Supplementary Material for Chapter 4

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Results

Tables

	Test Characteristic		Testing Rate					
Noise Type	Test Type	Test Lag	10%	20%	30%	40%	50%	60%
Dynamical noise: in-phase	RDT Equivalent (85.0%)	0	0.64	0.72	0.71	0.68	0.7	0.73
Dynamical noise: in-phase	RDT Equivalent (90.0%)	0	0.64	0.73	0.72	0.71	0.72	0.71
Poisson noise	RDT Equivalent (85.0%)	0	0.66	0.93	0.92	0.93	0.88	0.88
Poisson noise	RDT Equivalent (90.0%)	0	0.66	0.85	0.91	0.87	0.92	0.93
All noise structures	Perfect Test	0	0.66	0.93	0.91	0.89	0.91	0.93
All noise structures	Perfect Test	14	0.67	0.9	0.89	0.88	0.88	0.91

Table 1: Mean outbreak detection accuracy of each testing scenario at their specific optimal thresholds, when the average noise incidence is 8 times higher than the average measles incidence. A) the noise structure is dynamical, and the seasonality is in-phase with the measles incidence. B) the noise structure is Poisson only.

	Test Characteristic		Testing Rate					
Noise Type	Test Type	Test Lag	10%	20%	30%	40%	50%	60%
Dynamical noise: in-phase	RDT Equivalent (85.0%)	0	452	3053	4424	7728	3406	4361
Dynamical noise: in-phase	RDT Equivalent (90.0%)	0	515	3289	4650	6417	2578	4933
Poisson noise	RDT Equivalent (85.0%)	0	766	6592	9111	9107	11865	11765
Poisson noise	RDT Equivalent (90.0%)	0	770	3178	9736	12808	5205	8111
All noise structures	Perfect Test	0	770	5980	8893	11172	4529	6144
All noise structures	Perfect Test	14	2015	9277	12363	14643	7641	9495

Table 2: Mean unavoidable cases per annum of each testing scenario at their specific optimal thresholds, scaled up to Ghana's 2022 population, when the average noise incidence is 8 times higher than the average measles incidence. A) the noise structure is dynamical, and the seasonality is in-phase with the measles incidence. B) the noise structure is Poisson only.

	Test Characteristic		Testing Rate					
Noise Type	Test Type	Test Lag	10%	20%	30%	40%	50%	60%
Dynamical noise: in-phase	RDT Equivalent (85.0%)	0	-24.82	-12.79	-9.15	-3.21	-16.22	-10.77
Dynamical noise: in-phase	RDT Equivalent (90.0%)	0	-17.21	-5.34	-0.55	3.03	-10.55	-3.66
Poisson noise	RDT Equivalent (85.0%)	0	-3.75	24.49	31.45	31.85	38.17	37.87
Poisson noise	RDT Equivalent (90.0%)	0	-3.69	12.94	32.92	40.14	20.26	28.74
All noise structures	Perfect Test	0	-3.69	22.61	30.64	36.08	17.92	23.05
All noise structures	Perfect Test	14	3.69	33.64	42.38	48.18	28.21	34.07

Table 3: Mean outbreak alert delay (days) of each testing scenario at their specific optimal thresholds, when the average noise incidence is 8 times higher than the average measles incidence. A) the noise structure is dynamical, and the seasonality is in-phase with the measles incidence. B) the noise structure is Poisson only.

Figures

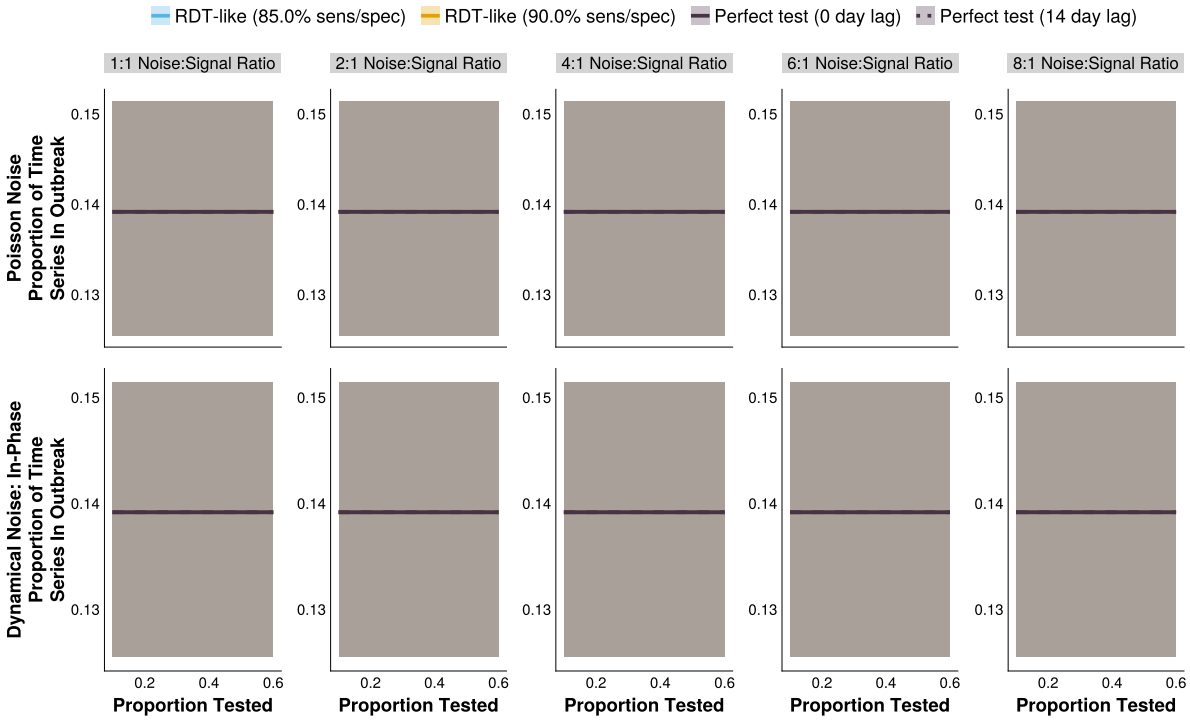

Figure 1: The difference between the proportion of the time series in outbreak for outbreak detection systems under different testing rates and noise structures. The shaded bands illustrate the 80% central interval, and the solid/dashed lines represent the mean estimate. Solid lines represent tests with 0-day turnaround times, and dashed lines represent tests with result delays.

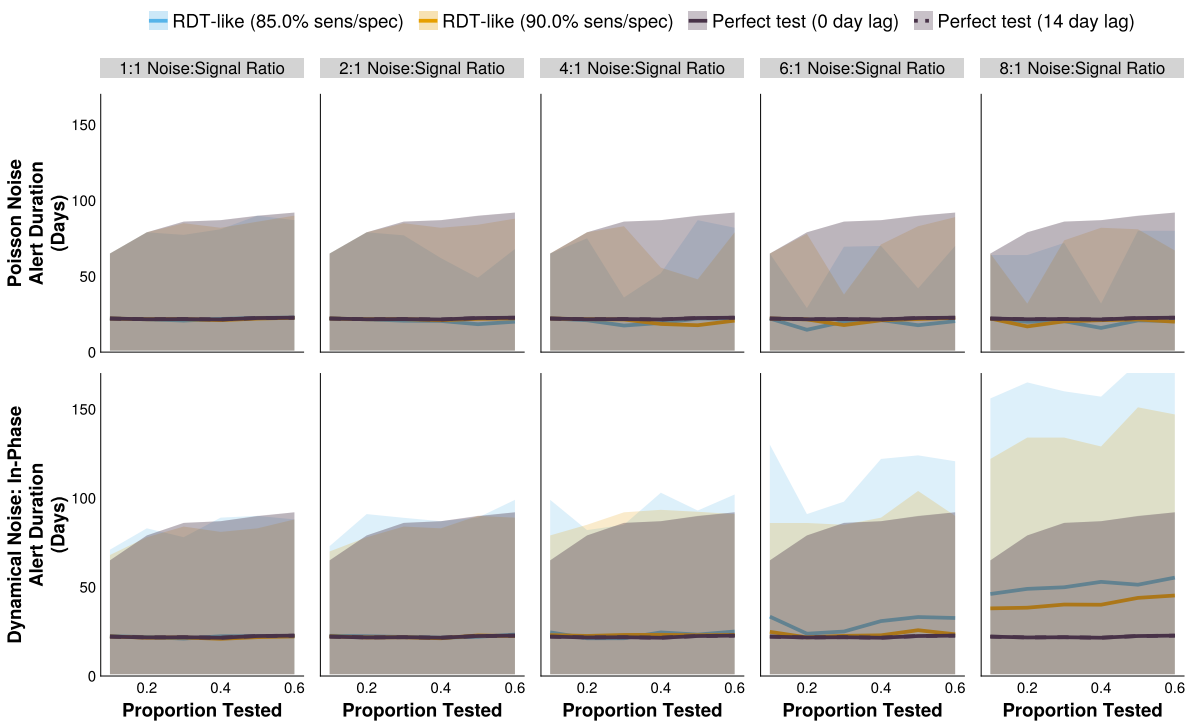

Figure 2: The difference between the alert durations for outbreak detection systems under different testing rates and noise structures. The shaded bands illustrate the 80% central interval, and the solid/dashed lines represent the mean estimate. Solid lines represent tests with 0-day turnaround times, and dashed lines represent tests with result delays.

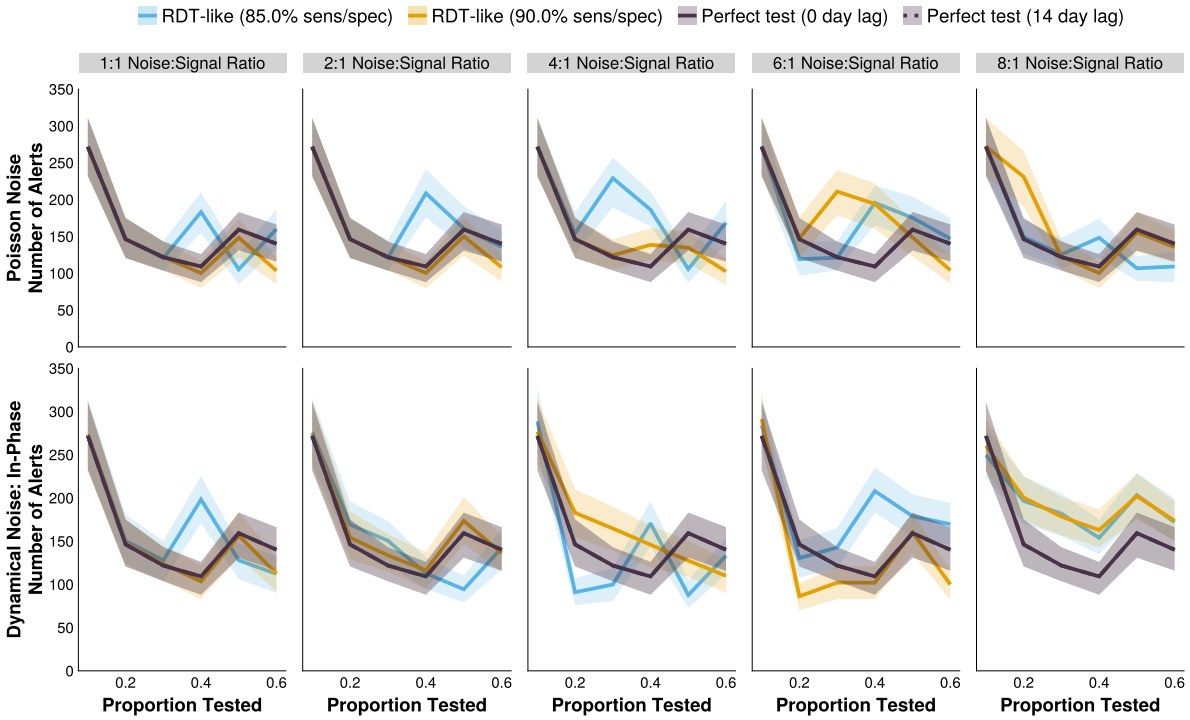

Figure 3: The difference between the number of alerts under different testing rates and noise structures. The shaded bands illustrate the 80% central interval, and the solid/dashed lines represent the mean estimate. Solid lines represent tests with 0-day turnaround times, and dashed lines represent tests with result delays.