

Original Article

Prospective food diaries demonstrate breastfeeding characteristics in a UK birth cohort

Kate E.C. Grimshaw^{*†}, Burcu Aksoy[†], Anna Palmer[†], Katharine Jenner[†], Erin M. Oliver^{*}, Joe Maskell[§], Terri Kemp[¶], Keith D. Foote[¶], Graham C. Roberts^{*}, Basma Ellahi[†] and Barrie M. Margetts[†]

^{*}Clinical Experimental Science Academic Unit, Faculty of Medicine, University of Southampton, Southampton, UK, [†]Department of Clinical Sciences, University of Chester, Chester, UK, [‡]Faculty of Medicine, University of Southampton, Southampton, UK, [§]Public Health Sciences and Medical Statistics, University of Southampton, Southampton, UK, and [¶]Winchester and Eastleigh Health Care Trust, Winchester, UK

Abstract

Breastfeeding duration and exclusive breastfeeding rates are universally below those recommended by World Health Organization. Due to limitations and challenges associated with researching breastfeeding characteristics, the times when exclusivity is likely to be lost and when women are most likely to discontinue breastfeeding have not yet been identified. Prospective food diaries allow reliable description of the dynamics of breastfeeding to be made to help identify these key time periods. Food diaries detailing intake from birth until the cessation of breastfeeding were analysed for 718 infants recruited into a national arm of an international multicentre birth cohort study (EuroPreval). Analyses included linear regression analysis and Kaplan–Meier time course analysis. Breastfeeding and exclusive breastfeeding cessation rates for younger mothers (<25 years) are high in the first few weeks after delivery but slow markedly in the period 10–12 weeks after delivery. Cessation rates are consistent from 0 to 26 weeks in older mothers. This difference in feeding patterns led to significant differences between the two different age groups at 26 weeks for breastfeeding ($P = 0.006$) and exclusive breastfeeding at 8 weeks ($P = 0.009$). Forty-nine per cent of younger mothers (<25 years) stopped breastfeeding before their infant was 3 weeks old. To increase breastfeeding duration, further work is required to investigate the attitudes and perceptions associated with such high breastfeeding cessation rates in younger mothers during these very early post-natal weeks.

Keywords: breastfeeding, exclusive breastfeeding, infant feeding, prospective food diaries.

Correspondence: Kate Grimshaw, University Child Health, Mailpoint 803, Faculty of Medicine, Southampton General Hospital, Tremona Road, Southampton SO16 6YD, UK. E-mail: kecg@soton.ac.uk

Introduction

In 2003, the World Health Organization (WHO) advocated breastfeeding as the best source of food for optimal infant growth and development. They recommended that infants should be exclusively breastfed, receiving no other foods or liquids besides breast milk except for medicine, vitamins or mineral supplements, until 6 months of age. This advice is

still in place (World Health Organisation 2008). The UK Department of Health (DoH) and National Institute for Health and Care Excellence have adopted the WHO's 6-month exclusive breastfeeding recommendation.

The 2010 Infant feeding study (IFS; Health and Social Care Information Centre 2012) showed initial breastfeeding rates were 83% with incidence increasing with age. For mothers who initiated breastfeeding,

57% were still breastfeeding at 6 weeks and 36% at 6 months. These rates are an increase on the those observed in the 2005 IFS study (Bolling *et al.* 2007). The 2005 IFS was the first time that levels of exclusive breastfeeding at specific ages were measured with only 45% of all mothers in the United Kingdom breastfeeding exclusively at 1 week, with 21% feeding exclusively at 6 weeks. For the 2010 IFS, these rates had increased slightly to 47% and 24%, respectively but the survey reported a negligible percentage of women (1%) conformed with the 6-month exclusive breastfeeding recommendation of WHO (Health and Social Care Information Centre 2012). This study further revealed that the highest incidences of breastfeeding were found among mothers from managerial and professional occupations, those with the highest educational levels, those aged 30 or over and first time mothers.

Much research has shown that the mother's socio-economic status influences breastfeeding initiation and duration (Foster *et al.* 1997; Bolling *et al.* 2007; Van Rossem *et al.* 2009), and breastfeeding trends have often been based on occupation related class categories with previous studies suggesting that breastfeeding is more common among advantaged socio-economic status (Earland *et al.* 1997; Kelly & Watt 2005). While it is important for efforts to be made to improve the numbers of women initiating breastfeeding, endeavours must also be made to increase the number of women who continue breastfeeding, (ideally exclusively) particularly for mothers with a low socio-economic status. To do this, we need to identify the time in the infants early life that exclusivity is likely to be lost and when women are most likely to discontinue breastfeeding. That would inform when the best time would be to intervene to encourage continued breastfeeding but also the best

time for post-natal research to be carried out to identify what factors are acting at these times to cause mothers to stop breastfeeding. The aim of the present study is to explore differences in breastfeeding and exclusive breastfeeding rates in a birth cohort using daily prospective food diary records to identify the age of the infant when breastfeeding is most likely to stop and also how and when exclusive breastfeeding status is lost.

Materials and methods

Subjects comprised infants born into the Prevalence of Infant Food Allergy (PIFA) Study, [which was part of a large European Union funded project called EuroPrevall (Keil *et al.* 2010)] who had completed food diaries until cessation of any breastfeeding. The PIFA study was a prospective cohort design. A total of 1140 mothers were recruited from among women booked to deliver under the care of Winchester and Eastleigh Health Care Trust between January 2006 and September 2008 via antenatal appointments, antenatal classes, posters and flyers. It received approval from Research and Development departments at the Royal Hampshire County Hospital, Winchester and Southampton General Hospital and ethical approval was been granted by North and Mid Hampshire Local Research Ethics Committee and Southampton and South West Hampshire Local Research Ethics Committee (05/Q1703/34).

All mothers enrolled onto the PIFA study were invited to keep weekly prospective food diaries throughout the first year of life, detailing how their infants were fed. Mothers were provided with weekly food diary sheets and asked to write down anything the infant ate or drank. Using this method of dietary assessment was thought to be the best for collecting

Key messages

- Forty-nine per cent of mothers under the age of 25 years who had started to breastfeed had stopped by the time their infant was 3 weeks old.
- Fifty per cent of these younger women had ceased exclusive breastfeeding at 2 weeks compared to 8 weeks for older mothers.
- These data show the critical time period for interventions in younger women to encourage continued breastfeeding to be in the first few weeks after birth in addition to the antenatal and pre-pregnancy periods.

data of adequate detail to assess everything the child was being fed, since prospectively collected data is considered accurate and reliable and not affected by recall bias. However, keeping such intake records can be an onerous task, so to keep the required work to a minimum, quantitative data were not collected for 3 of the 4 weeks. Upon completion, the weekly food diary sheets were returned in a prepaid envelope to the PIFA study office every 4 weeks. On receipt, all dietary intake data collected were checked for plausibility and completeness. If further detail was required, the mothers were contacted via telephone to clarify intake data, then the data were anonymised. To avoid information bias, subjects were not informed of current DoH infant feeding recommendations by any study team member and the study team did not deliberately try to influence feeding behaviour in any way. However, due to ethical considerations, procedures were put in place so that if any child's diet was considered to be nutritionally compromised, then the mother would be contacted and would be given nutrition counselling; however, this safety measure did not need to be initiated. Since records were kept weekly, all results are expressed in weeks, not months. Of the 1140 infants recruited into the PIFA study, 594 had complete food diaries records until the age of 24 weeks and 241 until the age of 52 weeks. A total of 718 (61%) had complete food diary records until at least the time they stopped breastfeeding and it is these infants which were included in the analysis described in this manuscript.

The study definition of exclusivity was based on the WHO definition as the intake of breast milk only, without any other drink or food (World Health Organisation 2008). The duration of exclusive breastfeeding and the total duration of breastfeeding were determined from the prospectively completed food diaries. To determine the effect of maternal age, the data were divided into the same five groups as used in the infant feeding study (<20, 20–24, 25–29, 30–34 and ≥ 35) and later into two groups (<20–24 and ≥ 25), and according to educational attainment (finished full time education up to and including 18, continued further education after 18). Differences between the groups were tested using the Mann–Whitney *U* statistical test since the data was not normally distributed.

Since breastfeeding duration and exclusivity is subject to confounding factors and effect modifiers, linear regression analysis (on data which had been log transformed since it was not normally distributed) was used to determine their influence on breastfeeding practices. Finally, a Kaplan–Meier time course analysis was applied to the data to assess when breastfeeding ceased and whether the timecourse of cessation was different between groups. Statistical Package for the Social Sciences was used for all statistical analysis (Version 17, SPSS Inc, Chicago, IL, USA).

Results

A total of 718 women (mean age 32.4 years) completed food diaries beyond the time they stopped breastfeeding (including those mothers who stopped breastfeeding in the first week) and were included in the analysis. There was no significant difference for infants included in this analysis ($n = 718$) compared to all the infants recruited into the PIFA study ($n = 1140$) for any background characteristics or demographic parameters except for gender where the proportion of boys in the analysis was higher than in the whole PIFA cohort (54% compared to 52%) (Chi-square $P = 0.002$) and for maternal education where the numbers of mothers educated to university level was lower in the analysis sample compared to the whole PIFA cohort (60% compared to 63%) (Chi-square $P = 0.006$). Despite this latter difference, there were more university-educated women in the subsample than in the general population and since education is known to affect breastfeeding practises, this needs to be considered in the discussion of the study findings.

Table 1 represents breastfeeding duration and exclusivity by social and demographic factors. The median number of weeks that mothers exclusively breastfeed was 7 (range 0–25 IQR 0–14). Breastfeeding initiation rate was 89.0% with 38.7% of women from the sample exclusively breastfeeding for 1 month. This fell to 24.8% at 4 months and by 6 months only 0.8% of study mothers were exclusively breastfeeding.

The mean duration of breastfeeding and exclusive breastfeeding increased with maternal age ($P < 0.001$

Table 1. Breastfeeding duration and exclusivity by social and demographic factors

	Mean breastfeeding duration (weeks)	<i>P</i>	<i>P^a</i>	Mean exclusive breasts feeding duration (weeks)	<i>P</i>	<i>P^a</i>
Age of mother (years)						
<20	3.67	<0.001	<0.001	1.7	0.001	0.002
20–24	11.56			5.0		
25–29	21.5			8.3		
30–34	25			10.4		
≤35	25.0			10.1		
Parity						
First child	24.0	0.199	0.175	9.6	0.581	0.688
Sex of baby						
Boy	23.8	0.299	0.236	9.6	0.277	0.180
Girl	22.7			9.1		
Maternal smoking						
Yes	9.25	<0.001	0.001	2.5	0.012	0.038
No, ex-smoker	22.7			8.9		
No, never smoked	24.1			10.0		
Maternal education						
Up to 18 years	15.4	0.005	0.020	7.2	0.133	0.687
Above 18 years	23.8			9.6		
Housing area						
Urban	20.9	0.235	0.674	8.7	0.259	0.438
Suburban/rural	23.9			9.6		

P^a from linear regression analysis adjusted for maternal age, maternal education, gender of infant, parity of infant, maternal smoking status and housing area.

Table 2. Odds ratio (OR) and 95% confidence interval (CI) for effect of socio-economic and demographic factors on breastfeeding at 26 weeks and exclusive breastfeeding at 8 weeks

	Breastfeeding at 26 weeks		<i>P</i>	Exclusive breastfeeding at 8 weeks		<i>P</i>
	OR	95% CI		OR	95% CI	
Maternal education (educated after 18 years)	1.815	0.969–3.401	0.063	1.111	0.442–2.796	0.823
Maternal age (≥25 years)	3.166	1.309–7.214	0.006	3.855	1.394–10.666	0.009
Sex of child (male)	0.807	0.586–1.110	0.187	0.871	0.578–1.312	0.507
Parity (≤2)	1.213	0.882–1.668	0.235	0.990	0.657–1.492	0.961
Area (Suburban/rural)	1.015	0.681–1.511	0.943	1.423	0.837–2.364	0.172
Maternal non-smoker	3.922	1.155–13.319	0.028	1.148	0.00–0.00	0.999

OR obtained from logistic regression analysis. Term in brackets is the parameter included in the analysis.

and $P = 0.001$, respectively). Women who smoked breastfed their babies (both partially or exclusively) for a shorter duration ($P < 0.001$ and $P = 0.012$). Mothers who went onto further education after 18 years of age breastfed for longer than the mothers who finished education at 18 years or younger ($P = 0.005$) but no such association was seen between maternal education and exclusive breastfeeding duration.

Table 2 represents odds ratios (OR) with 95% confidence intervals estimated using logistic regression analysis for the effect of maternal education, maternal age, parity, maternal smoking and housing area on breastfeeding at 26 weeks and exclusive breastfeeding at 8 weeks. The analysis revealed that being 25 years of age or more was associated with breastfeeding for 26 weeks ($P = 0.006$) and exclusive breastfeeding for 8 weeks ($P = 0.009$). Breastfeeding for 26 weeks was

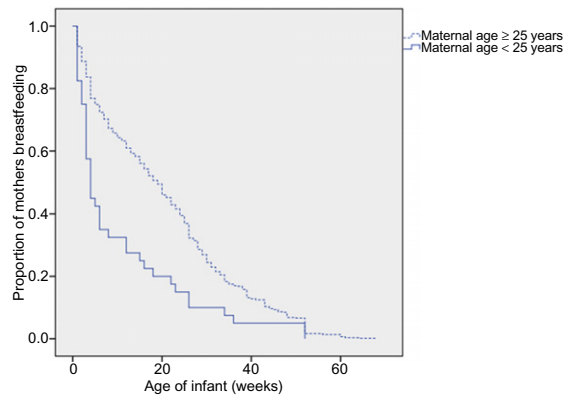


Fig. 1. Kaplan–Meier breastfeeding duration curves.

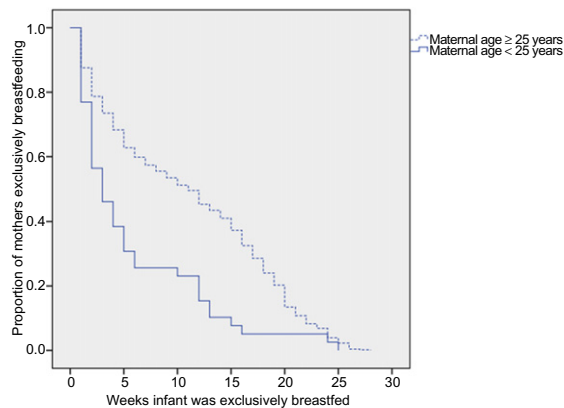


Fig. 2. Kaplan–Meier duration curves for exclusive breastfeeding.

also associated with smoking status of the mother, with mothers who smoked being associated with reduced breastfeeding duration.

Logistic regression OR showed that maternal smoking and maternal age were the strongest predictors of breastfeeding duration with maternal age being the strongest predictor of exclusive breastfeeding duration even when other variables were added to the model. A Kaplan–Meier analysis was applied as a secondary analysis to obtain the survival analysis for breastfeeding and exclusive breastfeeding up to 26 weeks to see if it differed between younger mothers and their older counterparts. These analyses are shown graphically in Figs 1 and 2.

Figure 1 demonstrates that, on average, women in the older age group breastfed for longer than women

in the younger age group and that this trend was seen throughout the time period analysed. After week one, 45% of younger mothers are not breastfeeding compared to 15% of older women. By week six, 66% of older mothers are still breastfeeding compared to only 24% of younger mothers. However, the survival curve shows that although the rate of cessation of breastfeeding for older mothers is fairly consistent for the first 26 weeks, once younger mothers have fed for 6 weeks, their rate of cessation declines.

Figure 2 demonstrates that women in the older age group exclusively breastfeed longer, whereas younger women stop exclusive breastfeeding much sooner. After week one, 71% of younger mothers are still exclusively breastfeeding, compared to 86% of older mothers. It only takes 2 weeks for 50% of the younger mothers to cease exclusively breastfeeding whereas it takes 8 weeks for 50% of the older mothers to cease exclusively breastfeeding. However, as was seen for breastfeeding duration, for younger mothers exclusive breastfeeding cessation rates slow as weeks pass whereas for older mothers, cessation rates are fairly constant. Breastfeeding exclusivity was lost as a result of the introduction of infant formula in 95% of younger mothers compared to 80% of older mothers. However, this difference was not significant ($P = 0.162$).

Discussion

The unique prospective food diary data collected as part of the PIFA study allowed a reliable description of the dynamics of breastfeeding to be made and survival analyses to be carried out on the nature of breastfeeding and exclusive breastfeeding duration. These analyses showed that breastfeeding cessation happened at a constant rate of approximately 15% to 20% every 10 weeks for older mothers over the first 6 months, but for younger mothers, cessation rates were initially more rapid (at approximately 75% every 10 weeks) until 10–12 weeks of age, but after this time for the younger mothers who were still breastfeeding, the cessation rate dropped to approximately 10% every 10 weeks until the age of 6 months (Fig. 1). It can be seen that the rapid cessation rate in younger mothers in the early weeks after birth led to mothers who were

aged 25 or over breastfeeding for an average of 11.7 weeks longer than the mothers who were under 25. The higher rate of cessation seen in younger mothers is also seen when considering exclusive breastfeeding since it only took 2 weeks for 50% for the younger mothers to cease exclusive breastfeeding, whereas it took 8 weeks for 50% of the older mothers ($P < 0.009$) to stop exclusive breastfeeding (Fig. 2). The likelihood of exclusive breastfeeding occurring at 8 weeks increased significantly with increasing maternal age.

For over 50% of the mothers in this cohort, this was their first child. In 2010, the standardised mean age of women having a first birth was 27.8 years (Office of National Statistics 2011) showing that a significant proportion of women delivering children in England and Wales are under 26 years of age, the age used to describe 'younger' mothers in this study.

Breastfeeding has clear health benefits for both mother and infant which are well-known (Booth 2001), so the key question to ask is why the feeding differences seen in this study occur. Although the ideal exclusive breastfeeding duration is defined as 6 months (Gartner *et al.* 2005), studies performed in both developed and developing countries demonstrate that few women in any country currently achieve this goal (Bolling *et al.* 2007; Gilmour *et al.* 2009; Senarath *et al.* 2010; Dozier & McKee 2011; Health and Social Care Information Centre 2012). A number of studies have observed that maternal education is significantly associated with exclusive breastfeeding and breastfeeding duration (Michaelsen *et al.* 1994; Scott & Binns 1999; Susin *et al.* 1999; Yngve & Sjöström 2001; Lanting *et al.* 2005; Ludvigsson & Ludvigsson 2005; Thulier & Mercer 2009) while others have linked it to poor paternal education (Susin *et al.* 1999; Heck *et al.* 2006) with low paternal education reported to be a risk factor for short exclusive breastfeeding (<4 months). These studies indicate that once the decision to breastfeed is made, different social factors influence the duration of breastfeeding and its exclusivity. Fifteen studies that explored exclusive breastfeeding rates at 6 months found that there was an overall increase of 137% in exclusive breastfeeding rate with promotion interventions, with a six times increased incidence in developing countries,

compared to 1.3 times increase in developed countries (Imdad *et al.* 2011). Education and support is therefore the cornerstone, supporting the framework of lactation and breastfeeding (Wright *et al.* 1996). However, education alone cannot address the myriad of factors that influence breastfeeding patterns. Studies have shown that nursing and other hospital/antenatal staff attitudes can play an important negative role in shaping mother's intentions (Graffy & Taylor 2005; Baxter 2011). This must be addressed in staff development. There also needs to be greater cultural acceptance of breastfeeding as this has been shown to affect breastfeeding rates and duration (Bryant 1982; Forste *et al.* 2001; Earles 2002). Simply telling mothers to breastfeed without addressing these important wider constraints is unlikely to be effective.

This study shows that younger mothers stop breastfeeding in the very early post-natal weeks. Further work needs to be carried out to investigate attitudes and perceptions that are acting during the very early post-natal weeks to cause such a high cessation rate in younger mothers. Previous research has identified a number of barriers to breastfeeding such as perception that the baby is hungry (Hill & Humenick 1989), ambivalent attitude towards breastfeeding (Gregg 1989), the need to return to work (Bolling *et al.* 2007) and in teenagers in particular, breastfeeding being seen as an unacceptable behaviour (Dyson *et al.* 2010). In addition to looking at barriers to breastfeeding, consideration of what factors are positively associated with breastfeeding initiation and duration need to be investigated, and the effect of maternal age on these needs to be considered. A recent study examining factors positively associated with breastfeeding in adolescents demonstrated that being breastfed themselves or seeing a mother breastfeed was associated with the intention to breastfeed (Giles *et al.* 2010) and this work could be extended to establish whether these factors also affect breastfeeding duration. This would help provide a fuller understanding of attitudes and beliefs which itself could lead to interventions that are effective at increasing duration of breastfeeding in younger mothers.

There are a number of limitations and challenges inherent in research into breastfeeding characteristics

such as subject selection, response rate and information bias. As mentioned previously, the subjects of this study do not represent the general population since they are older and better educated, a phenomenon often seen in clinical research. However, this study is comparing outcome between two different age groups, and since the two study groups did not differ significantly from each other for any other demographic or environmental measurement, the observed results are likely to be due to the variable of interest, that is age. As the differences observed are still present in such a selected sample, this suggests that these differences are large and important in the general population which has a larger proportion of younger mothers than we were able to recruit onto this study. A strength of the study is that it has been able to utilise prospective records of feeding patterns, the results of which are likely to provide a more reliable description of the dynamics of breastfeeding than data collected retrospectively via questionnaire, albeit in a selected sample.

Conclusion

From a public health perspective, it is important that newborns are breastfed at birth and that they continue to receive breast milk for at least their first 6 months of life, ideally exclusively. Findings from this study demonstrate help and support for mothers who have decided to breastfeed should be focused on younger mothers, particularly in the first weeks post-partum to maximise breastfeeding duration and exclusivity. Previous research has shown this advice should be comprehensive and culturally appropriate through counsellors (be they doctors, nurses, midwives, lactation consultants or peer counsellors) during the post-natal period, initially in the hospital, and then continued with repeated support in the mother's home (Caulfield *et al.* 1998; Morrow *et al.* 1999; Ahluwalia *et al.* 2000). However, since our data demonstrate that once younger mothers have achieved 10–12 weeks of breastfeeding their cessation rates improve dramatically without any supportive programmes in place, the need for support in the first few weeks post-partum is most important. Since it has been shown that breastfeeding rates are higher

in cultures that are supportive of breastfeeding (National Institute for Health and Care Excellence 2005), further work needs to be carried out to find what changes can be made to make breastfeeding culturally acceptable to younger mothers, particularly for the first few months of their infant's life.

Acknowledgements

We thank all families who took part in the PIFA Study, the midwives of Winchester and Eastleigh Health Care Trust for their support of the study and help in recruitment and all staff involved in the day-to-day running of the study particularly L. Gudgeon, K. Scally, E. Gatrell, L. Bellis, A. Acqua and R. Kemp. Our thanks also goes to Professor Jonathan Hourihane for his crucial role in initially setting up the PIFA study.

Source of funding

This project was supported by the UK Food Standards Agency (Project TO7046) as part of EU Euro-Prevall Project Contract No. FOOD-CT-2005-514000.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

KECG, KDF, GCR and BMM were involved in the initiation and set-up of the study. KECG, EMO and TK were involved in recruitment and data collection. KECG, AP and KJ analysed and interpreted the data. BA wrote the initial draft of the manuscript. JM provided data management and analysis. KECG, AP, KJ, EMO, BE and BMM, assisted in the interpretation of results. All co-authors participated in manuscript preparation and critically reviewed all sections of the text for important intellectual content.

References

- Ahluwalia I.B., Tessaro I., Grummer-Strawn L.M., MacGowan C. & Benton-Davis S. (2000) Georgia's breastfeeding promotion program for low-income women. *Pediatrics* **105**, E85.

- Baxter J. (2011) Women's experience of infant feeding following birth by caesarean section. *British Journal of Midwifery* **14**, 290–295.
- Bolling K., Grant C., Hamlyn B. & Thornton A. (2007) *Infant Feeding Survey 2005*. BMRB International: London.
- Booth I. (2001) Does the duration of breast feeding matter? *BMJ* **322**, 625–626.
- Bryant C.A. (1982) The impact of kin, friend and neighbor networks on infant feeding practices. Cuban, Puerto Rican and Anglo families in Florida. *Social Science and Medicine* **16**, 1757–1765.
- Caulfield L.E., Gross S.M., Bentley M.E., Bronner Y., Kessler L. & Jensen J. (1998) WIC-based interventions to promote breastfeeding among African-American Women in Baltimore: effects on breastfeeding initiation and continuation. *Journal of Human Lactation* **14**, 15–22.
- Dozier A.M. & McKee K.S. (2011) State breastfeeding worksite statutes. . . breastfeeding rates . . . and . . . *Breastfeeding Medicine* **6**, 319–324.
- Dyson L., Green J.M., Renfrew M.J., McMillan B. & Woolridge M. (2010) Factors influencing the infant feeding decision for socioeconomically deprived pregnant teenagers: the moral dimension. *Birth* **37**, 141–149.
- Earland J., Ibrahim S.O. & Harpin V.A. (1997) Maternal employment: does it influence feeding practices during infancy? *Journal of Human Nutrition and Dietetics* **10**, 305–311.
- Earles S. (2002) Factors affecting the initiation of breastfeeding: implications for breastfeeding promotion. *Health Promotion International* **17**, 205–214.
- Forste R., Weiss J. & Lippincott E. (2001) The decision to breastfeed in the United States: does race matter? *Pediatrics* **108**, 291–296.
- Foster K., Lader D. & Cheesbrough S. (1997) *Infant Feeding report 1995*. HMSO: London.
- Gartner L.M., Morton J., Lawrence R.A., Naylor A.J., O'Hare D., Schanler R.J. *et al.* (2005) Breastfeeding and the use of human milk. *Pediatrics* **115**, 496–506.
- Giles M., Connor S., McClenahan C. & Mallet J. (2010) Attitudes to breastfeeding among adolescents. *Journal of Human Nutrition and Dietetics* **23**, 285–293.
- Gilmour C., Hall H., McIntyre M., Gillies L. & Harrison B. (2009) Factors associated with early breastfeeding cessation in Frankston, Victoria: a descriptive study. *Breastfeeding Review* **17**, 13–19.
- Graffy J. & Taylor J. (2005) What information, advice, and support do women want with breastfeeding? *Birth* **32**, 179–186.
- Gregg J.E. (1989) Attitudes of teenagers in Liverpool to breast feeding. *BMJ (Clinical Research Ed.)* **299**, 147–148.
- Health and Social Care Information Centre (2012) Infant Feeding Study 2010. 20-11-2012. 26-11-2012. Ref Type: Online Source.
- Heck K.E., Braveman P., Cubbin C., Chavez G.F. & Kiely J.L. (2006) Socioeconomic status and breastfeeding initiation among California mothers. *Public Health Reports* **121**, 51–59.
- Hill P.D. & Humenick S.S. (1989) Insufficient milk supply. *Image – the Journal of Nursing Scholarship* **21**, 145–148.
- Imdad A., Yakoob M.Y. & Bhutta Z.A. (2011) The effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries. *BMC Public Health* **11** (Suppl. 3), s24.
- Keil T., McBride D., Grimshaw K., Niggemann B., Xepapadaki P., Zannikos K. *et al.* (2010) The multinational birth cohort of EuroPrevall: background, aims and methods. *Allergy* **65**, 482–490.
- Kelly Y.J. & Watt R.G. (2005) Breast-feeding initiation and exclusive duration at 6 months by social class – results from the Millennium Cohort Study. *Public Health Nutrition* **8**, 417–421.
- Lanting C.I., van Wouwe J.P. & Reijneveld S.A. (2005) Infant milk feeding practices in the Netherlands and associated factors. *Acta Paediatrica* **94**, 935–942.
- Ludvigsson J.F. & Ludvigsson J. (2005) Socio-economic determinants, maternal smoking and coffee consumption, and exclusive breastfeeding in 10205 children. *Acta Paediatrica* **94**, 1310–1319.
- Michaelsen K.F., Larsen P.S., Thomsen B. & Samuelson G. (1994) The Copenhagen cohort study on infant nutrition and growth: duration of breastfeeding and influencing factors. *Acta Paediatrica* **83**, 565–571.
- Morrow A.L., Guerrero M.L., Shults J., Calva J.J., Lutter C., Bravo J. *et al.* (1999) Efficacy of home-based peer counselling to promote exclusive breastfeeding: a randomised controlled trial. *Lancet* **353**, 1226–1231.
- National Institute for Health and Care Excellence (2005) *The Effectiveness of Public Health Intervention to Promote the Duration of Breastfeeding: A Systematic Review*. National Institute for Health and Care Excellence: London.
- Office of National Statistics (2-10-2011) Statistical Bulletin: Live births in England and Wales by characteristics of the mother 2010. Ref Type: Online Source.
- Scott J.A. & Binns C.W. (1999) Factors associated with the initiation and duration of breastfeeding: a review of the literature. *Breastfeeding Review* **7**, 5–16.
- Senarath U., Dibley M.J. & Agho K.E. (2010) Factors associated with nonexclusive breastfeeding in 5 east and southeast Asian countries: a multilevel analysis. *Journal of Human Lactation* **26**, 248–257.
- Susin L.R., Giugliani E.R., Kummer S.C., Maciel M., Simon C. & Da Silveira L.C. (1999) Does parental

- breastfeeding knowledge increase breastfeeding rates? *Birth* **26**, 149–156.
- Thulier D. & Mercer J. (2009) Variables associated with breastfeeding duration. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* **38**, 259–268.
- Van Rossem L., Oenema A., Steegers E.A., Moll H.A., Jaddoe V.W., Hofman A. *et al.* (2009) Are starting and continuing breastfeeding related to educational background? The generation R study. *Pediatrics* **123**, e1017–e1027.
- World Health Organisation (2008) Up to what age can a baby stay well nourished by just being breastfed? Ref Type: Online Source.
- Wright A., Rice S. & Wells S. (1996) Changing hospital practices to increase the duration of breastfeeding. *Pediatrics* **97**, 669–675.
- Yngve A. & Sjostrom M. (2001) Breastfeeding determinants and a suggested framework for action in Europe. *Public Health Nutrition* **4**, 729–739.