Analysis of Cluster Randomized Test-Negative Designs: Cluster-Level Methods

Supplementary Materials

Cluster ID	Distribution of Dengue Cases	Distribution of OFI Controls
1	52	138
2	74	212
3	54	125
4	72	145
5	46	165
6	42	194
7	70	250
8	50	131
9	73	229
10	69	156
Total	602	1745

Table 1: Hypothetical dengue and other febrile illness (OFI) count data for an example of 10 clusters used for permutation distribution estimates.

	Period								
Cluster ID	'03 – '05	'05 – '06	'06 – '07	'07 – '08	'08 – '10	'10 – '11	'11 – '12	'12 – '13	'13 – '14
1	13	19	37	29	42	48	18	26	34
2	14	14	30	27	34	37	15	25	34
3	35	32	39	43	62	52	25	40	38
4	9	13	13	8	18	18	6	7	9
5	17	25	69	60	36	53	34	47	71
6	37	38	77	72	75	89	84	120	104
7	23	28	48	51	85	76	28	40	36
8	20	32	51	57	66	41	13	36	37
9	25	29	46	41	57	48	15	27	25
10	14	25	53	49	41	31	9	35	42
11	40	61	78	64	84	98	57	62	71
12	33	54	74	59	80	80	44	63	69
13	35	52	79	86	119	112	49	56	76
14	28	39	57	48	59	56	29	49	62
15	30	39	56	46	52	40	20	25	27
16	22	51	68	47	56	43	19	36	38
17	12	18	25	22	20	14	8	17	16
18	41	55	112	93	130	151	81	139	128
19	16	27	69	71	53	44	24	47	69
20	19	37	43	28	45	41	30	79	77
21	24	45	63	49	59	62	42	73	68
22	33	57	72	59	84	73	35	66	62
23	12	19	29	29	36	29	14	34	32
24	21	40	67	90	151	106	27	72	76

Table 2: *Dengue Case Counts.* The frequency of recorded (hospitalized) dengue fever cases in each of these 24 clusters for each of nine distinct two-year periods covering the time interval from 2003-2014. During this period, there was no available data for 2004 and 2009, so that the first two-year interval was for 2003 and 2005; similarly the 2008-10 interval included data for 2008 and 2010. Otherwise each two-year period covered consecutive years.

Cluster ID	'14 – '15
1	486
2	155
3	1197
4	255
5	249
6	710
7	658
8	714
9	478
10	376
11	388
12	426
13	842
14	547
15	285
16	586
17	344
18	484
19	151
20	223
21	522
22	804
23	286
24	792

Table 3: *OFI Counts.* Data for the distribution for OFIs is only available for one two-year period from 2014-15.

Relative Risk (λ)	Test-Positive Fraction	Odds Ratio	GEE	Random Effects
1	0.0506	0.0749	0.0000	0.0742
0.6	0.5258	0.5795	0.0014	0.6222
0.5	0.7798	0.8238	0.0103	0.8508
0.4	0.9418	0.9620	0.0805	0.9693
0.3	0.9965	0.9985	0.4175	0.9990

Table 4: The proportion of simulations that returned significant results for each intervention effect of interest (λ) as in Table 2 of the paper, but now with 10,000 random intervention allocations of 1,000 cases and 1,000 controls ($r = 1$).

Relative Risk (λ)	Test-Positive Fraction	Odds Ratio	GEE	Random Effects
1	0.0013	0.0104	0.0000	0.0043
0.6	0.4783	0.6055	0.0000	0.6462
0.5	0.8075	0.8864	0.0007	0.9166
0.4	0.9732	0.9852	0.0241	0.9919
0.3	1.0000	0.9998	0.3462	1.0000

Table 5: The proportion of simulations that returned significant results for each intervention effect of interest (λ) as in Table 2 0f the paper, but now with each approach applied to the results of the 494 constrained intervention allocations with 1,000 cases and 4,000 controls ($r = 4$).

Relative Risk (λ)	Test-Positive Fraction	Odds Ratio	GEE	Random Effects
1	0.0022	0.0104	0.0000	0.0047
0.6	0.5283	0.6055	0.0000	0.6581
0.5	0.8488	0.8864	0.0007	0.9199
0.4	0.9800	0.9852	0.0241	0.9924
0.3	1.0000	0.9998	0.3462	1.0000

Table 6: The proportion of simulations that returned significant results for each intervention effect of interest (λ) as in Supplementary Table 4, but now using the 494 constrained constrained intervention allocations with 1,000 cases and 1,000 controls ($r = 1$)