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# International Child Care Practices Study: Breastfeeding and Pacifier Use

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and the International Child Care Practices Study Group Members

## Abstract

Although the Baby-Friendly Hospital Initiative advises that no pacifiers be given to breastfeeding infants, both breastfeeding and pacifier use may protect against sudden infant death syndrome. The International Child Care Practice Study data set on child care practices associated with sudden infant death syndrome risk from 21 centers in 17 countries was used to describe infant-feeding practices and pacifier use and assess factors associated with breastfeeding. At approximately 3 months of age, rates of breastfeeding only (4%-80%) and pacifier use (12.5%-71%) varied between centers. Pacifier use was negatively associated with breastfeeding, and a dose-response effect was noted. Other negative (multiple birth, smoking by mother) and positive (intention to breastfeed, bed sharing, mothers' education) associations with breastfeeding only were identified. Although causality should not be inferred, these associations are consistent with previous studies. Advice on pacifiers should include potential benefits as well as risks. *J Hum Lact.* 21(3):289-295.

**Keywords:** breastfeeding, bottle feeding, pacifiers, infant care, sudden infant death

Both breastfeeding and use of pacifiers (dummy or soother) have been associated with a decreased risk of sudden infant death syndrome (SIDS).<sup>1,2</sup> Four different studies from New Zealand, the United Kingdom, the Netherlands, and Norway have shown that pacifiers have a protective association against SIDS.<sup>3</sup> Although the protective association between breastfeeding and SIDS has not been consistent,<sup>4-6</sup> there are many other

health, cognitive, psychological, social, and economic benefits of breastfeeding. In 2001 at the World Health Assembly, the World Health Organization (WHO) recommended that optimal infant nutrition was "exclusive BF [breastfeeding] for six months, followed by the introduction of solids with continued BF for up to two years or beyond."<sup>7</sup> To promote breastfeeding, the United Nations Children's Fund and WHO have developed the Baby Friendly Hospital Initiative (BFHI), which requires hospitals to follow 10 steps to achieve "Baby-Friendly" status. Step 9 of these 10 steps advises that hospitals should "give no artificial teats or pacifiers (also called dummies or soothers) to breast-feeding

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infants.” This recommendation was subsequently supported by evidence that the use of artificial teats and pacifiers is associated with early cessation of breastfeeding as well as other problems.<sup>8,9</sup> Therefore, providing information to parents on the potential risk/benefits of pacifier use has become a more complex issue, depending on whether the goal is promotion of breastfeeding or prevention of SIDS.

The International Child Care Practices Study (ICCPs) collected comparative information on child care practices from 21 different study centers in 17 countries.<sup>10</sup> The aim of this report is to use this data set to describe infant-feeding practices and pacifier use in these varied populations and to assess factors associated with breastfeeding.

## Methods

The ICCPS was undertaken from late 1995 to mid-1997. The detailed methods have been previously described.<sup>10</sup> In summary, the study was designed to recruit 250 families in each center so that the infants would be 3 months old during the coldest 2 months of the year. Invitation to participate was made during the week after birth. A “birth questionnaire” was completed at the time of recruitment by interview and collected mainly sociodemographic data. A home questionnaire was posted to participating families when the baby was 12 weeks old. The home questionnaire was designed to be completed on the day that it was received, with many questions referring to “last night.” A number of variations in the methods between different centers occurred; for example, some centers conducted face-to-face interviews, and others used retrospectively collected birth information data. Although centers were advised to recruit 250 families, not all centers achieved this target, whereas other centers recruited more families. Not all centers recorded rates of refusal to participate, and some centers submitted data only where both birth and home questionnaires had been completed.<sup>10</sup>

## Statistical Methods

Centers coded and entered their data using Epi Info data entry and analysis programs provided (Epi Info statistical software, version 6, Centers for Disease Control and Prevention, Atlanta, Ga). Initial univariate analyses were used to ascertain factors associated with type of feeding used (breast only, breast + formula, and formula only). The variables included were gender, presentation of the fetus (vertex vs others), multiple births (yes, no),

neonatal unit admission (yes, no), marital status (married/cohabit vs other), mother’s occupation (employed vs housewife/unemployed), father’s occupation (employed vs unemployed), mother had paid employment before baby’s birth (yes, no), mother intended to breastfeed at baseline (yes, no), mother smoked at baseline (yes, no), father smoked at baseline (yes, no), type of delivery (normal, cesarean, other assisted), gestation (weeks), birth weight (kilograms), mother’s age at baby’s birth (years), father’s age at baby’s birth (years), maternity leave (weeks), mother’s age finished full-time education (years), father’s age finished full-time education (years), number of pregnancies, number of live births, infant shared a bed at time of home questionnaire (yes, no), and use of pacifier (most of the time, some of the time, not at all). Multinomial logistic regression analysis was then used to assess those factors found to be associated with infant-feeding method. The outcome variables examined were a breastfeeding-only group versus a mixed breastfeeding plus formula group (mainly breast and some formula, mainly formula and breast, and half and half) and the breastfeeding-only group versus a formula-feeding-only group. For these analyses, only infants aged 10 to 14 weeks at the time of completion of the home questionnaire were included. Because the sampling unit was centers in different countries rather than individuals, the data were not independent. The standard errors were adjusted for center using the cluster option in STATA.

## Results

Descriptive information on breastfeeding (Table 1) and use of pacifiers (Table 2) is shown for infants at approximately 3 months of age (time of home questionnaire). Rates of feeding with only breast milk at the time of the home questionnaire varied from 4% to 80%: 4% (Hong Kong), 12.5% (Dublin, Ireland), 26% (3 cities, Scotland), 58% (Graz, Austria), 58% (Copenhagen, Denmark), and 80% (Stockholm, Sweden) (see Figure 1). For those infants aged 10 to 14 weeks, 43% were given only breast milk, 20% mixed feeding, and 36% only formula milk at this time (Table 3). Pacifier use varied from 12.5% to 71%: 12.5% (2 cities, Japan), 14% (Dunedin, New Zealand), 16% (Chongqing, China), 69% (2 cities, Italy), and 71% (Odessa, Ukraine) (see Figure 1). Overall, 5.1% used a pacifier most of the time, 44% some of the time, and 51% not at all.

Table 1. International Child Care Practices Study: Infant-Feeding Method at Time of the Home Questionnaire (Approximately 3 Months of Age)

	Intention*		Feeding**					Age <sup>†</sup>	
	n	Yes, %	n	B, %	M, %	F, %	O, %	$\bar{x}$	SD
Americas									
Manitoba	301	79	229	40	19	39	2	3.7	0.8
Buenos Aires <sup>‡</sup>	76	97	81	53	25	22	0	3.7	0.9
Santiago	251	100	226	51	25	23.5	< 1	4.2	0.6
Northern Europe									
Copenhagen	375	99	361	58	19	22	< 1	3.0	0.4
Graz	199	97	199	58	12	29	< 1	3.1	0.4
Hannover	186	91	122	38	16	46	0	3.3	0.8
Innsbruck/Vienna	200	94	200	40	19	40.5	< 1	3.2	0.4
Dublin	386	42	320	12.5	4	82	1.5	3.1	0.4
Scotland (3 cities)	248	63	219	26	15	58	1	3.3	0.3
Stockholm	254	100	241	80	14	6	0	2.9	0.3
Southern and Eastern Europe									
Budapest <sup>‡</sup>	32	97	32	62.5	37.5	0	0	3.0	0.6
Istanbul <sup>‡</sup>	162	99	91	49.5	38.5	8	4	4.2	1.5
Italy (2 cities)	200	94.5	200	53.5	15.5	29.5	1.5	3.5	0.3
Odessa	490	96	489	30	30	33	7	3.3	1.2
Asia									
Beijing	306	99	306	42.5	35	22	< 1	3.1	0.4
Chongqing <sup>§</sup>	250	91	250	34	30.5	28.5	7	3.1	0.2
Hong Kong	251	40	197	4	8	87	< 1	2.8	0.4
Hong Kong Caucasian	124	94	117	33	21	44	2	3.2	0.3
Japan (2 cities)	281	99	289	47	34	19	0	3.3	0.7
Oceania									
Brisbane	302	84	224	37.5	12	50	< 1	2.9	0.2
Dunedin	268	88	249	51	17	32	< 1	3	0.4

\*Intention to breastfeed at birth (n = sample size at this stage).

\*\*Feeding method at time of the home questionnaire (n = sample size at this stage): B = breastfeeding only; M = mixed breastfeeding and formula feeding; F = formula feeding only; O = other.

<sup>†</sup>Mean age (standard deviation) in months at the time of completion of the home questionnaire.

<sup>‡</sup>Centers with fewer than 100 respondents for the 3-month home questionnaire.

<sup>§</sup>Retrospective for birth data.

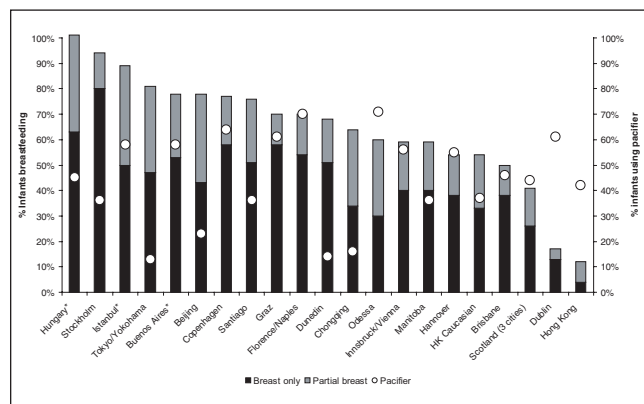


Figure 1. Infant-feeding practices and pacifier use at approximately 3 months of age.

\*Centers with fewer than 100 respondents for the 3-month home questionnaire.

Pacifier use was negatively associated with breastfeeding, and there was evidence of a dose-response effect in relation to exclusivity of breastfeeding and fre-

quency of pacifier use (Tables 3 and 4). Factors favoring exclusive breastfeeding included mothers who intended to breastfeed after delivery, infant bed shared at the time of the home questionnaire, and mothers' education. Factors adversely associated with exclusive breastfeeding were multiple birth, mother smoked at baseline, and pacifier use. Mother's age was associated with mixed feeding but not formula-only feeding (Table 5).

### Discussion

Our data show wide variations in both breastfeeding and pacifier use in these diverse samples. Pacifier use was significantly associated with a lower rate of breastfeeding. The association was greater in the formula-feeding-only group than in the mixed-feeding group, indicating a dose-response effect. However, viewed qualitatively, wide variations between the different cen-

Table 2. International Child Care Practices Study: Use of Pacifiers (Dummies or Soothers) at Approximately 3 Months of Age (Time of Home Questionnaire)

	<i>n</i>	<i>Most of the Time</i>	<i>Some of the Time</i>	<i>Any Pacifier Use</i>
		<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>
<b>Americas</b>				
Manitoba	230	5 (2)	79 (34)	84 (36.5)
Buenos Aires*	81	5 (6)	42 (52)	47 (58)
Santiago	226	13 (6)	68 (30)	81 (36)
<b>Northern Europe</b>				
Copenhagen	361	37 (10)	195 (54)	232 (64)
Graz	199	4 (2)	117 (59)	121 (61)
Hannover	122	2 (2)	65 (53)	67 (55)
Innsbruck/Vienna	200	12 (6)	99 (50)	111 (55.5)
Dublin	321	37 (12)	159 (50)	196 (61)
Scotland (3 cities)	219	9 (4)	88 (40)	97 (44)
Stockholm	241	1 (0)	85 (35)	86 (36)
<b>Southern and Eastern Europe</b>				
Budapest*	31	3 (10)	11 (35)	14 (45)
Istanbul*	93	11 (12)	43 (46)	54 (58)
Italy (2 cities)	200	24 (12)	115 (58)	139 (69.5)
Odessa	489	35 (7)	311 (64)	346 (71)
<b>Asia</b>				
Beijing	306	21 (7)	49 (16)	70 (23)
Chongqing	250	1 (0)	39 (16)	40 (16)
Hong Kong	195	1 (1)	81 (42)	82 (42)
Hong Kong Caucasian	117	3 (3)	40 (34)	43 (37)
Japan (2 cities)	287	2 (1)	34 (12)	36 (12.5)
<b>Oceania</b>				
Brisbane	224	15 (7)	89 (40)	104 (46)
Dunedin	249	7 (3)	27 (11)	34 (14)

\*Centers with fewer than 100 respondents for the 3-month home questionnaire.

ters were noted. Some centers such as Japan, Dunedin, and Chongqing had low rates of pacifier use and high rates of exclusive breastfeeding, whereas other centers such as Odessa, Italy, and Copenhagen had higher rates of pacifier use but more variable rates of breastfeeding. Stockholm, with the highest rate of exclusive breastfeeding at the time of the home questionnaire (80%), had a pacifier use rate of 36%, whereas Hong Kong, with the lowest exclusive breastfeeding rate (4%), had a similar rate of pacifier use (42%).

An ethnographic study of mothers in Brazil noted that mothers who feel confident about breastfeeding seem to be less affected by pacifier use.<sup>11</sup> Although an earlier randomized controlled study showed that pacifier use in the neonatal period was not associated with a lower frequency or shorter duration of breastfeeding in the first 6 months of life,<sup>12</sup> a subsequent study showed that such use was detrimental to exclusive and overall breastfeeding.<sup>9</sup> It has been suggested that even if the use

Table 3. Frequency of Pacifier Use and Exclusive Breastfeeding in Infants Aged 10 to 14 Weeks

	<i>Total Sample</i>	<i>Pacifier Use</i>		
		<i>Not Used</i>	<i>Some of the Time</i>	<i>Most of the Time</i>
<i>Feeding at Time of Home Interview</i>	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>	<i>No. (%)</i>
Breast only	1229 (43)	820 (67)	376 (31)	33 (2.7)
Mixed	581 (20)	319 (55)	237 (41)	25 (4.3)
Formula only	1034 (36)	458 (44)	492 (48)	84 (8.1)
All feeding groups combined	2844 (100)	1597 (56)	1105 (39)	142 (5)

Table 4. Multinomial Logistic Regression Analysis of Feeding Method in Relation to Frequency of Pacifier Use With Breastfeeding Only (*n* = 1229) and Pacifier Not Used (*n* = 1597) as Comparison Group for Infants Aged 10 to 14 Weeks at the Time of the Home Questionnaire (*n* = 2844)

	<i>No. (%)</i>	<i>Pacifier Used Some of the Time</i>	<i>Pacifier Used Most of the Time</i>
		<i>Relative Risk Ratio (95% Confidence Interval)</i>	<i>Relative Risk Ratio (95% Confidence Interval)</i>
Breast only	1229 (43)	Reference group	
Mixed	581 (20)	1.62 (1.11, 2.37)*	1.95 (1.07, 3.56)*
Formula only	1034 (36)	2.35 (1.61, 3.42)**	4.56 (2.33, 8.91)**

\**P* < .05.

\*\**P* < .001.

of pacifiers and feeding bottles is a marker of breastfeeding difficulties, as much as a cause of them, the recommendation that pacifiers should not be given to breastfeeding infants (step 9 of the BFHI) remains the same.<sup>8</sup> Negative risks suggested to be associated with pacifier use include “nipple confusion” and difficulties initiating breastfeeding, more breastfeeding problems, shorter duration of breastfeeding, dental malocclusion, and increased incidence of acute and recurrent otitis media and its sequelae.<sup>8,13</sup> However, whether nipple confusion is a real entity has been challenged,<sup>14</sup> and others have argued that pacifiers may do less harm to dentition in contrast to digit sucking.<sup>15</sup> The American Academy of Pediatrics and American Academy of Family Physician Clinical Practice Guidelines on the diagnosis and management of acute otitis media recommended the prevention of acute otitis media through reducing or eliminating pacifier use in the second 6 months of life.<sup>16</sup> However, this recommendation was based on a randomized controlled trial that had some potential design limitations.<sup>17,18</sup> The debate as to

Table 5. Factors Associated With Breastfeeding Only (n = 1229), Breastfeeding + Formula (Mixed, n = 581), and Formula Only (n = 1034) for Infants Aged 10 to 14 Weeks (n = 2844) Using Multinomial Logistic Regression With Standard Errors Adjusted for Clustering on Study Site

	<i>Breastfeeding Only</i>	<i>Mixed Feeding</i>	<i>Formula Only</i>	<i>Breastfeeding Only Compared With Mixed Feeding</i>	<i>Breastfeeding Only Compared With Formula Feeding Only</i>
				<i>Relative Risk Ratio (95% Confidence Interval)</i>	<i>Relative Risk Ratio (95% Confidence Interval)</i>
Mother intended to breastfeed at baseline, no.	1217	569	687	0.47 (0.21, 1.07)	0.02 (0.01, 0.05)**
Multiple birth, no.	19	29	57	3.46 (1.84, 6.52)**	5.26 (2.15, 12.87)**
Mother smoked at baseline, no.	159	81	219	0.98 (0.68, 1.40)	1.39 (1.02, 1.90)*
Mother's age at baby's birth, mean y	29.78	28.93	28.96	0.98 (0.96, 0.99)*	0.98 (0.95, 1.01)
Mother's age finished full-time education, y	20.25	19.82	18.19	0.98 (0.93, 1.03)	0.87 (0.81, 0.93)**
Infant bed shared at time of home questionnaire, no.	540	233	243	0.87 (0.62, 1.22)	0.43 (0.30, 0.61)**
Use of pacifier some of the time, no.	376	237	492	1.52 (1.07, 2.17)*	2.05 (1.53, 2.74)**
Use of pacifier most of the time, no.	33	25	84	1.85 (1.01, 3.38)*	4.41 (2.47, 7.87)**

\* $P < .05$ .\*\* $P < .001$ .

whether the association between pacifiers and negative breastfeeding outcomes is causal has intensified since the potential benefit of pacifiers for SIDS prevention has been documented. However, step 9 of the BFHI does not consider this potential beneficial role of pacifiers,<sup>3</sup> and this issue needs to be considered when providing comprehensive advice to parents and health workers on the use of pacifiers. The mechanism for this protective effect remains speculative but may be related to maintenance of airway patency.

Other factors associated with exclusivity of breastfeeding in our study included multiple pregnancy, smoking by the mother, and bed sharing at the time of the home questionnaire. Mother's age did not show a consistent association, being different only in the mixed-feeding group but not the formula-feeding-only group. Although no causation can be implied from any of these associations, our findings are similar to those found in a New Zealand multicenter case-control study of SIDS.<sup>19</sup> In that study, not exclusively breastfeeding at discharge was significantly associated with twin pregnancy, heavy maternal smoking, being a Pacific Islander, mother not bed sharing, subsequent pacifier use, birth weight less than 2500 g, not attending antenatal classes, and mother younger than 20 years at first pregnancy. Being exclusively breastfed at discharge but not at 4 weeks was associated with twin pregnancy, admission to the neonatal unit, subsequent pacifier use, and the mother not being married. A shorter overall duration of breastfeeding was associated with twin

pregnancy, mother not bed sharing, subsequent pacifier use, maternal smoking, not attending antenatal classes, mother younger than 20 years at first pregnancy, and low occupational status. Of these factors, both smoking and bed sharing have been shown to be associated with increased risk of SIDS and are potentially modifiable. However, on more detailed analysis, some studies have identified bed sharing as a risk factor for SIDS only when 1 or more of the parents smoke.<sup>20,21</sup> Our data show that mothers who exclusively breastfeed are more likely to bed share but less likely to smoke. Giving definitive advice on bed sharing in relation to breastfeeding is controversial. Mothers should be aware that for infants younger than 4 months and in unusual sleeping situations (eg, sleeping on a sofa), bed sharing can be dangerous.<sup>21-23</sup> Thus, the active promotion of bed sharing to encourage breastfeeding may be ill advised.<sup>23</sup> In contrast to the pros and cons of pacifiers and bed sharing for infant health, there is no suggestion that smoking has any beneficial effects. Our analysis showed a significant negative association of smoking between the breastfeeding-only and formula-feeding-only groups (Table 5). Preventing mothers from smoking is thus a highly desirable goal in view of its strong direct association with SIDS risk<sup>24,25</sup> and its many other negative health associations. It has been suggested that maternal smoking may decrease breastfeeding by suppressing prolactin levels. However, women who smoke are less likely to intend to breastfeed, and wide variations in breastfeeding rates among women who smoke suggest

that the association may be more related to psychological factors than to physiological factors.<sup>26</sup> Smoking of any kind has been shown to be a strong risk factor for not initiating breastfeeding.<sup>27</sup> Public health strategies, directed at likely underlying socioeconomic, demographic, and psychological factors, should be vigorously pursued to reduce the adverse effects of tobacco on breastfeeding and infant health in general.<sup>27</sup>

In view of the heterogeneity of the samples in our study, it is important that the associations identified are not overinterpreted.<sup>10</sup> Our study collected descriptive data on child care from a range of different countries and cultures. Although every attempt was made to use standardized methods, significant variations in data collection occurred. It is possible that some centers and mothers interpreted "breast milk only" more strictly than did others, with even small amounts of formula use being classified as mixed feeding. The data at 3 months were collected using self-completed questionnaires, and pacifier use may have been underreported in centers where pacifier use is viewed negatively by medical staff. Despite these limitations, our findings of associations between breastfeeding, pacifiers, and other factors associated with negative breastfeeding outcomes are generally consistent with other studies.

Both breastfeeding and pacifiers have been associated with reduced SIDS risk, but whereas breastfeeding is widely promoted for its many other well-documented health benefits, pacifier use is largely discouraged. Our analysis supports the negative association of pacifiers on breastfeeding and provides evidence of a dose-response effect. We also show that breastfeeding is positively associated with bed sharing and negatively associated with smoking. Although advice on whether bed sharing should be promoted to enhance breastfeeding is controversial, there should be no debate that smoking should be discouraged from a breastfeeding perspective, whether this association is physiological or psychological. When providing advice on pacifiers, parents should be informed that there are potential benefits as well as risks.

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### Resumen

A pesar de que la Iniciativa Hospital Amigo del Niño recomienda no dar chupetes a los bebés que amamantan, tanto la lactancia materna como el uso del chupete son protección contra el Síndrome de Muerte Súbita del Recién Nacido (SMSRN). Se utilizaron datos del estudio Internacional de Prácticas de Cuidado del Niño sobre prácticas de cuidado del niño que se asocian

con el riesgo de SMSRN en 21 centros de 17 países, para describir prácticas de alimentación infantil y el uso del chupete y evaluar factores asociados con la lactancia materna. A los 3 meses de edad aproximadamente, la tasa de solo lactancia materna (4%-80%) y el uso del chupete (12.5%-71%) fueron variadas en los centros. El uso del chupete se asoció negativamente con la lactancia materna y el efecto de respuesta de dosis era notorio. Se identificaron otras asociaciones en la práctica de solo lactancia materna tanto negativas (partos múltiples, madre fumadora) como positivas (intención de amamantar, compartir la cama, educación de las madres). A pesar de que la demostración de causa-efecto no debe interferir, estas asociaciones fueron consistentes con estudios previos. Al recomendar los chupetes se debe mencionar tanto los beneficios potenciales de su uso como sus riesgos.