Supplementary Material

Sensitivity analyses using multiple parameterizations of the outcome (kidney transplantation rates)

We ran mixed-effects linear models with the commonly used STR as a (1) continuous and (2) log-transformed (to address the failure of residual error normality assumptions) outcome, with a random intercept for Network to account for the potential nesting or correlation of dialysis facilities within ESRD Network. However, because the STR represents a ratio of counts, making it asymmetric on the natural scale, we also ran marginal negative binomial models, using GEE to account for correlated measurements, with (3) observed count as the outcome and expected count as offset. We compared all these models to our primary model (4), avoiding the unknown variability associated with a previously modeled offset.

Supplementary Table. Crude* association of dialysis facility tract characteristics with facility-level kidney transplant rates, by alternate parameterizations of the outcome.

	Model 1		**Model 2**		**Model 3****		**Model 4****	
Type	***Linear mixed-effects***		***Linear mixed-effects***		***Poisson fixed-effects***		***Poisson fixed-effects***	
Outcome	***STR***		***log(STR+1)***		***Observed no. transplants***		***Observed no. transplants***	
Offset	---		---		***Expected no. transplants***		***Person-time***	
Interpretation of b	***ΔSTR***		***Δlog(STR+1)***		***log(ΔSTR)***		***log(IRR)***	
Tract characteristic***	β	***P***	β	***P***	β	***P***	β	***P***
% black	-0.18	<0.0001	-0.08	<0.0001	-0.20	<0.0001	-0.22	<0.0001
% married	0.11	<0.0001	0.05	<0.0001	0.10	<0.0001	0.09	<0.0001
% female HOH	-0.15	<0.0001	-0.07	<0.0001	-0.17	<0.0001	-0.18	<0.0001
% English	0.03	0.003	0.01	0.02	0.03	0.5	0.03	0.5
% HS graduates	0.16	<0.0001	0.07	<0.0001	0.19	<0.0001	0.22	<0.0001
% unemployed	-0.12	<0.0001	-0.06	<0.0001	-0.12	<0.0001	-0.12	<0.0001
% poverty	-0.14	<0.0001	-0.07	<0.0001	-0.17	<0.0001	-0.18	<0.0001
% <$30K	-0.15	<0.0001	-0.07	<0.0001	-0.17	<0.0001	-0.18	<0.0001
Gini index	-0.04	<0.0001	-0.02	<0.0001	-0.07	<0.0001	-0.05	0.0001
% public assistance	-0.18	<0.0001	-0.08	<0.0001	-0.18	<0.0001	-0.20	<0.0002
% owned	0.06	<0.0001	0.02	<0.0001	0.06	0.0002	0.04	0.003
% vacant	-0.10	<0.0001	-0.05	<0.0001	-0.14	<0.0001	-0.13	<0.0001
% crowded	-0.07	<0.0001	-0.03	<0.0001	-0.07	0.0005	-0.07	0.001

STR, standardized transplant ratio; IRR, incidence rate ratio; % black, percentage of population reporting black race; % married, percentage of the population aged 15+ reporting being married; % female HOH, percentage of households reporting female head of household; % English, percentage of population reporting English as their primary language, % HS graduates, percentage of population 25+ reporting being high school graduates or equivalent; % unemployed, percentage of population 15+ reporting being in labor market but unemployed; % poverty, percentage of households reporting income <100% federal poverty threshold; % <$30K, percentage of households reporting income <$30,000; Gini index, Gini index of income inequality; % public assistance, percentage of households reporting receipt of any public assistance; % owned, percentage of housing that is owned; % vacant, percentage of housing that is vacant; and % crowded, percentage of housing that is crowded (>1.5 persons per room in the dwelling). *Association between selected neighborhood characteristic and outcome (no covariates). **Poisson models were run with negative binomial distributions to account for overdispersion. Adjusted for age since expected counts and STRs were adjusted for age. ***Values for β are per sample SD for indicated characteristic.

The table shows the crude associations of each of the neighborhood characteristics with STR using the various alternate STR modeling strategies described above. Among the multi-level linear mixed models, Model 2 [outcome = log(STR+1)] produced lower estimates than Model 1 (outcome = STR), consistent with the transformation of the outcome. However, when the observed number of transplants rather than the STRs were modeled as outcomes, using GEE modeling, Models 3 (expected number of transplants as offset) and 4 (person-years as offset) gave similar estimates (Table 3). Model 4 (our primary model) has the advantage that it models the actual counts and person-years and does not involve the previously modeled expected counts or STRs; additionally, it provides an interpretable incidence rate ratio. However, Models 3 and 4 gave similar estimates, suggesting that the unknown variability in the modeling of the reported expected counts does not substantially bias the estimates.