**INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO
EXPECTED RATES BY COUNTY FOR FLORIDA 2005**

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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 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 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.

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 0.05 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 2004 and 2005. 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 3000 birth records in the ninth category (about 1.3% of the resident births). The nine categories are as follows:

Mother's Category	Mother's Race	Mother's Marital Status	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 category-specific rates were calculated from the 2004 (the latest year for complete matched birth and infant death data) statewide totals, and these rates were used with the 2005 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 49,258 births with maternal race Black and 47,957 (97.4%) 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 counties 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. Counties with statistically, significantly high actual statistics are indicated in the tables with an "H" and "L" indicates significantly low 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.

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 0.293 with an associated p value of 0.02.

Also included in this report are summary tables for the years 2001 through 2005 that show the Hs and Ls for the counties 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. 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.

Mother's Resident County	2005 Births	2005 Expected[1] Infant Deaths	2005 Actual Infant Deaths	2005 Expected Infant Death Rate Per 1000 Births	2005 Actual Infant Death Rate Per 1000 Births	H=Actual Rate Signif.Higher[2] L=Actual Rate Signif.Lower[2] Than Expected
ALACHUA	2,690	19.7	25	7.32	9.29	
BAKER	369	2.4	7	6.50	18.97	H
BAY	2,391	16.0	14	6.69	5.86	
BRADFORD	332	2.2	1	6.63	3.01	
BREVARD	5,387	34.5	37	6.40	6.87	
BROWARD	23,127	202.6	144	8.76	6.23	L
CALHOUN	158	1.0	2	6.33	12.66	
CHARLOTTE	1,084	6.4	8	5.90	7.38	
CITRUS	1,021	6.1	10	5.97	9.79	H
CLAY	2,238	13.4	15	5.99	6.70	
COLLIER	4,069	27.0	18	6.64	4.42	L
COLUMBIA	851	5.9	11	6.93	12.93	H
DADE	32,365	237.3	176	7.33	5.44	L
DESOTO	505	3.6	2	7.13	3.96	
DIXIE	170	1.0	0	5.88	0.00	
DUVAL	12,974	104.5	150	8.05	11.56	H
ESCAMBIA	4,237	32.0	30	7.55	7.08	
FLAGLER	689	4.1	4	5.95	5.81	
FRANKLIN	119	0.8	1	6.72	8.40	
GADSDEN	741	7.6	10	10.26	13.50	
GILCHRIST	194	1.2	0	6.19	0.00	
GLADES	77	0.6	0	7.79	0.00	
GULF	130	0.9	1	6.92	7.69	
HAMILTON	191	1.6	1	8.38	5.24	
HARDEE	456	3.0	2	6.58	4.39	
HENDRY	757	5.6	9	7.40	11.89	
HERNANDO	1,496	11.4	12	7.62	8.02	
HIGHLANDS	939	6.6	7	7.03	7.45	
HILLSBOROUGH	16,753	118.1	149	7.05	8.89	H
HOLMES	247	1.5	1	6.07	4.05	
INDIAN RIVER	1,360	9.0	7	6.62	5.15	
JACKSON	567	4.3	9	7.58	15.87	H
JEFFERSON	167	1.5	3	8.98	17.96	
LAFAYETTE	114	0.7	1	6.14	8.77	
LAKE	3,223	20.7	26	6.42	8.07	
LEE	6,704	44.2	34	6.59	5.07	
LEON	3,105	25.1	26	8.08	8.37	
LEVY	462	3.0	3	6.49	6.49	
LIBERTY	108	0.7	0	6.48	0.00	
MADISON	253	2.3	1	9.09	3.95	
MANATEE	3,809	25.8	26	6.77	6.83	
MARION	3,449	24.1	27	6.99	7.83	
MARTIN	1,340	8.5	11	6.34	8.21	
MONROE	768	4.7	1	6.12	1.30	
NASSAU	812	4.7	8	5.79	9.85	
OKALOOSA	2,738	16.5	16	6.03	5.84	
OKEECHOBEE	587	3.9	1	6.64	1.70	
ORANGE	16,556	120.2	128	7.26	7.73	
OSCEOLA	3,593	22.4	29	6.23	8.07	
PALM BEACH	15,160	111.9	96	7.38	6.33	
PASCO	4,753	28.1	34	5.91	7.15	
PINELLAS	9,065	61.7	77	6.81	8.49	H
POLK	7,786	55.4	64	7.12	8.22	
PUTNAM	1,034	8.1	19	7.83	18.38	H
SAINT JOHNS	1,761	9.8	9	5.57	5.11	
SAINT LUCIE	3,003	22.0	19	7.33	6.33	
SANTA ROSA	1,746	9.3	9	5.33	5.15	
SARASOTA	2,997	17.8	16	5.94	5.34	
SEMINOLE	4,786	29.8	37	6.23	7.73	
SUMTER	501	3.6	2	7.19	3.99	
SUWANNEE	470	3.3	3	7.02	6.38	
TAYLOR	244	1.8	2	7.38	8.20	
UNION	166	1.1	0	6.63	0.00	
VOLUSIA	5,093	33.4	24	6.56	4.71	
WAKULLA	288	1.8	2	6.25	6.94	
WALTON	604	3.6	4	5.96	6.62	
WASHINGTON	249	1.6	4	6.43	16.06	H
TOTAL[4]	226,178	1,625	1,625	7.18	7.18	

2005 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS COMPARED TO EXPECTED[1] RATES PER 1000 BIRTHS

[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 41 births with county unknown

Mother's Resident County	2005 Births	2005 Expected [1] LBW Births	2005 Actual LBW Births	2005 Expected LBW Percent	2005 Actual LBW Percent	H=Actual Rate Signif.Higher [3] L=Actual Rate Signif.Lower [3] Than Expected
ALACHUA	2,690	245.0	242	9.11%	9.00%	
BAKER	369	30.5	35	8.27%	9.49%	
BAY	2,391	199.6	218	8.35%	9.12%	
BRADFORD	332	28.1	32	8.46%	9.64%	
BREVARD	5,387	444.3	484	8.25%	8.98%	H
BROWARD	23,127	2202.2	2,142	9.52%	9.26%	
CALHOUN	158	13.0	22	8.23%	13.92%	H
CHARLOTTE	1,084	85.0	70	7.84%	6.46%	L
CITRUS	1,021	79.6	78	7.80%	7.64%	
CLAY	2,238	177.0	168	7.91%	7.51%	
COLLIER	4,069	338.7	276	8.32%	6.78%	L
COLUMBIA	851	73.3	75	8.61%	8.81%	
DADE	32,365	2893.6	2,918	8.94%	9.02%	
DESOTO	505	43.0	36	8.51%	7.13%	
DIXIE	170	13.4	13	7.88%	7.65%	
DUVAL	12,974	1226.4	1,251	9.45%	9.64%	
ESCAMBIA	4,237	389.4	431	9.19%	10.17%	H
FLAGLER	689	55.3	50	8.03%	7.26%	
FRANKLIN	119	9.5	10	7.98%	8.40%	
GADSDEN	741	83.1	95	11.21%	12.82%	
GILCHRIST	194	15.4	10	7.94%	5.15%	
GLADES	77	6.7	5	8.70%	6.49%	
GULF	130	10.9	10	8.38%	7.69%	
HAMILTON	191	18.5	21	9.69%	10.99%	
HARDEE	456	37.4	32	8.20%	7.02%	
HENDRY	757	66.0	55	8.72%	7.27%	
HERNANDO	1,496	125.7	110	8.40%	7.35%	
HIGHLANDS	939	81.0	74	8.63%	7.88%	
HILLSBOROUGH	16,753	1449.4	1,504	8.65%	8.98%	
HOLMES	247	19.2	16	7.77%	6.48%	
INDIAN RIVER	1,360	113.8	107	8.37%	7.87%	
JACKSON	567	52.0	60	9.17%	10.58%	
JEFFERSON	167	16.7	20	10.00%	11.98%	
LAFAYETTE	114	9.4	10	8.25%	8.77%	
LAKE	3,223	265.6	254	8.24%	7.88%	
LEE	6,704	558.8	555	8.34%	8.28%	
LEON	3,105	298.1	302	9.60%	9.73%	
LEVY	462	38.0	47	8.23%	10.17%	
LIBERTY	108	8.9	12	8.24%	11.11%	
MADISON	253	26.4	16	10.43%	6.32%	L
MANATEE	3,809	321.4	291	8.44%	7.64%	L
MARION	3,449	298.7	308	8.66%	8.93%	
MARTIN	1,340	108.7	117	8.11%	8.73%	
MONROE	768	61.3	61	7.98%	7.94%	
NASSAU	812	63.3	61	7.80%	7.51%	
OKALOOSA	2,738	218.7	208	7.99%	7.60%	
OKEECHOBEE	587	48.1	53	8.19%	9.03%	
ORANGE	16,556	1476.5	1,476	8.92%	8.92%	
OSCEOLA	3,593	290.5	303	8.09%	8.43%	
PALM BEACH	15,160	1358.2	1,395	8.96%	9.20%	
PASCO	4,753	368.3	389	7.75%	8.18%	
PINELLAS	9,065	764.4	763	8.43%	8.42%	
POLK	7,786	679.5	668	8.73%	8.58%	
PUTNAM	1,034	95.6	102	9.25%	9.86%	
SAINT JOHNS	1,761	135.4	122	7.69%	6.93%	
SAINT LUCIE	3,003	269.0	240	8.96%	7.99%	L
SANTA ROSA	1,746	131.2	129	7.51%	7.39%	
SARASOTA	2,997	237.1	225	7.91%	7.51%	
SEMINOLE	4,786	389.5	365	8.14%	7.63%	
SUMTER	501	43.8	44	8.74%	8.78%	
SUWANNEE	470	40.5	42	8.62%	8.94%	
TAYLOR	244	22.0	27	9.02%	11.07%	
UNION	166	13.8	17	8.31%	10.24%	
VOLUSIA	5,093	424.4	414	8.33%	8.13%	
WAKULLA	288	23.1	24	8.02%	8.33%	
WALTON	604	47.5	62	7.86%	10.26%	H
WASHINGTON	249	20.8	27	8.35%	10.84%	
TOTAL [4]	226,178	19799.2	19,799	8.75%	8.75%	

2005 FLORIDA ACTUAL LOW BIRTH WEIGHT[1] PERCENTAGES COMPARED TO EXPECTED[2] PERCENTAGES

[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 41 births with county unknown

Florida 2005
Acutal County Infant Deaths per 1,000 Births
Compared to Expected County Infant Deaths per 1,000 Births

Significantly Higher Than Expected (a=0.05)

Significanly Lower Than Expected (a=0.05)
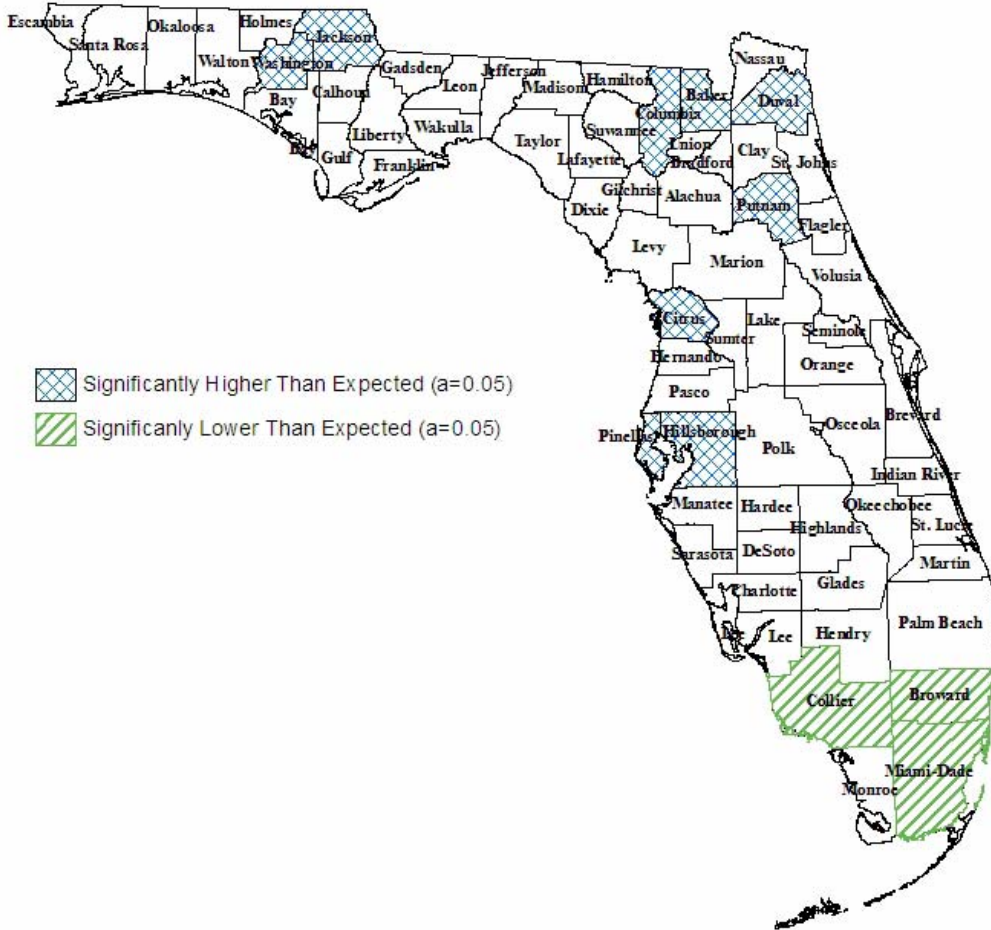
Florida 2005
Acutal County LBW Percentage
Compared to Expected LBW Percentage

Significantly Higher Than Expected (a=0.05)

Significantly Lower Than Expected (a=0.05)

*LBW = Low Birth Weight defined as <2500 grams
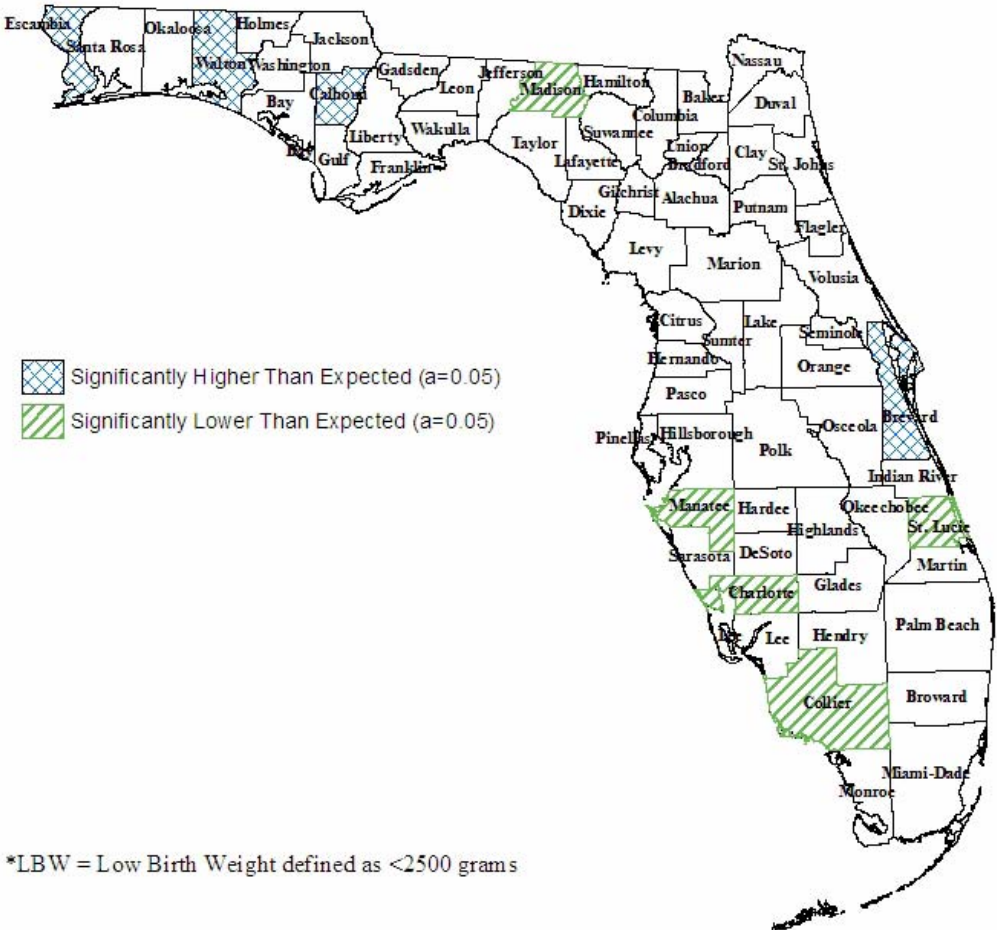
INFANT DEATH RATES ACTUAL VERSUS EXPECTED STATISTICAL SIGNIFICANCE[1] SUMMARY BY COUNTY 2001 - 2005

Mother's Resident County	2001	2002	2003	2004	2005	Total L	Total H
ALACHUA		H	H	H			3
BAKER					H		1
BAY			H				1
BRADFORD							
BREVARD		H					1
BROWARD	L	L	L	L	L	5	
CALHOUN							
CHARLOTTE							
CITRUS					H		1
CLAY			H				1
COLLIER		L			L	2	
COLUMBIA			H		H		2
DADE	L	L	L	L	L	5	
DESOTO							
DIXIE							
DUVAL	H		H	H	H		4
ESCAMBIA	H			H			2
FLAGLER							
FRANKLIN							
GADSDEN							
GILCHRIST							
GLADES				H			1
GULF							
HAMILTON							
HARDEE			L			1	
HENDRY							
HERNANDO							
HIGHLANDS							
HILLSBOROUGH	H		H	H	H		4
HOLMES	H						1
INDIAN RIVER							
JACKSON					H		1
JEFFERSON		H					1
LAFAYETTE							
LAKE							
LEE							
LEON		H	H	H			3
LEVY				H			1
LIBERTY							
MADISON							
MANATEE							
MARION			H				1
MARTIN							
MONROE							
NASSAU				L		1	
OKALOOSA		H		L		1	1
OKEECHOBEE							
ORANGE							
OSCEOLA							
PALM BEACH							
PASCO							
PINELLAS	H				H		2
POLK		H					1
PUTNAM			H		H		2
SAINT JOHNS							
SAINT LUCIE	L		L			2	
SANTA ROSA							
SARASOTA	L			L		2	
SEMINOLE							
SUMTER		H					1
SUWANNEE							
TAYLOR				H			1
UNION							
VOLUSIA			L			1	
WAKULLA			H	H			2
WALTON							
WASHINGTON					H		1

[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

Mother's Resident County	2001	2002	2003	2004	2005	Total L	Total H
ALACHUA							
BAKER							
BAY							
BRADFORD							
BREVARD	L			H	H	1	2
BROWARD	L		L	L		3	
CALHOUN					H		1
CHARLOTTE					L	1	
CITRUS							
CLAY			L			1	
COLLIER	L	L	L	L	L	5	
COLUMBIA			H	L		1	1
DADE	L	L		L		3	
DESOTO							
DIXIE							
DUVAL	H	H	H	H			4
ESCAMBIA	H	H	H	H	H		5
FLAGLER							
FRANKLIN							
GADSDEN							
GILCHRIST							
GLADES							
GULF							
HAMILTON				H			1
HARDEE							
HENDRY							
HERNANDO			L			1	
HIGHLANDS							
HILLSBOROUGH							
HOLMES							
INDIAN RIVER		L		L		2	
JACKSON		H					1
JEFFERSON							
LAFAYETTE			H				1
LAKE							
LEE	H						1
LEON	H						1
LEVY				H			1
LIBERTY							
MADISON	H				L	1	1
MANATEE				L	L	2	
MARION							
MARTIN							
MONROE							
NASSAU							
OKALOOSA	H	L				1	1
OKEECHOBEE							
ORANGE	H	H	H	H			4
OSCEOLA	H						1
PALM BEACH	L			H		1	1
PASCO				H			1
PINELLAS							
POLK			L			1	
PUTNAM		H		H			2
SAINT JOHNS				L		1	
SAINT LUCIE					L	1	
SANTA ROSA	H						1
SARASOTA		L		L		2	
SEMINOLE							
SUMTER			H				1
SUWANNEE							
TAYLOR							
UNION							
VOLUSIA							
WAKULLA		H					1
WALTON					H		1
WASHINGTON							

[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