Simulation Result For Two-Level Slope Model With Low Prevalence

The mean prevalence for this simulation is 9 %

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03 September 2023

Histograms for $log(\widehat{MOR})$ when First Quartile of X is used
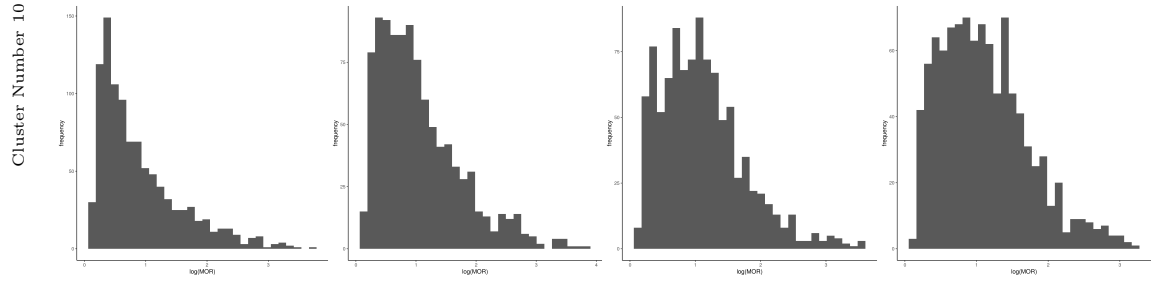

Figure 1: Cluster size 5   Figure 2: Cluster size 10   Figure 3: Cluster size 30   Figure 4: Cluster size 50
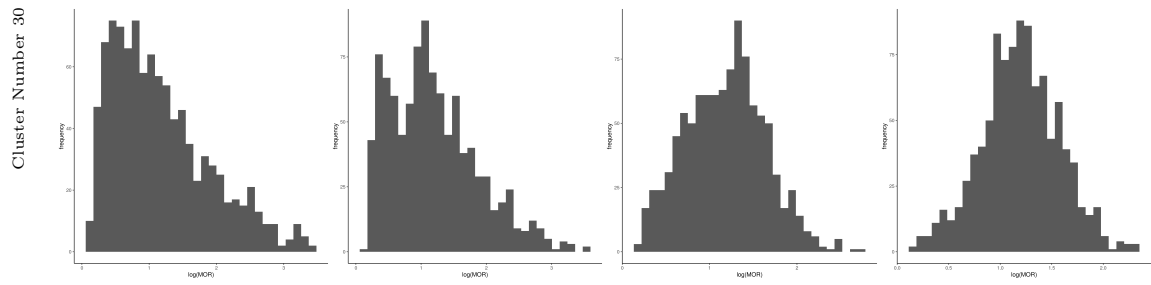
Figure 5: Cluster size 5   Figure 6: Cluster size 10   Figure 7: Cluster size 30   Figure 8: Cluster size 50
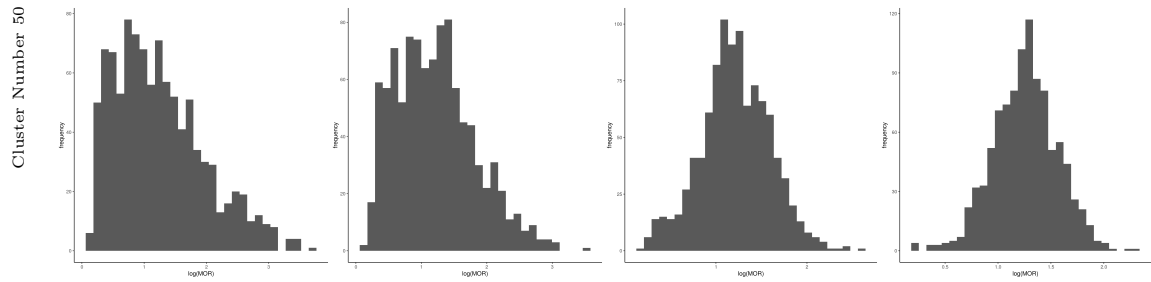
Figure 9: Cluster size 5   Figure 10: Cluster size 10   Figure 11: Cluster size 30   Figure 12: Cluster size 50

Figure 13: Cluster size 5   Figure 14: Cluster size 10   Figure 15: Cluster size 30   Figure 16: Cluster size 50

Histograms for $log(\widehat{MOR})$ when Mean of X is used

Figure 17: Cluster size 5 Figure 18: Cluster size 10 Figure 19: Cluster size 30 Figure 20: Cluster size 50

Figure 21: Cluster size 5 Figure 22: Cluster size 10 Figure 23: Cluster size 30 Figure 24: Cluster size 50

Figure 25: Cluster size 5 Figure 26: Cluster size 10 Figure 27: Cluster size 30 Figure 28: Cluster size 50

Figure 29: Cluster size 5 Figure 30: Cluster size 10 Figure 31: Cluster size 30 Figure 32: Cluster size 50
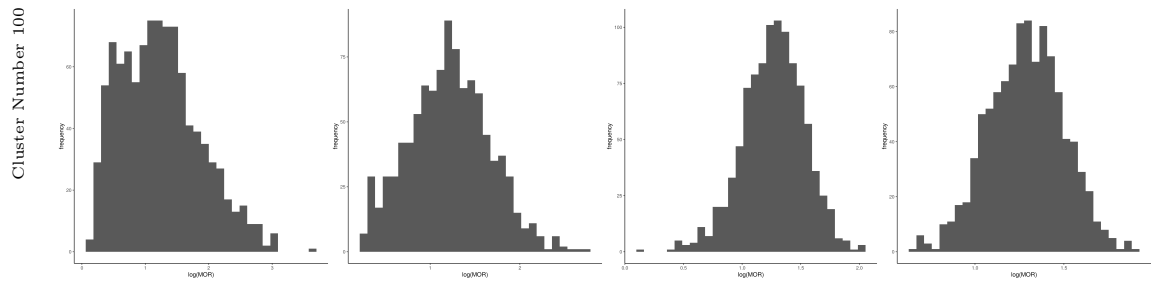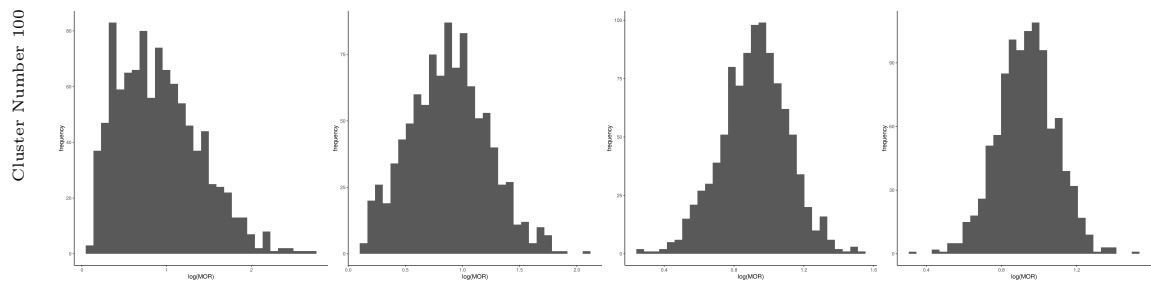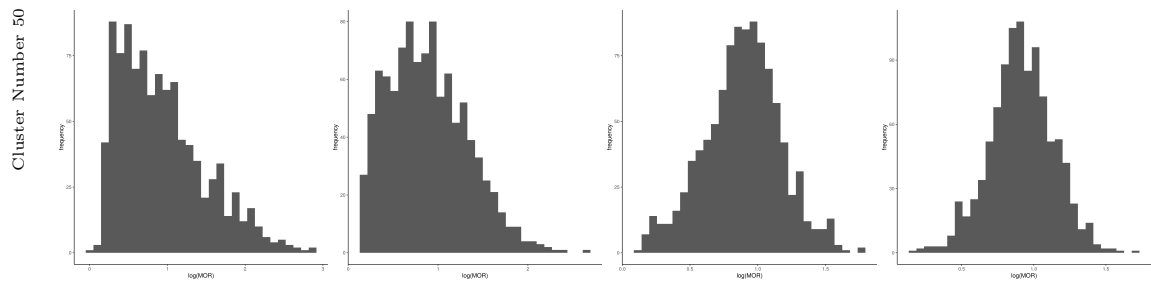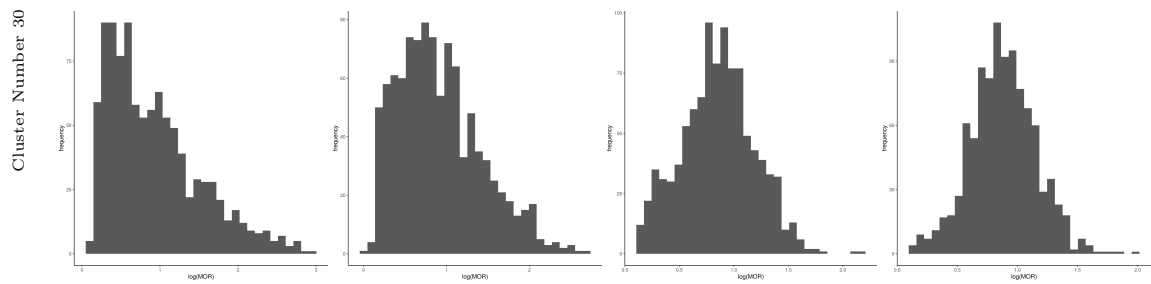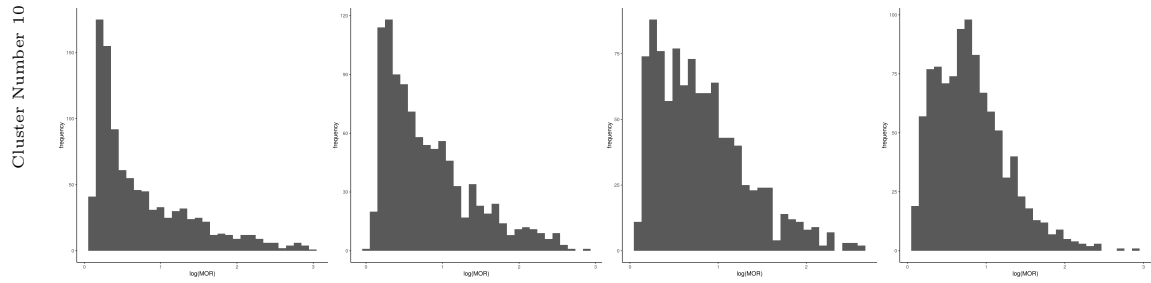
Histograms for $log(\widehat{MOR})$ when Third Quartile of X is used

Cluster Number 10

Figure 33: Cluster size 5   Figure 34: Cluster size 10   Figure 35: Cluster size 30   Figure 36: Cluster size 50

Cluster Number 30

Figure 37: Cluster size 5   Figure 38: Cluster size 10   Figure 39: Cluster size 30   Figure 40: Cluster size 50

Cluster Number 50
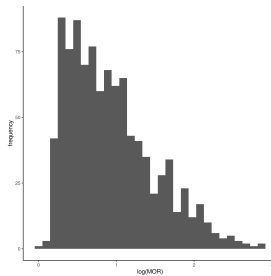
Figure 41: Cluster size 5   Figure 42: Cluster size 10   Figure 43: Cluster size 30   Figure 44: Cluster size 50
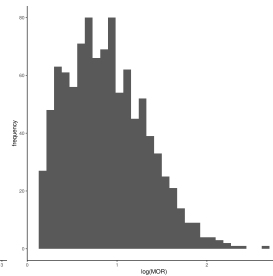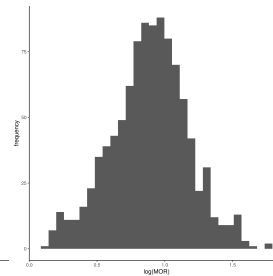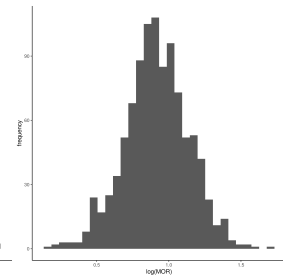
Cluster Number 100
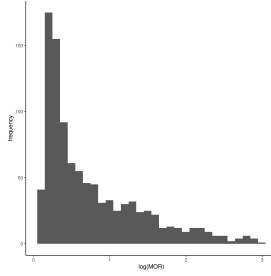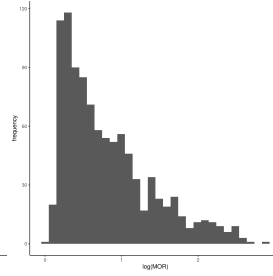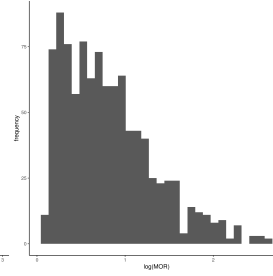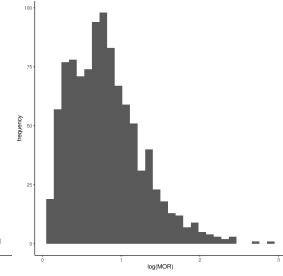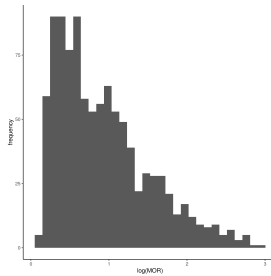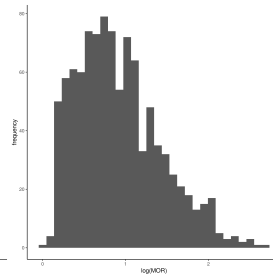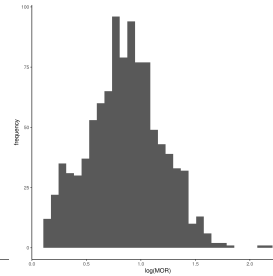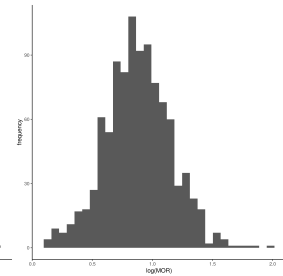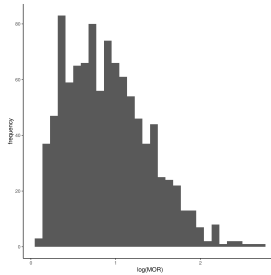

Figure 45: Cluster size 5   Figure 46: Cluster size 10   Figure 47: Cluster size 30   Figure 48: Cluster size 50
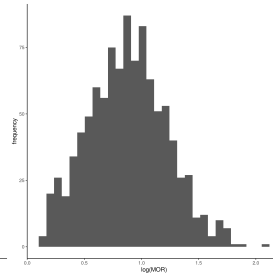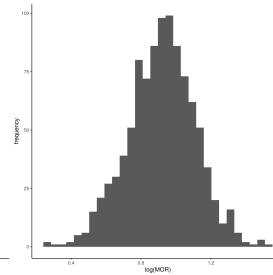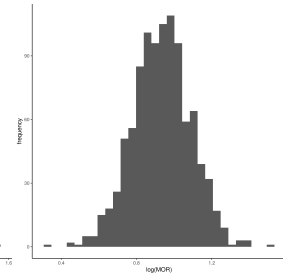
Simulation Result Table

Number of Cluster	Cluster Size	$\widehat{\beta_0}$	$\widehat{\beta_1}$	$\widehat{\beta_2}$	$\widehat{\sigma_{u_1}^2}$	$\widehat{\sigma_{u_2}^2}$	$\widehat{\sigma_{u_{12}}^2}$	Model Convergence (%)
10	5	-3.80	1.77	0.61	1.02	1.32	0.17	18.74
	10	-4.21	1.86	0.62	1.07	1.92	0.16	55.83
	30	-4.27	1.88	0.68	1.01	1.89	0.05	95.42
	50	-4.17	1.78	0.69	0.95	1.85	0.01	98.62
30	5	-4.38	1.88	0.69	1.31	2.22	0.16	68.31
	10	-4.29	1.85	0.65	1.20	2.22	0.09	96.81
	30	-4.13	1.76	0.67	0.92	1.96	0.04	100.00
	50	-4.10	1.73	0.67	0.93	1.91	0.05	100.00
50	5	-4.36	1.90	0.68	1.28	2.35	0.04	89.13
	10	-4.21	1.81	0.69	1.06	2.19	0.03	99.80
	30	-4.10	1.75	0.68	0.95	1.97	0.05	100.00
	50	-4.10	1.74	0.67	0.97	1.96	0.03	100.00
100	5	-4.26	1.83	0.70	1.17	2.25	0.05	98.72
	10	-4.12	1.76	0.67	0.97	2.00	0.03	100.00
	30	-4.10	1.75	0.67	0.97	1.97	0.01	100.00
	50	-4.10	1.74	0.66	0.98	1.98	0.01	100.00

[*] The mean prevalence for this simulation is 9%

[†] True $\sigma_{u_1}^2 = 1$, $\sigma_{u_2}^2 = 2$, $\sigma_{u_{12}}^2 = 0$

[‡] True Values of $\beta_0 = -4.1$, $\beta_1 = 1.75$, $\beta_2 = 0.67$

Simulation Result Table When First Quartile of X is used

Number of Cluster	Cluster Size	MOR	$\widehat{MOR}$	$Bias^1$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}{}^2$	Ratio[3]	CI Coverage (95%)
10	5	3.69	3.32	-9.23	10.44	1.95	5.34	1.00
	10	3.76	3.88	2.75	7.40	1.98	3.73	1.00
	30	3.73	3.88	4.29	3.52	1.90	1.86	0.99
	50	3.74	3.79	1.22	2.57	1.86	1.38	0.99
30	5	3.74	4.41	18.55	6.85	2.07	3.31	1.00
	10	3.73	4.29	15.39	3.32	1.95	1.70	0.98
	30	3.73	3.62	-3.15	1.65	1.58	1.04	0.98
	50	3.74	3.55	-4.96	1.45	1.46	1.00	0.97
50	5	3.72	4.69	26.16	4.10	2.06	1.99	0.99
	10	3.74	4.11	9.96	2.16	1.83	1.18	0.97
	30	3.74	3.62	-3.14	1.41	1.46	0.96	0.96
	50	3.74	3.67	-1.76	1.30	1.35	0.96	0.94
100	5	3.74	4.29	14.75	2.44	1.87	1.30	0.97
	10	3.73	3.73	-0.09	1.57	1.57	1.00	0.96
	30	3.73	3.67	-1.64	1.24	1.30	0.95	0.91
	50	3.74	3.70	-1.03	1.19	1.24	0.96	0.91

Note:

[1] It is Relative Bias $= \dfrac{\hat{\theta} - \theta}{\theta} \times 100$

[2] Simulation Standard Error of MOR

[3] Ratio $= \dfrac{\widehat{SE}_{MOR}}{Simulation\ \widehat{SE}_{MOR}}$

[*] The mean prevalence for this simulation is 9%

[†] True $\sigma^2_{u_1} = 1$, $\sigma^2_{u_2} = 2$, $\sigma^2_{u_{12}} = 0$

[‡] True Values of $\beta_0 = -4.1$, $\beta_1 = 1.75$, $\beta_2 = 0.67$

Simulation Result Table When Second Quartile of X is used

Number of Cluster	Cluster Size	MOR	$\widehat{MOR}$	$Bias^1$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}{}^2$	Ratio[3]	CI Coverage (95%)
10	5	2.64	2.77	4.68	4.75	1.89	2.51	1.00
	10	2.62	2.76	5.34	3.56	1.78	2.00	1.00
	30	2.60	2.62	0.82	2.04	1.67	1.23	0.98
	50	2.60	2.54	-2.37	1.70	1.58	1.08	0.95
30	5	2.61	3.10	18.64	3.21	1.80	1.78	1.00
	10	2.60	2.88	10.76	2.06	1.66	1.24	1.00
	30	2.60	2.49	-4.26	1.45	1.40	1.04	0.95
	50	2.60	2.50	-3.66	1.33	1.31	1.01	0.96
50	5	2.60	3.03	16.42	2.49	1.74	1.43	1.00
	10	2.60	2.69	3.39	1.72	1.55	1.11	0.98
	30	2.60	2.53	-2.76	1.33	1.33	1.00	0.96
	50	2.60	2.56	-1.45	1.24	1.25	1.00	0.95
100	5	2.60	2.83	8.76	1.86	1.62	1.15	0.99
	10	2.60	2.55	-1.71	1.47	1.41	1.05	0.96
	30	2.60	2.55	-1.79	1.21	1.21	1.00	0.96
	50	2.60	2.57	-0.90	1.16	1.17	0.99	0.95

Note:

[1] It is Relative Bias $= \dfrac{\hat{\theta} - \theta}{\theta} \times 100$

[2] Simulation Standard Error of MOR

[3] Ratio $= \dfrac{\widehat{SE}_{MOR}}{Simulation\ \widehat{SE}_{MOR}}$

[*] The mean prevalence for this simulation is 9%

Simulation Result Table When Third Quartile of X is used

Number of Cluster	Cluster Size	MOR	$\widehat{MOR}$	$Bias^1$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}{}^2$	Ratio[3]	CI Coverage (95%)
10	5	3.84	4.20	8.90	9.19	1.89	4.86	1.00
	10	3.78	4.45	17.20	6.42	1.78	3.61	1.00
	30	3.76	3.96	5.42	2.96	1.67	1.77	0.99
	50	3.74	3.70	-1.20	2.37	1.58	1.50	0.98
30	5	3.76	5.02	33.84	5.24	1.80	2.90	1.00
	10	3.75	4.55	21.05	2.69	1.66	1.62	0.98
	30	3.75	3.74	-0.27	1.51	1.40	1.08	0.99
	50	3.75	3.72	-0.63	1.38	1.31	1.05	0.98
50	5	3.76	4.81	27.40	3.73	1.74	2.14	0.99
	10	3.74	4.14	10.40	1.85	1.55	1.19	0.98
	30	3.75	3.78	0.98	1.35	1.33	1.02	0.98
	50	3.74	3.75	0.24	1.28	1.25	1.02	0.98
100	5	3.74	4.36	16.60	2.02	1.62	1.25	0.98
	10	3.75	3.81	1.64	1.48	1.41	1.05	0.98
	30	3.74	3.71	-0.77	1.23	1.21	1.02	0.99
	50	3.74	3.74	0.06	1.19	1.17	1.02	0.98

Note:

[1] It is Relative Bias $= \dfrac{\hat{\theta} - \theta}{\theta} \times 100$

[2] Simulation Standard Error of MOR

[3] Ratio $= \dfrac{\widehat{SE}_{MOR}}{Simulation\ \widehat{SE}_{MOR}}$

[*] The mean prevalence for this simulation is 9%

Simulation Result Table (All Together)

M, N[1]	Q_{1X}							Q_{2X}							Q_{3X}						
	MOR	$\widehat{MOR}$	$Bias^2$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}$[3]	Ratio[3]	Coverage (95%)	MOR	$\widehat{MOR}$	$Bias^2$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}$[3]	Ratio[3]	Coverage (95%)	MOR	$\widehat{MOR}$	$Bias^2$	$\widehat{SE}_{MOR}$	Sim. $\widehat{SE}_{MOR}$[3]	Ratio[3]	Coverage (95%)
10, 5	3.69	3.32	-9.23	10.44	1.95	5.34	1.00	2.64	2.77	4.68	4.75	1.89	2.51	1.00	3.84	4.20	8.90	9.19	1.89	4.86	1.00
10, 10	3.76	3.88	2.75	7.40	1.98	3.73	1.00	2.62	2.76	5.34	3.56	1.78	2.00	1.00	3.78	4.45	17.20	6.42	1.78	3.61	1.00
10, 30	3.73	3.88	4.29	3.52	1.90	1.86	0.99	2.60	2.62	0.82	2.04	1.67	1.23	0.98	3.76	3.96	5.42	2.96	1.67	1.77	0.99
10, 50	3.74	3.79	1.22	2.57	1.86	1.38	0.99	2.60	2.54	-2.37	1.70	1.58	1.08	0.95	3.74	3.70	-1.20	2.37	1.58	1.50	0.98
30, 5	3.74	4.41	18.55	6.85	2.07	3.31	1.00	2.61	3.10	18.64	3.21	1.80	1.78	1.00	3.76	5.02	33.84	5.24	1.80	2.90	1.00
30, 10	3.73	4.29	15.39	3.32	1.95	1.70	0.98	2.60	2.88	10.76	2.06	1.66	1.24	1.00	3.75	4.55	21.05	2.69	1.66	1.62	0.98
30, 30	3.73	3.62	-3.15	1.65	1.58	1.04	0.98	2.60	2.49	-4.26	1.45	1.40	1.04	0.95	3.75	3.74	-0.27	1.51	1.40	1.08	0.99
30, 50	3.74	3.55	-4.96	1.45	1.46	1.00	0.97	2.60	2.50	-3.66	1.33	1.31	1.01	0.96	3.75	3.72	-0.63	1.38	1.31	1.05	0.98
50, 5	3.72	4.69	26.16	4.10	2.06	1.99	0.99	2.60	3.03	16.42	2.49	1.74	1.43	1.00	3.76	4.81	27.40	3.73	1.74	2.14	0.99
50, 10	3.74	4.11	9.96	2.16	1.83	1.18	0.97	2.60	2.69	3.39	1.72	1.55	1.11	0.98	3.74	4.14	10.40	1.85	1.55	1.19	0.98
50, 30	3.74	3.62	-3.14	1.41	1.46	0.96	0.96	2.60	2.53	-2.76	1.33	1.33	1.00	0.96	3.75	3.78	0.98	1.35	1.33	1.02	0.98
50, 50	3.74	3.67	-1.76	1.30	1.35	0.96	0.94	2.60	2.56	-1.45	1.24	1.25	1.00	0.95	3.74	3.75	0.24	1.28	1.25	1.02	0.98
100, 5	3.74	4.29	14.75	2.44	1.87	1.30	0.97	2.60	2.83	8.76	1.86	1.62	1.15	0.99	3.74	4.36	16.60	2.02	1.62	1.25	0.98
100, 10	3.73	3.73	-0.09	1.57	1.57	1.00	0.96	2.60	2.55	-1.71	1.47	1.41	1.05	0.96	3.75	3.81	1.64	1.48	1.41	1.05	0.98
100, 30	3.73	3.67	-1.64	1.24	1.30	0.95	0.91	2.60	2.55	-1.79	1.21	1.21	1.00	0.96	3.74	3.71	-0.77	1.23	1.21	1.02	0.99
100, 50	3.74	3.70	-1.03	1.19	1.24	0.96	0.91	2.60	2.57	-0.90	1.16	1.17	0.99	0.95	3.74	3.74	0.06	1.19	1.17	1.02	0.98

Note:

[1] M is Number of Cluster and N is Cluster size

[2] It is Relative Bias = $\dfrac{\hat{\theta} - \theta}{\theta} \times 100$

[3] Simulation Standard Error of MOR

[4] Ratio = $\dfrac{\widehat{SE}_{MOR}}{Simulation\ \widehat{SE}_{MOR}}$

[*] The mean prevalence for this simulation is 9%