Wrap up results3

June 25, 2018

Highlights

This report contains:

More results about the comparison of CRA, IPW, and MMI (K=10, 25, 50):

- Table 1.1: The **Bias** of each method with different ICCs, missingness ICCs, and an independent working correlation matrix
- Table 1.2: The **Bias** of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix
- Table 1.3: The **Standard Deviation** of each method with different ICCs , missingness ICCs, and the independent working correlation matrix
- Table 1.4: The **Standard Deviation** of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix
- Table 1.5: The **MCSD** of each method with different ICCs , missingness ICCs,and an independent working correlation matrix
- Table 1.6: The **MCSD** of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix
- Table 1.7: The **Coverage** of each method with different ICCs, missingness ICCs, and an independent working correlation matrix
- Table 1.8: The **Coverage** of each method with different ICCs , missingness ICCs, and an exchangeable working correlation matrix
- Table 1.9: The **non-convergence** of each method with different ICCs , missingness ICCs, and an independent working correlation matrix
- Table 1.10: The **non-convergence** of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix

The average number of weights that exceed 20, 100, 500, 1000

- Table 2.1: The percentage of weigths that exceed 20, 100, 500, 1000
- Table 2.2: The counts of weights that exceed 20, 100, 500, 1000

Results

Table 1.1: The Bias of each method with different ICCs, missingness ICCs, and an independent working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.031	0.041	0.000	0.001	0.008
		0.1	0.029	0.039	0.000	0.009	0.004
		0.3	0.017	0.041	0.006	0.024	0.007
		0.5	0.014	0.038	0.002	0.040	0.003
		0.7	0.002	0.044	0.008	0.095	0.007
		0.9	0.005	0.045	0.008	0.275	0.001
	0.10	0.0	0.033	0.037	0.003	0.003	0.006
		0.1	0.029	0.035	0.003	0.006	0.004
		0.3	0.015	0.040	0.005	0.027	0.008
		0.5	0.011	0.038	0.002	0.050	0.004

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.7	0.002	0.045	0.010	0.122	0.009
		0.9	0.008	0.046	0.011	0.335	0.003
	0.20	0.0	0.033	0.030	0.005	0.006	0.006
		0.1	0.026	0.033	0.002	0.009	0.004
		0.3	0.013	0.037	0.005	0.041	0.005
		0.5	0.009	0.036	0.003	0.071	0.001
		0.7	0.006	0.045	0.013	0.172	0.008
		0.9	0.015	0.049	0.019	0.474	0.006
25	0.05	0.0	0.034	0.038	0.004	0.004	0.008
		0.1	0.034	0.033	0.009	0.010	0.002
		0.3	0.024	0.034	0.006	0.000	0.001
		0.5	0.017	0.034	0.005	0.012	0.000
		0.7	0.010	0.035	0.003	0.046	0.002
		0.9	0.000	0.040	0.002	0.352	0.001
	0.10	0.0	0.035	0.034	0.008	0.008	0.006
		0.1	0.032	0.031	0.008	0.010	0.003
		0.3	0.023	0.032	0.005	0.002	0.002
		0.5	0.016	0.033	0.004	0.017	0.002
		0.7	0.009	0.034	0.002	0.064	0.001
		0.9	0.000	0.038	0.002	0.378	0.002
	0.20	0.0	0.036	0.026	0.011	0.012	0.003
		0.1	0.033	0.024	0.012	0.014	0.002
		0.3	0.025	0.025	0.009	0.002	0.000
		0.5	0.016	0.027	0.006	0.020	0.000
		0.7	0.009	0.029	0.004	0.084	0.000
		0.9	0.001	0.034	0.002	0.372	0.001
50	0.05	0.0	0.033	0.036	0.006	0.006	0.008
		0.1	0.030	0.035	0.004	0.003	0.005
		0.3	0.020	0.037	0.001	0.004	0.006
		0.5	0.012	0.039	0.001	0.011	0.006
		0.7	0.006	0.038	0.001	0.027	0.005
		0.9	0.001	0.037	0.001	0.336	0.001
	0.10	0.0	0.033	0.033	0.009	0.009	0.007
		0.1	0.030	0.032	0.006	0.005	0.004
		0.3	0.020	0.034	0.003	0.005	0.005
		0.5	0.013	0.035	0.001	0.014	0.005
		0.7	0.007	0.035	0.001	0.032	0.002
		0.9	0.002	0.035	0.000	0.395	0.001
	0.20	0.0	0.033	0.027	0.011	0.011	0.005
		0.1	0.028	0.028	0.008	0.007	0.004
		0.3	0.020	0.028	0.005	0.007	0.004
		0.5	0.013	0.030	0.003	0.017	0.005
		0.7	0.008	0.029	0.003	0.040	0.001

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.9	0.004	0.028	0.003	0.370	0.002

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.2: The Bias of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.031	0.040	0.028	0.028	0.009
		0.1	0.030	0.037	0.024	0.029	0.004
		0.3	0.018	0.041	0.024	0.045	0.007
		0.5	0.014	0.039	0.015	0.060	0.003
		0.7	0.001	0.046	0.016	0.126	0.007
		0.9	0.005	0.046	0.012	0.340	0.001
	0.10	0.0	0.033	0.034	0.051	0.051	0.007
		0.1	0.032	0.031	0.044	0.052	0.003
		0.3	0.019	0.037	0.040	0.066	0.007
		0.5	0.014	0.037	0.026	0.097	0.003
		0.7	0.001	0.044	0.026	0.170	0.009
		0.9	0.006	0.043	0.015	0.438	0.003
	0.20	0.0	0.032	0.021	0.085	0.084	0.007
		0.1	0.030	0.023	0.077	0.081	0.004
		0.3	0.021	0.027	0.064	0.101	0.005
		0.5	0.017	0.028	0.044	0.118	0.001
		0.7	0.000	0.038	0.040	0.212	0.009
		0.9	0.008	0.039	0.026	0.571	0.006
	0.05	0.0	0.034	0.037	0.029	0.029	0.008
		0.1	0.034	0.032	0.018	0.016	0.002
		0.3	0.026	0.033	0.012	0.012	0.001
		0.5	0.019	0.033	0.006	0.016	0.000
		0.7	0.012	0.035	0.003	0.047	0.002
		0.9	0.000	0.041	0.005	0.384	0.001
	0.10	0.0	0.035	0.031	0.056	0.055	0.006
		0.1	0.033	0.029	0.048	0.041	0.003

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.3	0.026	0.030	0.033	0.032	0.001
		0.5	0.019	0.030	0.020	0.032	0.002
		0.7	0.011	0.032	0.011	0.075	0.001
		0.9	0.001	0.038	0.008	0.499	0.002
	0.20	0.0	0.035	0.018	0.098	0.099	0.003
		0.1	0.033	0.017	0.084	0.074	0.002
		0.3	0.029	0.017	0.063	0.061	0.001
		0.5	0.021	0.019	0.042	0.075	0.000
		0.7	0.013	0.021	0.023	0.131	0.000
		0.9	0.001	0.029	0.012	0.498	0.001
50	0.05	0.0	0.033	0.036	0.027	0.027	0.008
		0.1	0.031	0.034	0.023	0.025	0.005
		0.3	0.023	0.035	0.016	0.020	0.006
		0.5	0.015	0.037	0.012	0.021	0.006
		0.7	0.008	0.037	0.006	0.034	0.004
		0.9	0.002	0.036	0.001	0.364	0.001
	0.10	0.0	0.033	0.030	0.055	0.055	0.007
		0.1	0.032	0.029	0.047	0.050	0.004
		0.3	0.025	0.030	0.033	0.038	0.005
		0.5	0.017	0.032	0.021	0.034	0.005
		0.7	0.011	0.030	0.010	0.048	0.001
		0.9	0.004	0.031	0.001	0.418	0.002
	0.20	0.0	0.032	0.019	0.106	0.106	0.005
		0.1	0.030	0.020	0.095	0.090	0.004
		0.3	0.025	0.021	0.069	0.073	0.004
		0.5	0.017	0.023	0.048	0.064	0.004
		0.7	0.013	0.020	0.023	0.079	0.000
		0.9	0.006	0.017	0.002	0.324	0.002

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.3: The Standard Deviation of each method with different ICCs , missingness ICCs, and the independent working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.268	0.274	0.276	0.276	0.393
		0.1	0.267	0.272	0.274	0.283	0.395
		0.3	0.268	0.273	0.274	0.301	0.406
		0.5	0.270	0.275	0.274	0.313	0.419
		0.7	0.274	0.279	0.276	0.321	0.446
		0.9	0.279	0.285	0.280	0.313	0.504
	0.10	0.0	0.314	0.320	0.320	0.321	0.434
		0.1	0.315	0.321	0.320	0.333	0.437
		0.3	0.318	0.324	0.322	0.357	0.450
		0.5	0.321	0.327	0.324	0.373	0.464
		0.7	0.326	0.333	0.328	0.385	0.493
		0.9	0.335	0.342	0.336	0.374	0.553
	0.20	0.0	0.392	0.400	0.395	0.395	0.502
		0.1	0.398	0.406	0.401	0.417	0.512
		0.3	0.403	0.411	0.405	0.451	0.526
		0.5	0.408	0.416	0.409	0.472	0.542
		0.7	0.418	0.426	0.418	0.495	0.574
		0.9	0.430	0.439	0.430	0.479	0.639
25	0.05	0.0	0.175	0.178	0.180	0.180	0.247
		0.1	0.175	0.179	0.180	0.193	0.250
		0.3	0.177	0.181	0.181	0.224	0.256
		0.5	0.179	0.182	0.181	0.250	0.263
		0.7	0.181	0.185	0.182	0.269	0.273
		0.9	0.185	0.188	0.185	0.306	0.291
	0.10	0.0	0.206	0.210	0.210	0.210	0.276
		0.1	0.208	0.212	0.211	0.227	0.279
		0.3	0.211	0.215	0.213	0.265	0.288
		0.5	0.214	0.218	0.215	0.297	0.295
		0.7	0.218	0.222	0.218	0.319	0.307
		0.9	0.224	0.229	0.224	0.339	0.329
	0.20	0.0	0.260	0.266	0.262	0.262	0.328
		0.1	0.263	0.268	0.263	0.285	0.330
		0.3	0.267	0.273	0.267	0.335	0.339
		0.5	0.271	0.277	0.271	0.376	0.349
		0.7	0.278	0.283	0.277	0.400	0.364
		0.9	0.288	0.294	0.287	0.394	0.394
50	0.05	0.0	0.125	0.128	0.129	0.129	0.176
		0.1	0.126	0.129	0.129	0.141	0.176
		0.3	0.127	0.130	0.129	0.171	0.180
		0.5	0.129	0.131	0.130	0.198	0.185
		0.7	0.130	0.133	0.131	0.212	0.189
		0.9	0.132	0.135	0.132	0.217	0.197
	0.10	0.0	0.148	0.151	0.151	0.151	0.197

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.1	0.149	0.152	0.151	0.165	0.199
		0.3	0.151	0.154	0.152	0.202	0.202
		0.5	0.153	0.156	0.154	0.235	0.209
		0.7	0.156	0.159	0.156	0.251	0.215
		0.9	0.160	0.163	0.160	0.239	0.226
	0.20	0.0	0.186	0.190	0.187	0.187	0.233
		0.1	0.188	0.192	0.189	0.207	0.236
		0.3	0.192	0.196	0.192	0.254	0.241
		0.5	0.196	0.200	0.195	0.297	0.249
		0.7	0.200	0.204	0.199	0.316	0.258
		0.9	0.207	0.211	0.206	0.256	0.276

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.4: The Standard Deviation of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.268	0.274	0.286	0.286	0.393
		0.1	0.266	0.272	0.282	0.291	0.395
		0.3	0.268	0.273	0.280	0.313	0.406
		0.5	0.269	0.275	0.279	0.336	0.419
		0.7	0.273	0.279	0.279	0.362	0.445
		0.9	0.278	0.284	0.282	0.374	0.503
	0.10	0.0	0.313	0.322	0.341	0.342	0.434
		0.1	0.313	0.323	0.337	0.349	0.437
		0.3	0.316	0.325	0.335	0.384	0.450
		0.5	0.318	0.327	0.332	0.405	0.463
		0.7	0.324	0.333	0.333	0.438	0.492
		0.9	0.333	0.342	0.337	0.438	0.552
	0.20	0.0	0.390	0.404	0.442	0.442	0.502
		0.1	0.395	0.410	0.438	0.465	0.511
		0.3	0.399	0.413	0.431	0.513	0.526
		0.5	0.402	0.416	0.425	0.529	0.542
		0.7	0.411	0.425	0.426	0.579	0.573
		0.9	0.424	0.439	0.430	0.588	0.637

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
	0.05	0.0	0.174	0.179	0.187	0.187	0.247
		0.1	0.174	0.179	0.185	0.199	0.250
		0.3	0.177	0.181	0.184	0.233	0.256
		0.5	0.178	0.182	0.183	0.262	0.263
		0.7	0.180	0.184	0.183	0.284	0.273
		0.9	0.183	0.188	0.185	0.354	0.290
	0.10	0.0	0.205	0.211	0.224	0.224	0.276
		0.1	0.206	0.212	0.222	0.241	0.279
		0.3	0.208	0.215	0.220	0.285	0.287
		0.5	0.211	0.217	0.218	0.324	0.295
		0.7	0.215	0.221	0.219	0.351	0.307
		0.9	0.221	0.227	0.222	0.373	0.328
	0.20	0.0	0.259	0.267	0.292	0.292	0.327
		0.1	0.259	0.267	0.286	0.319	0.329
		0.3	0.262	0.270	0.280	0.386	0.339
		0.5	0.264	0.272	0.276	0.441	0.348
		0.7	0.269	0.278	0.276	0.473	0.363
		0.9	0.280	0.289	0.281	0.465	0.393
50	0.05	0.0	0.125	0.128	0.134	0.134	0.175
		0.1	0.126	0.129	0.133	0.145	0.176
		0.3	0.127	0.129	0.132	0.177	0.180
		0.5	0.128	0.131	0.131	0.209	0.184
		0.7	0.129	0.132	0.131	0.225	0.189
		0.9	0.131	0.134	0.132	0.212	0.197
	0.10	0.0	0.147	0.151	0.160	0.160	0.196
		0.1	0.148	0.152	0.158	0.174	0.198
		0.3	0.149	0.153	0.156	0.217	0.202
		0.5	0.151	0.155	0.156	0.257	0.208
		0.7	0.153	0.157	0.156	0.278	0.214
		0.9	0.157	0.162	0.158	0.239	0.225
	0.20	0.0	0.185	0.190	0.207	0.207	0.232
		0.1	0.186	0.191	0.204	0.230	0.235
		0.3	0.188	0.193	0.200	0.292	0.241
		0.5	0.190	0.195	0.197	0.346	0.248
		0.7	0.193	0.199	0.197	0.371	0.257
		0.9	0.200	0.206	0.201	0.304	0.275

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis

- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.5: The MCSD of each method with different ICCs , missingness ICCs,and an independent working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.291	0.298	0.299	0.299	0.294
		0.1	0.283	0.291	0.289	0.316	0.287
		0.3	0.292	0.301	0.296	0.388	0.297
		0.5	0.291	0.299	0.295	0.457	0.296
		0.7	0.300	0.307	0.303	0.506	0.309
		0.9	0.311	0.318	0.312	0.552	0.314
	0.10	0.0	0.344	0.353	0.348	0.348	0.348
		0.1	0.337	0.345	0.343	0.376	0.337
		0.3	0.345	0.354	0.348	0.465	0.347
		0.5	0.349	0.358	0.352	0.549	0.349
		0.7	0.361	0.369	0.363	0.612	0.361
		0.9	0.380	0.388	0.381	0.676	0.380
	0.20	0.0	0.431	0.441	0.432	0.433	0.435
		0.1	0.436	0.447	0.438	0.482	0.435
		0.3	0.448	0.459	0.446	0.599	0.440
		0.5	0.455	0.466	0.454	0.710	0.442
		0.7	0.473	0.483	0.472	0.802	0.458
		0.9	0.501	0.510	0.501	0.944	0.487
	0.05	0.0	0.178	0.182	0.186	0.186	0.179
		0.1	0.177	0.182	0.181	0.200	0.180
		0.3	0.183	0.187	0.186	0.252	0.185
		0.5	0.186	0.189	0.187	0.305	0.189
		0.7	0.188	0.192	0.189	0.314	0.191
		0.9	0.193	0.197	0.193	0.285	0.196
	0.10	0.0	0.212	0.216	0.218	0.218	0.214
		0.1	0.212	0.217	0.215	0.238	0.214
		0.3	0.218	0.223	0.220	0.302	0.218
		0.5	0.222	0.226	0.222	0.367	0.221
		0.7	0.227	0.232	0.227	0.381	0.226
		0.9	0.234	0.239	0.234	0.352	0.234
	0.20	0.0	0.264	0.269	0.267	0.268	0.265
		0.1	0.275	0.282	0.275	0.304	0.276
		0.3	0.281	0.288	0.280	0.383	0.278
		0.5	0.287	0.293	0.285	0.465	0.285
		0.7	0.294	0.301	0.293	0.498	0.289
		0.9	0.303	0.310	0.302	0.476	0.299

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
50	0.05	0.0	0.125	0.127	0.128	0.128	0.126
		0.1	0.131	0.134	0.135	0.150	0.131
		0.3	0.135	0.137	0.137	0.190	0.135
		0.5	0.136	0.138	0.138	0.227	0.135
		0.7	0.138	0.140	0.139	0.238	0.137
		0.9	0.141	0.143	0.141	NA	0.141
	0.10	0.0	0.147	0.150	0.149	0.149	0.148
		0.1	0.153	0.156	0.156	0.173	0.152
		0.3	0.157	0.161	0.159	0.221	0.156
		0.5	0.159	0.162	0.160	0.266	0.156
		0.7	0.162	0.165	0.162	0.287	0.158
		0.9	0.167	0.170	0.167	0.414	0.167
	0.20	0.0	0.184	0.187	0.183	0.183	0.185
		0.1	0.193	0.197	0.193	0.216	0.191
		0.3	0.198	0.203	0.198	0.281	0.194
		0.5	0.203	0.207	0.202	0.342	0.196
		0.7	0.206	0.211	0.206	0.367	0.197
		0.9	0.214	0.218	0.214	0.141	0.208

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.6: The MCSD of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.290	0.297	0.309	0.309	0.293
		0.1	0.283	0.293	0.302	0.328	0.287
		0.3	0.292	0.303	0.308	0.403	0.297
		0.5	0.290	0.300	0.303	0.485	0.296
		0.7	0.303	0.311	0.311	0.545	0.309
		0.9	0.310	0.317	0.314	0.640	0.313
	0.10	0.0	0.342	0.352	0.370	0.370	0.346
		0.1	0.336	0.349	0.367	0.401	0.336
		0.3	0.342	0.355	0.365	0.505	0.346

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.5	0.345	0.357	0.360	0.587	0.348
		0.7	0.358	0.367	0.369	0.679	0.361
		0.9	0.376	0.385	0.381	0.803	0.378
	0.20	0.0	0.428	0.442	0.479	0.479	0.433
		0.1	0.432	0.448	0.489	0.531	0.434
		0.3	0.437	0.454	0.479	0.660	0.438
		0.5	0.439	0.457	0.468	0.771	0.441
		0.7	0.456	0.471	0.475	0.884	0.458
		0.9	0.480	0.494	0.492	1.031	0.485
25	0.05	0.0	0.178	0.183	0.196	0.196	0.180
		0.1	0.176	0.181	0.189	0.206	0.179
		0.3	0.182	0.187	0.192	0.261	0.185
		0.5	0.185	0.189	0.191	0.312	0.189
		0.7	0.187	0.192	0.191	0.330	0.190
		0.9	0.192	0.197	0.194	0.274	0.196
	0.10	0.0	0.212	0.219	0.239	0.239	0.215
		0.1	0.210	0.216	0.231	0.251	0.213
		0.3	0.216	0.221	0.230	0.324	0.217
		0.5	0.219	0.224	0.227	0.392	0.220
		0.7	0.223	0.229	0.228	0.418	0.225
		0.9	0.232	0.237	0.234	0.493	0.233
	0.20	0.0	0.264	0.275	0.307	0.308	0.265
		0.1	0.271	0.278	0.306	0.340	0.274
		0.3	0.275	0.281	0.298	0.449	0.277
		0.5	0.280	0.284	0.293	0.544	0.284
		0.7	0.285	0.290	0.292	0.588	0.287
		0.9	0.294	0.299	0.296	0.518	0.297
50	0.05	0.0	0.124	0.126	0.133	0.133	0.126
		0.1	0.130	0.132	0.138	0.154	0.130
		0.3	0.133	0.136	0.140	0.197	0.134
		0.5	0.134	0.137	0.139	0.241	0.134
		0.7	0.136	0.139	0.139	0.253	0.137
		0.9	0.140	0.142	0.141	NA	0.140
	0.10	0.0	0.145	0.148	0.159	0.159	0.146
		0.1	0.150	0.154	0.163	0.183	0.151
		0.3	0.154	0.158	0.163	0.239	0.154
		0.5	0.155	0.159	0.162	0.290	0.155
		0.7	0.157	0.161	0.161	0.318	0.157
		0.9	0.165	0.169	0.166	0.441	0.165
	0.20	0.0	0.181	0.186	0.207	0.207	0.183
		0.1	0.187	0.193	0.212	0.241	0.189
		0.3	0.191	0.197	0.209	0.323	0.192
		0.5	0.194	0.200	0.206	0.402	0.194

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.7	0.196	0.202	0.203	0.429	0.195
		0.9	0.207	0.213	0.209	0.031	0.207

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.7: The Coverage of each method with different ICCs, missingness ICCs, and an independent working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.898	0.917	0.915	0.915	0.991
		0.1	0.918	0.922	0.928	0.898	0.991
		0.3	0.910	0.909	0.916	0.857	0.984
		0.5	0.917	0.918	0.915	0.776	0.990
		0.7	0.919	0.907	0.911	0.533	0.992
		0.9	0.897	0.902	0.891	0.064	0.997
	0.10	0.0	0.910	0.916	0.913	0.911	0.982
		0.1	0.906	0.913	0.915	0.887	0.987
		0.3	0.914	0.913	0.913	0.839	0.983
		0.5	0.914	0.909	0.915	0.764	0.986
		0.7	0.913	0.910	0.912	0.533	0.988
		0.9	0.900	0.895	0.891	0.072	0.987
	0.20	0.0	0.913	0.912	0.916	0.917	0.971
		0.1	0.904	0.904	0.909	0.885	0.975
		0.3	0.903	0.906	0.911	0.841	0.973
		0.5	0.902	0.907	0.906	0.752	0.978
		0.7	0.895	0.896	0.904	0.546	0.981
		0.9	0.888	0.887	0.886	0.080	0.987
25	0.05	0.0	0.934	0.941	0.937	0.938	0.992
		0.1	0.939	0.938	0.944	0.932	0.992
		0.3	0.939	0.935	0.940	0.905	0.993
		0.5	0.929	0.922	0.929	0.870	0.992
		0.7	0.939	0.939	0.942	0.687	0.993
		0.9	0.938	0.924	0.940	0.013	0.993
	0.10	0.0	0.932	0.940	0.936	0.937	0.985
		0.1	0.941	0.936	0.948	0.938	0.994

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.3	0.935	0.928	0.937	0.898	0.990
		0.5	0.935	0.929	0.941	0.868	0.987
		0.7	0.933	0.933	0.934	0.682	0.992
		0.9	0.929	0.925	0.932	0.009	0.996
	0.20	0.0	0.945	0.938	0.943	0.942	0.982
		0.1	0.934	0.935	0.936	0.931	0.982
		0.3	0.926	0.926	0.926	0.910	0.980
		0.5	0.931	0.928	0.927	0.874	0.980
		0.7	0.931	0.930	0.935	0.671	0.987
		0.9	0.937	0.932	0.942	0.015	0.983
50	0.05	0.0	0.934	0.936	0.949	0.949	0.992
		0.1	0.935	0.933	0.944	0.930	0.988
		0.3	0.930	0.938	0.944	0.915	0.989
		0.5	0.935	0.928	0.941	0.901	0.992
		0.7	0.932	0.916	0.944	0.790	0.994
		0.9	0.933	0.921	0.931	0.001	0.994
	0.10	0.0	0.938	0.944	0.944	0.945	0.988
		0.1	0.935	0.939	0.937	0.942	0.986
		0.3	0.932	0.943	0.950	0.917	0.992
		0.5	0.934	0.938	0.945	0.906	0.990
		0.7	0.936	0.932	0.932	0.772	0.990
		0.9	0.935	0.932	0.936	0.001	0.991
	0.20	0.0	0.943	0.953	0.947	0.947	0.984
		0.1	0.934	0.952	0.944	0.936	0.979
		0.3	0.942	0.940	0.948	0.922	0.989
		0.5	0.942	0.938	0.941	0.905	0.986
		0.7	0.942	0.941	0.939	0.764	0.992
		0.9	0.937	0.938	0.938	0.002	0.987

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.8: The Coverage of each method with different ICCs , missingness ICCs, and an exchangeable working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0.899	0.919	0.908	0.909	0.990
		0.1	0.921	0.919	0.915	0.890	0.992
		0.3	0.907	0.910	0.906	0.786	0.983
		0.5	0.918	0.918	0.917	0.678	0.990
		0.7	0.919	0.907	0.910	0.445	0.993
		0.9	0.901	0.907	0.894	0.054	0.996
	0.10	0.0	0.915	0.914	0.907	0.908	0.983
		0.1	0.911	0.910	0.900	0.858	0.987
		0.3	0.911	0.910	0.908	0.812	0.983
		0.5	0.918	0.913	0.912	0.697	0.990
		0.7	0.915	0.916	0.908	0.473	0.989
		0.9	0.910	0.906	0.901	0.061	0.987
	0.20	0.0	0.910	0.920	0.869	0.869	0.970
		0.1	0.908	0.917	0.855	0.828	0.973
		0.3	0.916	0.913	0.880	0.786	0.976
		0.5	0.908	0.902	0.893	0.695	0.978
		0.7	0.916	0.912	0.897	0.511	0.979
		0.9	0.909	0.910	0.892	0.077	0.987
	0.05	0.0	0.932	0.938	0.935	0.934	0.992
		0.1	0.940	0.941	0.948	0.934	0.993
		0.3	0.935	0.936	0.938	0.890	0.993
		0.5	0.927	0.924	0.938	0.845	0.991
		0.7	0.937	0.937	0.942	0.663	0.992
		0.9	0.934	0.934	0.937	0.012	0.992
	0.10	0.0	0.933	0.938	0.929	0.929	0.986
		0.1	0.941	0.931	0.936	0.921	0.995
		0.3	0.932	0.934	0.937	0.874	0.991
		0.5	0.928	0.934	0.934	0.845	0.986
		0.7	0.936	0.939	0.937	0.663	0.991
		0.9	0.926	0.927	0.929	0.009	0.994
	0.20	0.0	0.940	0.943	0.904	0.902	0.981
		0.1	0.934	0.939	0.908	0.898	0.983
		0.3	0.925	0.938	0.912	0.867	0.984
		0.5	0.924	0.931	0.936	0.836	0.982
		0.7	0.927	0.931	0.934	0.652	0.986
		0.9	0.930	0.936	0.941	0.013	0.984
50	0.05	0.0	0.937	0.940	0.951	0.949	0.992
		0.1	0.935	0.934	0.938	0.927	0.989
		0.3	0.930	0.942	0.939	0.909	0.988
		0.5	0.933	0.932	0.940	0.894	0.990
		0.7	0.940	0.932	0.946	0.786	0.995
		0.9	0.933	0.926	0.936	0.001	0.992
	0.10	0.0	0.939	0.952	0.943	0.943	0.988

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
		0.1	0.939	0.945	0.945	0.935	0.989
		0.3	0.939	0.947	0.939	0.905	0.992
		0.5	0.942	0.947	0.941	0.875	0.990
		0.7	0.939	0.946	0.940	0.749	0.990
		0.9	0.938	0.936	0.935	0.001	0.992
	0.20	0.0	0.946	0.953	0.924	0.923	0.983
		0.1	0.942	0.951	0.930	0.914	0.982
		0.3	0.946	0.948	0.928	0.891	0.988
		0.5	0.941	0.948	0.938	0.858	0.988
		0.7	0.947	0.945	0.941	0.747	0.992
		0.9	0.942	0.947	0.944	0.002	0.989

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.9: The non-convergence of each method with different ICCs , missingness ICCs, and an independent working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	18	0
		0.7	0	0	0	281	0
		0.9	0	0	9	899	0
	0.10	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	24	0
		0.7	0	0	0	273	0
		0.9	0	0	8	884	0
	0.20	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	25	0
		0.7	0	0	0	249	0
		0.9	0	0	8	858	0

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
	0.05	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	2	0
		0.7	0	0	0	220	0
		0.9	0	0	0	985	0
	0.10	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	3	0
		0.7	0	0	0	219	0
		0.9	0	0	0	986	0
	0.20	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	4	0
		0.7	0	0	0	217	0
		0.9	0	0	0	980	0
50	0.05	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	0	0
		0.7	0	0	0	129	0
		0.9	0	0	0	999	0
	0.10	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	0	0
		0.7	0	0	0	141	0
		0.9	0	0	0	998	0
	0.20	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	0	0
		0.5	0	0	0	0	0
		0.7	0	0	0	138	0
		0.9	0	0	0	998	0

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting

- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 1.10: The non-convergence of each method with different ICCs, missingness ICCs, and an exchangeable working correlation matrix

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
10	0.05	0.0	0	0	7	7	0
		0.1	0	0	5	13	0
		0.3	0	0	4	72	0
		0.5	0	0	1	151	0
		0.7	0	0	4	406	0
		0.9	0	0	11	920	0
	0.10	0.0	0	0	16	16	0
		0.1	0	0	13	31	0
		0.3	0	0	6	47	0
		0.5	0	0	5	117	0
		0.7	0	0	3	356	0
		0.9	0	0	9	901	0
	0.20	0.0	0	0	58	57	0
		0.1	0	0	57	69	0
		0.3	0	0	38	63	0
		0.5	0	1	24	109	0
		0.7	0	0	11	313	0
		0.9	0	0	11	875	0
25	0.05	0.0	0	0	0	0	0
		0.1	0	0	0	2	0
		0.3	0	0	0	19	0
		0.5	0	0	0	38	0
		0.7	0	0	0	245	0
		0.9	0	0	0	987	0
	0.10	0.0	0	0	2	3	0
		0.1	0	0	1	14	0
		0.3	0	0	0	35	0
		0.5	0	0	1	39	0
		0.7	0	0	0	240	0
		0.9	0	0	0	986	0
	0.20	0.0	0	0	31	30	0
		0.1	0	0	16	28	0
		0.3	0	0	7	42	0
		0.5	0	0	2	47	0
		0.7	0	0	1	249	0
		0.9	0	0	0	981	0

k	ICC	ICCM	UCRA	CRA	IPW	IPWC	MMI
50	0.05	0.0	0	0	0	0	0
		0.1	0	0	0	0	0
		0.3	0	0	0	6	0
		0.5	0	0	0	10	0
		0.7	0	0	0	133	0
		0.9	0	0	0	999	0
	0.10	0.0	0	0	1	1	0
		0.1	0	0	0	1	0
		0.3	0	0	0	18	0
		0.5	0	0	0	26	0
		0.7	0	0	0	162	0
		0.9	0	0	0	998	0
50	0.20	0.0	0	0	3	3	0
		0.1	0	0	1	12	0
		0.3	0	0	2	23	0
		0.5	0	0	0	43	0
		0.7	0	0	0	164	0
		0.9	0	0	0	998	0

- k: number of clusters in each arm
- ICC: dataset ICC
- ICCM: missingness ICC
- UCRA: unadjusted complete record analysis
- CRA: adjusted record analysis
- IPW: inverse probability weighting
- IPWC: inverse probability weighting with cluster effect
- MMI: multilevle multiple imputation
- BIAS = Absolute value of (estimate-true value)

Table 2.1: The percentage of weigths that exceed 20, 100, 500, 1000

K	ICC	ICCM	W1_20	W2_20	W1_100	W2_100	W1_500	W2_500	W1_1000	W2_1000
10	0.05	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.02	0	0.00	0	0.00	0	0.00
		0.5	0	0.04	0	0.01	0	0.00	0	0.00
		0.7	0	0.07	0	0.03	0	0.00	0	0.00
		0.9	0	0.10	0	0.07	0	0.04	0	0.03
	0.10	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.02	0	0.00	0	0.00	0	0.00
		0.5	0	0.04	0	0.01	0	0.00	0	0.00
		0.7	0	0.07	0	0.03	0	0.00	0	0.00
		0.9	0	0.10	0	0.07	0	0.04	0	0.03

K	ICC	ICCM	W1_20	W2_20	W1_100	W2_100	W1_500	W2_500	W1_1000	W2_1000
	0.20	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.02	0	0.00	0	0.00	0	0.00
		0.5	0	0.04	0	0.01	0	0.00	0	0.00
		0.7	0	0.07	0	0.03	0	0.00	0	0.00
		0.9	0	0.10	0	0.07	0	0.04	0	0.03
25	0.05	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.04	0	0.00	0	0.00	0	0.00
		0.5	0	0.10	0	0.01	0	0.00	0	0.00
		0.7	0	0.17	0	0.07	0	0.00	0	0.00
		0.9	0	0.25	0	0.20	0	0.12	0	0.07
	0.10	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.04	0	0.00	0	0.00	0	0.00
		0.5	0	0.10	0	0.01	0	0.00	0	0.00
		0.7	0	0.17	0	0.07	0	0.00	0	0.00
		0.9	0	0.25	0	0.20	0	0.12	0	0.07
	0.20	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.00	0	0.00	0	0.00	0	0.00
		0.3	0	0.04	0	0.00	0	0.00	0	0.00
		0.5	0	0.10	0	0.01	0	0.00	0	0.00
		0.7	0	0.17	0	0.07	0	0.00	0	0.00
		0.9	0	0.25	0	0.20	0	0.12	0	0.07
50	0.05	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.01	0	0.00	0	0.00	0	0.00
		0.3	0	0.07	0	0.00	0	0.00	0	0.00
		0.5	0	0.19	0	0.02	0	0.00	0	0.00
		0.7	0	0.34	0	0.14	0	0.00	0	0.00
		0.9	0	0.51	0	0.40	0	0.23	0	0.10
	0.10	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.01	0	0.00	0	0.00	0	0.00
		0.3	0	0.07	0	0.00	0	0.00	0	0.00
		0.5	0	0.19	0	0.02	0	0.00	0	0.00
		0.7	0	0.34	0	0.14	0	0.00	0	0.00
		0.9	0	0.51	0	0.40	0	0.23	0	0.10
	0.20	0.0	0	0.00	0	0.00	0	0.00	0	0.00
		0.1	0	0.01	0	0.00	0	0.00	0	0.00
		0.3	0	0.07	0	0.00	0	0.00	0	0.00
		0.5	0	0.19	0	0.02	0	0.00	0	0.00
		0.7	0	0.34	0	0.14	0	0.00	0	0.00
		0.9	0	0.51	0	0.40	0	0.23	0	0.10

- k: the number of clusters in each intervention arm. (total number of clusters: 2k)
- ICC: the ICC for the datasets
- ICCM: the ICC for the missingness
- W1_20: the weights that calculated from IPW without cluster effects lager than 20
- W2_20: the weights that calculated from IPW with cluster effects lager than 20
- W1_100: the weights that calculated from IPW without cluster effects lager than 100
- W2_100: the weights that calculated from IPW with cluster effects lager than 100
- W1_500: the weights that calculated from IPW without cluster effects lager than 500
- W2_500: the weights that calculated from IPW with cluster effects lager than 500
- W1_1000: the weights that calculated from IPW without cluster effects lager than 1000
- W2_1000: the weights that calculated from IPW with cluster effects lager than 1000

In each of the 1000 replications, the percentages of weights that exceeded 20, 100, 500, and 1000 were counted. The results report the mean values of those percentages in the 1000 replications.

Table 2.2: The counts of weights that exceed 20, 100, 500, 1000

K	ICC	ICCM	W1_20	W2_20	W1_100	W2_100	W1_500	W2_500	W1_1000	W2_1000
10	0.05	0.0	1	1	0	0	0	0	0	0
		0.1	1	9	0	0	0	0	0	0
		0.3	3	78	0	2	0	0	0	0
		0.5	7	203	0	29	0	1	0	0
		0.7	12	335	0	146	0	13	0	3
		0.9	16	479	3	369	0	219	0	149
	0.10	0.0	1	1	0	0	0	0	0	0
		0.1	1	9	0	0	0	0	0	0
		0.3	3	78	0	2	0	0	0	0
		0.5	7	203	0	29	0	1	0	0
		0.7	12	335	0	146	0	13	0	3
		0.9	16	479	3	369	0	219	0	149
	0.20	0.0	1	1	0	0	0	0	0	0
		0.1	1	9	0	0	0	0	0	0
		0.3	3	78	0	2	0	0	0	0
		0.5	7	203	0	29	0	1	0	0
		0.7	12	335	0	146	0	13	0	3
		0.9	16	479	3	369	0	219	0	149
25	0.05	0.0	1	1	0	0	0	0	0	0
		0.1	1	19	0	0	0	0	0	0
		0.3	1	190	0	2	0	0	0	0
		0.5	1	489	0	52	0	0	0	0
		0.7	1	839	0	356	0	9	0	0
		0.9	1	1251	0	979	0	586	0	329
	0.10	0.0	1	1	0	0	0	0	0	0

K	ICC	ICCM	W1_20	W2_20	W1_100	W2_100	W1_500	W2_500	W1_1000	W2_1000
		0.1	1	19	0	0	0	0	0	0
		0.3	1	190	0	2	0	0	0	0
		0.5	1	489	0	52	0	0	0	0
		0.7	1	839	0	356	0	9	0	0
		0.9	1	1251	0	979	0	586	0	329
	0.20	0.0	1	1	0	0	0	0	0	0
		0.1	1	19	0	0	0	0	0	0
		0.3	1	190	0	2	0	0	0	0
		0.5	1	489	0	52	0	0	0	0
		0.7	1	839	0	356	0	9	0	0
		0.9	1	1251	0	979	0	586	0	329
50	0.05	0.0	1	1	0	0	0	0	0	0
		0.1	1	33	0	0	0	0	0	0
		0.3	0	374	0	3	0	0	0	0
		0.5	0	963	0	89	0	0	0	0
		0.7	0	1679	0	689	0	8	0	0
		0.9	0	2531	0	1985	0	1172	0	523
	0.10	0.0	1	1	0	0	0	0	0	0
		0.1	1	33	0	0	0	0	0	0
		0.3	0	374	0	3	0	0	0	0
		0.5	0	963	0	89	0	0	0	0
		0.7	0	1679	0	689	0	8	0	0
		0.9	0	2531	0	1985	0	1172	0	523
	0.20	0.0	1	1	0	0	0	0	0	0
		0.1	1	33	0	0	0	0	0	0
		0.3	0	374	0	3	0	0	0	0
		0.5	0	963	0	89	0	0	0	0
		0.7	0	1679	0	689	0	8	0	0
		0.9	0	2531	0	1985	0	1172	0	523

- k: the number of clusters in each intervention arm. (total number of clusters: 2k)
- ICC: the ICC for the datasets
- ICCM: the ICC for the missingness
- W1_20: the weights that calculated from IPW without cluster effects lager than 20
- W2_20: the weights that calculated from IPW with cluster effects lager than 20
- W1_100: the weights that calculated from IPW without cluster effects lager than 100
- W2_100: the weights that calculated from IPW with cluster effects lager than 100
- W1_500: the weights that calculated from IPW without cluster effects lager than 500
- W2_500: the weights that calculated from IPW with cluster effects lager than 500
- W1_1000: the weights that calculated from IPW without cluster effects lager than 1000
- W2_1000: the weights that calculated from IPW with cluster effects lager than 1000

In each of the 1000 replications, the number of weights that exceeded 20, 100, 500, and 1000 were counted. The results report the mean values of those percentages in the 1000 replications.

Recall the settings

Outcome model

The outcome Y_{ijl} is generated by:

$$\pi_{ijl} = expit(1 + 1.36 * i + x_{ijl} + \delta_{ij})$$

1. i is the treatment indicator. $i = 1$ treated; $i = 0$ control
2. x is the covariate. $x \sim N(0, 0.2)$ (The variance is 0.2. I choose a relatively small variance since I want to avoid non-convergence. However, this generated small differences between CRA and adjusted CRA.)
3. The variance of δ_{ij} changed based on different ICC (the ICC for the datasets):

- ICC=0.05, $\delta_{ij} \sim N(0, 0.173)$ (the variance is 0.173)
- ICC=0.1, $\delta_{ij} \sim N(0, 0.366)$ (the variance is 0.366)
- ICC=0.2, $\delta_{ij} \sim N(0, 0.823)$ (the variance is 0.823)

4. Number of clusters: **10, 25, 50** clusters in each intervention arm
5. Cluster size: the cluster size is from a Poisson distribution, which is not fixed. cluster size $\sim POI(50)$

Missingness generation model

$$logit(R_{ijl} = 1|Y_{ij}, X_{ij}) = intercept + i + X_{ijl} + \sigma_{ij}$$

1. The intercept is varied to make sure the misisng percentage is around 30%
2. i is the treatment indicator. i=1 treated; i=0 control
3. x is the covariate. $x \sim N(0, 0.2)$ (The variance is 0.2)
4. The variance of σ_{ij} represents the cluster effects in missingness. It changed based on different missingness ICC:

- $\sigma_{ij} = 0$, the missing ICC=0, there is no cluster effects
- ICC=0.1, $\sigma_{ij} \sim N(0, 0.366)$ (the variance is 0.366)
- ICC=0.3, $\sigma_{ij} \sim N(0, 1.410)$ (the variance is 1.410)
- ICC=0.5, $\sigma_{ij} \sim N(0, 3.291)$ (the variance is 3.291)
- ICC=0.7, $\sigma_{ij} \sim N(0, 7.678)$ (the variance is 7.678)
- ICC=0.9, $\sigma_{ij} \sim N(0, 29.616)$ (the variance is 29.616)

5. 1000 replicates for each scenario

Missingness handling methods

1. Calculation of true value:

- Fit the GEE with the formula: Y $\sim$ intervention arm (without covariates). Estimate the coefficient of intervention arm.

- With full datasets without missing values
- Repeat for 1000 times and calculate the mean value.

2. UCRA: unadjusted complete record analysis

- Fit the GEE with the formula: Y $\sim$ intervention arm (without covariates). Estimate the coefficient of intervention arm.
- Delete the records with missing values in Y
- Repeat for 1000 times.

3. CRA: adjusted complete record analysis

- Fit the GEE with formula: Y $\sim$ intervention-arm + X (with covariates). Estimate the coefficient of intervention arm.
- Delete the records with missing values in Y
- Repeat for 1000 times.

4. IPW: inverse probability weighting

- Calculate the weights by fitting GLM: glm(y $\sim$ arm + x)
- Fit the GEE with the formula: Y $\sim$ intervention arm (without covariates) with corresponding weights. Estimate the coefficient of intervention arm.
- Repeat for 1000 times.

5. IPWC: inverse probability weighting with cluster effects

- Calculate the weights by fitting generalized linear mixed effect model: glmer (y $\sim$ arm + x + cluster effect)
- Fit the GEE with the formula: Y $\sim$ intervention arm (without covariates) with corresponding weights. Estimate the coefficient of intervention arm.
- Repeat for 1000 times.

6. MMI: multilevel multiple imputation

- consider cluster effects in the imputation