



**Florida's Infant Mortality and Low Birth Weight  
Actual Rates Compared To Expected Rates  
By Healthy Start Coalition Area  
2015 Update**

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## **Introduction**

The public health community uses infant mortality and birth weight statistics extensively as maternal and child health indicators because they are relevant, readily available, and reliable due to a relatively high level of completeness.

The purpose of this analysis is to identify geographic areas in the state that exhibit statistically significant differences in low birth weight (LBW) and infant mortality (IM) rates than would be expected considering the unique demographics of each Healthy Start Coalition (HSC) area.

IM and LBW rates in Florida vary across geographic areas. This variation is due, in part, to the unique demographic characteristics of the populations within each HSC area. In this analysis, adjustments are made to account for the differences in demographic characteristics. Three demographic characteristics are adjusted for to calculate the expected IM and LBW: maternal race, marital status, and educational attainment. These variables are used because of their known associations with risk of LBW and IM, and because adjusting provides a way to make valid comparisons among HSC areas with different population sizes based on these characteristics.

Other demographic characteristics, such as young maternal age and smoking status, were not used to adjust IM and LBW estimates, to avoid eliminating differences that could possibly be attributed to public health interventions. For example, HSC areas with lower than expected LBW percentages may have implemented successful smoking cessation programs. If adjustments had been made for smoking status, differences between actual and expected statistics would not be apparent. In another example, births to women under the age of 20 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 statistically significant, are likely to be the result of random variation.

## **Methods**

The data used in this analysis were extracted from the birth records for Florida residents who were born in calendar years 2014 and 2015. Infant mortality is defined as the death of a child less than one year of age. Infants born weighing less than 2,500 grams at delivery are considered LBW. This analysis uses three demographic variables to perform statistical adjustments on expected IM and LBW estimates: maternal race, marital status, and educational attainment. Each demographic variable has two defined values as follows: maternal race as non-Black or Black, marital status as married or not married, and educational attainment as high school or above, or less than high school graduation. All possible combinations of the three demographic variables form nine mutually exclusive categories. The ninth category includes birth records for which any of the three demographic variables had a missing value. The nine categories are as follows:

<u>Category</u>	<u>Maternal Race</u>	<u>Marital Status</u>	<u>Educational Attainment</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 IM and LBW Expected Rates:**

Using the classification scheme shown above, nine state-level category-specific IM expected rates were calculated from the 2014 vital records (the latest year available at the time of this analysis for complete linked birth and infant death data). The infant death linkage indicator is not recorded on the birth record until up to one year after a birth. Therefore, 2015 linked infant birth-death records were not complete at the time of this analysis and 2014 data were instead used to calculate expected IM estimates. This adjustment technique is referred to as “indirect adjustment.” To obtain the 2015 expected number of infant deaths by HSC area, each of the nine state-level category-specific IM rates for 2014 were multiplied by the total number of births in 2015 within the county or counties comprising each coalition and then summed. To compute the 2015 expected infant mortality rates for each HSC area, the 2015 expected number of infant deaths was used as the numerator and the total number of births in 2015 was used as the denominator. Using the nine state-level category-specific rates to estimate expected IM counts and rates accounts for the unique sociodemographic composition of mothers in each HSC area who gave birth to an infant and mothers whose infants had died by adjusting for the influence of maternal race, marital status and educational attainment.

These methods were applied in the same way to calculate expected LBW counts. However, 2015 state-level birth counts were used to calculate expected LBW percentages because birth weight is recorded at the time of delivery.

The *Normal Approximation to the Binomial Distribution* was used to test for statistically significant differences between actual and expected rates in most HSC areas. In instances where the number of infant deaths or number of LBW infants was less than 30, the Poisson formula was used. The correlation between IM and LBW rates across HSC areas was also assessed.

In March 2004, the recording of maternal race on the birth record was changed to allow the selection of more than one race. 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 and maps 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 HSC area, as described above. HSC areas with statistically significantly higher than expected actual statistics are indicated in the tables with an “H” and those with an “L” indicate statistically significant lower than expected actual statistics. The maps display the results of the statistical tests for significance. HSC areas where the actual statistics are significantly higher or lower are shaded, as indicated by the legend on the maps.

## Summary

For 2015 IM rates: Actual vs. Expected

- Broward Healthy Start Coalition (5.72 vs. 6.94), Healthy Start Coalition of Miami-Dade (4.84 vs. 6.16), and Healthy Start Coalition of Palm Beach County (4.91 vs. 6.48) areas had statistically significantly lower IM rates than expected (Table 1). HSC areas with lower than expected IM rates are located in the southeastern coastal region of Florida. Broward Healthy Start Coalition and Healthy Start Coalition of Miami-Dade areas presented lower IM rates than expected for the last five years (2011-2015), while the Healthy Start Coalition of Palm Beach County area had lower IM rates than expected for the last four years, 2012-2015 (Table 3).
- Capital Area Healthy Start Coalition (7.39 vs. 7.06), Healthy Start of North Central Florida (7.85 vs. 6.33), Healthy Start Coalition of Flagler and Volusia Counties (8.02 vs. 6.03), and Healthy Start Coalition of Hillsborough County (7.97 vs. 6.18) areas had statistically significantly higher IM rates than expected (Table 1). Larger HSC areas, composed of multiple counties, with higher than expected IM rates are located in the north central and central regions of Florida, in addition to some smaller HSC areas located on both the western and eastern coasts. Healthy Start Coalition of Hillsborough County area presented higher IM rates than expected for each of the last five years from 2011 to 2015 (Table 3).

For 2015 LBW percentages: Actual vs. Expected

- Florida Keys Healthy Start Coalition (5.98% vs. 7.92%), Healthy Start Coalition of Hardee, Highlands and Polk Counties (7.80% vs. 8.59%), Healthy Start Coalition of Manatee County (6.83% vs. 8.30%), Healthy Start Coalition of Pinellas County (7.58% vs. 8.51%), Healthy Start Coalition of Southwest Florida (7.14% vs. 8.20%), Healthy Start Coalition of St. Lucie County (7.84% vs. 9.09%), Indian River County Healthy Start Coalition (7.87% vs. 9.36%) and Martin County Healthy Start Coalition (5.31% vs. 7.95%) areas had significantly lower percentages of LBW infants than expected (Table 2). The majority of HSC areas that exhibit lower than expected LBW percentages are located in the eastern coastal, mid-central, and western coastal regions of the state. None of the HSC areas presented lower than expected percentages of LBW for at least four consecutive years (Table 4).
- Central Healthy Start (8.66% vs. 8.41%), Escambia County Healthy Start Coalition (10.92% vs. 9.21%), Gadsden County Healthy Start Coalition (13.46% vs. 11.09%), Healthy Start of North Central Florida (9.91% vs. 8.70%), Healthy Start Coalition of Hillsborough County (9.03% vs. 8.60%) and Northeast Florida Healthy Start Coalition (9.45% vs. 8.91%) areas had significantly higher percentages of LBW infants than expected (Table 3). These HSC areas are generally located within central, north central and northeastern Florida. Additional HSC areas with higher than expected LBW are seen on the western and eastern coastal regions of the state. From 2011-2015, only one HSC area which corresponds to the Escambia County Healthy Start Coalition exhibited

four years (albeit non-consecutive) of higher than expected percentages of LBW infants (Table 4).

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 = 0.32; p value of 0.000).

Also included in this report are summary tables for the years 2011 through 2015 that show the Highs (H's) and Lows (L's) for HSC areas for each of the past five years (Tables 3 and 4).

### **Discussion**

This analysis should be considered a preliminary step in the continuing endeavor to reduce IM and LBW in Florida. The results of this analysis can be used to focus further studies and public health efforts on areas of the state where the risks of poor infant health outcomes are significantly higher and analyze factors that contribute to the lower risks seen in some areas.

One limitation of this analysis is the high variability of rates in HSC areas with smaller populations compared to those with larger populations. Consequently, larger differences in rates for small HSC areas may not be statistically significant while the same or smaller differences may be statistically significant in larger HSC areas. Actual rates that are statistically significantly higher than the expected rates are most likely not a result of random fluctuations and may indicate a public health problem requiring further investigation and intervention; however, higher rates that are not statistically significant may warrant further investigation as well. Smaller HSC 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 HSC area, further analysis could focus on other factors that were not adjusted for, such as smoking rates and maternal age. Unique factors in each HSC area contribute to IM and LBW. Local area analysis of factors associated with these outcomes should be undertaken to better understand the reasons for statistically significant lower or higher than expected rates with separate analyses performed for individual factors of concern. Finally, it should be noted that in this analysis, rates for each HSC area are compared to the statewide rates, after adjustment for maternal race, marital status, and educational 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.

**TABLE 1. FLORIDA ACTUAL INFANT MORTALITY RATES PER 1000 BIRTHS  
COMPARED TO EXPECTED<sup>1</sup> RATES PER 1000 BIRTHS, 2015**

	2015		2015		2015	2015	H=Actual Rate Signif.Higher <sup>2</sup> L=Actual Rate Signif.Lower <sup>2</sup> Than Expected
	Expected <sup>1</sup>		Actual		Expected	Actual	
	Infant		Infant		Infant	Infant	
	Births <sup>3</sup>	Deaths	Deaths	Per 1000 Births	Per 1000 Births		
<b>Healthy Start Coalition</b>							
Bay, Franklin, Gulf Healthy Start Coalition, Inc.	2621	17	15	6.33	5.72		
Brow ard Healthy Start Coalition, Inc.	22307	155	121	6.94	5.42	L	
The Capital Area Healthy Start Coalition, Inc.	3385	24	25	7.06	7.39		
Central Healthy Start, Inc.	6301	36	54	5.75	8.57	H	
Charlotte County Healthy Start Coalition, Inc.	1030	6	7	5.51	6.80		
Chipola Healthy Start Coalition, Inc.	1168	7	8	6.21	6.85		
Florida Department of Health in Desoto County	376	2	5	6.33	13.30		
Escambia County Healthy Start Coalition, Inc.	3902	26	30	6.69	7.69		
Florida Keys Healthy Start Coalition, Inc.	752	4	3	5.49	3.99		
Gadsden County Healthy Start Coalition, Inc.	557	5	5	8.80	8.98		
Healthy Start Coalition of Miami-Dade Inc.	32432	200	157	6.16	4.84	L	
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3635	19	21	5.23	5.78		
Healthy Start of North Central Florida, Inc.	9939	63	78	6.33	7.85	H	
Healthy Start Coalition of Sarasota County, Inc.	2907	16	17	5.61	5.85		
Healthy Start Coalition of Hardee, Highlands and Polk Counties, Inc.	8790	56	69	6.33	7.85		
Healthy Start Coalition of Hillsborough County	17570	109	140	6.18	7.97	H	
Healthy Start Coalition of Jefferson, Madison and Taylor Counties, Inc.	583	4	3	7.19	5.15		
Healthy Start Coalition of Manatee County, Inc.	3469	21	20	6.07	5.77		
Healthy Start Coalition of Palm Beach County, Inc.	14873	96	73	6.48	4.91	L	
Healthy Start Coalition of Pasco County, Inc.	5105	28	23	5.40	4.51		
Healthy Start Coalition of Pinellas County, Inc.	8744	54	56	6.13	6.40		
Healthy Start Coalition of Santa Rosa County, Inc	1943	9	7	4.83	3.60		
Healthy Start Coalition of Southw est Florida, Inc.	10742	63	65	5.91	6.05		
Healthy Start Coalition of St. Lucie County, Inc.	3099	21	18	6.74	5.81		
Indian River County Healthy Start Coalition, Inc.	1246	10	9	7.65	7.22		
Martin County Healthy Start Coalition, Inc.	1262	7	6	5.83	4.75		
Northeast Florida Healthy Start Coalition, Inc.	18563	120	132	6.44	7.11		
Okeechobee County Family Health / Healthy Start Coalition, Inc.	523	3	3	6.11	5.74		
Healthy Start Coalition of Orange County, Inc.	16718	106	107	6.34	6.40		
Healthy Start Coalition of Brevard County, Inc.	5246	30	33	5.71	6.29		
Healthy Start Coalition of Seminole County, Inc.	4554	25	22	5.48	4.83		
The Healthy Start Coalition of Flagler and Volusia Counties, Inc.	5736	35	46	6.03	8.02	H	
The Healthy Start Coalition of Osceola County, Inc.	4183	23	21	5.50	5.02		
TOTAL	224,261	1,399	1,399	6.24	6.24		

<sup>1</sup> The expected number of infant deaths is calculated with adjusting for the maternal race, marital status and education characteristics of the births in each area

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

<sup>3</sup> Total excludes 20 births with county unknown

**TABLE 2. FLORIDA ACTUAL LOW BIRTH WEIGHT<sup>1</sup> PERCENTAGES  
COMPARED TO EXPECTED<sup>2</sup> PERCENTAGES, 2015**

Healthy Start Coalition	2015		2015		2015		H=Actual Rate
	Expected <sup>2</sup>	Actual	Expected	Actual	Actual	Signif.Higher <sup>3</sup>	
	2015 Births <sup>4</sup>	LBW <sup>1</sup> Births	LBW Births	LBW Percent	LBW Percent	L=Actual Rate Signif.Lower <sup>3</sup> Than Expected	
Bay, Franklin, Gulf Healthy Start Coalition, Inc.	2,621	220	227	8.41%	8.66%		
Broward Healthy Start Coalition, Inc.	22,307	2,090	2,074	9.37%	9.30%		
The Capital Area Healthy Start Coalition, Inc.	3,385	323	302	9.54%	8.92%		
Central Healthy Start, Inc.	6,301	510	587	8.10%	9.32%	H	
Charlotte County Healthy Start Coalition, Inc.	1,030	81	93	7.91%	9.03%		
Chipola Healthy Start Coalition, Inc.	1,168	99	99	8.45%	8.48%		
Florida Department of Health in Desoto County	376	31	32	8.22%	8.51%		
Escambia County Healthy Start Coalition, Inc.	3,902	359	426	9.21%	10.92%	H	
Florida Keys Healthy Start Coalition, Inc.	752	60	45	7.92%	5.98%	L	
Gadsden County Healthy Start Coalition, Inc.	557	62	75	11.09%	13.46%	H	
Healthy Start Coalition of Miami-Dade Inc.	32,432	2,789	2,733	8.60%	8.43%		
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.	3,635	279	269	7.68%	7.40%		
Healthy Start of North Central Florida, Inc.	9,939	865	985	8.70%	9.91%	H	
Healthy Start Coalition of Sarasota County, Inc.	2,907	232	220	7.97%	7.57%		
Healthy Start Coalition of Hardee, Highlands and Polk Counties, Inc.	8,790	755	686	8.59%	7.80%	L	
Healthy Start Coalition of Hillsborough County	17,570	1,510	1,586	8.60%	9.03%	H	
Healthy Start Coalition of Jefferson, Madison and Taylor Counties, Inc.	583	56	62	9.55%	10.63%		
Healthy Start Coalition of Manatee County, Inc.	3,469	288	237	8.30%	6.83%	L	
Healthy Start Coalition of Palm Beach County, Inc.	14,873	1,315	1,259	8.84%	8.47%		
Healthy Start Coalition of Pasco County, Inc.	5,105	396	420	7.75%	8.23%		
Healthy Start Coalition of Pinellas County, Inc.	8,744	744	663	8.51%	7.58%	L	
Healthy Start Coalition of Santa Rosa County, Inc.	1,943	143	152	7.34%	7.82%		
Healthy Start Coalition of South west Florida, Inc.	10,742	881	767	8.20%	7.14%	L	
Healthy Start Coalition of St. Lucie County, Inc.	3,099	282	243	9.09%	7.84%	L	
Indian River County Healthy Start Coalition, Inc.	1,246	117	98	9.36%	7.87%	L	
Martin County Healthy Start Coalition, Inc.	1,262	100	67	7.95%	5.31%	L	
Northeast Florida Healthy Start Coalition, Inc.	18,563	1,654	1,754	8.91%	9.45%	H	
Okeechobee County Family Health / Healthy Start Coalition, Inc.	523	42	38	8.08%	7.27%		
Healthy Start Coalition of Orange County, Inc.	16,718	1,474	1,508	8.82%	9.02%		
Healthy Start Coalition of Brevard County, Inc.	5,246	428	429	8.17%	8.18%		
Healthy Start Coalition of Seminole County, Inc.	4,554	366	364	8.04%	7.99%		
The Healthy Start Coalition of Flagler and Volusia Counties, Inc.	5,736	482	514	8.41%	8.96%		
The Healthy Start Coalition of Osceola County, Inc.	4,183	333	350	7.95%	8.37%		
TOTAL	224,261	19,366	19,364	8.64%	8.63%		

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

<sup>2</sup> The expected number of low birth weight births is calculated with adjusting for the maternal race, marital status and education characteristics of the births in each area

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

<sup>4</sup> Total excludes 20 births with county unknown

**TABLE 3. INFANT MORTALITY RATES ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE<sup>1</sup> SUMMARY  
BY HEALTHY START COALITION 2011 - 2015**

<b>Healthy Start Coalition</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Total L</b>	<b>Total H</b>
Bay, Franklin, Gulf Healthy Start Coalition, Inc.				H			1
Brow ard Healthy Start Coalition, Inc.	L	L	L	L	L	5	
The Capital Area Healthy Start Coalition, Inc.							
Central Healthy Start, Inc.	H			H	H		3
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.							
Florida Keys Healthy Start Coalition, Inc.							
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				1
Healthy Start of North Central Florida, Inc.			H	H	H		3
Healthy Start Coalition of Sarasota County, Inc.	L					1	
Healthy Start Coalition of Hardee, Highlands and Polk Counties, Inc.		H					1
Healthy Start Coalition of Hillsborough County	H	H	H	H	H		5
Healthy Start Coalition of Jefferson, Madison and Taylor Counties, Inc.							
Healthy Start Coalition of Manatee County, Inc.	H						1
Healthy Start Coalition of Palm Beach County, Inc.		L	L	L	L	4	
Healthy Start Coalition of Pasco County, Inc.			H				1
Healthy Start Coalition of Pinellas County, Inc.							
Healthy Start Coalition of Santa Rosa County, Inc							
Healthy Start Coalition of Southw est Florida, Inc.							
Healthy Start Coalition of St. Lucie County, Inc.							
Indian River County Healthy Start Coalition, Inc.	H						1
Martin County Healthy Start Coalition, Inc.							
Northeast Florida Healthy Start Coalition, Inc.			H	H			2
Okeechobee County Family Health / Healthy Start Coalition, Inc.							
Healthy Start Coalition of Orange County, Inc.			H	L		1	1
Healthy Start Coalition of Brevard County, Inc.							
Healthy Start Coalition of Seminole County, Inc.							
The Healthy Start Coalition of Flagler and Volusia Counties, Inc.					H		1
The Healthy Start Coalition of Osceola County, Inc.							

<sup>1</sup> H indicates the actual infant death rate was statistically significantly higher than the expected infant death rate for the area

L indicates the actual infant death rate was statistically significantly lower than the expected infant death rate for the area after adjusting for the race, marital status and education characteristics of the births in each area.

The significance level used is .05

**TABLE 4. LOW BIRTH WEIGHT (< 2500 grams) PERCENTAGE ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE<sup>1</sup> SUMMARY  
BY HEALTHY START COALITION 2011 - 2015**

<b>Healthy Start Coalition</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Total L</b>	<b>Total H</b>
Bay, Franklin, Gulf Healthy Start Coalition, Inc.	H						1
Brow ard Healthy Start Coalition, Inc.							
The Capital Area Healthy Start Coalition, Inc.							
Central Healthy Start, Inc.				H	H		2
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	H		4
Florida Keys Healthy Start Coalition, Inc.		L		L	L	3	
Gadsden County Healthy Start Coalition, Inc.				H	H		2
Healthy Start Coalition of Miami-Dade Inc.							
Healthy Start Community Coalition of Okaloosa and Walton Counties, Inc.							
Healthy Start of North Central Florida, Inc.	L			H	H	1	2
Healthy Start Coalition of Sarasota County, Inc.		L	L	L		3	
Healthy Start Coalition of Hardee, Highlands and Polk Counties, Inc.	L				L	2	
Healthy Start Coalition of Hillsborough County	H		H		H		3
Healthy Start Coalition of Jefferson, Madison and Taylor Counties, Inc.			H				1
Healthy Start Coalition of Manatee County, Inc.			L	L	L	3	
Healthy Start Coalition of Palm Beach County, Inc.			L	L		2	
Healthy Start Coalition of Pasco County, Inc.				H			1
Healthy Start Coalition of Pinellas County, Inc.					L	1	
Healthy Start Coalition of Santa Rosa County, Inc.				H			1
Healthy Start Coalition of Southwest Florida, Inc.				L	L	2	
Healthy Start Coalition of St. Lucie County, Inc.	L	H		L	L	3	1
Indian River County Healthy Start Coalition, Inc.			L	L	L	3	
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.							
Healthy Start Coalition of Orange County, Inc.							
Healthy Start Coalition of Brevard County, Inc.	L		L			2	
Healthy Start Coalition of Seminole County, Inc.	H			L		1	1
The Healthy Start Coalition of Flagler and Volusia Counties, Inc.		L				1	
The Healthy Start Coalition of Osceola County, Inc.				H			1

<sup>1</sup> H indicates the actual low birth weight percent was statistically significantly higher than the expected low birth weight percent for the area  
L indicates the actual low birth weight percent was statistically significantly lower than the expected low birth weight percent for the area  
after adjusting for the race, marital status and education characteristics of the births in each area.  
The significance level used is .05

