

Analysis of Regional Mortality using Physician Network Characteristics

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November 10, 2015

Response

- ▶ Mortality Rates
(<http://http://www.dartmouthatlas.org/tools/downloads.aspx>)
- ▶ Rates of Ambulatory Care (Laditka et al 2003; Billings, Anderson, & Newman, 1996; Bindman et al., 1995; Millman, 1993)
- ▶ Age Adjusted Mortality
- ▶ Condition Specific Life Expectancy

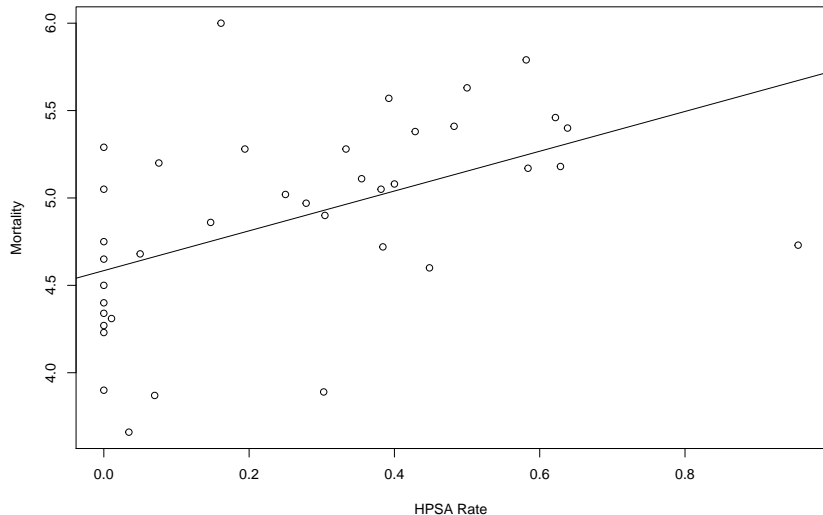
Predictors & Confounding Variables

- ▶ Physician Referral Network
(<https://questions.cms.gov/faq.php?faqId=7977>)
 - ▶ Density
 - ▶ Transitivity
 - ▶ Reciprocity
 - ▶ Betweenness Centralization
- ▶ HPSA Region (Factor)
- ▶ Percent Population below FPL
- ▶ Percent Population Minorities
- ▶ Percent Population 65+
- ▶ Income Disparity by GINI
- ▶ Percent Urban to Rural

HPSA as Predictor

Relation of HPSA to Mortality

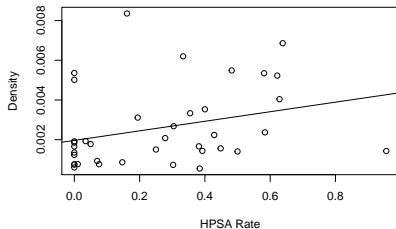
Mortality vs. HPSA Rate



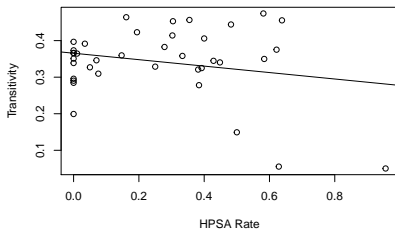
HPSA as Predictor

Relation of HPSA to Network Characteristics

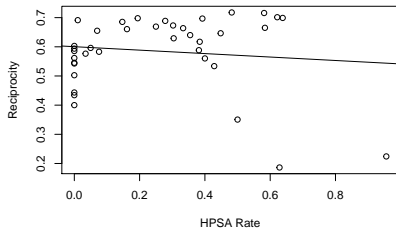
Density vs. HPSA Rate



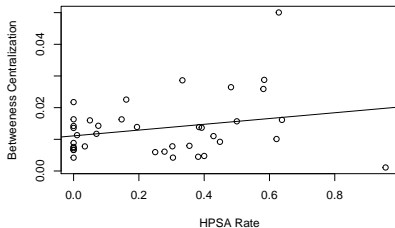
Transitivity vs. HPSA Rate



Reciprocity vs. HPSA Rate



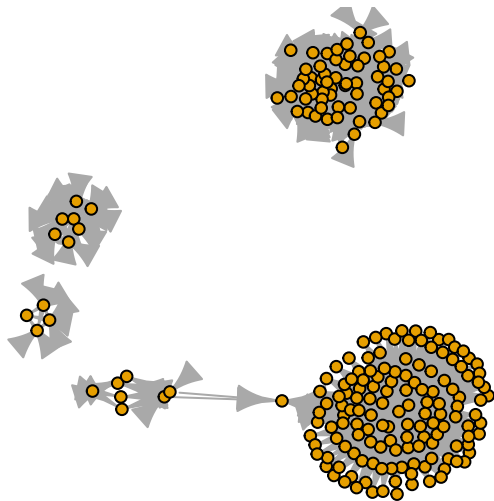
Betweenness Centralization vs. HPSA Rate



Initial Network Modeling

Sample HRR Physician Network (Alaska)

- ▶ Density: 0.0014 – Transitivity: 0.0502
- ▶ Reciprocity: 0.2242 – Betweenness Centralization: 0.0137



Initial Regression Modeling

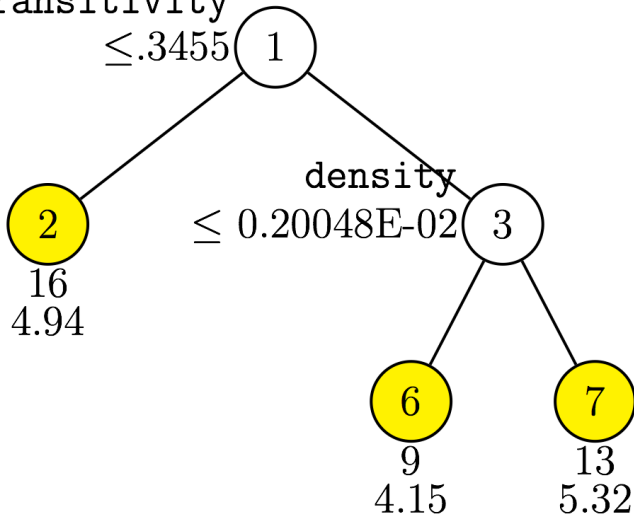
Results of Linear Model

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	4.3476	0.3471	12.53	0.0000
Density	219.2241	48.4758	4.52	0.0001
Transitivity	-3.8029	1.6353	-2.33	0.0263
Reciprocity	2.1814	1.1072	1.97	0.0573
BetweennessCentralization	-0.5314	9.4679	-0.06	0.9556

Initial Regression Modeling

Regression Tree

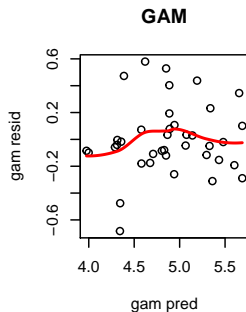
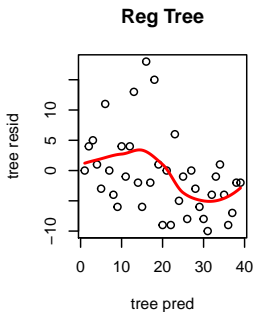
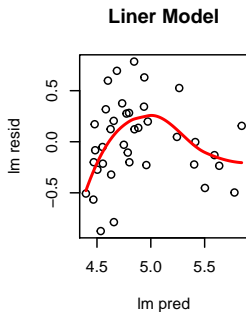
transitivity
 $\leq .3455$



Initial Regression Modeling

Generalized Additive Model

- ▶ Full Linear: $AIC = 48.07$
- ▶ Full Additive: $AIC = 41.78$
- ▶ Reduced Additive: $AIC = 36.73$



Questions

- ▶ Response
- ▶ Covariates
- ▶ Network Characteristics
- ▶ Analysis Techniques