

INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY HEALTHY START COALITION AREA 2003

By: Daniel Thompson, M.P.H.,* Melanie Simmons, Ph.D.,* Carol Graham, Ph.D.*

December 15, 2004

*Florida State University Institute for Research Infrastructure Consultant to Florida Department of Health

Introduction

Infant mortality and birth weight statistics are used extensively in public health. These statistics are especially useful because of their relevance as maternal and child health indicators and because of their ease of availability. These data are also virtually 100 percent complete since they are recorded for every birth and death that occurs in the state.

The purpose of this analysis is to identify geographic areas in the state where low birth weight (LBW) rates and infant mortality (IM) rates are statistically, significantly higher than would be expected considering the unique demographics of each area. These areas should then be the focus of further, more detailed analyses to determine the reasons for the high rates and to develop intervention strategies for improving the outcomes.

IM and LBW rates vary in relation to the demographic characteristics and the variation in rates across the Healthy Start Coalition areas is due in part to the unique demographic characteristics of the county populations. In this analysis, adjustments are made to account for the differences in demographic characteristics. The adjusted statistics can then be compared across areas independently of the demographic differences.

Three demographic variables are used in calculating the adjusted and expected statistics. These are maternal race, marital status, and education. These variables are used because they are known to be associated with risk of LBW and IM, and because public health interventions are not designed to influence these characteristics in the prenatal or infancy period. In an analysis (analysis not shown) of Florida resident births in 2001, linked to infant deaths, risk of infant death was found to be 133% higher for maternal race black, 89% higher for unmarried maternal marital status, and 41% higher for maternal education less than high school. In the same analysis, risk of LBW was found to be 82% higher for maternal race black, 44% higher for unmarried maternal marital status, and 22% higher for maternal education less than high school. These results were all statistically significant at the .05 alpha level. Maternal characteristics such as maternal age and smoking status are not used in the adjustment because there are public health efforts directed at changing these factors and adjusting for them would eliminate differences due to these factors. For example, if a county has an actual LBW percentage significantly lower than the expected LBW percentage, the difference could be due to the extraordinary success of a smoking cessation program in the county. If adjustments were made for smoking status, this difference would not be apparent. Maternal age can be influenced by reducing teen births, and by the same logic, adjustments are not made for maternal age.

IM and LBW rates also reflect random variation. In this analysis, statistical methods are used to separate the random variation from the non-random variation, so rates that are significantly high are most likely a result of non-random influences. Likewise, rates that are higher than expected,

but not significantly high, are likely to be the result of random variation and are said to be within the range of normal variation.

Methods

The data used in this analysis were extracted from the birth records for residents of Florida born in calendar year 2003. Births were classified as LBW if the birth weight on the birth record was in the range of 1 to 2499 grams. Three demographic variables were used in this analysis: mother’s race, marital status, and education. These are recorded on the birth record, and for the purposes of this analysis, two categories were used for each variable. Mother’s race was classified as Black or non-Black, marital status was classified as married or not married, and mother’s education was classified as 12th grade or higher completed or less than 12th grade completed. The three variables were then used to classify the births into eight mutually exclusive categories. Birth records with unknown values for any of the three variables were placed in a ninth category. There were roughly 1500 birth records in the ninth category (less than one percent of the resident births). The nine categories are as follows:

<u>Mother’s Category</u>	<u>Mother’s Race</u>	<u>Mother’s Marital Status</u>	<u>Education</u>
1	Non-Black	Married	High School or More
2	Non-Black	Married	Less than High School
3	Non-Black	Not Married	High School or More
4	Non-Black	Not Married	Less than High School
5	Black	Married	High School or More
6	Black	Married	Less than High School
7	Black	Not Married	High School or More
8	Black	Not Married	Less than High School
9*	Unknown	Unknown	Unknown

* This includes records with unknown values in any of the three categories.

Calculating Expected Rates:

Using this classification, the category-specific rates were calculated from the 2002 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2003 births in each Healthy Start Coalition area to calculate the expected LBW births and infant deaths. In this way, the expected statistics are adjusted for the three demographic characteristics and then used to calculate the adjusted rates. The term for this adjustment technique is “indirect adjustment.”

For example, if an area existed where all the births were in category 1, then the expected statistics for the area would be the same as the statewide statistics for category 1. Another area might have had births that were all in category 8. For this area, the expected statistics would be the same as the statewide statistics for category 8. These two hypothetical areas would have different expected statistics because they have populations with different demographic characteristics. If both areas had actual rates equal to the expected rates, they would be considered equal regarding the rates. Stated differently, both areas are doing equally well at preventing IM and LBW, considering their different demographic characteristics.

The correlation between actual IM and LBW across the areas was also assessed. The normal approximation to the binomial distribution formulas were used for statistical testing in areas where the number of infant deaths or low birth weight infants were above 50. When these were 50 or below, the Poisson formula was used.

Results

The results of this analysis are shown in the following tables where actual statistics are compared to expected statistics. The expected statistics are adjusted for the demographic characteristics in each area, as described above. Areas with statistically, significantly high actual statistics are indicated in the tables with an “H” and “L” indicates significantly low actual statistics.

There is a statistically, significant correlation between areas with high LBW percentages and areas with high infant death rates. This means areas with high LBW percentages tend to have high infant death rates and areas with low LBW percentages tend to have low infant death rates. The correlation coefficient based on the ranks of the p values across coalition areas is 0.394 with an associated p value of 0.02.

Discussion

This analysis should be considered a preliminary step in the continuing endeavor to reduce risk of infant death and low birth weight in Florida. The rationale is to use the results of this analysis to focus further analysis and efforts on the areas where the risks are significantly high. Since adjustments were used to account for the differing demographic composition in each area, further analysis would focus on other factors such as smoking rates and mother’s age at birth. Unique factors in each county contribute to infant deaths and low birth weight. Local area analysis of factors associated with these outcomes should be undertaken to better understand the reasons for higher than expected rates. The process becomes much more complicated at this point, and a separate analysis should be done for each area of concern. Finally, although demographic adjustment is useful for analyzing additional influencing variables, it remains critical to continue efforts to address issues such as racial disparity in health outcomes.

**2003 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS
COMPARED TO EXPECTED¹ RATES PER 1000 BIRTHS**

1	2	3	4	5	6	7
		2003	2003	2003	2003	
		Expected ¹	Actual	Death Rate	Death Rate	H=Actual Rate
	2003	Infant	Infant	Per 1000	Per 1000	Signif.Higher ²
	Births	Deaths	Deaths	Births	Births	L=Actual Rate
						Than Expected
Healthy Start Coalition						
Bay, Franklin, Gulf Healthy Start Coalition	2,289	24.7	33	10.79	14.42	H
Broward Healthy Start Coalition, Inc.	22,489	212.2	143	9.43	6.36	L
Capital Area Healthy Start Coalition, Inc.	3,422	26.4	38	7.71	11.10	H
Central Healthy Start, Inc.	5,429	35.9	36	6.61	6.63	
Charlotte County Healthy Start Coalition, Inc.	1,047	6.6	8	6.26	7.64	
Chipola Healthy Start Coalition, Inc.	1,249	9.6	10	7.69	8.01	
Desoto	459	3.4	2	7.46	4.36	
Escambia County Healthy Start Coalition, Inc.	3,981	29.9	34	7.50	8.54	
Florida Keys Healthy Start Coalition, Inc.	711	4.6	5	6.46	7.03	
Gadsden Citizens for Healthy Babies Inc.	710	7.1	6	9.98	8.45	
Miami-Dade	32,551	237.0	194	7.28	5.96	L
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3,050	19.1	25	6.27	8.20	
Healthy Start of North Central Florida, Inc.	9,077	66.0	110	7.28	12.12	H
Healthy Start Coalition of Sarasota County, Inc.	2,987	18.1	18	6.04	6.03	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8,457	61.0	62	7.21	7.33	
Healthy Start Coalition of Hillsborough County, Inc.	15,294	114.1	137	7.46	8.96	H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	589	4.9	7	8.28	11.88	
Healthy Start Coalition of Manatee County, Inc.	3,338	23.5	20	7.05	5.99	
Maternal Child Family Health Alliance of Palm Beach County, Inc.	14,659	114.0	112	7.78	7.64	
Healthy Start Coalition of Pasco County, Inc.	4,042	25.4	23	6.28	5.69	
Healthy Start Coalition of Pinellas County, Inc.	9,225	62.7	72	6.80	7.80	
Healthy Start Coalition of Santa Rosa County, Inc.	1,580	9.0	13	5.69	8.23	
Healthy Start Coalition of Southwest Florida, Inc.	10,135	69.9	64	6.89	6.31	
Healthy Start Coalition of St. Lucie County, Inc.	2,448	18.3	11	7.48	4.49	L
Indian River County Healthy Start Coalition, Inc.	1,213	8.3	7	6.82	5.77	
Martin County Healthy Start Coalition, Inc.	1,175	7.4	8	6.30	6.81	
Northeast Florida Healthy Start Coalition, Inc.	17,053	135.0	167	7.92	9.79	H
Okeechobee County Family Health / Healthy Start Coalition, Inc.	537	3.9	3	7.31	5.59	
Orange County Healthy Start Coalition, Inc.	14,917	107.9	123	7.23	8.25	
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	5,017	33.0	25	6.57	4.98	
Seminole County Healthy Start Coalition, Inc.	4,599	27.8	25	6.05	5.44	
The Healthy Start Prenatal & Infant Coalition of Flagler and Volusia Counties, Inc.	5,366	37.4	28	6.98	5.22	
The Healthy Start Coalition of Osceola County, Inc.	3,148	20.0	15	6.35	4.76	
TOTAL	212,243	1,584	1,584	7.46	7.46	

¹ The expected number of infant deaths is calculated based on the maternal race, marital status and education characteristics of the births in each county

² The significance level used is .05

**2003 FLORIDA ACTUAL LOW BIRTH WEIGHT PERCENTAGES
COMPARED TO EXPECTED PERCENTAGES**

1	2	3	4	5	6	7
		2003	2003	2003	2003	H=Actual Rate
	Expected ¹	Actual	Expected	Actual	Signif. Higher ³	
	2003	LBW	LBW	LBW	LBW	L=Actual Rate
Healthy Start Coalition	Births	Births	Births	Percent	Percent	Than Expected
Bay, Franklin, Gulf Healthy Start Coalition	2,289	199.2	216	8.70%	9.44%	
Broward Healthy Start Coalition, Inc.	22,489	2051.6	1,955	9.12%	8.69%	L
Capital Area Healthy Start Coalition, Inc.	3,422	312.3	306	9.13%	8.94%	
Central Healthy Start, Inc.	5,429	431.4	443	7.95%	8.16%	
Charlotte County Healthy Start Coalition, Inc.	1,047	80.7	83	7.71%	7.93%	
Chipola Healthy Start Coalition, Inc.	1,249	105.9	122	8.48%	9.77%	
Desoto	459	39.3	37	8.56%	8.06%	
Escambia County Healthy Start Coalition, Inc.	3,981	352.8	416	8.86%	10.45%	H
Florida Keys Healthy Start Coalition, Inc.	711	55.2	45	7.77%	6.33%	
Gadsden Citizens for Healthy Babies Inc.	710	77.7	75	10.94%	10.56%	
Miami-Dade	32,551	2811.7	2,797	8.64%	8.59%	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc	3,050	237.2	239	7.78%	7.84%	
Healthy Start of North Central Florida, Inc.	9,077	778.9	774	8.58%	8.53%	
Healthy Start Coalition of Sarasota County, Inc.	2,987	230.7	245	7.72%	8.20%	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8,457	716.2	651	8.47%	7.70%	L
Healthy Start Coalition of Hillsborough County, Inc	15,294	1291.1	1,343	8.44%	8.78%	
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	589	55.9	46	9.49%	7.81%	
Healthy Start Coalition of Manatee County, Inc.	3,338	277.2	274	8.31%	8.21%	
Maternal Child Family Health Alliance of Palm Beach County, Inc.	14,659	1269.5	1,245	8.66%	8.49%	
Healthy Start Coalition of Pasco County, Inc.	4,042	305.3	308	7.55%	7.62%	
Healthy Start Coalition of Pinellas County, Inc.	9,225	759.5	741	8.23%	8.03%	
Healthy Start Coalition of Santa Rosa County, Inc	1,580	116.6	111	7.38%	7.03%	
Healthy Start Coalition of Southwest Florida, Inc.	10,135	824.3	712	8.13%	7.03%	L
Healthy Start Coalition of St. Lucie County, Inc.	2,448	215.8	201	8.81%	8.21%	
Indian River County Healthy Start Coalition, Inc.	1,213	100.2	109	8.26%	8.99%	
Martin County Healthy Start Coalition, Inc.	1,175	92.1	83	7.84%	7.06%	
Northeast Florida Healthy Start Coalition, Inc.	17,053	1496.0	1,559	8.77%	9.14%	H
Okeechobee County Family Health / Healthy Start Coalition, Inc.	537	44.1	37	8.21%	6.89%	
Orange County Healthy Start Coalition, Inc.	14,917	1276.7	1,437	8.56%	9.63%	H
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	5,017	403.3	396	8.04%	7.89%	
Seminole County Healthy Start Coalition, Inc.	4,599	357.3	375	7.77%	8.15%	
The Healthy Start Prenatal & Infant Coalition of Flagler and Volusia Counties, Inc.	3,966	435.6	413	8.12%	7.70%	
The Healthy Start Coalition of Osceola County, Inc.	3,148	245.5	253	7.80%	8.04%	
TOTAL	212,243	18,047	18,047	8.50%	8.50%	

¹ LBW = Low birth Weight, defined as birth weight below 2500 grams.

² The expected number of infant deaths is calculated based on the maternal race, marital status and education characteristics of the births in each county

³ The significance level used is .05