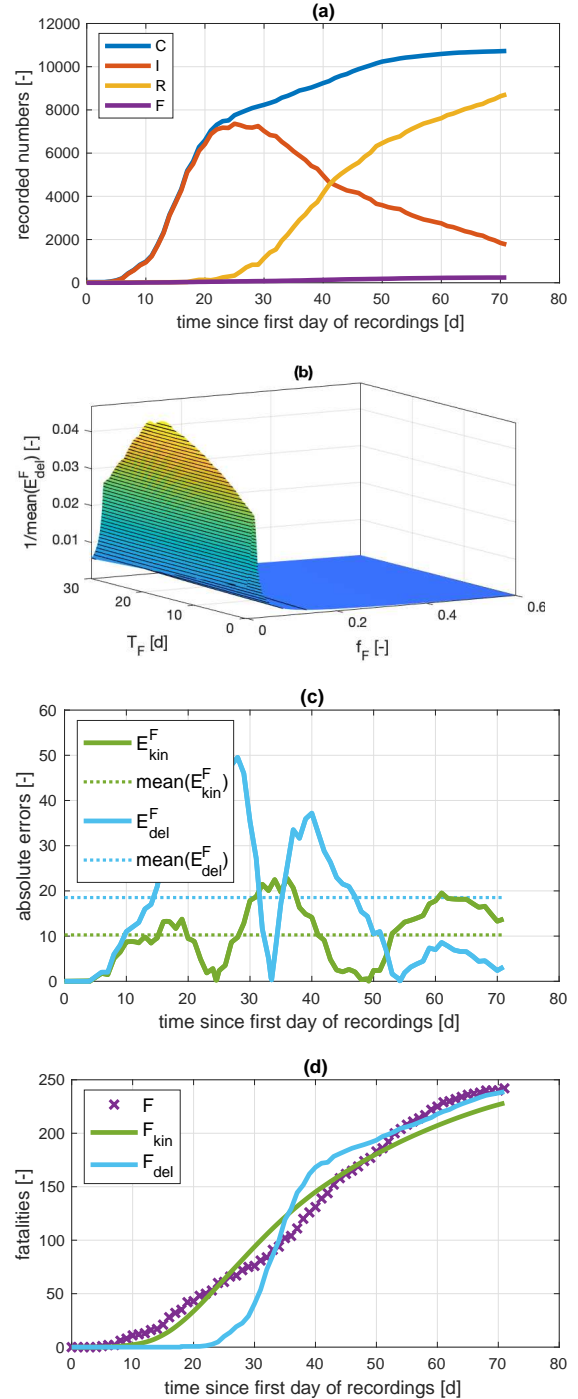


Figure 50: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for South Korea

Table 51: Data recorded in Spain

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	2	2	0	0	0	0	2	2
Feb 16	2	0	0	0	0	0	2	0
Feb 17	2	0	0	0	0	0	2	0
Feb 18	2	0	0	0	0	0	2	0
Feb 19	2	0	0	0	0	0	2	0
Feb 20	2	0	0	0	0	0	2	0
Feb 21	2	0	0	0	0	0	2	0
Feb 22	2	0	0	0	0	0	2	0
Feb 23	2	0	0	0	0	0	2	0
Feb 24	3	1	1	1	0	0	2	0
Feb 25	9	6	7	6	0	0	2	0
Feb 26	13	4	11	4	0	0	2	0
Feb 27	25	12	23	12	0	0	2	0
Feb 28	33	8	31	8	0	0	2	0
Feb 29	58	25	56	25	0	0	2	0
Mar 1	84	26	82	26	0	0	2	0
Mar 2	120	36	118	36	0	0	2	0
Mar 3	165	45	162	44	1	1	2	0
Mar 4	228	63	224	62	2	1	2	0
Mar 5	282	54	276	52	3	1	3	1
Mar 6	401	119	387	111	8	5	6	3
Mar 7	525	124	485	98	10	2	30	24
Mar 8	674	149	625	140	17	7	32	2
Mar 9	1231	557	1169	544	30	13	32	0
Mar 10	1695	464	1524	355	36	6	135	103
Mar 11	2277	582	2039	515	55	19	183	48
Mar 12	3146	869	2871	832	86	31	189	6
Mar 13	5232	2086	4906	2035	133	47	193	4
Mar 14	6391	1159	5678	772	196	63	517	324
Mar 15	7988	1597	7177	1499	294	98	517	0
Mar 16	9942	1954	9070	1893	342	48	530	13
Mar 17	11826	1884	10265	1195	533	191	1028	498
Mar 18	14769	2943	13050	2785	638	105	1081	53
Mar 19	18077	3308	16139	3089	831	193	1107	26
Mar 20	21571	3494	18890	2751	1093	262	1588	481
Mar 21	25496	3925	21990	3100	1381	288	2125	537
Mar 22	28768	3272	24421	2431	1772	391	2575	450
Mar 23	35136	6368	29470	5049	2311	539	3355	780
Mar 24	42058	6922	35273	5803	2991	680	3794	439
Mar 25	49515	7457	40501	5228	3647	656	5367	1573
Mar 26	57786	8271	46406	5905	4365	718	7015	1648
Mar 27	65719	7933	51224	4818	5138	773	9357	2342
Mar 28	73235	7516	54968	3744	5982	844	12285	2928
Mar 29	80110	6875	58598	3630	6803	821	14709	2424
Mar 30	87956	7846	63460	4862	7716	913	16780	2071
Mar 31	95923	7967	68200	4740	8464	748	19259	2479
Apr 1	104118	8195	72084	3884	9387	923	22647	3388
Apr 2	112065	7947	74974	2890	10348	961	26743	4096
Apr 3	119199	7134	77488	2514	11198	850	30513	3770
Apr 4	126168	6969	80002	2514	11947	749	34219	3706
Apr 5	131646	5478	80925	923	12641	694	38080	3861
Apr 6	136675	5029	82897	1972	13341	700	40437	2357
Apr 7	141942	5267	84689	1792	14045	704	43208	2771
Apr 8	148220	6278	85407	718	14792	747	48021	4813
Apr 9	153222	5002	85610	203	15447	655	52165	4144
Apr 10	158273	5051	86524	914	16081	634	55668	3503
Apr 11	163027	4754	87312	788	16606	525	59109	3441
Apr 12	166831	3804	87231	-81	17209	603	62391	3282
Apr 13	170099	3268	87616	385	17756	547	64727	2336
Apr 14	174060	3961	88301	685	18255	499	67504	2777
Apr 15	180659	6599	90994	2693	18812	557	70853	3349
Apr 16	184948	4289	91021	27	19130	318	74797	3944
Apr 17	190839	5891	96564	5543	19478	348	74797	0
Apr 18	194416	3577	99576	3012	20043	565	74797	0
Apr 19	198674	4258	100864	1288	20453	410	77357	2560
Apr 20	200210	1536	98771	-2093	20852	399	80587	3230
Apr 21	204178	3968	100382	1611	21282	430	82514	1927
Apr 22	208389	4211	100757	375	21717	435	85915	3401
Apr 23	213024	4635	101617	860	22157	440	89250	3335
Apr 24	219764	6740	104885	3268	22524	367	92355	3105
Apr 25	223759	3995	105149	264	22902	378	95708	3353
Apr 26	226629	2870	85712	-19437	23190	288	117727	22019

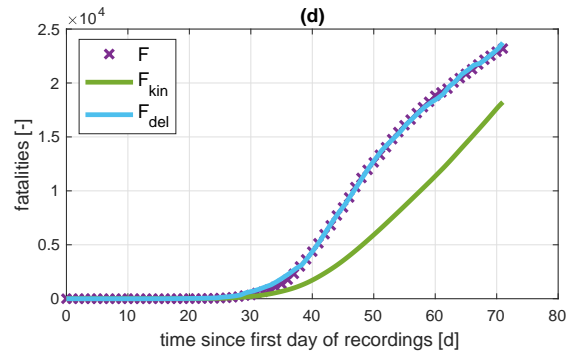
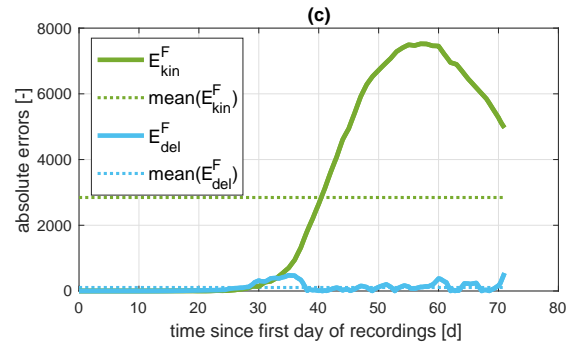
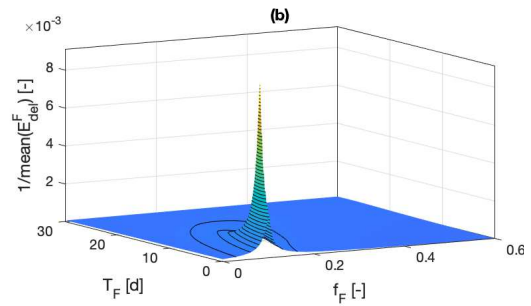
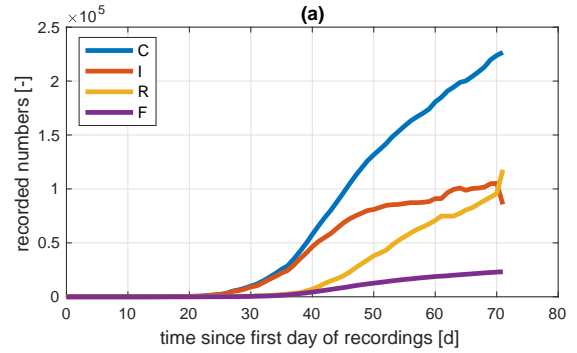


Figure 51: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Spain

Table 52: Data recorded in Sweden

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	1	1	1	1	0	0	0	0
Feb 16	1	0	1	0	0	0	0	0
Feb 17	1	0	1	0	0	0	0	0
Feb 18	1	0	1	0	0	0	0	0
Feb 19	1	0	1	0	0	0	0	0
Feb 20	1	0	1	0	0	0	0	0
Feb 21	1	0	1	0	0	0	0	0
Feb 22	1	0	1	0	0	0	0	0
Feb 23	1	0	1	0	0	0	0	0
Feb 24	1	0	1	0	0	0	0	0
Feb 25	1	0	1	0	0	0	0	0
Feb 26	2	1	2	1	0	0	0	0
Feb 27	7	5	7	5	0	0	0	0
Feb 28	11	4	11	4	0	0	0	0
Feb 29	13	2	13	2	0	0	0	0
Mar 1	14	1	14	1	0	0	0	0
Mar 2	15	1	15	1	0	0	0	0
Mar 3	30	15	29	14	0	0	1	1
Mar 4	52	22	51	22	0	0	1	0
Mar 5	94	42	93	42	0	0	1	0
Mar 6	137	43	136	43	0	0	1	0
Mar 7	161	24	160	24	0	0	1	0
Mar 8	203	42	202	42	0	0	1	0
Mar 9	260	57	259	57	0	0	1	0
Mar 10	355	95	354	95	0	0	1	0
Mar 11	500	145	498	144	1	1	1	0
Mar 12	687	187	685	187	1	0	1	0
Mar 13	814	127	812	127	1	0	1	0
Mar 14	961	147	958	146	2	1	1	0
Mar 15	1040	79	1036	78	3	1	1	0
Mar 16	1121	81	1113	77	7	4	1	0
Mar 17	1196	75	1187	74	8	1	1	0
Mar 18	1301	105	1276	89	10	2	15	14
Mar 19	1439	138	1412	136	11	1	16	1
Mar 20	1639	200	1607	195	16	5	16	0
Mar 21	1770	131	1734	127	20	4	16	0
Mar 22	1934	164	1897	163	21	1	16	0
Mar 23	2046	112	2003	106	27	6	16	0
Mar 24	2299	253	2243	240	40	13	16	0
Mar 25	2526	227	2448	205	62	22	16	0
Mar 26	2840	314	2747	299	77	15	16	0
Mar 27	3069	229	2948	201	105	28	16	0
Mar 28	3447	378	3326	378	105	0	16	0
Mar 29	3700	253	3574	248	110	5	16	0
Mar 30	4028	328	3866	292	146	36	16	0
Mar 31	4435	407	4239	373	180	34	16	0
Apr 1	4947	512	4605	366	239	59	103	87
Apr 2	5568	621	5157	552	308	69	103	0
Apr 3	6131	563	5568	411	358	50	205	102
Apr 4	6443	312	5865	297	373	15	205	0
Apr 5	6830	387	6224	359	401	28	205	0
Apr 6	7206	376	6524	300	477	76	205	0
Apr 7	7693	487	6897	373	591	114	205	0
Apr 8	8419	726	7527	630	687	96	205	0
Apr 9	9141	722	8143	616	793	106	205	0
Apr 10	9685	544	8434	291	870	77	381	176
Apr 11	10151	466	8883	449	887	17	381	0
Apr 12	10483	332	9203	320	899	12	381	0
Apr 13	10948	465	9648	445	919	20	381	0
Apr 14	11445	497	10031	383	1033	114	381	0
Apr 15	11927	482	10343	312	1203	170	381	0
Apr 16	12540	613	10657	314	1333	130	550	169
Apr 17	13216	676	11266	609	1400	67	550	0
Apr 18	13822	606	11761	495	1511	111	550	0
Apr 19	14385	563	12295	534	1540	29	550	0
Apr 20	14777	392	12647	352	1580	40	550	0
Apr 21	15322	545	13007	360	1765	185	550	0
Apr 22	16004	682	13517	510	1937	172	550	0
Apr 23	16755	751	14184	667	2021	84	550	0
Apr 24	17567	812	14865	681	2152	131	550	0
Apr 25	18177	610	14980	115	2192	40	1005	455
Apr 26	18640	463	15441	461	2194	2	1005	0

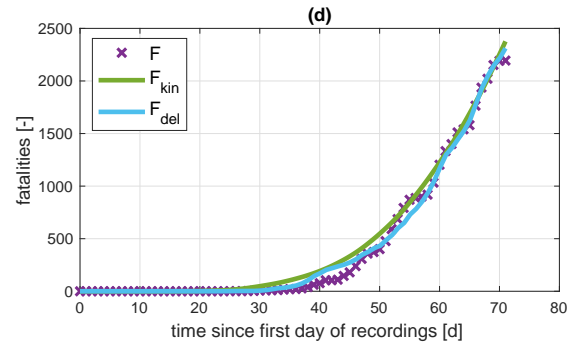
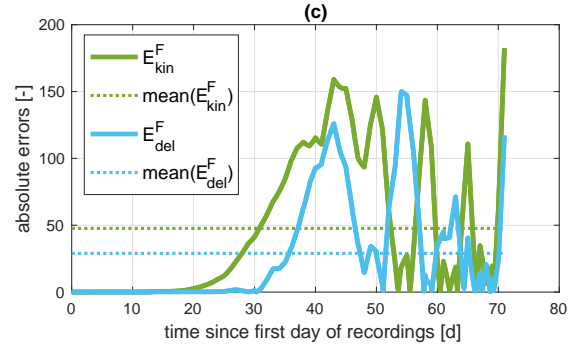
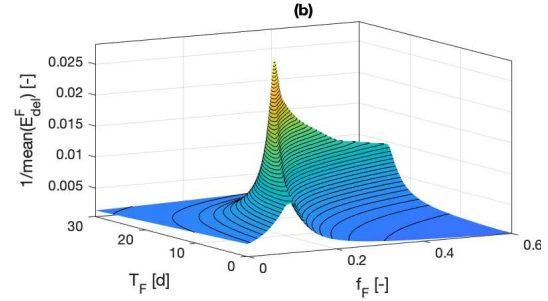
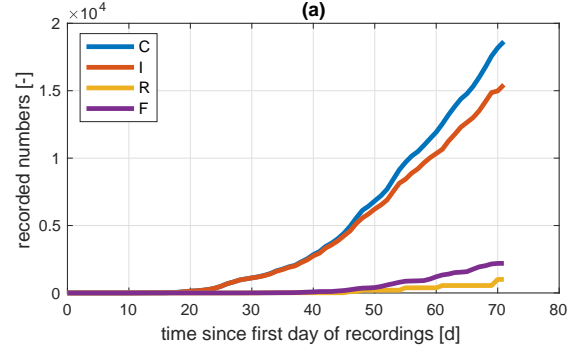


Figure 52: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Sweden

Table 53: Data recorded in Switzerland

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 25	1	1	1	1	0	0	0	0
Feb 26	1	0	1	0	0	0	0	0
Feb 27	8	7	8	7	0	0	0	0
Feb 28	15	7	15	7	0	0	0	0
Feb 29	19	4	19	4	0	0	0	0
Mar 1	24	5	23	4	0	0	1	1
Mar 2	30	6	29	6	0	0	1	0
Mar 3	58	28	56	27	0	0	2	1
Mar 4	93	35	90	34	0	0	3	1
Mar 5	120	27	116	26	1	1	3	0
Mar 6	214	94	210	94	1	0	3	0
Mar 7	268	54	264	54	1	0	3	0
Mar 8	332	64	327	63	2	1	3	0
Mar 9	374	42	369	42	2	0	3	0
Mar 10	497	123	491	122	3	1	3	0
Mar 11	652	155	644	153	4	1	4	1
Mar 12	868	216	857	213	7	3	4	0
Mar 13	1139	271	1124	267	11	4	4	0
Mar 14	1375	236	1358	234	13	2	4	0
Mar 15	2217	842	2199	841	14	1	4	0
Mar 16	2353	136	2330	131	19	5	4	0
Mar 17	2742	389	2700	370	27	8	15	11
Mar 18	3115	373	3067	367	33	6	15	0
Mar 19	4222	1107	4164	1097	43	10	15	0
Mar 20	5615	1393	5544	1380	56	13	15	0
Mar 21	6863	1248	6652	1108	80	24	131	116
Mar 22	7474	611	7245	593	98	18	131	0
Mar 23	8795	1321	8544	1299	120	22	131	0
Mar 24	9877	1082	9624	1080	122	2	131	0
Mar 25	10897	1020	10613	989	153	31	131	0
Mar 26	11811	914	11488	875	192	39	131	0
Mar 27	12928	1117	11167	-321	231	39	1530	1399
Mar 28	14076	1148	12282	1115	264	33	1530	0
Mar 29	14829	753	12934	652	300	36	1595	65
Mar 30	15922	1093	13740	806	359	59	1823	228
Mar 31	16605	683	14349	609	433	74	1823	0
Apr 1	17768	1163	14313	-36	488	55	2967	1144
Apr 2	18827	1059	14278	-35	536	48	4013	1046
Apr 3	19606	779	14169	-109	591	55	4846	833
Apr 4	20505	899	13424	-745	666	75	6415	1569
Apr 5	21100	595	13970	546	715	49	6415	0
Apr 6	21657	557	12836	-1134	765	50	8056	1641
Apr 7	22253	596	12728	-108	821	56	8704	648
Apr 8	23280	1027	12585	-143	895	74	9800	1096
Apr 9	24051	771	12503	-82	948	53	10600	800
Apr 10	24551	500	12449	-54	1002	54	11100	500
Apr 11	25107	556	11971	-478	1036	34	12100	1000
Apr 12	25415	308	11609	-362	1106	70	12700	600
Apr 13	25688	273	10850	-759	1138	32	13700	1000
Apr 14	25936	248	11062	212	1174	36	13700	0
Apr 15	26336	400	9697	-1365	1239	65	15400	1700
Apr 16	26732	396	9551	-146	1281	42	15900	500
Apr 17	27078	346	9351	-200	1327	46	16400	500
Apr 18	27404	326	8936	-415	1368	41	17100	700
Apr 19	27740	336	8547	-389	1393	25	17800	700
Apr 20	27944	204	7915	-632	1429	36	18600	800
Apr 21	28063	119	7185	-730	1478	49	19400	800
Apr 22	28268	205	6859	-326	1509	31	19900	500
Apr 23	28496	228	6347	-512	1549	40	20600	700
Apr 24	28677	181	6088	-259	1589	40	21000	400
Apr 25	28894	217	5995	-93	1599	10	21300	300
Apr 26	29061	167	5651	-344	1610	11	21800	500

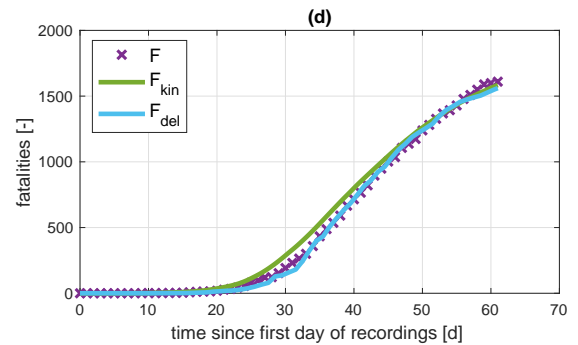
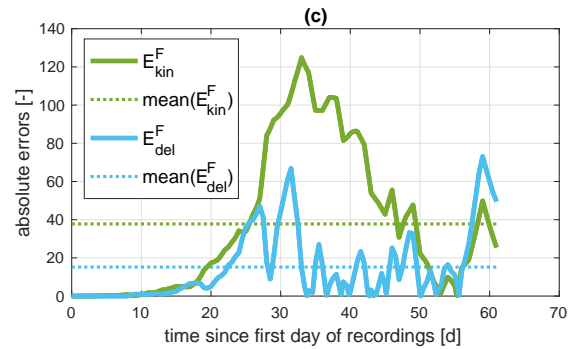
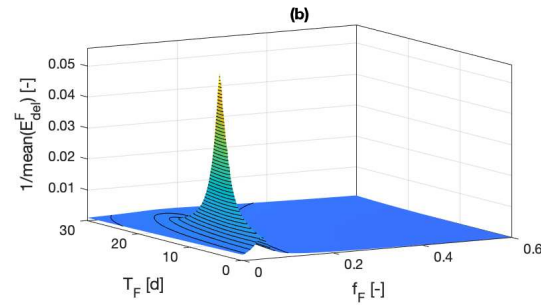
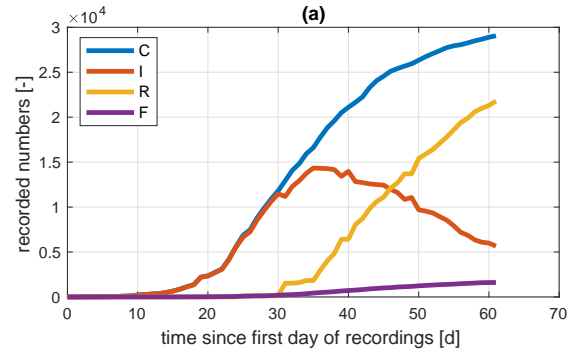


Figure 53: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Switzerland

Table 54: Data recorded in Turkey

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 10	1	1	1	1	0	0	0	0
Mar 11	1	0	1	0	0	0	0	0
Mar 12	1	0	1	0	0	0	0	0
Mar 13	5	4	5	4	0	0	0	0
Mar 14	6	1	6	1	0	0	0	0
Mar 15	18	12	18	12	0	0	0	0
Mar 16	47	29	47	29	0	0	0	0
Mar 17	98	51	97	50	1	1	0	0
Mar 18	191	93	189	92	2	1	0	0
Mar 19	359	168	355	166	4	2	0	0
Mar 20	670	311	661	306	9	5	0	0
Mar 21	947	277	926	265	21	12	0	0
Mar 22	1236	289	1206	280	30	9	0	0
Mar 23	1529	293	1492	286	37	7	0	0
Mar 24	1872	343	1828	336	44	7	0	0
Mar 25	2433	561	2348	520	59	15	26	26
Mar 26	3629	1196	3528	1180	75	16	26	0
Mar 27	5698	2069	5564	2036	92	17	42	16
Mar 28	7402	1704	7224	1660	108	16	70	28
Mar 29	9217	1815	8981	1757	131	23	105	35
Mar 30	10827	1610	10497	1516	168	37	162	57
Mar 31	13531	2704	13074	2577	214	46	243	81
Apr 1	15679	2148	15069	1995	277	63	333	90
Apr 2	18135	2456	17364	2295	356	79	415	82
Apr 3	20921	2786	20012	2648	425	69	484	69
Apr 4	23934	3013	22647	2635	501	76	786	302
Apr 5	27069	3135	25453	2806	574	73	1042	256
Apr 6	30217	3148	28242	2789	649	75	1326	284
Apr 7	34109	3892	31802	3560	725	76	1582	256
Apr 8	38226	4117	35568	3766	812	87	1846	264
Apr 9	42282	4056	39232	3664	908	96	2142	296
Apr 10	47029	4747	43600	4368	1006	98	2423	281
Apr 11	52167	5138	48101	4501	1101	95	2965	542
Apr 12	56956	4789	52312	4211	1198	97	3446	481
Apr 13	61049	4093	55796	3484	1296	98	3957	511
Apr 14	65111	4062	58909	3113	1403	107	4799	842
Apr 15	69392	4281	62200	3291	1518	115	5674	875
Apr 16	74193	4801	65461	3261	1643	125	7089	1415
Apr 17	78546	4353	68146	2685	1769	126	8631	1542
Apr 18	82329	3783	69986	1840	1890	121	10453	1822
Apr 19	86306	3977	72313	2327	2017	127	11976	1523
Apr 20	90980	4674	75410	3097	2140	123	13430	1454
Apr 21	95591	4611	78414	3004	2259	119	14918	1488
Apr 22	98674	3083	79821	1407	2376	117	16477	1559
Apr 23	101790	3116	80808	987	2491	115	18491	2014
Apr 24	104912	3122	80575	-233	2600	109	21737	3246
Apr 25	107773	2861	79485	-1090	2706	106	25582	3845
Apr 26	110130	2357	78185	-1300	2805	99	29140	3558

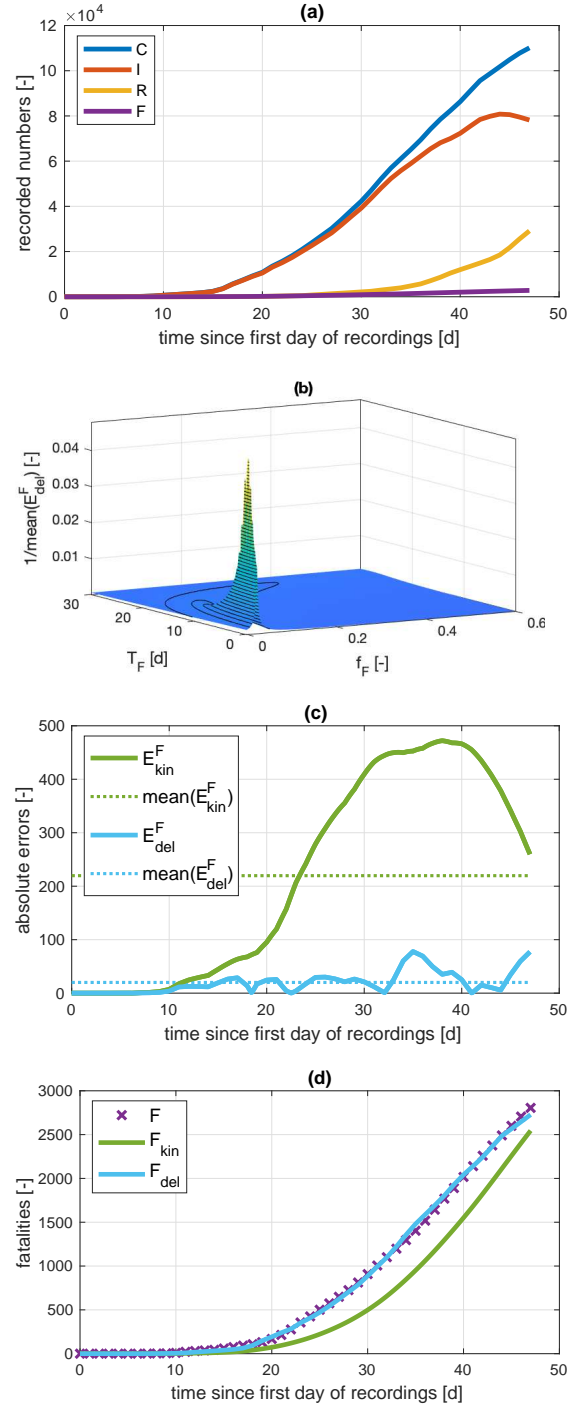


Figure 54: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Turkey

Table 55: Data recorded in Ukraine

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Mar 3	1	1	1	1	0	0	0	0
Mar 4	1	0	1	0	0	0	0	0
Mar 5	1	0	1	0	0	0	0	0
Mar 6	1	0	1	0	0	0	0	0
Mar 7	1	0	1	0	0	0	0	0
Mar 8	1	0	1	0	0	0	0	0
Mar 9	1	0	1	0	0	0	0	0
Mar 10	1	0	1	0	0	0	0	0
Mar 11	1	0	1	0	0	0	0	0
Mar 12	3	2	3	2	0	0	0	0
Mar 13	3	0	2	-1	1	1	0	0
Mar 14	3	0	2	0	1	0	0	0
Mar 15	3	0	2	0	1	0	0	0
Mar 16	7	4	6	4	1	0	0	0
Mar 17	14	7	12	6	2	1	0	0
Mar 18	16	2	14	2	2	0	0	0
Mar 19	26	10	23	9	3	1	0	0
Mar 20	41	15	37	14	3	0	1	1
Mar 21	47	6	43	6	3	0	1	0
Mar 22	73	26	69	26	3	0	1	0
Mar 23	73	0	69	0	3	0	1	0
Mar 24	102	29	98	29	3	0	1	0
Mar 25	145	43	139	41	5	2	1	0
Mar 26	196	51	190	51	5	0	1	0
Mar 27	310	114	300	110	5	0	5	4
Mar 28	356	46	342	42	9	4	5	0
Mar 29	475	119	459	117	10	1	6	1
Mar 30	548	73	527	68	13	3	8	2
Mar 31	645	97	618	91	17	4	10	2
Apr 1	794	149	761	143	20	3	13	3
Apr 2	897	103	856	95	22	2	19	6
Apr 3	1072	175	1023	167	27	5	22	3
Apr 4	1225	153	1168	145	32	5	25	3
Apr 5	1308	83	1243	75	37	5	28	3
Apr 6	1319	11	1253	10	38	1	28	0
Apr 7	1462	143	1389	136	45	7	28	0
Apr 8	1668	206	1581	192	52	7	35	7
Apr 9	1892	224	1790	209	57	5	45	10
Apr 10	2203	311	2073	283	69	12	61	16
Apr 11	2511	308	2359	286	73	4	79	18
Apr 12	2777	266	2605	246	83	10	89	10
Apr 13	3102	325	2912	307	93	10	97	8
Apr 14	3372	270	3155	243	98	5	119	22
Apr 15	3764	392	3513	358	108	10	143	24
Apr 16	4161	397	3859	346	116	8	186	43
Apr 17	4662	501	4291	432	125	9	246	60
Apr 18	5106	444	4698	407	133	8	275	29
Apr 19	5449	343	4961	263	141	8	347	72
Apr 20	5710	261	5200	239	151	10	359	12
Apr 21	6125	415	5597	397	161	10	367	8
Apr 22	6592	467	5994	397	174	13	424	57
Apr 23	7170	578	6479	485	187	13	504	80
Apr 24	7647	477	6853	374	193	6	601	97
Apr 25	8125	478	7142	289	201	8	782	181
Apr 26	8617	492	7568	426	209	8	840	58

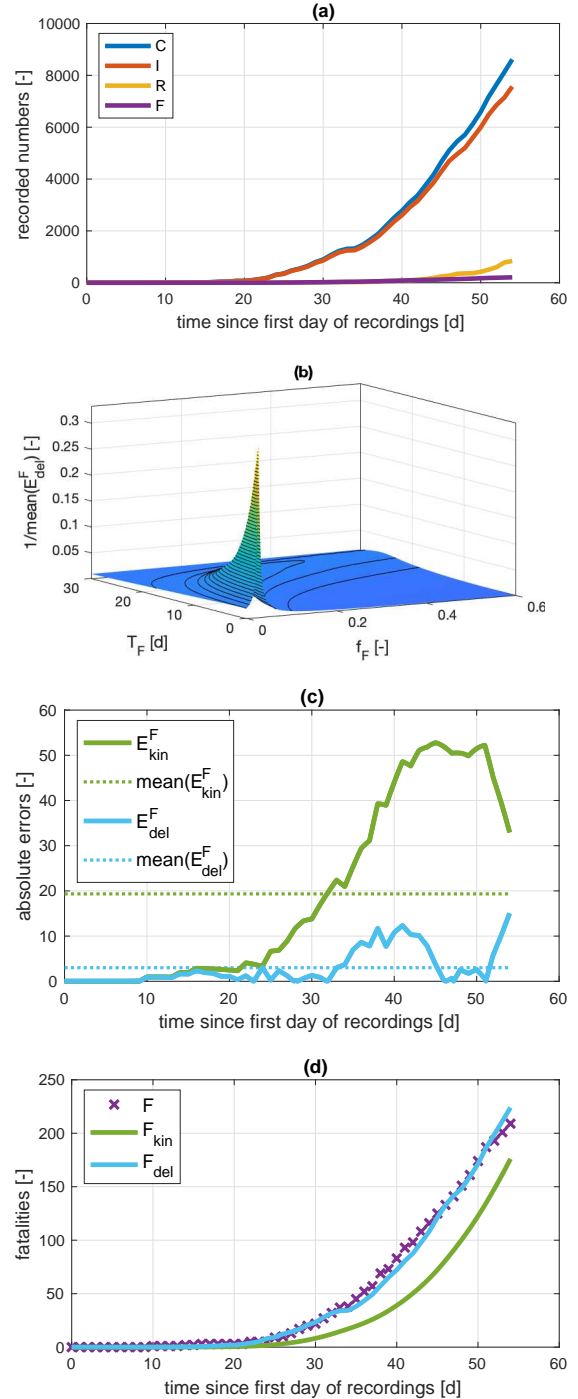


Figure 55: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for Ukraine

Table 56: Data recorded in United Kingdom

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	9	9	1	1	0	0	8	8
Feb 16	9	0	1	0	0	0	8	0
Feb 17	9	0	1	0	0	0	8	0
Feb 18	9	0	1	0	0	0	8	0
Feb 19	9	0	1	0	0	0	8	0
Feb 20	9	0	1	0	0	0	8	0
Feb 21	9	0	1	0	0	0	8	0
Feb 22	9	0	1	0	0	0	8	0
Feb 23	13	4	5	4	0	0	8	0
Feb 24	13	0	5	0	0	0	8	0
Feb 25	13	0	5	0	0	0	8	0
Feb 26	13	0	5	0	0	0	8	0
Feb 27	16	3	8	3	0	0	8	0
Feb 28	20	4	12	4	0	0	8	0
Feb 29	23	3	15	3	0	0	8	0
Mar 1	36	13	28	13	0	0	8	0
Mar 2	39	3	31	3	0	0	8	0
Mar 3	51	12	43	12	0	0	8	0
Mar 4	87	36	79	36	0	0	8	0
Mar 5	116	29	97	18	1	1	18	10
Mar 6	164	48	144	47	2	1	18	0
Mar 7	209	45	189	45	2	0	18	0
Mar 8	278	69	257	68	3	1	18	0
Mar 9	321	43	298	41	5	2	18	0
Mar 10	383	62	359	61	6	1	18	0
Mar 11	460	77	434	75	8	2	18	0
Mar 12	590	130	562	128	10	2	18	0
Mar 13	797	207	769	207	11	1	17	-1
Mar 14	1061	264	1101	332	21	10	-61	-78
Mar 15	1391	330	1336	235	35	14	20	81
Mar 16	1543	152	1436	100	55	20	52	32
Mar 17	1950	407	1814	378	71	16	65	13
Mar 18	2626	676	2457	643	104	33	65	0
Mar 19	3269	643	3060	603	144	40	65	0
Mar 20	3983	714	3741	681	177	33	65	0
Mar 21	5018	1035	4692	951	233	56	93	28
Mar 22	5683	665	5309	617	281	48	93	0
Mar 23	6650	967	6180	871	335	54	135	42
Mar 24	8077	1427	7520	1340	422	87	135	0
Mar 25	9529	1452	8931	1411	463	41	135	0
Mar 26	11658	2129	10945	2014	578	115	135	0
Mar 27	14543	2885	13649	2704	759	181	135	0
Mar 28	17089	2546	15935	2286	1019	260	135	0
Mar 29	19522	2433	18159	2224	1228	209	135	0
Mar 30	22141	2619	20598	2439	1408	180	135	0
Mar 31	25150	3009	23226	2628	1789	381	135	0
Apr 1	29474	4324	26987	3761	2352	563	135	0
Apr 2	33718	4244	30662	3675	2921	569	135	0
Apr 3	38168	4450	34428	3766	3605	684	135	0
Apr 4	41903	3735	37455	3027	4313	708	135	0
Apr 5	47806	5903	42737	5282	4934	621	135	0
Apr 6	51608	3802	46100	3363	5373	439	135	0
Apr 7	55242	3634	48948	2848	6159	786	135	0
Apr 8	60733	5491	53501	4553	7097	938	135	0
Apr 9	65077	4344	56964	3463	7978	881	135	0
Apr 10	73758	8681	64456	7492	8958	980	344	209
Apr 11	78991	5233	68772	4316	9875	917	344	0
Apr 12	84279	5288	73323	4551	10612	737	344	0
Apr 13	88621	4342	76948	3625	11329	717	344	0
Apr 14	93873	5252	81422	4474	12107	778	344	0
Apr 15	98476	4603	85264	3842	12868	761	344	0
Apr 16	103093	4617	89020	3756	13729	861	344	0
Apr 17	108692	5599	93772	4752	14576	847	344	0
Apr 18	114217	5525	98409	4637	15464	888	344	0
Apr 19	120067	5850	103663	5254	16060	596	344	0
Apr 20	124743	4676	107890	4227	16509	449	344	0
Apr 21	129044	4301	111363	3473	17337	828	344	0
Apr 22	133495	4451	115051	3688	18100	763	344	0
Apr 23	138078	4583	118996	3945	18738	638	344	0
Apr 24	143464	5386	123614	4618	19506	768	344	0
Apr 25	148377	4913	127714	4100	20319	813	344	0
Apr 26	152840	4463	131764	4050	20732	413	344	0

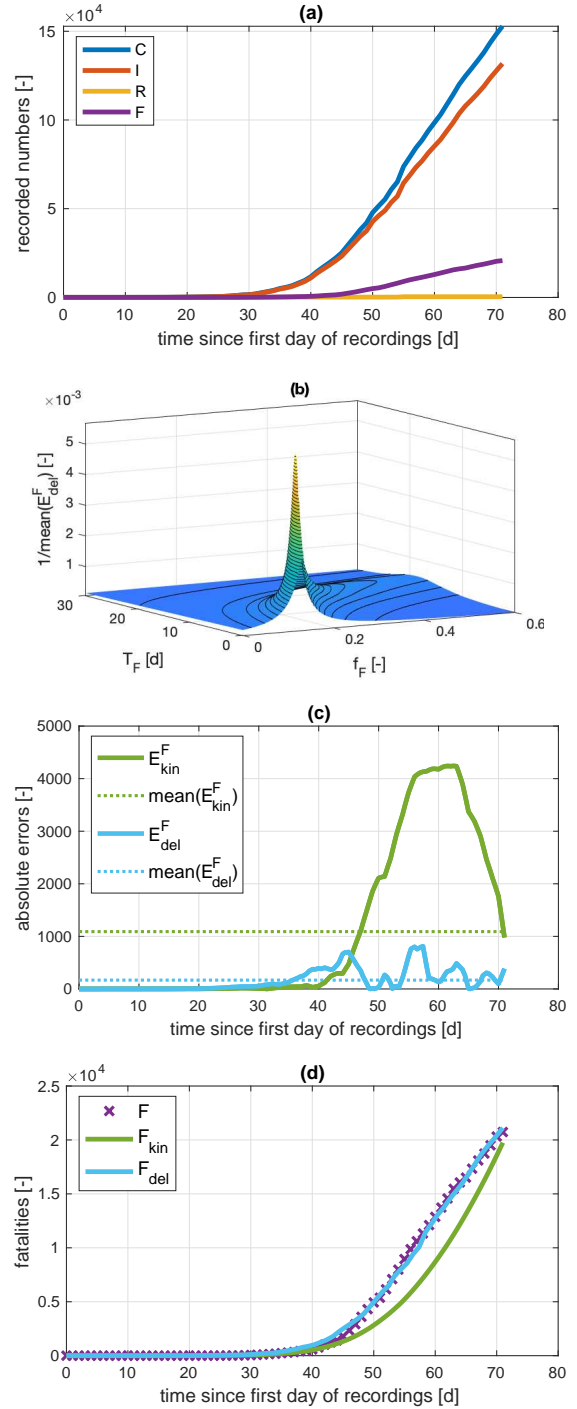


Figure 56: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for United Kingdom

Table 57: Data recorded in United States

Date	C	ΔC	I	ΔI	F	ΔF	R	ΔR
Feb 15	15	15	12	12	0	0	3	3
Feb 16	15	0	12	0	0	0	3	0
Feb 17	15	0	12	0	0	0	3	0
Feb 18	15	0	12	0	0	0	3	0
Feb 19	15	0	12	0	0	0	3	0
Feb 20	15	0	10	-2	0	0	5	2
Feb 21	35	20	29	19	0	0	6	1
Feb 22	35	0	29	0	0	0	6	0
Feb 23	35	0	28	-1	0	0	7	1
Feb 24	53	18	48	20	0	0	5	-2
Feb 25	57	4	51	3	0	0	6	1
Feb 26	60	3	54	3	0	0	6	0
Feb 27	60	0	54	0	0	0	6	0
Feb 28	63	3	57	3	0	0	6	0
Feb 29	68	5	60	3	1	1	7	1
Mar 1	75	7	65	5	1	0	9	2
Mar 2	100	25	85	20	6	5	9	0
Mar 3	124	24	106	21	9	3	9	0
Mar 4	158	34	138	32	11	2	9	0
Mar 5	221	63	200	62	12	1	9	0
Mar 6	319	98	289	89	15	3	15	6
Mar 7	435	116	401	112	19	4	15	0
Mar 8	541	106	504	103	22	3	15	0
Mar 9	704	163	663	159	26	4	15	0
Mar 10	994	290	949	286	30	4	15	0
Mar 11	1301	307	1248	299	38	8	15	0
Mar 12	1630	329	1581	333	41	3	8	-7
Mar 13	2183	553	2126	545	48	7	9	1
Mar 14	2771	588	2664	538	58	10	49	40
Mar 15	3617	846	3484	820	73	15	60	11
Mar 16	4604	987	4434	950	95	22	75	15
Mar 17	6357	1753	6129	1695	121	26	107	32
Mar 18	9317	2960	9032	2903	171	50	114	7
Mar 19	13898	4581	13548	4516	239	68	111	-3
Mar 20	19551	5653	19092	5544	309	70	150	39
Mar 21	24418	4867	23870	4778	374	65	174	24
Mar 22	33840	9422	33150	9280	509	135	181	7
Mar 23	44189	10349	43199	10049	689	180	301	120
Mar 24	55398	11209	54044	10845	957	268	397	96
Mar 25	68905	13507	67231	13187	1260	303	414	17
Mar 26	86379	17474	82872	15641	1614	354	1893	1479
Mar 27	105217	18838	100548	17676	2110	496	2559	666
Mar 28	124788	19571	118766	18218	2754	644	3268	709
Mar 29	144980	20192	137133	18367	3251	497	4596	1328
Mar 30	168177	23197	158563	21430	4066	815	5548	952
Mar 31	193353	25176	180900	22337	5151	1085	7302	1754
Apr 1	220295	26942	204966	24066	6394	1243	8935	1633
Apr 2	250708	30413	232646	27680	7576	1182	10486	1551
Apr 3	283477	32769	262257	29611	8839	1263	12381	1895
Apr 4	317994	34517	292687	30430	10384	1545	14923	2542
Apr 5	343747	25753	313879	21192	11793	1409	18075	3152
Apr 6	375348	31601	342203	28324	13298	1505	19847	1772
Apr 7	409225	33877	371824	29621	15526	2228	21875	2028
Apr 8	441569	32344	400987	29163	17691	2165	22891	1016
Apr 9	475515	33946	429785	28798	19802	2111	25928	3037
Apr 10	509604	34089	460252	30467	22038	2236	27314	1386
Apr 11	539942	30338	485427	25175	24062	2024	30453	3139
Apr 12	567708	27766	509285	23858	25789	1727	32634	2181
Apr 13	594693	26985	530230	20945	27515	1726	36948	4314
Apr 14	621953	27260	553052	22822	30081	2566	38820	1872
Apr 15	652474	30521	571061	18009	32712	2631	48701	9881
Apr 16	682454	29980	590041	18980	34905	2193	57508	8807
Apr 17	714822	32368	616864	26823	37448	2543	60510	3002
Apr 18	743901	29079	636301	19437	39331	1883	68269	7759
Apr 19	770014	26113	657926	21625	40901	1570	71187	2918
Apr 20	798145	28131	682903	24977	42853	1952	72389	1202
Apr 21	824229	26084	695770	12867	45536	2683	82923	10534
Apr 22	854385	30156	722441	26671	47894	2358	84050	1127
Apr 23	886274	31889	750118	27677	50234	2340	85922	1872
Apr 24	925232	38958	762607	12489	52193	1959	110432	24510
Apr 25	960651	35419	788233	25626	54256	2063	118162	7730
Apr 26	987160	26509	812966	24733	55413	1157	118781	619

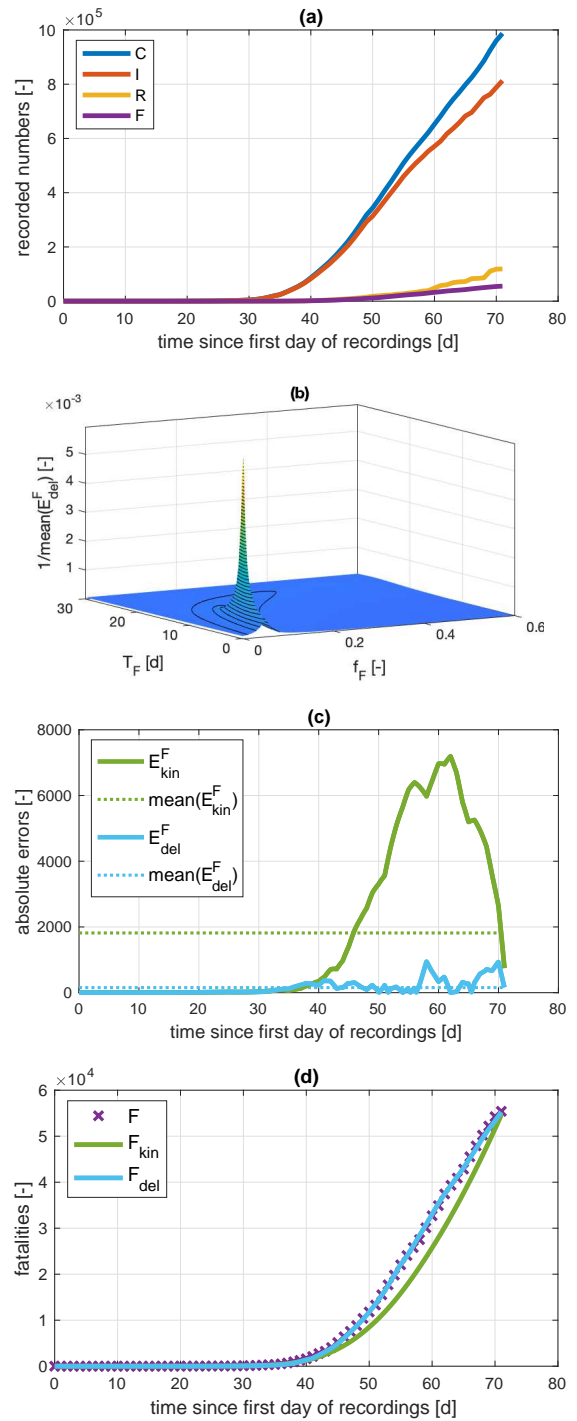


Figure 57: (a) Recorded data, (b) results of optimization based on infection-to-death delay rule, (c) absolute errors based on optimized parameter estimates, and (d) comparison between model-predicted fatalities based on optimized parameter estimates and recorded fatalities for United States