

INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY COUNTY FOR FLORIDA 2004

**By: Daniel Thompson, M.P.H.; Carol Graham, Ph.D.; Cheryl Clark, M.P.H., R.H.I.A.;
Angel Watson, M.P.H., R.H.I.A.**

**Florida Department of Health, Division of Family Health Services
Bureau of Family and Community Health**

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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 (100%) 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 (data not shown) of Florida resident births in 2001, linked to infant deaths, risk of infant death was found to be 133 percent (133%) higher for maternal race Black, 89 percent (89%) higher for unmarried maternal marital status, and 41 percent (41%) higher for maternal education less than high school. In the same analysis, risk of LBW was found to be 82 percent (82%) higher for maternal race Black, 44 percent (44%) higher for unmarried maternal marital status, and 22 percent (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 years 2003 and 2004. 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 2000 birth records in the ninth category (less than one percent (1%) of the resident births). The nine categories are as follows:

<u>Mother’s Category</u>	<u>Mother’s Race</u>	<u>Mother’s Marital Status</u>	<u>Education</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 Expected Rates:

Using this classification, the category-specific rates were calculated from the 2003 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2004 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.”

In March of 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. There were 47,944 births with maternal race Black and 46,998 (98.0%) of these recorded no other race for maternal race.

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.

There is a statistically, significant correlation between counties with high LBW percentages and counties with high infant death rates. This means counties with high LBW percentages tend to have high infant death rates and counties with low LBW percentages tend to have low infant death rates. The correlation coefficient based on the ranks of the p values across counties is 0.392 with an associated p value of 0.001.

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.

**2004 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS
 COMPARED TO EXPECTED¹ RATES PER 1000 BIRTHS**

Mother's Resident County	2004 Births	2004 Expected¹ Infant Deaths	2004 Actual Infant Deaths	2004 Expected Infant Death Rate Per 1000 Births	2004 Actual Infant Death Rate Per 1000 Births	H=Actual Rate Signif.Higher² L=Actual Rate Signif.Lower² Than Expected
ALACHUA	2,607	17.5	32	6.71	12.27	H
BAKER	372	2.5	2	6.68	5.38	
BAY	2,236	14.8	11	6.62	4.92	
BRADFORD	327	2.1	2	6.40	6.12	
BREVARD	5,214	31.9	32	6.13	6.14	
BROWARD	22,899	186.6	135	8.15	5.90	L
CALHOUN	145	1.1	1	7.44	6.90	
CHARLOTTE	1,073	6.4	6	5.95	5.59	
CITRUS	926	5.4	7	5.78	7.56	
CLAY	2,110	12.4	12	5.87	5.69	
COLLIER	3,893	28.8	25	7.41	6.42	
COLUMBIA	811	5.8	9	7.10	11.10	
DADE	32,045	224.3	167	7.00	5.21	L
DESOTO	425	3.8	3	8.94	7.06	
DIXIE	155	0.9	1	5.77	6.45	
DUVAL	12,702	97.1	138	7.64	10.86	H
ESCAMBIA	4,056	30.1	43	7.42	10.60	H
FLAGLER	594	3.3	1	5.53	1.68	
FRANKLIN	122	0.9	1	7.29	8.20	
GADSDEN	667	6.5	9	9.82	13.49	
GILCHRIST	198	1.2	2	6.19	10.10	
GLADES	89	0.7	2	7.87	22.47	H
GULF	129	0.8	0	6.05	0.00	
HAMILTON	179	1.8	1	10.00	5.59	
HARDEE	494	4.2	2	8.45	4.05	
HENDRY	662	5.4	6	8.18	9.06	
HERNANDO	1,412	9.3	14	6.58	9.92	
HIGHLANDS	968	7.9	6	8.12	6.20	
HILLSBOROUGH	16,041	113.9	142	7.10	8.85	H
HOLMES	215	2.7	3	12.55	13.95	
INDIAN RIVER	1,234	8.4	8	6.78	6.48	
JACKSON	557	7.6	3	13.62	5.39	
JEFFERSON	161	1.2	2	7.75	12.42	
LAFAYETTE	94	0.5	1	5.45	10.64	
LAKE	3,034	19.2	17	6.32	5.60	
LEE	5,920	40.8	38	6.89	6.42	
LEON	3,126	22.3	32	7.14	10.24	H
LEVY	438	2.9	9	6.57	20.55	H
LIBERTY	90	0.5	0	5.91	0.00	
MADISON	222	2.5	4	11.43	18.02	
MANATEE	3,496	25.9	20	7.41	5.72	
MARION	3,202	22.2	27	6.94	8.43	
MARTIN	1,290	9.1	7	7.09	5.43	
MONROE	738	4.2	5	5.76	6.78	
NASSAU	706	5.0	1	7.07	1.42	L
OKALOOSA	2,697	16.0	9	5.93	3.34	L
OKEECHOBEE	592	5.0	2	8.41	3.38	
ORANGE	15,327	104.7	117	6.83	7.63	
OSCEOLA	3,320	19.7	19	5.93	5.72	
PALM BEACH	15,020	109.2	97	7.27	6.46	
PASCO	4,592	27.0	35	5.88	7.62	
PINELLAS	9,043	57.8	54	6.39	5.97	
POLK	7,245	55.1	63	7.60	8.70	
PUTNAM	965	8.5	13	8.82	13.47	
SAINT JOHNS	1,563	8.7	13	5.54	8.32	
SAINT LUCIE	2,864	20.8	17	7.27	5.94	
SANTA ROSA	1,686	8.9	10	5.27	5.93	
SARASOTA	2,935	16.3	8	5.54	2.73	L
SEMINOLE	4,741	26.6	29	5.60	6.12	
SUMTER	511	4.2	5	8.12	9.78	
SUWANNEE	516	3.6	4	6.97	7.75	
TAYLOR	235	1.6	4	6.90	17.02	H
UNION	149	0.9	1	6.09	6.71	
VOLUSIA	4,749	30.8	35	6.49	7.37	
WAKULLA	309	1.6	4	5.33	12.94	H
WALTON	560	3.6	5	6.51	8.93	
WASHINGTON	257	3.0	3	11.79	11.67	
TOTAL⁴	217,950	1,536	1,536	7.05	7.05	

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

⁴ Total excludes 95 births with county unknown

**2004 FLORIDA ACTUAL LOW BIRTH WEIGHT¹ PERCENTAGES
COMPARED TO EXPECTED² PERCENTAGES**

Mother's Resident County	2004 Births	2004	2004	2004	2004	H=Actual Rate Signif.Higher ³ L=Actual Rate Signif.Lower ³ Than Expected
		Expected ¹ LBW Births	Actual LBW Births	Expected LBW Percent	Actual LBW Percent	
ALACHUA	2,607	231.8	238	8.89%	9.13%	
BAKER	372	29.8	24	8.02%	6.45%	
BAY	2,236	182.4	197	8.16%	8.81%	
BRADFORD	327	27.1	34	8.29%	10.40%	
BREVARD	5,214	418.8	454	8.03%	8.71%	H
BROWARD	22,899	2093.8	2,007	9.14%	8.76%	L
CALHOUN	145	11.9	11	8.21%	7.59%	
CHARLOTTE	1,073	82.7	71	7.71%	6.62%	
CITRUS	926	70.6	74	7.62%	7.99%	
CLAY	2,110	163.0	146	7.73%	6.92%	
COLLIER	3,893	321.2	272	8.25%	6.99%	L
COLUMBIA	811	69.3	56	8.55%	6.91%	L
DADE	32,045	2794.1	2,703	8.72%	8.44%	L
DESOTO	425	36.9	40	8.68%	9.41%	
DIXIE	155	12.4	7	8.00%	4.52%	
DUVAL	12,702	1173.3	1,265	9.24%	9.96%	H
ESCAMBIA	4,056	366.1	397	9.03%	9.79%	H
FLAGLER	594	46.1	51	7.77%	8.59%	
FRANKLIN	122	10.3	10	8.41%	8.20%	
GADSDEN	667	74.5	76	11.17%	11.39%	
GILCHRIST	198	15.3	17	7.72%	8.59%	
GLADES	89	7.3	7	8.24%	7.87%	
GULF	129	10.2	5	7.91%	3.88%	
HAMILTON	179	17.0	24	9.47%	13.41%	H
HARDEE	494	41.3	37	8.35%	7.49%	
HENDRY	662	57.3	46	8.65%	6.95%	
HERNANDO	1,412	110.8	109	7.85%	7.72%	
HIGHLANDS	968	83.7	81	8.65%	8.37%	
HILLSBOROUGH	16,041	1366.5	1,377	8.52%	8.58%	
HOLMES	215	19.5	23	9.07%	10.70%	
INDIAN RIVER	1,234	102.6	82	8.31%	6.65%	L
JACKSON	557	56.3	53	10.11%	9.52%	
JEFFERSON	161	15.4	16	9.55%	9.94%	
LAFAYETTE	94	7.2	11	7.66%	11.70%	
LAKE	3,034	242.2	228	7.98%	7.51%	
LEE	5,920	486.5	483	8.22%	8.16%	
LEON	3,126	291.6	293	9.33%	9.37%	
LEVY	438	35.5	46	8.12%	10.50%	H
LIBERTY	90	7.2	7	8.05%	7.78%	
MADISON	222	23.8	21	10.71%	9.46%	
MANATEE	3,496	293.9	253	8.41%	7.24%	L
MARION	3,202	271.3	272	8.47%	8.49%	
MARTIN	1,290	104.5	101	8.10%	7.83%	
MONROE	738	56.6	54	7.67%	7.32%	
NASSAU	706	56.2	55	7.95%	7.79%	
OKALOOSA	2,697	209.9	219	7.78%	8.12%	
OKEECHOBEE	592	49.9	47	8.42%	7.94%	
ORANGE	15,327	1326.3	1,392	8.65%	9.08%	H
OSCEOLA	3,320	259.1	256	7.80%	7.71%	
PALM BEACH	15,020	1317.7	1,390	8.77%	9.25%	H
PASCO	4,592	344.8	377	7.51%	8.21%	H
PINELLAS	9,043	742.1	740	8.21%	8.18%	
POLK	7,245	627.6	648	8.66%	8.94%	
PUTNAM	965	88.8	106	9.21%	10.98%	H
SAINT JOHNS	1,563	119.4	100	7.64%	6.40%	L
SAINT LUCIE	2,864	252.7	247	8.82%	8.62%	
SANTA ROSA	1,686	123.0	119	7.29%	7.06%	
SARASOTA	2,935	223.9	198	7.63%	6.75%	L
SEMINOLE	4,741	370.5	393	7.81%	8.29%	
SUMTER	511	46.3	44	9.06%	8.61%	
SUWANNEE	516	42.6	41	8.26%	7.95%	
TAYLOR	235	20.7	22	8.79%	9.36%	
UNION	149	11.9	8	8.00%	5.37%	
VOLUSIA	4,749	390.4	370	8.22%	7.79%	
WAKULLA	309	23.4	28	7.59%	9.06%	
WALTON	560	43.6	47	7.79%	8.39%	
WASHINGTON	257	24.1	29	9.36%	11.28%	
TOTAL ⁴	217950	18,654.7	18,655	8.56%	8.56%	

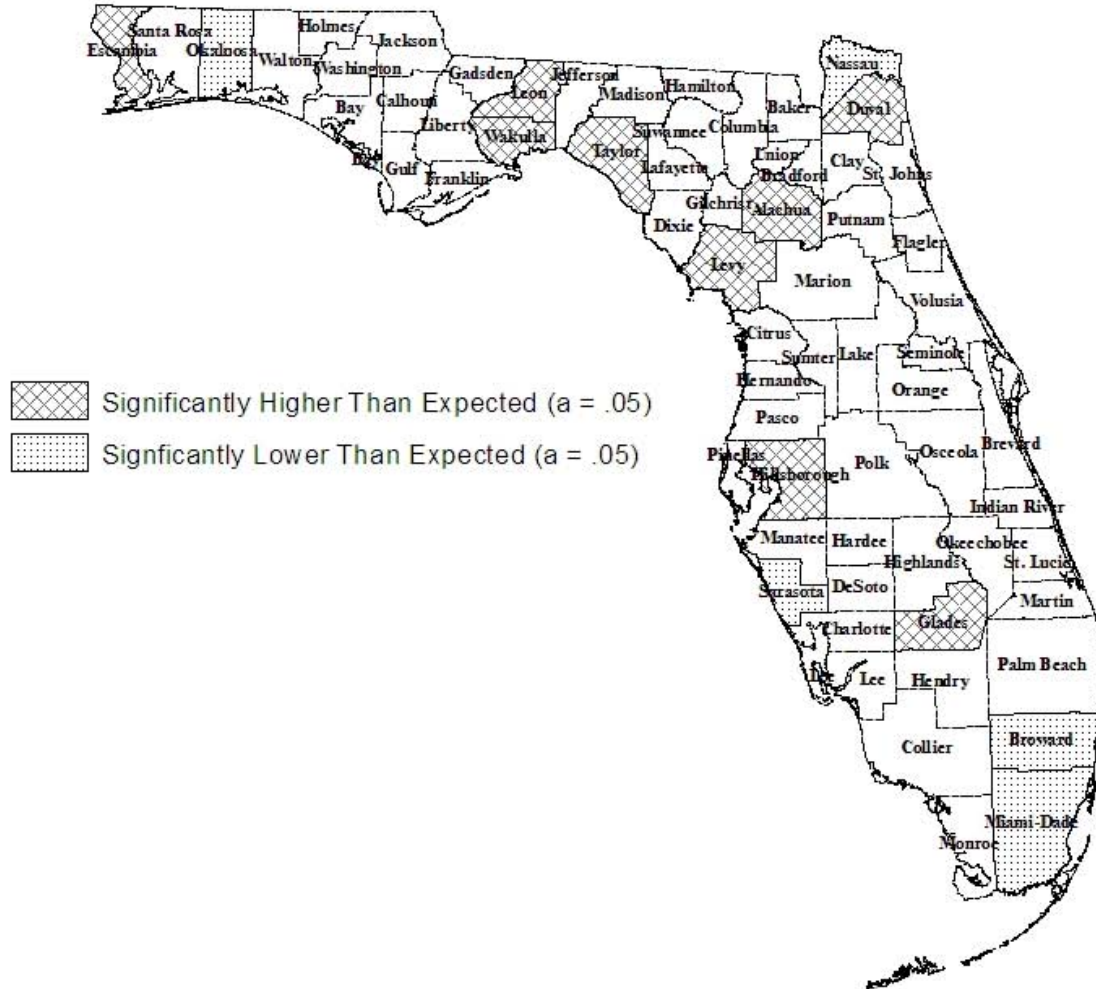
¹ LBW = Low birth Weight, defined as birth weight below 2500 grams.

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

⁴ Total excludes 95 births with county unknown

Florida 2004
Actual County Infant Deaths per 1,000 Births
Compared to Expected County Infant Deaths per 1,000 Births



Florida 2004 Actual County LBW Percentage Compared to Expected LBW Percentage

