Maternal and Child Health Issues In The U.S. And Around The World: A Showcase of Student's Papers

Della (Dee) Campbell PhD, APRN

University of Medicine & Dentistry NJ

APHA 135th Annual Meeting & Expo

November 5, 2007

Washington, D.C.

Objective of the Study

To determine the magnitude of risk for low birth weight in relation to combined maternal alcohol and tobacco use within the context of the Black woman's cumulative socioeconomic disadvantage and exposure to chronic stressors of the urban environment.

What is Low Birth Weight?

Low birth weight (LBW) is defined by the World Health Organization (WHO) as birthweight less than 2500 grams/5.5 pounds or below the 10th percentile for gestational age based on a standard weight-for-age chart.

Why Study LBW?

- It is a marker of poor maternal/infant outcome & the health of a community.
- It is a Leading Health Indicator in Healthy People 2010 (7.6%,1998 to 5%, 2010).
- There is a strong relationship between LBW and infant morbidity and mortality.
- LBW is the leading cause of Black infant death.
- LBW has risen each year since 1980.

Why Study LBW in an Urban Systems Approach?

- Although a national problem, low birth weight is not evenly distributed throughout the US population.
- Black women consistently are twice as likely to have a LBW infant than non-black mothers.
- Low socioeconomic status (SES) and place (urban) appear to contribute to health care disparities.

Why Study LBW in an Urban Systems Approach, continued

- Women with low SES, like those living in poverty in the center city, have an increased risk of LBW.
- LBW infants are at increased risk for morbidity and long term developmental difficulties that may have an economic impact to the city's fiscal planning to meet special needs for social and educational support.

Theoretical Framework

The Weathering Hypothesis

- Health of Black Women deteriorates in early adulthood.
- This is a physical consequence of cumulative socioeconomic disadvantage.
- It is reflective of insults and injuries from her conception to the current state.

Geronimus, A. (1992). The weathering hypothesis and the health of African-American women and infants: evidence and speculations. *Ethn Dis, 2*(3), 207-221.

The Weathering Hypothesis

- Examples of Insults to Health
  - Social stressors
  - Environmental hazards
  - Economic adversity
  - Homelessness
  - Onset of chronic disease
  - Family disruption: death, prison

These stressors may be chronic in nature and exert a cumulative influence on health.

Primary Question

What is the incidence and relative risk for low birth weight (neonatal birth weight less than 2500 grams) in relation to combined maternal alcohol and tobacco use.

Additional Questions

- Does LBW increase with the advancing maternal age of the Black woman?
- Are there any similarities in maternal age, highest educational attainment by the mother, or population of the place of maternal residence within the Black and White groups reporting the highest incidence of tobacco and/or alcohol use?
- How do those variables contribute to the incidence of LBW in women who use both tobacco and alcohol during pregnancy?

Methodology: Research Design

A population-based study of singleton births delivered in the USA in 2003.

Methodology:
Sample

The National Center for Health Statistics (NCHS) of the U.S. Department of Health and Human Services Natality File, 2003.

N = 4.1 million

Methodology:
Data Set

- American born Black or White; non-Hispanic women
- Singleton pregnancies
- Excluding Puerto Rico, Virgin Islands, Guam, American Samoa, and Northern Marianas Data

n= 2,582,991

Methodology: Study Variables

- Maternal age
- Maternal race and ethnicity
- Marital status
- Maternal educational achievement
- Neonatal birth weight
- Maternal tobacco and alcohol use
- Geographic Residence
  - Population of city
  - County status, metropolitan vs. non-metropolitan

Methodology: Analysis

- Secondary data analysis
- SAS, V 9

Analysis, continued

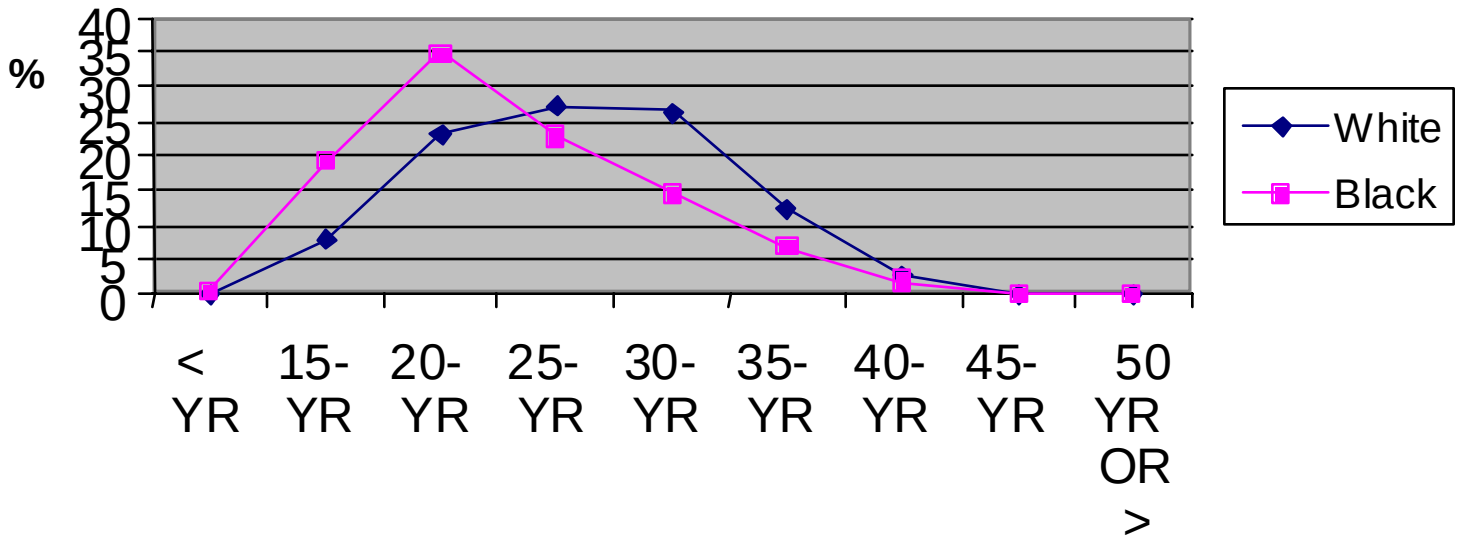
Logistic Regression was used to calculate the relative risk of the investigational variable (LBW) while controlling for race (Black versus White), age (in 5 year increments), smoking status (smokes versus nonsmoker), whether the mother drank during the pregnancy (versus didn't drink), and geographic place of residence (city population).

Socioeconomic Variables of the Study Data Set

Variable	White Population n = 2,099,416	Black Population n= 483,575
Marital Status	**Married: 75%**	**Married: 27%**
Prenatal Care in 1st Trimester	Yes: 82%	Yes: 72%
Maternal Tobacco Use	**Yes: 14%**	**Yes: 9%**
Maternal Alcohol Use	Yes: 1%	Yes: 1%

Most Frequent Age at Childbearing: White 25-29, Black 20-24

Figure 4.1* Maternal Age at Childbearing by Race



Age and Place Variables

Variable	White Population n = 2,099,416	Black Population n= 483,575
LBW, overall	5.15%	12.02%
Maternal Age Lowest LBW	30-34(4.2%)	25-29 (10.8%)
Maternal Age Highest LBW	15-19(7.8%)	45-49(18.3%)
City Pop. Lowest LBW	1 mill(4.7%)	<100k(11.8%)
City Pop. Highest LBW	250-500 K(5.4%)	500-1m (12.4%)
Metro county Lowest LBW	5%	12%
All p values significant at	<0.001	

Tobacco Use Subset

Variable	White Population n = 2,099,416	Black Population n= 483,575
LBW, non-smoker/smoker	4.4%/9.7%	11.4%/18.6%
Most frequent daily use	6-10 cigarettes	1-5 cigarettes
Highest LBW by cigs/day	41 or more (15%)	21-40 (23%)
Highest LBW by age	45-49 yrs (16.6%)	40-44(32%)
Highest LBW by city pop	500-1mil(10.7%)	>1 mil (21%)
Highest LBW by county	Non-metro(5%)	Metro(19%)
Highest LBW by schooling	1-8 yrs elem(12%)	1-2 HS (19%)
All p values significant at	<0.001	

Summary of Tobacco Use

- LBW is highly associated with tobacco use in both races.
- White women age 45-49 have an OR 2.5 (CI 1.5, 4.1).
- Black women age 40-44 have an OR 2.7 (CI 2.3, 3.1).
- Tobacco prevalence increases with the Black woman's advancing age.
- Tobacco, an unhealthy lifestyle choice, may be a coping mechanism in response to chronic stress.

Alcohol Use Subset

Variable	White Population n = 2,099,416	Black Population n= 483,575
LBW, non-drinker/drinker	5.2%/7.9%	12%/26%
Most frequent use/wk	1 drink	1 drink
Highest LBW	5 or > (16.3%)	5 or >(34.8%)
Highest LBW by age	45-49yrs(15%)	40-44yrs(43%)
Highest LBW by city pop	100-250K(8%)	500-1m(31%)
Highest LBW by county	Non-metro(11%)	Non-metro(27%)
Highest LBW by schooling	1-8 elem(21%)	1-8 elem(31%)
All p values significant at	<0.001	

Summary of Alcohol Use

- LBW is highly associated with alcohol use in both races.
- Alcohol use is presumably underreported.
- White women age 45-49 have an OR 2.0 (CI.6, 5.9).
- Black women age 40-44 have an OR 3.8 (CI2.7,5.2).
- Possible protective mechanism noted with 1-2 drinks per week in other studies was not found.

Educational Attainment

Variable	White Population n = 2,099,416	Black Population n= 483,575
Most frequent highest level	1-4 years of college, 45%	3-4 years of HS, 52%
Highest LBW rate	1-2 yrs HS (9%)	1-8 yrs elemen.(15%)
Lowest LBW rate	5 or more college (3.7%)	5 or more college (9%)
All p values	significant at	<0.001

Combined Tobacco and Alcohol Use Subset

- Self Reported Tobacco & Alcohol Use
  - White: n=4652; LBW 14%;OR 2.9 (2.7,3.2)
  - Black: n=1847; LBW 31%; OR 3.2 (2.9,3.6)
- LBW rate was 18.6% vs. 6.5% in the non-user group.
- Highest prevalence was in cities of 500,000 to 1 million in a metropolitan county.
- Combined use of these substances affect both races, however the Black race continues to face double the prevalence rate.

Maternal Age and LBW

- A 5 year difference noted between the Black and White race in the lowest LBW and its rise:
  - Black lowest noted in age group 25-29 and rise at 30-34.
  - White lowest noted in age group 30-34 and rise at 35-39

Logistic Regression

- Black woman OR 2.8, (CI 2.5, 3.1)
- White woman OR 2.5, (CI 2.3,2.7)

  After controlling for maternal age, educational attainment of the mother, place of residence (population of the city, and metropolitan status of the county)

Limitations of the Study

- Relies on self reported information.
- Underreporting of alcohol use.
- 1989 and 2003 Revisions and incomparable data for some variables.
- Lack of socioeconomic data.
- Education ineffective as SES proxy.
- Balance of state for city populations.
- Single year birth cohort.

Benefits of This Study

This study has contributed to our body of knowledge of LBW and has embraced the core functions of public health:

- Assessment
- Policy Development
- Assurance

Assessment

- Healthcare providers must explore the relationship of maternal age along with biologic, environmental, and psychosocial influences of LBW.
- Women must be educated and empowered to make healthy lifestyle choices.
- Urban healthcare workers should develop age-targeted and place specific education and intervention.

Policy Development

- Support the public health agenda.
- Stay informed of legislative bills.
- Be politically active at a local, state, and/or national level.
- Support your professional organization and legislative arm.

Assurance

- Refer clients/patients to the appropriate systems to promote and improve health.
- Pre-conception planning.
- Smoking and alcohol cessation support
- Promulgation of system wide policies for regionalized care for childbearing women.

New Research in Support of Weathering

- Allostasis defines the relationship between psychoneurohormonal responses to stress and the mind/body display of health or illness.
- Allostatic load occurs when there is a chronic elevation of an allostatic mediator that is sustained over time.
- Responses may be expressed as a disease/unhealthy state: hypertension, hypercholesteremia, hyperlipidemia

Results of a Recent Study

NHANES IV, 1999-2002

- Total allostatic load was based on the sum of 10 biomarkers.
- Blacks had higher scores at earlier ages than their White counterparts.
- Highest Allostatic Load Scores :
  - Poor Black Women
  - Non-poor Black Women

Geronimus, A., Hicken, M., Keene, D., & Bound, J. (2006). "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *Am J Public Health,* 96(5), 826-833.

Conclusions of the Researchers

- Racial inequalities in health exist and are not explained by differences in poverty.
- Black women are in greater risk by gender and race.
- The weathering effects may be greatest among those Blacks who engage in high-effort coping:
  - Tobacco, alcohol, illicit drugs, poor nutrition.

Implications for Future Research: Allostasis

- Expansion of the allostatic load research with perinatal implications.
- Modify the initiation of stressors in the urban landscape: clean air, green space, employment, education, enrichment programs.
- Introduce clinical health systems interventions to modify the perception of stress and reduce/alter the response.

Implications for Future Research continued

- Study the complex interplay of of the environment, race, genetics, and stress on health disparities.
- Explore the context of the urban environment (community support) and its influence on health.
- Examine the paradox of assimilation and increasing the risk for LBW.

Implications for Future Research continued

- Ethnic differences in polymorphisms in cytokines. (a group of proteins and peptides that allow one cell to communicate with another and have a central role in the immune system)
- Innate immune system genes in pregnant women.
- Still unclear of the relationship of genetic versus environmental factors, as well as combined genetic/environmental forces.

Final Comments

The Black-White disparity in LBW is complex, lacks exact medical etiology, or specific pathways through which social environmental factors contribute to the inequality.

Weathering has the potential to guide the development of comprehensive strategies to improve the health of socioeconomically disadvantaged women and reduce the social inequalities that exist in today's healthcare environment.