

Supplementary materials

Table 1. Districts detected as the most likely cluster and secondary clusters for COVID-19 incidence in Ghana.

Wave	Cluster	District		#Cases	Expected	RR	Stats	<i>p</i> -value
		(no.)	Max dist					
W1	1	8	0.35	13242	1496.2	8.85	18895.3	0.001
	2	11	1.59	7320	2403.3	3.05	3533.9	0.001
	3	1	0.00	1978	317.4	6.23	1990.2	0.001
	4	6	0.63	3348	1434.5	2.33	967.1	0.001
	5	6	1.66	2185	1404.3	1.56	192.3	0.001
	6	5	1.03	1292	846.6	1.53	103.0	0.001
	7	1	0.00	244	126.3	1.93	43.1	0.001
	8	2	0.31	664	455.3	1.46	42.4	0.001
W2	1	5	0.10	22165	983.2	22.54	53485.4	0.001
	2	14	0.96	8245	3805.4	2.17	2162.6	0.001
	3	3	1.23	2403	880.6	2.73	914.5	0.001
	4	3	0.08	2529	1238.7	2.04	532.5	0.001
	5	1	0.00	468	221.3	2.11	104.4	0.001
	6	2	0.49	739	431.4	1.71	91.1	0.001
	7	1	0.00	428	300.5	1.42	24.0	0.013
W3	1	5	0.10	15423	742.1	20.78	35627.4	0.001
	2	5	1.44	2909	930.0	3.13	1394.0	0.001
	3	6	0.50	3431	1267.7	2.71	1320.0	0.001
	4	8	1.30	3630	1672.1	2.17	911.6	0.001
	5	6	1.29	1749	1261.6	1.39	87.3	0.001
	6	3	1.44	801	529.9	1.51	60.9	0.001
W4	1	5	0.10	13878	432.4	32.10	40427.2	0.001
	2	3	1.23	1844	356.1	5.18	1598.4	0.001
	3	3	0.13	915	440.3	2.08	200.0	0.001
	4	2	0.08	772	457.2	1.69	92.0	0.001

Table 2. Districts detected as the most likely cluster and secondary clusters for COVID-19 CFR in Ghana.

Wave	Cluster	District		#Cases	Expected	RR	Stats	p-value
		(no.)	Max dist					
W1	1	20	1.41	130	61.30	2.12	36.65	0.001
	2	8	1.28	29	5.64	5.15	24.86	0.002
	3	9	3.09	32	8.92	3.59	18.51	0.019
W2	1	14	3.98	92	15.24	6.04	95.75	0.001
	2	30	1.72	133	35.54	3.74	90.30	0.001
	3	7	1.69	53	10.78	4.92	44.26	0.001
W3	1	21	1.72	120	20.43	5.87	129.51	0.001
	2	10	1.54	76	15.11	5.03	67.71	0.001
	3	7	3.16	14	0.81	17.30	26.97	0.001
W4	1	23	1.41	82	9.65	8.50	122.22	0.001
	2	2	0.98	19	0.95	19.92	39.78	0.001
	3	6	3.36	20	1.19	16.83	38.73	0.001

Table 3. Districts detected as the most likely cluster and secondary clusters for COVID-19 incidence in Ghana after adjusting for covariate.

Wave	Cluster	District		#Cases	Expected	RR	Stats	p-value
		(no.)	Max dist					
W1	1	2	0.08	6990	383.9	18.21	14198.0	0.001
	2	9	2.13	5181	1135.0	4.57	4014.8	0.001
	3	13	1.36	6159	2503.5	2.46	2052.3	0.001
	4	25	1.53	7935	4240.1	1.87	1452.2	0.001
	5	1	0.00	244	57.4	4.25	166.7	0.001
	6	7	2.27	909	479.1	1.90	154.3	0.001
	7	5	1.56	502	233.3	2.15	116.8	0.001
	8	7	1.11	2014	1521.7	1.32	75.0	0.001
W2	1	9	1.34	22900	1945.8	11.77	41123.9	0.001
	2	2	0.95	1182	296.4	3.99	757.7	0.001
	3	18	1.73	6941	4591.8	1.51	582.4	0.001
	4	6	1.33	931	610.6	1.53	73.4	0.001

	5	1	0.00	133	47.1	2.82	52.2	0.001
	6	4	1.64	299	196.7	1.52	23.0	0.007
W3	1	8	1.16	15626	1399.5	11.17	26827.0	0.001
	2	12	2.03	1202	442.6	2.72	449.4	0.001
	3	12	1.73	2737	1512.2	1.81	420.6	0.001
	4	12	1.35	3220	1922.8	1.68	387.5	0.001
	5	3	3.08	283	89.3	3.17	133.2	0.001
	6	5	1.12	817	518.7	1.58	74.1	0.001
	7	2	1.06	805	619.8	1.30	25.8	0.002
	8	6	0.57	1392	1168.9	1.19	20.8	0.021
W4	1	5	0.83	13641	736.7	18.52	32211.5	0.001
	2	7	1.38	2105	966.2	2.18	532.7	0.001
	3	2	0.49	358	91.2	3.93	224.4	0.001
	4	1	0.00	62	16.5	3.77	36.7	0.001
	5	1	0.00	25	2.8	8.93	32.6	0.001

Table 4. Districts detected as the most likely cluster and secondary clusters for COVID-19 CFR in Ghana after adjusting for adjusting for covariate.

Wave	Cluster	District (no.)	Max dist	#Cases	Expected	RR	Stats	p-value
W1	1	13	1.14	118	16.8	7.04	144.0	0.001
	2	21	1.51	124	44.9	2.76	56.5	0.001
W2	1	9	1.96	116	12.3	9.43	169.7	0.001
	2	8	3.14	53	9.7	5.48	49.0	0.001
	3	13	1.72	85	34.8	2.44	28.8	0.001
W3	1	10	1.54	74	9.3	8.00	95.6	0.001
	2	14	1.72	101	22.3	4.53	84.1	0.001
W4	1	6	1.14	43	5.6	7.74	55.1	0.001
	2	18	1.70	73	22.4	3.26	45.3	0.001
	3	3	2.75	9	0.5	19.84	18.6	0.028