

# Project 3

Yingxi Kong

## Abstract

## Introduction

Cluster Randomized Trials (CRTs) are a common design approach in public health research. This method is well suited to testing differences in a method or approach to patient care (as opposed to evaluating the physiological effects of an intervention)<sup>1</sup>. evaluate interventions and strategies used when observations within clusters

## Methods

### Normal Distributed Y

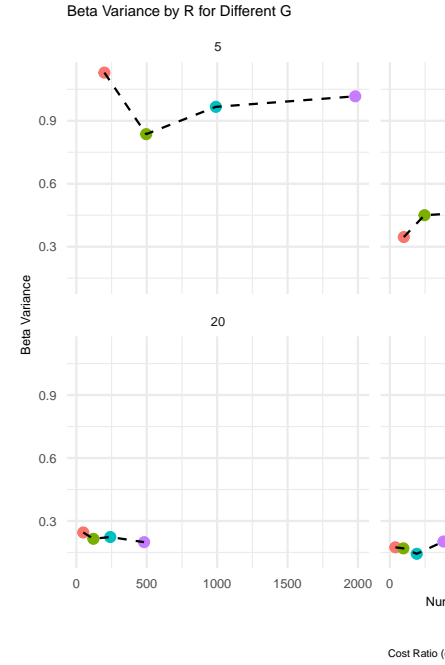
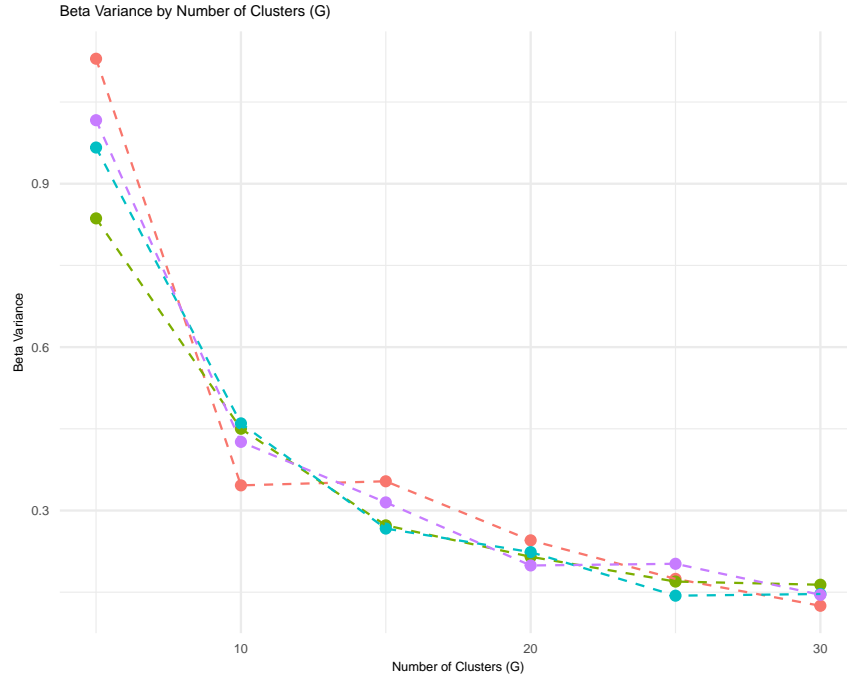
### Vary G, R, c1/c2

Table 1: Metrics Summary Varying Number of Clusters

Number of Cluster (G)	Number of Observations per Cluster (R)	Cost Ratio (c1/c2)	Beta Variance	Beta Bias	MSE	Coverage
5	991	10	0.9664506	0.0813709	0.9634073	84
10	491	10	0.4600079	0.1723095	0.4850983	92
15	324	10	0.2668408	0.0489170	0.2665652	91
20	241	10	0.2236300	0.1111983	0.2337588	93
25	191	10	0.1436221	0.0272516	0.1429285	95
30	157	10	0.1467200	0.0584557	0.1486699	92

Table 2: Metrics Summary Varying Cost Ratio

Number of Cluster (G)	Number of Observations per Cluster (R)	Cost Ratio (c1/c2)	Beta Variance	Beta Bias	MSE	Coverage
20	49	2	0.2452454	0.0135748	0.2429772	90
20	121	5	0.2150198	0.0171457	0.2131636	94
20	241	10	0.2236300	0.1111983	0.2337588	93
20	481	20	0.1991018	0.0305745	0.1980456	96



## Vary gamma\_sq

Table 3: Metrics Summary Varying Between-cluster Variance

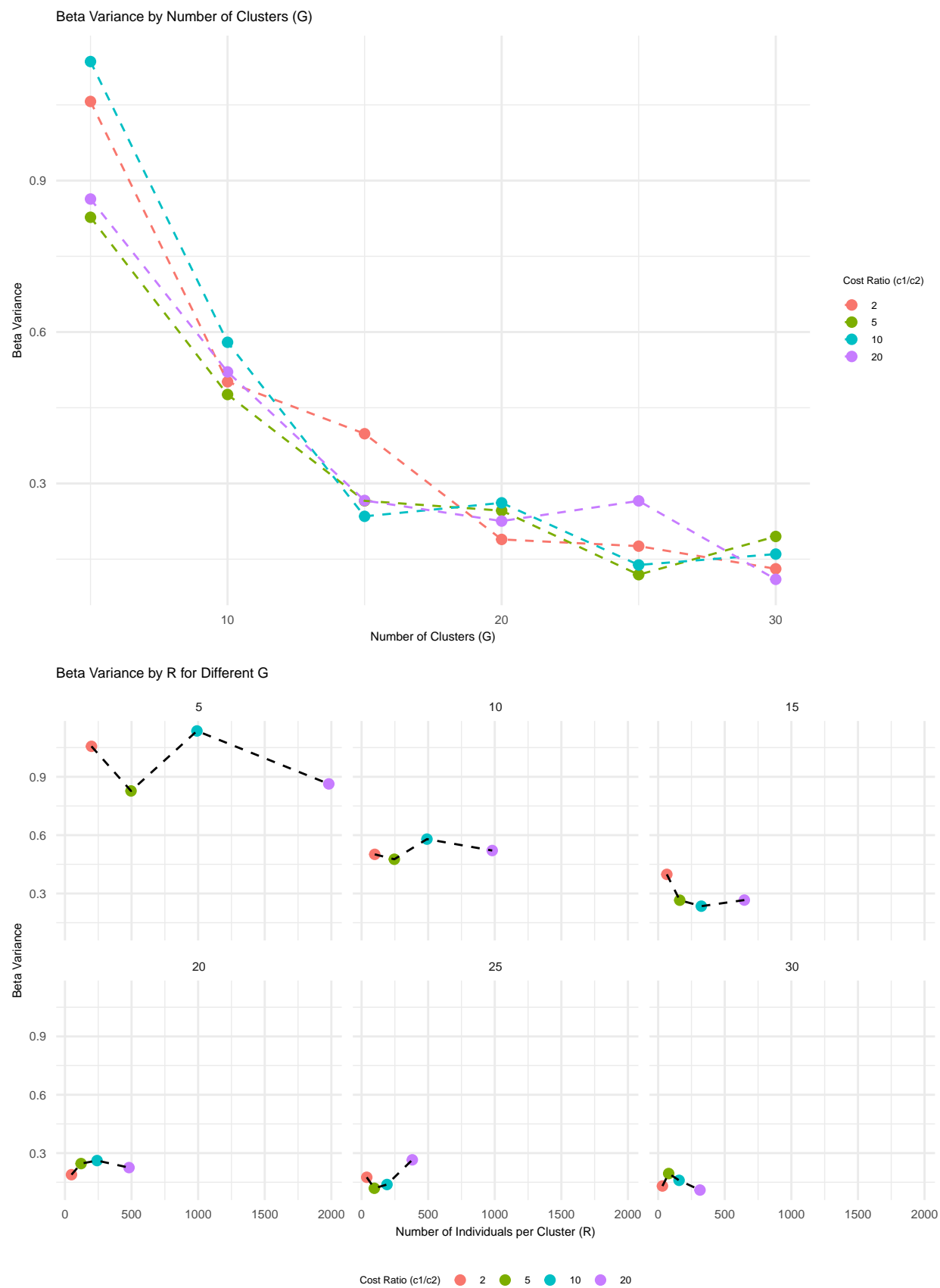
Baseline Mean	Treatment Effect	Between-cluster Variance	Within-cluster Variance	Beta Estimate	Beta Variance	Beta Bias	MSE
0	1.5	0.5	1	1.483455	0.0650664	0.0165450	0.0646895
0	1.5	1.0	1	1.546137	0.1637061	0.0461375	0.1641977
0	1.5	1.5	1	1.579362	0.2670818	0.0793615	0.2707092
0	1.5	2.0	1	1.459525	0.2768554	0.0404747	0.2757251
0	1.5	2.5	1	1.537960	0.3648378	0.0379599	0.3626304
0	1.5	3.0	1	1.449572	0.4960040	0.0504276	0.4935869

Vary sigma\_sq

Table 4: Metrics Summary Varying Within-cluster Variance

Baseline Mean	Treatment Effect	Between-cluster Variance	Within-cluster Variance	Beta Estimate	Beta Variance	Beta Bias	MSE
0	1.5	1	0.5	1.449135	0.1696803	0.0508652	0.1705707
0	1.5	1	1.0	1.546137	0.1637061	0.0461375	0.1641977
0	1.5	1	1.5	1.479028	0.1561825	0.0209718	0.1550605
0	1.5	1	2.0	1.452371	0.1146344	0.0476287	0.1157565
0	1.5	1	2.5	1.534967	0.1115000	0.0349666	0.1116077
0	1.5	1	3.0	1.441906	0.1417913	0.0580941	0.1437483

Poisson Distributed Y



Vary  $\gamma_{sq}$

Reference

Results

Discussion

## Reference

1. Heagerty, P. J., Biostatistics, N. P. T. C., & Core, S. D. (2024). *Experimental designs and randomization schemes: Cluster randomized trials*. In *Rethinking Clinical Trials: A Living Textbook of Pragmatic Clinical Trials*; NIH Pragmatic Trials Collaboratory. <https://doi.org/10.28929/204>