

Supplemental Table S1– Full Regression Models of Nursing Home Resident COVID-19 on Facility Star Ratings^a

Independent Variable	Cumulative Resident Incidence		Cumulative Resident Mortality		Number of weeks with high resident incidence	
	IRR/OR	(95% CI)	IRR/OR	(95% CI)	IRR/OR	(95% CI)
Overall Quality Rating						
★	1.158	(1.105-1.213)****	1.096	(1.030-1.167)**	1.081	(1.037-1.128)***
★★	1.129	(1.083-1.178)****	1.081	(1.021-1.144)**	1.103	(1.062-1.146)****
★★★	1.154	(1.107-1.204)****	1.104	(1.043-1.168)***	1.093	(1.052-1.136)****
★★★★	1.080	(1.038-1.124)***	1.039	(0.985-1.097)	1.055	(1.018-1.094)**
★★★★★	1.000	Reference	1.000	Reference	1.000	Reference
% Medicaid residents in facility	1.002	(1.002-1.003)****	1.000	(0.999-1.001)	1.001	(1.001-1.002)***
County COVID rate (cases/1000)	1.004	(1.003-1.005)****	1.001	(1.000-1.002)**	1.005	(1.004-1.006)****
Number of certified beds	1.000	(0.999-1.000)***	0.999	(0.999-1.000)****	1.001	(1.001-1.001)****
Urban facility	1.025	(0.988-1.064)	0.983	(0.934-1.034)	1.182	(1.142-1.223)****
County Area Deprivation Index	1.001	(1.001-1.002)***	1.000	(0.999-1.001)	1.004	(1.003-1.005)****
Zero Model^b						
County COVID rate (cases/1000)	0.967	(0.962-0.971)****	0.970	(0.966-0.975)****	0.968	(0.964-0.973)****
Number of certified beds	0.972	(0.970-0.975)****	0.981	(0.979-0.983)****	0.983	(0.981-0.986)****
Urban facility	0.337	(0.272-0.416)****	0.628	(0.527-0.749)****	0.508	(0.419-0.616)****
County Area Deprivation Index	0.991	(0.986-0.996)***	0.998	(0.994-1.002)	0.991	(0.987-0.996)****
Health Inspection Rating						
★	1.125	(1.065-1.188)****	1.081	(1.003-1.165)*	1.126	(1.071-1.184)****
★★	1.093	(1.037-1.152)***	1.082	(1.007-1.163)*	1.115	(1.062-1.170)****

Independent Variable	Cumulative Resident Incidence		Cumulative Resident Mortality		Number of weeks with high resident incidence	
	IRR/OR	(95% CI)	IRR/OR	(95% CI)	IRR/OR	(95% CI)
★★★	1.075	(1.020-1.133)**	1.058	(0.984-1.137)	1.112	(1.059-1.167)****
★★★★	1.025	(0.973-1.080)	1.011	(0.940-1.086)	1.068	(1.017-1.121)***
★★★★★	1.000	Reference	1.000	Reference	1.000	Reference
% Medicaid residents in facility	1.003	(1.002-1.003)****	1.000	(0.999-1.001)	1.001	(1.001-1.002)****
County COVID rate (cases/1000)	1.004	(1.003-1.005)****	1.001	(1.000-1.002)**	1.005	(1.004-1.006)****
Number of certified beds	1.000	(0.999-1.000)***	0.999	(0.999-1.000)****	1.001	(1.001-1.001)****
Urban facility	1.026	(0.989-1.065)	0.982	(0.934-1.033)	1.181	(1.142-1.222)****
County Area Deprivation Index	1.002	(1.001-1.003)****	1.000	(0.999-1.001)	1.004	(1.003-1.005)****
Zero Model ^b						
County COVID rate (cases/1000)	0.967	(0.962-0.971)****	0.970	(0.966-0.975)****	0.968	(0.964-0.973)****
Number of certified beds	0.972	(0.970-0.975)****	0.981	(0.979-0.983)****	0.984	(0.981-0.986)****
Urban facility	0.337	(0.272-0.416)****	0.628	(0.527-0.749)****	0.505	(0.417-0.613)****
County Area Deprivation Index	0.991	(0.986-0.996)***	0.998	(0.994-1.002)	0.991	(0.987-0.996)****
Staffing Rating						
★	1.226	(1.146-1.312)****	1.031	(0.942-1.129)	1.181	(1.111-1.256)****
★★	1.301	(1.239-1.366)****	1.058	(0.989-1.130)	1.205	(1.151-1.261)****
★★★	1.303	(1.244-1.364)****	1.072	(1.007-1.141)*	1.221	(1.170-1.275)****
★★★★	1.206	(1.152-1.262)****	1.063	(0.998-1.131)	1.170	(1.121-1.221)****
★★★★★	1.000	Reference	1.000	Reference	1.000	Reference

Independent Variable	Cumulative Resident Incidence		Cumulative Resident Mortality		Number of weeks with high resident incidence	
	IRR/OR	(95% CI)	IRR/OR	(95% CI)	IRR/OR	(95% CI)
% Medicaid residents in facility	1.002	(1.001-1.003)****	1.000	(0.999-1.001)	1.001	(1.000-1.001)****
County COVID rate (cases/1000)	1.004	(1.003-1.005)****	1.001	(1.000-1.002)***	1.005	(1.005-1.006)****
Number of certified beds	0.999	(0.999-1.000)****	0.999	(0.999-1.000)****	1.001	(1.001-1.001)****
Urban facility	1.025	(0.987-1.065)	0.982	(0.931-1.035)	1.184	(1.143-1.227)****
County Area Deprivation Index	1.001	(1.000-1.002)*	1.000	(0.999-1.001)	1.004	(1.003-1.005)****
Zero Model^b						
County COVID rate (cases/1000)	0.964	(0.960-0.969)****	0.969	(0.964-0.973)****	0.968	(0.963-0.973)****
Number of certified beds	0.972	(0.969-0.975)****	0.980	(0.978-0.983)****	0.984	(0.981-0.987)****
Urban facility	0.310	(0.246-0.390)****	0.592	(0.491-0.715)****	0.485	(0.394-0.597)****
County Area Deprivation Index	0.990	(0.985-0.996)***	0.997	(0.993-1.002)	0.991	(0.986-0.996)***
Quality Measure Rating						
★	1.070	(1.003-1.140)*	1.097	(1.007-1.194)*	1.008	(0.952-1.066)
★★	1.066	(1.017-1.116)**	1.043	(0.981-1.109)	1.041	(0.999-1.085)
★★★	1.047	(1.008-1.088)*	1.047	(0.995-1.102)	1.016	(0.982-1.052)
★★★★	1.046	(1.010-1.083)*	1.063	(1.015-1.114)**	1.013	(0.981-1.045)
★★★★★	1.000	Reference	1.000	Reference	1.000	Reference
% Medicaid residents in facility	1.003	(1.002-1.003)****	1.000	(0.999-1.001)	1.001	(1.001-1.002)****
County COVID rate (cases/1000)	1.004	(1.004-1.005)****	1.002	(1.001-1.002)**	1.005	(1.004-1.006)****
Number of certified beds	1.000	(0.999-1.000)***	0.999	(0.999-1.000)****	1.001	(1.001-1.002)****
Urban facility	1.033	(0.995-1.071)	0.990	(0.941-1.041)	1.187	(1.148-1.228)****

Independent Variable	Cumulative Resident Incidence		Cumulative Resident Mortality		Number of weeks with high resident incidence	
	IRR/OR	(95% CI)	IRR/OR	(95% CI)	IRR/OR	(95% CI)
County Area Deprivation Index	1.001	(1.001-1.002)***	1.000	(0.999-1.001)	1.004	(1.003-1.005)****
Zero Model ^b						
County COVID rate (cases/1000)	0.967	(0.962-0.971)****	0.971	(0.966-0.975)****	0.969	(0.964-0.973)****
Number of certified beds	0.972	(0.969-0.975)****	0.980	(0.978-0.982)****	0.983	(0.980-0.986)****
Urban facility	0.340	(0.274-0.420)****	0.633	(0.531-0.754)****	0.506	(0.418-0.614)****
County Area Deprivation Index	0.991	(0.986-0.996)***	0.998	(0.994-1.002)	0.991	(0.987-0.995)****

*p<0.05, **p<0.01, ***p<0.001, ****p<0.0001.

Abbreviations: IRR = Incidence Rate Ratio; CI = Confidence Interval, OR = Odds Ratio.

^aEach rating domain is modeled separately, using zero-inflated negative binomial models.

^bThe zero-model is a logit model, predicting the likelihood of having 0 cases, deaths or high-incidence weeks. The estimate is an odds ratio.