

Appendix Table 1. Comparison of R- and two ICC-based approaches to sample size calculation when moving from high prevalence setting (0.70 in Arm 1, 0.50 in Arm 2) to a moderate prevalence setting (0.50 in Arm 1, 0.30 in Arm 2).

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power			
	R1	R2	ICC1	ICC2	Overall ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B	
Setting: Clusters of size 5, R1<R2																
1.02	1.12	0.047	0.120	0.154	21	24	30	14%	43%	0.809	0.857	0.923	0.049	0.114		
1.04	1.14	0.093	0.140	0.204	22	27	33	23%	50%	0.807	0.879	0.934	0.072	0.126		
1.06	1.16	0.140	0.160	0.254	23	29	37	26%	61%	0.806	0.887	0.947	0.081	0.142		
1.08	1.18	0.187	0.180	0.304	24	32	41	33%	71%	0.804	0.902	0.957	0.098	0.153		
1.10	1.20	0.233	0.200	0.354	25	34	44	36%	76%	0.803	0.907	0.962	0.104	0.159		
Setting: Clusters of size 5, R1=R2																
1.07	1.07	0.163	0.070	0.175	21	27	31	29%	48%	0.815	0.900	0.935	0.084	0.119		
1.09	1.09	0.210	0.090	0.225	23	30	35	30%	52%	0.812	0.901	0.939	0.089	0.128		
1.11	1.11	0.257	0.110	0.275	25	32	38	28%	52%	0.809	0.893	0.937	0.085	0.129		
1.13	1.13	0.303	0.130	0.325	27	35	42	30%	56%	0.806	0.895	0.941	0.089	0.135		
1.15	1.15	0.350	0.150	0.375	29	37	46	28%	59%	0.804	0.889	0.944	0.085	0.140		
Setting: Clusters of size 5, R1>R2																
1.12	1.02	0.280	0.020	0.196	24	30	33	25%	38%	0.816	0.892	0.918	0.076	0.102		
1.14	1.04	0.327	0.040	0.246	25	33	36	32%	44%	0.814	0.906	0.928	0.092	0.114		
1.16	1.06	0.373	0.060	0.296	26	35	40	35%	54%	0.812	0.910	0.942	0.098	0.129		
1.18	1.08	0.420	0.080	0.346	27	38	44	41%	63%	0.811	0.921	0.952	0.110	0.141		
1.20	1.10	0.467	0.100	0.396	28	40	47	43%	68%	0.810	0.924	0.957	0.114	0.147		
Setting: Clusters of size 20, R1<R2																
1.02	1.20	0.047	0.200	0.238	9	15	25	67%	178%	0.809	0.955	0.997	0.146	0.188		
1.04	1.20	0.093	0.200	0.267	10	17	28	70%	180%	0.811	0.959	0.997	0.149	0.187		
1.06	1.20	0.140	0.200	0.296	11	19	30	73%	173%	0.812	0.962	0.997	0.150	0.185		
1.08	1.20	0.187	0.200	0.325	12	22	33	83%	175%	0.813	0.971	0.997	0.158	0.184		
1.10	1.20	0.233	0.200	0.354	13	24	35	85%	169%	0.814	0.972	0.997	0.158	0.182		
Setting: Clusters of size 20, R1=R2																
1.04	1.04	0.093	0.040	0.100	8	11	14	38%	75%	0.847	0.938	0.977	0.091	0.129		
1.08	1.08	0.187	0.080	0.200	10	17	22	70%	120%	0.816	0.962	0.989	0.145	0.172		
1.12	1.12	0.280	0.120	0.300	13	23	31	77%	138%	0.827	0.971	0.994	0.144	0.167		
1.16	1.16	0.373	0.160	0.400	15	29	39	93%	160%	0.809	0.976	0.995	0.167	0.186		
1.20	1.20	0.467	0.200	0.500	18	35	48	94%	167%	0.818	0.979	0.997	0.161	0.179		
Setting: Clusters of size 20, R1>R2																
1.20	1.02	0.467	0.020	0.313	15	28	32	87%	113%	0.822	0.976	0.988	0.154	0.166		
1.20	1.04	0.467	0.040	0.333	15	28	34	87%	127%	0.813	0.973	0.990	0.160	0.177		
1.20	1.06	0.467	0.060	0.354	15	29	35	93%	133%	0.804	0.975	0.990	0.171	0.186		
1.20	1.08	0.467	0.080	0.375	16	30	37	88%	131%	0.820	0.976	0.992	0.156	0.172		
1.20	1.10	0.467	0.100	0.396	16	31	39	94%	144%	0.812	0.977	0.993	0.165	0.181		
Setting: Clusters of size 50, R1<R2																
1.01	1.10	0.023	0.100	0.119	5	7	13	40%	160%	0.878	0.959	0.999	0.081	0.121		
1.02	1.10	0.047	0.100	0.133	5	9	14	80%	180%	0.840	0.977	0.999	0.138	0.159		
1.03	1.10	0.070	0.100	0.148	5	10	15	100%	200%	0.802	0.978	0.998	0.176	0.196		
1.04	1.10	0.093	0.100	0.163	6	11	17	83%	183%	0.836	0.978	0.999	0.142	0.163		
1.05	1.10	0.117	0.100	0.177	6	12	18	100%	200%	0.804	0.978	0.998	0.174	0.194		
Setting: Clusters of size 50, R1=R2																
1.02	1.02	0.047	0.020	0.050	4	5	7	25%	75%	0.888	0.944	0.987	0.056	0.100		
1.04	1.04	0.093	0.040	0.100	5	8	11	60%	120%	0.846	0.965	0.993	0.119	0.147		
1.06	1.06	0.140	0.060	0.150	6	11	16	83%	167%	0.818	0.973	0.997	0.155	0.179		
1.08	1.08	0.187	0.080	0.200	8	15	20	88%	150%	0.848	0.983	0.997	0.136	0.149		
1.10	1.10	0.233	0.100	0.250	9	18	24	100%	167%	0.829	0.984	0.997	0.156	0.168		
Setting: Clusters of size 50, R1>R2																
1.10	1.01	0.233	0.010	0.156	7	14	16	100%	129%	0.812	0.980	0.990	0.168	0.178		
1.10	1.02	0.233	0.020	0.167	7	14	17	100%	143%	0.802	0.978	0.992	0.176	0.190		
1.10	1.03	0.233	0.030	0.177	8	15	18	88%	125%	0.843	0.982	0.994	0.139	0.151		
1.10	1.04	0.233	0.040	0.188	8	15	19	88%	138%	0.834	0.980	0.995	0.146	0.160		
1.10	1.05	0.233	0.050	0.198	8	16	20	100%	150%	0.826	0.984	0.996	0.158	0.170		

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14.

ICC method B uses a single overall ICC and equation 15.

Appendix Table 2. Comparison of R- and two ICC-based approaches to sample size calculation when moving from a moderate prevalence setting (0.50 in Arm 1, 0.30 in Arm 2) to a low prevalence setting (0.30 in Arm 1, 0.10 in Arm 2).

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power	
R1	R2	ICC1	ICC2	ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B
Setting: Clusters of size 5, R1<R2														
1.02	1.12	0.020	0.051	0.096	13	14	17	8%	31%	0.823	0.850	0.910	0.027	0.087
1.04	1.14	0.040	0.060	0.129	13	14	18	8%	38%	0.813	0.841	0.918	0.027	0.105
1.06	1.16	0.060	0.069	0.163	13	15	20	15%	54%	0.804	0.856	0.937	0.053	0.133
1.08	1.18	0.080	0.077	0.196	14	16	21	14%	50%	0.823	0.870	0.942	0.047	0.119
1.10	1.20	0.100	0.086	0.229	14	17	23	21%	64%	0.814	0.882	0.955	0.068	0.141
Setting: Clusters of size 5, R1=R2														
1.04	1.04	0.040	0.017	0.067	13	14	15	8%	15%	0.818	0.845	0.869	0.027	0.051
1.08	1.08	0.080	0.034	0.133	14	15	19	7%	36%	0.827	0.852	0.923	0.025	0.095
1.12	1.12	0.120	0.051	0.200	14	17	22	21%	57%	0.810	0.878	0.945	0.069	0.135
1.16	1.16	0.160	0.069	0.267	15	19	25	27%	67%	0.819	0.898	0.960	0.079	0.141
1.20	1.20	0.200	0.086	0.333	15	20	28	33%	87%	0.802	0.901	0.970	0.098	0.168
Setting: Clusters of size 5, R1>R2														
1.12	1.02	0.120	0.009	0.138	14	16	19	14%	36%	0.814	0.862	0.914	0.048	0.100
1.14	1.04	0.140	0.017	0.171	14	17	20	21%	43%	0.805	0.875	0.921	0.069	0.116
1.16	1.06	0.160	0.026	0.204	15	18	22	20%	47%	0.823	0.885	0.938	0.062	0.115
1.18	1.08	0.180	0.034	0.238	15	19	23	27%	53%	0.815	0.895	0.942	0.080	0.128
1.20	1.10	0.200	0.043	0.271	15	19	25	27%	67%	0.806	0.889	0.954	0.082	0.148
Setting: Clusters of size 20, R1<R2														
1.02	1.20	0.020	0.086	0.146	4	6	12	50%	200%	0.835	0.949	0.999	0.114	0.165
1.04	1.20	0.040	0.086	0.167	4	6	13	50%	225%	0.801	0.930	0.999	0.129	0.198
1.06	1.20	0.060	0.086	0.188	5	7	14	40%	180%	0.854	0.946	0.999	0.092	0.145
1.08	1.20	0.080	0.086	0.208	5	8	15	60%	200%	0.827	0.957	0.999	0.129	0.172
1.10	1.20	0.100	0.086	0.229	5	9	16	80%	220%	0.800	0.964	0.999	0.164	0.198
Setting: Clusters of size 20, R1=R2														
1.04	1.04	0.040	0.017	0.067	4	5	7	25%	75%	0.831	0.903	0.971	0.073	0.140
1.08	1.08	0.080	0.034	0.133	5	7	11	40%	120%	0.845	0.941	0.993	0.096	0.148
1.12	1.12	0.120	0.051	0.200	6	9	15	50%	150%	0.854	0.958	0.998	0.104	0.143
1.16	1.16	0.160	0.069	0.267	6	11	18	83%	200%	0.805	0.968	0.998	0.163	0.193
1.20	1.20	0.200	0.086	0.333	7	13	22	86%	214%	0.819	0.974	0.999	0.156	0.181
Setting: Clusters of size 20, R1>R2														
1.20	1.02	0.200	0.009	0.221	7	11	16	57%	129%	0.838	0.958	0.994	0.121	0.156
1.20	1.04	0.200	0.017	0.233	7	12	16	71%	129%	0.836	0.970	0.993	0.135	0.158
1.20	1.06	0.200	0.026	0.246	7	12	17	71%	143%	0.833	0.969	0.995	0.136	0.162
1.20	1.08	0.200	0.034	0.258	7	12	18	71%	157%	0.831	0.969	0.997	0.137	0.165
1.20	1.10	0.200	0.043	0.271	7	12	19	71%	171%	0.829	0.968	0.998	0.139	0.169
Setting: Clusters of size 50, R1<R2														
1.01	1.10	0.010	0.043	0.073	2	3	6	50%	200%	0.891	0.974	1.000	0.084	0.109
1.02	1.10	0.020	0.043	0.083	2	3	6	50%	200%	0.857	0.959	0.999	0.103	0.143
1.03	1.10	0.030	0.043	0.094	2	4	7	100%	250%	0.822	0.983	1.000	0.161	0.178
1.04	1.10	0.040	0.043	0.104	3	4	8	33%	167%	0.922	0.974	1.000	0.052	0.078
1.05	1.10	0.050	0.043	0.115	3	4	8	33%	167%	0.901	0.963	1.000	0.062	0.099
Setting: Clusters of size 50, R1=R2														
1.02	1.02	0.020	0.009	0.033	2	3	4	50%	100%	0.887	0.973	0.994	0.086	0.107
1.04	1.04	0.040	0.017	0.067	2	4	6	100%	200%	0.811	0.980	0.998	0.170	0.188
1.06	1.06	0.060	0.026	0.100	3	5	7	67%	133%	0.888	0.984	0.998	0.096	0.110
1.08	1.08	0.080	0.034	0.133	3	6	9	100%	200%	0.838	0.986	0.999	0.149	0.162
1.10	1.10	0.100	0.043	0.167	4	6	11	50%	175%	0.889	0.974	1.000	0.084	0.110
Setting: Clusters of size 50, R1>R2														
1.10	1.01	0.100	0.004	0.110	3	6	8	100%	167%	0.810	0.980	0.996	0.170	0.187
1.10	1.02	0.100	0.009	0.117	3	6	8	100%	167%	0.807	0.979	0.996	0.172	0.189
1.10	1.03	0.100	0.013	0.123	3	6	9	100%	200%	0.804	0.979	0.998	0.174	0.194
1.10	1.04	0.100	0.017	0.129	3	6	9	100%	200%	0.802	0.978	0.998	0.176	0.196
1.10	1.05	0.100	0.021	0.135	4	6	9	50%	125%	0.898	0.977	0.998	0.079	0.100

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.

Appendix Table 3. Comparison of R- and two ICC-based approaches to sample size calculation when moving from a low prevalence setting (0.30 in Arm 1, 0.10 in Arm 2) to a moderate prevalence setting (0.50 in Arm 1, 0.30 in Arm 2).

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power		
R1	R2	ICC1	ICC2	Overall ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B	
Setting: Clusters of size 5, R1<R2															
1.02	1.12	0.009	0.013	0.056	21	19	23	-10%	10%	0.809	0.769	0.843	-0.040	0.034	
1.04	1.14	0.017	0.016	0.081	22	20	24	-9%	9%	0.807	0.769	0.840	-0.038	0.033	
1.06	1.16	0.026	0.018	0.106	23	20	26	-13%	13%	0.806	0.749	0.851	-0.057	0.045	
1.08	1.18	0.034	0.020	0.131	24	21	28	-13%	17%	0.804	0.750	0.861	-0.054	0.056	
1.10	1.20	0.043	0.022	0.156	25	21	30	-16%	20%	0.803	0.732	0.869	-0.071	0.066	
Setting: Clusters of size 5, R1=R2															
1.04	1.04	0.017	0.004	0.050	21	19	22	-10%	5%	0.815	0.776	0.833	-0.039	0.017	
1.08	1.08	0.034	0.009	0.100	23	20	26	-13%	13%	0.812	0.755	0.856	-0.056	0.045	
1.12	1.12	0.051	0.013	0.150	25	21	29	-16%	16%	0.809	0.738	0.862	-0.071	0.054	
1.16	1.16	0.069	0.018	0.200	27	22	33	-19%	22%	0.806	0.722	0.877	-0.084	0.071	
1.20	1.20	0.086	0.022	0.250	29	23	37	-21%	28%	0.804	0.708	0.889	-0.096	0.085	
Setting: Clusters of size 5, R1>R2															
1.12	1.02	0.051	0.002	0.119	24	21	27	-13%	13%	0.816	0.763	0.858	-0.053	0.043	
1.14	1.04	0.060	0.004	0.144	25	21	29	-16%	16%	0.814	0.744	0.867	-0.070	0.053	
1.16	1.06	0.069	0.007	0.169	26	21	31	-19%	19%	0.812	0.725	0.875	-0.087	0.062	
1.18	1.08	0.077	0.009	0.194	27	22	33	-19%	22%	0.811	0.727	0.881	-0.084	0.070	
1.20	1.10	0.086	0.011	0.219	28	22	34	-21%	21%	0.810	0.710	0.878	-0.099	0.069	
Setting: Clusters of size 20, R1<R2															
1.02	1.20	0.009	0.022	0.081	9	6	12	-33%	33%	0.809	0.638	0.905	-0.171	0.096	
1.04	1.20	0.017	0.022	0.100	10	7	14	-30%	40%	0.811	0.661	0.919	-0.149	0.109	
1.06	1.20	0.026	0.022	0.119	11	7	15	-36%	36%	0.812	0.622	0.913	-0.190	0.101	
1.08	1.20	0.034	0.022	0.138	12	7	17	-42%	42%	0.813	0.586	0.924	-0.227	0.111	
1.10	1.20	0.043	0.022	0.156	13	8	18	-38%	38%	0.814	0.610	0.919	-0.205	0.105	
Setting: Clusters of size 20, R1=R2															
1.04	1.04	0.017	0.004	0.050	8	6	9	-25%	13%	0.847	0.734	0.886	-0.113	0.039	
1.08	1.08	0.034	0.009	0.100	10	7	14	-30%	40%	0.816	0.668	0.923	-0.148	0.107	
1.12	1.12	0.051	0.013	0.150	13	8	18	-38%	38%	0.827	0.624	0.927	-0.203	0.100	
1.16	1.16	0.069	0.018	0.200	15	9	22	-40%	47%	0.809	0.593	0.930	-0.216	0.121	
1.20	1.20	0.086	0.022	0.250	18	10	26	-44%	44%	0.818	0.570	0.931	-0.248	0.114	
Setting: Clusters of size 20, R1>R2															
1.20	1.02	0.086	0.002	0.194	15	9	22	-40%	47%	0.822	0.608	0.937	-0.214	0.115	
1.20	1.04	0.086	0.004	0.200	15	9	22	-40%	47%	0.813	0.597	0.932	-0.216	0.119	
1.20	1.06	0.086	0.007	0.206	15	9	23	-40%	53%	0.804	0.588	0.937	-0.216	0.133	
1.20	1.08	0.086	0.009	0.213	16	9	23	-44%	44%	0.820	0.578	0.932	-0.242	0.111	
1.20	1.10	0.086	0.011	0.219	16	9	24	-44%	50%	0.812	0.569	0.936	-0.243	0.124	
Setting: Clusters of size 50, R1<R2															
1.01	1.10	0.004	0.011	0.041	5	3	6	-40%	20%	0.878	0.678	0.928	-0.200	0.050	
1.02	1.10	0.009	0.011	0.050	5	3	7	-40%	40%	0.840	0.629	0.938	-0.211	0.098	
1.03	1.10	0.013	0.011	0.059	5	3	8	-40%	60%	0.802	0.585	0.944	-0.217	0.143	
1.04	1.10	0.017	0.011	0.069	6	4	8	-33%	33%	0.836	0.669	0.924	-0.166	0.088	
1.05	1.10	0.021	0.011	0.078	6	4	9	-33%	50%	0.804	0.633	0.932	-0.171	0.128	
Setting: Clusters of size 50, R1=R2															
1.02	1.02	0.009	0.002	0.025	4	3	5	-25%	25%	0.888	0.785	0.944	-0.103	0.056	
1.04	1.04	0.017	0.004	0.050	5	3	7	-40%	40%	0.846	0.636	0.941	-0.210	0.095	
1.06	1.06	0.026	0.007	0.075	6	4	9	-33%	50%	0.818	0.648	0.940	-0.169	0.122	
1.08	1.08	0.034	0.009	0.100	8	4	11	-50%	38%	0.848	0.561	0.939	-0.287	0.091	
1.10	1.10	0.043	0.011	0.125	9	5	13	-44%	44%	0.829	0.583	0.938	-0.246	0.109	
Setting: Clusters of size 50, R1>R2															
1.10	1.01	0.043	0.001	0.097	7	4	11	-43%	57%	0.812	0.576	0.946	-0.236	0.134	
1.10	1.02	0.043	0.002	0.100	7	4	11	-43%	57%	0.802	0.565	0.941	-0.237	0.139	
1.10	1.03	0.043	0.003	0.103	8	5	11	-38%	38%	0.843	0.650	0.936	-0.193	0.093	
1.10	1.04	0.043	0.004	0.106	8	5	12	-38%	50%	0.834	0.640	0.949	-0.195	0.114	
1.10	1.05	0.043	0.006	0.109	8	5	12	-38%	50%	0.826	0.630	0.944	-0.196	0.118	

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.

Appendix Table 4. Comparison of R- and two ICC-based approaches to sample size calculation when moving from a moderate prevalence setting (0.50 in Arm 1, 0.30 in Arm 2) to a high prevalence setting (0.70 in Arm 1, 0.50 in Arm 2).

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power		
R1	R2	ICC1	ICC2	Overall ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. A	R vs. B	
Setting: Clusters of size 5, R1<R2															
1.02	1.12	0.020	0.051	0.096	25	21	25	-16%	0%	0.811	0.740	0.811	-0.071	0.000	
1.04	1.14	0.040	0.060	0.129	27	22	28	-19%	4%	0.805	0.721	0.819	-0.084	0.014	
1.06	1.16	0.060	0.069	0.163	29	23	30	-21%	3%	0.801	0.704	0.814	-0.096	0.013	
1.08	1.18	0.080	0.077	0.196	32	24	33	-25%	3%	0.809	0.690	0.821	-0.119	0.012	
1.10	1.20	0.100	0.086	0.229	34	25	35	-26%	3%	0.805	0.676	0.816	-0.129	0.011	
Setting: Clusters of size 5, R1=R2															
1.04	1.04	0.040	0.017	0.067	23	21	23	-9%	0%	0.805	0.769	0.805	-0.036	0.000	
1.08	1.08	0.080	0.034	0.133	28	23	28	-18%	0%	0.809	0.729	0.809	-0.080	0.000	
1.12	1.12	0.120	0.051	0.200	32	25	33	-22%	3%	0.800	0.697	0.812	-0.103	0.012	
1.16	1.16	0.160	0.069	0.267	37	27	38	-27%	3%	0.804	0.672	0.814	-0.132	0.010	
1.20	1.20	0.200	0.086	0.333	42	29	43	-31%	2%	0.807	0.651	0.816	-0.156	0.009	
Setting: Clusters of size 5, R1>R2															
1.12	1.02	0.120	0.009	0.138	29	23	28	-21%	-3%	0.813	0.718	0.799	-0.095	-0.014	
1.14	1.04	0.140	0.017	0.171	31	24	31	-23%	0%	0.808	0.702	0.808	-0.106	0.000	
1.16	1.06	0.160	0.026	0.204	33	25	33	-24%	0%	0.803	0.688	0.803	-0.116	0.000	
1.18	1.08	0.180	0.034	0.238	36	26	36	-28%	0%	0.811	0.675	0.811	-0.136	0.000	
1.20	1.10	0.200	0.043	0.271	38	27	38	-29%	0%	0.807	0.663	0.807	-0.143	0.000	
Setting: Clusters of size 20, R1<R2															
1.02	1.20	0.020	0.086	0.146	16	10	18	-38%	13%	0.808	0.610	0.852	-0.199	0.043	
1.04	1.20	0.040	0.086	0.167	18	11	19	-39%	6%	0.811	0.603	0.832	-0.208	0.020	
1.06	1.20	0.060	0.086	0.188	20	11	21	-45%	5%	0.814	0.561	0.832	-0.252	0.018	
1.08	1.20	0.080	0.086	0.208	22	12	23	-45%	5%	0.815	0.560	0.832	-0.255	0.017	
1.10	1.20	0.100	0.086	0.229	23	13	25	-43%	9%	0.801	0.559	0.832	-0.242	0.032	
Setting: Clusters of size 20, R1=R2															
1.04	1.04	0.040	0.017	0.067	11	7	11	-36%	0%	0.835	0.648	0.835	-0.187	0.000	
1.08	1.08	0.080	0.034	0.133	16	10	16	-38%	0%	0.811	0.613	0.811	-0.198	0.000	
1.12	1.12	0.120	0.051	0.200	22	12	22	-45%	0%	0.817	0.561	0.817	-0.255	0.000	
1.16	1.16	0.160	0.069	0.267	27	14	28	-48%	4%	0.806	0.529	0.820	-0.277	0.014	
1.20	1.20	0.200	0.086	0.333	33	17	34	-48%	3%	0.811	0.531	0.822	-0.279	0.011	
Setting: Clusters of size 20, R1>R2															
1.20	1.02	0.200	0.009	0.221	24	13	24	-46%	0%	0.805	0.546	0.805	-0.259	0.000	
1.20	1.04	0.200	0.017	0.233	25	14	25	-44%	0%	0.806	0.560	0.806	-0.245	0.000	
1.20	1.06	0.200	0.026	0.246	26	14	26	-46%	0%	0.806	0.545	0.806	-0.262	0.000	
1.20	1.08	0.200	0.034	0.258	27	14	27	-48%	0%	0.807	0.530	0.807	-0.277	0.000	
1.20	1.10	0.200	0.043	0.271	28	15	28	-46%	0%	0.808	0.544	0.808	-0.264	0.000	
Setting: Clusters of size 50, R1<R2															
1.01	1.10	0.010	0.043	0.073	8	5	9	-38%	13%	0.822	0.625	0.864	-0.197	0.042	
1.02	1.10	0.020	0.043	0.083	9	5	10	-44%	11%	0.822	0.575	0.860	-0.247	0.038	
1.03	1.10	0.030	0.043	0.094	10	6	11	-40%	10%	0.822	0.608	0.856	-0.214	0.034	
1.04	1.10	0.040	0.043	0.104	11	6	12	-45%	9%	0.822	0.567	0.854	-0.255	0.031	
1.05	1.10	0.050	0.043	0.115	12	6	12	-50%	0%	0.822	0.532	0.822	-0.291	0.000	
Setting: Clusters of size 50, R1=R2															
1.02	1.02	0.020	0.009	0.033	5	4	5	-20%	0%	0.828	0.738	0.828	-0.089	0.000	
1.04	1.04	0.040	0.017	0.067	8	5	8	-38%	0%	0.825	0.629	0.825	-0.196	0.000	
1.06	1.06	0.060	0.026	0.100	11	6	11	-45%	0%	0.824	0.569	0.824	-0.255	0.000	
1.08	1.08	0.080	0.034	0.133	14	7	14	-50%	0%	0.823	0.532	0.823	-0.291	0.000	
1.10	1.10	0.100	0.043	0.167	17	8	17	-53%	0%	0.822	0.508	0.822	-0.315	0.000	
Setting: Clusters of size 50, R1>R2															
1.10	1.01	0.100	0.004	0.110	12	7	12	-42%	0%	0.810	0.582	0.810	-0.228	0.000	
1.10	1.02	0.100	0.009	0.117	13	7	13	-46%	0%	0.825	0.565	0.825	-0.260	0.000	
1.10	1.03	0.100	0.013	0.123	13	7	13	-46%	0%	0.810	0.549	0.810	-0.261	0.000	
1.10	1.04	0.100	0.017	0.129	14	7	14	-50%	0%	0.824	0.533	0.824	-0.291	0.000	
1.10	1.05	0.100	0.021	0.135	14	7	14	-50%	0%	0.810	0.519	0.810	-0.291	0.000	

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.

Appendix Table 5. Comparison of R- and two ICC-based approaches to sample size calculation in high prevalence setting (0.70 in Arm 1, 0.50 in Arm 2) with no change in prevalence between studies

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power	
R1	R2	ICC1	ICC2	Overall ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B
Setting: Clusters of size 5, R1<R2														
1.02	1.12	0.047	0.120	0.154	25	25	30	0%	20%	0.811	0.811	0.876	0.000	0.064
1.04	1.14	0.093	0.140	0.204	27	27	33	0%	22%	0.805	0.805	0.877	0.000	0.071
1.06	1.16	0.140	0.160	0.254	29	29	37	0%	28%	0.801	0.801	0.886	0.000	0.086
1.08	1.18	0.187	0.180	0.304	32	32	41	0%	28%	0.809	0.809	0.894	0.000	0.085
1.10	1.20	0.233	0.200	0.354	34	34	44	0%	29%	0.805	0.805	0.894	0.000	0.089
Setting: Clusters of size 5, R1=R2														
1.04	1.04	0.093	0.040	0.100	23	23	26	0%	13%	0.805	0.805	0.850	0.000	0.045
1.08	1.08	0.187	0.080	0.200	28	28	33	0%	18%	0.809	0.809	0.868	0.000	0.059
1.12	1.12	0.280	0.120	0.300	32	32	40	0%	25%	0.800	0.800	0.880	0.000	0.079
1.16	1.16	0.373	0.160	0.400	37	37	47	0%	27%	0.804	0.804	0.887	0.000	0.084
1.20	1.20	0.467	0.200	0.500	42	42	55	0%	31%	0.807	0.807	0.899	0.000	0.092
Setting: Clusters of size 5, R1>R2														
1.12	1.02	0.280	0.020	0.196	29	29	33	0%	14%	0.813	0.813	0.859	0.000	0.047
1.14	1.04	0.327	0.040	0.246	31	31	36	0%	16%	0.808	0.808	0.862	0.000	0.054
1.16	1.06	0.373	0.060	0.296	33	33	40	0%	21%	0.803	0.803	0.872	0.000	0.069
1.18	1.08	0.420	0.080	0.346	36	36	44	0%	22%	0.811	0.811	0.881	0.000	0.070
1.20	1.10	0.467	0.100	0.396	38	38	47	0%	24%	0.807	0.807	0.881	0.000	0.075
Setting: Clusters of size 20, R1<R2														
1.02	1.20	0.047	0.200	0.238	16	16	25	0%	56%	0.808	0.808	0.943	0.000	0.135
1.04	1.20	0.093	0.200	0.267	18	18	28	0%	56%	0.811	0.811	0.944	0.000	0.132
1.06	1.20	0.140	0.200	0.296	20	20	30	0%	50%	0.814	0.814	0.937	0.000	0.124
1.08	1.20	0.187	0.200	0.325	22	22	33	0%	50%	0.815	0.815	0.938	0.000	0.123
1.10	1.20	0.233	0.200	0.354	23	23	35	0%	52%	0.801	0.801	0.933	0.000	0.132
Setting: Clusters of size 20, R1=R2														
1.04	1.04	0.093	0.040	0.100	11	11	14	0%	27%	0.835	0.835	0.911	0.000	0.077
1.08	1.08	0.187	0.080	0.200	16	16	22	0%	38%	0.811	0.811	0.915	0.000	0.104
1.12	1.12	0.280	0.120	0.300	22	22	31	0%	41%	0.817	0.817	0.925	0.000	0.108
1.16	1.16	0.373	0.160	0.400	27	27	39	0%	44%	0.806	0.806	0.924	0.000	0.118
1.20	1.20	0.467	0.200	0.500	33	33	48	0%	45%	0.811	0.811	0.929	0.000	0.118
Setting: Clusters of size 20, R1>R2														
1.20	1.02	0.467	0.020	0.313	24	24	32	0%	33%	0.805	0.805	0.902	0.000	0.098
1.20	1.04	0.467	0.040	0.333	25	25	34	0%	36%	0.806	0.806	0.908	0.000	0.103
1.20	1.06	0.467	0.060	0.354	26	26	35	0%	35%	0.806	0.806	0.906	0.000	0.100
1.20	1.08	0.467	0.080	0.375	27	27	37	0%	37%	0.807	0.807	0.911	0.000	0.104
1.20	1.10	0.467	0.100	0.396	28	28	39	0%	39%	0.808	0.808	0.916	0.000	0.108
Setting: Clusters of size 50, R1<R2														
1.01	1.10	0.023	0.100	0.119	8	8	13	0%	63%	0.822	0.822	0.957	0.000	0.135
1.02	1.10	0.047	0.100	0.133	9	9	14	0%	56%	0.822	0.822	0.949	0.000	0.127
1.03	1.10	0.070	0.100	0.148	10	10	15	0%	50%	0.822	0.822	0.942	0.000	0.120
1.04	1.10	0.093	0.100	0.163	11	11	17	0%	55%	0.822	0.822	0.948	0.000	0.126
1.05	1.10	0.117	0.100	0.177	12	12	18	0%	50%	0.822	0.822	0.942	0.000	0.120
Setting: Clusters of size 50, R1=R2														
1.02	1.02	0.047	0.020	0.050	5	5	7	0%	40%	0.828	0.828	0.930	0.000	0.103
1.04	1.04	0.093	0.040	0.100	8	8	11	0%	38%	0.825	0.825	0.924	0.000	0.099
1.06	1.06	0.140	0.060	0.150	11	11	16	0%	45%	0.824	0.824	0.936	0.000	0.113
1.08	1.08	0.187	0.080	0.200	14	14	20	0%	43%	0.823	0.823	0.932	0.000	0.109
1.10	1.10	0.233	0.100	0.250	17	17	24	0%	41%	0.822	0.822	0.929	0.000	0.106
Setting: Clusters of size 50, R1>R2														
1.10	1.01	0.233	0.010	0.156	12	12	16	0%	33%	0.810	0.810	0.906	0.000	0.096
1.10	1.02	0.233	0.020	0.167	13	13	17	0%	31%	0.825	0.825	0.911	0.000	0.087
1.10	1.03	0.233	0.030	0.177	13	13	18	0%	38%	0.810	0.810	0.916	0.000	0.106
1.10	1.04	0.233	0.040	0.188	14	14	19	0%	36%	0.824	0.824	0.920	0.000	0.096
1.10	1.05	0.233	0.050	0.198	14	14	20	0%	43%	0.810	0.810	0.924	0.000	0.114

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.

Appendix Table 6. Comparison of R- and two ICC-based approaches to sample size calculation in moderate prevalence setting (0.50 in Arm 1, 0.30 in Arm 2) with no change in prevalence between studies

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power	
R1	R2	ICC1	ICC2	ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B
Setting: Clusters of size 5, R1<R2														
1.02	1.12	0.020	0.051	0.096	21	21	25	0%	19%	0.809	0.809	0.871	0.000	0.062
1.04	1.14	0.040	0.060	0.129	22	22	28	0%	27%	0.807	0.807	0.891	0.000	0.083
1.06	1.16	0.060	0.069	0.163	23	23	30	0%	30%	0.806	0.806	0.897	0.000	0.091
1.08	1.18	0.080	0.077	0.196	24	24	33	0%	38%	0.804	0.804	0.910	0.000	0.106
1.10	1.20	0.100	0.086	0.229	25	25	35	0%	40%	0.803	0.803	0.914	0.000	0.111
Setting: Clusters of size 5, R1=R2														
1.04	1.04	0.040	0.017	0.067	21	21	23	0%	10%	0.815	0.815	0.849	0.000	0.033
1.08	1.08	0.080	0.034	0.133	23	23	28	0%	22%	0.812	0.812	0.881	0.000	0.069
1.12	1.12	0.120	0.051	0.200	25	25	33	0%	32%	0.809	0.809	0.902	0.000	0.094
1.16	1.16	0.160	0.069	0.267	27	27	38	0%	41%	0.806	0.806	0.918	0.000	0.112
1.20	1.20	0.200	0.086	0.333	29	29	43	0%	48%	0.804	0.804	0.929	0.000	0.125
Setting: Clusters of size 5, R1>R2														
1.12	1.02	0.120	0.009	0.138	24	24	28	0%	17%	0.816	0.816	0.870	0.000	0.055
1.14	1.04	0.140	0.017	0.171	25	25	31	0%	24%	0.814	0.814	0.888	0.000	0.074
1.16	1.06	0.160	0.026	0.204	26	26	33	0%	27%	0.812	0.812	0.894	0.000	0.081
1.18	1.08	0.180	0.034	0.238	27	27	36	0%	33%	0.811	0.811	0.907	0.000	0.096
1.20	1.10	0.200	0.043	0.271	28	28	38	0%	36%	0.810	0.810	0.911	0.000	0.101
Setting: Clusters of size 20, R1<R2														
1.02	1.20	0.020	0.086	0.146	9	9	18	0%	100%	0.809	0.809	0.980	0.000	0.171
1.04	1.20	0.040	0.086	0.167	10	10	19	0%	90%	0.811	0.811	0.975	0.000	0.164
1.06	1.20	0.060	0.086	0.188	11	11	21	0%	91%	0.812	0.812	0.976	0.000	0.164
1.08	1.20	0.080	0.086	0.208	12	12	23	0%	92%	0.813	0.813	0.976	0.000	0.163
1.10	1.20	0.100	0.086	0.229	13	13	25	0%	92%	0.814	0.814	0.977	0.000	0.163
Setting: Clusters of size 20, R1=R2														
1.04	1.04	0.040	0.017	0.067	8	8	11	0%	38%	0.847	0.847	0.938	0.000	0.091
1.08	1.08	0.080	0.034	0.133	10	10	16	0%	60%	0.816	0.816	0.952	0.000	0.135
1.12	1.12	0.120	0.051	0.200	13	13	22	0%	69%	0.827	0.827	0.965	0.000	0.138
1.16	1.16	0.160	0.069	0.267	15	15	28	0%	87%	0.809	0.809	0.972	0.000	0.163
1.20	1.20	0.200	0.086	0.333	18	18	34	0%	89%	0.818	0.818	0.976	0.000	0.158
Setting: Clusters of size 20, R1>R2														
1.20	1.02	0.200	0.009	0.221	15	15	24	0%	60%	0.822	0.822	0.954	0.000	0.132
1.20	1.04	0.200	0.017	0.233	15	15	25	0%	67%	0.813	0.813	0.957	0.000	0.144
1.20	1.06	0.200	0.026	0.246	15	15	26	0%	73%	0.804	0.804	0.960	0.000	0.156
1.20	1.08	0.200	0.034	0.258	16	16	27	0%	69%	0.820	0.820	0.962	0.000	0.142
1.20	1.10	0.200	0.043	0.271	16	16	28	0%	75%	0.812	0.812	0.964	0.000	0.152
Setting: Clusters of size 50, R1<R2														
1.01	1.10	0.010	0.043	0.073	5	5	9	0%	80%	0.878	0.878	0.987	0.000	0.109
1.02	1.10	0.020	0.043	0.083	5	5	10	0%	100%	0.840	0.840	0.987	0.000	0.147
1.03	1.10	0.030	0.043	0.094	5	5	11	0%	120%	0.802	0.802	0.986	0.000	0.185
1.04	1.10	0.040	0.043	0.104	6	6	12	0%	100%	0.836	0.836	0.986	0.000	0.150
1.05	1.10	0.050	0.043	0.115	6	6	12	0%	100%	0.804	0.804	0.978	0.000	0.174
Setting: Clusters of size 50, R1=R2														
1.02	1.02	0.020	0.009	0.033	4	4	5	0%	25%	0.888	0.888	0.944	0.000	0.056
1.04	1.04	0.040	0.017	0.067	5	5	8	0%	60%	0.846	0.846	0.965	0.000	0.119
1.06	1.06	0.060	0.026	0.100	6	6	11	0%	83%	0.818	0.818	0.973	0.000	0.155
1.08	1.08	0.080	0.034	0.133	8	8	14	0%	75%	0.848	0.848	0.977	0.000	0.129
1.10	1.10	0.100	0.043	0.167	9	9	17	0%	89%	0.829	0.829	0.979	0.000	0.150
Setting: Clusters of size 50, R1>R2														
1.10	1.01	0.100	0.004	0.110	7	7	12	0%	71%	0.812	0.812	0.961	0.000	0.149
1.10	1.02	0.100	0.009	0.117	7	7	13	0%	86%	0.802	0.802	0.969	0.000	0.167
1.10	1.03	0.100	0.013	0.123	8	8	13	0%	63%	0.843	0.843	0.966	0.000	0.123
1.10	1.04	0.100	0.017	0.129	8	8	14	0%	75%	0.834	0.834	0.972	0.000	0.138
1.10	1.05	0.100	0.021	0.135	8	8	14	0%	75%	0.826	0.826	0.969	0.000	0.144

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.

Appendix Table 7. Comparison of R- and two ICC-based approaches to sample size calculation in low prevalence setting (0.30 in Arm 1, 0.10 in Arm 2) with no change in prevalence between studies

Values from previous study					No. clusters per condition calculated to be required for 80% power			Percent difference in no. clusters compared to R-based approach		Actual achieved power			Difference in power		
R1	R2	ICC1	ICC2	Overall ICC	R	ICC A	ICC B	ICC A	ICC B	R	ICC A	ICC B	R vs. ICC A	R vs. ICC B	
Setting: Clusters of size 5, R1<R2															
1.02	1.12	0.009	0.013	0.056	13	13	15	0%	15%	0.823	0.823	0.873	0.000	0.050	
1.04	1.14	0.017	0.016	0.081	13	13	16	0%	23%	0.813	0.813	0.885	0.000	0.072	
1.06	1.16	0.026	0.018	0.106	13	13	17	0%	31%	0.804	0.804	0.896	0.000	0.092	
1.08	1.18	0.034	0.020	0.131	14	14	18	0%	29%	0.823	0.823	0.905	0.000	0.082	
1.10	1.20	0.043	0.022	0.156	14	14	20	0%	43%	0.814	0.814	0.926	0.000	0.112	
Setting: Clusters of size 5, R1=R2															
1.04	1.04	0.017	0.004	0.050	13	13	15	0%	15%	0.818	0.818	0.869	0.000	0.051	
1.08	1.08	0.034	0.009	0.100	14	14	17	0%	21%	0.827	0.827	0.893	0.000	0.065	
1.12	1.12	0.051	0.013	0.150	14	14	19	0%	36%	0.810	0.810	0.911	0.000	0.101	
1.16	1.16	0.069	0.018	0.200	15	15	22	0%	47%	0.819	0.819	0.935	0.000	0.117	
1.20	1.20	0.086	0.022	0.250	15	15	24	0%	60%	0.802	0.802	0.945	0.000	0.142	
Setting: Clusters of size 5, R1>R2															
1.12	1.02	0.051	0.002	0.119	14	14	18	0%	29%	0.814	0.814	0.899	0.000	0.085	
1.14	1.04	0.060	0.004	0.144	14	14	19	0%	36%	0.805	0.805	0.908	0.000	0.102	
1.16	1.06	0.069	0.007	0.169	15	15	20	0%	33%	0.823	0.823	0.915	0.000	0.092	
1.18	1.08	0.077	0.009	0.194	15	15	21	0%	40%	0.815	0.815	0.922	0.000	0.107	
1.20	1.10	0.086	0.011	0.219	15	15	23	0%	53%	0.806	0.806	0.938	0.000	0.132	
Setting: Clusters of size 20, R1<R2															
1.02	1.20	0.009	0.022	0.081	4	4	8	0%	100%	0.835	0.835	0.986	0.000	0.151	
1.04	1.20	0.017	0.022	0.100	4	4	9	0%	125%	0.801	0.801	0.988	0.000	0.186	
1.06	1.20	0.026	0.022	0.119	5	5	10	0%	100%	0.854	0.854	0.989	0.000	0.135	
1.08	1.20	0.034	0.022	0.138	5	5	11	0%	120%	0.827	0.827	0.990	0.000	0.163	
1.10	1.20	0.043	0.022	0.156	5	5	12	0%	140%	0.800	0.800	0.991	0.000	0.191	
Setting: Clusters of size 20, R1=R2															
1.04	1.04	0.017	0.004	0.050	4	4	6	0%	50%	0.831	0.831	0.947	0.000	0.116	
1.08	1.08	0.034	0.009	0.100	5	5	9	0%	80%	0.845	0.845	0.979	0.000	0.134	
1.12	1.12	0.051	0.013	0.150	6	6	12	0%	100%	0.854	0.854	0.989	0.000	0.135	
1.16	1.16	0.069	0.018	0.200	6	6	15	0%	150%	0.805	0.805	0.994	0.000	0.189	
1.20	1.20	0.086	0.022	0.250	7	7	17	0%	143%	0.819	0.819	0.994	0.000	0.175	
Setting: Clusters of size 20, R1>R2															
1.20	1.02	0.086	0.002	0.194	7	7	14	0%	100%	0.838	0.838	0.986	0.000	0.149	
1.20	1.04	0.086	0.004	0.200	7	7	15	0%	114%	0.836	0.836	0.990	0.000	0.155	
1.20	1.06	0.086	0.007	0.206	7	7	15	0%	114%	0.833	0.833	0.990	0.000	0.157	
1.20	1.08	0.086	0.009	0.213	7	7	15	0%	114%	0.831	0.831	0.990	0.000	0.158	
1.20	1.10	0.086	0.011	0.219	7	7	16	0%	129%	0.829	0.829	0.993	0.000	0.164	
Setting: Clusters of size 50, R1<R2															
1.01	1.10	0.004	0.011	0.041	2	2	4	0%	100%	0.891	0.891	0.995	0.000	0.104	
1.02	1.10	0.009	0.011	0.050	2	2	5	0%	150%	0.857	0.857	0.998	0.000	0.141	
1.03	1.10	0.013	0.011	0.059	2	2	5	0%	150%	0.822	0.822	0.995	0.000	0.173	
1.04	1.10	0.017	0.011	0.069	3	3	6	0%	100%	0.922	0.922	0.998	0.000	0.075	
1.05	1.10	0.021	0.011	0.078	3	3	6	0%	100%	0.901	0.901	0.996	0.000	0.095	
Setting: Clusters of size 50, R1=R2															
1.02	1.02	0.009	0.002	0.025	2	2	3	0%	50%	0.887	0.887	0.973	0.000	0.086	
1.04	1.04	0.017	0.004	0.050	2	2	5	0%	150%	0.811	0.811	0.994	0.000	0.184	
1.06	1.06	0.026	0.007	0.075	3	3	6	0%	100%	0.888	0.888	0.994	0.000	0.106	
1.08	1.08	0.034	0.009	0.100	3	3	7	0%	133%	0.838	0.838	0.994	0.000	0.157	
1.10	1.10	0.043	0.011	0.125	4	4	9	0%	125%	0.889	0.889	0.998	0.000	0.108	
Setting: Clusters of size 50, R1>R2															
1.10	1.01	0.043	0.001	0.097	3	3	7	0%	133%	0.810	0.810	0.991	0.000	0.182	
1.10	1.02	0.043	0.002	0.100	3	3	7	0%	133%	0.807	0.807	0.991	0.000	0.184	
1.10	1.03	0.043	0.003	0.103	3	3	8	0%	167%	0.804	0.804	0.996	0.000	0.191	
1.10	1.04	0.043	0.004	0.106	3	3	8	0%	167%	0.802	0.802	0.996	0.000	0.194	
1.10	1.05	0.043	0.006	0.109	4	4	8	0%	100%	0.898	0.898	0.995	0.000	0.097	

R method uses R1 and R2 for Arms 1 and 2, respectively, and equation 13. ICC method A uses ICC1 and ICC2 for Arms 1 and 2 and equation 14. ICC method B uses a single overall ICC and equation 15.