



# ARKANSAS PRAMS UPDATE

PREGNANCY RISK ASSESSMENT MONITORING SYSTEM

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## Racial/Ethnic Differences in Factors Associated With Infant Sleep Position: Arkansas, 2000-2005

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**Background:** Epidemiologic studies have identified prone (stomach) sleeping as a risk factor for Sudden Infant Death Syndrome. In 1992, the American Academy of Pediatrics (AAP) issued a recommendation that all healthy infants be placed in a supine (back) or lateral (side) position during sleep. In 2005, the American Academy of Pediatrics stated that side sleeping was no longer an acceptable alternative to supine (back) sleeping. In Arkansas, 7 out of 10 non-Hispanic Blacks and 4 out of 10 non-Hispanic Whites and Hispanics use a non-back sleep position.

**Objective:** To identify the factors that are associated with whether a mother lays her infant down to sleep in the prone (stomach) or side sleep position compared to the supine (back) position, and the similarities and differences in these factors for different racial/ethnic groups in Arkansas.

**Study Design:** Cross-sectional study using Arkansas Pregnancy Risk Assessment Monitoring System (PRAMS) and linked birth certificate data, 2000-2005.

**Measurement:** Sleep position was determined by using the question "How do you most often lay your baby down to sleep now?"

**Limitations:** Responses may be subject to social desirability bias.

### Key Findings:

- Non-Hispanic Black mothers (29.1%) were less likely than non-Hispanic White (55.6%) or Hispanic (56.1%) mothers to place their infants on the back to sleep.
- Regarding stomach and side position use, non-Hispanic Blacks used the stomach position most often (39.5%), while Hispanics (37.3%) and non-Hispanic Whites (23.3%) favored the side position.
- Receiving prenatal care from a nurse or midwife versus a personal doctor/HMO, living in an urban area versus a suburban area, and being unmarried were associated with an increased likelihood of stomach position use among non-Hispanic Blacks.
- Medicaid payment for prenatal care and having less than a high school education increased the likelihood of side position use among Hispanics, while having a male infant decreased the likelihood of side position use.
- Living in a rural area, being less than 20 years of age, and having had a previous birth increased the chances that a non-Hispanic White mother would place her infant on its side to sleep.

**Conclusions:** Within each racial/ethnic group, there are distinct factors associated with side or stomach position that can be targeted with culturally appropriate messages that stress the importance of placing an infant on its back to sleep.

## Introduction

In Arkansas as well as the nation, Sudden Infant Death Syndrome (SIDS) is the leading cause of postneonatal mortality. Epidemiologic studies have identified prone (stomach) sleeping to be a risk factor for SIDS. In 1992, the American Academy of Pediatrics (AAP) issued a recommendation that all healthy infants be placed in a supine (back) or lateral (side) position during sleep.<sup>1</sup> Prior studies have examined sociodemographic, geographic and behavioral factors associated with the three main infant sleep positions (stomach, back, side) and the

reasons for the adoption of that sleep position. Maternal characteristics associated with prone sleep position in multiple studies included non-Hispanic black race/ethnicity, higher parity, younger age, less education, residence in a southern state, and presence of the infant's grandmother in the home.<sup>1-7</sup> Back position use was associated with older maternal age, higher maternal education, intended pregnancy, breastfeeding, higher socioeconomic status and non-Black race.<sup>3,5</sup> Factors associated with side sleeping are found less frequently in the scientific literature. However, one study using Pregnancy Risk Assessment Monitoring System

(PRAMS) data from Oklahoma found that younger mothers, those with lower levels of education, on WIC, or of Hispanic race/ethnicity were most likely to place their infants in the side sleep position<sup>5</sup>. The latest AAP recommendation in 2005 stated that side sleeping was no longer an acceptable alternative to back sleeping.<sup>8</sup> This recommendation was supported by evidence that found that the risk of SIDS was twice as high for infants placed on their side than for those on their back and comparable to the risk for those on their stomach.<sup>9</sup>

The purpose of this study was to identify the factors associated with stomach and side sleep position compared to back position, among Hispanics, non-Hispanic blacks, and non-Hispanic whites in Arkansas between 2000 and 2005. Social, biological, and demographic factors were examined in order to focus future prevention and intervention efforts related to safe sleep practices.

## Methods

Arkansas PRAMS and linked birth certificate data from 2000-2005 were used. PRAMS collects information on maternal behaviors and experiences that occur before, during, and after pregnancy among women who had a live birth. Each month over 200 mothers are mailed questionnaires with follow-up phone interviewers made to non-respondents. Survey responses are weighted to adjust for the sampling design, non-coverage, and non-response.

For the 2000-2005 period, 15,791 Arkansas mothers were sent the PRAMS survey. Of these mothers, 11,985 completed the questionnaire for an unweighted response rate of 75.9%. Sleep position was assessed by the PRAMS question “How do you most often lay your baby down to sleep now?” Infants who slept in a combination of positions (side/back, stomach/back, side/stomach, or side/stomach/back) were excluded from analyses.

Because of the small number of respondents of other races, only non-Hispanic White, non-Hispanic Black, and Hispanic women were included in multivariable analyses. The final sample size was 10,883.

For both the side and stomach positions,

separate analyses for non-Hispanic White, non-Hispanic Black, and Hispanic mothers were done to determine if the factors associated with whether a mother placed her infant in one of these positions varied by race/ethnicity. For the side position analysis, sleep position (outcome variable) was coded as side or back position, with back position serving as the reference category. Similarly, for stomach position analyses, sleep position (outcome variable) was coded as stomach or back position, with back position serving as the reference category.

The factors analyzed to determine if they had any effect on how a mother lays her infant down to sleep (independent variables) included maternal age, maternal education, marital status, infant sex, infant age, prenatal care entry, prenatal care adequacy (as measured by the Kotelchuck Index), location of prenatal care, breastfeeding status, location of well-child care, geography, parity, Medicaid payment for prenatal care and/or delivery, pre-pregnancy body mass index, smoking status, birthweight, preterm status, visit to a doctor within a week after birth, and pregnancy intention.

## Results

Overall, from 2000-2005, 26% of Arkansas infants were placed in the side sleep position, 51% on their backs, and 23% on their stomachs. Compared to women who placed their infants on the side or stomach to sleep, women who placed their infant on its back to sleep were older (25 years and older), non-Black, had higher levels of education, lived in non-rural areas, had no prior births, breastfed, received well-child care from a private doctor/HMO, were married, did not receive Medicaid, received prenatal care from a private doctor, had an intended pregnancy, and had a normal birthweight infant (Table 1, page 3).

The sleep positions Arkansas mothers chose for their infants are presented by race/ethnicity (Figure 1). The Healthy People 2010 target for back position use is 70%; over this time period, none of the racial/ethnic groups achieved this goal.

Of the two undesirable sleep positions (stomach and side), non-Hispanic Blacks used the stomach

**Table 1. Characteristics of mothers in PRAMS surveys: Arkansas, 2000-2005**

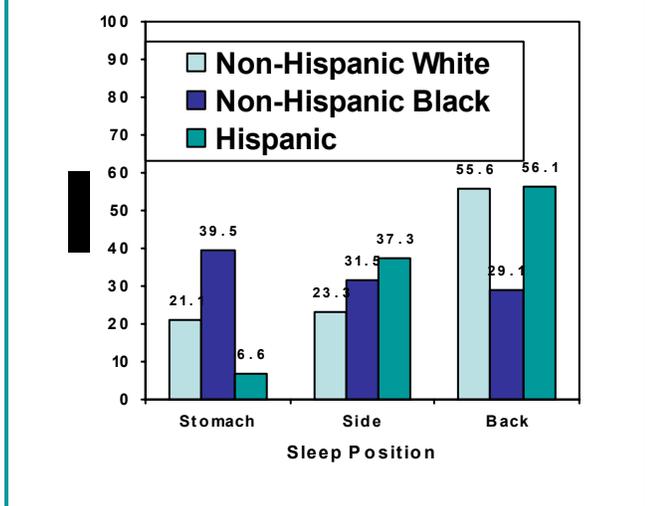
Characteristic	Stomach		Side		Back	
	N	%	N	%	N	%
<b>Maternal Age</b>						
Less than 20 Years	511	29.5	537	26.0	800	44.4
20-24 Years	920	23.8	1,118	28.0	1,862	48.2
25-29 Years	592	20.1	769	25.6	1501	54.4
30+ Years	486	20.1	615	23.4	1365	56.5
<b>Maternal Race/Ethnicity</b>						
Non-Hispanic White	1,629	21.1	1,977	23.3	4,324	55.6
Non-Hispanic Black	803	39.5	719	31.5	668	29.1
Hispanic	54	6.6	293	37.3	416	56.1
Non-Hispanic Other	20	10.3	49	24.1	111	65.6
<b>Maternal Education</b>						
Less than High School	512	20.6	807	33.9	1075	45.6
High School Graduate	1,154	25.0	1,315	25.8	2,237	49.2
Greater than High School	832	21.9	900	21.9	2189	56.2
<b>Population Density</b>						
Rural	756	23.1	969	28.7	1612	48.2
Suburban	830	22.6	991	26.2	1840	51.2
Urban	923	22.9	1,079	25.2	2,077	51.9
<b>Parity</b>						
1 or More Prior Births	1,432	22.7	1,796	27.4	3,081	49.9
No Prior Births	1,076	23.1	1,239	23.9	2,442	53.0
<b>Breastfeeding Status</b>						
Never Breastfed	1,191	26.9	1,303	27.3	1,999	45.8
Ever Breastfed	1,314	20.5	1,727	25.1	3,514	54.5
<b>Well-Child Care Source</b>						
No Well-Child Care	104	21.8	165	37.2	198	41.0
Hospital / Health Department Clinic Care	519	22.2	716	29.1	1,085	48.7
Private Doctor / HMO Clinic Care	1,849	23.1	2,100	24.2	4,166	52.7
<b>Marital Status</b>						
Unmarried	1,162	28.7	1,303	29.1	1,772	42.2
Married	1,340	19.5	1,731	24.2	3,744	56.4
<b>Medicaid Status—Any</b>						
On Medicaid	1,622	24.9	2,009	29.1	3,018	46.0
Not On Medicaid	874	20.4	1,012	22.0	2,481	57.6
<b>Prenatal Care Source</b>						
Hospital / Health Department Clinic	713	21.8	941	29.0	1,518	49.2
Nurse / Midwife	36	27.1	51	28.1	74	44.8
Private Doctor / HMO	1,673	23.3	1,920	24.5	3,775	52.2
<b>Pregnancy Intention</b>						
Unintended	441	29.4	452	28.3	690	42.3
Mistimed	1,346	23.7	1,598	25.7	2,853	50.6
Intended	695	19.0	959	25.6	1,937	55.4
<b>Birthweight</b>						
Low Birthweight (<2500 grams)	1,049	24.2	1,319	29.3	2,133	46.5
Normal Birthweight (≥2500 grams)	1,457	22.7	1,715	25.7	3,394	51.6

position most often (39.5%), while Hispanics favored the side position (37.3%). Approximately 56% of Hispanics and non-Hispanic Whites used the back position, compared to just 29% of non-Hispanic Blacks.

**Side Position**

*Hispanics:* Mothers with less than a high

Figure 1. Prevalence of selected sleep positions by race/ethnicity: Arkansas PRAMS, 2000-2005



school education were more than twice as likely to use the side position, compared to those with greater than a high school education. Mothers whose prenatal care was paid by Medicaid had an increased likelihood of side position use. Hispanic male infants were about half as likely to be placed on their side, compared to females (Table 2).

Characteristic	Odds Ratio	95% CI
<b>Maternal Education</b>		
Less Than High School	<b>2.18</b>	<b>1.01-4.70</b>
High School Graduate	1.57	0.70-3.51
More than High School	Ref	Ref
<b>Medicaid Status - Prenatal Care</b>		
On Medicaid	<b>1.63</b>	<b>1.06-2.51</b>
Not On Medicaid	Ref	Ref
<b>Sex of Infant</b>		
Male	<b>0.53</b>	<b>0.35-0.81</b>
Female	Ref	Ref

*Non-Hispanic Blacks:* Receiving prenatal care from a nurse or midwife versus a personal doctor or HMO, having no well-child care compared to well-child care from a personal doctor or HMO, and being unmarried increased the likelihood that a Black mother would most often place her infant in the side position. Infants who received well-child care at a hospital or health department clinic versus a personal doctor or HMO were half as likely to be placed in the side position (Table 3). Black women who received prenatal care from a nurse/midwife were six times more likely than those who received care from a private doctor/HMO to place their infants in the side sleep position. Also, Black infants who received no well-child care were almost four times more likely to be placed on their side than those infants who received their well-child care from a private doctor.

Characteristic	Odds Ratio	95% CI
<b>Prenatal Care Source</b>		
Hospital/Health Dept Clinic	1.07	0.71-1.62
Nurse/Midwife	<b>6.12</b>	<b>1.65-22.73</b>
Private Doctor/HMO	Ref	Ref
<b>Marital Status</b>		
Unmarried	<b>1.52</b>	<b>1.01-2.29</b>
Married	Ref	Ref
<b>Well-Child Care Source</b>		
No Well Child Care	<b>3.56</b>	<b>1.54-8.25</b>
Hospital/Health Dept Clinic	<b>0.56</b>	<b>0.37-0.85</b>
Private Doctor/HMO clinic	Ref	Ref

*Non-Hispanic Whites:* White mothers who lived in a rural area were more likely than those who lived in a suburban area to place their infant in the side sleep position. The effect that maternal age had on whether an infant was placed in the side sleep position depended on the mother’s level of education. Among White mothers with less than a

high school education, those less than 20 years of age were twice as likely to use the side position, compared to those aged 25 to 29. Among mothers with a high school education, those aged 20 to 24 were five times more likely to use the side position, compared to those aged 25 to 29. In addition, the effect that having a prior birth had on which sleep position the mother used depended on the birth weight of the infant. Women whose last infant was of normal birth weight (2500 grams or more) were more likely to use side position if they had one or more prior births (Table 4).

### Stomach Position

*Hispanics:* Unmarried Hispanic women were nearly four times more likely than married Hispanic women to lay their infants down to sleep on their stomachs. Having received well-child care at a health department or hospital clinic as compared to a private doctor or HMO was associated with a decreased likelihood of stomach position use, as was living in an urban or rural area compared to a suburban area (Table 5).

Table 5. Logistic regression for stomach sleep position, Hispanic population; Arkansas PRAMS 2000-2005		
Characteristic	Odds Ratio	95% CI
<b>Population Density</b>		
Urban (high density)	<b>0.31</b>	<b>0.14-0.68</b>
Suburban (medium density)	Ref	Ref
Rural (low density)	<b>0.24</b>	<b>0.09-0.65</b>
<b>Marital Status</b>		
Unmarried	<b>3.94</b>	<b>1.90-8.18</b>
Married	Ref	Ref
<b>Well-Child Care Source</b>		
No Well-Child Care	0.53	0.18-1.57
Hospital / Health Department Clinic	<b>0.38</b>	<b>0.16-0.89</b>
Private Doctor / HMO Clinic	Ref	Ref

*Non-Hispanic Blacks:* Receiving prenatal care from a nurse or midwife versus a personal doctor/HMO, living in an urban area compared to a suburban area, and being unmarried increased the likelihood that a Black mother would lay her infant down to sleep on its stomach (Table 6).

Table 4. Logistic regression<sup>1</sup> for side sleep position, non-Hispanic White population; Arkansas PRAMS 2000-2005

Characteristic	Odds Ratio	95% CI
<b>Population Density</b>		
Urban (high density)	1.05	0.89-1.24
Suburban (medium density)	Ref	Ref
Rural (low density)	<b>1.23</b>	<b>1.05-1.44</b>
<b>Interactions</b>		
<b>Maternal Age Among &lt;High School Education</b>		
Less than 20 years	<b>2.03</b>	<b>1.06-3.91</b>
20-24 years	0.70	0.25-1.96
25-29 years	Ref	Ref
30+ years	1.82	0.89-3.70
<b>Maternal Age Among High School Education</b>		
Less than 20 years	1.37	0.50-3.78
20-24 years	<b>5.28</b>	<b>2.14-13.03</b>
25-29 years	Ref	Ref
30+ years	0.82	0.57-1.20
<b>Maternal Age Among &gt; High School Education</b>		
Less than 20 years	1.47	0.56-6.84
20-24 years	1.12	0.82-1.52
25-29 years	Ref	Ref
30+ years	0.88	0.67-1.17
<b>Parity Among Low Birthweight</b>		
1 or more prior births	0.96	0.79-1.16
No Prior Births	Ref	Ref
<b>Parity Among Normal Birthweight</b>		
1 or more prior births	<b>1.23</b>	<b>1.03-1.48</b>
No prior births	Ref	Ref

<sup>1</sup>Adjusted for pregnancy intention, marital, smoking, Medicaid, and breastfeeding status, and well-child care.

*Non-Hispanic Whites:* White mothers less than 20 years old were 1.6 times more likely to place their infants on their stomachs than those aged 25 to 29 years. In addition, mothers who had one or more previous live births were more likely to place their current infant on its stomach, compared to first-time mothers (Table 7).

Table 6. Logistic regression <sup>1</sup> for stomach sleep position, non-Hispanic Black population; Arkansas PRAMS 2000-2005		
Characteristic	Odds Ratio	95% CI
<b>Population Density</b>		
Urban (high density)	<b>1.51</b>	<b>1.05-2.17</b>
Suburban (medium density)	Ref	Ref
Rural (low density)	1.16	0.81-1.67
<b>Prenatal Care Source</b>		
Hospital / Health Department Clinic	0.76	0.53-1.11
Nurse / Midwife	<b>5.13</b>	<b>1.77-14.86</b>
Private Doctor / HMO	Ref	Ref
<b>Marital Status</b>		
Unmarried	<b>1.61</b>	<b>1.05-2.46</b>
Married	Ref	Ref

<sup>1</sup>Adjusted for maternal age and parity.

Table 7. Logistic regression <sup>1</sup> for stomach sleep position, non-Hispanic White population; Arkansas PRAMS, 2000-2005		
Characteristic	Odds Ratio	95% CI
<b>Age</b>		
Less than 20 years	<b>1.64</b>	<b>1.22-2.21</b>
20-24 years	1.18	0.96-1.46
25-29 years	Ref	Ref
30+ years	0.95	0.76-1.19
<b>Parity</b>		
1 or more prior births	<b>1.40</b>	<b>1.17-1.67</b>
No prior births	Ref	Ref

<sup>1</sup>Adjusted for maternal education, pregnancy intention, marital status, Medicaid status, and breastfeeding status.

## Discussion

Overall, approximately 50% of Arkansas infants were placed on their backs to sleep during the study period, 2000-2005. This percentage falls short of the Healthy People 2010 goal of 70%. Hispanics (56.1%) and Whites (55.6%) were almost twice as likely as Blacks (29.1%) to place their infants to sleep on their backs, the recommended position. Black mothers were more likely to place their infants on their stomach (39.5%) or side (31.5%).

The results of our study indicate that separate analyses by race are essential when trying to determine which factors are associated with the sleep positions used by mothers. We found unique factors associated with side and stomach position for each racial/ethnic group as well as some factors that were common to multiple racial/ethnic groups or positions. For example, being unmarried or receiving prenatal care from a nurse or midwife versus a personal doctor was associated with an increased likelihood of both stomach and side position use in the non-Hispanic Black population. However, no one characteristic consistently increased or decreased the likelihood that a mother would place her infant on its side or stomach. Some characteristics even had opposite effects depending on race/ethnicity and/or position. Living in an urban area increased the likelihood of stomach position use among non-Hispanic Blacks and decreased the likelihood of stomach position use among Hispanics, while living in a rural area decreased the likelihood of stomach position use in Hispanics and increased the likelihood of side position use in non-Hispanic Whites.

These results indicate that within each racial/ethnic group, there appear to be distinct factors associated with side or stomach position that can be targeted with culturally appropriate messages that stress the importance of placing an infant on its back to sleep. PRAMS is an appropriate and effective source to identify and target groups and intervention settings for safe-sleep messages. However, the results do not tell us conclusively why these mothers chose to place their infants in a particular position to sleep. They do provide additional questions that need to be addressed to help understand why mothers choose a particular sleep position. For example, our results indicated that Black mothers who received prenatal care from a nurse or midwife rather than a personal doctor are more likely to place their infants on the stomach or side. More analysis needs to be conducted to determine why this might be true.

This study had several limitations. First, we were unable to assess why mothers chose to place infants in a given position. This information would be helpful in targeting behavior change. Second, PRAMS data are self-reported, and responses may be subject to social desirability bias. Third, the sleep

position question was asked of the infant's mother. We were unable to ask how the infant was placed to sleep by other caregivers such as relatives or daycare employees. Fourth, the study was limited to women with a living infant at the time of the survey. Deceased infants were excluded from the sleep position question.

## Recommendations

A number of opportunities exist to inform Black mothers about the importance of back-lying sleep position. Although prenatal care beginning *after* the first trimester is more common among Black mothers, a very high percentage of these mothers receive prenatal care in more than one visit. Mentioning the use of back-lying position at each visit, thereby giving the message repeatedly, especially from a trusted local health unit nurse is a good place to begin. However, many other opportunities could be found. The most teachable moment occurs in the hospital in the day or two after the birth. Women who are recognized as leaders in Black communities are invaluable advocates for change in sleep position behaviors. We know that young mothers may not be the most common caregiver in terms of infant care. So it is important to target other family members with these messages that can be helpful in targeting behavior change. Finally, the ADH is developing its social marketing capacities. These skills can provide great assistance in communicating with the many different family cultures that occur in Arkansas.

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## WHAT IS PRAMS?

The Pregnancy Risk Assessment Monitoring System (PRAMS) is an on-going, population-based surveillance system sponsored by the Centers for Disease Control and Prevention (CDC). The PRAMS survey is designed to capture information on maternal behaviors and experiences that occur before, during, and after pregnancy among women who had a live birth. PRAMS provides information that is not available from the birth certificate or other sources.

The goal of PRAMS is to provide state-specific information that can be used to improve the health of mothers and infants by reducing adverse outcomes such as low birth weight, infant mortality and morbidity, and maternal morbidity. Data from the PRAMS survey can be used to identify women who are at high risk for health problems, to monitor changes in maternal health indicators, and to measure progress in improving the health of mothers and their infants.

In Arkansas, over 200 recent mothers are sampled from Arkansas birth certificates each month and stratified by birth weight and population density. Mothers are mailed as many as three questionnaires seeking participation, with follow-up phone interviews for non-respondents. These mothers are asked questions about such issues as prenatal care, birth control, breastfeeding, insurance coverage, well-child care, and pregnancy intention. Responses are weighted to adjust for sample design, non-coverage, and non-response.