NEIGHBORHOOD SOCIOECONOMIC STATUS AND PRIMARY CARE ACCESS IN GREATER PHILADELPHIA

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Disclosures

For Mustafa Hussein

No Financial Relationships to Disclose
No Discussion of “Off-Label” Use of Substances to Disclose

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  The Diez Roux Research Group
Outline

- The neighborhood as a determinant of access to care
- Variation in the type of usual source of care by neighborhood SES
- Multilevel analysis of regional data
- Key Findings
- Implications for research and policy in a Health Reform era

Primary Care Access

- **Key Measure**: Having an identifiable usual source of care (USC) (IOM 1996; Starfield, Shi, & Macinko 2005)
  - Ensures timely access, coordination, and patient-centeredness (Ettner 1996)
  - Might reduce negative health effects of social disadvantage (Shi et al. 2005)
- **Existing Disparities**: low-income, uninsured, minorities less likely to have a USC (AHRQ 2014; Forrest & Whelan 2000; NACHC 2014)
  - Safety net provides care for the disadvantaged
  - Community health centers (CHCs) key provider

Neighborhood as a Determinant of Access

- Predominant focus on individual-level factors in the HSR literature (Bodrick et al. 2012; Bureau, Givens, & Vingel 2011)
- Sociological theory on access (Andersen’s model) and neighborhood effects research suggest important role (Andersen 2008; Davidson et al. 2004; Diez Roux & Mair 2010)
- Neighborhoods stratified by race and socioeconomic status ⇒ variation in quality, amenities, & behaviors
  - Residents sorted into distinct healthcare markets
  - Social capital effects on availability, awareness, & attitudes towards healthcare (Bureau & Van de Veld 2009)
Prior Work on Neighborhood SES & Access

- Limited Literature: (Auchincloss et al, 2001; Kirby & Kaneda, 2005; Prentice, 2006; Ryvicker et al, 2012)
- Auchincloss et al 2001: Living in a poor neighborhood → 5% increase in access problems
- Kirby & Kaneda 2005: 1-SD higher neighborhood social disadvantage → 13% less likely to have a USC
- Prentice 2006 (LA) & Ryvicker et al 2012 (NYC): social capital and local provider supply important
- More studies focused on county and metropolitan SES (Brown et al 2004; Litaker et al 2005)

Why Revisiting Neighborhood SES & Access?

- Limitations of existing literature:
  - Lumping USC types together
  - Likely underpowered for neighborhood SES & supply interactions
  - Modeled many neighborhood covariates together
  - Changes over recent years remain unknown
- The Affordable Care Act:
  - Changes in primary care supply, delivery, & payment
  - Spatially-based variations in implementation

Research Questions

1) To what extent is the type of USC an individual relies on independently associated with the SES of his/her residential neighborhood?
2) How, if any, has this association changed in the recent decade from 2002-2012?
3) To what extent does this association vary by the level of provider supply in the neighborhood’s local service area?
**Approach**

Neighborhood Effect on Primary Care: A Working Causal Structure (DAG)

![Directed Acyclic Graph (produced by DAGitty)](image)

**Data**

- **Contextual Data**: respondents were linked to
  - Provider supply data in local Primary Care Service Areas (PCSAs): PCSAs proxy primary care markets or “activity space” (Goodman et al. 2003; White, Haas, & Williams 2012)
  - N (median per tract)=9; n (median per PCSA)=93

**Measures**

- **Outcome**: Self-reported Usual Source of Care: 0=No USC; 1=Physician Office; 2=CHC; 3=Outpatient Clinic
- **Exposure**: Neighborhood SES = Census tract median household income (quintiles then low/mid/high)
- **Covariates**:
  - Provider Supply in PCSA (z scores): Primary Care Providers (PCPs), foreign-trained PCPs, CHCs, Hospital EDs, and outpatient departments
  - Confounders: individuals’ demographics, SES, insurance, and behaviors; neighborhood composition
### Approach: Statistical Analysis

- **Multi-level Multinomial Logit Models**, with robust standard errors (Grilli and Rampichini 2007; Skrondal and Rabe-Hesketh 2003)
- Multi-level (mixed-effects) linear predictor of the probability of having USC \( m \):
  \[
  \eta_{ij}(m) = \beta_{00}(m) + \gamma_{00}(m) \text{Income}_0j + \gamma_{00}z(m)Z_0j + \sum_{t=2004}^{2012} \beta_{0jt}(m)T_{ijt} + \mu_0j + \epsilon_{ij}(m)
  \]
  - Conditional Probability of having USC \( m \):
  \[
  Pr(Y_{ij}=m|X_{ij},Z_0j,\mu_0j) = \frac{\exp(\eta_{ij}(m))}{\sum_{l=1}^{M} \exp(\eta_{ij}(l))}
  \]

### Approach: Limitations

- Generalizability to other urban areas
  - Large sample size and wide variation
- Phone survey, low response rate (20%)
  - Comparable to other major phone surveys ( пом. 2013)
- No data on supply of non-physician providers and CHC “look-alikes”
  - Included CHC and foreign-PCP supply
- Sizable crossing across PCSA boundaries
- No objective measure of utilization

### Findings: USC Type by Neighborhood Income Quintiles

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>10,973</td>
<td>11,071</td>
<td>11,101</td>
<td>11,220</td>
<td>11,163</td>
<td>55,528</td>
</tr>
<tr>
<td>Proportion</td>
<td>19.76</td>
<td>19.94</td>
<td>19.99</td>
<td>20.21</td>
<td>20.10</td>
<td>100</td>
</tr>
<tr>
<td>Had no USC</td>
<td>12.74</td>
<td>11.54</td>
<td>9.88</td>
<td>8.48</td>
<td>8.04</td>
<td>10.12</td>
</tr>
<tr>
<td>Physician Office</td>
<td>61.00</td>
<td>76.70</td>
<td>84.61</td>
<td>87.09</td>
<td>88.42</td>
<td>79.64</td>
</tr>
<tr>
<td>CHC or Public Clinic</td>
<td>13.88</td>
<td>5.26</td>
<td>2.08</td>
<td>1.42</td>
<td>1.05</td>
<td>4.70</td>
</tr>
<tr>
<td>Hospital Outpatient Department</td>
<td>9.69</td>
<td>4.25</td>
<td>1.94</td>
<td>1.53</td>
<td>1.12</td>
<td>3.68</td>
</tr>
<tr>
<td>Other</td>
<td>2.69</td>
<td>2.25</td>
<td>1.49</td>
<td>1.49</td>
<td>1.37</td>
<td>1.85</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

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Findings
Supply of health centers markedly patterned by neighborhood SES than PCP supply (Map)

Findings
More reliance on safety net, less on physician offices in low-income neighborhoods (Map)

Findings
No gap in lacking a USC; Physician office USC less likely in low-income neighborhoods

Adjusted associations of neighborhood income with usual sources of care (USC)

<table>
<thead>
<tr>
<th>Probability Difference, percentage points [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>No USC</td>
</tr>
<tr>
<td>Low-Income, (Q1: &lt;$37K)</td>
</tr>
<tr>
<td>4.00 [-0.04, -0.29, -0.37]</td>
</tr>
<tr>
<td>Middle-Income, (Q2: $37-$55K)</td>
</tr>
<tr>
<td>2.66 [-0.28, -0.15, -0.53]</td>
</tr>
<tr>
<td>High-Income, (Q3-5: ≥ $55K)</td>
</tr>
<tr>
<td>Ref Ref Ref Ref</td>
</tr>
</tbody>
</table>

| No USC: Physician’s Office                         |
| Low-Income, (Q1: <$37K)                           |
| -25.76 [-26.74, -24.78]                           |
| Middle-Income, (Q2: $37-$55K)                     |
| -10.01 [-10.88, -9.14]                            |
| High-Income, (Q3-5: ≥ $55K)                       |
| Ref Ref Ref Ref                                    |

*p < 0.10, † p < 0.05, ‡ p < 0.01.

Model 1: adjusted for survey year;
Model 2: Model 1 + individual and neighborhood confounders;
Model 3: Model 2 + healthcare supply;
Model 4: Model 3 + behaviors, insurance, and health status.

Source: Author Analysis of the Southeastern Pennsylvania Household Health Survey, 2002-2012
Safety-net USC's more likely in low-income neighborhoods

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Income, &lt;$37K</td>
<td>12.45 [11.79, 13.12]‡</td>
<td>2.08 [1.42, 2.75]‡</td>
<td>1.82 [1.15, 2.50]‡</td>
</tr>
<tr>
<td>Middle-Income, $37-$55K</td>
<td>3.75 [3.32, 4.19]‡</td>
<td>0.50 [-0.03, 1.02]</td>
<td>0.49 [-0.05, 1.03]</td>
</tr>
<tr>
<td>High-Income, ≥$55K</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>Hospital Outpatient Dept.</td>
<td>8.06 [7.49, 8.62]‡</td>
<td>1.61 [0.97, 2.26]‡</td>
<td>1.33 [0.67, 1.99]‡</td>
</tr>
<tr>
<td>Low-Income, &lt;$37K</td>
<td>2.79 [2.39, 3.20]‡</td>
<td>0.37 [-0.12, 0.86]</td>
<td>0.43 [-0.08, 0.94]</td>
</tr>
<tr>
<td>Middle-Income, $37-$55K</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>High-Income, ≥$55K</td>
<td>Ref</td>
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Source: Author Analysis of the Southeastern Pennsylvania Household Health Survey, 2002-2012.
Discussion | Key Findings

- Above and beyond individuals’ own SES, race, or insurance, living in a low-income (vs. high-income) neighborhood has persistently been associated with:
  - No different probability of lacking a USC
  - Lower probability of having a physician office USC
  - Even lower in low-supply, underserved PCSAs
  - Higher probability of relying on a CHC or an outpatient clinics
  - Magnitude comparable to individual-level factors
  - Healthcare supply partially explains patterns

Discussion | Comparison & Explanation

- Findings consistent with literature on USC types (Forrest & Whelan 2000; Shi et al 2010; Shi et al 2012) and literature on the role of supply in neighborhood variation in access (Mobley et al 2006; Ryvicker et al 2012)
- Findings extend & update literature on neighborhood SES and access (Auchincloss et al, 2001; Kirby & Kaneda, 2005; Prentice, 2006)
- Beyond provider supply, neighborhood variation in USC type might also be driven by:
  - Provider characteristics (CHCs more convenient for residents of low-income neighborhoods)
  - Neighborhood social capital

Discussion | Policy Implications

- Safety-net providers compensate for the lower access to physician offices in low-income neighborhoods
  - Help narrow neighborhood gap in overall access
- Safety net challenged under the ACA (Hall 2011; Analysis & Glisan, 2011; Summer 2011)
  - Increasing demand by newly insured populations
  - Financially strained & under-resourced, thwarting ability to ensure equitable access or invest in quality improvement
Need to monitor equity in access across neighborhoods with ACA implementation

Three policy proposals to support the safety net:
1) Ensure adequate federal funding for CHCs
   Federal funding = 40% of CHC revenue (NACHC 2014)
2) Reform Medicaid reimbursement
   Medicaid reimbursement levels & process
   Can bolster financial viability of safety net and incentivize providers to accept Medicaid
3) Expand provider supply to primary care “deserts”
Cited Bibliography

Neighborhood SES & Primary Care Access in Greater Philadelphia
Mustafa Hussein, PhD, Drexel University
APHA Annual Meeting, Chicago, IL, Nov. 2015


