

Maternal-Infant Bedsharing: Risk Factors for Bedsharing in a Population-Based Survey of New Mothers and Implications for SIDS Risk Reduction

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Abstract *Objectives:* Maternal-infant bedsharing is a common but controversial practice. Little has been published about who bedshares in the United States. This information would be useful to inform public policy, to guide clinical practice and to help focus research. The objective was to explore the prevalence and determinants of bedsharing in Oregon.

Methods. Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) surveys a population-based random sample of women after a live birth. Women were asked if they shared a bed with their infant “always,” “almost always,” “sometimes” or “never.”

Results: 1867 women completed the survey in 1998–99 (73.5% weighted response rate). Of the respondents, 20.5% reported bedsharing always, 14.7% almost always, 41.4% sometimes, and 23.4% never. In multivariable logistic regression, Hispanics (adjusted odds ratio [ORa] 1.69, 95% Confidence Interval [CI] 1.17–2.43), blacks (ORa 3.11, 95% CI 2.03–4.76) and Asians/Pacific Islanders (ORa 2.14, 95% CI 1.51–3.03), women who breastfed more than 4 weeks (ORa 2.65, 95% CI 1.72–4.08), had annual family incomes less than \$30,000 (ORa 2.44, 95% CI 1.44–4.15), or were

single (ORa 1.55, 95% CI 1.03–2.35) were more likely to bedshare frequently (*always* or *almost always*). Among Hispanic and black women, bedsharing did not vary significantly by income level. Bedsharing black, American Indian/Alaska Native and white infants were much more likely to be exposed to smoking mothers than Hispanic or Asian/Pacific Islander infants ($p < .0001$).

Conclusions: Bedsharing is common in Oregon. The women most likely to bedshare are non-white, single, breastfeeding and low-income. Non-economic factors are also important, particularly among blacks and Hispanics. Campaigns to decrease bedsharing by providing cribs may have limited effectiveness if mothers are bedsharing because of cultural norms.

Keywords SIDS · Infant mortality · Bedsharing · Public health · Race · Ethnicity · Class

Abbreviations

SIDS	Sudden Infant Death Syndrome
OR	odds ratio
ORa	adjusted OR
CI	Confidence Interval
PRAMS	Pregnancy Risk Assessment Monitoring System
PNCHS	Plunket National Child Health Study
NISPS	National Infant Sleep Position Study
PHD	Public Health Division
AAP	American Academy of Pediatrics

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Sudden Infant Death Syndrome (SIDS), with a United States mortality rate of 0.57 per 1000 live births per year, remains the leading cause of postneonatal infant mortality, accounting for 22.7% of all postneonatal deaths in 2002 [1]. Rates vary significantly by race/ethnicity; the 2002 U.S. SIDS rate per 1000 live births was 0.53 for whites, 1.19 for blacks, 0.34

for Hispanics, 0.21 for Asians/Pacific Islanders and 1.25 for American Indians [1]. In Oregon, the SIDS rate has been consistently higher than the national average and in 2002 was 0.69 per 1000 live born [2]. In Oregon, the combined 2001–2004 rate for whites was 0.55 for whites, 0.48 for Hispanics, and 2.10 for blacks. There were too few deaths among Oregon Asians/Pacific Islanders and American Indians for reliable statistics.

In 1992, the American Academy of Pediatrics (AAP) recommended that all healthy babies be placed supine to sleep after a number of epidemiological studies identified prone infant sleep position as a major risk factor for SIDS. In 1994, a number of organizations joined the AAP in a nationwide “Back to Sleep” campaign that led to a dramatic decline in prone positioning, from 70% in 1992 to 17% in 1998 [3]. A halving of the U.S. SIDS rate followed [4]. With the success of this public health intervention in dramatically reducing SIDS deaths, other potentially avoidable SIDS risk factors have been sought.

Much attention has focused on maternal-infant bedsharing. Bedsharing is a specific form of co-sleeping, the practice of placing an infant to sleep on the same surface as another person, and now generally refers to the sharing of an adult bed. Other forms of co-sleeping include sharing non-bed surfaces such as sofas and chairs. The practice of bedsharing, while common, is controversial in the public health community. Some public health practitioners consider bedsharing to be a significant causative factor under any circumstances for SIDS and recommend that all infants sleep in a crib [5–7]. Others disagree, seeing benefits in bedsharing and little or no risk to most mothers and infants [8–11].

The goal of this study was to explore the prevalence and determinants of bedsharing among new Oregon mothers using a population-based cross-sectional sample drawn from birth certificates.

Methods

Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing surveillance project of the Oregon Public Health Division’s (PHD) Office of Family Health for monitoring maternal and child health events [11, 12]. It relies upon a stratified sample of women drawn every month from recently filed birth certificates. Sampling is random within strata, with oversampling of racial/ethnic minorities and non-Hispanic white women with babies less than 2500 grams at birth. The questionnaire includes a number of questions about the woman’s prenatal, perinatal and postnatal experiences, attitudes and practices. The sample is weighted to account for over-sampling and non-response. Oregon PRAMS methods have been published elsewhere [11, 12]. While modeled after the CDC PRAMS survey, this data was not collected under CDC protocol.

The Oregon Public Health Division deemed Oregon PRAMS exempt from Institutional Review Board review because it was public health practice and not primarily for the purpose of research. (For a longer discussion of the distinction between public health practice (surveillance) and research, please see the full report sponsored by the Council of State and Territorial Epidemiologists [13].) Respondents provided consent for participation at the time the survey was completed. Each survey was matched with the infant birth certificate and the information was combined.

Between November 1998 and October 1999, 2919 women were selected to be surveyed. 1867 women completed the survey (73.5% weighted response, using the strata-weighted number of respondents as a proportion of the total number of women eligible for sampling), at an average of 12 weeks postpartum. Fifty-three women reported that their babies were no longer alive or no longer living with them and 38 failed to provide that information; all were excluded from the analysis, per survey protocol. There remained 1776 women eligible for analysis. Of these, 1756 women provided responses to the bedsharing question (99% of those eligible) and were included in the current analysis. To examine trend, bedsharing prevalence was also calculated for PRAMS years 2000 and 2001 (weighted responses 79.5% and 78.1%, respectively).

Respondents were asked “How often does your new baby sleep in the same bed with you? (check only one): *always, almost always, sometimes, never.*” For the purposes of logistic regression modeling, a binary outcome variable was created; “always” or “almost always” responses were combined and designated as “frequent bedsharing”; “sometimes” or “never” were combined and designated as “infrequent bedsharing.”

Twenty-five maternal and infant demographic and socioeconomic characteristics were explored as potential determinants of maternal-infant bedsharing (Table 1). All variables were taken from the PRAMS survey, except the following, taken entirely or in part from the birth certificate: maternal race/ethnicity, maternal age, maternal education, marital status, prenatal insurance status, initiation of prenatal care (by trimester), birthweight, infant gender and Kotelchuck index of adequacy of prenatal care. Annual family income was divided into approximate quartiles for the analysis (and the lower two quartiles were combined when no differences in bedsharing prevalence were found between them in univariable analysis). Exploratory variables were chosen on the basis of earlier studies or epidemiological interest.

SUDAAN 8.01 was used to account for the complex sample design involving a stratified weighted sample. First, variables significantly associated with bedsharing were identified using the chi-square test of independence (Crosstabs procedure), which allowed use of all four levels of bedsharing prevalence. We also evaluated the Wald-F test statistic and odds ratio in univariable logistic regression models, using

Table 1 Variables explored as potential determinants of maternal-infant bedsharing, among respondents to the 1998–1999 Oregon PRAMS

From PRAMS	From the Birth Certificate
Annual Family Income	County of Residence at Birth
Bedsharing Frequency	(Urban, Mixed Rural & Frontier)
Breastfeeding Duration	Birth Order/Parity
Usual Infant Sleep Position	Birthweight
Insurance at Delivery	Hospital at Birth
Insurance Currently	Infant Gender
PRAMS Mode (Mail, Phone)	Insurance at Delivery
Other Smokers in the House	Kotelchuck Index of Adequacy of
Smoking Status (Before	Prenatal Care (calculated)
Pregnancy)	Smoking Status
Smoking Status (Prenatal)	Marital Status
Smoking Status (Postpartum)	Maternal Race/Ethnicity
Timing of Initiation of Prenatal	Maternal Age
Care	Maternal Education
Type of Prenatal Care Site	Timing of Initiation of Prenatal Care
Type of Well Baby Care Site	
WIC Enrollment	

the frequent bedsharing outcome as previously defined. All variables with the level of significance $p < .05$ were considered for multivariable logistic regression. All significant variables were entered into a multivariable model and those with a level of significance of $>.10$ were removed, while those with a level of significance $<.05$ were reentered (i.e., reverse stepwise procedure). The final model was chosen when no further variables were eligible for entry to or removal from the model. We report the adjusted odds ratios and 95% confidence interval from this final multivariable model.

We further explored the relationship between income and bedsharing by repeating the reverse stepwise multivariable logistic regression procedure for women with annual family incomes of at least \$30,000 (the upper two quartiles of the sample). We previously examined the relationship between smoking and bedsharing [11]; for this report we looked at the proportions of bedsharing infants of each racial/ethnic group exposed to smoking mothers.

Results

Bedsharing between mother and infant is common in Oregon. Of the respondents, 20.5% reported always bedsharing, 14.7% almost always, 41.4% sometimes and 23.4% never (Table 2). Over 76% of our respondents reported bedsharing at least sometimes. Within some subgroups (Hispanic and black women), over 40% of women reported always bedsharing (Table 3). The prevalence of bedsharing remained stable between 1998–2001 ($p = .20$) (Table 2). This was

Table 2 Changes in bedsharing prevalence in Oregon over time – weighted prevalence from Oregon PRAMS

Frequency of bedsharing*	1998–1999 (%) ^a	2000 (%) ^b	2001 (%) ^c
Always	20.5	17.5	20.5
Almost Always	14.7	12.2	14.3
Sometimes	41.4	42.5	38.1
Never	23.4	27.7	22.1
Number of Respondents (unweighted)	1756	2061	1711

*Chi-square Test of Independence ($p = .20$).

^aweighted response rate for November 1998–October 1999: 73.5%.

^bweighted response rate for single year: 79.5%.

^cweighted response rate for single year: 78.1%.

also true for the prevalence of women who ever ($p = .07$) or frequently ($p = .06$) bedshared (data not shown).

Bedsharing was associated with a number of maternal characteristics (Table 3). There were no statistically significant differences in bedsharing prevalence between smoking and nonsmoking mothers. In addition, the racial/ethnic distribution of bedsharing practice was similar among smokers and nonsmokers, with blacks, Hispanics and Asian/Pacific Islanders having higher prevalences among both smokers and nonsmokers (Chi-square test of independence, $p = .008$ and $p < .001$, respectively) (data not shown).

The unadjusted magnitude of these associations can be seen in the results of the logistic regression analyses. (Table 4, column 3, univariable logistic regression results.)

In adjusted analysis, using reverse stepwise model selection procedures as defined previously, we found that non-Hispanic blacks and Asians/Pacific Islanders, Hispanics, women who breastfed more than 4 weeks, have incomes less than \$30,000, or are single were more likely to bedshare. (Table 4, column 4, multivariable logistic regression model 1.) Several variables associated with socioeconomic status that were significant in univariable models lost their significance when annual family income was in the model (e.g., insurance type and WIC enrollment, which are associated with income status).

Respondents with annual family incomes $\geq \$30,000$ were analyzed separately. (Table 4, column 5, multivariable logistic regression model 2.) The associations between maternal-infant bedsharing and race/ethnicity, marital status and breastfeeding duration were seen in the wealthier half of the sample. Among these higher income mothers, those most likely to report bedsharing were black (ORa 2.77, 95% CI 1.43–5.36), Asian/Pacific Islander (ORa 2.36, 95% CI 1.47–3.78), breastfeeding more than 4 weeks (ORa 2.40, 95% CI 1.11–5.20) and single (ORa 3.66, 95% CI 1.62–8.27). The odds ratio for Asians/Pacific Islanders increases when

Table 3 Frequency of bedsharing by selected maternal characteristics and practices, among respondents to the 1998–1999 Oregon PRAMS

Characteristics	Number of respondents*	Proportion of Sample (%) ^a	Frequency of Bedsharing ^a			
			Always %	Almost Always %	Sometimes %	Never %
Total	1756	100	20.5	14.7	41.4	23.4
Race/Ethnicity^b						
Hispanic	417	14.7	41.1	15.2	31.2	12.6
Black ^c	201	2.0	43.1	20.5	27.4	9.0
Asian/Pacific Islander ^c	296	4.7	23.8	20.7	40.0	15.9
American Indian/Alaska Native ^c	200	1.4	26.0	15.4	38.8	19.9
White ^c	655	77.2	15.7	14.1	43.9	26.3
Maternal age^b						
13–19 years	274	12.2	38.0	14.1	40.0	8.0
20–25 years	557	33.2	19.0	15.6	43.6	21.9
26–30 years	462	27.5	16.0	17.5	41.6	25.0
31–48 years	463	27.0	19.0	11.1	39.3	30.6
Marital status^b						
Single/Divorced	607	29.1	32.9	14.5	39.5	13.1
Married/Separated	1149	70.9	15.4	14.8	42.3	27.6
Maternal education^b						
<12 years	430	19.1	39.0	12.6	33.3	15.2
12 years	583	35.5	17.3	19.0	40.8	23.0
>12 years	729	45.4	15.2	12.5	45.4	26.9
Annual family income^b						
<\$15,000	574	26.2	28.0	17.9	35.9	18.2
\$15,000–29,999	484	29.7	26.8	15.7	41.4	16.2
\$30,000–49,999	305	24.3	14.0	12.8	49.9	23.3
≥50,000	300	19.9	8.3	12.2	40.9	38.6
Insurance at delivery^b						
Public or none	813	40.6	30.2	16.4	37.7	17.8
Private	921	59.4	13.6	13.8	45.2	27.3
Parity						
First born	779	43.8	22.6	15.1	42.3	19.8
Second born	539	30.9	17.2	14.1	41.0	27.7
Third born	269	16.1	23.6	11.8	36.6	28.0
Fourth or higher	167	9.2	16.6	18.2	47.0	18.2
Breastfeeding^b						
>4 weeks	1255	75.4	21.6	17.0	43.1	18.3
≤4 weeks	430	24.6	15.5	7.5	40.1	37.0
Postpartum smoking						
Yes	297	20.1	18.8	12.6	45.1	23.6
No	1441	79.9	20.6	15.3	40.6	23.5
Initiation of prenatal care^b						
> first trimester or none	500	24.5	28.4	12.3	37.8	21.5
First trimester	1218	75.5	17.6	15.2	42.8	24.3
Usual infant sleep position^b						
Supine (back)	1047	67.0	19.5	14.5	40.7	25.3
Side	537	24.0	25.6	17.1	42.3	15.0
Prone (stomach)	144	9.0	14.0	9.3	42.7	34.0

*unweighted.

^aweighted.^bCrosstabs Chi-Square Test of Independence, indicating that bedsharing frequency is distributed significantly differently for at least one level of the independent variable (e.g. race/ethnicity) versus other levels, $p \leq .02$.^cnon-Hispanic.

Table 4 Frequent bedsharing (“always” and “almost always”), *logistic regression, among respondents to the 1998–1999 Oregon PRAMS, logistic regression results

Characteristic		Univariable Logistic Regression (Entire Sample) Crude Odds Ratio (95% CI)	Multivariable Logistic Regression (Model 1 – Entire Sample) Adjusted Odds Ratio (95% CI)	Multivariable Logistic Regression (Model 2 – Family Income \geq \$30,000 Adjusted Odds Ratio (95% CI)
Race/Ethnicity	Hispanic	3.03 (2.29–4.01)	1.69 (1.17–2.43)	1.58 (0.79–3.16)
	Black ^a	4.12 (2.96–5.72)	3.11 (2.03–4.76)	2.77 (1.43–5.36)
	Asian/Pacific Islander ^a	1.90 (1.41–2.56)	2.14 (1.51–3.03)	2.36 (1.47–3.78)
	American Indian/Alaska Native ^a	1.66 (1.21–2.28)	1.17 (0.80–1.71)	1.66 (0.90–3.04)
	White ^a	1.00 (referent)	1.00 (referent)	1.00 (referent)
Maternal age	13–19 years	2.17 (1.32–3.57)		
	20–25 years	1.05 (0.71–1.56)		
	26–30 years	1.00 (referent)		
	31–48 years	0.85 (0.56–1.31)		
Marital status	Single/Divorced	2.09 (1.51–2.89)	1.55 (1.03–2.35)	3.66 (1.62–8.27)
	Married/Separated	1.00 (referent)	1.00 (referent)	1.00 (referent)
Maternal education	<12 years	2.77 (1.89–4.05)		
	12 years	1.48 (1.02–2.13)		
	>12 years	1.00 (referent)		
Annual family income	<\$30,000	3.06 (1.93–4.85)	2.44 (1.44–4.15)	Not applicable
	\$30,000–49,999	1.43 (0.82–2.48)	1.57 (0.88–2.82)	
	\geq \$50,000	1.00 (referent)	1.00 (referent)	
Insurance at delivery	Public or none	2.31 (1.69–3.15)		
	Private	1.00 (referent)		
Parity	Firstborn	1.00 (referent)		
	Second born	0.75 (0.53–1.08)		
	Third born	0.91 (0.58–1.42)		
	Fourth or higher	0.88 (0.51–1.52)		
Breastfeeding	>4 weeks	2.11 (1.43–3.09)	2.65 (1.72–4.08)	2.40 (1.11–5.20)
	\leq 4 weeks	1.00 (referent)	1.00 (referent)	1.00 (referent)
Initiation of prenatal care	After the first trimester or none	1.46 (1.01–2.10)		
	First trimester	1.00 (referent)		
Usual infant sleep position	Supine (back) or side	1.87 (1.01–3.45)		
	Prone (stomach)	1.00 (referent)		

*The outcome variable in all logistic regression models was frequent bedsharing. The responses “always” and “almost always” to the question “How often does your new baby sleep in the same bed with you?” were combined as frequent bedsharing; “sometimes” and “never” were combined as *not* frequent (infrequent) bedsharing.

^anon-Hispanic.

adjusted for confounding, while the odds ratios for Hispanics and blacks decline.

Looking at bedsharing by income among mothers of each racial/ethnic group, we found lower income Asian/Pacific Islanders, American Indians/Alaska Natives and white women were more likely to bedshare than higher income women suggesting that the income gradient remained important within these racial subgroups. However, there was no significant income gradient among Hispanics and blacks, indicating wealthier black and Hispanic women are as likely to bedshare as poorer women (Table 5). Apparently, economic factors operate differently in different racial/ethnic groups.

Infants of smoking mothers who bedshare are at a very increased risk of SIDS. While there were no significant differences in the prevalence of bedsharing between smoking and nonsmoking mothers, as a whole or when stratified by race/ethnicity [11], there was a significant difference, by race/ethnicity, in the proportion of infants falling into this high risk group: 19.5% of black infants, 18.1% of white infants and 21.6% of American Indian/Alaska Native infants at least sometimes bedshared with smoking mothers, while only 6.2% of Hispanic and 7.1% of Asian/Pacific Islander infants did so (Chi-square test of independence $p < .0001$) (Table 6). Looked at another way, among bedsharing infants, 21.4% of black infants, 26.9% of American Indian/Alaska

Table 5 Bedsharing and income by race/ethnicity, frequent bedsharing (“always” and “almost always”)* multivariable logistic regression^a, among respondents to the 1998–1999 Oregon PRAMS, logistic regression results

Strata	Hispanic	Black ^b	Asian/Pacific Islander ^b	American Indian/ Alaska Native ^b	White ^b
Annual family income	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
< \$30,000	1.77 (0.66–4.74)	1.05 (0.42–2.67)	2.02 (1.12–3.65)	2.62 (1.09–6.32)	2.48 (1.30–4.72)
\$30,000–49,999	0.53 (0.16–1.76)	0.52 (0.18–1.76)	1.92 (0.99–3.72)	4.40 (1.60–12.09)	1.68 (0.84–3.34)
≥ \$50,000	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)	1.00 (referent)

* The outcome variable in all logistic regression models was frequent bedsharing. The responses “always” and “almost always” to the question “How often does your new baby sleep in the same bed with you?” were combined as frequent bedsharing; “sometimes” and “never” were combined as *not* frequent (infrequent) bedsharing.

^aadjusted for breastfeeding status, prenatal care site and marital status.

^bnon-Hispanic.

Native and 24.6% of white infants are exposed to smoke, as compared to 7.1% of Hispanics and 8.4% of Asians/Pacific Islanders ($p < .0001$) (Table 6).

Discussion

Maternal-infant bedsharing is common in Oregon and our study found significant associations between bedsharing and race/ethnicity, marital status, family income and breastfeeding duration. It is interesting to note that while both Hispanics (56%) and blacks (64%) were more likely to bedshare *frequently* (always or almost always) than whites (30%), the SIDS rate among Hispanics, using combined 2001–2004 Oregon mortality data, was only 0.48 per 1000 live born, below that of whites (0.55), while that of blacks was much higher (2.11). This apparent paradox may be explained, at least in part, by the higher exposure of bedsharing black infants to (prenatal or postpartum) maternal smoke than Hispanic infants, as well as by racial/ethnic disparities in the prevalence of prone infant sleep position, favoring Hispanics over blacks. The same could be said about American Indian/Alaska Native infants, also with elevated SIDS mortality rates.

PRAMS asks respondents about the position in which they *usually* place their infants to sleep. During this same period, the proportion of infants in Oregon *usually* put to bed prone was for blacks 19.0%, American Indians/Alaska Natives 4.4%, Hispanics 4.7%, Asians/Pacific Islanders 8.1% and whites 10.0%.

Given the very high prevalence of frequent bedsharing in blacks and Hispanics with widely different SIDS rates, it is hard to see how bedsharing alone – without other modifying factors, such as maternal smoking – is contributing substantially to SIDS rates, adding further to doubts about the hypothesized dangers of bedsharing in and of itself.

Comparison to 3 previous large studies of bedsharing

The National Infant Sleep Position Study (NISPS), a 1993–2000 random-digit-dial survey within the continental United States, is the closest to ours in time and population [14]. They found a similar distribution but lower prevalence of bedsharing than we did (Table 7). The NISPS study overrepresented whites and underrepresented women with low education and young age. They did not ask about marital status. Our study has the advantage of being drawn from birth certificates and weighted for non-response. The NISPS study has the

Table 6 Proportion* of infants bedsharing with smoking mothers by race/ethnicity, any bedsharing, among respondents to the 1998–1999 Oregon PRAMS, crosstabs procedure

	Hispanic	Black ^a	Asian/Pacific Islander ^a	American Indian/ Alaska Native ^a	White ^a	Total Sample
Proportion of <i>all</i> infants who <i>at least sometimes</i> bedshare with smoking mothers (prenatal or postpartum) ^b	6.2%	19.5%	7.1%	21.6%	18.1%	16.0%
Proportion, among smoking mothers (prenatal or postpartum), of infants who <i>at least sometimes</i> bedshare ^b	7.1%	21.4%	8.4%	26.9%	24.6%	20.8%

*weighted proportions.

^anon-Hispanic.

^bChi-square test of independence, $p < .0001$.

Table 7 Comparison of frequent bedsharing prevalence, selected subgroups, Oregon, from the respondents to the 1998–1999 Oregon PRAMS, and the U.S., from the respondents to the NISPS

	Oregon PRAMS (%) ^a	NISPS ⁽¹⁶⁾ (%) [*]
Overall	35.2	19.4
Race/Ethnicity		
Hispanic	56.3	25.5
Black ^b	63.6	41.8
Asian/Pacific Islander ^b	44.5	33.0
American Indian/Alaska Native ^b	41.4	Not available
White ^b	29.8	12.2
Maternal age		
<18 years	46.7	36.4
18–29 years	38.2	16.5
≥30 years	28.3	12.9
Maternal education		
<12 years of education	48.7	26.4
12–15 years	33.8	15.4
≥16 years	25.7	12.9
Annual family income		
<\$20,000	45.6	24.8
≥\$20,000	28.6	13.5
Parity ^c		
1	37.7	16.2
>1	33.3	14.5
Birthweight ^d		
<2000 grams	30.8	13.6
≥2500 grams	35.4	15.5

^{*}for Oregon PRAMS = always and almost always; for NISPS, = usually and half the time. In addition, 41.4% of Oregon respondents reported bedsharing sometimes and 23.4% never bedshared, while of the NISPS respondents, 27.6% reported bedsharing less than half the time and 53.8% never bedshared.

^asome PRAMS variables recategorized (from previous tables) to correspond to NISPS categories.

^bnon-Hispanic.

^cnot significant Oregon PRAMS; for NISPS, significant.

^dnot significant Oregon PRAMS and NISPS.

advantage of somewhat more precise response options; but, given the nature of both surveys, both are susceptible to respondent interpretation and inaccurate recall.

Our findings are also similar to those of the Plunket National Child Health Study (PNCHS), a 1990–1991 population-based stratified random sample of 4262 New Zealand infants and their parents [15]. The PNCHS found that 12.2% of infants shared their parents' bed, with increased prevalence among teen and single mothers and those with less than 3 years of secondary education, and those with the lowest socioeconomic status ($p < .005$ for all comparisons). They found an association with parity; we did not. As we did, the PNCHS found wide racial variations in prevalence.

By contrast, an English study [16] found that bedsharing, while relatively common (nearly half of all infants bedshared

some of the time and 14% bedshared all the time), was not associated with non-white ethnicity, younger maternal age, single motherhood, larger families or socially deprived families; bedsharing was more common among the least deprived families in the first months of life. Similar to other studies, however, it was strongly associated with breastfeeding. This study, as did ours, supports the hypothesis that non-economic factors, in addition to or instead of economic factors, motivate mothers to bedshare.

Racial and ethnic differences

As did we, others have found a higher prevalence of bedsharing among blacks, ranging from 31.3% [14] to 61% [17], depending on how the question was asked. A consecutive sample of blacks in St. Louis found that 41% usually shared a bed and 46% had shared a bed the night before the interview [18]. In Cleveland, investigators found routine bedsharing in 35% of white and 70% of black families with children 1–48 months of age [19].

NISPS, too, found higher prevalences of bedsharing among Hispanics. However, a prospective maternity ward-based survey of low-income, inner city, primarily black (82%) and Hispanic (16%) mothers in Washington, DC did not find a statistically significant increase among Hispanics. They did find that overall 51% of mothers reported that their infants bedshared [20] and that 40% of the mothers *usually* slept with their infant [21]. Bedsharing determinants in the Washington D.C. survey included black race, single marital status, less than a high school education, less than 20 years old and having moved since the birth of the infant.

Bedsharing in Asian and Pacific Island cultures is common [15, 20–29]. In Oregon, frequent bedsharing by Asian/Pacific Islanders was high, but not as high as that of Hispanics or blacks. Investigators in Birmingham, England, drawing a sample from a single perinatal clinic with low socioeconomic status patients, found Asians bedsharing three times as frequently as whites [30]. Pacific Islanders, despite having a very low SIDS rate, have the highest prevalence of parental bedsharing in New Zealand [15].

Our categorizations of racial/ethnic groups often obscure significant heterogeneity. Most Hispanics in Oregon are of Mexican origin; in Washington D.C. most are of Central American origin. Similarly, most Asians in Oregon are from Southeast Asia, Japan and China; in England, most originate in South Asia.

Bedsharing and breastfeeding

Many have found that bedsharing is associated with breastfeeding. British studies have found that ease of nighttime breastfeeding was the primary reason given for bedsharing and that breastfeeding duration was strongly associated with

bedsharing [16, 31, 32]. Breastfeeding has many benefits for infants and mothers [32]. Bedsharing appears to promote breastfeeding and prolong its duration [32, 34, 35], and may increase infant arousability [36]. However, there is no strong evidence that breastfeeding decreases the risk of SIDS [37–40]. Room-sharing may be protective against SIDS [41], but the evidence does not support a *protective* effect of bedsharing [40–52].

Non-economic reasons for bedsharing

Our study supports, but does not prove, the hypothesis that non-economic factors influence bedsharing choice in the U.S. The associations between race/ethnicity, marital status and breastfeeding remained strong after the analysis was limited to those with higher annual family income and no significant differences were found between the prevalence of bedsharing among high-, middle- and low-income black or Hispanic women.

Several studies outside the United States have explored the motivations behind bedsharing. In one study, mothers offered multiple reasons for bedsharing, including ease of breastfeeding, settling the baby, infant illness, fear of SIDS, enjoyment and parental ideology [31]. Only one of 253 subjects cited lack of other space. Parents found it “convenient and practical,” [53] and about twice as many bedshared postnatally as had anticipated it antenatally [54].

A St. Louis study [18] found that bedsharing was *not* due to lack of space. After being surveyed, fifty-three mothers were then given cribs; of these 53, 23 mothers were recontacted when their infants were six months old. One infant had never tolerated a crib; four continued to bedshare at least half of the time and seven bedshared some of the time; only 11 used the crib every night. These results are consistent with the hypothesis that non-economic factors may be stronger than economic factors. There are public health programs, in several places around the country, to provide access to cribs to those without. If there are non-economic influences to bedsharing, these programs may be less effective than anticipated and potentially culturally insensitive.

Limitations

The greatest limitation of our study was its inability to explore individual reasons for choosing to bedshare. It would have been useful to know if a crib was available, if respondents had relatives or friends who bedshared, and whether they shared all night or only part of the night.

The survey information is self-reported and PRAMS is a multimode survey (mailed questionnaires and telephone interviews for non-responders). This might lead to social acceptability bias (e.g., if women responded differently to an interviewer than to a mailed survey). The mode of the

survey was tested as a potential confounding variable, but its addition did not alter the results. Recall bias would not be a factor as women were asked about current practice.

Our response rates, between 70–80%, were high for a survey of this type. Oregon, with the CDC’s assistance, adjusted for non-response by a second weighting step (after adjusting for nonrandom sampling), using the variables identified by the CDC as likely indicators of a mother’s inclination to respond: marital status, high education, low education, parity, high age, low age, and 1st trimester prenatal care. This will minimize but not eliminate response bias.

Missing data are unlikely to have appreciably altered the results. Not all respondents answered all questions. The bedsharing question was answered by 99% of those eligible; 97% answered the family income question; 95% reported breastfeeding status. Race/ethnicity and marital status were reported by virtually all.

This study excluded responses on bedsharing from mothers whose infants were no longer alive or no longer living with them (4% of the respondents). As the survey was designed to capture bedsharing status only at the time of the survey, this should have a very small effect on the results.

We were only able to explore bedsharing with mothers. Bedsharing with other children has been associated with increased SIDS risk [45]. We cannot exclude the presence of others in the maternal bed but the PRAMS question specifically asks about bedsharing by the mother and infant; infants who sleep primarily with siblings would not have been counted as bedsharers by this study. Likewise, the PRAMS question refers to sharing a “bed.” Certain sleep surfaces (couches, chairs) have been associated with SIDS risk [44, 45]. These circumstances were unlikely to have been counted as “bedsharing” in this analysis.

It would also have been useful to look at infant age, particularly in light of recent findings regarding SIDS risk in younger bedsharing infants [49, 50], but infant age, by design, is not an independent variable in PRAMS.

Conclusions

Maternal-infant bedsharing is common in Oregon. The women most likely to bedshare are non-white, single, breastfeeding and low income. Black and Asian/Pacific Island mothers are more likely to bedshare than white women, regardless of income level. Qualitative research in the United States into maternal motivations to bedshare would be useful. It is important to understand the characteristics of bedsharers, in order to inform public policy and health education content, to guide clinical practice and to help focus future research.

Given the apparently increasing popularity of bedsharing, as documented in the popular press, and in the face of

differing and sometimes conflicting advice from health professionals, changes in the epidemiologic profile over time of maternal-infant bedsharing cannot be predicted. It will be important to track the prevalence and determinants of bedsharing over time and in different geographic localities.

It would be worthwhile to investigate the relative weight of individual SIDS risk factors (population attributable risk) but this will require case control studies that can take into account the existence of many individual infants with multiple risk factors. The sequential partitioning of population attributable risk would be useful for targeting SIDS risk reduction campaigns.

From our review of the literature [11], there is strong evidence that infants of smoking mothers should not bedshare. There is sufficient evidence that infants less than 11 weeks of age should not bedshare. There is no scientific evidence that infants at least 11 weeks of age should not bedshare with non-smoking mothers. Based on the current evidence, programs to make cribs available must target infants early in order to be effective in reducing SIDS risk, preferably before hospital discharge. These programs need to take cultural diversity into account and providers' cultural values should not be imposed on diverse groups. The evidence supports providing cribs to smoking mothers, regardless of infant age.

Some mothers may *need* to share a bed with their infant, for economic reasons, but many other mothers *want* to bring their infant to bed. Women who want to bedshare should be provided with the known facts in order to make informed choices. Bedsharing should be discouraged for infants of smoking mothers and infants less than 11 weeks of age. Cribs should be an option for all, but not an obligation for nonsmoking mothers of older infants.

One must consider the popularity of bedsharing when evaluating uncontrolled case series' reports of the frequency SIDS cases are found in the parental bed. Further studies into any possible association between bedsharing and SIDS must adjust for maternal smoking, race/ethnicity, breastfeeding and socioeconomic status, as well as infant age. The relative importance of socio-cultural preference for bedsharing vs. economic necessity should be explored further. Mainstream cultural values should not be imposed on diverse groups. Programs to make cribs available need to take cultural diversity into account; cribs should be a choice, not an obligation. Recommendations regarding bedsharing must be based on sound epidemiologic evidence. Lacking convincing evidence of risk, women who choose to bedshare for cultural reasons should not be condemned, but provided with the known facts. Bedsharing, when practiced, should be made as safe as possible.

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