Model Building

Lecture 14

STA 371G

There is a Primary Care Physician Shortage in Texas!

35 Texas Counties Have Zero Physicians

John Commins, May 6, 2015

Even if you don't live in Texas, these numbers should scare anyone who cares about rural healthcare, because this crisis is not unique to Texas.

How bad is the provider shortage in Texas?

There is a Primary Care Physician Shortage in Texas!

HealthLeaders *Media*

Sign up for E-Newsletters | Store

35 Texas Counties Have Zero Physicians

John Commins, May 6, 2015

Even if you don't live in Texas, these numbers should scare anyone who cares about rural healthcare, because this crisis is not unique to Texas.

How bad is the provider shortage in Texas?

What might explain this? There are many potential predictors!

- Small counties
- Poverty
- Health insurance smallest population

- Unemployment
- Large rural areas
- Something else?

What to do if there a lot of potential predictors

- Previously, we assumed that the explanatory variables were either from a small set or chosen in advance.

What to do if there a lot of potential predictors

- Previously, we assumed that the explanatory variables were either from a small set or chosen in advance.
- However, selecting the explanatory variables, or figuring out what predicts the number of physicians that a county has, is a large part of the analysis in this case.

What to do if there a lot of potential predictors

- Previously, we assumed that the explanatory variables were either from a small set or chosen in advance.
- However, selecting the explanatory variables, or figuring out what predicts the number of physicians that a county has, is a large part of the analysis in this case.
- This type of analysis is an exploratory study.

An exploratory study of the Texas physician shortage

- Exploratory studies are observational studies, in that the variables are observed rather than controlled, which is different from an experiment.

An exploratory study of the Texas physician shortage

- Exploratory studies are observational studies, in that the variables are observed rather than controlled, which is different from an experiment.
- Multicollinearity is much more likely in an exploratory study than in an experiment or a confirmatory study.

An exploratory study of the Texas physician shortage

- Exploratory studies are observational studies, in that the variables are observed rather than controlled, which is different from an experiment.
- Multicollinearity is much more likely in an exploratory study than in an experiment or a confirmatory study.
- Exploratory studies require the most in terms of model selection. Automated tools are helpful, but judgement is still needed!

Population as a predictor of number of physicians

```
plot(counties$Population, counties$Physicians)
popmodel <- lm(counties$Physicians ~ counties$Population)
abline(popmodel)
```
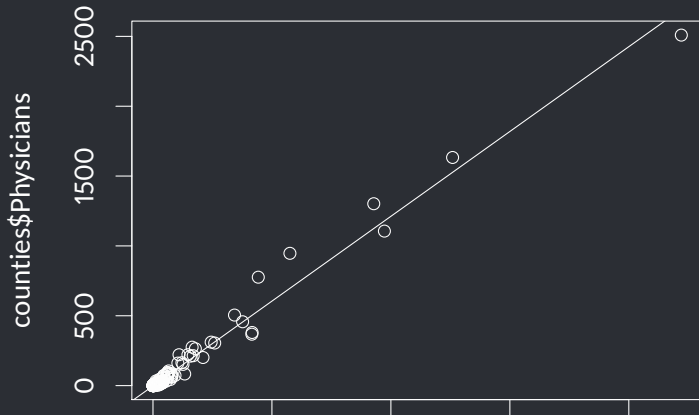
Transform and Subset the data

```
# Transform Physians
counties$PhysiciansPer10000 <- (counties$Physicians / coun-
ties$Population) * 10000

# Remove the very small and very large counties
mcounties <- counties[counties$Population < 500000 & coun-
ties$Population > 10000,]

# Show medium counties with no physicians
mcounties[mcounties$Physicians == 0, c(1,5,12)]

      X...County Population Physicians
157     Live Oak      12091            0
159        Duval      11533            0
```

The 10 potential x variables

- LandArea
- Pct$_R$*uralMedianIncome*
- Population
- PctUnder18
- PctOver65
- PctPoverty
- PctUninsured
- PctSomeCollege
- PctUnemployed