

Table S9: Deterministic Coalescent SIR Results from Trees Simulated with Higher  $S_0$  (with Fixed  $R_0$ ) and Higher  $R_0$  (with Fixed  $S_0$ )

$\eta$	Truth	Mean	Median	Error	Bias	Relative HPD width	95% HPD accuracy
$\mathcal{R}_0$	2.50	2.68	2.49	0.13	0.04	0.81	98.00%
$\gamma$	0.30	0.32	0.29	0.16	3.14E-3	1.27	99.00%
$S_{(0)}$	999	1807	1133	0.52	0.29	4.59	98.00%
$z_{(0)}$	(varies)	41.17	39.99	0.03	0.01	0.07	76.00%
$\mathcal{R}_0$	2.50	3.28	2.97	0.23	0.20	1.42	100.00%
$\gamma$	0.35	0.30	0.28	0.24	-0.20	1.28	99.00%
$S_{(0)}$	4999	7733	4838	0.34	0.03	4.18	100.00%
$z_{(0)}$	(varies)	37.45	36.15	0.03	1.48e-3	0.06	56.00%
$\mathcal{R}_0$	2.50	3.76	3.05	0.26	0.23	1.50	100.00%
$\gamma$	0.40	0.33	0.31	0.26	-0.22	1.22	100.00%
$S_{(0)}$	9999	12,609	7405	0.35	-0.15	3.31	100.00%
$z_{(0)}$	(varies)	34.99	34.28	0.04	-1.94e-3	0.05	43.00%
$\eta$	Truth	Mean	Median	Error	Bias	Relative HPD width	95% HPD accuracy
$\mathcal{R}_0$	2.50	2.68	2.49	0.13	0.04	0.81	98.00%
$\gamma$	0.30	0.32	0.29	0.16	3.14E-3	1.27	99.00%
$S_{(0)}$	999	1807	1133	0.52	0.29	4.59	98.00%
$z_{(0)}$	(varies)	41.17	39.99	0.03	0.01	0.07	76.00%
$\mathcal{R}_0$	3.50	3.92	3.76	0.18	0.06	0.95	95.00%
$\gamma$	0.30	0.31	0.29	0.21	-0.01	1.16	99.00%
$S_{(0)}$	999	1909	1060	0.64	0.36	4.26	100.00%
$z_{(0)}$	(varies)	30.65	30.35	0.04	-6.35E-3	0.05	45.00%
$\mathcal{R}_0$	5.00	6.13	5.53	0.20	0.12	1.39	100.00%
$\gamma$	0.30	0.28	0.27	0.29	-0.09	1.18	100.00%
$S_{(0)}$	999	2144	1220	0.68	0.49	4.94	99.00%
$z_{(0)}$	(varies)	26.28	25.26	0.03	-0.01	0.03	52.00%
$\eta$	Truth	Mean	Median	Error	Bias	Relative HPD width	95% HPD accuracy
$\mathcal{R}_0$	5.00	7.20	6.37	0.27	0.23	2.53	100.00%
$\gamma$	0.30	0.26	0.22	0.26	-0.19	1.41	100.00%
$S_{(0)}$	9999	17,339	10,518	0.31	0.12	4.91	100.00%
$z_{(0)}$	(varies)	28.20	26.93	0.03	-0.01	1.05	36.00%