GIS for Decision Making in a Local Health Department Setting: A review of health center placement

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• Jefferson County
  • Population 659,503
    • Black – 41.1%
    • White – 56.3%
    • Hispanic (any race) – 3.1%
  • Med HH – 46,305

• Birmingham, AL
  • Population 210,422
    • Black - 71.9%
    • White - 23.9%
    • Hispanic (any race) - 3.9%
  • Med HH – 32,630

• JCDH Patient Population
  • Population approx. @ 43,133
    • Black – 78.8%
    • White – 19.7%
    • Hispanic (any race) – 12.4%
  • Majority of patients use Medicaid, Medicare, AllKids, etc.

2008 U.S. Census Estimates
Jefferson County Department of Health

- Location Quotient
  - Ratio of poverty concentration in Jefferson County compared to AL
- Seven Health Centers (HC)
  - Bessemer (BHC)
  - Western (WHC)
  - West End (WEHC)
  - Central (CHC)
  - Northern (NHC)
  - Eastern (EHC)
  - Morris (MHC)
Jefferson County Department of Health

• JCDH operated seven health centers in 2008
  – 4 were running below capacity
  – Cost to operate was growing larger than income
• Patient population was declining
  – 14.4% between 2000 and 2008
• Shift in thought
  – turning away from neighborhood based health centers
GIS Questions

• Where do JCDH patients live and how far from their center of choice?

• What proportion of JCDH patients are served in a reasonable distance from a HC?

• What would center consolidation look like?
Where do JCDH patients live?

- Distance between points - distance between residence and health center of choice
- Some patients pass HC to reach their HC of choice
- Avg. distance ranged from 4.9 to 9.0 miles
- Overall patients, on average, drive 6 miles to a HC
Where do JCDH patients live?

- Test for Spatial Autocorrelation
  - Percent of population that are JCDH patients
Where do JCDH patients live?

- Test for High/Low clustering
- Percent of population that are JCDH patients
What proportion of JCDH patients are served?

- 6 mile radius around HC
- Seven HC, 84% of patients served in 6 miles of residence
What would consolidation look like?

- Kriging Prediction
- Highlight areas for a HC facility based on current population
What would consolidation look like?

- Mean $X,Y$ of western Jefferson County patients
- Central feature between BHC and WHC in the Fairfield/Midfield area
What would consolidation look like?

- 6 mile radius around HC
- Three HC, 81% of patients served in 6 miles of residence
What would consolidation look like?

- 3 HC - 6 mile radius encompass Kriging prediction areas
Summary

• JCDH centers located where patients live

• Patients clustered together

• A reduction in centers = 3% drop in coverage within 6 miles
Conclusions

• Administration considered the GIS results along with other research
• Scenario being debated
  – Close NHC
  – Keep MHC
  – Look for property in Midfield/Fairfield area to consolidate and replace WHC and BHC
  – Renovate CHC to accommodate WEHC
  – Keep EHC
Limitations

• Simple methodology
• Residence to HC
  – More advanced methods could yield different result such as Network Analyst
  – Patients may not travel from residence e.g. work, school
• Facility capacity and staff requirements need to be addressed
• Evaluate cost effectiveness
Literature Review

Thank You

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Software used: ArcView 9.3