

INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY COUNTY FOR FLORIDA 2007

By: Daniel Thompson, M.P.H. and Cheryl Clark, M.P.H., R.H.I.A.;

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

October 15, 2008

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 and relatively high level of completeness.

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 identified areas should become the focus of further detailed analyses to investigate 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. 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 of known associations with risk of LBW and IM, and because adjusting for these characteristics provides a way to make valid comparisons among counties with different demographic characteristics.

Other maternal 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 a county 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 county. 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 are 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 2006 and 2007. 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. 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 1,100 birth records in the ninth category (less than 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 2006 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2007 births in each county to calculate the expected LBW births and infant deaths. The county-expected statistics are adjusted for the three demographic characteristics and 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 Normal Approximation to the Binomial distribution was used to test for statistically significant differences between actual and expected rates in most of the counties. 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 counties 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 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. Counties 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. 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.

For this analysis, the correlation between counties with high LBW percentages and counties with high infant death rates is weak and not statistically significant. This means that counties with high LBW percentages do not have a strong tendency to have high infant death rates or vice versa (rank correlation coefficient = 0.193; p value of 0.114).

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 counties. Consequently, larger differences in rates for small counties may not be statistically significant while the same or smaller differences may be statistically significant in larger counties. 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 counties 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 county, 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 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 with separate analyses performed for each area of concern. Finally, it should be noted that in this analysis, rates for each county 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.

**2007 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS
COMPARED TO EXPECTED¹ RATES PER 1000 BIRTHS**

<i>Mother's Resident County</i>	<i>2007 Births</i>	<i>2007 Expected¹ Infant Deaths</i>	<i>2007 Actual Infant Deaths</i>	<i>2007 Expected Infant Death Rate Per 1000 Births</i>	<i>2007 Actual Infant Death Rate Per 1000 Births</i>	<i>H=Actual Rate Signif.Higher² L=Actual Rate Signif.Lower² Than Expected</i>
ALACHUA	2,849	21	25	7.21	8.78	
BAKER	430	3	3	6.28	6.98	
BAY	2,223	14	8	6.47	3.60	L
BRADFORD	361	2	5	6.91	13.85	
BREVARD	5,731	36	38	6.37	6.63	
BROWARD	22,926	181	130	7.90	5.67	L
CALHOUN	176	1	3	6.31	17.05	
CHARLOTTE	1,199	7	7	6.02	5.84	
CITRUS	1,177	7	6	5.83	5.10	
CLAY	2,421	14	11	5.80	4.54	
COLLIER	4,087	27	24	6.55	5.87	
COLUMBIA	911	6	15	7.05	16.47	H
DADE	34,286	248	214	7.24	6.24	L
DESOTO	483	3	1	6.82	2.07	L
DIXIE	186	1	2	6.30	10.75	
DUVAL	13,777	108	124	7.83	9.00	
ESCAMBIA	4,261	32	31	7.57	7.28	
FLAGLER	988	6	4	6.04	4.05	
FRANKLIN	125	1	0	6.98	0.00	
GADSDEN	760	8	10	10.39	13.16	
GILCHRIST	200	1	1	5.75	5.00	
GLADES	99	1	1	7.31	10.10	
GULF	139	1	1	6.49	7.19	
HAMILTON	174	2	4	8.72	22.99	
HARDEE	524	3	7	6.66	13.36	
HENDRY	776	6	9	7.90	11.60	
HERNANDO	1,649	10	12	6.23	7.28	
HIGHLANDS	1,151	8	6	7.01	5.21	
HILLSBOROUGH	18,001	126	153	7.03	8.50	H
HOLMES	224	1	1	5.65	4.46	
INDIAN RIVER	1,424	9	13	6.60	9.13	
JACKSON	613	4	3	7.22	4.89	
JEFFERSON	156	2	0	9.71	0.00	
LAFAYETTE	96	1	0	6.24	0.00	
LAKE	3,568	23	34	6.38	9.53	H
LEE	7,633	54	56	7.06	7.34	
LEON	3,341	27	30	8.23	8.98	
LEVY	486	3	2	6.57	4.12	
LIBERTY	116	1	0	6.08	0.00	
MADISON	288	3	0	8.99	0.00	
MANATEE	4,133	28	36	6.83	8.71	
MARION	3,696	25	30	6.84	8.12	
MARTIN	1,302	9	11	6.77	8.45	
MONROE	810	5	2	6.08	2.47	L
NASSAU	787	5	6	6.10	7.62	
OKALOOSA	2,785	16	25	5.70	8.98	H
OKEECHOBEE	642	4	4	6.55	6.23	
ORANGE	16,858	121	120	7.21	7.12	
OSCEOLA	4,219	26	30	6.15	7.11	
PALM BEACH	15,689	120	102	7.62	6.50	L
PASCO	5,528	32	33	5.71	5.97	
PINELLAS	9,397	65	69	6.89	7.34	
POLK	8,543	60	75	7.01	8.78	
PUTNAM	1,077	8	5	7.62	4.64	
SAINT JOHNS	1,853	11	10	5.73	5.40	
SAINT LUCIE	3,623	26	24	7.15	6.62	
SANTA ROSA	1,886	10	14	5.25	7.42	
SARASOTA	3,298	20	8	6.03	2.43	L
SEMINOLE	4,772	29	28	6.12	5.87	
SUMTER	531	4	2	7.29	3.77	
SUWANNEE	533	4	7	6.73	13.13	
TAYLOR	274	2	2	7.55	7.30	
UNION	176	1	4	6.07	22.73	H
VOLUSIA	5,417	36	43	6.62	7.94	
WAKULLA	289	2	1	6.00	3.46	
WALTON	654	4	3	5.92	4.59	
WASHINGTON	282	2	0	7.04	0.00	
TOTAL⁴	239,069	1,688	1,688	7.06	7.06	

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 51 births and 1 infant death with county unknown

**2007 FLORIDA ACTUAL LOW BIRTH WEIGHT¹ PERCENTAGES
COMPARED TO EXPECTED² PERCENTAGES**

<i>Mother's Resident County</i>	<i>2007 Expected² Births</i>		<i>2007 Actual Births</i>		<i>2007 Expected Percent</i>		<i>2007 Actual Percent</i>		<i>H=Actual Rate Signif.Higher³ L=Actual Rate Signif.Lower³ Than Expected</i>
	<i>2007 Births</i>	<i>LBW Births</i>	<i>Actual Births</i>	<i>LBW Births</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	
ALACHUA	2,849	259	255		9.09%		8.95%		
BAKER	430	35	37		8.17%		8.60%		
BAY	2,223	182	169		8.17%		7.60%		
BRADFORD	361	31	33		8.65%		9.14%		
BREVARD	5,731	472	487		8.23%		8.50%		
BROWARD	22,926	2,133	2,105		9.30%		9.18%		
CALHOUN	176	14	14		8.17%		7.95%		
CHARLOTTE	1,199	94	92		7.84%		7.67%		
CITRUS	1,177	90	91		7.65%		7.73%		
CLAY	2,421	189	164		7.81%		6.77%	L	
COLLIER	4,087	336	269		8.21%		6.58%	L	
COLUMBIA	911	80	89		8.75%		9.77%		
DADE	34,286	3,028	3,092		8.83%		9.02%		
DESOTO	483	41	27		8.42%		5.59%	L	
DIXIE	186	15	16		8.10%		8.60%		
DUVAL	13,777	1,298	1,330		9.42%		9.65%		
ESCAMBIA	4,261	396	440		9.28%		10.33%	H	
FLAGLER	988	79	76		8.03%		7.69%		
FRANKLIN	125	10	11		8.33%		8.80%		
GADSDEN	760	85	97		11.23%		12.76%		
GILCHRIST	200	15	8		7.74%		4.00%	L	
GLADES	99	9	11		8.67%		11.11%		
GULF	139	11	13		8.08%		9.35%		
HAMILTON	174	17	20		9.89%		11.49%		
HARDEE	524	43	48		8.19%		9.16%		
HENDRY	776	67	66		8.69%		8.51%		
HERNANDO	1,649	130	124		7.86%		7.52%		
HIGHLANDS	1,151	100	71		8.66%		6.17%	L	
HILLSBOROUGH	18,001	1,559	1,593		8.66%		8.85%		
HOLMES	224	17	19		7.65%		8.48%		
INDIAN RIVER	1,424	119	105		8.37%		7.37%		
JACKSON	613	54	48		8.76%		7.83%		
JEFFERSON	156	16	23		10.33%		14.74%		
LAFAYETTE	96	8	7		8.13%		7.29%		
LAKE	3,568	291	274		8.17%		7.68%		
LEE	7,633	635	670		8.33%		8.78%		
LEON	3,341	321	310		9.62%		9.28%		
LEVY	486	40	23		8.31%		4.73%	L	
LIBERTY	116	9	12		8.09%		10.34%		
MADISON	288	29	30		10.12%		10.42%		
MANATEE	4,133	351	300		8.50%		7.26%	L	
MARION	3,696	317	316		8.57%		8.55%		
MARTIN	1,302	106	110		8.16%		8.45%		
MONROE	810	64	67		7.89%		8.27%		
NASSAU	787	61	58		7.80%		7.37%		
OKALOOSA	2,785	217	212		7.81%		7.61%		
OKEECHOBEE	642	52	56		8.14%		8.72%		
ORANGE	16,858	1,496	1,508		8.88%		8.95%		
OSCEOLA	4,219	335	335		7.94%		7.94%		
PALM BEACH	15,689	1,411	1,480		8.99%		9.43%	H	
PASCO	5,528	423	453		7.65%		8.19%		
PINELLAS	9,397	795	789		8.46%		8.40%		
POLK	8,543	742	718		8.69%		8.40%		
PUTNAM	1,077	98	95		9.11%		8.82%		
SAINT JOHNS	1,853	143	133		7.72%		7.18%		
SAINT LUCIE	3,623	321	310		8.86%		8.56%		
SANTA ROSA	1,886	141	148		7.47%		7.85%		
SARASOTA	3,298	262	244		7.96%		7.40%		
SEMINOLE	4,772	384	354		8.05%		7.42%	L	
SUMTER	531	46	52		8.69%		9.79%		
SUWANNEE	533	45	45		8.39%		8.44%		
TAYLOR	274	24	30		8.83%		10.95%		
UNION	176	14	17		8.18%		9.66%		
VOLUSIA	5,417	453	465		8.36%		8.58%		
WAKULLA	289	23	25		7.94%		8.65%		
WALTON	654	51	55		7.84%		8.41%		
WASHINGTON	282	23	16		8.31%		5.67%	L	
TOTAL ⁴	239,069	20,760	20,760		8.68%		8.68%		

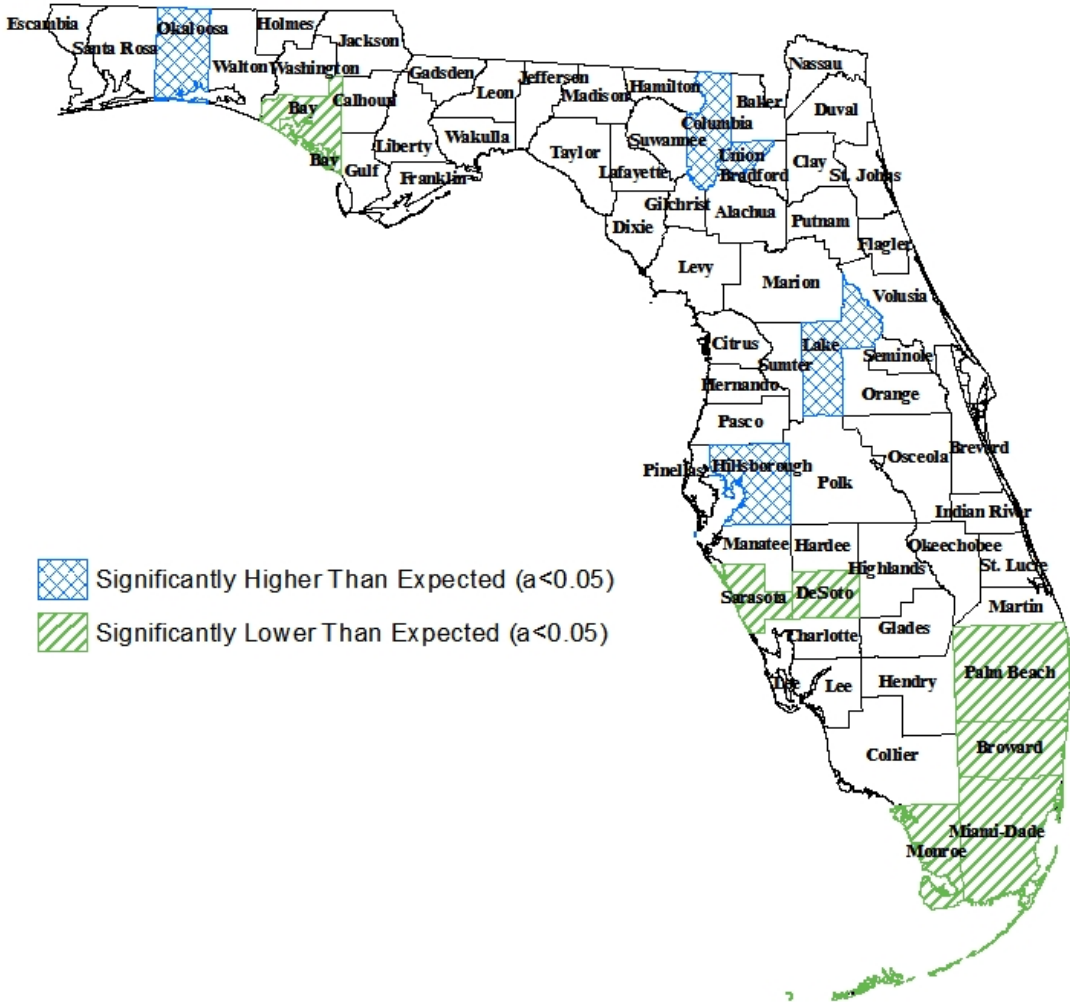
¹ LBW = Low birth Weight, defined as birth weight below 2500 grams.

² The expected number of low birth weight births 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 51 births with county unknown

Florida 2007
Actual County Infant Deaths per 1,000 Births
Compared to Expected County Infant Deaths per 1,000 Births



**Florida 2007
Actual County LBW Percentage
Compared to County Expected LBW Percentage**

