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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  Ana Diez Roux, Dean of the Dornsife School
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  Kari Moore
  Steven Melly
  Katie Livengood
  The Diez Roux Research Group

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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

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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

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Neighborhood as a Determinant of Access

- Predominant focus on individual-level factors in the HSR literature (Babitsch et al 2012; Derose, Gresenz, & Ringel 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 (Derose & Varda 2009)

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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)

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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

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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?

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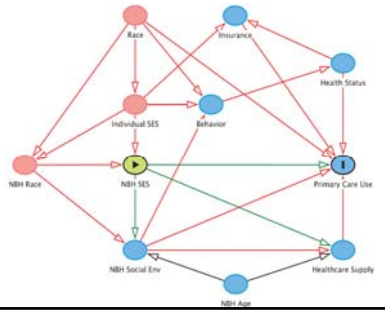
Approach | Neighborhood Effect on Primary Care: A Working Causal Structure (DAG)

Directed Acyclic Graph (produced by DAGitty)



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Approach | Data

- **Individual-level (n=55,528)**: Southeastern Pennsylvania Household Health Survey (phone), time-series cross-sectional data 2002-2012 (PHMC, 2012);
- **Contextual Data**: respondents were linked to
  - Census tract (neighborhoods) demographic data: 2000 Census & ACA 2005-09 & 2007-11
  - 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

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Approach | 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

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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*:

$$\eta_{ij}^{(m)} = \beta_{00}^{(m)} + \gamma_{00}^{(m)} . N'hood\text{-}Income_{0j} + \gamma_{00Z}^{(m)} . Z_{0j} + \sum_{t=2004}^{2012} \beta_{0jt}^{(m)} . T_{ijt} + \beta_{0jx}^{(m)} . X_{ij} + \mu_{0j} + \varepsilon_{ij}^{(m)}$$

  - Conditional Probability of having USC *m*:

$$Pr\left(Y_{ij}=m \mid X_{ij}, Z_{0j}, \mu_{0j}\right) = \frac{exp\left\{\eta_{ij}^{(m)}\right\}}{exp\left\{\eta_{ij}^{(0)}\right\} + \sum_{l=1}^{M} exp\left\{\eta_{ij}^{(l)}\right\}} = \frac{exp\left\{\eta_{ij}^{(m)}\right\}}{1 + \sum_{l=1}^{M} exp\left\{\eta_{ij}^{(l)}\right\}}$$

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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 (Pew 2012)
- 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

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Findings | USC Type by Neighborhood Income Quintiles

	Q1: $12-$37K	Q2: $37-$55K	Q3: $55-$72K	Q4: $72-$95K	Q5: $95-$277K	Overall
Sample Size	10,973	11,071	11,101	11,220	11,163	55,528
Proportion	19.76	19.94	19.99	20.21	20.10	100
Type of USC (%)						
Had no USC	12.74	11.54	9.88	8.48	8.04	10.12
Physician's Office	61.00	76.70	84.61	87.09	88.42	79.64
CHC or Public Clinic	13.88	5.26	2.08	1.42	1.05	4.70
Hospital Outpatient Department	9.69	4.25	1.94	1.53	1.12	3.68
Other	2.69	2.25	1.49	1.49	1.37	1.85
Total	100	100	100	100	100	100

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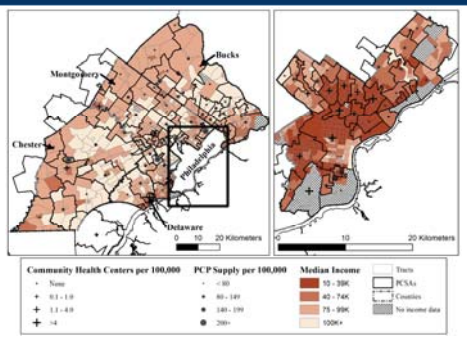
Findings

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



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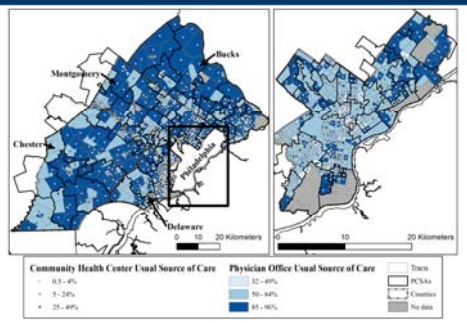
Findings

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



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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)

	Model 1	Model 2	Model 3	Model 4
	Probability Difference, percentage points [95% CI]			
No USC				
Low-Income, (Q1: <$37K)	4.00	-0.04	-0.29	-0.37
	[3.30,4.70]‡	[-1.15,1.06]	[-1.40,0.83]	[-1.46,0.71]
Middle-Income, (Q2: $37-$55K)	2.66	-0.28	-0.15	-0.53
	[1.99,3.32]‡	[-1.11,0.54]	[-0.98,0.69]	[-1.33,0.28]
High-Income, (Q3-5: ≥$55K)	Ref	Ref	Ref	Ref
USC: Physician's Office				
Low-Income, (Q1: <$37K)	-25.76	-4.40	-3.52	-3.03
	[-26.74,-24.78]‡	[-5.80,-3.00]‡	[-4.92,-2.11]‡	[-4.40,-1.66]‡
Middle-Income, (Q2: $37-$55K)	-10.01	-1.01	-1.20	-0.51
	[-10.88,-9.14]‡	[-2.04,0.02]*	[-2.25,-0.15]†	[-1.53,0.51]
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

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Findings
Safety-net USCs more likely in low-income neighborhoods

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

	Model 1	Model 2	Model 3	Model 4
	Probability Difference, percentage points [95% CI]			
USC: Community Health Center				
Low-Income, (Q1: <$37K)	12.45	2.08	1.82	1.61
	[11.79,13.12]‡	[1.42,2.75]‡	[1.15,2.50]‡	[0.93,2.28]‡
Middle-Income, (Q2: $37-$55K)	3.75	0.50	0.49	0.28
	[3.32,4.19]‡	[-0.03,1.02]*	[-0.05,1.03]*	[-0.26,0.81]
High-Income, (Q3-5: ≥$55K)	Ref	Ref	Ref	Ref
USC: Hospital Outpatient Dept.				
Low-Income, (Q1: <$37K)	8.06	1.61	1.33	1.18
	[7.49,8.62]‡	[0.97,2.26]‡	[0.67,1.99]‡	[0.52,1.84]‡
Middle-Income, (Q2: $37-$55K)	2.79	0.37	0.43	0.36
	[2.39,3.20]‡	[-0.12,0.86]	[-0.08,0.94]*	[-0.15,0.87]
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

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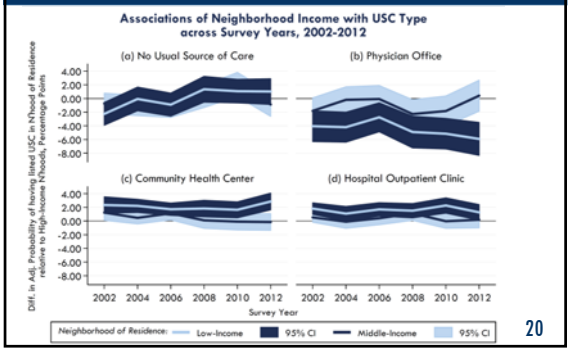
Findings
Patterning of USC type by neighborhood SES largely stable in recent years



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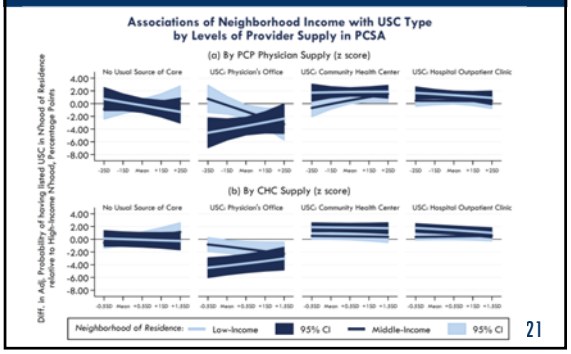
Findings
Having a physician office USC much less likely in a low-income, low-supply area



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Discussion | Key Findings

- **Above and beyond individuals' own SES, race, or insurance,** living in a low-income (vs. a 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

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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

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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; Andrulis & Siddiqui 2011; Summer 2011)
  - Increasing demand by newly insured populations
  - Financially strained & under-resourced; thwarting ability to ensure equitable access or invest in quality improvement

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Discussion | Proposals for Research & Policy

- 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"

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Thank You!

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