

Effects of socioeconomic status on breastfeeding duration in mothers of preterm and term infants

Renée Flacking^{1,2}, Kerstin Hedberg Nyqvist¹, Uwe Ewald¹

Background: The propensity to breastfeed is not only of importance with regard to the beneficial effects on the individual, but is also of concern as an indicator of health behaviour related to social conditions. Thus, our aim was to investigate the impact of socioeconomic status (SES) on breastfeeding duration in mothers of preterm and term infants. **Methods:** Prospective population based cohort study. Data for infants registered in breastfeeding databases of two Swedish counties 1993–2001 were matched with data from two national registries—the Medical Birth Registry and Statistics Sweden. A total of 37 343 mothers of 2093 preterm and 35 250 term infants participated. **Results:** All socioeconomic factors; maternal educational level, maternal unemployment benefit, social welfare and equivalent disposable income, were strongly associated with breastfeeding when examined individually in mothers of preterm and term infants. Some of the associations attenuated when investigated simultaneously. Independently of SES and confounders, mothers of preterm infants were at higher risk of weaning before the infant was 2 months (adjusted odds ratio (OR) 1.70; 95% confidence interval ((CI) 1.46–1.99)), 4 months (OR 1.79; CI 1.60–2.01), 6 months (OR 1.48; CI 1.33–1.64), and 9 months old (OR 1.19; CI 1.06–1.34), compared with mothers of term infants. **Conclusions:** In Sweden, despite its social welfare support system and a positive breastfeeding tradition, SES clearly has an impact on the breastfeeding duration. Mothers of preterm infants breastfeed for a shorter time compared with mothers of term infants, even when adjustments are made for SES and confounders.

Keywords: breastfeeding, infants, register, socioeconomic status, sweden

Introduction

Breastfeeding is beneficial for nutritional, immunological and cognitive development in infants, with heightened effects in those born preterm (at <37 gestational weeks).^{1,2} The propensity to breastfeed is not only of importance with regard to the beneficial effects on the individual, but is also of concern as an indicator of health behaviour related to social conditions. A large body of research supports an association between socioeconomic status (SES) and children's health and development,^{3–7} but this concept has rarely been studied in relation to duration of breastfeeding.

Internationally, studies on weaning of term infants suggest that mothers who have lower education wean earlier than those with higher education; the results concerning the influence of family income have been equivocal.^{8,9} Other factors, associated with SES, that also relate to breastfeeding duration are smoking, cohabitation, maternal age and paternal education.^{8–12} These studies on breastfeeding might not be appropriate to generalize, as the attitudes and welfare support systems differ. In addition, little research has sought to investigate the breastfeeding duration in mothers of preterm infants; reports have been derived from small samples with the incidence at discharge as the outcome^{13,14} and with few studies on longer periods of breastfeeding.¹⁵ As findings suggest that socioeconomic disparities relate to rates of preterm birth,^{16–19} the association between health behaviours and SES in mothers of preterm infants becomes a complex and urgent issue of international importance.

In Sweden, breastfeeding is regarded as the cultural norm and there has been a constantly high breastfeeding frequency from the beginning of the 1990's; 98% of all infants are breastfed at 1 week of age and 72% at 6 months of age.²⁰ In addition, Sweden is a country with low rates of unemployment, high rates of social expenditure (including parental benefit for 450 days and guaranteed temporary parental benefit when the infant is sick), low income inequality and cost-free access to child health care.^{21–23} Hence, data from this setting would provide us with important information about the impact of SES on health behaviour such as breastfeeding that cannot be obtained in settings where socioeconomic disparities are more pronounced, and would contribute with a valid ground for studies of causal mechanisms.

This study was undertaken to investigate the impact of SES on breastfeeding duration in mothers of preterm and term infants.

Methods

Sample

This study had a prospective cohort design, and the subjects were recruited from two registers in a step-wise process. Firstly, all infants registered in the Child Health Center (CHC) registers on breastfeeding in the counties of Örebro and Uppsala from 1993–2001 were selected. A total of 57 607 infants were identified and, on the basis of their personal identity numbers, data on 55 672 infants of 38 893 mothers were obtained at the Medical Birth Registry in Sweden. As a mother could occur in the data set with infants born in different years, we selected the mother–infant couple that appeared the first time in the period 1993–2001. This means that mothers, regardless of parity, were only selected once as subjects. Secondly, mothers with multiple births (twins, triplets) and mothers whose infants lacked registered data on gestational age at birth were excluded. Of the remaining

¹ Department of Women's and Children's Health, Uppsala University, S-751 85 Uppsala, Sweden

² Center for Clinical Research Dalarna, S-791 82 Falun, Sweden

Correspondence: Renée Flacking, Center for Clinical Research Dalarna, Nissers v 3, S-791 82 Falun, Sweden, tel: +46 23 18831, fax: +46 23 18375, e-mail: renee.flacking@ltldalarna.se

38 246 mothers, 903 mothers lacked data on breastfeeding at the infant ages of 2–12 months. The final sample consisted of 37 343 mothers, 2093 of preterm infants and 35 250 of infants born at term.

Data sources and included variables

In Sweden, the frequency of breastfeeding has been registered nationally for several decades and is defined by the Swedish National Board of Health and Welfare as being fed with breast milk. In connection with scheduled visits at the CHC, in which almost 100% of all infants are enrolled, the mothers are asked whether the infant is breastfed and the answer is recorded by the CHC nurse; and these findings are then registered at the county Child Health Services. In this study, mothers who were breastfeeding (exclusively or partially) were compared with those not breastfeeding, at 2, 4, 6, 9 and 12 months of infants' postnatal age. Missing data on occurrence of breastfeeding were replaced by 'no breastfeeding' if the mother had not been breastfeeding at the point in time before the missing value. Data were not replaced for mothers who breastfed and subsequently lacked data.

A conceptual framework was constructed to assess the effects of SES on weaning. As there is a general consensus that income, employment status, occupation and education reflect SES better when considered together than any one of these factors alone,³ we chose maternal education, maternal unemployment benefit and two income measures (social welfare and equivalent disposable income of the household) as representing SES. Social welfare is a financial assistance to secure a reasonable standard of living. Equivalent disposable income is the disposable income (sum of all taxable income and tax-free income minus tax and additional negative transfer) in the household, adjusted to household size using the Statistics Sweden Equivalence Scale.²⁴ This scale is based on the Swedish norms of social welfare and measures the cost of providing an equal standard of living for households that differ in size and age. Each household's equivalent disposable income was index adjusted to the 2001 level of prices and categorized into four quartiles based on all households in Sweden for each year in the time frame of the study. All data on SES were obtained from Statistics Sweden (compiled from different sources: tax returns, the National Social Insurance Board, and Educational Register and covering the entire population of Sweden) and refer to the year in which the infant was born. Fewer than 1% of the data were missing for all factors except for maternal education (3%). The study was approved by the research ethics committee of the medical faculty at Uppsala University.

Statistical methods

Differences in breastfeeding frequency between mothers of preterm and term infants were analysed with the Chi-square test with a two-sided 5% level of significance. Logistic regression (enter model) was used to investigate the effect of SES on weaning before the infant age of 6 months. In the first step we investigated the individual effect of each of the SES factors on weaning. In the second step, all socioeconomic factors were mutually adjusted for each other. As other factors might operate contemporaneously between SES and breastfeeding, we also needed to adjust for confounding factors. The choice of confounders, entered into the model, was based on theoretical assumptions and by subsequent analyses. Investigated factors were assessed as confounders when; (i) they were associated with breastfeeding duration, and (ii) if the factor influenced any of the SES factors with >10% deviation from the unadjusted estimate after its introduction in the model. Smoking, cohabitation, maternal age and

paternal education have previously showed to be strongly associated with SES^{10–12} and with breastfeeding duration^{8,9–25}, and were assessed as confounders in our study, together with county. In the preterm group, gestational week (three subgroups) was additionally adjusted for, as we wanted to control for a possible impact of degree of prematurity in relation to SES. The influence of parity, ethnicity, and year of birth were analysed but not considered as confounders. Data on confounders were obtained from the Medical Birth Registry and Statistics Sweden. Missing data concerned paternal education (3%), smoking (5.5%) and cohabitation (7.6%).

Cox proportional hazard model was used as secondary analyses to obtain the hazard ratio for being weaned at 2–12 months in each of the SES factors individually. In these analyses, Kaplan–Meier hazard curves were scrutinized visually to consider the proportional hazard assumption in the Cox model. The hazard function represents the risk of being weaned assuming breastfeeding thus far.

To compare the risk of weaning between mothers of preterm and those of term infants, we performed multivariate analyses including SES and confounders with the variable preterm/term. The OR for this latter variable was used as an estimate of increased risk for weaning before 2, 4, 6, 9 and 12 months. The interaction between preterm birth and SES regarding weaning before each point in time was analysed by multiplying the variable preterm/term by each of the SES factors in the bivariate analyses (dichotomized). The product was added to a regression model in which it was possible to detect an interaction effect. The results are presented as OR with 95% CI. The statistical package SPSS 12.0 for Windows was used for statistical analyses.

Results

Characteristics

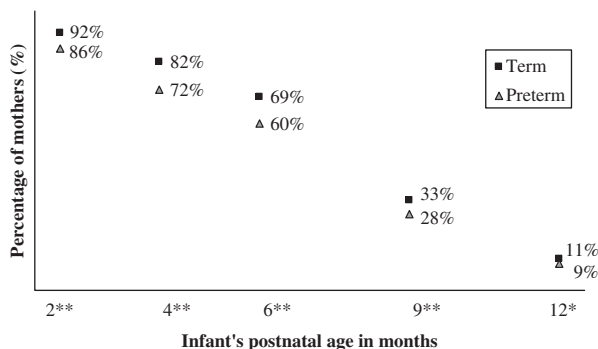
Among the preterm infants, the gestational age at birth ranged from 22 to 36 weeks, with a median (inter quartile range) of 35 (1.0). The preterm infants weighed 453–4927 g with a mean (\pm SD) of 2526 ± 669 g, and the term infants weighed 1370–6530 g with a mean (\pm SD) of 3609 ± 491 g. In table 1, the characteristics in mothers of preterm and term infants are presented. Figure 1 presents the breastfeeding frequency at 2, 4, 6, 9 and 12 months in mothers of preterm ($n = 2086 - 1632$) and term ($n = 35\,217 - 26\,159$) infants; significantly fewer mothers of preterm infants breastfed at each point in time in comparison with mothers of term infants.

Impact of SES on weaning in mothers of preterm infants

Table 2 presents the results from the unadjusted and adjusted logistic regression analyses for mothers of preterm infants. In the unadjusted analyses (first column), lower maternal education, maternal unemployment benefit, social welfare and lower equivalent disposable income in the household were individually associated with weaning before 6 months. The analyses of the Cox proportional hazard model (not presented) showed identical findings; all SES factors were individually associated with breastfeeding duration up to 1 year of infant's age. In subsequent logistic regression analyses, in which all SES factors were mutually adjusted for (second column), lower maternal education and receiving social welfare remained significant. The association between maternal unemployment benefit, equivalent disposable income and weaning disappeared. When adjustments were additionally made for confounders (third column), lower maternal education and receiving social welfare remained significantly related to weaning.

Table 1 Distribution of the characteristics in mothers of preterm ($N=2093$) and term ($N=35\,250$) infants

Demographic and socioeconomic characteristics	Preterm, <37gw		Term, >37gw	
	<i>n</i>	%	<i>n</i>	%
Maternal educational level				
Compulsory school or less	338	(16.6%)	4952	(14.5%)
Upper secondary school	1087	(53.4%)	18 281	(53.5%)
Higher education	612	(30.0%)	10 922	(32.0%)
Maternal unemployment benefit	504	(24.1%)	8585	(24.4%)
Social welfare	323	(15.4%)	4689	(13.3%)
Equivalent disposable income				
Lowest quartile	753	(36.0%)	13 264	(37.7%)
2nd lowest quartile	554	(26.5%)	9981	(28.3%)
2nd highest quartile	578	(27.6%)	8821	(25.0%)
Highest quartile	207	(9.9%)	3158	(9.0%)
Single mother	136	(7.2%)	1877	(5.8%)
Smoking at first antenatal care visit	337	(17.6%)	5111	(15.3%)
Mother's age, years				
< 23	384	(18.3%)	5943	(16.9%)
24–28	699	(33.4%)	12 313	(34.9%)
29–33	597	(28.5%)	11 008	(31.2%)
34 –	413	(19.7%)	5986	(17.0%)
Paternal educational level				
Compulsory school or less	355	(17.6%)	5541	(16.3%)
Upper secondary school	1100	(54.5%)	18 442	(54.1%)
Higher education	565	(28.0%)	10 110	(29.7%)
Gestational age at birth, weeks				
22–27	58	(2.8%)	–	–
28–31	169	(8.1%)	–	–
32–36	1866	(89.2%)	–	–

**Figure 1** Breastfeeding frequency (%) at 2–12 months of age in mothers of preterm ($N=2093$) and term ($N=35\,250$) infants. ** $P<0.001$, * $P<0.05$

Impact of SES on weaning in mothers of term infants

Table 3 presents the results from the unadjusted and adjusted logistic regression analyses for mothers of term infants. In the unadjusted analyses (first column), all SES factors were individually associated with weaning before 6 months. The analyses of the Cox proportional hazard model (not presented) showed identical findings; all SES factors were individually associated with breastfeeding duration up to 1 year of infant's age. In subsequent logistic regression analyses, in which all SES factors were mutually adjusted for (second column), lower maternal education, unemployment benefit received by the mother, social welfare in the household, were all independently negatively associated with breastfeeding at 6 months. In addition, a larger proportion of mothers whose equivalent disposable income was in one of the two middle quartiles weaned before 6 months compared with mothers in the highest quartile. Adding confounders to the logistic regression model (third column) only slightly attenuated the association between SES factors and weaning.

Comparisons of the impact of SES on weaning between mothers of preterm and term mothers

Mothers of preterm infants showed an increased risk of weaning before an infant age of 2 months (adjusted OR 1.70; 95% CI 1.46–1.99), 4 months (OR 1.79; CI 1.60–2.01), 6 months (OR 1.48; CI 1.33–1.64) and 9 months (OR 1.19; CI 1.06–1.34), when adjustments were made for SES and confounders. At 12 months, mothers of preterm infants were not at a higher risk of having weaned than mothers of term infants (adjusted OR 1.21; 95% CI 1.00–1.47). The interaction analyses showed that none of the SES factors was more decisive for weaning from breastfeeding before the age of 2, 4, 6, 9 and 12 months in mothers of preterm infants than in those of term infants.

Discussion

This study provides the first population based data on the association between SES and breastfeeding duration up to 1 year in mothers of preterm and term infants. The main strengths of this register-based study lie in its coverage of the whole population in two counties and the provision of longitudinal breastfeeding data, gathered prospectively. Almost 100% of all Swedish infants are registered at the CHS and in our study only a small number (2.4%) of mothers lacked data on breastfeeding. There are two principal findings in our study. First, when studied individually, all SES factors showed a strong association with breastfeeding up to 6 months of infant's postnatal age. The impact of these factors on weaning was also supported in the findings of the survival analyses 2–12 months. Examining all SES factors simultaneously attenuated the association with weaning, and in mothers of preterm infants maternal unemployment benefit and equivalent disposable income became non-significant. The association between SES factors and breastfeeding remained significant after adjustments were made for confounders, in both groups. Secondly, even if adjustments are made for SES and confounders, preterm infants are breastfed

Table 2 OR for weaning from breastfeeding before the infants' postnatal age of 6 months in mothers of preterm infants (*N* = 2093), in unadjusted and adjusted logistic regression

	No. of Cases	Proportion of mothers who had weaned %	Unadjusted OR (95% CI)	Adjusted ^a <i>n</i> = 2012 OR (95% CI)	Adjusted ^b <i>n</i> = 1727 OR (95% CI)
Maternal educational level					
Compulsory school or less	334	57%	4.84 (3.62–6.48)	3.92 (2.87–5.36)	2.39 (1.62–3.52)
Upper secondary school	1077	45%	2.92 (2.33–3.67)	2.78 (2.20–3.52)	2.28 (1.72–3.03)
Higher education	601	22%	1.00	1.00	1.00
Maternal unemployment benefit	498	46%	1.36 (1.11–1.67)	1.09 (0.88–1.36)	1.10 (0.86–1.40)
No maternal unemployment benefit	1565	38%	1.00	1.00	1.00
Social welfare	317	58%	2.37 (1.86–3.02)	1.71 (1.27–2.31)	1.58 (1.10–2.26)
No social welfare	1747	37%	1.00	1.00	1.00
Equivalent disposable income					
Lowest quartile	740	47%	2.06 (1.48–2.86)	1.04 (0.72–1.51)	0.72 (0.47–1.09)
2nd lowest quartile	550	40%	1.49 (1.06–2.10)	1.05 (0.73–1.51)	0.88 (0.59–1.32)
2nd highest quartile	570	35%	1.23 (0.87–1.73)	0.97 (0.68–1.39)	0.85 (0.57–1.26)
Highest quartile	204	30%	1.00	1.00	1.00

a: Adjusted for maternal educational level and unemployment benefit, social welfare and equivalent disposable income

b: Adjusted for maternal educational level and unemployment benefit, social welfare, equivalent disposable income cohabitation, smoking at first antenatal visit, maternal age, paternal educational level, county and gestational age at birth
CI = Confidence interval

Table 3 OR for weaning from breastfeeding before the infants' postnatal age of 6 months in mothers of term infants (*N* = 35 250), in unadjusted and adjusted logistic regression

	No. of Cases	Proportion of mothers who had weaned	Unadjusted OR (95% CI)	Adjusted ^a <i>n</i> = 33 718 OR (95% CI)	Adjusted ^b <i>n</i> = 29 931 OR (95% CI)
Maternal educational level					
Compulsory school or less	4885	48%	5.05 (4.68–5.46)	4.16 (3.83–4.51)	2.66 (2.42–2.93)
Upper secondary school	18 086	35%	2.90 (2.74–3.09)	2.66 (2.50–2.83)	1.98 (1.85–2.13)
Higher education	10 747	15%	1.00	1.00	1.00
Maternal unemployment benefit	8 475	37%	1.44 (1.37–1.52)	1.20 (1.13–1.26)	1.11 (1.05–1.18)
No maternal unemployment benefit	26 287	29%	1.00	1.00	1.00
Social welfare	4 599	44%	1.98 (1.86–2.12)	1.53 (1.42–1.66)	1.32 (1.21–1.44)
No social welfare	30 164	28%	1.00	1.00	1.00
Equivalent disposable income					
Lowest quartile	13 049	35%	2.69 (2.43–2.97)	1.40 (1.26–1.56)	1.13 (1.00–1.27)
2nd lowest quartile	9 872	32%	2.40 (2.16–2.66)	1.61 (1.45–1.80)	1.30 (1.16–1.46)
2nd highest quartile	8 722	27%	1.83 (1.64–2.02)	1.42 (1.27–1.58)	1.23 (1.09–1.38)
Highest quartile	3 120	17%	1.00	1.00	1.00

a: Adjusted for maternal educational level and unemployment benefit, social welfare and equivalent disposable income

b: Adjusted for maternal educational level and unemployment benefit, social welfare, equivalent disposable income cohabitation, smoking at first antenatal visit, maternal age, paternal educational level and county
CI = Confidence interval

for a shorter time compared with term infants, despite the known health benefits of breastfeeding in the preterm infants.

Our results conform to other findings on the importance of SES on breastfeeding duration in mothers of preterm and term infants.^{8,9,12,13,26} Previous reports on the relation between family economy and breastfeeding have been inconsistent.^{9,13,25} In our study, being in need of social welfare was consistently adversely related to weaning, but the effects of low equivalent disposable income were somewhat divergent after adjustments had been made. Fewer available observations in the preterm group provide one plausible explanation. The incongruity might also reveal that being exposed to social welfare reflect a more comprehensive financial situation than the measure of equivalent disposable income. Hence, it would have been of interest to have data on the individual earnings, as this may correspond more to position in the social structure compared to disposable income.²⁷ Although a broad range of factors was available through Statistics Sweden and the Medical Birth Registry, some additional aspects were not to be elucidated from these registries or included in the data collection. For instance, we had no information on long-term income, occupational level, housing or neighbourhood conditions, all of which are factors suggested as related to health and health behaviours.^{28,29}

This study provides us with information on the effects of SES on breastfeeding, in a setting with a positive breastfeeding tradition and where a long subsidized parental benefit, cost-free child health care and a welfare support system are applied. The studies on interventions aimed at increasing the breastfeeding duration in mothers of low SES have been performed in settings with high income inequality and a moderate tradition in breastfeeding.^{30,31} However, these forms of interventions are similar to the support already implemented in the Swedish child and maternal health services, or have been proven as unsuccessful. The inability to construct successful interventions targeted at more vulnerable groups may relate to the narrow approach often used, in which interventions aiming at effects of education are prevailing. As having low SES may reduce the reserve capacity of an individual dealing with stressful situations, mediate feelings of inferiority, insecurity or shame and affecting the self-esteem,^{32–34} interventions ought to regard both individual and societal aspects. Regarding interventions in health care, aimed at improving health and health behaviour in the individuals exposed to risk factors, a greater attention must be paid to sociological mechanisms. Empowerment and resource-based approaches have been proven prosperous in interventions on the effects of promoting the well-being within families

as well as preventing child maltreatment.³⁵ We hypothesize, that such tools may be efficacious in interventions also aimed at improving various health behaviours such as breastfeeding.

Regarding the shorter breastfeeding duration in mothers of preterm infants compared with mothers of term infants, this difference may be even more prominent as we lacked the possibilities to differentiate the frequency of exclusive and partial breastfeeding. Even though most Swedish mothers of low-birth weight or preterm infants initiate breastfeeding at the hospital,³⁶ it is suggested that the long-term experiences made during the stay at a neonatal unit may mediate feelings of breastfeeding as a duty and not mutually satisfying.³⁷ Such feelings might hypothetically impair the breastfeeding duration. Strategies like increased opportunities for being together in privacy, individualized care routines, psychological support and empowering attitudes, may entail feelings of trust and pride and less symptomatic response to the experienced situation of having a preterm infant^{37,38} as well as being beneficial for a longer breastfeeding duration.

The findings in our study call for substantial improvements in the pre- and post-natal care of mothers exposed to low SES and of mothers of preterm infants. Such improvements include better allocations and prioritizations of resources to meet the needs in these more vulnerable mothers and infants. In addition, in order to make valid implementations of improvements, further research on interventions are required, comprising effects of individual and societal support.

Acknowledgements

This research was funded by the Center for Clinical Research Dalarna, the Vardal Foundation, the Department of Pediatrics of Falun Hospital, Gillbergska Foundation, the Faculty of Medicine of Uppsala University, and the Section for Pediatrics at the Department of Women's and Children's Health, University Children's Hospital, Uppsala, Sweden. The research was independent of the funders. We thank Petra Otterblad and Milla Pakkanen at the Centre for Epidemiology at The National Board of Health and Welfare, Sweden, Hans Heggeman and Håkan Schultz at Statistics Sweden, and Johan Bring at Statisticon for valuable support and advice. We also wish to thank the Child Health Services in Uppsala and Örebro for their collaboration.

Conflicts of interest: None declared.

Key points

- Evidence was found suggesting that socioeconomic status clearly has an impact on breastfeeding, despite a positive breastfeeding tradition, high rates of social expenditure and generous parental allowances in Sweden.
- Even if adjustments are made for SES and confounders, preterm infants are breastfed for a shorter time compared with term infants.
- Public health interventions to improve breastfeeding duration must take social indicators into account.

References

- 1 Anderson JW, Johnstone BM, Remley DT. Breast-feeding and cognitive development: a meta-analysis. *Am J Clin Nutr* 1999;70:525–35.
- 2 Schanler RJ, Shulman RJ, Lau C. Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula. *Pediatrics* 1999;103:1150–7.
- 3 Bradley RH, Corwyn RF. Socioeconomic status and child development. *Annu Rev Psychol* 2002;53:371–99.
- 4 Halldorsson M, Kunst AE, Kohler L, Mackenbach JP. Socioeconomic inequalities in the health of children and adolescents. *Eur J Public Health* 2000;10:281–8.
- 5 Hjern A, Bremberg S. Social aetiology of violent deaths in Swedish children and youth. *J Epidemiol Community Health* 2002;56:688–92.
- 6 Fairley L, Leyland AH. Social class inequalities in perinatal outcomes: Scotland 1980–2000. *J Epidemiol Community Health* 2006;60:31–6.
- 7 von Rueden U, Gosch A, Rajmil L, et al. Socioeconomic determinants of health related quality of life in childhood and adolescence: results from a European study. *J Epidemiol Community Health* 2006;60:130–5.
- 8 Lande B, Andersen LF, Baerug A, et al. Infant feeding practices and associated factors in the first six months of life: the Norwegian infant nutrition survey. *Acta Paediatr* 2003;92:152–61.
- 9 Dubois L, Girard M. Social determinants of initiation, duration and exclusivity of breastfeeding at the population level: the results of the longitudinal study of child development in Quebec (ELDEQ 1998–2002). *Can J Public Health* 2003;94:300–5.
- 10 Aber JL, Jones S, Cohen J. The impact of poverty on the mental health and development of very young children. In: Zeanah CH, editor. *Handbook of infant mental health*. 2nd edition. New York: The Guilford Press, 2000.
- 11 Laaksonen M, Rahkonen O, Karvonen S, Lahelma E. Socioeconomic status and smoking: analysing inequalities with multiple indicators. *Eur J Public Health* 2005;15:262–9.
- 12 Killersreiter B, Grimmer I, Buhner C, et al. Early cessation of breast milk feeding in very low birthweight infants. *Early Human Development* 2001;60:193–205.
- 13 Espy KA, Senn TE. Incidence and correlates of breast milk feeding in hospitalized preterm infants. *Soc Sci Med* 2003;57:1421–8.
- 14 Yip E, Lee J, Sheehy Y. Breast-feeding in neonatal intensive care. *J Paediatr Child Health* 1996;32:296–8.
- 15 Kaufman KJ, Hall LA. Influences of the social network on choice and duration of breast-feeding in mothers of preterm infants. *Res Nursing & Health* 1989;12:149–59.
- 16 Kramer MS, Seguin L, Lydon J, Goulet L. Socio-economic disparities in pregnancy outcome: why do the poor fare so poorly?. *Paediatr Perinat Epidemiol* 2000;14:194–210.
- 17 Peacock JL, Bland JM, Anderson HR. Preterm delivery: effects of socioeconomic factors, psychological stress, smoking, alcohol, and caffeine. *Br Med J* 1995;311:531–5.
- 18 Savitz DA, Kaufman JS, Dole N, et al. Poverty, education, race, and pregnancy outcome. *Ethn Dis* 2004;14:322–9.
- 19 Gissler M, Meriläinen J, Vuori E, Hemminki E. Register based monitoring shows decreasing socioeconomic differences in Finnish perinatal health. *J Epidemiol Community Health* 2003;57:433–9.
- 20 The National Board of Health and Welfare. Breast-feeding, children born 2003: Centre for Epidemiology, 2005.
- 21 Vogel J. Welfare production, poverty and wealth. In: Statistics Sweden, editor. *Good times and hard times in Sweden during the 1990s*. Örebro: Statistics Sweden, 2003.
- 22 The National Board of Health and Welfare. The public health report 2005 (in Swedish): Centre for Epidemiology, 2005.
- 23 Galtry J. The impact on breastfeeding of labour market policy and practice in Ireland, Sweden, and the USA. *Soc Sci Med* 2003;57:167–77.
- 24 Jansson K, Karlsson Å, Lundberg P. Distribution of income 1975–2001. In: Statistics Sweden, editor. *Good times and hard times in Sweden during the 1990s*. Örebro: Statistics Sweden, 2003.
- 25 Celi AC, Rich-Edwards JW, Richardson MK, et al. Immigration, race/ethnicity, and social and economic factors as predictors of breastfeeding initiation. *Arch Pediatr Adolesc Med* 2005;159:255–60.
- 26 Fewtrell MS, Lucas A, Morgan JB. Factors associated with weaning in full term and preterm infants. *Arch Dis Child Fetal Neonatal Ed* 2003;88:F296–301.

- 27 Fritzell J, Nermo M, Lundberg O. The impact of income: assessing the relationship between income and health in Sweden. *Scand J Public Health* 2004;32:6–16.
- 28 van Lenthe FJ, Schrijvers CT, Droomers M, et al. Investigating explanations of socio-economic inequalities in health: the Dutch GLOBE study. *Eur J Public Health* 2004;14:63–70.
- 29 Benzeval M, Judge K. Income and health: the time dimension. *Soc Sci Med* 2001;52:1371–90.
- 30 Pugh LC, Milligan RA, Frick KD, et al. Breastfeeding duration, costs, and benefits of a support program for low-income breastfeeding women. *Birth* 2002;29:95–100.
- 31 Ahluwalia IB, Tessaro I, Grummer-Strawn LM, et al. Georgia's breastfeeding promotion program for low-income women. *Pediatrics* 2000;105:E85.
- 32 Chen CW, Conrad B. The relationship between maternal self-esteem and maternal attachment in mothers of hospitalized premature infants. *J Nurs Res* 2001;9:69–82.
- 33 Guttman N, Zimmerman DR. Low-income mothers' views on breastfeeding. *Soc Sci Med* 2000;50:1457–73.
- 34 Gallo LC, Matthews KA. Understanding the association between socioeconomic status and physical health: do negative emotions play a role? *Psychol Bull* 2003;129:10–51.
- 35 MacLeod J, Nelson G. Programs for the promotion of family wellness and the prevention of child maltreatment: a meta-analytic review. *Child Abuse Negl* 2000;24:1127–49.
- 36 Flacking R, Nyqvist KH, Ewald U, Wallin L. Long-term duration of breastfeeding in Swedish low birth weight infants. *J Hum Lact* 2003;19:157–65.
- 37 Flacking R, Ewald U, Nyqvist KH, Starrin B. Trustful bonds: a key to “becoming a mother” and to reciprocal breastfeeding. Stories of mothers of very preterm infants at a neonatal unit. *Soc Sci Med* 2006;62:70–80.
- 38 Jotzo M, Poets CF. Helping parents cope with the trauma of premature birth: an evaluation of a trauma-preventive psychological intervention. *Pediatrics* 2005;115:915–9.

Received 14 March 2006, accepted 12 February 2007