INFANT MORTALITY AND LOW BIRTH WEIGHT ACTUAL RATES COMPARED TO EXPECTED RATES BY HEALTHY START COALITION AREA 2011

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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 2010 and 2011. 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 2,000 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 2010 (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 2011, to obtain the number of expected infant deaths for each of the nine categories for each coalition area for 2011. 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 2011 birth data instead of 2010 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 an "H", and "L" indicates significantly lower than expected actual statistics.

There is a statistically significant correlation between the actual to expected LBW ratios and the actual to expected infant death ratios. This means that areas with high actual to expected LBW ratios have a tendency to have high actual to expected infant death ratios and vice versa (Kendall's rank correlation coefficient = 0.405; p value of 0.001).

Also included in this report are summary tables for the years 2007 through 2011 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.

Healthy Start Coalition	2011 Births [3]	2011 Expected [1] Infant Deaths	2011 Actual Infant Deaths	2011 Expected Infant Death Rate Per 1000 Births	2011 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	2394	14	21	5.91	8.77	
Broward Healthy Start Coalition, Inc.	21075	152	129	7.22	6.12	L
Capital Area Healthy Start Coalition, Inc.	3358	25	20	7.37	5.96	
Central Healthy Start, Inc.	6008	35	47	5.86	7.82	H
Charlotte County Healthy Start Coalition, Inc.	987	6	5	5.74	5.07	
Chipola Healthy Start Coalition, Inc.	1132	7	11	6.30	9.72	
Desoto	387	2	0	6.46	0.00	
Escambia County Healthy Start Coalition, Inc.	3836	26	29	6.81	7.56	
Florida Keys Healthy Start Coalition, Inc.	720	4	3	5.55	4.17	
Gadsden County Healthy Start Coalition, Inc.	595	5	6	9.10	10.08	
Healthy Start Coalition of Miami-Dade Inc.	31349	204	147	6.50	4.69	L
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3267	17	17	5.31	5.20	
Healthy Start of North Central Florida, Inc.	9850	63	60	6.42	6.09	
Healthy Start Coalition of Sarasota County, Inc.	2943	18	10	5.95	3.40	L
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8507	54	53	6.30	6.23	
Healthy Start Coalition of Hillsborough County, Inc	16456	105	142	6.37	8.63	H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	582	5	7	7.87	12.03	
Healthy Start Coalition of Manatee County, Inc.	3362	21	31	6.14	9.22	H
Healthy Start Coalition of Palm Beach County, Inc.	13797	91	81	6.56	5.87	
Healthy Start Coalition of Pasco County, Inc.	4699	25	29	5.35	6.17	
Healthy Start Coalition of Pinellas County, Inc.	8289	52	55	6.31	6.64	
Healthy Start Coalition of Santa Rosa County, Inc	1858	9	11	4.91	5.92	
Healthy Start Coalition of Southwest Florida, Inc.	10155	61	61	6.04	6.01	
Healthy Start Coalition of St. Lucie County, Inc.	2995	20	14	6.84	4.67	
Indian River County Healthy Start Coalition, Inc.	1277	8	16	6.21	12.53	H
Martin County Healthy Start Coalition, Inc.	1185	8	5	6.81	4.22	
Northeast Florida Healthy Start Coalition, Inc.	17407	114	114	6.54	6.55	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	532	3	1	5.84	1.88	
Orange County Healthy Start Coalition, Inc.	15392	102	119	6.62	7.73	
Healthy Start Coalition of Brevard County, Inc.	5178	31	35	5.90	6.76	
Seminole	4441	26	28	5.79	6.30	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.	5441	34	36	6.18	6.62	
The Healthy Start Coalition of Osceola County, Inc.	3775	22	25	5.76	6.62	
TOTAL	213,229	1,368	1,368	6.42	6.42	

2011 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS COMPARED TO EXPECTED [1] RATES PER 1000 BIRTHS

[1] The expected number of infant deaths is calculated with adjusting for the maternal race, marital status and education characteristics of the births in each county

[2] The significance level used is .05

[3] Total excludes 8 births with county unknown

2011 FLORIDA ACTUAL LOW BIRTH WEIGHT[1] PERCENTAGES
COMPARED TO EXPECTED[2] PERCENTAGES

Healthy Start Coalition	2011 Births[4]	2011 Expected[2] LBW[1] Births	2011 Actual LBW Births	2011 Expected LBW Percent	2011 Actual LBW Percent	H=Actual Rate Signif.Higher[3] L=Actual Rate Signif.Lower[3] Than Expected
Bay, Franklin, Gulf Healthy Start Coalition	2,394	195	223	8.16%	9.31%	H
Broward Healthy Start Coalition, Inc.	21,075	1,999	1,962	9.49%	9.31%	
Capital Area Healthy Start Coalition, Inc.	3,358	322	335	9.58%	9.98%	
Central Healthy Start, Inc.	6,008	487	496	8.10%	8.26%	
Charlotte County Healthy Start Coalition, Inc.	987	78	76	7.92%	7.70%	
Chipola Healthy Start Coalition, Inc.	1,132	96	108	8.52%	9.54%	
Desoto	387	33	32	8.63%	8.27%	
Escambia County Healthy Start Coalition, Inc.	3,836	349	394	9.11%	10.27%	H
Florida Keys Healthy Start Coalition, Inc.	720	57	52	7.90%	7.22%	
Gadsden County Healthy Start Coalition, Inc.	595	66	62	11.06%	10.42%	
Healthy Start Coalition of Miami-Dade Inc.	31,349	2,756	2,723	8.79%	8.69%	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3,267	254	266	7.78%	8.14%	
Healthy Start of North Central Florida, Inc.	9,850	859	814	8.72%	8.26%	L
Healthy Start Coalition of Sarasota County, Inc.	2,943	237	236	8.06%	8.02%	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8,507	732	655	8.61%	7.70%	L
Healthy Start Coalition of Hillsborough County, Inc	16,456	1,428	1,544	8.67%	9.38%	H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	582	57	60	9.71%	10.31%	
Healthy Start Coalition of Manatee County, Inc.	3,362	283	280	8.42%	8.33%	
Healthy Start Coalition of Palm Beach County, Inc.	13,797	1,235	1,251	8.95%	9.07%	
Healthy Start Coalition of Pasco County, Inc.	4,699	362	377	7.71%	8.02%	
Healthy Start Coalition of Pinellas County, Inc.	8,289	701	727	8.46%	8.77%	
Healthy Start Coalition of Santa Rosa County, Inc	1,858	139	141	7.48%	7.59%	
Healthy Start Coalition of Southwest Florida, Inc.	10,155	843	822	8.30%	8.09%	
Healthy Start Coalition of St. Lucie County, Inc.	2,995	270	243	9.02%	8.11%	L
Indian River County Healthy Start Coalition, Inc.	1,277	109	122	8.54%	9.55%	
Martin County Healthy Start Coalition, Inc.	1,185	100	93	8.47%	7.85%	
Northeast Florida Healthy Start Coalition, Inc.	17,407	1,549	1,489	8.90%	8.55%	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	532	43	42	8.02%	7.89%	
Orange County Healthy Start Coalition, Inc.	15,392	1,373	1,363	8.92%	8.86%	
Healthy Start Coalition of Brevard County, Inc.	5,178	425	370	8.20%	7.15%	L
Seminole	4,441	363	406	8.17%	9.14%	H
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Ir	5,441	455	474	8.36%	8.71%	
The Healthy Start Coalition of Osceola County, Inc.	3,775	303	320	8.02%	8.48%	
TOTAL	213,229	18,558	18,558	8.70%	8.70%	

[1] **LBW = Low Birth Weight, defined as birth weight below 2500 grams.**

[2] **The expected number of LBW births is calculated with adjusting for the maternal race, marital status and education characteristics of the births in each county**

[3] **The significance level used is .05**

[4] **Total excludes 8 births with county unknown**

INFANT DEATH RATES ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY BY HEALTHY START COALITION 2007 - 2011							
Healthy Start Coalition	2007	2008	2009	2010	2011	Total L	Total H
Bay, Franklin, Gulf Healthy Start Coalition	L					1	
Broward Healthy Start Coalition, Inc.	L	L	L	L	L	5	
Capital Area Healthy Start Coalition, Inc.							
Central Healthy Start, Inc.					H		1
Charlotte County Healthy Start Coalition, Inc.							
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 County Healthy Start Coalition, Inc.							
Healthy Start Coalition of Miami-Dade Inc.	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			3
Healthy Start Coalition of Sarasota County, Inc.	L				L	2	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	H		H				2
Healthy Start Coalition of Hillsborough County, Inc	H		H		H		3
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	L			H		1	1
Healthy Start Coalition of Manatee County, Inc.			H		H		2
Healthy Start Coalition of Palm Beach County, Inc.	L	L		L		3	
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							
Healthy Start Coalition of Southwest Florida, Inc.				L		1	
Healthy Start Coalition of St. Lucie County, Inc.							
Indian River County Healthy Start Coalition, Inc.					H		1
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					1
Healthy Start Coalition of Brevard County, Inc.							
Seminole							
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 COUNTY 2007 - 2011

Healthy Start Coalition	2007	2008	2009	2010	2011	Total L	Total H
Bay, Franklin, Gulf Healthy Start Coalition					H		1
Broward Healthy Start Coalition, Inc.				L		1	
Capital Area Healthy Start Coalition, Inc.				L		1	
Central Healthy Start, Inc.							
Charlotte County Healthy Start Coalition, Inc.							
Chipola Healthy Start Coalition, Inc.							
Desoto	L	L				2	
Escambia County Healthy Start Coalition, Inc.	H	H		H	H		4
Florida Keys Healthy Start Coalition, Inc.							
Gadsden County Healthy Start Coalition, Inc.							
Healthy Start Coalition of Miami-Dade Inc.				H			1
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.							
Healthy Start of North Central Florida, Inc.					L	1	
Healthy Start Coalition of Sarasota County, Inc.		L	L			2	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	L	H			L	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			2	
Healthy Start Coalition of Palm Beach County, Inc.	H						1
Healthy Start Coalition of Pasco County, Inc.			H	H			2
Healthy Start Coalition of Pinellas County, Inc.							
Healthy Start Coalition of Santa Rosa County, Inc							
Healthy Start Coalition of Southwest Florida, Inc.			L	L		2	
Healthy Start Coalition of St. Lucie County, Inc.					L	1	
Indian River County Healthy Start Coalition, Inc.		L				1	
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			1
Orange County Healthy Start Coalition, Inc.			H				1
Healthy Start Coalition of Brevard County, Inc.					L	1	
Seminole	L				H	1	1
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.							
The Healthy Start Coalition of Osceola County, Inc.							

[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