Trends in socio-economic and racial disparity in birth outcomes in South Carolina: Evidence from Pregnancy Risk Assessment and Monitoring System (PRAMS) data

Mohammad Rifat Haider, Khairul Alam Siddiqi, Ibrahim Demir, M. Mahmud Khan
Health Services Policy and Management, Arnold School of Public Health, University of South Carolina

UNIVERSITY OF SOUTH CAROLINA

Introduction

- Infant born with low-birth-weight (less than 2,500 grams) experience severe health and developmental difficulties which account for big portion of the increased morbidity, mortality, and health care costs in the United States.(1).
- Low birth weight has two main causes, premature births, which do not allow the infant time to grow sufficiently prior to birth and fetal growth restrictions that cause a fetus to gain insufficient weight during pregnancy.
- Low birth weight is the second leading cause of infant mortality after birth defects in the United States, and surviving infants are at elevated risk for debilitating medical conditions and learning disorders (2).
- Preterm births are the largest cause of infant death.
- In 2012, 13.6% of all births in South Carolina were premature (3).

Objectives

- To assess the level of premature birth and low birth weight babies born in South Carolina in 2004 and 2013.
- To examine the racial and income related disparities in premature birth and low birth weight in South Carolina in 2004 and 2013.
- To find out the factors affecting premature birth and low birth weight in South Carolina in those two years.

Methods

- The study uses the 2004 and 2013 waves of South Carolina Pregnancy Risk Assessment and Monitoring System (PRAMS) data.
- Number of births recorded in PRAMS 2004 was 1,31 and in PRAMS 2013 the number was 949.
- Income related disparity was calculated using Concentration Index.
- Racial disparity was shown by descriptive statistics.
- Survey weighted logistic regression models for two waves were fitted to identify the determinants of premature birth and low birth weight.
- All analyses were performed using STATA 14.2.

Results

Figure 1. Racial Disparity in Premature Birth and Low Birth Weight in South Carolina in 2004 and 2013

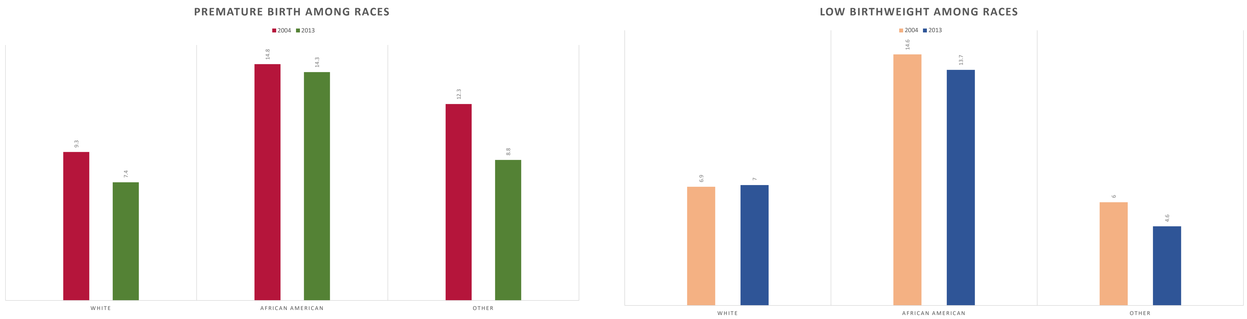

Table1. Concentration Indices for Premature Birth and Low Birth Weight in South Carolina in 2004 and 2013 (by income category)

Indicators	PRAMS 2004			PRAMS 2013			P-value	
	CI	LL	UL	CI	LL	UL		% Change
Premature Birth	-0.038	-0.098	0.023	-0.015	-0.192	0.163	0	-1.90
Low Birth Weight	-0.063	-0.216	0.089	-0.108	-0.118	-0.097	0	2.70

Note: CI: Concentration Index; LL: Lower Limit; UL: Upper Limit

Table 2: Survey Weighted Prevalence of Premature Birth and Low Birth Weight and Multivariable Logistic Regression Models of Factors Associated with Premature Birth and Low Birth Weight in South Carolina in 2004 and 2013

Variables	Premature Birth				Low Birth Weight			
	2004		2013		2004		2013	
	Wt% (95% CI) (N=1,622)	OR (95% CI) (N=1,481)	Wt% (95% CI) (N=947)	OR (95% CI) (N=847)	Wt% (95% CI) (N= 1,627)	OR (95% CI) (N=1,487)	Wt% (95% CI) (N=943)	OR (95% CI) (N=706)
Premature Birth								
No	0.89 (0.87-0.90)	-	0.90 (0.88-0.93)	-	-	-	-	-
Yes	0.11 (0.10-0.13)	-	0.10 (0.07-0.12)	-	-	-	-	-
Low Birth Weight								
No	-	-	-	-	0.91 (0.91-0.91)	-	0.91 (0.91-0.92)	-
Yes	-	-	-	-	0.09 (0.09-0.09)	-	0.09 (0.08-0.09)	-
Maternal Age								
<20 Years	17.3 (11.0-26.0)	Ref.	17.7 (7.0-37.9)	Ref.	12.9 (9.7-16.9)	Ref.	7.6 (4.2-13.5)	Ref.
21-30 Years	10.3 (8.1-12.9)	0.59 (0.29-1.22)	8.3 (6.0-11.2)	0.58 (0.15-2.29)	9.6 (8.6-10.6)	0.92 (0.55-1.52)	8.9 (7.6-10.3)	1.60 (0.62-4.10)
30-40 Years	10.7 (7.6-14.7)	0.60 (0.27-1.35)	8.2 (5.5-12.0)	0.63 (0.16-2.52)	7.2 (6.1-8.5)	0.66 (0.37-1.17)	8.3 (6.7-10.2)	2.44 (0.91-6.57)
40 Years and above	7.9 (4.1-14.7)	0.55 (0.18-1.72)	26.7 (7.5-62.7)	2.24 (0.43-11.8)	9.7 (5.3-17.1)	1.31 (0.52-3.30)	12.0 (5.2-25.6)	1.67 (0.39-7.16)
Maternal Education								
<High School	12.8 (8.7-18.4)	Ref.	12.0 (6.7-20.6)	Ref.	10.9 (8.8-13.5)	Ref.	11.1 (7.7-15.8)	Ref.
High School	11.7 (8.3-16.1)	1.16 (0.61-2.25)	14.4 (8.3-23.7)	0.79 (0.22-2.86)	10.8 (8.9-12.9)	1.02 (0.64-1.64)	8.8 (6.5-11.8)	0.48 (0.22-1.02)
Some College	10.1 (7.2-13.8)	1.21 (0.62-2.37)	7.9 (5.1-12.0)	0.59 (0.19-1.80)	7.6 (6.4-8.9)	0.90 (0.55-1.48)	8.8 (7.0-11.1)	0.40 (0.19-0.85)*
Bachelor and Higher	10.7 (7.4-15.4)	1.50 (0.71-3.17)	6.2 (4.3-9.0)	0.45 (0.11-1.85)	8.2 (6.6-10.0)	1.26 (0.73-2.18)	6.9 (5.4-8.8)	0.32 (0.14-0.73)**
Race								
White	9.3 (7.2-11.8)	Ref.	7.4 (5.4-10.0)	Ref.	6.9 (6.2-7.6)	Ref.	7.0 (6.2-7.9)	Ref.
African American	14.8 (11.4-19.0)	1.70 (1.00-2.92)*	14.3 (9.2-21.5)	1.88 (1.00-3.52)*	14.6 (12.5-17.0)	2.25 (1.63-3.10)***	13.7 (10.5-17.6)	2.48 (1.43-4.32)**
Other	12.3 (6.1-23.4)	1.66 (0.55-5.05)	8.8 (3.3-21.5)	0.16 (0.05-0.52)**	6.0 (4.0-9.1)	0.67 (0.26-1.72)	4.6 (2.7-7.6)	0.35 (0.11-1.06)
Ethnicity								
Non-Hispanic	11.5 (9.6-13.6)	Ref.	9.1 (7.0-11.6)	Ref.	9.5 (9.2-9.9)	Ref.	9.0 (8.5-9.7)	Ref.
Hispanic	8.9 (4.0-18.3)	1.43 (0.35-5.84)	15.0 (6.1-32.6)	3.31 (0.66-16.48)	5.8 (3.6-9.3)	1.77 (0.63-4.95)	4.4 (2.4-8.0)	6.00 (1.42-25.32)*
Residence								
Urban	11.0 (9.0-13.3)	Ref.	9.2 (7.1-11.9)	Ref.	8.9 (8.4-9.4)	Ref.	8.6 (8.0-9.3)	Ref.
Rural	12.2 (8.4-17.3)	0.98 (0.55-1.74)	11.5 (5.6-21.9)	1.01 (0.40-2.58)	10.7 (8.7-13.2)	1.02 (0.69-1.49)	8.8 (6.0-12.9)	0.75 (0.37-1.53)
HH Income								
0-15K	11.4 (8.9-14.5)	Ref.	9.6 (7.0-13.2)	Ref.	10.5 (9.4-11.8)	Ref.	11.0 (9.3-13.0)	Ref.
15-25K	10.8 (8.2-14.0)	0.90 (0.56-1.44)	8.1 (5.1-12.6)	0.71 (0.37-1.36)	7.6 (6.7-8.6)	0.65 (0.47-0.90)**	7.4 (6.0-9.2)	0.47 (0.28-0.77)**
25-40K	6.7 (3.8-11.5)	0.59 (0.27-1.32)	10.3 (3.2-28.6)	0.91 (0.27-3.14)	9.4 (5.6-15.3)	0.92 (0.45-1.89)	5.3 (2.9-9.4)	0.18 (0.05-0.66)*
>40K	10.0 (3.9-23.1)	0.56 (0.16-2.00)	11.7 (4.1-28.6)	0.83 (0.23-3.04)	14.7 (6.2-31.1)	0.97 (0.50-0.98)	15.4 (5.8-35.1)	1.64 (0.52-5.21)
Child Sex								
Female	10.6 (8.2-13.5)	Ref.	12.7 (9.0-17.7)	Ref.	9.6 (8.5-10.7)	Ref.	9.6 (8.2-11.1)	Ref.
Male	11.9 (9.3-14.9)	1.06 (0.67-1.68)	6.5 (4.7-8.8)	0.70 (0.36-1.32)	9.0 (8.0-10.0)	0.97 (0.72-1.32)	7.7 (6.5-9.2)	0.92 (0.57-1.47)
Maternal BMI								
Underweight	16.5 (8.3-30.3)	Ref.	12.8 (6.0-25.3)	Ref.	16.1 (10.6-23.6)	Ref.	21.1 (10.5-37.8)	Ref.
Normal	11.2 (8.6-14.4)	0.54 (0.23-1.24)	8.3 (5.5-12.3)	0.61 (0.18-2.01)	8.5 (7.6-9.6)	0.39 (0.21-0.73)**	7.1 (5.9-8.5)	0.32 (0.11-0.96)*
Overweight	11.9 (7.9-17.3)	0.49 (0.19-1.22)	9.3 (5.8-14.6)	0.67 (0.21-2.16)	7.7 (6.2-9.5)	0.35 (0.18-0.69)**	8.5 (6.4-11.2)	0.33 (0.10-1.01)
Obese	9.6 (7.1-12.8)	0.48 (0.21-1.12)	9.3 (5.6-15.3)	0.53 (0.17-1.67)	10.8 (8.7-13.2)	0.50 (0.25-0.98)*	10.7 (8.1-14.1)	0.30 (0.11-0.94)*
Diabetes								
No	11.4 (9.6-13.5)	Ref.	8.9 (6.9-11.3)	Ref.	9.3 (9.0-9.6)	Ref.	8.6 (8.0-9.2)	Ref.
Yes	9.1 (4.2-18.4)	0.77 (0.27-2.16)	18.9 (7.6-39.7)	3.33 (1.39-7.99)**	8.2 (5.1-13.0)	0.80 (0.37-1.70)	9.7 (5.4-16.8)	2.02 (0.89-4.60)
Hypertension								
No	10.4 (8.6-12.6)	Ref.	8.7 (6.6-11.5)	Ref.	8.5 (8.2-8.9)	Ref.	7.3 (6.8-7.9)	Ref.
Yes	19.8 (13.5-28.0)	2.95 (1.03-8.42)***	29.9 (18.1-45.3)	6.04 (2.67-13.70)***	16.7 (12.4-22.1)	2.05 (1.30-3.25)**	40.3 (24.3-58.7)	14.00 (6.83-28.55)***
Previous Premature Birth								
No	8.2 (5.9-11.1)	Ref.	6.0 (4.0-9.0)	Ref.	6.7 (6.1-7.4)	Ref.	5.2 (4.5-6.1)	Ref.
Yes	30.4 (20.1-43.1)	5.10 (2.62-9.91)***	28.1 (15.1-46.1)	3.94 (1.47-10.60)**	25.2 (18.0-34.0)	5.15 (3.03-8.74)***	25.0 (15.6-37.6)	4.10 (1.73-9.70)**

Note: *p<0.05 **p<0.01 ***p<0.001; CI: Confidence interval; OR: Odds ratio

Discussions

- Across two surveys most of the mothers were White, aged 21-29 years, had some college and associate degree, and had Women, Infants, and Children (WIC) supplement during pregnancy.
- Over the nine years period South Carolina has experienced decrease in inequity in premature birth (CI: -0.038 in 2004 and -0.015 in 2013).
- However, inequity in low birth weight has increased in the same time period (CI: -0.063 in 2004 and -0.108 in 2013).
- Along the racial line, African Americans showed no significant progress in decreasing premature birth and low birth weight over nine years period.
- African American race is one of the most influential factors in determining baby's fate of being premature and of low birth weight.
- Income, maternal education, and BMI showed effect in determining low birth weight, not prematurity.
- Hypertensive mothers had higher odds of delivering premature and low birth weight baby.

Conclusions

- Study results demonstrate that South Carolina faces increasing health inequity in terms of LBW and still have marked inequity in premature births.
- It is imperative to reach out to the African American women who are deprived of basic amenities during pregnancy to ensure healthy newborns.

References

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Contact: M. Rifat Haider E-mail: mhaider@email.sc.edu