

# **INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY HEALTHY START COALITION AREA 2009**

**By: Daniel Thompson, MPH; Cheryl Clark, DrPH, RHIA**

**Florida Department of Health, Division of Family Health Services  
Bureau of Family and Community Health**

**December 20, 2010**

## **Introduction**

Infant mortality and birth weight statistics are used extensively in public health. These statistics are especially useful because of relevance as maternal and child health indicators, ease of availability and reliability due to a relatively high level of completeness.

The purpose of this annual analysis is to identify Healthy Start Coalition 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 identified areas should become the focus of further detailed analyses to investigate the reasons for the higher than expected rates and to develop intervention strategies for improving the outcomes.

IM and LBW rates will vary across areas. This variation is due, in part, to the unique demographic characteristics of the area populations. In this analysis, adjustments are made to account for the differences in demographic characteristics. Three demographic variables are accounted for when calculating the adjusted and expected statistics. These are maternal race, marital status, and maternal education. These variables are used because of known associations with risk of LBW and IM, and because adjusting for these characteristics provide a way to make valid comparisons among areas with different demographic characteristics.

Other maternal characteristics, such as young maternal age and smoking status, are not used in this adjustment, because there are public health interventions directed at addressing these factors and adjustment would eliminate differences that may be due to the effects of public health interventions. For example, if an area has an actual LBW percentage significantly lower than the expected LBW percentage, the difference could be due to the success of a smoking cessation program in the area. If adjustments were made for smoking status, differences between actual and expected statistics would not be apparent. In another example, births to women of young maternal age can be influenced by teen pregnancy prevention interventions and by the same logic; adjustments are not made for maternal age.

IM and LBW rates can also vary due to random variation or chance. In this analysis, statistical methods are used to separate random variation from non-random variation, so rates that are reported as significantly higher or lower are most likely a result of non-random influences. Likewise, rates that are higher or lower than expected, but not significantly, are likely to be the result of random variation.

## **Methods**

The data used in this analysis were extracted from the birth records for residents of Florida born in calendar years 2008 and 2009. 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 obtained from the

birth record were used in this analysis: mother’s race, marital status, and educational attainment. 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. These three variables were 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 approximately 1,200 birth records in the ninth category (less than 1% of the resident births). The nine categories are as follows:

<b><u>Mother’s Category</u></b>	<b><u>Mother’s Race</u></b>	<b><u>Mother’s Marital Status</u></b>	<b><u>Education</u></b>
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 2008 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2009 births in each area to calculate the expected LBW births and infant deaths. The area-expected statistics are adjusted for the three demographic characteristics and 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 *Normal Approximation to the Binomial Distribution* was used to test for statistically significant differences between actual and expected rates in most of the areas. In instances where the number of infant deaths or number of low birth weight infants was less than 30, the Poisson formula was used. The correlation between IM and LBW rates across the areas was also assessed.

In March 2004, the recording of maternal race on the birth record was changed so that more than one race can be selected. For the purposes of this analysis, births where the only maternal race recorded was Black were classified as Black and all others were classified as non-Black.

## **Results**

The results of this analysis are shown in the following tables for IM and LBW. In the tables, 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 higher than expected actual statistics are indicated in the tables with a “H”, and “L” indicates significantly lower than expected actual statistics.

The correlation, between areas with high LBW percentages and areas with high infant death rates, is weak and not statistically significant. This means areas with high LBW percentages do not have a tendency to have high infant death rates and vice versa. The correlation coefficient is 0.143 with an associated p value of 0.425.

## **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 and also analyze factors that contribute to the lower risks seen in some areas.

One limitation of this analysis is the comparatively high level of variability of rates in smaller areas. Consequently, larger differences in rates for small areas may not be statistically significant while the same or smaller differences may be statistically significant in larger areas. Rates that are statistically significantly higher than the expected rates are most likely not a result of random fluctuations and are cause for concern; however, higher rates that are not statistically significant may warrant further investigation. Additionally, smaller areas with higher than expected rates for a period of several years may also be cause for concern.

Since adjustments were used to account for the differing demographic composition in each area, further analysis would focus on other factors that were not adjusted for, such as smoking rates and mother’s age at birth. Unique factors in each area 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 with separate analyses performed for each area of concern. Finally, it should be noted that in this analysis, rates for each area are compared to the statewide rates, after adjustment for maternal race, marital status and education attainment. The issue of whether or not the statewide rates should be used as a baseline in these comparisons is not addressed in this analysis.

**2009 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS  
 COMPARED TO EXPECTED<sup>1</sup> RATES PER 1000 BIRTHS**

	2009 Expected <sup>1</sup> Infant Deaths	2009 Actual Infant Deaths	2009 Expected Infant Death Rate Per 1000 Births	2009 Actual Infant Death Rate Per 1000 Births	H=Actual Rate Signif.Higher <sup>2</sup> L=Actual Rate Signif.Lower <sup>2</sup> Than Expected
<b>Healthy Start Coalition</b>	<b>2009 Births</b>				
Bay, Franklin, Gulf Healthy Start Coalition	2576	17	17	6.47	6.60
Broward Healthy Start Coalition, Inc.	21394	166	129	7.74	6.03 L
Capital Area Healthy Start Coalition, Inc.	3439	28	28	8.08	8.14
Central Healthy Start, Inc.	6308	39	34	6.12	5.39
Charlotte County Healthy Start Coalition, Inc.	991	6	4	6.01	4.04
Chipola Healthy Start Coalition, Inc.	1298	9	11	6.72	8.47
Desoto	452	3	2	6.68	4.42
Escambia County Healthy Start Coalition, Inc.	4166	31	41	7.40	9.84 H
Florida Keys Healthy Start Coalition, Inc.	707	4	4	5.87	5.66
Gadsden Citizens for Healthy Babies Inc.	692	7	6	10.03	8.67
Miami-Dade	32341	232	188	7.18	5.81 L
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3310	19	26	5.77	7.85
Healthy Start of North Central Florida, Inc.	10393	72	84	6.89	8.08
Healthy Start Coalition of Sarasota County, Inc.	2931	17	17	5.90	5.80
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	9231	62	77	6.71	8.34 H
Healthy Start Coalition of Hillsborough County, Inc.	16729	116	159	6.93	9.50 H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	669	6	6	8.43	8.97
Healthy Start Coalition of Manatee County, Inc.	3658	23	36	6.42	9.84 H
Maternal Child Family Health Alliance of Palm Beach County, Inc.	14177	103	87	7.27	6.14
Healthy Start Coalition of Pasco County, Inc.	4945	28	26	5.65	5.26
Healthy Start Coalition of Pinellas County, Inc.	8772	58	73	6.60	8.32 H
Healthy Start Coalition of Santa Rosa County, Inc.	1835	10	7	5.27	3.81
Healthy Start Coalition of Southwest Florida, Inc.	10888	71	67	6.55	6.15
Healthy Start Coalition of St. Lucie County, Inc.	3142	22	22	7.12	7.00
Indian River County Healthy Start Coalition, Inc.	1278	8	6	6.38	4.69
Martin County Healthy Start Coalition, Inc.	1163	7	4	6.38	3.44
Northeast Florida Healthy Start Coalition, Inc.	18331	129	145	7.04	7.91
Okeechobee County Family Health / Healthy Start Coalition, Inc.	564	4	2	6.44	3.55
Orange County Healthy Start Coalition, Inc.	15393	106	94	6.92	6.11
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	5172	32	36	6.21	6.96
Seminole County Healthy Start Coalition, Inc.	4470	27	31	6.03	6.94
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.	5968	39	31	6.51	5.19
The Healthy Start Coalition of Osceola County, Inc.	3863	23	24	6.08	6.21
<b>TOTAL</b>	<b>221,246</b>	<b>1,524</b>	<b>1,524</b>	<b>6.89</b>	<b>6.89</b>

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

<sup>2</sup> The significance level used is .05

**2009 FLORIDA ACTUAL LOW BIRTH WEIGHT<sup>1</sup> PERCENTAGES  
COMPARED TO EXPECTED<sup>2</sup> PERCENTAGES**

Healthy Start Coalition	2009	2009	2009	2009	H=Actual Rate	
	Births	Expected <sup>2</sup> LBW Births	Actual LBW Births	Expected LBW Percent	Actual LBW Percent	
					Signif.Higher <sup>3</sup> L=Actual Rate Signif.Lower <sup>3</sup> Than Expected	
Bay, Franklin, Gulf Healthy Start Coalition	2,576	211	205	8.18%	7.96%	
Broward Healthy Start Coalition, Inc.	21,394	2,029	2,078	9.48%	9.71%	
Capital Area Healthy Start Coalition, Inc.	3,439	333	332	9.67%	9.65%	
Central Healthy Start, Inc.	6,308	505	517	8.00%	8.20%	
Charlotte County Healthy Start Coalition, Inc.	991	78	65	7.89%	6.56%	
Chipola Healthy Start Coalition, Inc.	1,298	110	110	8.48%	8.47%	
Desoto	452	37	32	8.29%	7.08%	
Escambia County Healthy Start Coalition, Inc.	4,166	387	407	9.28%	9.77%	
Florida Keys Healthy Start Coalition, Inc.	707	55	45	7.84%	6.36%	
Gadsden Citizens for Healthy Babies Inc.	692	78	79	11.31%	11.42%	
Miami-Dade	32,341	2,869	2,898	8.87%	8.96%	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3,310	260	276	7.86%	8.34%	
Healthy Start of North Central Florida, Inc.	10,393	912	887	8.77%	8.53%	
Healthy Start Coalition of Sarasota County, Inc.	2,931	232	198	7.92%	6.76%	L
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	9,231	791	777	8.56%	8.42%	
Healthy Start Coalition of Hillsborough County, Inc.	16,729	1,459	1,432	8.72%	8.56%	
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	669	66	62	9.82%	9.27%	
Healthy Start Coalition of Manatee County, Inc.	3,658	305	277	8.33%	7.57%	L
Maternal Child Family Health Alliance of Palm Beach County, Inc.	14,177	1,280	1,324	9.03%	9.34%	
Healthy Start Coalition of Pasco County, Inc.	4,945	379	416	7.67%	8.41%	H
Healthy Start Coalition of Pinellas County, Inc.	8,772	745	706	8.49%	8.05%	
Healthy Start Coalition of Santa Rosa County, Inc.	1,835	137	136	7.48%	7.41%	
Healthy Start Coalition of Southwest Florida, Inc.	10,888	895	828	8.22%	7.60%	L
Healthy Start Coalition of St. Lucie County, Inc.	3,142	281	256	8.94%	8.15%	
Indian River County Healthy Start Coalition, Inc.	1,278	107	92	8.35%	7.20%	
Martin County Healthy Start Coalition, Inc.	1,163	94	91	8.08%	7.82%	
Northeast Florida Healthy Start Coalition, Inc.	18,331	1,649	1,702	8.99%	9.28%	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	564	45	45	8.02%	7.98%	
Orange County Healthy Start Coalition, Inc.	15,393	1,365	1,428	8.87%	9.28%	H
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	5,172	424	398	8.19%	7.70%	
Seminole County Healthy Start Coalition, Inc.	4,470	363	383	8.13%	8.57%	
The Healthy Start Prenatal & Infant Coalition of Flagler and Volusia Counties, Inc.	5,968	498	490	8.34%	8.21%	
The Healthy Start Coalition of Osceola County, Inc.	3,863	308	313	7.98%	8.10%	
<b>TOTAL</b>	<b>221,246</b>	<b>19,285</b>	<b>19,285</b>	<b>8.72%</b>	<b>8.72%</b>	

<sup>1</sup> LBW = Low birth weight, defined as birth weight below 2500 grams.

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

<sup>3</sup> The significance level used is .05