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Sociodemographic factors associated with sleeping position and location

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Abstract

Recent research has implicated infant sleeping body position and bed sharing as risk factors in the sudden infant death syndrome. The sociodemographic associations of infant sleeping body position and location were examined in this study. This showed that the majority (86·4%) of New Zealand parents now place their infants to sleep on their sides. The remainder place their infants supine (1·3%), prone (4·8%), or no particular way (7·5%). In the waking position, 57·9% were usually found on their sides, 18·2% supine, and 6·1% prone. Infant sleeping position showed marked sociodemographic variability. These findings are a marked contrast to previous New Zealand studies which showed a reversed pattern, with most infants put to sleep prone.

There were also highly significant sociodemographic differences in the place of sleeping. Overall 12·2% of infants shared a bed, with infants of younger less well educated mothers who were of non-European origin, with a parity of five or more, or unmarried significantly more likely to do so. Infants of unemployed and lower socioeconomic group (Elley-Irving groups 5 and 6) fathers were also more likely to share a parental bed.

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This paper reports the finding of the Plunket National Child Health Study (PNCHS) six week questionnaire with regard to infant sleeping body position and location. The Plunket Society is taking an active role in the current New Zealand investigation into cot death. This study was designed to provide information on a variety of infant care practices as well as establish a national database on the health and sociodemographic status of New Zealand children and their families. It follows a previous paper based on the PNCHS which has validated the basic sociodemographic variables by relating them to the 1991 New Zealand census.[1]

The objective is to use the information to bring about an improvement in both infant care practices and in the delivery of services by identifying areas of most need, targeting service delivery to those areas, and meeting specific performance indicators.

Methods

The data is derived from the six week data collection point of the PNCHS, which follows a cohort of 4286 children born in New Zealand during 1990 and 1991. This represents 7·3% of the live births over that period. The parents were interviewed by Plunket nurses (in two districts by public health nurses) as part of the routine well child services provided by the Royal New Zealand Plunket Society to over 90% of the New Zealand population. Infant sleeping position was determined by asking parents in which position they placed their child down to sleep in the cot and how the child was usually found. The parents were also asked where the child usually slept, particularly whether the child slept in the parent's bed at any stage during the night.

The details of data collection and issues of validation and ethical considerations have been addressed in a previous paper[1] and will not be covered. Around 2% of infants did not have information on some or all the required sociographic variables provided and are deleted from the analysis. The study used stratified randomised sampling to ensure a representative proportion of Maori infants were included. Socioeconomic status was measured using the Elley-Irving scale,[2 3] which has been validated for the New Zealand population.[4] The socioeconomic status groupings were ranked numerically (1=high– 6=low); an additional group (unemployed) was also used. The sample size was sufficient to give a statistically valid percentage of births and remain manageable for the nurses undertaking the data collection in addition to their other duties. The study has been approved by the Plunket Society's independent ethics committee. Statistical analysis was performed using the 'Systat' package. The χ^2 test was used to examine the categorical data presented in this paper and the 5% level of significance was used. The independent variables used in the analysis are given in table 1.

Results

The results for 4254 infant's position of placing and 4262 infant's position of waking were available for analysis.

Table 1 Independent variables

Variable	*Description*
Maternal age	<20, 20–24, 25–29, 30–34, ≥35 years
Maternal education	Secondary education: <3, 3, 4–5 years and tertiary education: polytechnic, teacher training and university
Parity	Number of children born alive to the mother (1–≥5)
Socioeconomic group	Four Elley-Irving groups: 1 and 2, 3 and 4, 5 and 6, and unemployed
Marital status	Married, unmarried with partner, or unmarried without partner
Infant's ethnic group	European, Maori, Pacific Islander, and other (defined by parents)

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POSITION OF INFANT PLACEMENT

The study showed that the vast majority (86·4%) of New Zealand parents now place their infants to sleep on their sides. The remainder place their infants supine (1·3%), prone (4·8%), or no particular way (7·5%). There were significant sociodemographic differences within all the variables examined except for maternal age (table 2). With regard to prone sleeping, the mothers who placed their infants in this position were more likely to be unmarried without partners, nulliparous, less well educated, of Maori or 'other' ethnic group. The fathers were more likely to be unemployed or in groups 3–6 on the Elley-Irving scale.

Table 2 Position laid down

Variable	*No of infants*	*Prone %*	*Supine %*	*Side %*	*No special position %*	*Significance*
Maternal age (years)						χ^2=15·28, df=12, p=0·23
<20	275	4·4	1·5	84·0	10·2	
20–24	893	5·2	1·4	85·8	7·7	
25–29	1460	4·9	1·5	85·4	8·2	
30–34	1174	4·4	0·9	88·1	6·6	
≥35	404	5·0	2·0	88·6	4·5	
Maternal education Secondary (years):						χ^2=23·94, df=12, p=0·02
<3	775	5·9	1·3	83·4	9·4	
3	1353	5·5	1·9	85·1	7·5	
4–5	949	4·0	0·8	89·5	5·7	
Tertiary:						
Polytechnic	579	3·3	0·9	88·1	7·8	
Teaching/ university	539	4·6	1·5	86·6	7·2	
Parity						χ^2=41·6, df=12, p<0·005
1	1578	2·7	1·1	89·6	6·6	
2	1397	6·1	1·8	85·1	7·0	
3	751	6·4	1·5	82·4	9·7	
4	309	4·9	0·7	85·8	8·7	
≥5	209	6·7	0·5	85·2	7·7	
Marital status						χ^2=27·7, df=6, p<0·005
Married	2963	4·6	1·5	87·7	6·2	
Unmarried with partner	687	4·7	1·0	84·6	9·8	
Unmarried without partner	589	6·1	1·0	81·7	11·2	
Socioeconomic status Elley-Irving groups						χ^2=21·04, df=9, p<0·01
1 and 2	976	4·2	1·3	88·7	5·7	
3 and 4	1719	5·2	1·2	87·6	6·1	
5 and 6	611	5·1	1·3	84·1	9·5	
Unemployed	430	5·6	1·4	82·6	10·5	
Ethnic group						χ^2=84·15, df=9, p<0·005
European	2683	4·3	1·3	89·4	5·0	
Maori	508	6·3	1·2	78·9	13·6	
Pacific Islander	241	3·3	2·1	80·9	13·7	
Other	813	6·3	1·4	82·4	10·0	

Table 3 Infant sleeping arrangements

Variable	*No of infants*	*Parent's bed*	*Own bed*	*Other place*	*Significance*
Maternal age (years)					χ^2=44·3, df=8, p<0·005
<20	277	20·2	76·5	3·3	
20–24	892	15·1	83·1	1·8	
25–29	1464	9·0	88·8	2·2	
30–34	1176	11·6	85·5	3·0	
≥35	406	13·8	84·5	1·7	
Maternal education Secondary (years):					χ^2=79·2, df=8, p<0·005
<3	780	20·0	76·7	3·3	
3	1353	10·9	86·7	2·4	
4–5	948	7·4	90·6	2·0	
Tertiary:					
Polytechnic	578	10·6	88·1	1·4	
Teaching/university	544	13·4	83·5	3·1	
Parity					χ^2=76·46, df=8, p<0·005
1	1580	12·0	86·0	2·1	
2	1396	9·4	88·3	2·4	
3	755	12·1	86·1	1·9	
4	311	15·4	81·0	3·5	
≥5	210	28·1	66·7	5·2	
Marital status					χ^2=88·06, df=4, p<0·005
Married	2964	9·3	88·5	2·2	
Unmarried with partner	691	16·1	80·9	3·0	
Unmarried without partner	593	21·91	75·6	2·5	
Socioeconomic status Elley-Irving groups					χ^2=98·0, df=6, p<0·005
1 and 2	981	8·8	88·7	2·6	
3 and 4	1718	9·2	89·1	1·8	
5 and 6	612	13·6	83·5	2·9	
Unemployed	434	24·4	72·1	3·5	
Ethnic group					χ^2=339·6, df=6, p<0·005
European	2687	6·8	91·3	1·9	
Maori	511	21·1	74·6	4·3	
Pacific islander	242	42·2	55·8	2·1	
Other	815	15·6	81·6	2·8	

POSITION OF INFANT WAKING

Most infants were found in the position in which they were placed, with 57·9% found on their sides, 18·2% supine, and 6·1% prone.

SLEEPING LOCATION

Information on the night time sleeping location was available for 4263 infants. Overall 12·2% of infants shared a bed with the parent(s). There was significant sociodemographic variation in the rate of bed sharing (table 3).

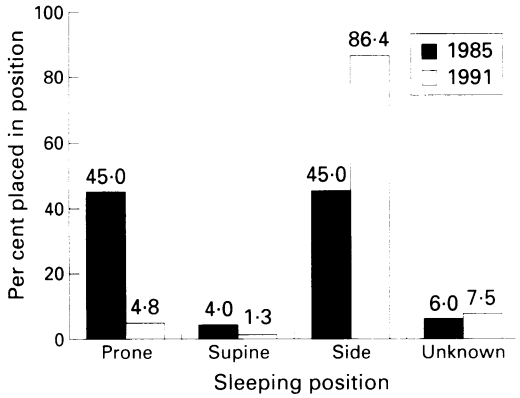
Discussion

This study has shown that there has been a marked change in infant sleeping position over the last two years after a nationwide education programme aimed at informing parents of the increased risk of sudden infant death syndrome (SIDS) associated with the prone sleeping position. However there remains significant sociodemographic variations in the position in which infants in New Zealand are laid to sleep, and in their sleeping locations.

Beal and Blundell[5] and Kravitz[6] first suggested in 1978 that infant sleeping position might be related to SIDS. This association has now been clearly demonstrated by the New Zealand cot death study,[7] which showed an increased SIDS risk for infants sleeping prone (odds ratio 5·74; 95% confidence interval (CI): 3·6 to 10·1) The latest update from the New Zealand cot death study has confirmed the association between SIDS and the child sharing the parental bed (odds ratio 2·7; 95% CI 2·02 to 363),[8] which the initial data strongly suggested.

Several studies[7–13] have examined infant sleeping position since the association between SIDS and sleeping position was first proposed. In 1985 Hassall and Vandenberg surveyed 4041 infants aged 1–4 months and found that over 46% were placed prone, and 42% were found prone.[9] Only 43% were laid on their side and 20% were found in this position. The New Zealand cot death study found that 42·9% of control infants were placed prone,[7] virtually identical to the figures obtained five years previously. This contrasts markedly with the results of the PNCHS, which shows that the prone sleeping position of infants has been reduced 10-fold over the last two years (figure). The figures from the PNCHS therefore represent a dramatic change in the behaviour of New Zealand parents and parallel the unprecedented halving of the incidence of SIDS over the last two years.

The significant sociodemographic associations with prone sleeping found in the PNCHS (lower maternal education, unmarried, higher



The change in the incidence of prone sleeping in New Zealand between 1985 and 1991. The 1985 figures are from Hassall and Vandenberg.[9]

parity, lower socioeconomic status, and Maori race) have all been noted as independent risk factors for SIDS in various studies. Of interest however is the finding that maternal age made little difference to infant sleeping position. It appears that first born infants are less likely to be placed prone, suggesting that new mothers are taking note of the information currently being disseminated, but more experienced mothers are changing their behaviour less. These findings need to be incorporated into ongoing SIDS education programmes.

Pacific Island groups have the highest rate of bed sharing in the study (42·2%) but are known to have very low SIDS rate. Anecdotal evidence suggests that Pacific Island infants sleep *on* the parents bed, rather than *in* the bed as do the infants of the other groups. This subtle difference in behaviour needs further research and may help shed some light on the underlying processes in the SIDS puzzle.

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1 Alison LH, Counsell AM, Geddis DC, Sanders DM. First report from the Plunket National Child Health Study – smoking during pregnancy in New Zealand. *Paediatr Perinat Epidemiol* 1993; **7:** 318–33.
2 Elley WB, Irving JC. A socioeconomic index for New Zealand based on levels of education and income from the 1966 census. *New Zealand Journal of Educational Studies* 1972; **7:** 153–67.
3 Elley WB, Irving JC. A socioeconomic index for New Zealand. *New Zealand Journal of Educational Studies* 1976; **11:** 25–36.
4 Fergusson DM, Horwood LJ. The measurement of socio-economic status for 1109 New Zealand families. *New Zealand Journal of Educational Studies* 1979; **14:** 58–60.
5 Beal SM, Blundell H. Sudden infant death syndrome related to position in cot. *Med J Aust* 1978, ii: 217–8.
6 Kravitz H. The importance of the position of infants on the sudden infant death syndrome. *Clin Pediatr (Phila)* 1978; **17:** 403–6.
7 Mitchell EA, Scragg R, Stewart AW, *et al.* Results from the first year of the New Zealand cot death study. *N Z Med J* 1991; **104:** 71–6.
8 Mitchell EA, Taylor BJ, Ford RPK, *et al.* Four modifiable and other major risk factors for cot death: the New Zealand study. *J Paediatr Child Health* 1992; **28:** 3–8.
9 Hassall IB, Vandenberg M. Infant sleep position: a New Zealand survey. *N Z Med J* 1985; **98:** 97–9.
10 McGlashan ND. Sleeping position and SIDS. *Lancet* 1986; i: 106.
11 Fleming PJ, Gilbert R, Azaz Y, *et al.* Interaction between bedding and sleeping position in the sudden infant death syndrome: a population based case-control study. *BMJ* 1990; **301:** 85–9.
12 Lee M, Davies DP, Chan YF. Prone or supine for preterm babies. *Lancet* 1988; i: 1332.
13 De Jonge GA, Engleberts AC, Koomen-Leifting AJM, Kostense PJ. Cot death and prone sleeping position in the Netherlands. *BMJ* 1989; **298:** 722.