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The prevalence and determinants of breast-feeding initiation and duration in a sample of women in Ireland

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Abstract

Objective: To assess breast-feeding initiation and prevalence from birth to 6 months in a sample of mothers in Dublin, and to determine the factors associated with breast-feeding initiation and 'any' breast-feeding at 6 weeks in a sample of Irish-national mothers.

Design: This prospective cross-sectional study involved the recruitment of women during the antenatal period, with subsequent follow-up of mothers who delivered healthy, term singleton infants, at 6 weeks and 6 months postpartum.

Setting: Participants were recruited from antenatal clinics in the Coombe Women and Infants University Hospital, Dublin.

Subjects: In all, 401 Irish-national and forty-nine non-Irish-national mothers met the criteria for inclusion in the present study.

Results: Breast-feeding initiation rates of the Irish-national and non-Irish-nationals were 47 % and 79·6 %, respectively. Factors that were significantly ($P = 0{\cdot}000$) associated with both breast-feeding initiation and 'any' breast-feeding at 6 weeks included mothers who were ≥35 years, educated to third level, reported positive postnatal encouragement to breast-feed from their partners and had a positive antenatal intention to breast-feed. The maternal negative perception that breast-feeding is an embarrassing way to feed an infant was demonstrated as a major barrier to initiation.

Conclusions: Breast-feeding initiation and prevalence rates of the Irish-national population remain low and lag considerably behind national and international targets. Inclusion of the partner in breast-feeding promotional initiatives during the antenatal period may be crucial to increase breast-feeding rates in Ireland. Public health campaigns that focus on increasing the social acceptability of breast-feeding may prove effective in addressing this cultural barrier.

Keywords
Breast-feeding
Prevalence
Duration rates
Determinants
Ireland

The evidence for the short- and long-term health benefits of breast-feeding for the young infant[1,2] and mother[3,4], in both developing[5,6] and developed countries[7–9], is robust, and recognised globally[10,11]. More recently, data suggest that the promotion of exclusive breast-feeding for prolonged duration[12,13] may represent a potentially ideal window of opportunity for obesity prevention[14–16], which is especially pertinent as childhood and adulthood obesity rates are increasing both in Ireland[17,18] and internationally[19,20]. The WHO globally recommends exclusive breast-feeding during the first 6 months of life with the introduction of solid foods thereafter, and continued breast-feeding until 2 years of age or above[21], a recommendation that was subsequently endorsed in Ireland in 2003[22]. Although the rates of exclusive breast-feeding at 6 months postpartum are low internationally[23], it is well documented that the breast-feeding rates in Ireland throughout infancy are among the lowest worldwide[24–27].

Recent figures from the 2005 National Perinatal Statistics (NPS) report an initiation rate (rate of exclusive breast-feeding upon hospital discharge or under domiciliary care) of 44 %[28], a rate well below Irish and international targets. This figure represents only a small increase in breast-feeding initiation from previous NPS[28], including 42·5 % in 2004, 41 % in both 2003 and 2002 and 39 % in 2001, in comparison to higher breast-feeding initiation rates reported internationally in 2005, including 78 % in the Netherlands (n 9133)[29], 71 % in the USA (n 3444)[30] and 71 % in the UK (n 18 125)[31].

To improve breast-feeding rates, it is emphasised that ascertaining the factors important to a mother's decision about how to feed her infant is crucial[32]. Moreover, the acquisition of country-specific knowledge about the type

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and importance of the determinants for breast-feeding is essential for building effective promotion programmes[33]. However, a paucity of data exists with regard to the feeding of infants in Ireland[34], and greater investigations are needed to explain the persistently low breast-feeding rates[35]. Difficulties are compounded by the fact that no national breast-feeding monitoring system exists beyond the point of hospital discharge in Ireland, resulting in a total lack of national breast-feeding duration rates. Furthermore, no published data are currently available on the feeding of infants born to non-Irish-national mothers, a population which now accounts for 10 % of the current population in Ireland[36]. Although several regional studies have been carried out to examine breast-feeding rates[37,38], some of these studies[39–41] do not include well-defined breast-feeding definitions, making comparison with other national and international breast-feeding data difficult[42]. Further limitations in Irish-based infant-feeding studies relate to the reported recruitment bias towards mothers from higher socio-economic groups[43,44] and the exclusion of asylum seekers, because of the difficulties in the follow-up of this population[38].

In view of the above, we undertook the present study to assess breast-feeding initiation and prevalence from birth to 6 months in a sample of mothers in Dublin, and to determine the factors associated with breast-feeding initiation and 'any' breast-feeding at 6 weeks in a sample of Irish-national mothers.

Experimental methods

Study design and population

This cross-sectional, prospective study (1 June 2004–31 October 2006) involved the recruitment of 491 pregnant women from separate public, semi-private and private antenatal clinics in the Coombe Women and Infants University Hospital (CWIUH) in west Dublin. During the study interval, the CWIUH had membership to the Breast-feeding Friendly Hospital Initiative.

Specific and separate weekly timetabled public, semi-private and private antenatal clinics are held in the CWIUH. Across the seating arrangements in each clinic women were consecutively invited to participate in the present study. Women were deemed eligible to participate if they were ≥24 weeks gestational age, reported a singleton pregnancy and were planning to reside in Ireland for at least 6 months postpartum. Representing the sociodemographic profile of women who attend public and semi-private/private antenatal clinics (58 % and 42 %, respectively) in the hospital, 51 % and 49 % of the study cohort were recruited from these clinics, respectively.

From the initial sample of 539 women who met the study inclusion criteria, and who were invited to participate in the present study, 491 women (91 %) agreed to participate and gave signed consent.

All eligible mothers who subsequently delivered a healthy, singleton, term infant ≥37 weeks gestational age, weighing ≥2·5 kg at birth, were followed up postpartum. Follow-up of mothers consisted of either a telephone or a face-to-face interview by one investigator within a time frame of 7 d after the infants 6th week and at 6 months of age. Of the 491 mothers who were recruited, 98 % (*n* 483) were followed up at the 6-week follow-up and from this sample, 94 % of mothers (*n* 454) were followed up at 6 months. Owing to case exclusions due to missing values (*n* 4), infant prematurity (*n* 19), one postnatal infant death and five intra-uterine deaths, as well as cases lost to follow-up (*n* 12), 450 mothers met the criteria for the final data analysis. This final sample included 401 Irish-national, 49 non-Irish-national mothers.

Data collection

Data were collected using three semi-structured questionnaires. The first questionnaire was completed by mothers at recruitment in the hospital antenatal clinic, with a follow-up interviewer-administered questionnaire at 6 weeks and 6 months postpartum, either in the hospital clinic, in the mothers' home or via telephone. Questions addressed breast-feeding initiation and duration[45], maternal perceptions and attitudes[46], ethnic considerations[47], factors related to the partner[10] and mother's employment status[48,49]. All three questionnaires were pre-tested on three separate pilot groups.

The first self-administered questionnaire was designed to record information on variables suggested to be associated with infant-feeding decisions including mothers': infant-feeding history, attitudes/exposure to breast-feeding and perception of partners' infant-feeding preference. Maternal and paternal reported sociodemographic, anthropometric and employment factors were also identified. Data relating to mothers medical and obstetric status were obtained from the medical notes.

The 6-week and 6-month interviewer-administered questionnaires aimed to collect quantitative data on mothers' infant-feeding methods and practices along with the reasons for such feeding choices. Data relating to in-hospital practices including rooming-in, occurrence of skin-to-skin contact and mothers' satisfaction with the support received on the ward, post birth, were elicited from the 6-week questionnaire. Detailed barriers to breast-feeding initiation or reasons for early discontinuation were elicited in both follow-up questionnaires. Mothers were questioned on their infant's milk-feeding status and/or the inclusion of solid foods in their infant's diet. Infant-feeding status was collected at a moment in time via maternal 24 h recall of the infant's usual diet at 6 weeks and again, at 6 months. Any feeding transitions that occurred between the contact points with mothers were retrospectively recorded, enabling the collection of infant-feeding status at the point of hospital discharge, at 4, 8, 12, 16 and 20 weeks postpartum. For mothers who initiated breast-feeding but who

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were no longer breast-feeding at 6 weeks or 6 months, data were collected on the number of days the mothers exclusively, predominantly or partially breast-fed, from which the duration of 'any' breast-feeding was recorded.

The definitions of exclusive and predominant breast-feeding in the present study were in accordance with the WHO[50,51] breast-feeding definitions and were strictly used. Thus, exclusive breast-feeding referred to mothers who only offered breast milk to their infants (including expressed breast milk), while giving no other food or liquid, not even water, with the exception of drops or syrups (vitamins, minerals, medicines). 'Partial breast-feeding' included infants who received breast milk in combination with formula feeds or other non-human milk feeds and/or solid food[52,53] and 'any' breast-feeding referred to all infants who received 'any' breast milk or a combination of breast milk with other non-human milk feeds and/or solid food[30,54]. Breast-feeding 'initiation' in the present study was defined as all mothers who 'ever' tried to breast-feed post birth.

Statistical analyses

The Statistical Package for the Social Sciences statistical software package version 13.0 (SPSS Inc.; Chicago, IL, USA) was used for all statistical analyses. Comparison between groups was performed by means of the Student's t test for continuous variables and by the χ^2 test for categorical variables using the Yates's continuity correction value when two dichotomous variables were analysed. Data are presented using numerical descriptive statistics, including means with standard deviations (SD) and medians with interquartile ranges (IQ). Descriptive statistics and cross-tabulations were generated for demographic factors, tables were used for breast-feeding rates and binary logistic regression was used to predict breast-feeding initiation and 'any' breast-feeding at 6 weeks.

To explore the independent factors associated with breast-feeding initiation and 'any' breast-feeding at 6 weeks, only those factors that were significant ($P < 0{\cdot}05$) in univariate analysis were included in binary logistic regression models. Univariate and adjusted odds ratios (OR) and 95% confidence intervals (CI) were calculated for each factor.

Ethical considerations

Ethical approval for the present study was obtained from the ethics committee of the CWIUH and the Dublin Institute of Technology. Informed consent was obtained from the parent(s).

Results

Sociodemographic, biomedical and infant characteristics of the sample

Table 1 shows the social and demographic characteristics of the Irish-national and non-Irish-national mothers for whom complete data are available from the 6-week (mean 6·56 weeks (SD 0·42)) and 6-month (mean 24·7 weeks (SD 0·43)) follow-up. The two populations differed in terms of marital status ($P = 0{\cdot}042$) and maternal social class ($P = 0{\cdot}003$), with a higher proportion of married and stay-at-home mothers observed in the non-Irish-national population. In addition, a shorter duration of hospital stay ($P = 0{\cdot}05$) was observed in the non-Irish-national, compared to the Irish-national population (3·2 d (SD 1·63) *v.* 3·7 d (SD 1·75), respectively).

The non-responders in the present study (n 48) were either unwilling to take part or were planning to emigrate from Ireland during the initial months postpartum. Compared to the responders, the non-responders were significantly ($P = 0{\cdot}001$) more likely to be younger, smokers and reported an antenatal intention to formula-feed postpartum (data not shown).

Breast-feeding initiation and prevalence

In total, 47% (n 189) of the Irish-national and 79·6% (n 39) of the non-Irish-national mothers initiated breast-feeding postpartum ($P = 0{\cdot}000$). Significantly higher 'any', exclusive and partial breast-feeding rates were observed in the non-Irish-national compared to the Irish-national population ($P = 0{\cdot}000$) during the first 20 weeks (see Table 2). The highest drop in 'any' breast-feeding was observed between hospital discharge and 4 weeks in the Irish-national mothers (10·3%) and between 4 and 6 weeks in the non-Irish-national mothers (8·2%). Less than half (44%) of the Irish-national mothers who initiated breast-feeding were exclusively breast-feeding at 4 weeks postpartum and from the two populations, only one Irish-national mother was still exclusively breast-feeding at 6 months. While the partial breast-feeding rate of the Irish-national mothers remained relatively unchanged during the first 6 months (6·5–9·4%), there was a marked trend towards increased partial breast-feeding between 12 weeks and 6 months in the non-Irish-national population.

Breast-feeding duration rates

The duration of 'any' breast-feeding during the study time frame was significantly higher ($P = 0{\cdot}000$) in the non-Irish-national (median 170 d, IQ 84–175) compared to the Irish-national (median 56 d, IQ 7–126) population. No significant difference ($P = 0{\cdot}510$) was observed in the number of days mothers exclusively breast-fed between the two populations (median 56 d, IQ 0–112 *v.* median 21 d, IQ 2–84, respectively).

Determinants of breast-feeding initiation in the Irish-national population

The sociodemographic factors that influenced breast-feeding initiation after adjustment included: non-smoking (OR 3·1; 95% CI 1·6, 5·9) primiparous (OR 3·1; 95% CI 1·9, 5·2) mothers, ≥35 years (OR 5·4; 95% CI 2·4, 12·4) and educated to third level education (OR 4·1; 95% CI 2·3, 7·4) (see Table 3). Almost 94% of the mothers who initiated breast-feeding reported a positive antenatal intention to

Table 1 Social and demographic characteristics of the Irish-national and non-Irish-national mothers as well as the characteristics of their infants

	Irish-national mothers (*n* 401)		Non-Irish-national mothers (*n* 49)	
Characteristic	%	*n*	%	*n*
Maternal education				
Primary and secondary	39·9	160	34·7	17
Vocational/training course	28·7	115	18·4	9
Third level degree/postgraduate level	31·4	126	46·9	23
Maternal age (years)				
≤24	22·4	90	16·3	8
25–34	59·4	238	59·2	29
≥35	18·2	73	24·5	12
Marital status*				
Married	58·6	235	75·5	37
Unmarried/partnered	30·9	124	22·4	11
Single	10·5	42	2·0	1
Maternal social class** (based on occupation†)				
Social class 1	30·9	124	32·7	16
Social class 2	30·7	123	10·2	5
Social class 3	11·5	46	6·1	3
Unknown category (unemployed/students)	11·5	46	22·4	11
Stay-at-home mothers/home-makers	15·5	62	28·6	14
Employment status of mothers postpartum				
Returned to work ≤18 weeks	19·7	79	10·2	5
Returned to work >18 weeks	18·2	73	10·2	5
Did not return to work outside the home	62·1	249	79·6	39
Parity				
Primiparous	48·9	196	34·7	17
Multiparous	51·1	205	65·3	32
Gender of infant				
Male	55·6	223	55·1	27
Female	44·4	178	44·9	22
Type of delivery				
Spontaneous vaginal delivery	76·6	307	75·5	37
Caesarean section	23·4	94	24·5	12
Birth weight (kg)				
≤2·99	14·5	58	14·3	7
3–4	69·1	277	65·3	32
>4	16·5	66	20·4	10
	Mean	SD	Mean	SD
Gestational age at birth (weeks)	40·21	1·3	39·86	1·14

*$P = 0·042$; **$P = 0·003$.
†Maternal occupations were categorised according to the social class categories from the UK[55] and Irish[56] classification system; a separate category was created for those who reported that they were 'stay-at-home mothers'.

breast-feed postpartum compared to 94% of the non-initiators who had no positive antenatal intention to breast-feed. After adjustment, mothers' positive antenatal feeding intention to breast-feed was indicated as one of the most important independent determinants ($P = 0·000$) of breast-feeding initiation (OR 224; 95% CI 85, 587). Mothers who reported positive postnatal encouragement to breast-feed from the partner (OR 7·9; 95% CI 4·6, 13·8) and the maternal grandmother (OR 6·2; 95% CI 3·4, 11·3) were significantly more likely to initiate breast-feeding. Maternal antenatal attitudes towards breast-feeding were also found to influence a mothers' feeding decision with those who reported that breast-feeding is 'not embarrassing' being significantly more likely to initiate the practice.

Maternal perceptions about breast-feeding initiation

The principal perceived reasons reported by mothers for initiating breast-feeding related to the optimum health benefits of breast milk (54%), intrinsic mother-led reasons such as a wish to promote bonding and maternal instinct (18%) along with positive encouragement from others (health professionals, family, friends) to breast-feed (15%) (data not shown). The following were the principal perceived reasons reported by mothers for not initiating breast-feeding: embarrassment of breast-feeding in front of others/in public (31%), time and lifestyle restrictions associated with breast-feeding (24%), a reported negative perception of breast-feeding (11%), as well as mothers' general preference not to breast-feed (8%) (data not shown).

Determinants of 'any' breast-feeding at 6 weeks in the Irish-national population

As presented in Table 4, the factors that influenced 'any' breast-feeding at 6 weeks included primiparous (OR 1·9; 95% CI 1, 3·4) mothers, ≥35 years (OR 4·9; 95% CI 1·6, 14·4) and educated to third level (OR 5·7; 95% CI 2·7, 12·2). Similar to the factors influencing initiation, mothers who had

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Table 2 Prevalence of breast-feeding* in the Irish-national (*n* 401) and non-Irish-national (*n* 49) population from the point of discharge from the maternity hospital to 6 months postpartum

	Exclusive breast-feeding				Predominant breast-feeding				Partial breast-feeding				'Any' breast-feeding			
	Irish-national		Non-Irish-national		Irish-national		Non-Irish-national		Irish-national		Non-Irish-national		Irish-national		Non-Irish-national	
Age of infant (weeks)	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*
0†	31·7	127	49·0	24	0·5	2	2·0	1	6·5	26	26·5	13	38·7	155	77·5	38
4	20·9	84	44·9	22	0·5	2	2·0	1	7·0	28	28·6	14	28·4	114	75·5	37
6	14·5	58	40·8	20	0·7	3	2·0	1	9·2	37	24·5	12	24·4	98	67·3	33
8	14·5	58	40·8	20	0·7	3	2·0	1	8·5	34	24·5	12	23·7	95	67·3	33
12	12·7	51	36·7	18	0·5	2	2·0	1	7·0	28	22·4	11	20·2	81	61·1	30
16	7·2	29	18·4	9	0·2	1	2·0	1	9·2	37	34·7	17	16·6	67	55·1	27
20	3·2	13	8·2	4	0·0	0	2·0	1	8·0	32	38·8	19	11·2	45	49·0	24
24	0·2	1	0·0	0	0·0	0	0·0	0	9·4	38	46·9	23	9·6	39	46·9	23

*For breast-feeding definitions, see Experimental Methods section.
†0 refers to the feeding status at the point of discharge from the maternity hospital.

positive antenatal feeding intention to breastfeed (OR 31·7; 95% CI 10·5, 95), reported positive encouragement to breast-feed from the partner (OR 4·0; 95% CI 2·2, 7·3) and who had the perception that breast-feeding is 'natural' (OR 3·7; 95% CI 2, 6·8) were more likely to have been offering 'any' breast milk to their infants at 6 weeks.

Reasons for discontinuing breast-feeding during the first 6 weeks

The principal reasons for discontinuing breast-feeding during the first 6 weeks postpartum related to maternal tiredness (26%) as well as to the demands of breast-feeding due to frequent feeding frequency (23%). Almost one-sixth of mothers (17%) discontinued owing to their perception that they had an inadequate breast milk supply and the perception that the breast milk was not satisfying their infant's hunger. Few mothers reported work return (1%), lack of breast-feeding support and reassurance (1%), and infant- (4%) and mother-related illness (5%) as the principal reasons for abandoning the practice (data not shown).

Discussion

Despite the recognised benefits of breast-feeding[1–9], the majority of infants born in Ireland never experience the benefits of breast milk[28], a pattern that has been observed over the last 30 years[57–59]. With a view to increasing breast-feeding rates, the present study sought to provide data on breast-feeding initiation and prevalence in a sample of Irish-national and non-Irish-national mothers, including the factors that influence initiation and 'any' breast-feeding at 6 weeks in the former population.

An important finding from the present study was the significant difference in the breast-feeding initiation and prevalence rates between the two study populations. While the high breast-feeding initiation rate of the non-Irish-national population (79·6%) in the present study is comparable with initiation rates (71–84%) reported internationally[30,60,61], the initiation rate of 47% found in the Irish-national population remains low and far from the achievement of national breast-feeding targets[24]. In contrast, lower initiation rates of 39·5%, 38% and 36% have been reported in earlier studies from Dublin[62], Co. Kildare[39] and Galway[63], respectively; however, more recent regional studies from Dublin[38,59] report a higher initiation rate of 51%.

Interestingly, the 2004 NPS[28], which coincided with the first year of data collection in the present study, reports that 42·5% of mothers in Ireland were exclusively breast-feeding at hospital discharge, which is over 10% higher than the figure found here among Irish-national mothers (31·7%). It is thus possible that the low breast-feeding rates found in the present study were specific to the mothers who attended the CWIUH

Table 3 Factors influencing breast-feeding initiation in the Irish-national population, performed by binary logistic regression analysis

	Initiated (*n* 189)		Non-initiators (*n* 212)		Univariate		Adjusted*		
Factors	%	*n*	%	*n*	OR	95 % CI	OR	95 % CI	*P* value
Maternal education									
Primary and secondary	23·3	44	54·7	116	1·0†		1·0		
Vocational/training course	30·2	57	27·4	58	2·5	1·5, 4·2	2·3	1·3, 4·1	
Third level degree/postgraduate level	46·6	88	17·9	38	6·1	3·6, 10·2	4·1	2·3, 7·4	0·000
Maternal age (years)									
≤24	13·8	26	30·2	64	1·0		1·0		
25–34	59·8	113	59·0	125	2·2	1·3, 3·7	1·5	0·8, 2·9	
≥35	26·5	50	10·8	23	5·3	2·7, 10·4	5·4	2·4, 12·4	0·000
Smoking status during pregnancy									
Yes	8·5	16	36·3	77	1·0		1·0		
No	91·5	173	63·7	135	6·1	3·4, 11	3·1	1·6, 5·9	0·001
Parity									
Multiparous	40·7	77	60·4	128	1·0		1·0		
Primiparous	59·3	112	39·6	84	2·2	1·4, 3·3	3·1	1·9, 5·2	0·000
Type of delivery									
Spontaneous vaginal delivery	75·7	143	77·4	164	1·0		1·0		
Caesarean section	24·3	46	22·6	48	1·0	0·6, 1·7	0·7	0·4, 1·2	0·227
Gender of infant									
Female	41·3	78	47·2	100	1·0		1·0		
Male	58·7	111	52·8	112	1·2	0·8, 1·8	1·2	0·7, 1·9	0·391
Birth weight (kg)									
≤2·99	7·4	14	20·8	44	1·0		1·0		
3–4	72·0	136	66·5	141	3·0	1·5, 5·7	2·1	1·0, 4·4	
>4	20·6	39	12·7	27	4·5	2·0, 9·8	2·3	0·9, 5·5	0·111
Mothers' antenatal infant-feeding intention									
No positive intention to breast-feed	6·3	12	93·9	199	1·0		1·0		
Positive intention to breast-feed	93·7	177	6·1	13	225·7	100, 507	224	85, 587	0·000
Mothers' antenatal attitude to breast-feeding practice being									
Embarrassing	37·6	71	59·9	127	1·0		1·0		
Not embarrassing	62·4	118	40·1	85	2·4	1·6, 3·7	2·3	1·4, 3·7	0·000
Feeding mode encouraged by the partner postnatally‡									
Did not encourage breast-feeding	33·2	61	80·5	149	1·0		1·0		
Positively encouraged breast-feeding	66·8	123	19·5	36	8·3	5·1, 13·4	7·9	4·6, 13·8	0·000
Feeding mode encouraged by the maternal grandmother									
Did not encourage breast-feeding	59·3	112	87·3	185	1·0		1·0		
Positively encouraged breast-feeding	40·7	77	12·7	27	4·7	2·8, 7·7	6·2	3·4, 11·3	0·000
Maternal reporting of the most beneficial feeding mode for infants									
Formula feeding	1·1	2	21·7	46	1·0		1·0		
No difference between formula and breast milk	3·2	6	33·5	71	1·9	0·3, 10	2·4	0·4, 13·3	
Breast-feeding	95·8	181	44·8	95	43·8	10·4, 184	39·7	8·9, 177	0·000

*Adjusted for maternal age and education, smoking status, parity and infant birth weight.
†1·0 denotes the reference category.
‡*n* 369 mothers reported that they had a partner who was actively involved in their lives.

Table 4 Factors influencing 'any' breast-feeding (AB) at 6 weeks in the Irish-national population, performed by binary logistic regression analysis

	AB at 6 weeks (*n* 98)		Non-AB at 6 weeks (*n* 303)		Univariate		Adjusted*		
Factors	%	*n*	%	*n*	OR	95 % CI	OR	95 % CI	*P* value
Maternal education									
Primary and secondary	13·3	13	48·5	147	1·0†		1·0		
Vocational/training course	24·5	24	30·0	91	2·9	1·4, 6·1	2·3	1·0, 5·1	
Third level degree/postgraduate level	62·2	61	21·5	65	10·6	5·4, 20·6	5·7	2·7, 12·2	0·000
Maternal age (years)									
≤24	9·2	9	26·7	81	1·0		1·0		
25–34	54·1	53	61·1	185	2·5	1·2, 5·4	1·1	0·4, 3	
≥35	36·7	36	12·2	37	8·7	3·8, 20	4·9	1·6, 14·4	0·000
Parity									
Multiparous	43·9	43	53·5	162	1·0		1·0		
Primiparous	56·1	55	46·5	141	1·4	0·9, 2·3	1·9	1, 3·4	0·033
Gender									
Female	46·9	46	43·6	132	1·0		1·0		
Male	53·1	52	56·4	171	0·87	0·5, 1·3	0·24	0·4, 1·2	0·24
Timing of when mother made her infant-feeding decision									
During the pregnancy	27·6	27	43·2	131	1·0		1·0		
Pre-pregnancy	72·4	71	56·8	172	2·0	1·2, 3·2	3·5	1·9, 6·5	0·000
Feeding mode encouraged by partner postnatally‡									
Did not encourage breast-feeding	27·8	27	67·3	183	1·0		1·0		
Positively encouraged breast-feeding	72·2	70	32·7	89	5·3	3·1, 8·8	4·0	2·2, 7·3	0·000
Mothers' antenatal feeding intention									
No positive intention to breast-feed	5·1	5	68	206	1·0		1·0		
Positive intention to breast-feed	94·9	93	32	97	39·5	15, 100	31·7	10·5, 95	0·000
Mothers' antenatal attitude to breast-feeding practice being									
Not natural	32·7	32	61·1	185	1·0		1·0		
Natural	67·3	66	38·9	118	3·2	1·9, 5·2	3·7	2, 6·8	0·000
Employment status of mothers during the first 6 months postpartum									
Did not return to work outside the home	59·2	58	63	191	1·0		1·0		
Returned to work ≤18 weeks	19·4	19	19·8	60	1·0	0·5, 1·8	1·5	0·7, 3·3	
Returned to work >18 weeks	21·4	21	17·2	52	1·3	0·7, 2·3	0·9	0·4, 1·8	0·441

*Adjusted for maternal age, education, smoking status, parity, infant birth weight and parental social class.
†1·0 denotes the reference category.
‡*n* 369 mothers reported that they had a partner who was actively involved in their lives.

between 2004 and 2006. Nonetheless, based on the differing breast-feeding rates between the non-Irish-nationals and Irish-nationals in the present study, our results suggest that a separate analysis of breast-feeding rates by mothers' nationality in future breast-feeding monitoring systems and NPS reports in Ireland may yield valuable information as regards national breast-feeding trends over time.

An extremely low level of compliance with the WHO (2001) recommendation was found in the present study, with only one Irish-national mother reported to be exclusively breast-feeding at 6 months. A similarly low exclusive breast-feeding rate of <1 % at 6 months was reported in an earlier national infant-feeding study (*n* 1195)[64] indicating that there has been no prolongation of exclusive breast-feeding among Irish mothers over the last 20 years. The rate of exclusive breast-feeding at 6 months, however, appears low worldwide with rates of 6 % and 4·7 % reported in China[54] and Italy, respectively[65]. It is a further concern that mothers in the present study were reluctant to exclusively breast-feed to 16 weeks postpartum with rates in the Irish-national and non-Irish-national populations dropping to 7·2 % and 18·4 % respectively, at this time point.

A precipitous drop in the 'any' breast-feeding rate in the Irish-national mothers between each follow-up point in the present study was also highlighted. The highest drop in 'any' breast-feeding occurred during the hospital stay (8·3 %) and between hospital discharge and 4 weeks postpartum (10·3 %) in the Irish-national population. Other investigators in Ireland have reported similar findings[40,59]. The fact that almost 40 % of Irish-national mothers who initiated breast-feeding in the hospital had abandoned the practice by 4 weeks suggests that the interval from birth to 4 weeks is particularly sensitive to a change in the feeding decision and breast-feeding cessation. Although the two study populations experienced similar support from the health professionals in the hospital (2004–2006), few non-Irish-national mothers abandoned breast-feeding during the hospital stay. Taken

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together, our data suggest that a breast-feeding-supportive culture in the latter population exists and was likely to have contributed towards continued breast-feeding during the first 6 months.

It is a further possibility that the higher breast-feeding rates observed in the non-Irish-national population may be explained by the significantly greater proportion of married and/or stay-at-home mothers in this population, factors that are known to be positively associated with breast-feeding[66,67]; however, variability in breast-feeding rates by ethnic diversity has been reported by other investigators[68,69]. Data from Kelly and collegues[68] in the UK (n 17 474) found that the highest breast-feeding rates from initiation to 3 months postpartum, after adjustment, were among the Black African, Black Caribbean and Asian, compared to White mothers. Similarly, foreign-Latina mothers in the USA were more likely to initiate breast-feeding than USA-born Latina, or White non-Hispanic mothers[69]. Furthermore, data from the present study show that partial rather than exclusive or predominant breast-feeding was a more common practice among non-Irish-national, compared to the Irish-national mothers throughout the study, a practice that contributed to the maintenance of their 'any' breast-feeding rates to 6 months. It is well established that culturally based feeding beliefs influence how mothers make decisions[70]; however, the context of maternal beliefs and decisions can also change in those who immigrate to a different culture and geographic region[71]. An examination of the effect of immigration to Ireland on the breast-feeding practices of the non-Irish-national population should thus be considered in future research.

The present study also sought to identify the factors that influence breast-feeding initiation and 'any' breast-feeding at 6 weeks in the Irish-national population. Similar to earlier international[31,72,73] and regional Irish studies[38,44], our data show that sociodemographic variables, including maternal age, education level and parity, were consistent predictive factors in determining breast-feeding initiation and 'any' breast-feeding at 6 weeks. In particular, mothers who had a third level education were almost six times more likely to have been breast-feeding at 6 weeks ($P = 0{\cdot}000$) compared to those who had a primary or secondary educational attainment level. Although work return has been reported as a barrier to breast-feeding initiation and duration in other studies from the USA[74] and UK[75], no significant associations were observed between these variables in the present study.

There is little doubt from our data that a positive antenatal intention to breast-feed is one of the strongest and persistent independent predictors of breast-feeding initiation and 'any' breast-feeding at 6 weeks, a finding that agrees with other studies[76,77]. The importance of the antenatal period in determining breast-feeding success postpartum in the present study is further highlighted by the fact that mothers who made their decision to breast-feed pre-pregnancy were more likely to offer breast milk to their infants at 6 weeks. Our data suggest that in order to improve breast-feeding rates, the antenatal period should be targeted as being an effective time in which to concentrate efforts to promote breast-feeding. Moreover, exploring the concerns of parents who indicate ambivalence or resistance towards breast-feeding antenatally may be essential in addressing socio-cultural issues and misperceptions[78].

Results from the present study also underscore the importance of positive encouragement from the partner and maternal grandmother to breast-feed on initiation and duration postpartum. Consistent with these associations, a wealth of evidence highlights the importance of social and emotional support from the partner[79,80], family members and friends in promoting breast-feeding initiation and duration[81,82]. The provision of partner and grandmother-specific infant-feeding information and guidance during the ante- and postnatal period may prove to be an effective measure in the promotion of breast-feeding, across all socio-economic groups.

Other emerging themes from our data relate to the important role of positive maternal attitudes and perceptions of the acceptability of breast-feeding in public in determining breast-feeding rates. In another Irish study, confusion around the dual feeding/sexual role of the female breast has been shown to be associated with the embarrassment of breast-feeding, with the majority of participants reporting that they disapproved of the practice in public[83]. Moreover, maternal attitudes, compared to sociodemographic factors, have been suggested as better predictors of feeding choice[84]. Although national efforts to promote breast-feeding as a cultural norm continue, results from the present study highlight the perception among many mothers that breast-feeding is a social taboo and an embarrassing way to feed an infant. These data are further supported by mothers' principal reasons for choosing not to breast-feed in the present study, with the 'embarrassment issue' being a priority among almost a third of these mothers (31 %). Clearly, the cultural barrier towards breast-feeding appears to still prevail among mothers in Ireland, and if our breast-feeding rates are to ever improve, stronger motivations and creative campaigns that relate directly towards addressing the negative cultural perception of the practice need to be considered.

Positive features of the present study include the high follow-up response rates and the consistent and strict use of breast-feeding definitions. Several limitations of the work must also be considered. Firstly, the fact that mothers were recruited and lived within a similar geographical area may limit the generalisability of the data to the rest of Ireland. The fact that there was an under-representation of mothers recruited from public antenatal clinics (51 %), relative to the proportion that attend such clinics in the CWIUH (58 %), may also have influenced

our results. Finally, long-term recall of breast-feeding data has been found to be inaccurate[85] and it is possible that the maternal reporting of the feeding status of some infants at 4, 8, 12, 16 and 20 weeks, in particular, was influenced by maternal memory bias. Due to direct maternal reporting of the feeding status of infants at 6 weeks and 6 months, however, the accuracy of the feeding status at these time points can be assured.

Conclusions

Non-Irish-national, compared to Irish-national, mothers were significantly more likely to initiate and offer 'any' breast milk to their infants during the first 6 months postpartum. The WHO (2001) recommendation was adhered to by only one Irish-national mother. Based on our results, the antenatal period is an effective time for concentrating efforts to encourage women to breast-feed. Involving the partner and the maternal grandmother in ante and postnatal breast-feeding initiatives appears crucial to increase rates. Finally, mothers' perception of the social acceptability of breast-feeding in Ireland is strongly highlighted as an important determinant of both breast-feeding initiation and duration.

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