# A comparison of design-based and model-based approaches for finite population spatial data – Supporting Information.

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## 1. Simulation Study Tables

Recall the four sampling-analysis combinations from the simulation study, summarized in Table 1. Also recall the 36 parameter configurations from the simulation study, summarized in Table 2.

|  | Design | Model |
|---:|---|---|
| IRS | IRS-Design | IRS-Model |
| GRTS | GRTS-Design | GRTS-Model |

Table 1: Sampling-analysis combinations in the simulation study. The rows give the two types of sampling designs and the columns give the two types of analyses.

| | | | |
|---:|---|---|---|
| Sample Size (n) | 50 | 100 | 200 |
| Layout | Random | Gridded | - |
| Proportion of Dependent Error | 0 | 0.5 | 0.9 |
| Response Type | Normal | Lognormal | - |

Table 2: Simulation scenario options. All combinations of sample size, location layout, response type, and proportion of dependent random error composed the 36 simulation scenarios. In each simualtion scenario, the total variance was 2.

Next we present tables summarizing mean estimation bias (design-based) or mean prediction bias (model-based), root-mean-squared error (design-based) or root-mean-squared-prediction error (model-based), and 95% confidence interval coverage (design-based) or 95% prediction interval coverage (model-based) for all 36 simulation scenarios.

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| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0 | 50 | -0.0023 | 0.1968 | 0.9440 |
| IRS-Model | Gridded | Normal | 0 | 50 | -0.0029 | 0.1988 | 0.9400 |
| GRTS-Design | Gridded | Normal | 0 | 50 | -0.0011 | 0.1946 | 0.9110 |
| GRTS-Model | Gridded | Normal | 0 | 50 | -0.0006 | 0.1949 | 0.9300 |

Table 3: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 1.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0 | 50 | -0.0036 | 0.2007 | 0.9080 |
| IRS-Model | Gridded | Lognormal | 0 | 50 | -0.0094 | 0.2071 | 0.9045 |
| GRTS-Design | Gridded | Lognormal | 0 | 50 | -0.0007 | 0.1962 | 0.8690 |
| GRTS-Model | Gridded | Lognormal | 0 | 50 | -0.0022 | 0.1969 | 0.8945 |

Table 4: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 2.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0 | 50 | 0.0019 | 0.1861 | 0.9505 |
| IRS-Model | Random | Normal | 0 | 50 | 0.0014 | 0.1892 | 0.9445 |
| GRTS-Design | Random | Normal | 0 | 50 | -0.0040 | 0.1955 | 0.9090 |
| GRTS-Model | Random | Normal | 0 | 50 | -0.0040 | 0.1965 | 0.9315 |

Table 5: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 3.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0 | 50 | 0.0032 | 0.1843 | 0.9205 |
| IRS-Model | Random | Lognormal | 0 | 50 | -0.0039 | 0.1945 | 0.9105 |
| GRTS-Design | Random | Lognormal | 0 | 50 | -0.0056 | 0.1944 | 0.8870 |
| GRTS-Model | Random | Lognormal | 0 | 50 | -0.0078 | 0.1967 | 0.9075 |

Table 6: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 4.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.5 | 50 | 0.0025 | 0.1762 | 0.9470 |
| IRS-Model | Gridded | Normal | 0.5 | 50 | 0.0007 | 0.1655 | 0.9305 |
| GRTS-Design | Gridded | Normal | 0.5 | 50 | 0.0004 | 0.1524 | 0.9115 |
| GRTS-Model | Gridded | Normal | 0.5 | 50 | -0.0003 | 0.1499 | 0.9320 |

Table 7: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 5.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.5 | 50 | 0.0004 | 0.1863 | 0.9140 |
| IRS-Model | Gridded | Lognormal | 0.5 | 50 | -0.0076 | 0.1834 | 0.9035 |
| GRTS-Design | Gridded | Lognormal | 0.5 | 50 | 0.0016 | 0.1612 | 0.8810 |
| GRTS-Model | Gridded | Lognormal | 0.5 | 50 | -0.0017 | 0.1606 | 0.8940 |

Table 8: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 6.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.5 | 50 | 0.0037 | 0.1657 | 0.9590 |
| IRS-Model | Random | Normal | 0.5 | 50 | 0.0027 | 0.1546 | 0.9495 |
| GRTS-Design | Random | Normal | 0.5 | 50 | -0.0034 | 0.1511 | 0.9170 |
| GRTS-Model | Random | Normal | 0.5 | 50 | -0.0037 | 0.1504 | 0.9305 |

Table 9: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 7.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.5 | 50 | 0.0023 | 0.1637 | 0.9245 |
| IRS-Model | Random | Lognormal | 0.5 | 50 | -0.0055 | 0.1622 | 0.9125 |
| GRTS-Design | Random | Lognormal | 0.5 | 50 | -0.0057 | 0.1570 | 0.9000 |
| GRTS-Model | Random | Lognormal | 0.5 | 50 | -0.0079 | 0.1567 | 0.9100 |

Table 10: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 8.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.9 | 50 | 0.0053 | 0.1579 | 0.9470 |
| IRS-Model | Gridded | Normal | 0.9 | 50 | 0.0026 | 0.1165 | 0.9315 |
| GRTS-Design | Gridded | Normal | 0.9 | 50 | 0.0013 | 0.1074 | 0.9220 |
| GRTS-Model | Gridded | Normal | 0.9 | 50 | -0.0007 | 0.0949 | 0.9430 |

Table 11: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 9.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.9 | 50 | 0.0031 | 0.1731 | 0.9220 |
| IRS-Model | Gridded | Lognormal | 0.9 | 50 | -0.0020 | 0.1325 | 0.9135 |
| GRTS-Design | Gridded | Lognormal | 0.9 | 50 | 0.0031 | 0.1183 | 0.9065 |
| GRTS-Model | Gridded | Lognormal | 0.9 | 50 | -0.0002 | 0.1090 | 0.9120 |

Table 12: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 10.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.9 | 50 | 0.0062 | 0.1520 | 0.9525 |
| IRS-Model | Random | Normal | 0.9 | 50 | 0.0037 | 0.1074 | 0.9525 |
| GRTS-Design | Random | Normal | 0.9 | 50 | -0.0029 | 0.1038 | 0.9340 |
| GRTS-Model | Random | Normal | 0.9 | 50 | -0.0027 | 0.0940 | 0.9360 |

Table 13: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 11.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.9 | 50 | 0.0053 | 0.1542 | 0.9325 |
| IRS-Model | Random | Lognormal | 0.9 | 50 | -0.0012 | 0.1160 | 0.9115 |
| GRTS-Design | Random | Lognormal | 0.9 | 50 | -0.0033 | 0.1150 | 0.9160 |
| GRTS-Model | Random | Lognormal | 0.9 | 50 | -0.0031 | 0.1014 | 0.9235 |

Table 14: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 12.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0 | 100 | -0.0029 | 0.1322 | 0.9430 |
| IRS-Model | Gridded | Normal | 0 | 100 | -0.0033 | 0.1332 | 0.9410 |
| GRTS-Design | Gridded | Normal | 0 | 100 | 0.0041 | 0.1302 | 0.9245 |
| GRTS-Model | Gridded | Normal | 0 | 100 | 0.0038 | 0.1304 | 0.9420 |

Table 15: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 13.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0 | 100 | -0.0052 | 0.1334 | 0.9335 |
| IRS-Model | Gridded | Lognormal | 0 | 100 | -0.0072 | 0.1350 | 0.9300 |
| GRTS-Design | Gridded | Lognormal | 0 | 100 | 0.0042 | 0.1303 | 0.9035 |
| GRTS-Model | Gridded | Lognormal | 0 | 100 | 0.0034 | 0.1307 | 0.9265 |

Table 16: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 14.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0 | 100 | -0.0066 | 0.1366 | 0.9405 |
| IRS-Model | Random | Normal | 0 | 100 | -0.0067 | 0.1370 | 0.9385 |
| GRTS-Design | Random | Normal | 0 | 100 | 0.0028 | 0.1364 | 0.9180 |
| GRTS-Model | Random | Normal | 0 | 100 | 0.0029 | 0.1363 | 0.9345 |

Table 17: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 15.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0 | 100 | -0.0051 | 0.1348 | 0.9280 |
| IRS-Model | Random | Lognormal | 0 | 100 | -0.0075 | 0.1372 | 0.9230 |
| GRTS-Design | Random | Lognormal | 0 | 100 | 0.0002 | 0.1375 | 0.8840 |
| GRTS-Model | Random | Lognormal | 0 | 100 | -0.0003 | 0.1377 | 0.9090 |

Table 18: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 16.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.5 | 100 | -0.0016 | 0.1177 | 0.9540 |
| IRS-Model | Gridded | Normal | 0.5 | 100 | -0.0023 | 0.1072 | 0.9470 |
| GRTS-Design | Gridded | Normal | 0.5 | 100 | 0.0051 | 0.0998 | 0.9300 |
| GRTS-Model | Gridded | Normal | 0.5 | 100 | 0.0039 | 0.0982 | 0.9470 |

Table 19: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 17.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.5 | 100 | -0.0021 | 0.1211 | 0.9445 |
| IRS-Model | Gridded | Lognormal | 0.5 | 100 | -0.0058 | 0.1153 | 0.9295 |
| GRTS-Design | Gridded | Lognormal | 0.5 | 100 | 0.0041 | 0.1090 | 0.9085 |
| GRTS-Model | Gridded | Lognormal | 0.5 | 100 | 0.0019 | 0.1090 | 0.9180 |

Table 20: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 18.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.5 | 100 | -0.0064 | 0.1222 | 0.9440 |
| IRS-Model | Random | Normal | 0.5 | 100 | -0.0049 | 0.1073 | 0.9440 |
| GRTS-Design | Random | Normal | 0.5 | 100 | 0.0013 | 0.1041 | 0.9155 |
| GRTS-Model | Random | Normal | 0.5 | 100 | 0.0014 | 0.1020 | 0.9400 |

Table 21: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 19.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.5 | 100 | -0.0063 | 0.1204 | 0.9355 |
| IRS-Model | Random | Lognormal | 0.5 | 100 | -0.0097 | 0.1150 | 0.9275 |
| GRTS-Design | Random | Lognormal | 0.5 | 100 | 0.0003 | 0.1092 | 0.8960 |
| GRTS-Model | Random | Lognormal | 0.5 | 100 | -0.0004 | 0.1088 | 0.9120 |

Table 22: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 20.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.9 | 100 | -0.0007 | 0.1059 | 0.9605 |
| IRS-Model | Gridded | Normal | 0.9 | 100 | -0.0019 | 0.0700 | 0.9445 |
| GRTS-Design | Gridded | Normal | 0.9 | 100 | 0.0044 | 0.0655 | 0.9435 |
| GRTS-Model | Gridded | Normal | 0.9 | 100 | 0.0030 | 0.0585 | 0.9440 |

Table 23: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 21.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.9 | 100 | -0.0011 | 0.1092 | 0.9540 |
| IRS-Model | Gridded | Lognormal | 0.9 | 100 | -0.0033 | 0.0779 | 0.9330 |
| GRTS-Design | Gridded | Lognormal | 0.9 | 100 | 0.0035 | 0.0757 | 0.9190 |
| GRTS-Model | Gridded | Lognormal | 0.9 | 100 | 0.0017 | 0.0693 | 0.9190 |

Table 24: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 22.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.9 | 100 | -0.0048 | 0.1095 | 0.9430 |
| IRS-Model | Random | Normal | 0.9 | 100 | -0.0017 | 0.0671 | 0.9535 |
| GRTS-Design | Random | Normal | 0.9 | 100 | -0.0009 | 0.0674 | 0.9265 |
| GRTS-Model | Random | Normal | 0.9 | 100 | 0.0000 | 0.0595 | 0.9420 |

Table 25: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 23.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.9 | 100 | -0.0045 | 0.1110 | 0.9375 |
| IRS-Model | Random | Lognormal | 0.9 | 100 | -0.0052 | 0.0771 | 0.9310 |
| GRTS-Design | Random | Lognormal | 0.9 | 100 | -0.0009 | 0.0732 | 0.9195 |
| GRTS-Model | Random | Lognormal | 0.9 | 100 | -0.0007 | 0.0661 | 0.9165 |

Table 26: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 24.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0 | 200 | 0.0013 | 0.0882 | 0.9550 |
| IRS-Model | Gridded | Normal | 0 | 200 | 0.0013 | 0.0886 | 0.9530 |
| GRTS-Design | Gridded | Normal | 0 | 200 | -0.0045 | 0.0885 | 0.9380 |
| GRTS-Model | Gridded | Normal | 0 | 200 | -0.0045 | 0.0885 | 0.9460 |

Table 27: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 25.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0 | 200 | 0.0001 | 0.0880 | 0.9350 |
| IRS-Model | Gridded | Lognormal | 0 | 200 | -0.0002 | 0.0883 | 0.9355 |
| GRTS-Design | Gridded | Lognormal | 0 | 200 | -0.0034 | 0.0898 | 0.9285 |
| GRTS-Model | Gridded | Lognormal | 0 | 200 | -0.0035 | 0.0900 | 0.9335 |

Table 28: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 26.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0 | 200 | -0.0014 | 0.0893 | 0.9465 |
| IRS-Model | Random | Normal | 0 | 200 | -0.0015 | 0.0896 | 0.9465 |
| GRTS-Design | Random | Normal | 0 | 200 | 0.0007 | 0.0868 | 0.9460 |
| GRTS-Model | Random | Normal | 0 | 200 | 0.0007 | 0.0867 | 0.9490 |

Table 29: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 27.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0 | 200 | -0.0028 | 0.0891 | 0.9425 |
| IRS-Model | Random | Lognormal | 0 | 200 | -0.0033 | 0.0896 | 0.9395 |
| GRTS-Design | Random | Lognormal | 0 | 200 | 0.0015 | 0.0860 | 0.9365 |
| GRTS-Model | Random | Lognormal | 0 | 200 | 0.0012 | 0.0861 | 0.9415 |

Table 30: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 28.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.5 | 200 | 0.0022 | 0.0788 | 0.9535 |
| IRS-Model | Gridded | Normal | 0.5 | 200 | 0.0008 | 0.0678 | 0.9580 |
| GRTS-Design | Gridded | Normal | 0.5 | 200 | -0.0024 | 0.0671 | 0.9335 |
| GRTS-Model | Gridded | Normal | 0.5 | 200 | -0.0030 | 0.0661 | 0.9410 |

Table 31: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 29.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.5 | 200 | 0.0016 | 0.0816 | 0.9420 |
| IRS-Model | Gridded | Lognormal | 0.5 | 200 | -0.0000 | 0.0739 | 0.9335 |
| GRTS-Design | Gridded | Lognormal | 0.5 | 200 | -0.0033 | 0.0744 | 0.9330 |
| GRTS-Model | Gridded | Lognormal | 0.5 | 200 | -0.0041 | 0.0742 | 0.9350 |

Table 32: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 30.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.5 | 200 | -0.0016 | 0.0790 | 0.9480 |
| IRS-Model | Random | Normal | 0.5 | 200 | -0.0010 | 0.0690 | 0.9475 |
| GRTS-Design | Random | Normal | 0.5 | 200 | -0.0002 | 0.0652 | 0.9455 |
| GRTS-Model | Random | Normal | 0.5 | 200 | 0.0001 | 0.0640 | 0.9500 |

Table 33: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 31.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.5 | 200 | -0.0027 | 0.0809 | 0.9494 |
| IRS-Model | Random | Lognormal | 0.5 | 200 | -0.0037 | 0.0732 | 0.9454 |
| GRTS-Design | Random | Lognormal | 0.5 | 200 | -0.0008 | 0.0671 | 0.9434 |
| GRTS-Model | Random | Lognormal | 0.5 | 200 | -0.0012 | 0.0662 | 0.9479 |

Table 34: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 32.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Normal | 0.9 | 200 | 0.0021 | 0.0704 | 0.9570 |
| IRS-Model | Gridded | Normal | 0.9 | 200 | 0.0005 | 0.0411 | 0.9590 |
| GRTS-Design | Gridded | Normal | 0.9 | 200 | -0.0005 | 0.0423 | 0.9370 |
| GRTS-Model | Gridded | Normal | 0.9 | 200 | -0.0012 | 0.0377 | 0.9450 |

Table 35: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 33.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Gridded | Lognormal | 0.9 | 200 | 0.0014 | 0.0744 | 0.9520 |
| IRS-Model | Gridded | Lognormal | 0.9 | 200 | -0.0002 | 0.0480 | 0.9355 |
| GRTS-Design | Gridded | Lognormal | 0.9 | 200 | -0.0014 | 0.0499 | 0.9380 |
| GRTS-Model | Gridded | Lognormal | 0.9 | 200 | -0.0022 | 0.0459 | 0.9380 |

Table 36: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 34.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Normal | 0.9 | 200 | -0.0009 | 0.0725 | 0.9470 |
| IRS-Model | Random | Normal | 0.9 | 200 | -0.0010 | 0.0409 | 0.9450 |
| GRTS-Design | Random | Normal | 0.9 | 200 | -0.0005 | 0.0405 | 0.9490 |
| GRTS-Model | Random | Normal | 0.9 | 200 | 0.0001 | 0.0354 | 0.9510 |

Table 37: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 35.

| Approach | Layout | Response | DE Prop | n | Bias | rMS(P)E | Coverage |
|---|---|---|---|---|---|---|---|
| IRS-Design | Random | Lognormal | 0.9 | 200 | -0.0006 | 0.0750 | 0.9393 |
| IRS-Model | Random | Lognormal | 0.9 | 200 | -0.0025 | 0.0461 | 0.9418 |
| GRTS-Design | Random | Lognormal | 0.9 | 200 | -0.0013 | 0.0452 | 0.9348 |
| GRTS-Model | Random | Lognormal | 0.9 | 200 | -0.0012 | 0.0397 | 0.9418 |

Table 38: Sampling-analysis combination (Approach), population layout (Layout), response type (Response), proportion of dependent random error (DE Prop), sample size (n), mean (prediction) bias (Bias), root-mean-squared-(prediction) error (rMS(P)E), and 95% interval coverage (Coverage) in simulation scenario 36.