Connecting Concentrated Disadvantage and Birth Outcomes to Enhance Program Targeting

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BACKGROUND

Problem: Scarce Local Level Data

- Identifying target communities for public health programs can be challenging when local-level health data are unavailable or unreliable.
- In the absence of local data, jurisdictions may rely on state or regional estimates for program planning.

Concentrated Disadvantage [1]

- Individual measures of poverty or income do not capture the synergistic effects of factors that cluster together to create disadvantaged communities.
- Concentrated disadvantage (CD) is one of 59 "life course indicators" developed by the Association of Maternal and Child Health Programs (AMCHP).
- CD measures community economic strength by combining data from five measures related to income, poverty, and employment.
- CD can impact health through reduced access to health care, social services, resources, skills, work, education, technology, nutrition, and safety.
- CD has been associated with educational attainment, youth delinquency, mental health, and overall health status ; less is known about how it is associated with maternal and child health outcomes.

Study Objectives

- Calculate CD at the county level for Illinois.
- Examine the relationship between county-level CD and birth outcomes to determine whether CD is a reasonable proxy to inform geographical targeting of MCH programs.

METHODS

Concentrated Disadvantage

Data Sources

- 2010 Decennial U.S. Census
- 2008-2012 American Community Survey (ACS), 5-year estimates

Calculation Methods [1]

- Five variables from the Census and ACS were obtained by county
  - Percent of individuals living in poverty [2]
  - Percent of individuals living households receiving public assistance [3]
  - Percent of households headed by a female [4]
  - Percent of the population 16 or older who were unemployed [5]
  - Percent of the population that is less than 18 years old [6]
- The average of the county values was determined for each variable
- For each variable, a z-score was calculated to indicate how far the county fell from the average
- The five z-scores for a county were averaged to determine an overall z-score
- Counties were sorted by overall z-score and divided into four quartiles

Mapping Methods

- Census 2010 TigerLine shapefile with county boundaries obtained for Illinois
- ArcGIS v.10.2 used to map the quartiles of concentrated disadvantage by county

MCH Indicators

Data Sources

- Vital Records: 2010 Illinois birth certificates (BC); 2009-2011 Illinois death certificates (DC)
- 2010 Census population estimates for women 15-19 years old (PE)

Calculation Methods

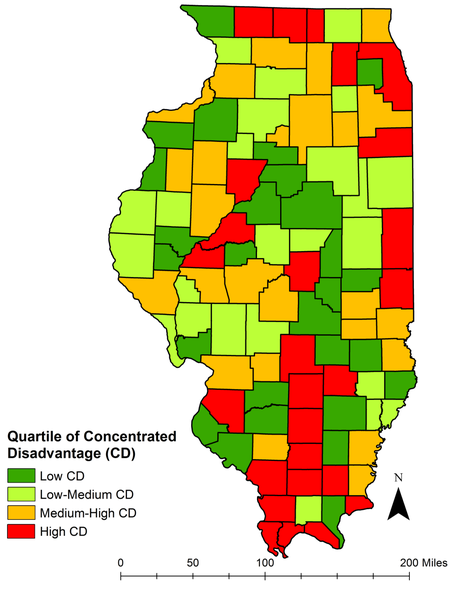
- % Low Birth Weight (LBW): # infants 350-2499g (BC) ÷ # infants with known birth weight (BC)
- % Very Low Birth Weight (VLBW): # infants 350-1499g (BC) ÷ # infants with known birth weight (BC)
- Infant Mortality Rate (IMR): # deaths to infants < 1 year age (DC) ÷ # live births (BC) * 1000
- % Less Than Adequate Prenatal Care: # infants whose mother received inadequate or intermediate prenatal care (BC) ÷ # infants with known adequacy of prenatal care utilization (APNCU) index (BC)
  - The APNCU index determines adequacy of prenatal care by considering both timing of prenatal care initiation and the number of visits for the gestational age of the infant
- Teen Birth Rate: # live births to women 15-19 years old (BC) ÷ # women 15-19 in population (PE) * 1000

Statistical Methods

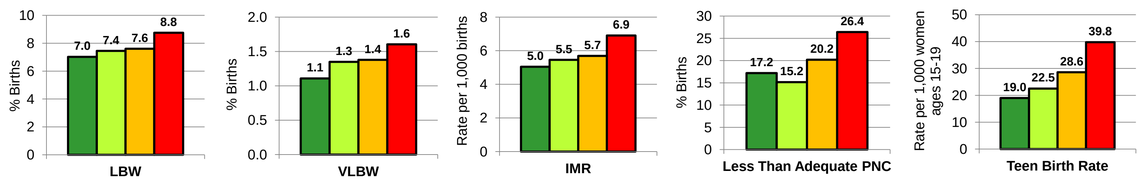
- The numerators and denominators for the five indicators were determined for each of the CD quartiles
- Crude binomial regression was used to assess whether each CD quartile's rates were significantly different from rate in the reference group (the lowest CD quartile)
- All analyses conducted in SAS v.9.4

RESULTS

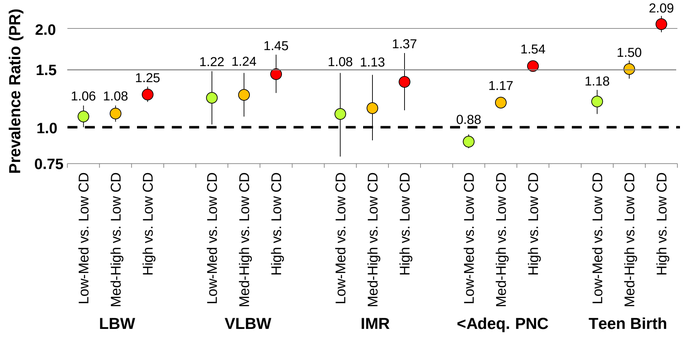
Concentrated Disadvantage, By Illinois County, 2008-2012



Prevalence of Five MCH Indicators, By Quartile of Concentrated Disadvantage for County of Residence



Prevalence Ratio and 95% Confidence Interval of Five MCH Indicators, By Quartile of Concentrated Disadvantage for County of Residence



Interpretation

- **In general, the prevalence of the five MCH indicators increased with increasing quartile of county-level CD.**
- For all five outcomes, the prevalence among high CD counties was significantly higher than low CD counties.
- For LBW, VLBW, and IM, the rates for low-medium and medium-high CD counties were similar to each other and not substantially different from the low CD counties.
- Of the five outcomes, teen birth showed the strongest dose-response relationship with CD quartile.
- The rate of less than adequate prenatal care was significantly lower in low-medium CD counties than low CD counties.

LIMITATIONS & FUTURE RESEARCH

- Birth data were not geocoded to the census tract level, so a more granular look at the relation of CD and birth outcomes was not possible.
- The purpose of this study was to identify a simple way to target communities at high-risk of adverse MCH outcomes, not to establish the impact of CD separate from other risk factors. Future studies could adjust for individual- and community-level confounders to determine an independent effect.
- Many organizations are calling for a place-based approach to health equity, but place alone may not fully explain racial/ethnic disparities. Future studies could assess interaction between CD and maternal race/ethnicity to determine how race and place combine to impact MCH outcomes.

CONCLUSIONS & PUBLIC HEALTH IMPLICATIONS

- High county-level concentrated disadvantage was associated with all five MCH indicators: LBW, VLBW, Infant Mortality, Less Than Adequate Prenatal Care, and Teen Birth.
- Because CD was strongly correlated with a variety of MCH indicators, it may be useful for targeting public health programs in the absence of local data.
- CD can be calculated at more specific geographic areas than most health indicators (such as census tract), so it may be useful for determining how to allocate resources and programs within a county or within a city.

CONTACT INFORMATION

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REFERENCES

1 Association of Maternal and Child Health Programs (2013). Life Course Indicator: Concentrated Disadvantage. Retrieved from: http://www.amchp.org/programsandtopics/data-assessment/LifeCourseIndicatorDocuments/LC-06_ConcentratedDisad_Final-4-24-2014.pdf (10 November 2014).

2 U.S. Census Bureau; American Community Survey, 2008-2012 ACS 5-Year Estimates, Table S1702; generated by Amanda Bennett; using American FactFinder; http://factfinder2.census.gov; (12 Nov 2014).

3 U.S. Census Bureau; American Community Survey, 2008-2012 ACS 5-Year Estimates, Table B09010; generated by Amanda Bennett; using American FactFinder; http://factfinder2.census.gov; (12 Nov 2014).

4 U.S. Census Bureau; 2010 Census, Table DP-1; generated by Amanda Bennett; using American FactFinder; http://factfinder2.census.gov; (12 Nov 2014).

5 U.S. Census Bureau; American Community Survey, 2008-2012 ACS 5-Year Estimates, Table S2301; generated by Amanda Bennett; using American FactFinder; http://factfinder2.census.gov; (12 Nov 2014).

6 U.S. Census Bureau; American Community Survey, 2008-2012 ACS 5-Year Estimates, Table S0101; generated by Amanda Bennett; using American FactFinder; http://factfinder2.census.gov; (12 Nov 2014).