SES, Race, and Birth Outcomes: An Ecologic Study in Maryland

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Background

Low Birth Weight (LBW) and Preterm Birth (PTB) have serious developmental impacts for children. Births of less than 2500 grams, most of which are preterm, have been associated with developmental delays, heightened risk of disease in adulthood, effects on IQ, and increased infant mortality. The United States has long struggled with high LBW and PTB rates, and consistently ranks behind developed nations on these measures. According to 2011 Vital Statistics, Maryland's rate of LBW births is 8.9 percent and PTB is 10.2 percent. There is great variability in both PTB and LBW rates at the county level in Maryland (Figures 1 and 2). County-level LBW rates range from 5.6 percent in St. Mary's County to 11.6 percent in Baltimore. A similar variance is seen in PTB rates across counties (Figure 2).

Recent studies have suggested that living in a low-SES neighborhood increases exposure to environmental stressors, restricted access to health services, and unhealthy behaviors in pregnancy, and may explain the relationship between neighborhood-level demographics and PTB and LBW. The variability in SES across Maryland counties is wide, ranging from 22% in poverty in Baltimore City to less than 5% in Howard country. Research suggests that SES disparities have led to unequal distribution of educational resources, healthcare resources and social structures that would have otherwise supported healthy pregnancies and healthy birth outcomes. Racial disparities also exist in LBW and PTB rates. Communities with a high concentration of racial and ethnic minorities are considered to be at higher risk of LBW and PTB than communities with a high racial majority population. Current research suggests that we may expect PTB and LBW to be influenced by the neighborhood-level SES and the racial/ethnic makeup of the community. A review of the literature found there to be few ecologic studies of racial/ethnic and SES disparities in maternal and child health outcomes conducted in Maryland, with most of these studies concentrating on Baltimore City.

The purpose of this study will be to examine the relationship between neighborhood-level SES factors, racial/ethnic distribution, and rates of PTB and LBW births in the state of Maryland. Preliminary analysis has been conducted at the county level, and the next step will move to an analysis of these relationships at the census tract level. Previous research suggests the census tract level provides more precise area-level rates, and has been shown to have great power in analysis than the county level.

The racial and ethnic backgrounds of interest are White Non-Hispanic, Black Non-Hispanic, Hispanic (regardless of race), and Asian/Pacific Islander. As evidenced by the 2010 Census, Maryland has a highly diverse population. Over 30 percent of Maryland residents are African American and nearly 10 percent of the population are of Hispanic or Latino heritage (regardless of race), and there are substantial cross-county differences in racial/ethnic composition of the population. Table 1 contains demographics for select counties in Maryland. Recent vital statistics for Maryland show variability in racial risk for LBW and PTB at the county level. Risk ratios have been calculated based on available vital statistics reports. Results show that in all counties, African Americans have a higher risk for LBW and PTB when compared to Whites, but the risk ratio varies (Table 2).

Socioeconomic data also reveal great variability at the county level. Poverty rates, unemployment rates, educational attainment, and annual household income differ widely across the various counties in Maryland. For instance, recent poverty estimates show that 22.4 percent of Baltimore City residents live in poverty, while only 4.5 percent of Howard County residents live in poverty (Table 1).

Research Questions

The first research question is whether census tracts with higher levels of economic disadvantage will have higher rates of LBW and/or PTB. Second, we will ask how the racial/ethnic composition of a census tract is associated with rates of LBW and/or PTB. Lastly, we will ask how rates of LBW and/or PTB differ when comparing census tracts with a high racial/ethnic minority population and high SES to census tracts with a high racial/ethnic minority population and low SES. For example, we will compare LBW and/or PTB rates of census tracts with a high racial/ethnic majority population and high SES to census tracts with a high racial/ethnic majority population and low SES.

Description of Data

Data from Maryland Vital Statistics will provide us with LBW and PTB rates for census tracts. Overall population rates and rates by racial/ethnic background are available. Vital Statistics data from 2009-2011 will be used. Census tract populations are considered highly stable, and pooling data over multiple years will provide us a more accurate depiction of the relationship between neighborhood factors and birth outcomes. The midpoint for this range (2010) is a Census year, indicating that the 2009 and 2011 populations should remain similar to the 2010 Census population.

2010 Census data will be utilized to obtain socioeconomic factors at the census tract level for the state of Maryland. Population by race/ethnicity for each census tract will be used for analyses. Median Household Income, Poverty Rate, Unemployment Rate, and Educational Attainment for census tracts will be used to determine the census-tract level SES. The four SES indicators will be combined on a 0-4 scale to determine the degree of SES disadvantage on the census tract level. 0 will be the absence of any low SES indicator, with 4 being the presence of all 4 low SES indicators.

Analysis Plan

For the first question, we will regress LBW and PTB rates for the census tracts onto individual SES indicators. We will initially test the crude relationship and then the adjusted relationship by controlling for other SES indicators and race. Next, we will regress rate of LBW and PTB at the census tract level on the low SES indicator scale. LBW and PTB will be considered separate dependent variables. Race will be controlled in this analysis.
The second question will be analyzed by regressing LBW and PTB rates for the census tracts onto the separate race/ethnic categories. This will determine whether variation in the proportion of a specific racial group is related to variation in the odds of LBW or PTB for the census tract. LBW and PTB will be individual dependent variables in this analysis. SES indicators will be controlled in this analysis.

For the third question, census tracts will be categorized based on the racial/ethnic group with the highest percentage of the population and the presence of low SES indicators. Census tracts without a clear racial/ethnic majority will be labeled as "mixed." There will be two new categories for each racial/ethnic group. For example, "High Percent White, No Presence low SES Indicators" will be one group, and the accompanying group will be "High Percent White, Presence of low SES Indicators." LBW and PTB will be regressed onto these groups. We will then compare the OR for each category and determine if there is a significant difference between the categories. LBW and PTB will be individual dependent variables in this analysis.

Finally, we will examine racial/ethnic disparities by regressing the ratio of minority to majority risk of LBW and PTB on SES and racial/ethnic group composition of each tract. We will examine black/white and Hispanic/white disparities; the proportions with substantial Asian populations are expected to be too small for this comparison.

Tables and Figures

Table 1. Demographics of 5 Most Populated Counties and State.

Jurisdiction	Overall Birth Rate per 1000	Percent Low Birth Rate	Percent Preterm Birth	Poverty Rate Estimate	Percent Population White Non-Hispanic	Percent Population Black Non-Hispanic	Percent Population Hispanic (regardless of race)
Anne Arundel Co.	12.5	8.1	9.9	5.5	73.1	16.2	6.3
Baltimore Co.	12.2	9.1	10.6	8.2	62.9	26.8	4.3
Baltimore City	14.3	11.6	12.1	22.4	28.8	63.8	4.3
Montgomery Co.	13.2	7.7	8.7	6.3	49.7	17.6	17.4
Prince George's Co.	13.9	10.0	11.1	8.2	15.5	64.4	15.2
Maryland	12.5	8.9	10.2	9.0	55.2	29.9	8.4

Table 2. Risk Ratios for Black Non-Hispanic LBW and PTB for 5 Most Populated Counties and State (White Non-Hispanic as reference)

Jurisdiction	Low Birth Weight (95% CI)	Preterm Birth (95% CI)
Anne Arundel Co.	2.02 (1.68, 2.42)	1.55 (1.31, 1.84)
Baltimore Co.	1.84 (1.61, 2.11)	1.45 (1.28, 1.64)
Baltimore City	1.73 (1.49, 2.01)	1.67 (1.44, 1.94)
Montgomery Co.	1.76 (1.51, 2.06)	1.37 (1.18, 1.59)
Prince George's Co.	1.52 (1.23, 1.87)	1.26 (1.04, 1.52)
Maryland	1.86 (1.77, 1.96)	1.45 (1.39, 1.53)

Figure 1.

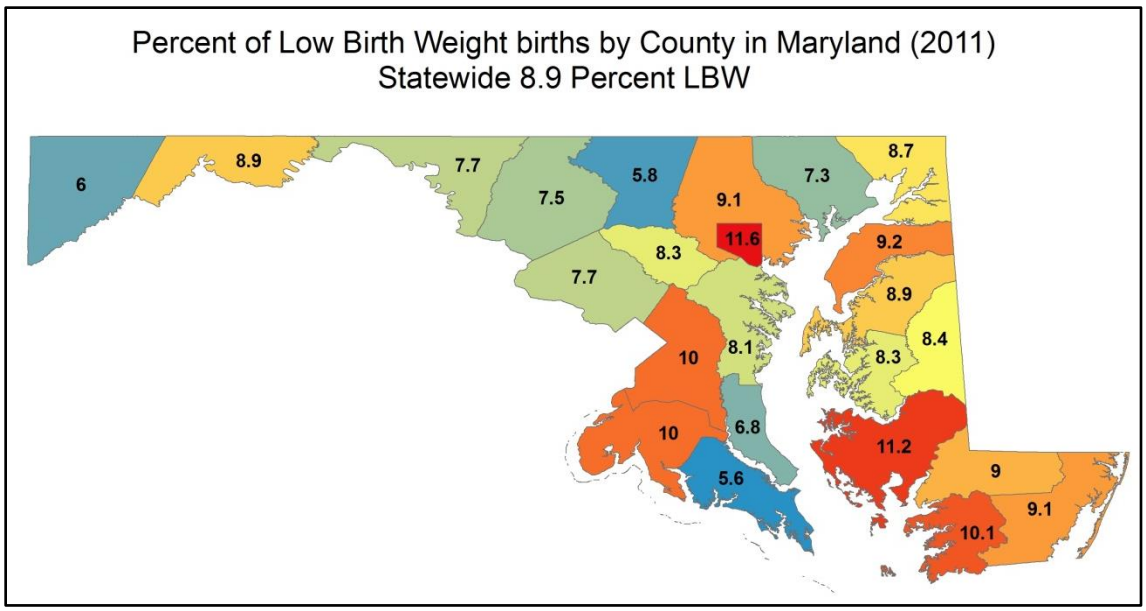

Figure 2.