INFANT MORTALITY AND LOW BIRTH WEIGHT ACTUAL RATES COMPARED TO EXPECTED RATES BY HEALTHY START COALITION AREA 2010

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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 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 identified areas should become the focus of further detailed analyses to investigate 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 characteristics are accounted for when calculating the adjusted and expected statistics: 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 demographic 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 2009 and 2010. 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 1,000 birth records in the ninth category (less than 1% of the resident births). The nine categories are as follows:

Mother's Category	Mother's Race	Mother's Marital Status	Mother's Education
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 nine category-specific IM rates were calculated from the 2009 (the latest year for complete matched birth and infant death data) statewide totals. These statewide rates were then multiplied by the number of births in each of the nine categories for each area, using area specific birth data for 2010, to obtain the number of expected infant deaths for each of the nine categories for each coalition area for 2010. The sum of the nine category-specific expected infant deaths for each area was then calculated as the total number of expected infant deaths for each area. The expected number of infant deaths was then used as the numerator, and the total number of births was used as the denominator, to compute the expected infant death rate for each area. Since all of the above calculations were done on a category-specific basis, the expected number of infant deaths and expected infant death rates reflect the unique maternal race, marital status and education characteristics of the births in each coalition area. The area-specific expected statistics are thereby adjusted for the influence of differing proportions of births in the nine categories.

These methods were applied in the same way to calculate the expected statistics for LBW, except the nine category-specific LBW rates were calculated from 2010 birth data instead of 2009 birth data. 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 as well as the state 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.

For this analysis, the correlation between areas with high LBW percentages and areas with high infant death rates is weak and not statistically significant. This means that areas with high LBW percentages do not have a strong tendency to have high infant death rates or vice versa (rank correlation coefficient = 0.205; p value of 0.098).

Also included in this report are summary tables for the years 2006 through 2010 that show the H's and L's for the coalitions for each of the past 5 years.

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. Actual 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.

2010 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS
COMPARED TO EXPECTED[1] RATES PER 1000 BIRTHS

Healthy Start Coalition	2010 Births	2010 Expected[1] Infant Deaths	2010 Actual Infant Deaths	2010 Expected Infant Death Rate Per 1000 Births	2010 Actual Infant Death Rate Per 1000 Births	H=Actual Rate Signif.Higher[2] L=Actual Rate Signif.Lower[2] Than Expected
Bay, Franklin, Gulf Healthy Start Coalition	2434	15	10	6.01	4.11	
Broward Healthy Start Coalition, Inc.	21342	157	135	7.37	6.33	L
Capital Area Healthy Start Coalition, Inc.	3414	26	31	7.73	9.08	
Central Healthy Start, Inc.	6072	35	34	5.70	5.60	
Charlotte County Healthy Start Coalition, Inc.	1012	6	5	5.72	4.94	
Chipola Healthy Start Coalition, Inc.	1178	7	6	6.17	5.09	
Desoto	435	3	2	6.23	4.60	
Escambia County Healthy Start Coalition, Inc.	3922	28	40	7.24	10.20	H
Florida Keys Healthy Start Coalition, Inc.	696	4	3	5.34	4.31	
Gadsden Citizens for Healthy Babies Inc.	672	7	7	10.23	10.42	
Miami-Dade	31335	206	138	6.59	4.40	L
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3152	17	21	5.38	6.66	
Healthy Start of North Central Florida, Inc.	10054	65	81	6.50	8.06	H
Healthy Start Coalition of Sarasota County, Inc.	2817	16	14	5.58	4.97	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8789	57	69	6.45	7.85	
Healthy Start Coalition of Hillsborough County, Inc	16409	110	122	6.68	7.43	
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	609	5	10	7.59	16.42	H
Healthy Start Coalition of Manatee County, Inc.	3350	21	23	6.17	6.87	
Maternal Child Family Health Alliance of Palm Beach County, Inc.	13822	96	77	6.94	5.57	L
Healthy Start Coalition of Pasco County, Inc.	4802	25	30	5.29	6.25	
Healthy Start Coalition of Pinellas County, Inc.	8469	54	73	6.43	8.62	H
Healthy Start Coalition of Santa Rosa County, Inc	1713	8	8	4.86	4.67	
Healthy Start Coalition of Southwest Florida, Inc.	10339	63	49	6.05	4.74	L
Healthy Start Coalition of St. Lucie County, Inc.	3076	21	22	6.89	7.15	
Indian River County Healthy Start Coalition, Inc.	1305	8	11	6.19	8.43	
Martin County Healthy Start Coalition, Inc.	1226	7	2	6.00	1.63	L
Northeast Florida Healthy Start Coalition, Inc.	17693	120	129	6.76	7.29	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	549	3	6	5.74	10.93	
Orange County Healthy Start Coalition, Inc.	15186	101	117	6.66	7.70	
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	4966	29	32	5.84	6.44	
Seminole County Healthy Start Coalition, Inc.	4373	25	34	5.73	7.77	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc	5589	34	37	6.14	6.62	
The Healthy Start Coalition of Osceola County, Inc.	3709	21	22	5.54	5.93	
TOTAL	214,509	1,400	1,400	6.53	6.53	

[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

2010 FLORIDA ACTUAL LOW BIRTH WEIGHT [1] PERCENTAGES COMPARED TO EXPECTED [2] PERCENTAGES						
Healthy Start Coalition	2010 Births	2010 Expected [2] LBW [1] Births	2010 Actual LBW Births	2010 Expected LBW Percent	2010 Actual LBW Percent	H=Actual Rate Signif.Higher [3] L=Actual Rate Signif.Lower [3] Than Expected
Bay, Franklin, Gulf Healthy Start Coalition	2,434	200	199	8.20%	8.18%	
Broward Healthy Start Coalition, Inc.	21,342	2,039	1,932	9.56%	9.05%	L
Capital Area Healthy Start Coalition, Inc.	3,414	333	304	9.77%	8.90%	L
Central Healthy Start, Inc.	6,072	485	495	7.99%	8.15%	
Charlotte County Healthy Start Coalition, Inc.	1,012	80	87	7.94%	8.60%	
Chipola Healthy Start Coalition, Inc.	1,178	99	107	8.39%	9.08%	
Desoto	435	36	32	8.17%	7.36%	
Escambia County Healthy Start Coalition, Inc.	3,922	366	423	9.33%	10.79%	H
Florida Keys Healthy Start Coalition, Inc.	696	54	47	7.74%	6.75%	
Gadsden Citizens for Healthy Babies Inc.	672	78	81	11.65%	12.05%	
Miami-Dade	31,335	2,771	2,858	8.84%	9.12%	H
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc	3,152	245	241	7.78%	7.65%	
Healthy Start of North Central Florida, Inc.	10,054	874	850	8.70%	8.45%	
Healthy Start Coalition of Sarasota County, Inc.	2,817	223	216	7.90%	7.67%	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8,789	751	731	8.54%	8.32%	
Healthy Start Coalition of Hillsborough County, Inc	16,409	1,435	1,490	8.75%	9.08%	
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	609	58	68	9.58%	11.17%	
Healthy Start Coalition of Manatee County, Inc.	3,350	277	266	8.27%	7.94%	
Maternal Child Family Health Alliance of Palm Beach County, Inc.	13,822	1,250	1,235	9.05%	8.94%	
Healthy Start Coalition of Pasco County, Inc.	4,802	366	404	7.61%	8.41%	H
Healthy Start Coalition of Pinellas County, Inc.	8,469	728	770	8.60%	9.09%	
Healthy Start Coalition of Santa Rosa County, Inc	1,713	126	127	7.36%	7.41%	
Healthy Start Coalition of Southwest Florida, Inc.	10,339	849	803	8.21%	7.77%	L
Healthy Start Coalition of St. Lucie County, Inc.	3,076	278	274	9.04%	8.91%	
Indian River County Healthy Start Coalition, Inc.	1,305	110	103	8.46%	7.89%	
Martin County Healthy Start Coalition, Inc.	1,226	99	86	8.05%	7.01%	
Northeast Florida Healthy Start Coalition, Inc.	17,693	1,590	1,562	8.99%	8.83%	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	549	43	55	7.80%	10.02%	H
Orange County Healthy Start Coalition, Inc.	15,186	1,350	1,386	8.89%	9.13%	
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	4,966	404	374	8.14%	7.53%	
Seminole County Healthy Start Coalition, Inc.	4,373	356	343	8.13%	7.84%	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Coun	5,589	469	464	8.38%	8.30%	
The Healthy Start Coalition of Osceola County, Inc.	3,709	293	302	7.90%	8.14%	
TOTAL	214,509	18,715	18,715	8.72%	8.72%	

[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

INFANT DEATH RATES ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY
By Healthy Start Coalition 2006 - 2010

Healthy Start CoalitionCounty	2006	2007	2008	2009	2010	Total L	Total H
Bay, Franklin, Gulf Healthy Start Coalition	H	L				1	1
Broward Healthy Start Coalition, Inc.	L	L	L	L	L	5	
Capital Area Healthy Start Coalition, Inc.							
Central Healthy Start, Inc.							
Charlotte County Healthy Start Coalition, Inc.	L					1	
Chipola Healthy Start Coalition, Inc.							
Desoto		L				1	
Escambia County Healthy Start Coalition, Inc.			H	H	H		3
Florida Keys Healthy Start Coalition, Inc.		L				1	
Gadsden Citizens for Healthy Babies Inc.							
Miami-Dade	L	L	L	L	L	5	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.		H	H				2
Healthy Start of North Central Florida, Inc.	H	H	H		H		4
Healthy Start Coalition of Sarasota County, Inc.		L				1	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.		H		H			2
Healthy Start Coalition of Hillsborough County, Inc		H		H			2
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.		L			H	1	1
Healthy Start Coalition of Manatee County, Inc.				H			1
Maternal Child Family Health Alliance of Palm Beach County, Inc.	L	L	L		L	4	
Healthy Start Coalition of Pasco County, Inc.							
Healthy Start Coalition of Pinellas County, Inc.			H	H	H		3
Healthy Start Coalition of Santa Rosa County, Inc	H						1
Healthy Start Coalition of Southwest Florida, Inc.					L	1	
Healthy Start Coalition of St. Lucie County, Inc.							
Indian River County Healthy Start Coalition, Inc.							
Martin County Healthy Start Coalition, Inc.			L		L	2	
Northeast Florida Healthy Start Coalition, Inc.			H				1
Okeechobee County Family Health / Healthy Start Coalition, Inc.							
Orange County Healthy Start Coalition, Inc.	H		H				2
Prenatal and Infant Health Care Coalition of Brevard County, Inc.							
Seminole County Healthy Start Coalition, Inc.							
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.			H				1
The Healthy Start Coalition of Osceola County, Inc.			H				1

[1] H indicates the actual infant death rate was statistically significantly higher than the expected infant death rate for the county

 L indicates the actual infant death rate was statistically significantly lower than the expected infant death rate for the county

 after adjusting for the race, marital status and education characteristics of the births in each county.

 The significance level used is .05

LOW BIRTH WEIGHT (< 2500 grams) PERCENTAGE ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY
By Healthy Start Coalition 2006 - 2010

Healthy Start CoalitionCounty	2006	2007	2008	2009	2010	Total L	Total H
Bay, Franklin, Gulf Healthy Start Coalition							
Broward Healthy Start Coalition, Inc.	L				L	2	
Capital Area Healthy Start Coalition, Inc.					L	1	
Central Healthy Start, Inc.							
Charlotte County Healthy Start Coalition, Inc.							
Chipola Healthy Start Coalition, Inc.	H						1
Desoto		L	L			2	
Escambia County Healthy Start Coalition, Inc.	H	H	H		H		4
Florida Keys Healthy Start Coalition, Inc.							
Gadsden Citizens for Healthy Babies Inc.							
Miami-Dade	L				H	1	1
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.							
Healthy Start of North Central Florida, Inc.							
Healthy Start Coalition of Sarasota County, Inc.	L		L	L		3	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	L	L	H			2	1
Healthy Start Coalition of Hillsborough County, Inc	H						1
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.							
Healthy Start Coalition of Manatee County, Inc.	L	L		L		3	
Maternal Child Family Health Alliance of Palm Beach County, Inc.		H					1
Healthy Start Coalition of Pasco County, Inc.	H			H	H		3
Healthy Start Coalition of Pinellas County, Inc.							
Healthy Start Coalition of Santa Rosa County, Inc							
Healthy Start Coalition of Southwest Florida, Inc.	L			L	L	3	
Healthy Start Coalition of St. Lucie County, Inc.	L					1	
Indian River County Healthy Start Coalition, Inc.	L		L			2	
Martin County Healthy Start Coalition, Inc.			L			1	
Northeast Florida Healthy Start Coalition, Inc.			L			1	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	H				H		2
Orange County Healthy Start Coalition, Inc.	H			H			2
Prenatal and Infant Health Care Coalition of Brevard County, Inc.	H						1
Seminole County Healthy Start Coalition, Inc.		L				1	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.							
The Healthy Start Coalition of Osceola County, Inc.	H						1

[1] H indicates the actual infant death rate was statistically significantly higher than the expected infant death rate for the county

L indicates the actual infant death rate was statistically significantly lower than the expected infant death rate for the county

after adjusting for the race, marital status and education characteristics of the births in each county.

The significance level used is .05