

Spatial Approximations of Network-based Individual Level Infectious Disease Models - Supplemental Material

Table 1: Study one ($\alpha = 0.4$ and infectious period=2) - Proportion of infection probability differences for susceptible individuals that exceed the cut of value of 0.1 for all network combinations of e_{in} , e_{out} and r . Brackets contain corresponding standard errors across replications.

e_{in}	e_{out}	r	Network ILM	Geometric ILM	Exponential ILM	Constant Piecewise Model	Homogeneous Mixing Model
0.3	0	3	0(0)	0.076928 (0.00347)	0.083976 (0.00390)	0.097952 (0.00475)	0.097952 (0.00249)
0.5	0	3	0(0)	0.095992 (0.00441)	0.101336 (0.00451)	0.111384 (0.00577)	0.092112 (0.00362)
0.7	0	3	0(0)	0.115024 (0.00495)	0.108424 (0.00558)	0.072192 (0.00430)	0.115472 (0.00459)
0.3	0.05	3	0(0)	0.792944 (0.02977)	0.896376 (0.03558)	0.931656 (0.04591)	0.886768 (0.07982)
0.5	0.05	3	0(0)	0.77748 (0.02050)	0.911376 (0.01424)	0.933568 (0.04157)	0.968864 (0.02469)
0.7	0.05	3	0(0)	0.692648 (0.02218)	0.833976 (0.01237)	0.926744 (0.04435)	0.9722 (0.02300)
0.3	0.2	3	0(0)	0.622728 (0.00802)	0.610992 (0.00741)	0.516264 (0.12950)	0.600632 (0.00671)
0.5	0.2	3	0(0)	0.62684 (0.00753)	0.620736 (0.00811)	0.489720 (0.13156)	0.606472 (0.00666)
0.7	0.2	3	0(0)	0.6416 (0.00669)	0.643376 (0.00728)	0.551096 (0.12087)	0.6156 (0.00598)
0.3	0	5	0(0)	0.174816 (0.00607)	0.183200 (0.00591)	0.186096 (0.00782)	0.153208 (0.00436)
0.5	0	5	0(0)	0.211296 (0.00683)	0.205888 (0.00681)	0.211824 (0.00879)	0.210784 (0.00569)
0.7	0	5	0(0)	0.24124 (0.00797)	0.223040 (0.00730)	0.188832 (0.00866)	0.255688 (0.00765)
0.3	0.05	5	0(0)	0.816744 (0.02034)	0.860768 (0.01001)	0.930744 (0.03883)	0.983528 (0.01031)
0.5	0.05	5	0(0)	0.832928 (0.01060)	0.768968 (0.00753)	0.887544 (0.03311)	0.990664 (0.00019)
0.7	0.05	5	0(0)	0.825 (0.00875)	0.756104 (0.00691)	0.854936 (0.03552)	0.990696 (0.000200)
0.3	0.2	5	0(0)	0.631752 (0.00853)	0.627112 (0.00886)	0.566864 (0.12775)	0.60544 (0.00719)
0.5	0.2	5	0(0)	0.639504 (0.00718)	0.652944 (0.00786)	0.514904 (0.11935)	0.62912 (0.00704)
0.7	0.2	5	0(0)	0.648512 (0.00817)	0.685688 (0.00870)	0.551128 (0.10044)	0.72952 (0.01942)
0.3	0	7	0(0)	0.28804 (0.00694)	0.302312 (0.00714)	0.326784 (0.01031)	0.267328 (0.00602)
0.5	0	7	0(0)	0.344096 (0.00898)	0.332912 (0.00808)	0.320176 (0.01262)	0.347056 (0.00865)
0.7	0	7	0(0)	0.377208 (0.00977)	0.346880 (0.00800)	0.236296 (0.01006)	0.403208 (0.01077)
0.3	0.05	7	0(0)	0.881624 (0.00837)	0.816312 (0.00627)	0.905352 (0.02889)	0.99072 (0.00021)
0.5	0.05	7	0(0)	0.839752 (0.00734)	0.746984 (0.00695)	0.816688 (0.02948)	0.96584 (0.00200)
0.7	0.05	7	0(0)	0.80792 (0.00684)	0.719096 (0.00628)	0.758736 (0.02914)	0.890208 (0.01562)
0.3	0.2	7	0(0)	0.642864 (0.00773)	0.644280 (0.00809)	0.523040 (0.12210)	0.61308 (0.00724)
0.5	0.2	7	0(0)	0.651104 (0.00861)	0.677320 (0.00903)	0.455552 (0.12132)	0.710152 (0.01536)
0.7	0.2	7	0(0)	0.636312 (0.00721)	0.644664 (0.00708)	0.556584 (0.09400)	0.8278 (0.02874)

Table 2: Study two ($\alpha = 0.4$ and infectious period=2) - Proportion of infection probability differences for susceptible individuals that exceed the cut of value of 0.1 for all network combinations of Δ , SS and n . Brackets contain corresponding standard errors across replications.

Decay	SS	n	Network ILM	Geometric ILM	Exponential ILM	Constant Piecewise Model	Homogeneous Mixing Model
1.1	10	20	0 (0)	0.197432 (0.01873967)	0.235720 (0.02265920)	0.186000 (0.01431129)	0.898592 (0.01568763)
0.75	10	20	0 (0)	0.341320 (0.03212182)	0.366936 (0.02901553)	0.294048 (0.01875375)	0.836728 (0.02484755)
1.1	40	20	0 (0)	0.397536 (0.05269704)	0.552104 (0.07613051)	0.425248 (0.09318772)	0.858808 (0.02405734)
0.75	40	20	0 (0)	0.625320 (0.07367455)	0.597120 (0.05345638)	0.496744 (0.07218851)	0.800336 (0.03235120)
1.1	10	50	0 (0)	0.312808 (0.03736633)	0.459680 (0.06372113)	0.345032 (0.07490917)	0.882152 (0.01769037)
0.75	10	50	0 (0)	0.591672 (0.07010462)	0.635448 (0.06015033)	0.419432 (0.05006607)	0.808800 (0.02981668)
1.1	40	50	0 (0)	0.816840 (0.08444333)	0.845776 (0.08037046)	0.794488 (0.10245413)	0.774656 (0.03926014)
0.75	40	50	0 (0)	0.859696 (0.07326930)	0.879416 (0.06321200)	0.826304 (0.09105020)	0.746288 (0.04106505)

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader

Table 3: Study one ($\alpha = 0.1$ and infectious period=6) - Proportion of infection probability differences for susceptible individuals that exceed the cut of value of 0.1 for all network combinations of e_{in} , e_{out} and r . Brackets contain corresponding standard errors across replications.

e_{in}	e_{out}	r	Network ILM	Geometric ILM	Exponential ILM	Constant Piecewise Model	Homogeneous Mixing Model
0.3	0	3	0(0)	0.018856 (0.00158)	0.161536 (0.21127)	0.010832 (0.00144)	0.010832 (0.00144)
0.5	0	3	0(0)	0.026656 (0.00170)	0.170720 (0.21059)	0.007360 (0.00117)	0.024184 (0.0019)
0.7	0	3	0(0)	0.037616 (0.00216)	0.170680 (0.21059)	0.004968 (0.00082)	0.041352 (0.0025)
0.3	0.05	3	0(0)	0.045024 (0.0032)	0.195160 (0.2087)	0.044544 (0.00328)	0.047648 (0.0034)
0.5	0.05	3	0(0)	0.050280 (0.0030)	0.207104 (0.2079)	0.050752 (0.00341)	0.064976 (0.00351)
0.7	0.05	3	0(0)	0.049992 (0.0031)	0.209280 (0.2077)	0.045152 (0.00319)	0.081464 (0.00421)
0.3	0.2	3	0(0)	0.320840 (0.01703)	0.449768 (0.1908)	0.256416 (0.02036)	0.287328 (0.03075)
0.5	0.2	3	0(0)	0.321488 (0.01680)	0.450752 (0.1911)	0.263304 (0.02411)	0.310856 (0.03135)
0.7	0.2	3	0(0)	0.320848 (0.0101)	0.464296 (0.1889)	0.285536 (0.02866)	0.324280 (0.02282)
0.3	0	5	0(0)	0.046344 (0.00260)	0.186184 (0.2094)	0.036632 (0.00255)	0.046936 (0.00301)
0.5	0	5	0(0)	0.082280 (0.00348)	0.205552 (0.2080)	0.028144 (0.00217)	0.093544 (0.00374)
0.7	0	5	0(0)	0.106464 (0.00381)	0.214024 (0.2074)	0.020344 (0.00172)	0.136968 (0.00418)
0.3	0.05	5	0(0)	0.073304 (0.00388)	0.220600 (0.2069)	0.071536 (0.0039)	0.086648 (0.0046)
0.5	0.05	5	0(0)	0.085352 (0.00403)	0.233496 (0.2059)	0.080416 (0.0040)	0.136784 (0.0053)
0.7	0.05	5	0(0)	0.090528 (0.00394)	0.255328 (0.2044)	0.065624 (0.0035)	0.180032 (0.0057)
0.3	0.2	5	0(0)	0.328616 (0.01337)	0.460216 (0.18977)	0.291824 (0.0242)	0.312624 (0.0317)
0.5	0.2	5	0(0)	0.318656 (0.00885)	0.467928 (0.18872)	0.269248 (0.0213)	0.350352 (0.0165)
0.7	0.2	5	0(0)	0.324208 (0.00756)	0.468384 (0.18861)	0.292528 (0.0190)	0.393584 (0.0098)
0.3	0	7	0(0)	0.095216 (0.00410)	0.224768 (0.20659)	0.065200 (0.0032)	0.101856 (0.0045)
0.5	0	7	0(0)	0.151232 (0.00517)	0.253256 (0.20449)	0.058544 (0.0031)	0.187904 (0.0058)
0.7	0	7	0(0)	0.195584 (0.00567)	0.265904 (0.20356)	0.040848 (0.0026)	0.256120 (0.0060)
0.3	0.05	7	0(0)	0.104632 (0.00452)	0.241776 (0.20534)	0.105160 (0.0050)	0.139856 (0.0062)
0.5	0.05	7	0(0)	0.131664 (0.00429)	0.272536 (0.20309)	0.120096 (0.0061)	0.233080 (0.0068)
0.7	0.05	7	0(0)	0.149936 (0.00536)	0.273176 (0.20309)	0.081400 (0.0041)	0.268712 (0.0085)
0.3	0.2	7	0(0)	0.315408 (0.012684)	0.450624 (0.19008)	0.283080 (0.0220)	0.321072 (0.0251)
0.5	0.2	7	0(0)	0.315728 (0.006406)	0.449264 (0.18997)	0.306096 (0.0147)	0.391360 (0.0063)
0.7	0.2	7	0(0)	0.301864 (0.007013)	0.440016 (0.19069)	0.257272 (0.0108)	0.409264 (0.0120)

Table 4: Study two ($\alpha = 0.1$ and infectious period=6) - Proportion of infection probability differences for susceptible individuals that exceed the cut of value of 0.1 for all network combinations of Δ , SS and n . Brackets contain corresponding standard errors across replications.

Decay	SS	n	Network ILM	Geometric	Exponential	Constant	Homogeneous
				ILM	ILM	Piecewise Model	Mixing Model
1.1	10	20	0 (0)	0.143088 (0.01583652)	0.144848 (0.01621333)	0.142992 (0.01580001)	0.952560 (0.006808888)
0.75	10	20	0 (0)	0.365488 (0.04441304)	0.431792 (0.05818432)	0.335632 (0.03700054)	0.913824 (0.018366843)
1.1	40	20	0 (0)	0.190600 (0.02330336)	0.198576 (0.02543271)	0.188592 (0.02279059)	0.949696 (0.008524688)
0.75	40	20	0 (0)	0.282904 (0.03364194)	0.303392 (0.03764487)	0.284640 (0.03344915)	0.932336 (0.014653183)
1.1	10	50	0 (0)	0.144888 (0.01842389)	0.146928 (0.01896299)	0.143320 (0.01805624)	0.950224 (0.007401508)
0.75	10	50	0 (0)	0.260864 (0.02941257)	0.278240 (0.03295736)	0.264536 (0.02988084)	0.933112 (0.013096005)
1.1	40	50	0 (0)	0.288008 (0.03757680)	0.292520 (0.03979529)	0.273416 (0.03412023)	0.928984 (0.013722091)
0.75	40	50	0 (0)	0.442456 (0.06070293)	0.511800 (0.07594442)	0.406336 (0.05081276)	0.901728 (0.021897844)

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader

Table 5: Study one ($\alpha = 0.4$ and infectious period=2) posterior mean values for each fitted model, averaged over 10 epidemic replicates.

e_{in}	e_{out}	r	Network	(α)	Geometric (γ)	Geometric (δ)	Exponential (η)	Exponential (λ)	Piecewise (ϕ)	Piecewise (ψ)	Piecewise (τ)	Mixing (ω)
0.3	0	3	0.427	0.355	3.088	0.735	1.151	0.104	0.104	5.51E-06	3.081	0.002
0.5	0	3	0.412	0.756	3.359	1.727	1.273	0.179	0.179	5.52E-06	3.081	0.002
0.7	0	3	0.411	1.356	3.558	3.09	1.342	0.267	0.267	5.57E-06	3.081	0.002
0.3	0.05	3	0.403	0.093	0.614	0.035	0.045	0.063	0.063	0.016	2.691	0.02
0.5	0.05	3	0.419	0.169	0.833	0.055	0.068	0.150	0.150	0.013	2.859	0.023
0.7	0.05	3	0.403	0.311	1.143	0.095	0.117	0.178	0.178	0.015	2.828	0.024
0.3	0.2	3	0.412	0.141	0.255	0.096	0.022	0.098	0.098	0.055	3.955	0.072
0.5	0.2	3	0.413	0.171	0.305	0.101	0.023	0.050	0.050	0.061	5.84	0.075
0.7	0.2	3	0.413	0.259	0.473	0.12	0.033	0.201	0.201	0.056	2.739	0.077
0.3	0	5	0.402	0.891	2.768	0.779	0.722	0.1	0.1	1.11E-05	5.058	0.003
0.5	0	5	0.394	2.425	3.049	2.001	0.802	0.176	0.176	1.24E-05	5.049	0.004
0.7	0	5	0.388	3.922	3.183	3.49	0.851	0.25	0.25	1.31E-05	5.067	0.004
0.3	0.05	5	0.395	0.205	0.917	0.089	0.107	0.1062	0.1062	0.012	4.365	0.024
0.5	0.05	5	0.405	0.391	1.148	0.189	0.171	0.117	0.117	0.018	4.965	0.031
0.7	0.05	5	0.4	0.592	1.28	0.278	0.197	0.188	0.188	0.016	4.312	0.034
0.3	0.2	5	0.42	0.179	0.325	0.109	0.028	0.158	0.158	0.057	3.209	0.074
0.5	0.2	5	0.408	0.292	0.472	0.147	0.044	0.125	0.125	0.049	6.282	0.079
0.7	0.2	5	0.417	0.496	0.692	0.206	0.065	0.194	0.194	0.037	6.691	0.088
0.3	0	7	0.408	0.98	2.22	0.642	0.488	0.105	0.105	9.04E-05	6.966	0.008
0.5	0	7	0.411	2.98	2.575	1.666	0.554	0.182	0.182	5.40E-05	7.009	0.008
0.7	0	7	0.405	5.374	2.821	3.071	0.61	0.262	0.262	3.32E-05	7.035	0.008
0.3	0.05	7	0.399	0.264	0.932	0.139	0.133	0.081	0.081	0.015	6.05	0.03
0.5	0.05	7	0.404	0.6	1.186	0.316	0.19	0.180	0.180	0.014	5.943	0.039
0.7	0.05	7	0.414	1.058	1.393	0.495	0.217	0.179	0.179	0.018	6.196	0.042
0.3	0.2	7	0.424	0.196	0.346	0.116	0.03	0.110	0.110	0.055	3.823	0.078
0.5	0.2	7	0.391	0.373	0.584	0.182	0.058	0.167	0.167	0.048	5.383	0.086
0.7	0.2	7	0.41	0.335	0.519	0.682	0.257	0.196	0.196	0.039	6.209	1.106

Table 6: Study one ($\alpha = 0.1$ and infectious period=6) posterior mean values for each fitted model, averaged over 10 epidemic replicates.

e_{in}	e_{out}	r	Network	(α)	Geometric (γ)	Geometric (δ)	Exponential (η)	Exponential (λ)	Piecewise (ϕ)	Piecewise (ψ)	Piecewise (τ)	Mixing (ω)
0.3	0	3	0.101	0.099	2.688	0.204	1.039	0.035	0	3.11	0.002	
0.5	0	3	0.106	0.169	3.128	0.342	1.145	0.049	0	3.08	0.001	
0.7	0	3	0.102	0.242	3.195	0.482	1.151	0.069	0	3.081	0.001	
0.3	0.05	3	0.1	0.029	0.665	0.01	0.045	0.034	0.004	3.034	0.006	
0.5	0.05	3	0.1	0.057	0.967	0.016	0.074	0.058	0.005	2.925	0.006	
0.7	0.05	3	0.101	0.1	1.212	0.039	0.151	0.079	0.004	3.065	0.007	
0.3	0.2	3	0.098	0.045	0.319	0.026	0.023	0.055	0.018	4.04	0.019	
0.5	0.2	3	0.098	0.053	0.362	0.028	0.026	0.061	0.019	3.724	0.02	
0.7	0.2	3	0.103	0.088	0.547	0.034	0.035	0.12	0.019	3.08	0.022	
0.3	0	5	0.101	0.161	2.383	0.147	0.623	0.027	0	5.087	0.002	
0.5	0	5	0.102	0.325	2.549	0.29	0.658	0.048	0	5.079	0.002	
0.7	0	5	0.098	0.449	2.519	0.413	0.662	0.067	0	5.058	0.003	
0.3	0.05	5	0.101	0.057	0.886	0.025	0.106	0.03	0.005	5.172	0.007	
0.5	0.05	5	0.101	0.116	1.169	0.062	0.186	0.055	0.005	4.948	0.009	
0.7	0.05	5	0.101	0.142	1.169	0.072	0.178	0.067	0.005	4.974	0.011	
0.3	0.2	5	0.101	0.052	0.344	0.03	0.028	0.048	0.019	4.473	0.02	
0.5	0.2	5	0.098	0.08	0.498	0.036	0.037	0.076	0.019	4.184	0.022	
0.7	0.2	5	0.103	0.112	0.591	0.054	0.058	0.084	0.021	4.564	0.025	
0.3	0	7	0.102	0.224	2.105	0.142	0.45	0.029	0	6.91	0.003	
0.5	0	7	0.1	0.421	2.187	0.269	0.472	0.05	0	6.844	0.004	
0.7	0	7	0.102	0.649	2.239	0.398	0.475	0.07	0	6.955	0.005	
0.3	0.05	7	0.102	0.074	0.912	0.034	0.114	0.031	0.005	6.603	0.009	
0.5	0.05	7	0.102	0.157	1.161	0.075	0.171	0.049	0.005	6.937	0.012	
0.7	0.05	7	0.101	0.275	1.361	0.14	0.226	0.069	0.005	6.948	0.014	
0.3	0.2	7	0.1	0.067	0.46	0.037	0.045	0.061	0.019	4.914	0.021	
0.5	0.2	7	0.104	0.089	0.489	0.051	0.053	0.059	0.021	5.561	0.026	
0.7	0.2	7	0.103	0.152	0.696	0.079	0.083	0.077	0.019	6.798	0.028	

Table 7: Study two ($\alpha = 0.4$ and infectious period=2) posterior mean values for each fitted model, averaged over 10 epidemic replicates.

Decay	SS	n	Network (α)	Geometric (γ)	Geometric (δ)	Exponential (η)	Exponential (λ)	Piecewise (ϕ)	Piecewise (ψ)	Piecewise (τ)	Mixing (ω)
1.1	10	20	0.403	0.102	2.182	0.088	0.559	0.048	0.001	2.727	0.002
0.75	10	20	0.398	0.221	2.189	0.183	0.545	0.064	0.001	3.872	0.003
1.1	40	20	0.399	0.07	1.538	0.026	0.205	0.048	0.002	2.685	0.003
0.75	40	20	0.415	0.171	1.72	0.107	0.347	0.076	0.002	3.609	0.005
1.1	10	50	0.403	0.062	1.563	0.02	0.199	0.041	0.001	2.937	0.003
0.75	10	50	0.401	0.148	1.693	0.07	0.289	0.057	0.002	3.965	0.005
1.1	40	50	0.403	0.058	1.052	0.018	0.103	0.056	0.004	2.903	0.005
0.75	40	50	0.398	0.134	1.313	0.047	0.163	0.065	0.005	4.221	0.008

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader

Table 8: Study two ($\alpha = 0.1$ and infectious period=6) posterior mean values for each fitted model, averaged over 10 epidemic replicates.

Decay	SS	n	Network (α)	Geometric (γ)	Geometric (δ)	Exponential (η)	Exponential (λ)	Piecewise (ϕ)	Piecewise (ψ)	Piecewise (τ)	Mixing (ω)
1.1	10	20	0.097	0.03	2.292	0.038	0.667	0.015	0	2.634	0.001
0.75	10	20	0.102	0.041	1.437	0.021	0.227	0.023	0.001	3.303	0.002
1.1	40	20	0.101	0.022	1.644	0.014	0.317	0.013	0	2.773	0.001
0.75	40	20	0.101	0.046	1.742	0.034	0.394	0.019	0.001	3.705	0.001
1.1	10	50	0.098	0.022	1.775	0.014	0.362	0.017	0	2.3	0.001
0.75	10	50	0.1	0.052	1.917	0.034	0.412	0.02	0	3.742	0.001
1.1	40	50	0.102	0.019	1.177	0.006	0.109	0.02	0.001	2.44	0.001
0.75	40	50	0.103	0.033	1.247	0.013	0.155	0.019	0.001	4.159	0.002

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader

Table 9: Study one ($\alpha = 0.4$ and infectious period=2) - Mean predicted squared error of each model's posterior predictive distribution of the epidemic timeline.

e_{in}	e_{out}	r	Network ILM	Exponential ILM	Geometric ILM	Constant Piecewise Model	Homogeneous Mixing Model
0.3	0	3	104.87532	250.71984	664.48438	170.95916	626.74684
0.5	0	3	91.55352	199.23172	783.22278	141.54484	735.0067
0.7	0	3	46.9904	144.40476	807.15038	91.07132	951.02606
0.3	0.05	3	169.87912	1444.79946	2843.6856	395.36976	273.27856
0.5	0.05	3	135.51264	1373.26774	1878.1785	247.84552	172.77944
0.7	0.05	3	190.67568	2139.8333	1425.63944	227.39568	273.96224
0.3	0.2	3	24.53568	212.47448	1050.69648	191.86792	30.62704
0.5	0.2	3	11.888	198.80992	1092.11726	199.98216	16.65832
0.7	0.2	3	9.90632	250.53472	1286.43094	140.12976	17.234
0.3	0	5	109.24528	292.24792	981.80338	152.39428	1624.42924
0.5	0	5	71.428	237.70936	1072.28278	108.88884	2690.6297
0.7	0	5	36.55784	254.45912	1140.48888	86.62424	3286.1421
0.3	0.05	5	110.28984	1488.89868	1610.4234	340.40456	205.08752
0.5	0.05	5	176.14208	966.51356	929.32342	446.9764	376.6768
0.7	0.05	5	132.19552	837.0448	914.22496	512.09792	591.5307
0.3	0.2	5	14.84232	262.54256	1032.18732	134.67968	23.69672
0.5	0.2	5	10.14952	222.72104	897.73078	151.58648	12.50376
0.7	0.2	5	6.66184	255.55792	575.94032	148.09528	10.32384
0.3	0	7	85.43872	346.81056	642.51026	138.27944	3037.4766
0.5	0	7	61.02184	240.71368	722.182	75.172	3554.323
0.7	0	7	31.8604	251.66968	944.3105	42.80536	4766.2764
0.3	0.05	7	190.85448	1177.96728	1432.18108	529.24408	536.78528
0.5	0.05	7	114.59976	784.19184	848.65684	414.07824	489.71062
0.7	0.05	7	100.41624	517.59464	594.30884	277.06224	436.73232
0.3	0.2	7	9.99152	232.43824	997.77596	154.80576	14.06312
0.5	0.2	7	7.35336	260.07552	756.08704	142.74896	8.17072
0.7	0.2	7	6.50176	115.50864	411.1036	114.25792	7.98224

Table 10: Study one ($\alpha = 0.1$ and infectious period=6) - Mean predicted squared error of each model's posterior predictive distribution of the epidemic timeline.

e_{in}	e_{out}	r	Network ILM	Exponential ILM	Geometric ILM	Constant Piecewise Model	Homogeneous Mixing Model
0.3	0	3	109.14268	316.9646	750.07354	406.5467	1815.98998
0.5	0	3	91.19692	194.69556	329.42864	116.60696	461.7524
0.7	0	3	105.47076	208.88552	443.848	125.1858	494.07236
0.3	0.05	3	561.53964	1774.0816	3250.4425	812.65378	602.5113
0.5	0.05	3	602.93826	2452.8663	2908.8496	780.63334	670.67946
0.7	0.05	3	799.96828	3417.674	2211.3354	962.44946	914.04888
0.3	0.2	3	200.97368	958.63762	3137.0109	457.19792	214.18832
0.5	0.2	3	200.0212	925.01202	3013.7681	421.4212	189.85328
0.7	0.2	3	174.4196	1134.82674	3149.4272	272.45144	182.71704
0.3	0	5	262.80864	500.41044	500.26396	286.22072	1195.52494
0.5	0	5	171.68756	423.69276	629.03448	205.94164	1575.743
0.7	0	5	185.64196	352.54296	634.11974	206.27784	2251.1914
0.3	0.05	5	480.48032	2054.506	2308.9122	818.94912	767.928
0.5	0.05	5	605.5378	2159.3549	1727.8883	720.59876	592.74988
0.7	0.05	5	698.5409	1957.04806	1687.7811	851.93838	875.44742
0.3	0.2	5	210.35224	974.9011	3209.5036	361.22616	208.99568
0.5	0.2	5	230.08296	1447.4107	3703.0591	435.62568	235.95112
0.7	0.2	5	352.30256	1643.1372	2836.5559	711.53356	368.98176
0.3	0	7	415.3078	678.09976	605.97034	447.55296	1264.51806
0.5	0	7	293.57912	549.29016	705.11362	309.70256	2157.84084
0.7	0	7	192.98272	391.15664	531.86896	205.47704	2603.002
0.3	0.05	7	453.47448	1950.5349	2297.6996	837.66796	573.68028
0.5	0.05	7	653.87544	1610.34834	1550.25078	833.61094	831.27652
0.7	0.05	7	243.63656	795.3454	823.89612	344.82896	584.46212
0.3	0.2	7	165.84	1253.1019	3101.1475	590.56586	166.96904
0.5	0.2	7	218.27104	1502.6933	2512.3826	480.2092	236.28504
0.7	0.2	7	187.73192	1044.0874	1719.5858	329.13888	224.85456

Table 11: Study two ($\alpha = 0.4$ and infectious period=2) - Mean predicted squared error of each model's posterior predictive distribution of the epidemic timeline.

Decay	SS	n	Network ILM	Exponential ILM	Geometric ILM	Constant Piecewise Model	Homogeneous Mixing Model
1.1	10	20	724.70006	898.0427	883.28132	848.79252	925.36234
0.75	10	20	557.06274	861.10574	781.90782	875.97304	995.84058
1.1	40	20	1107.98756	2229.754	1656.6507	1401.69226	1214.84544
0.75	40	20	1024.25084	1538.65876	1312.56724	972.30796	1008.46384
1.1	10	50	768.72694	1649.5091	1627.8166	1050.95052	1524.61164
0.75	10	50	764.52282	1738.0608	1603.0957	1633.15254	1593.6054
1.1	40	50	1308.86472	2090.1276	2662.7003	1469.96692	1361.20008
0.75	40	50	1951.11042	3157.8822	3080.1744	2874.17612	2815.53768

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader

Table 12: Study two ($\alpha = 0.1$ and infectious period=6) - Mean predicted squared error of each model's posterior predictive distribution of the epidemic timeline.

Decay	SS	n	Network ILM	Exponential ILM	Geometric ILM	Constant Piecewise Model	Homogeneous Mixing Model
1.1	10	20	135.83392	238.44756	195.31092	179.27744	183.26708
0.75	10	20	885.6794	1818.92052	1665.75954	1545.28118	1583.03278
1.1	40	20	433.28084	1021.08318	726.46956	686.88376	670.27302
0.75	40	20	713.96744	1207.83728	1023.886	966.50584	925.0106
1.1	10	50	367.405	684.61118	582.23292	631.20976	624.64656
0.75	10	50	540.59756	832.36092	638.89292	590.12128	594.70092
1.1	40	50	1700.45874	1714.2029	1718.5377	1530.5662	1594.9081
0.75	40	50	968.21896	1696.6774	1660.5845	1070.37046	928.24234

Decay: Spatial decay parameter (Δ)

SS: Number of super-spreaders

n: Mean number of connecting individuals for each super-spreader