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INFANT MORTALITY AND LOW BIRTH WEIGHT ACTUAL RATES COMPARED TO EXPECTED RATES BY HEALTHY START COALITION AREA 2013

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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 2012 and 2013. 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 2,300 (1.1%) birth records in the ninth category. 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 2012 (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 2013, to obtain the number of expected infant deaths for each of the nine categories for each coalition area for 2013. 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 2013 birth data instead of 2012 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.

As shown in the tables below, there were six areas with an H for infant mortality and three areas with an L for infant mortality. On the table for low birth weight, there were two areas with an H and five areas with an L. On both tables the areas without an H or an L had rates that were not statistically significantly different from the expected rates.

There is a statistically significant correlation between the actual to expected LBW ratios and the actual to expected infant death ratios (Kendall’s rank correlation coefficient = 0.274; p value of 0.027).

Also included in this report are summary tables for the years 2009 through 2013 that show the Hs and Ls 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.

2013 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS COMPARED TO EXPECTED[1] RATES PER 1000 BIRTHS

Healthy Start Coalition	2013 Births[3]	2013 Expected[1] Infant Deaths	2013 Actual Infant Deaths	2013 Expected Infant Death Rate Per 1000 Births	2013 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	2485	17	21	6.82	8.45	
Broward Healthy Start Coalition, Inc.	21541	145	114	6.74	5.29	L
Capital Area Healthy Start Coalition, Inc.	3316	23	19	6.96	5.73	
Central Healthy Start, Inc.	6043	35	41	5.79	6.78	
Charlotte County Healthy Start Coalition, Inc.	1021	6	1	5.69	0.98	L
Chipola Healthy Start Coalition, Inc.	1140	7	7	6.35	6.14	
Desoto	363	2	1	6.06	2.75	
Escambia County Healthy Start Coalition, Inc.	3804	25	28	6.55	7.36	
Florida Keys Healthy Start Coalition, Inc.	741	4	4	5.74	5.40	
Gadsden County Healthy Start Coalition, Inc.	561	5	9	9.13	16.04	
Healthy Start Coalition of Miami-Dade Inc.	31147	192	138	6.16	4.43	L
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3526	18	27	4.98	7.66	H
Healthy Start of North Central Florida, Inc.	9794	60	81	6.10	8.27	H
Healthy Start Coalition of Sarasota County, Inc.	2803	15	15	5.35	5.35	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8495	52	53	6.07	6.24	
Healthy Start Coalition of Hillsborough County, Inc	16614	100	122	6.02	7.34	H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	603	4	4	7.33	6.63	
Healthy Start Coalition of Manatee County, Inc.	3375	20	15	5.86	4.44	
Healthy Start Coalition of Palm Beach County, Inc.	14198	91	65	6.38	4.58	L
Healthy Start Coalition of Pasco County, Inc.	4789	25	37	5.32	7.73	H
Healthy Start Coalition of Pinellas County, Inc.	8576	53	48	6.23	5.60	
Healthy Start Coalition of Santa Rosa County, Inc	1797	8	11	4.64	6.12	
Healthy Start Coalition of Southwest Florida, Inc.	10187	59	62	5.77	6.09	
Healthy Start Coalition of St. Lucie County, Inc.	2990	19	13	6.39	4.35	
Indian River County Healthy Start Coalition, Inc.	1217	7	8	5.79	6.57	
Martin County Healthy Start Coalition, Inc.	1169	6	8	5.53	6.84	
Northeast Florida Healthy Start Coalition, Inc.	17721	111	141	6.26	7.96	H
Okeechobee County Family Health / Healthy Start Coalition, Inc.	522	3	4	5.75	7.66	
Orange County Healthy Start Coalition, Inc.	15829	99	119	6.23	7.52	H
Healthy Start Coalition of Brevard County, Inc.	5076	29	35	5.62	6.90	
Seminole	4416	24	24	5.49	5.43	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc	5415	32	23	5.98	4.25	
The Healthy Start Coalition of Osceola County, Inc.	3909	22	20	5.51	5.12	
TOTAL	215,183	1,318	1,318	6.13	6.13	

[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 11 births with county unknown*

2013 FLORIDA ACTUAL LOW BIRTH WEIGHT[1] PERCENTAGES COMPARED TO EXPECTED[2] PERCENTAGES

Healthy Start Coalition	2013 Births[4]	2013 Expected[2] LBW[1] Births	2013 Actual LBW Births	2013 Expected LBW Percent	2013 Actual LBW Percent	H=Actual Rate Signif.Higher [3] L=Actual Rate Signif.Lower [3] Than Expected
Bay, Franklin, Gulf Healthy Start Coalition	2,485	209	200	8.40%	8.05%	
Broward Healthy Start Coalition, Inc.	21,541	2,000	2,026	9.29%	9.41%	
Capital Area Healthy Start Coalition, Inc.	3,316	309	322	9.33%	9.71%	
Central Healthy Start, Inc.	6,043	483	512	7.99%	8.47%	
Charlotte County Healthy Start Coalition, Inc.	1,021	80	84	7.80%	8.23%	
Chipola Healthy Start Coalition, Inc.	1,140	96	87	8.43%	7.63%	
Desoto	363	30	22	8.17%	6.06%	
Escambia County Healthy Start Coalition, Inc.	3,804	343	364	9.01%	9.57%	
Florida Keys Healthy Start Coalition, Inc.	741	60	67	8.03%	9.04%	
Gadsden County Healthy Start Coalition, Inc.	561	62	66	11.03%	11.76%	
Healthy Start Coalition of Miami-Dade Inc.	31,147	2,666	2,636	8.56%	8.46%	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3,526	269	279	7.63%	7.91%	
Healthy Start of North Central Florida, Inc.	9,794	838	844	8.55%	8.62%	
Healthy Start Coalition of Sarasota County, Inc.	2,803	218	173	7.78%	6.17%	L
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.	8,495	718	716	8.45%	8.43%	
Healthy Start Coalition of Hillsborough County, Inc	16,614	1,410	1,493	8.49%	8.99%	H
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.	603	57	75	9.52%	12.44%	H
Healthy Start Coalition of Manatee County, Inc.	3,375	277	244	8.19%	7.23%	L
Healthy Start Coalition of Palm Beach County, Inc.	14,198	1,255	1,162	8.84%	8.18%	L
Healthy Start Coalition of Pasco County, Inc.	4,789	366	383	7.64%	8.00%	
Healthy Start Coalition of Pinellas County, Inc.	8,576	721	720	8.40%	8.40%	
Healthy Start Coalition of Santa Rosa County, Inc	1,797	131	131	7.30%	7.29%	
Healthy Start Coalition of Southwest Florida, Inc.	10,187	823	860	8.08%	8.44%	
Healthy Start Coalition of St. Lucie County, Inc.	2,990	265	248	8.85%	8.29%	
Indian River County Healthy Start Coalition, Inc.	1,217	101	85	8.26%	6.98%	L
Martin County Healthy Start Coalition, Inc.	1,169	91	93	7.80%	7.96%	
Northeast Florida Healthy Start Coalition, Inc.	17,721	1,552	1,553	8.76%	8.76%	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	522	41	44	7.91%	8.43%	
Orange County Healthy Start Coalition, Inc.	15,829	1,380	1,430	8.72%	9.03%	
Healthy Start Coalition of Brevard County, Inc.	5,076	409	374	8.05%	7.37%	L
Seminole	4,416	355	349	8.03%	7.90%	
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties	5,415	447	433	8.26%	8.00%	
The Healthy Start Coalition of Osceola County, Inc.	3,909	310	295	7.93%	7.55%	
TOTAL	215,183	18,370	18,370	8.54%	8.54%	

[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 11 births with county unknown

INFANT DEATH RATES ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY
BY HEALTHY START COALITION 2009 - 2013

Healthy Start Coalition	*2009*	*2010*	*2011*	*2012*	*2013*	*Total L*	*Total H*
Healthy Start of Bay, Franklin, and Gulf Counties							
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.					L	1	
Chipola Healthy Start Coalition, Inc.							
Florida Department of Health in Desoto County							
Escambia County Healthy Start Coalition, Inc.	H	H					2
Florida Keys Healthy Start Coalition, Inc.							
Gadsden Citizens for Healthy Babies 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		1
Healthy Start of North Central Florida, Inc.		H			H		2
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	H	H		4
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.		H					1
Healthy Start Coalition of Manatee County, Inc.	H		H				2
Maternal Child Family Health Alliance of Palm Beach County, Inc.		L		L	L	3	
Healthy Start Coalition of Pasco County, Inc.					H		1
Healthy Start Coalition of Pinellas County, Inc.	H	H					2
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				1	
Northeast Florida Healthy Start Coalition, Inc.					H		1
Okeechobee County Family Health / Healthy Start Coalition, Inc.							
Orange County Healthy Start Coalition, Inc.					H		1
Prenatal and Infant Health Care Coalition of Brevard County, Inc.							
Florida Department of Health in Seminole County							
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

LOW BIRTH WEIGHT (< 2500 grams) PERCENTAGE ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY BY HEALTHY START COALITION 2009 - 2013

Healthy Start Coalition	*2009*	*2010*	*2011*	*2012*	*2013*	*Total L*	*Total H*
Healthy Start of Bay, Franklin, and Gulf Counties			H				1
Brow ard 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.							
Florida Department of Health in Desoto County				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.							
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	L	3	
Healthy Start Coalition of Hardee / Highlands / Polk Counties, Inc.			L			1	
Healthy Start Coalition of Hillsborough County, Inc			H		H		2
Healthy Start Coalition of Jefferson / Madison / Taylor Counties, Inc.					H		1
Healthy Start Coalition of Manatee County, Inc.	L				L	2	
Maternal Child Family Health Alliance of Palm Beach County, Inc.					L	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 Southw est Florida, Inc.	L	L				2	
Healthy Start Coalition of St. Lucie County, Inc.			L	H		1	1
Indian River County Healthy Start Coalition, Inc.					L	1	
Martin County Healthy Start Coalition, Inc.							
Northeast Florida Healthy Start Coalition, Inc.							
Okeechobee County Family Health / Healthy Start Coalition, Inc.		H					1
Orange County Healthy Start Coalition, Inc.	H						1
Prenatal and Infant Health Care Coalition of Brevard County, Inc.			L		L	2	
Florida Department of Health in Seminole County			H				1
The Healthy Start Prenatal & Infant Coalition of Flager and Volusia Counties, Inc.				L		1	
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