Regression Analysis

Regression Analysis in Practice

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Healthcare Costs: Findings

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About This Lesson

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Access to Care: Intervention

Access to Primary Care

- *Availability*
  - Proxy for appointment wait times
  - Takes values between 0 (low wait times) and 1 (high wait times)

Interpretation

- An increase of 1% in lack of availability of primary care providers results in $1.078 unit increase in ED cost PMPM, given all other predictors fixed

Policy Research Question

- Does improvement in availability of primary care providers reduce the cost of ED care?

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Findings: Access Intervention

```
newdata=dataAdult.no.out
index = which(newdata$Availability >= 0.5)

# Improve Availability to at most 0.5 congestion experienced by all communities
newdata$Availability[index] = 0.5

# Predict by changing Availability with all other predictors fixed
EDCost.predict = predict(reg.step.no.out, newdata, interval="prediction")[,1]

# Compare predicted to fitted for those communities with intervention
EDCost.diff.fitted = exp(fitted(reg.step.no.out)) - exp(EDCost.predict)
hist(EDCost.diff.fitted[index], xlab="Difference in Expected versus Predicted ED Cost",
     main="Predicted vs. Fitted with Intervention", col="orange")

# Compare predicted to observed for those communities with intervention
EDCost.diff.observed = EDCost.pmpm[-909] - exp(EDCost.predict)
summary(EDCost.diff.observed[index])
hist(EDCost.diff.observed[index], xlab="Difference in Observed versus Predicted ED Cost",
     main="Predicted vs. Observed with Intervention", col="red")
```

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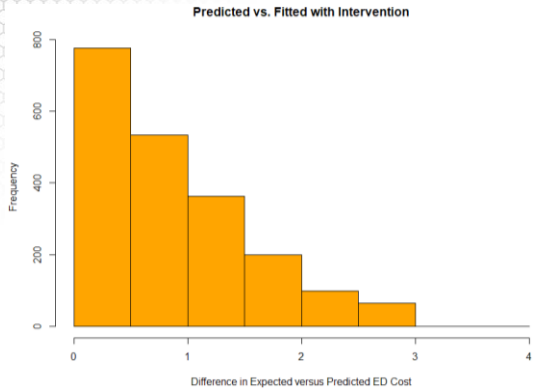
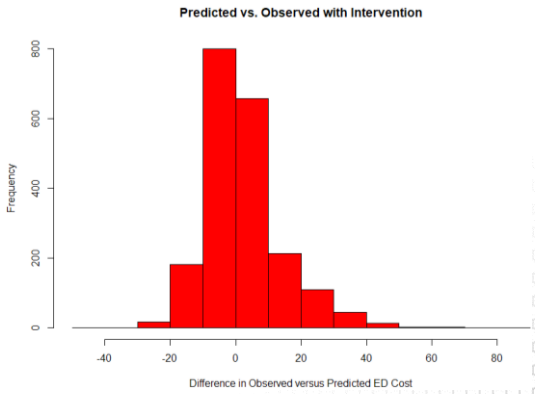
Findings: Access Intervention





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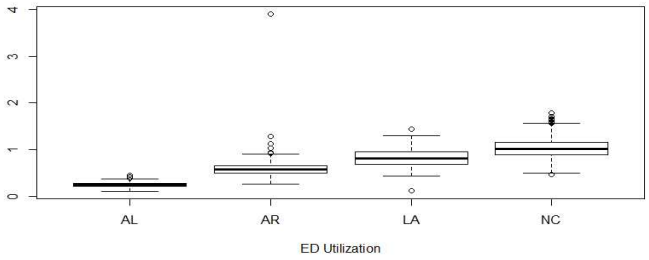
Findings: State Variations

- Large variations in ED healthcare cost across the four states
  - North Carolina leads and Alabama trails in ED care cost. ***Why?***
    - Medicaid programs vary by state
      - Different health policies and reimbursements levels
    - North Carolina leads and Alabama trails also in ED utilization PMPM



The correlation between ED cost and ED utilization is 0.899

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Findings: Utilization

- Utilization of physician office visits is positively associated with ED cost of care given the other predicting variables fixed in the model
  - Correlation between utilization of physician office visits and utilization of ED is high (0.54)
    - There may be communities with higher utilization of healthcare in general and thus higher ED costs
- Utilization of inpatient care (hospitalizations) is positively associated with ED cost of care given the other predicting variables fixed in the model
  - There is a very weak correlation between utilization of inpatient care and utilization of ED
  - Further investigation is needed

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Findings: Other Variables

- *Education* is the only socioeconomic variable selected in the reduced model
  - Other socioeconomic variables do not add additional explanatory power given the other predicting variables in the model
- Availability of primary care providers is statistically significantly associated with ED cost of care
  - Intervening to improve availability shows a reduction in the expected ED cost of care according to the fitted model
    - Such analysis relies on causal inference
- Whether living in urban or rural communities is not statistically significantly associated to ED cost of care given other predicting variables in the model

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Summary