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Infant sleep location: Associated maternal and infant characteristics with SIDS prevention recommendations

Linda Y. Fu, MD, MS[1,2], **Eve R. Colson, MD**[3], **Michael J. Corwin, MD**[4,5], and **Rachel Y. Moon, MD**[1,2]

[1]Goldberg Center for Community Pediatric Health, Children's National Medical Center, Washington, DC

[2]Department of Pediatrics, George Washington University School of Medicine and Health Sciences, Washington, DC

[3]Department of Pediatrics, School of Medicine, Yale University, New Haven, CT

[4]Department of Epidemiology, School of Public Health, Boston University, Boston, MA

[5]Department of Pediatrics, School of Medicine, Boston University, Boston, MA

Abstract

Objective—To identify factors associated with infant sleep location.

Methods—Demographic information and infant care practices were assessed for 708 mothers of infants ages 0 to 8 months at Women, Infants and Children centers (WIC). Generalized linear latent mixed models were constructed for the outcome, sleeping arrangement last night (bedsharing with infants vs. roomsharing without bedsharing, and versus sleeping in separate rooms).

Results—Two-thirds of the mothers were black. 48.6% roomshared without bedsharing; 32.5% bedshared; and 18.9% slept in separate rooms. Compared with infants who slept in separate rooms, infants who roomshared without bedsharing were more likely to be Hispanic (OR 2.58, 95%CI 1.11–5.98) and younger (3.66 and 1.74 times more likely for infants 0–1 month and 2–3 months old respectively as compared with older infants). Compared with infants who bedshared, those that roomshared without bedsharing were more likely to be 0–1 month old (1.57, 1.05–2.35), and less likely to be black (0.43, 0.26–0.70) or have a teenage mother (0.37, 0.23–0.58).

Conclusions—Approximately one-third of mothers and infants bedshare despite increased risk of sudden infant death syndrome (SIDS). The factors associated with bedsharing are also associated with SIDS likely rendering infants with these characteristics at high risk for SIDS.

Keywords

infants; SIDS; bed sharing

The incidence of SIDS in the US has declined 50% since 1992, when the American Academy of Pediatrics (AAP) first recommended that infants be placed in a nonprone position for sleep.(1) Despite the tremendous success of the subsequent Back to Sleep campaign, the initial decline in SIDS rates has leveled off in the last 5 years.(2) In 2004,

Corresponding and reprint request author: Linda Y. Fu, MD, MS, Goldberg Center for Community Pediatric Health, Children's National Medical Center, 111 Michigan Avenue NW, Washington, DC 20010, Tel: 202-476-3931, Fax: 202-476-3386, lfu@cnmc.org.

2246 infants died of sudden infant death syndrome (SIDS) in the US.(3) SIDS remains the third most common cause of death in infants, and the most common cause of death in infants from 1 month to 1 year of age.(4, 5)

As the rate of prone positioning has declined, other previously unrecognized risk factors for sudden unexplained infant death have emerged in recent epidemiologic studies. Despite the fact that bedsharing between an infant and adult facilitates breastfeeding and enhances parent-infant interactions,(6, 7) this sleeping arrangement has been identified in epidemiologic studies as being hazardous in certain situations, particularly when one or both parents are smokers,(8–12) on excessively soft surfaces, such as waterbeds, sofas, and armchairs,(9, 10, 13–15) or when the infant is less than 2–3 months of age.(9, 12, 14–17) In addition, there is an increased risk for sudden unexpected infant death when there are multiple bedsharers(13) and when bedsharing occurs for the entire night.(9, 11) The risk for infant death may also be increased when the bedsharer has consumed alcohol or is overtired. (11, 16) While it may not be bedsharing itself but the accompanying conditions that are hazardous, bedsharing may increase the risk in certain circumstances for overheating,(18) rebreathing,(19) and exposure to tobacco smoke,(20)all of which are known risk factors for SIDS. Currently, approximately half of all sudden and unexpected infant deaths in the US occur when the infant is sharing a sleep surface with someone else.(21–24)

There is growing evidence that roomsharing without bedsharing is associated with a reduced risk of SIDS.(9, 15, 16) Several countries, including the US, currently recommend that infants sleep in a crib or bassinet next to the parents' bed. The AAP recommends a separate but proximate sleep environment (i.e., the infant should be in a crib/bassinet in the parent's room), or roomsharing without bedsharing, to reduce the risk of SIDS.(25)

Because of this increased emphasis on the importance of the infant's sleep location, it is necessary to understand factors associated with bedsharing, roomsharing without bedsharing, and solitary sleeping (i.e., infant sleeps in a separate room from parents). The primary aim of this study was to determine the maternal and infant characteristics associated with each of these sleeping arrangements.

METHODS

Interviews

Face-to-face interviews were conducted between June and August 2005 with 708 mothers of infants recruited at WIC centers in Dallas, New Haven, Atlanta and Savannah. WIC is a federal grant program which provides supplemental nutrition for low-income women, infants and children. Caregivers who were eligible to participate in the study received benefits from WIC, had an infant younger than 8 months, and spoke English. Interviews were conducted by research assistants local to each WIC center who received extensive, standardized training. All participants received information regarding current recommendations for safe infant sleep practices according to the Back to Sleep guidelines. Institutional Review Board approval was obtained for all sites.(26)

Statistical Analysis

Data were analyzed for caregivers who identified themselves as mothers since we believed this was a relatively homogeneous group most likely to have consistent contact with the infants. *A priori* and based on findings from previous studies of risk factors for SIDS,(25) we selected the following as potential predictor variables: maternal age, race, education, smoking status, infant's age, health status, usual sleep position, usual intake (includes breast milk or excludes breast milk) and place of well-child care. There is evidence that when

mothers have more trust in their infant's healthcare provider, they are more likely to follow their provider's advice regarding safe infant sleep practices.(26) The variable *place of well-child care* explores whether particular types of healthcare provider (free-standing clinic, hospital-based clinic, private practice or none) are associated with safe infant sleep practices more than others). Descriptive statistics, including frequencies and percentages for categorical predictor variables, and means and standard deviations (SD) for continuous variables, were calculated. The relationship of each predictor variable to the three possible infant sleeping arrangements last night (bedsharing, roomsharing without bedsharing or solitary sleeping) was examined using the chi-square test. Sleeping arrangement "last night" (i.e. on the night prior to the interview) was chosen to reduce recall bias. Test levels for significance were $P<0.05$. Next, using the Stata gllamm procedure, we constructed generalized linear latent mixed models to examine multinomial outcomes (bedsharing vs. roomsharing without bedsharing, and solitary sleeping vs. roomsharing without bedsharing). The typical multinomial logistic regression model requires that the outcome is categorical and the observations are mutually independent. In contrast, the gllamm model used here assumes that underlying the categorical outcome, there is an unobserved or latent continuous outcome (probability of being of a level of outcome) and allows for clustering effects (or dependence among observations) within the same study site.(27) By allowing a random intercept of study site, we consider the sites in this dataset to be randomly sampled from the population of many sites. We started with full models that included all nine predictors listed above, as well as study site. Then we removed one predictor at a time, starting with the predictor with the largest p value. We stopped when the remaining predictors were at least marginally significant (p < .10) in one of the outcome levels (bedsharing vs. roomsharing without bedsharing, or solitary sleeping vs. roomsharing without bedsharing), except when exclusion increased the standard error of the other predictors remaining in a model. Odds Ratios (OR) with 95% confidence intervals (95%CI) were calculated for the covariates for each outcome level. All analyses were conducted using STATA/SE 9.

RESULTS

Demographics

A total of 817 caregivers were enrolled in the study. Of all the caregivers interviewed, 723 (88.7%) were mothers. Data were analyzed for the 708 mothers for whom there was response to the question of where their infant slept last night. Participants were fairly evenly distributed among the 4 study sites (Table 1). The median age for the mothers was 23 years. The majority of mothers were black (66%). The percentage of non-White participants (85%) was greater compared to the percentage of non-White population overall in the four study cities (39%), as well as compared to the US overall (26%). The percentage of mothers who had not completed a high school education or the equivalent at the time of the study (21%) was slightly less compared to the percentage overall in the four cities (26%) but greater compared to the US overall (16%).(28) Of the infants, the median age was 3 months and roughly half were female.

Infant Sleeping Arrangement

Approximately half of the mothers (48.6%) reported that their infant slept in the same room and in a separate bed last night, i.e., roomshared without bedsharing, as advised by the AAP. Almost a third of respondents reported that their infants bedshared. The least common sleeping arrangement for infants was solitary sleeping (18.9%) (Table 2). On univariate analysis, teenage mothers were more likely to report that their infants were bedsharing as compared to other sleep arrangements, whereas mothers who were at least 20 years old were more likely to report that their infants were roomsharing without bedsharing ($P<0.001$). There was also a significant difference in choice of sleeping arrangement by maternal race

(*P*<0.001). Although roomsharing without bedsharing was the most common sleeping arrangement reported by all races, the percentage of infants bedsharing was higher among blacks than among other races, with 37.2% of the African-American mothers reporting bedsharing. For all other races, at least twice as many mothers reported roomsharing without bedsharing versus bedsharing with their infants. The amount of education reported by mothers was also associated with where their infants slept (*P*=0.01). Higher levels of maternal education were associated with higher percentages that reported roomsharing without bedsharing and lower percentages that reported bedsharing. There was also a significant difference in sleeping arrangement among infants of different age groups (*P*<0.001). With increasing age of the infant, the percentage of infants roomsharing without bedsharing decreased, and the percentage of infants sleeping solitary increased. In addition, the position infants were placed to sleep was also associated with their sleeping arrangement (*P*=0.02). Almost 40% of infants sleeping non-supine were bedsharing, whereas approximately half of infants sleeping supine were roomsharing without bedsharing. Finally, there was no difference in sleeping arrangements by maternal smoking status, place of well child care, or by usual infant feeding (breast milk or formula).

On multinomial modeling, compared with those infants who slept solitary, infants who roomshared without bedsharing were more likely to be Hispanic (OR 2.58, 95%CI 1.11–5.98) and also younger. Infants at 0–1 month of age were 3.66 times more likely, and infants 2–3 months of age were 1.74 times more likely to roomshare without bedsharing compared with infants 4–8 months of age (Table 3). Compared with infants who bedshared, those that roomshared without bedsharing were more likely to be a newborn, ages 0–1 month (1.57, 1.05–2.35) and less likely to be black (0.43, 0.26–0.70) or have a teenage mother (0.37, 0.23–0.58).

Discussion

The AAP first advocated roomsharing without bedsharing as the preferred sleeping arrangement for infants in 2005.(25) Although this recommendation has been somewhat controversial, our study, which interviewed parents at approximately the same time the recommendations were published, indicates that roomsharing without bedsharing is common practice. In fact, it was the most common sleeping arrangement reported by mothers in our study for infants on the night prior to the interview.

Another reassuring finding of our study, given that 90% of the cases of SIDS occur in the first six months of life,(25) was that younger infants were more likely to roomshare without bedsharing as compared to the other sleeping arrangements. It is possible that parents are reluctant to have very young infants sleep in a separate room, as it is more difficult to monitor what is happening with the infant from a different room.

However, approximately one third of the infants in our study were bedsharing on the night before the interview. Bedsharing was more common among African Americans and teenage mothers. This is consistent with the findings of other studies. The National Infant Sleep Position study reported that African Americans are 4 times more likely to routinely bedshare as white infants.(29) African-American infants who die from SIDS or sudden unexpected infant death are also more likely to be bedsharing. Hauck, et al., in a case-control study of SIDS, found that 58% of African-American infants bedshared, compared with 29.2% of non-African-American infants.(30) Similarly, in a retrospective population-based cohort of sudden unexpected infant deaths, Unger et al. found bedsharing deaths to be nearly twice as common in African American infants.(24) Other studies have found bedsharing to be linked to measures of poverty. Teenage motherhood may be an indicator of lower socioeconomic status which may explain why bedsharing was more common among these younger mothers

in our study. In an Oregon cohort, Lahr found that bedsharing was most prevalent in families with annual incomes of less than $30,000.(31) Other studies have found this sleeping arrangement is more common if the parent is a teenager,(32) did not attend college,(33, 34), or has moved at least once since the baby's birth.(33) While these are all potential markers of lower income, it should be noted that these studies were conducted in populations that were predominantly urban and indigent, which was also true for our study.

One notable observation regarding our study population is that all of the mothers who reported bedsharing with an infant on the night prior to the interview stated that the infant had slept on an adult bed or mattress. However, one mother also reported that she usually put her infant to sleep on a sofa, and 31 others stated that their infants sometimes slept on sofas. Soft surfaces such as sofas have been found to be particularly hazardous for infants. (13, 14, 35)

With increased awareness of the risk factors associated with bedsharing, it is important to try to understand why people in certain demographic categories bedshare more than others. For some families, the reason may be purely economic; they lack the funds to purchase a separate crib or bassinet for their child. Many states are initiating free crib distribution programs,(36) and it will be important to evaluate the effectiveness and acceptability of these programs. In addition, it is likely that for some families, cultural practices and expectations also are involved in the decision to bedshare. Although our study population was predominantly urban and indigent, African-American mothers more commonly reported bedsharing, whereas Hispanic mothers more commonly reported roomsharing without bedsharing. In the National Infant Sleep Position study, more than twice as many African-American mothers reported "usually" bedsharing compared with Hispanic mothers.(29)

Regardless of race, most studies have found that bedsharing is more common if the infant is being breastfed.(31, 32) The rate of breastfeeding in our study population (15.4%) was slightly lower than the rate of breastfeeding at 6 months of age found in one study for WIC participants overall in 2003 (21.0%), which in turn was lower than for all 6 month-olds infants in the US (42.7%).(37) Studies in low-income African-Americans have not found a correlation between breastfeeding and bedsharing.(33, 34) However, McCoy found that breastfeeding and bedsharing were correlated in the African-American subset of her cohort, (32) and Lahr found this to be true only in higher income African-Americans.(31) Breastfeeding advocates cite ease of breastfeeding as an advantage of bedsharing,(6) and some have expressed concern that the recommendation for roomsharing without bedsharing will negatively impact on breastfeeding rates.(38) Our study did not find an association between breastfeeding and the infant's sleep location. This is important because while some studies have found that breastfeeding confers protection against SIDS,(39–41) thus providing a rationale for encouraging bedsharing, a recent study by Ruys, et al. found that the risk caused by bedsharing is not significantly modified by the presence or absence of breastfeeding.(12)

We also did not find an association between maternal smoking and bedsharing. However, one-third of mothers who smoked bedshared with their infants. Multiple studies have demonstrated that bedsharing is particularly hazardous if one or both parents smoke.(10, 12, 16, 17)

A potential limitation of this study is that data collection occurred in only four cities, although demographic data indicate that infant mortality rates in Dallas, New Haven, Atlanta and Savannah of 6.3, 5.5, 7.1 and 11.0[*] deaths per 1,000 live births, respectively,

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[*]Infant mortality data available at the public health district level only for Atlanta and Savannah.

were similar to the national average of 6.8 in 2006, the last year for which this information is available. (28, 42) Our study population was limited to WIC clients. National surveys have shown that in the US, low-income populations such as those serviced by WIC are more likely to bedshare.(29) Although high rates of bedsharing are often associated with markers of social deprivation in the US, this is not universally true. In some cultures, including many Asian and European cultures, bedsharing is the norm.(43)However, bedsharing in these cultures may look very different from bedsharing as commonly practiced in the US; infants in Asian cultures typically sleep on a firm surface (such as a futon) in the supine position, and prenatal and postnatal exposure to tobacco smoke is rare.(44, 45) In many Western societies, including the US, the incidence of bedsharing has recently increased in higher socioeconomic classes, partly because of the increase in breastfeeding.(29)

In conclusion, bedsharing in a low-income population is associated with African-American race and having a teenage mother. As these are also risk factors for SIDS, it will be important for future studies to investigate parental reasons for bedsharing in order to identify effective interventions to change typical practices regarding infant sleep location.

Acknowledgments

Abbreviations

AAP	American Academy of Pediatrics
RS	roomsharing
SIDS	Sudden Infant Death Syndrome
WIC	Women Infants and Children program
BS	bedsharing

REFERENCES

1. Kattwinkel J, Brooks J, Myerberg D. American Academy of Pediatrics AAP Task Force on Infant Positioning and SIDS: Positioning and SIDS [Erratum in: Pediatrics 1992 Aug; 90:264]. Pediatrics. 1992 Jun.89:1120–1126. [PubMed: 1503575]

2. NICHD/NIH. [Last accessed: 7-11-07] Back to Sleep Campaign. Available at: www.nichd.nih.gov/sids/sids.cfm.

3. Mathews TJ, MacDorman MF. Infant mortality statistics from the 2004 period linked birth/infant death data set. Natl Vital Stat Rep. 2007; 55:1–32. [PubMed: 17569269]

4. Hoyert DL, Arias E, Smith BL, Murphy SL, Kochanek KD. Deaths: final data for 1999. Natl Vital Stat Rep. 2001 Sep 21.49:1–113. 2001.

5. Hoyert DL, Mathews TJ, Menacker F, Strobino DM, Guyer B. Annual summary of vital statistics: 2004. Pediatrics. 2006 Jan.117:168–183. [PubMed: 16396875]

6. McKenna JJ, Mosko S, Richard CA. Bedsharing promotes breastfeeding. Pediatrics. 1997; 100:214–219. [PubMed: 9240802]

7. Mosko S, Richard C, McKenna J. Infant arousals during mother-infant bed sharing: implications for infant sleep and sudden infant death syndrome research. Pediatrics. 1997; 100:841–849. [PubMed: 9346985]

8. Arnestad M, Andersen M, Vege A, Rognum TO. Changes in the epidemiological pattern of sudden infant death syndrome in southeast Norway, 1984–1998: implications for future prevention and research. Arch Dis Child. 2001; 85:108–115. [PubMed: 11466184]

9. Blair PS, Fleming PJ, Smith IJ, Platt MW, Young J, Nadin P, et al. Babies sleeping with parents: case-control study of factors influencing the risk of the sudden infant death syndrome. CESDI SUDI research group. BMJ. 1999; 319:1457–1462. [PubMed: 10582925]

10. Fleming PJ, Blair PS, Bacon C, Bensley D, Smith I, Taylor E, et al. Environment of infants during sleep and risk of the sudden infant death syndrome: results of 1993–5 case-control study for confidential inquiry into stillbirths and deaths in infancy. Confidential Enquiry into Stillbirths and Deaths Regional Coordinators and Researchers. BMJ. 1996 Jul 27.313:191–195. [PubMed: 8696193]

11. Scragg R, Mitchell EA, Taylor BJ, Stewart AW, Ford RP, Thompson JM, et al. Bed sharing, smoking, and alcohol in the sudden infant death syndrome. New Zealand Cot Death Study Group. BMJ. 1993 Nov 20.307:1312–1318. [PubMed: 8257885]

12. Ruys JH, de Jonge GA, Brand R, Engelberts AC, Semmekrot BA. Bed-sharing in the first four months of life: a risk factor for sudden infant death. Acta Paediatr. 2007 Aug 20.

13. Hauck FR, Herman SM, Donovan M, Iyasu S, Merrick Moore C, Donoghue E, et al. Sleep environment and the risk of sudden infant death syndrome in an urban population: the Chicago Infant Mortality Study. Pediatrics. 2003; 111:1207–1214. [PubMed: 12728140]

14. McGarvey C, McDonnell M, Chong A, O'Regan M, Matthews T. Factors relating to the infant's last sleep environment in sudden infant death syndrome in the Republic of Ireland. Arch Dis Child. 2003; 88:1058–1064. [PubMed: 14670769]

15. Tappin D, Ecob R, Brooke H. Bedsharing and sudden infant death syndrome in Scotland: a case control study. J Pediatr. 2005 Jul.147:32–37. [PubMed: 16027691]

16. Carpenter RG, Irgens LM, Blair PS, England PD, Fleming PJ, Huber J, et al. Sudden unexplained infant death in 20 regions in Europe: case control study. Lancet. 2004 Jan 17.363:185–191. 2004. [PubMed: 14738790]

17. McGarvey C, McDonnell M, Hamilton K, O'Regan M, Matthews T. An 8 year study of risk factors for SIDS: Bed- sharing vs. non bed-sharing. Arch Dis Child. 2006 Apr.91:318–323. [PubMed: 16243855]

18. Baddock SA, Galland BC, Beckers MG, Taylor BJ, Bolton DP. Bed-sharing and the infant's thermal environment in the home setting. Arch Dis Child. 2004 Dec.89:1111–1116. [PubMed: 15557043]

19. Baddock SA, Galland BC, Bolton DP, Williams SM, Taylor BJ. Differences in infant and parent behaviors during routine bed sharing compared with cot sleeping in the home setting. Pediatrics. 2006 May.117:1599–1607. [PubMed: 16651313]

20. Kattwinkel J, Brooks J, Keenan ME, Malloy MH. Changing concepts of sudden infant death syndrome: implications for infant sleeping environment and sleep position. American Academy of Pediatrics. Task Force on Infant Sleep Position and Sudden Infant Death Syndrome. Pediatrics. 2000 Mar.105:650–656. [PubMed: 10699127]

21. Alexander RT, Radisch D. Sudden infant death syndrome risk factors with regards to sleep position, sleep surface, and co-sleeping. J Forensic Sci. 2005 Jan.50:147–151. [PubMed: 15831009]

22. Carroll-Pankhurst C, Mortimer EAJ. Sudden infant death syndrome, bedsharing, parental weight, and age at death. Pediatrics. 2001; 107:530–536. [PubMed: 11230594]

23. Kemp JS, Unger B, Wilkins D, Psara RM, Ledbetter TL, Graham MA, et al. Unsafe sleep practices and an analysis of bedsharing among infants dying suddenly and unexpectedly: results of a four-year, population-based, death-scene investigation study of sudden infant death syndrome and related deaths. Pediatrics. 2000; 106:E41. [PubMed: 10969125]

24. Unger B, Kemp JS, Wilkins D, Psara R, Ledbetter T, Graham M, et al. Racial disparity and modifiable risk factors among infants dying suddenly and unexpectedly. Pediatrics. 2003; 111:E127–E131. [PubMed: 12563085]

25. Kattwinkel J, Hauck FR, Keenan ME, Malloy MH, Moon RY. Task Force on Sudden Infant Death Syndrome, American Academy of Pediatrics. The changing concept of sudden infant death

syndrome: diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk. Pediatrics. 2005 Nov.116:1245–1255. [PubMed: 16216901]

26. Colson ER, Levenson S, Rybin D, Calianos C, Margolis A, Colton T, et al. Barriers to following the supine sleep recommendation among mothers at four centers for the Women, Infants, and Children Program. Pediatrics. 2006 Aug.118:e243–e250. [PubMed: 16882769]

27. Rabe-Hesketh S, Skrondal A, Pickles AR. Maximum likelihood estimation of limited and discrete dependent variable models with nested random effects. J Econometrics. 2005; 128:301–323.

28. U.S. Census Bureau. [updated 2006; cited March 4, 2008] 2006 American Community Survey. 2006. Available from: http://factfinder.census.gov.

29. Willinger M, Ko CW, Hoffman HJ, Kessler RC, Corwin MJ. Trends in infant bed sharing in the United States, 1993–2000: the National Infant Sleep Position study. Arch Pediatr Adolesc Med. 2003 Jan.157:43–49. [PubMed: 12517193]

30. Hauck FR, Moore CM, Herman SM, Donovan M, Kalelkar M, Christoffel KK, et al. The contribution of prone sleeping position to the racial disparity in sudden infant death syndrome: the Chicago Infant Mortality Study. Pediatrics. 2002 Oct.110:772–780. [PubMed: 12359794]

31. Lahr MB, Rosenberg KD, Lapidus JA. Maternal-Infant Bedsharing: Risk Factors for Bedsharing in a Population-Based Survey of New Mothers and Implications for SIDS Risk Reduction. Matern Child Health J. 2006; 11:277–286. [PubMed: 17195100]

32. McCoy RC, Hunt CE, Lesko SM, Vezina R, Corwin MJ, Willinger M, et al. Frequency of bed sharing and its relationship to breastfeeding. J Dev Behav Pediatr. 2004 Jun.25:141–149. [PubMed: 15194897]

33. Brenner RA, Simons-Morton BG, Bhaskar B, Revenis M, Das A, Clemens JD. Infant-parent bed sharing in an inner-city population. Arch Pediatr Adolesc Med. 2003 Jan.157:33–39. [PubMed: 12517192]

34. Weimer SM, Dise TL, Evers PB, Ortiz MA, Welldaregay W, Steinmann WC. Prevalence, predictors, and attitudes toward cosleeping in an urban pediatric center. Clin Pediatr (Phila). 2002 Jul-Aug;41:433–438. [PubMed: 12166796]

35. Tappin D, Brooke H, Ecob R, Gibson A. Used infant mattresses and sudden infant death syndrome in Scotland: case-control study. BMJ. 2002; 325:1007–1012. [PubMed: 12411359]

36. Carlins EM, Collins KS. Cribs for Kids: risk and reduction of sudden infant death syndrome and accidental suffocation. Health Soc Work. 2007 Aug.32:225–229. [PubMed: 17896680]

37. Ryan AS, Zhou W. Lower breastfeeding rates persist among the Special Supplemental Nutrition Program for Women, Infants, and Children participants, 1978–2003. Pediatrics. 2006 Apr. 117:1136–1146. [PubMed: 16585308]

38. Heinig MJ, Banuelos J. American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome (SIDS) Statement on SIDS Reduction: Friend or Foe of Breastfeeding? J Hum Lact. 2005 Nov.22:7–10. [PubMed: 16467282]

39. L'Hoir MP, Engelberts AC, van Well GTJ, Westers P, Mellenbergh GJ, Wolters WHG, et al. Case-control study of current validity of previously described risk factors for SIDS in the Netherlands. Arch Dis Child. 1998; 79:386–393. [PubMed: 10193249]

40. Mitchell EA, Tuohy PG, Brunt JM, Thompson JMD, Clements MS, Stewart AW, et al. Risk factors for sudden infant death syndrome following the prevention campaign in New Zealand: a prospective study. Pediatrics. 1997; 100:835–840. [PubMed: 9346984]

41. Wennergren G, Alm B, Oyen N, Helweg-Larsen K, Milerad J, Skjaerven R, et al. The decline in the incidence of SIDS in Scandinavia and its relation to risk-intervention campaigns. Nordic Epidemiological SIDS Study. Acta Paediatr. 1997 Sep.86:963–968. [PubMed: 9343276]

42. Online Analytical Statistical Information System (OASIS). Atlanta, GA: Georgia Department of Human Services, Division of Public Health, Office of Health Information and Policy; Available from: http://oasis.state.ga.us. [cited March 4, 2008]

43. Nelson EA, Taylor BJ, Jenik A, Vance J, Walmsley K, Pollard K, et al. International child care practices study: infant sleeping environment. Early Hum Develop. 2001; 62:43–55.

44. Davies DP. Cot death in Hong Kong: a rare problem? Lancet. 1985; 14:1346–1349. [PubMed: 2866397]

45. Nelson EAS, Taylor BJ. International child care practices study: infant sleep position and parental smoking. Early Hum Develop. 2001; 64:7–20.

Table 1

Demographic Characteristics of Participants

Characteristic	All Groups (*N*=708)
Maternal age, median (inter-quartile range), y	23 (20, 28)
Infant age, median (inter-quartile range), mo	3 (1, 6)
Infant gender, % female	51
Maternal race, %	
Black	66
Hispanic	14
White	15
Other	5
Maternal education, %	
Less than high school	21
High school/GED	39
Some college	29
College/more	11
Site, %	
Dallas	27
New Haven	26
Atlanta	24
Savannah	23

Table 2

Association of potential risk factors for SIDS by univariate analysis with roomsharing without bedsharing, solitary sleeping and bedsharing.

Variable	Total	Roomsharing without Bedsharing n (%)	Solitary Sleeping n (%)	Bedsharing n (%)	P value
Total Sample	**708**	**344 (48.6)**	**134 (18.9)**	**230 (32.5)**	
Maternal age, y					<.001
19	120	41 (12.0)	18 (13.7)	61 (26.5)	
20	583	301 (88.0)	113 (86.3)	169 (73.5)	
Maternal race					<.001
Black	465	205 (60.3)	87 (66.9)	173 (75.5)	
Hispanic	96	59 (17.3)	9 (6.9)	28 (12.2)	
Other	32	19 (5.6)	6 (4.6)	7 (3.1)	
White	106	57 (16.8)	28 (21.6)	21 (9.2)	
Maternal education					.01
Less than high school	145	64 (18.7)	21 (16.0)	60 (26.1)	
High school/GED	276	131 (38.2)	48 (36.7)	97 (42.2)	
Some college	206	101 (29.4)	46 (35.1)	59 (25.6)	
College/more	77	47 (13.7)	16 (12.2)	14 (6.1)	
Infant age, mo					<.001
0–1	256	146 (42.5)	24 (18.0)	86 (37.4)	
2–3	145	72 (20.9)	27 (20.3)	46 (20.0)	
4–8	306	126 (36.6)	82 (61.7)	98 (42.6)	
Infant health status					.95
Chronic/acute illness	59	28 (8.2)	12 (9.1)	19 (8.3)	
Healthy	646	315 (91.8)	120 (90.9)	211 (91.7)	
Usual infant sleep position					.02
Non-supine	269	118 (34.3)	47 (35.1)	104 (45.2)	
Supine	439	226 (65.7)	87 (64.9)	126 (54.8)	
Maternal smoking status					.64
Smoker	114	59 (17.2)	18 (13.6)	37 (16.1)	

Variable	Total	Roomsharing without Bedsharing *n* (%)	Solitary Sleeping *n* (%)	Bedsharing *n* (%)	*P* value
Total Sample	**708**	**344 (48.6)**	**134 (18.9)**	**230 (32.5)**	
Non-Smoker	591	284 (82.8)	114 (86.4)	193 (83.9)	
Place of well-child care					.06
Free-standing clinic	112	55 (16.0)	25 (18.9)	32 (14.0)	
Hospital-based clinic	262	122 (35.5)	37 (28.0)	103 (45.0)	
None	13	5 (1.4)	3 (2.3)	5 (2.2)	
Private-practice/Other	318	162 (47.1)	67 (50.8)	89 (38.8)	
Usual infant intake					.34
Includes breast milk	109	56 (16.3)	24 (17.9)	29 (12.7)	
Excludes beast milk	598	288 (83.7)	110 (82.1)	200 (87.3)	

Table 3

Odds ratios based on generalized linear latent mixed modeling of factors associated with roomsharing without bedsharing versus: 1) solitary sleeping and 2) bedsharing. Models have been adjusted for study site.

	Roomsharing without Bedsharing (vs. Solitary Sleeping)	Roomsharing without Bedsharing (vs. Bedsharing)
Variable	**OR (95% CI)**	**OR (95% CI)**
Maternal age, y		
19	0.71 (0.38–1.32)	0.37 (0.23–0.58)[*]
20	1	1
Maternal race		
Black	1.26 (0.76–2.09)	0.43 (0.26–0.70)[*]
Hispanic	2.58 (1.11–5.98)[*]	0.79 (0.41–1.52)
Other	1	1
White	1	1
Infant age, mo		
0–1	3.66 (2.16–6.22)[*]	1.57 (1.05–2.35)[*]
2–3	1.74 (1.01–3.00)[*]	1.28 (0.79–2.06)
4–8	1	1

[*] Odds ratio is statistically significant at *P*<0.05