

# INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY COUNTY FOR FLORIDA 2003

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## Introduction

Infant mortality and birth weight statistics are used extensively in public health. These statistics are especially useful because of their relevance as maternal and child health indicators and because of their ease of availability. These data are also virtually 100 percent complete since they are recorded for every birth and death that occurs in the state.

The purpose of this 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 areas should then be the focus of further, more detailed analyses to determine the reasons for the high rates and to develop intervention strategies for improving the outcomes.

IM and LBW rates vary in relation to the demographic characteristics and the variation in rates across the counties is due in part to the unique demographic characteristics of the county populations. In this analysis, adjustments are made to account for the differences in demographic characteristics. The adjusted statistics can then be compared across counties independently of the demographic differences.

Three demographic variables are used in calculating the adjusted and expected statistics. These are maternal race, marital status, and education. These variables are used because they are known to be associated with risk of LBW and IM, and because public health interventions are not designed to influence these characteristics in the prenatal or infancy period. In an analysis (analysis not shown) of Florida resident births in 2001, linked to infant deaths, risk of infant death was found to be 133% higher for maternal race black, 89% higher for unmarried maternal marital status, and 41% higher for maternal education less than high school. In the same analysis, risk of LBW was found to be 82% higher for maternal race black, 44% higher for unmarried maternal marital status, and 22% higher for maternal education less than high school. These results were all statistically significant at the .05 alpha level. Maternal characteristics such as maternal age and smoking status are not used in the adjustment because there are public health efforts directed at changing these factors and adjusting for them would eliminate differences due to these factors. For example, if a county has an actual LBW percentage significantly lower than the expected LBW percentage, the difference could be due to the extraordinary success of a smoking cessation program in the county. If adjustments were made for smoking status, this difference would not be apparent. Maternal age can be influenced by reducing teen births, and by the same logic, adjustments are not made for maternal age.

IM and LBW rates also reflect random variation. In this analysis, statistical methods are used to separate the random variation from the non-random variation, so rates that are significantly high are most likely a result of non-random influences. Likewise, rates that are higher than expected, but not significantly high, are likely to be the result of random variation and are said to be within the range of normal variation.

## **Methods**

The data used in this analysis were extracted from the birth records for residents of Florida born in calendar year 2003. 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 were used in this analysis: mother's race, marital status, and education. These are recorded on the birth record, and 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. The three variables were then 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 roughly 1500 birth records in the ninth category (less than one percent 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 2002 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2003 births in each county to calculate the expected LBW births and infant deaths. In this way the county-expected statistics are adjusted for the three demographic characteristics and then used to calculate the adjusted rates. The term for this adjustment technique is "indirect adjustment."

For example, if a county existed where all the births were in category 1, then the expected statistics for the county would be the same as the statewide statistics for category 1. Another county might have had births that were all in category 8. For this county, the expected statistics would be the same as the statewide statistics for category 8. These two hypothetical counties would have different expected statistics because they have populations with different demographic characteristics. If both counties had actual rates equal to the expected rates, they would be considered equal regarding the rates. Stated differently, both counties are doing equally well at preventing IM and LBW, considering their different demographic characteristics.

The correlation between actual IM and LBW across the areas was also assessed. The normal approximation to the binomial distribution formulas were used for statistical testing in counties where the number of infant deaths or low birth weight infants were above 50. When these were 50 or below, the Poisson formula was used.

## **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 county, as described above. The maps display the results of the statistical tests for significance. Counties where the actual statistics are significantly higher or lower are shaded, as indicated by the legend on the maps.

The correlation coefficient between counties with high LBW percentages and counties with high infant death rates is 0.110 and is not statistically significant. This means counties with high LBW percentages do not necessarily tend to have high infant death rates and vice versa.

## **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. Since adjustments were used to account for the differing demographic composition in each county, further analysis would focus on other factors such as smoking rates and mother's age at birth.

Unique factors in each county 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. The process becomes much more complicated at this point, and a separate analysis should be done for each area of concern. Finally, although demographic adjustment is useful for analyzing additional influencing variables, it remains critical to continue efforts to address issues such as racial disparity in health outcomes.

**2003 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS  
COMPARED TO EXPECTED<sup>1</sup> RATES PER 1000 BIRTHS**

1	2	3	4	5	6	7
<i>Mother's Resident County</i>	<i>2003 Births</i>	<i>2003 Expected<sup>1</sup> Infant Deaths</i>	<i>2003 Actual Infant Deaths</i>	<i>2003 Expected Infant Death Rate Per 1000 Births</i>	<i>2003 Actual Infant Death Rate Per 1000 Births</i>	<i>H=Actual Rate Signif.Higher<sup>2</sup> L=Actual Rate Signif.Lower<sup>2</sup> Than Expected</i>
ALACHUA	2,480	18.3	34	7.40	13.71	H
BAKER	353	2.4	3	6.80	8.50	
BAY	2,058	22.2	30	10.78	14.58	H
BRADFORD	300	2.1	3	7.15	10.00	
BREVARD	5,017	33.0	25	6.57	4.98	
BROWARD	22,489	212.2	143	9.43	6.36	L
CALHOUN	138	1.0	1	7.32	7.25	
CHARLOTTE	1,047	6.6	8	6.26	7.64	
CITRUS	894	5.6	5	6.26	5.59	
CLAY	2,091	12.7	19	6.08	9.09	H
COLLIER	3,730	25.3	29	6.78	7.77	
COLUMBIA	771	5.5	11	7.18	14.27	H
DADE	32,551	237.0	194	7.28	5.96	L
DESOTO	459	3.4	2	7.46	4.36	
DIXIE	157	1.0	2	6.68	12.74	
DUVAL	12,421	106.5	130	8.57	10.47	H
ESCAMBIA	3,981	29.9	34	7.50	8.54	
FLAGLER	557	3.4	4	6.09	7.18	
FRANKLIN	123	1.4	2	11.01	16.26	
GADSDEN	710	7.1	6	9.98	8.45	
GILCHRIST	176	1.2	2	6.62	11.36	
GLADES	58	0.5	1	7.88	17.24	
GULF	108	1.2	1	10.78	9.26	
HAMILTON	172	1.6	3	9.08	17.44	
HARDEE	506	3.7	0	7.32	0.00	L
HENDRY	694	5.5	5	7.94	7.20	
HERNANDO	1,248	7.8	11	6.26	8.81	
HIGHLANDS	898	6.4	5	7.14	5.57	
HILLSBOROUGH	15,294	114.1	137	7.46	8.96	H
HOLMES	229	1.5	2	6.33	8.73	
INDIAN RIVER	1,213	8.3	7	6.82	5.77	
JACKSON	535	4.2	5	7.89	9.35	
JEFFERSON	145	1.2	2	8.31	13.79	
LAFAYETTE	90	0.6	0	6.66	0.00	
LAKE	2,838	19.2	16	6.77	5.64	
LEE	5,653	38.6	29	6.83	5.13	
LEON	3,132	24.5	33	7.83	10.54	H
LEVY	388	2.6	4	6.74	10.31	
LIBERTY	96	0.7	0	7.39	0.00	
MADISON	234	2.2	2	9.30	8.55	
MANATEE	3,338	23.5	20	7.05	5.99	
MARION	2,979	21.2	33	7.11	11.08	H
MARTIN	1,175	7.4	8	6.30	6.81	
MONROE	711	4.6	5	6.46	7.03	
NASSAU	704	4.3	4	6.16	5.68	
OKALOOSA	2,541	15.6	21	6.14	8.26	
OKEECHOBEE	537	3.9	3	7.31	5.59	
ORANGE	14,917	107.9	123	7.23	8.25	
OSCEOLA	3,148	20.0	15	6.35	4.76	
PALM BEACH	14,659	114.0	112	7.78	7.64	
PASCO	4,042	25.4	23	6.28	5.69	
PINELLAS	9,225	62.7	72	6.80	7.80	
POLK	7,053	50.9	57	7.21	8.08	
PUTNAM	923	7.4	13	8.07	14.08	H
SAINT JOHNS	1,484	9.1	11	6.10	7.41	
SAINT LUCIE	2,448	18.3	11	7.48	4.49	L
SANTA ROSA	1,580	9.0	13	5.69	8.23	
SARASOTA	2,987	18.1	18	6.04	6.03	
SEMINOLE	4,599	27.8	25	6.05	5.44	
SUMTER	449	3.3	4	7.27	8.91	
SUWANNEE	486	3.4	5	7.08	10.29	
TAYLOR	210	1.5	3	7.13	14.29	
UNION	155	1.0	0	6.22	0.00	
VOLUSIA	4,809	34.0	24	7.08	4.99	L
WAKULLA	290	1.8	5	6.36	17.24	H
WALTON	509	3.5	4	6.95	7.86	
WASHINGTON	251	2.2	2	8.81	7.97	
<b>TOTAL</b>	<b>212243</b>	<b>1,584</b>	<b>1,584</b>	<b>7.46</b>	<b>7.46</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

**2003 FLORIDA ACTUAL LOW BIRTH WEIGHT<sup>1</sup> PERCENTAGES  
COMPARED TO EXPECTED<sup>2</sup> PERCENTAGES**

1	2	3	4	5	6	7
<i>Mother's Resident County</i>	<i>2003 Births</i>	<i>2003 Expected<sup>1</sup> LBW Births</i>	<i>2003 Actual LBW Births</i>	<i>2003 Expected LBW Percent</i>	<i>2003 Actual LBW Percent</i>	<i>H=Actual Rate Signif.Higher<sup>3</sup> L=Actual Rate Signif.Lower<sup>3</sup> Than Expected</i>
ALACHUA	2,480	219.6	230	8.85%	9.27%	
BAKER	353	28.6	30	8.12%	8.50%	
BAY	2,058	179.4	197	8.72%	9.57%	
BRADFORD	300	25.6	28	8.52%	9.33%	
BREVARD	5,017	403.3	396	8.04%	7.89%	
BROWARD	22,489	2051.6	1,955	9.12%	8.69%	L
CALHOUN	138	11.5	13	8.31%	9.42%	
CHARLOTTE	1,047	80.7	83	7.71%	7.93%	
CITRUS	894	68.4	68	7.65%	7.61%	
CLAY	2,091	159.7	137	7.64%	6.55%	L
COLLIER	3,730	299.8	207	8.04%	5.55%	L
COLUMBIA	771	65.3	78	8.46%	10.12%	H
DADE	32,551	2811.7	2,797	8.64%	8.59%	
DESOTO	459	39.3	37	8.56%	8.06%	
DIXIE	157	12.5	15	7.97%	9.55%	
DUVAL	12,421	1139.2	1,207	9.17%	9.72%	H
ESCAMBIA	3,981	352.8	416	8.86%	10.45%	H
FLAGLER	557	42.7	38	7.67%	6.82%	
FRANKLIN	123	10.5	12	8.50%	9.76%	
GADSDEN	710	77.7	75	10.94%	10.56%	
GILCHRIST	176	13.9	15	7.89%	8.52%	
GLADES	58	5.1	5	8.86%	8.62%	
GULF	108	9.4	7	8.72%	6.48%	
HAMILTON	172	17.0	12	9.87%	6.98%	
HARDEE	506	41.5	38	8.20%	7.51%	
HENDRY	694	59.3	51	8.55%	7.35%	
HERNANDO	1,248	96.8	69	7.75%	5.53%	L
HIGHLANDS	898	75.2	62	8.37%	6.90%	
HILLSBOROUGH	15,294	1291.1	1,343	8.44%	8.78%	
HOLMES	229	17.0	20	7.44%	8.73%	
INDIAN RIVER	1,213	100.2	109	8.26%	8.99%	
JACKSON	535	48.1	56	8.99%	10.47%	
JEFFERSON	145	14.0	8	9.63%	5.52%	
LAFAYETTE	90	6.9	15	7.70%	16.67%	H
LAKE	2,838	228.0	248	8.03%	8.74%	
LEE	5,653	460.0	449	8.14%	7.94%	
LEON	3,132	289.4	279	9.24%	8.91%	
LEVY	388	31.6	24	8.15%	6.19%	
LIBERTY	96	8.0	11	8.33%	11.46%	
MADISON	234	23.8	23	10.17%	9.83%	
MANATEE	3,338	277.2	274	8.31%	8.21%	
MARION	2,979	251.2	234	8.43%	7.85%	
MARTIN	1,175	92.1	83	7.84%	7.06%	
MONROE	711	55.2	45	7.77%	6.33%	
NASSAU	704	54.0	57	7.67%	8.10%	
OKALOOSA	2,541	196.8	193	7.74%	7.60%	
OKEECHOBEE	537	44.1	37	8.21%	6.89%	
ORANGE	14,917	1276.7	1,437	8.56%	9.63%	H
OSCEOLA	3,148	245.5	253	7.80%	8.04%	
PALM BEACH	14,659	1269.5	1,245	8.66%	8.49%	
PASCO	4,042	305.3	308	7.55%	7.62%	
PINELLAS	9,225	759.5	741	8.23%	8.03%	
POLK	7,053	599.6	551	8.50%	7.81%	L
PUTNAM	923	82.9	73	8.98%	7.91%	
SAINT JOHNS	1,484	114.5	128	7.71%	8.63%	
SAINT LUCIE	2,448	215.8	201	8.81%	8.21%	
SANTA ROSA	1,580	116.6	111	7.38%	7.03%	
SARASOTA	2,987	230.7	245	7.72%	8.20%	
SEMINOLE	4,599	357.3	375	7.77%	8.15%	
SUMTER	449	38.3	58	8.52%	12.92%	H
SUWANNEE	486	40.4	42	8.32%	8.64%	
TAYLOR	210	18.1	15	8.63%	7.14%	
UNION	155	12.1	8	7.80%	5.16%	
VOLUSIA	4,809	392.9	375	8.17%	7.80%	
WAKULLA	290	22.8	27	7.88%	9.31%	
WALTON	509	40.5	46	7.95%	9.04%	
WASHINGTON	251	21.3	22	8.49%	8.76%	
TOTAL	212243	18,047.0	18,047	8.50%	8.50%	

<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



FLORIDA 2003 ACTUAL COUNTY LBW\* PERCENTAGE  
 COMPARED TO EXPECTED LBW PERCENTAGE

