# Reduction in Infant Mortality Associated With Decreases in Modifiable Risk Factors Florida Births in 2008 Compared to 2011

**By: Daniel Thompson, MPH**

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

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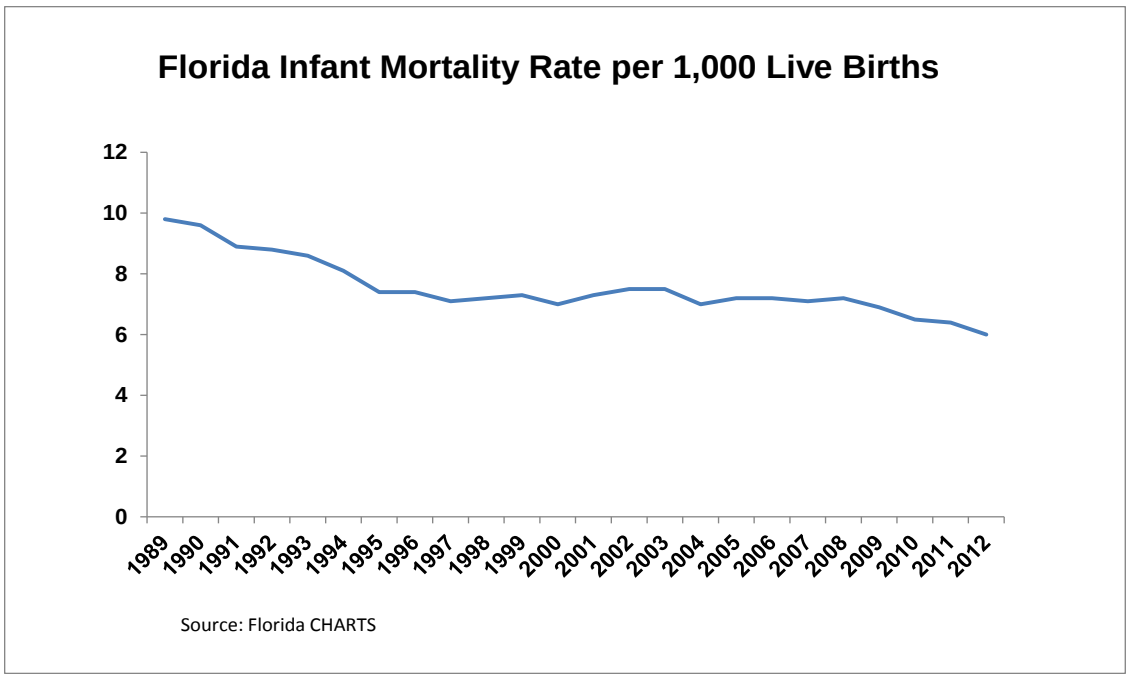
## Introduction

After many years of steadily decreasing, Florida's infant mortality rates leveled off in the period 1995 through 2008 (see graph below). In 2009 the rates began another downward trend and went from 7.2 infant deaths per 1000 live births in 2008 to 6.0 infant deaths per 1000 live births in 2012.




The purpose of this analysis is to quantify the relationship between the prevalence of four risk factors and the trend in infant mortality rates. The four risk factors are: maternal age 10 to 20, no prenatal care, maternal smoking during pregnancy, and maternal body mass index (BMI) of 30+. These risk factors were selected for this analysis because they are all modifiable or could be influenced by Public Health programs. Maternal age is not modifiable for an individual; however, successful efforts to reduce teen births will reduce the prevalence of births to mothers age 10 to 20. The other three factors

are modifiable for individuals, but reducing BMI would probably require more time to accomplish before a pregnancy than the other two risk factors, maternal smoking and no prenatal care.

**Methods and Results**

Data for these four risk factors are collected in the birth registration process. For this analysis birth records for infants born in 2008 were compared to birth records for infants born in 2011. Infant death data was linked to the birth records if the infant died before reaching 1 year of age. This linking requires complete infant mortality data for the year after the births occur which precludes using infants born in 2012 in this analysis.

Table 1 below shows the infant death rate for the 2008 birth cohort is 7.09 per 1,000 births and the infant death rate for the 2011 birth cohort is 9.5% lower at 6.42. This is a statistically significant difference with a p-value of 0.0065. The rate ratio of 0.905 indicates the rate for 2011 is 0.905 times the rate for 2008, or 9.5% lower (1.000 – 0.905 = 0.095 or 9.5%).

**Table 1**

**Florida Resident Births Linked to Infant Deaths**

**Infant Mortality Rates 2008 compared to 2011**

| | Birth Year 2008 | Birth Year 2011 |
|---|---|---|
| **Infant Deaths** | 1,636 | 1,365 |
| **Births** | 230,631 | 212,536 |
| **Infant Mortality Rate per 1000 Births** | **7.09** | **6.42** |
| **Rate Ratio 2011 to 2008** | | 0.905 |
| **Rate Ratio 95% CI Lower** | | 0.843 |
| **Rate Ratio 95% CI Upper** | | 0.973 |
| **Rate Ratio p value** | | 0.0065 |

Percentages for three of the four modifiable risk factors described above also decreased in 2011 compared to 2008. These were: births to mothers age 10 to 20, births with no prenatal care, and maternal smoking during pregnancy. The percentage of births with maternal BMI of 30+ increased in 2011 compared to 2008. Table 2 compares the percentages of these four factors for 2008 versus 2011.

**Table 2**

**Florida Resident Births Linked to Infant Deaths**

**Selected Risk Factor Percentages**

| Risk factor | Birth Year 2008 Percentage of Births | Birth Year 2011 Percentage of Births | 2008 to 2011 Difference |
|---|---|---|---|
| **Maternal Age 10 to 20** | 15.1% | 12.4% | -2.7% |
| **No Prenatal Care** | 2.1% | 1.4% | -0.7% |
| **Maternal Smoking** | 7.7% | 6.8% | -0.9% |
| **Pre-Pregnancy BMI 30+** | 19.0% | 20.6% | 1.5% |

All of these factors are associated with increased risk of infant death. Table 3 shows the infant death rate ratios for births with these factors compared to births without these factors for the 2011 birth cohort.

**Table 3**

**Florida 2011 Resident Births Linked to Infant Deaths**

**Selected Adjusted Risk Ratios**

| Risk factor | Infant Death Adjusted* Risk Ratio | 95% Confidence Interval Lower | Upper |
|---|---|---|---|
| **Maternal Age 10 to 20** | 1.23 | 1.06 | 1.42 |
| **No Prenatal Care** | 6.94 | 5.78 | 8.34 |
| **Maternal Smoking** | 1.58 | 1.34 | 1.86 |
| **Pre-Pregnancy BMI 30+** | 1.27 | 1.18 | 1.37 |

* Each factor is adjusted for the other factors in the table

In summary, the infant death rate decreased from 2008 to 2011 (Table 1) and the prevalence of three risk factors also decreased from 2008 to 2011 (Table 2). These factors are associated with increased risk of infant death (Table 3). It follows that the infant death rate for 2011 would have been higher if the prevalence of the three risk factors had not decreased and all other factors had remained unchanged.

The number of infant deaths that would have occurred if the prevalence of the three risk factors was the same in 2011 as it was in 2008 can be estimated by redistributing the 2011 births to reflect the risk factor prevalence of 2008. The 2011 risk factor specific rates are then applied to the redistributed births

to estimate the number of infant deaths that would have occurred if there had been no change in the risk factor prevalence between 2008 and 2011. The results of this estimation procedure are shown in Table 4. The details of the calculations are shown in Table 5.

**Table 4**

**Florida Resident Births Linked to Infant Deaths**

**Actual Infant Deaths Compared to Estimated* Infant Deaths**

| | **Birth Year 2011** |
|---|---|
| **Actual Infant Deaths** | 1,365 |
| **Estimated* Infant Deaths** | 1,436 |
| **Estimated* Number of Infant Deaths Avoided** | **71** |
| **Estimated* Percentage of Infant Deaths Avoided** | **5.0%** |

* Estimated by applying percentages of births in 2008 with: mothers age 10 - 20, mothers with no prenatal care, and mothers who smoked, to births in 2011

There were an estimated 71 fewer infant deaths in 2011 than there would have been if the decreases in births to mothers age 10 to 20, births with no prenatal care, and maternal smoking during pregnancy had not occurred.

**Conclusions**

This analysis shows that risk of infant death in Florida decreased from 2008 to 2011 and that a substantial proportion of the reduced risk was associated with reductions in the prevalence of mothers age 10 to 20, births to mothers with no prenatal care, and maternal smoking during pregnancy. These are all risk factors that could be influenced by Public Health programs. For many years the Florida Department of Health has had programs and policies in place with the goal of reducing the prevalence of these factors. This analysis indicates that if these programs and policies help reduce the prevalence of these factors, then decreases in risk of infant death are likely to result.

Pre-pregnancy obesity has also been shown in this analysis to be a risk factor for infant death and it is also modifiable. The prevalence of pre-pregnancy obesity increased in the 2011 births compared to the 2008 births. However, if the prevalence of this factor could be reduced, this would contribute to further decreases in the infant death rates.

In summary, reducing the prevalence of modifiable risk factors is achievable since they are, after all, modifiable. Consequently, reducing the prevalence of these factors will likely result in reductions in the infant death rate.

**Table 5**

**Estimated Infant Deaths for 2011 Births If Prevalence of Mothers Age 10 to 20, Births with No Prenatal Care and Maternal Smoking Had Not Decreased from 2008 to 2011**

| Maternal Age < 21 | Prenatal Care | Maternal Smoking | Births 2011 | Infant Deaths | Infant Deaths per 1000 Births | 2011 Births Redistributed Using 2008 Birth Distribution | Redistributed 2011 Births X 2011 Rates |
|---|---|---|---|---|---|---|---|
| no | yes | no | 172,283 | 940 | 5.46 | 164,404 | 897 |
| no | yes | yes | 11,666 | 121 | 10.37 | 12,638 | 131 |
| no | no | no | 1,747 | 75 | 42.93 | 2,666 | 114 |
| no | no | yes | 586 | 23 | 39.25 | 748 | 29 |
| yes | yes | no | 23,685 | 162 | 6.84 | 28,287 | 193 |
| yes | yes | yes | 2,021 | 13 | 6.43 | 2,835 | 18 |
| yes | no | no | 473 | 24 | 50.74 | 862 | 44 |
| yes | no | yes | 75 | 7 | 93.33 | 97 | 9 |
| | | | 212,536 | 1,365 | 6.42 | 212,536 | 1,436 |