



# SC PRAMS Special Delivery

## Infant Sleep Position in South Carolina, 2004-2006

### Introduction

The 2005 South Carolina Infant Mortality Report indicated a slight increase in the South Carolina infant mortality rate from 2004 to 2005<sup>1</sup>. In 2004, 9.3 infant deaths occurred for every 1,000 live births. In 2005, 9.5 infant deaths occurred for every 1,000 live births.

This increase is due, in part, to a 65.5 percent increase in infant deaths from SIDS and unsafe sleep environments from 2004 to 2005. In 2004, 29 SIDS cases were observed, whereas 48 SIDS cases were observed in 2005.

Studies have shown that placing infants to sleep on their stomachs increases the risk for SIDS<sup>2-4</sup>. Furthermore, the American Academy of Pediatrics recommends placing infants on their backs, rather than their sides or stomachs, to sleep<sup>5</sup>. The U.S. Department of Health and Human Services' Healthy People 2010 objective for infant sleep position is that 70 percent of all healthy full-term infants be placed to sleep on their backs.

This report is a follow up to a S.C. PRAMS fact sheet on infant sleep position in South Carolina printed in May 2008. The fact sheet examined infant sleep position practices by selected mother and infant

characteristics for the years 2004-2006.

### What is SC PRAMS?

The South Carolina Pregnancy Risk Assessment Monitoring System (S.C. PRAMS) is an ongoing population-based surveillance system of maternal behaviors and experiences before, during and after pregnancy. About 2,300 mothers are randomly sampled from the state's live birth registry each year.

The data presented in this newsletter reflect live births to South Carolina mothers occurring in South Carolina during the years of 2004, 2005, and 2006. The overall response rate for these three years was 70.0 percent.

### Methods

Women that are South Carolina residents delivering live born infants in South Carolina are eligible to be selected for participation in the PRAMS project. All PRAMS participants are selected through a random sampling of the South Carolina live birth registry, stratified by birthweight.

In this report, PRAMS data for years 2004-2006 are used to describe the characteristics of women who report laying their infants down to sleep in a position other than on

their backs.

For the years 2004-2006, 6,972 women were sent a South Carolina PRAMS survey. Of these women, 4,766 completed the survey, yielding an unweighted response rate of 68.4 percent (weighted response rate: 70.0 percent).

Only non-Hispanic white and non-Hispanic

black women, women giving birth to full-term infants, and women that are living with their infants at the time of the survey are included in the analyses described in this report (n=1,763). Further, observations with missing information on usual infant sleep position (n=6) or any of the selected maternal characteristics (n=283) are excluded from these analyses.

SAS and SAS-callable SUDAAN software are used to calculate frequencies and percentages and to conduct all statistical tests and analyses presented in this report. SUDAAN is used to accommodate the complex sampling design employed by the SC PRAMS project and to weight survey responses so that the data are representative of all live births occurring in South Carolina. The survey responses are weighted to account for sampling design, nonresponse, and noncoverage.

The South Carolina Phase V PRAMS questionnaire asks new mothers the following question: “How do you *most often* lay your baby down to sleep now?” The answer choices for this question include: “On his or her side,” “On his or her back,” and “On his or her stomach.”

This report seeks to identify characteristics of women that are most likely to lay their infant down to sleep in a position other than on their backs. The identification of these characteristics may be useful in efforts to increase the proportion of women that lay their infants down to sleep in the recommended position, on their backs.

A dichotomous sleep position variable (back/other) is created to be used in the analyses described in this report. Mothers that indicated that their infants most often slept on their stomachs, sides, or any combination of the three sleep positions are included in the ‘other’ sleep position group.

Chi-square tests of independence are used to assess the significance of the bivariate relationship between sleep position and several characteristics of interest. Then, multivariate logistic regression is used to model the relationship between women laying infants down to sleep in a position other than on their backs and each characteristic, while adjusting for the other characteristics as covariates.

## Results

There were 1,474 women included in this study, representing approximately 108,024 South Carolina women who delivered a full-term, live-born infant during 2004, 2005 and 2006 (after statistical weighting).

Overall, 58.9 percent of infants were usually laid down to sleep on their backs and 41.1 percent of infants were usually laid down to sleep in a position other than on their backs.

Figure 1 displays the prevalence of the back and other sleep positions by year in South Carolina. In 2004, 54.7 percent of mothers usually laid their full-term infants down to sleep on their backs. In 2005, the percent of mothers usually laying their infants down to sleep on their backs had increased to 58.7 percent, and the percentage had increased to 63.1 percent in 2006. Though the percentage of women laying their infants down to sleep on their backs increased each year, there is not a statistically significant association between year of birth and sleep position (alpha level = 0.05).

**Figure 1: Usual sleep position prevalence by year of birth, South Carolina PRAMS 2004-2006**

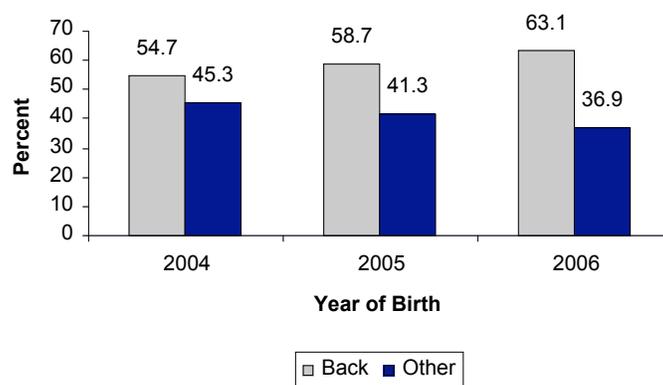


Table 1 gives the unweighted number and weighted percent of women that usually laid their infant down to sleep on their backs and in a position other than their backs, respectively, by the characteristics of interest. A chi-square test of independence was done to analyze the significance of the bivariate association between each maternal characteristic and usual sleep position.

Table 1: Sleep position by maternal characteristics among infants living with their mothers at the time of the survey.

Maternal Characteristic	Back Sleep Position (N=863)		Other Sleep Position (N=611)		P-value*
	Unweighted n	Weighted Percent	Unweighted n	Weighted Percent	
<b>Race</b>					
Non-Hispanic Black	216	42.6	293	57.4	<0.0001
Non-Hispanic White	647	66.7	318	33.3	
<b>Mother's Age (years)</b>					
<20	85	54.8	80	45.2	0.0003
20-29	449	55.1	368	44.9	
30	329	67.4	163	32.6	
<b>Marital Status</b>					
Married	557	64.0	312	36.0	0.0001
Unmarried	306	51.7	299	48.3	
<b>Poverty Status<sup>^</sup></b>					
<100% of poverty level	202	51.0	209	49.0	0.0004
100-185% of poverty level	210	56.8	165	43.2	
185% of poverty level	451	64.8	237	35.2	
<b>Education</b>					
Less than HS	124	51.5	121	48.5	0.0150
Completed HS	194	55.7	156	44.3	
More than HS	545	62.5	334	37.5	
<b>Gender of Baby</b>					
Male	422	58.0	302	42.0	0.5554
Female	441	59.8	309	40.2	
<b>Birthweight of Baby (grams)</b>					
Low birthweight (<2500)	211	51.6	181	48.4	0.0110
Normal birthweight (2500)	652	59.1	430	40.9	
<b>Delivery Method</b>					
C-Section	285	60.6	186	39.4	0.4466
Vaginal	578	58.2	425	41.8	
<b>Smoked During Pregnancy</b>					
Yes	130	56.2	95	43.8	0.4614
No	733	59.4	516	40.7	
<b>Prenatal Care Initiation</b>					
Care in first trimester	735	61.6	487	38.4	0.0004
Care later than first trimester	128	46.8	124	53.2	
<b>Ever Breastfed</b>					
No	282	52.9	261	47.1	0.0028
Yes	581	62.3	350	37.7	
<b>Number of Previous Live Births</b>					
0	407	60.0	261	40.0	0.2347
1-2	407	59.3	298	40.7	
3	49	49.2	52	50.8	
<b>Pregnancy Intendedness<sup>†</sup></b>					
Intended	498	63.3	288	36.7	0.0020
Unintended	365	54.1	323	45.9	
<b>Bedsharing Status<sup>‡</sup></b>					
Frequent	175	50.1	185	49.9	0.0039
Infrequent	381	60.2	253	39.8	
Never	307	63.4	173	36.6	

\*P-value from the Chi-Square test of independence

<sup>^</sup>Poverty Status thresholds were obtained from the Health and Human Services Federal Poverty Guidelines, 2006.

<sup>†</sup>Unintended pregnancies include pregnancies that were not wanted or wanted later; intended pregnancies include pregnancies that were wanted then or sooner.

<sup>‡</sup>Frequent bedsharing includes infants who bedshare always or often; infrequent bedsharing includes infants who bedshare sometimes or rarely.

Table 2: Adjusted odds ratios resulting from a multivariate logistic regression analysis modeling infants being laid down to sleep in a position other than on their backs.

Characteristic	AOR* (95% CI**)
<b>Race</b>	
Non-Hispanic Black	2.37 (1.70, 3.28)
Non-Hispanic White	Ref.
<b>Mother's Age (years)</b>	
<20	1.16 (0.67, 2.03)
20-29	1.55 (1.14, 2.10)
30	Ref.
<b>Marital Status</b>	
Married	Ref.
Unmarried	0.84 (0.59, 1.20)
<b>Poverty Status<sup>^</sup></b>	
<100% of poverty level	0.97 (0.65, 1.44)
100-185% of poverty level	0.90 (0.62, 1.30)
185% of poverty level	Ref.
<b>Education</b>	
Less than HS	1.08 (0.68, 1.70)
Completed HS	0.97 (0.69, 1.37)
More than HS	Ref.
<b>Birthweight of Baby (grams)</b>	
Low birthweight (<2500)	1.12 (0.86, 1.46)
Normal birthweight (2500)	Ref.
<b>Prenatal Care Initiation</b>	
Care in first trimester	Ref.
Care later than first trimester	1.46 (1.02, 2.10)
<b>Ever Breastfed</b>	
No	1.15 (0.86, 1.54)
Yes	Ref.
<b>Pregnancy Intendedness<sup>†</sup></b>	
Intended	Ref.
Unintended	1.07 (0.80, 1.43)
<b>Bedsharing Status<sup>‡</sup></b>	
Frequent	1.05 (0.73, 1.53)
Infrequent	0.96 (0.71, 1.29)
Never	Ref.

\*Adjusted Odds Ratio

\*\*95% Confidence Interval

<sup>^</sup>Poverty Status thresholds were obtained from the Health and Human Services Federal Poverty Guidelines, 2006.

<sup>†</sup>Unintended pregnancies include pregnancies that were not wanted or wanted later; intended pregnancies include pregnancies that were wanted then or sooner.

<sup>‡</sup>Frequent bedsharing includes infants who bedshare always or often; infrequent bedsharing includes infants who bedshare sometimes or rarely.

Statistically significant associations were observed between usual sleep position and the following maternal characteristics: race (p-value < 0.0001), mother's age (p-value = 0.0003), marital status (p-value = 0.0001), poverty status (p-value = 0.0004), maternal education (p-value = 0.0150), baby's birthweight (p-value = 0.011), prenatal care initiation (p-value = 0.0004), breastfeeding (p-value = 0.0028), pregnancy intendedness (p-value=0.002), and bedsharing (p-value = 0.0039).

To further investigate the associations between selected characteristics and usual sleep position, each of the characteristics found to be significantly associated with usual sleep positions by the chi-square tests of independence were included in a logistic regression model (table 2). This model was used to examine the association between each maternal characteristic and usual sleep position, while adjusting for the other characteristics.

It should be noted that the poverty index and the maternal education variables included in the logistic regression model have a moderately high correlation ( $r = 0.52$ ). Including both of these variables, however, does not appear to introduce major problems due to collinearity.

Though correlated, poverty status and maternal education are thought to have distinct effects on the dependent variable, usual infant sleep position. For this reason, both variables were included in the logistic regression model. The effect of including these correlated variables is that the confidence intervals for each AOR are slightly wider and, therefore, more conservative.

As expected, many of the variables found to be significantly associated with usual infant sleep position in the bivariate analysis were not significant after adjustment in the logistic model. After adjustment, the odds of mothers laying their infants down to sleep in a position other than on their backs was significantly higher among: non-Hispanic black mothers (AOR = 2.37, 95% CI = (1.70, 3.28)) as compared to non-Hispanic white mothers; mothers between 20 and 29 years of age

(AOR = 1.55, 95% CI = (1.14, 2.10)) as compared to mothers 30 years of age or older; and mothers that began prenatal care later than the first trimester of their pregnancy (AOR = 1.46, 95% CI = (1.02, 2.10)) as compared to mothers that began their prenatal care in the first trimester of their pregnancy.

## **Discussion and Conclusion**

Overall, during the years from 2004 to 2006 58.9 percent of full-term infants were usually laid down to sleep on their backs. This is well below the Healthy People 2010 goal of 70 percent of healthy, full-term infants sleeping on their backs.

The percentage of infants being laid down to sleep on their backs appears to be increasing. Of full-term infants born in South Carolina in 2006, 63.1 percent were usually laid down to sleep on their backs, up from 54.7 percent of infants born in 2004. Though the association between sleep position and year of birth was not found to be statistically significant, this increase is a positive step toward reaching the Healthy People 2010 goal for infant sleep position.

The characteristics that were significantly associated with usual infant sleep position after adjustment were maternal race, maternal age, and prenatal care initiation. Black mothers, mothers between the ages of 20 and 29, and mothers that began prenatal care later than the first trimester of their pregnancy had increased odds of laying their infants down to sleep in a position other than on their backs compared to white mothers, mothers 30 years of age or older, and mothers that began their prenatal care in the first trimester of their pregnancy, respectively.

The characteristic with the greatest disparity in the odds that infants were laid down to sleep in a position other than on their backs was race. The odds of a black mother laying her infant down to sleep in a position other than on their back was 2.37 times greater than the odds of a white

mother laying her infant down to sleep in a position other than on their back.

Though the magnitude of the disparity observed between the maternal age and prenatal care initiation categories was not as large as the disparity observed in race, mothers between the ages of 20 and 29 and mothers that began prenatal care later than their first trimester were meaningfully more likely to lay their infant down to sleep in a position other than on their back.

These results are only generalizable to non-Hispanic white and non-Hispanic black South Carolina resident mothers that gave birth to full-term infants in South Carolina, as these were the only women included in these analyses. Also, S.C. PRAMS data can not be used to determine and analyze the reasons for which mothers lay their infants down to sleep in a position other than on their backs, but can only describe the characteristics of such mothers. Another limitation to this study is that all answers to PRAMS surveys are self reported by the mother from two to eight months after giving birth, which may introduce various types of bias.

## Safe Sleeping Tips

- **Back to sleep for infants:** Always place your baby on his/her back to sleep for naps and at night.
- **Use a firm sleep surface:** Use a safety approved crib mattress covered by a fitted sheet.
- **Keep soft objects, toys and loose bedding out of baby's sleep area:** No blankets or bumper pads.
- **Do NOT allow smoking around your baby:** Do not smoke during your pregnancy and never allow smoking around your baby.
- **Think about using a clean, dry pacifier when placing baby down to sleep:** Introduce pacifier at sleep after one month of age and/or after breastfeeding has been established.
- **Avoid overheating your baby:** Keep room at a comfortable temperature.
- **Share your room with your baby, not your bed:** Babies should not sleep in a bed, on a couch, on a chair, or with other children. Your baby may get caught under the pillows or blankets and not be able to breathe. Also, your baby may be trapped in the space between the mattress and wall, headboard, footboard, or bed railings.

## References

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