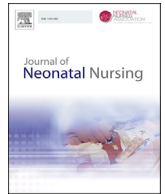




Contents lists available at ScienceDirect

Journal of Neonatal Nursing

journal homepage: www.elsevier.com/jneo

Original Article

Breastfeeding determinants in Cyprus: A cross-sectional study

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ARTICLE INFO

Article history:

Received 29 November 2016

Received in revised form

24 May 2017

Accepted 26 May 2017

Available online xxx

Keywords:

Breastfeeding

Determinants

Initiation

Duration

Exclusivity

Cyprus

ABSTRACT

Aim: To identify the determinants of breastfeeding initiation, duration and exclusivity in Cyprus.

Methods: A cross-sectional study was conducted that included 128 mothers of infants aged 6–18 months. Data was collected using a questionnaire. A chi-square test and multivariate logistic regression were performed for statistical analysis.

Results: The only factor associated with breastfeeding initiation was care in the Neonatal Intensive Care Unit. In-hospital formula supplementation and use of a pacifier were negatively associated with breastfeeding duration, whereas previous breastfeeding experience for more than one month and father's tertiary educational level were positively associated. In-hospital formula supplementation and free formula samples were negatively associated, and father's tertiary educational level was positively associated with breastfeeding exclusivity.

Conclusions: Although breastfeeding initiation rates were high, breastfeeding duration was far from the international recommendations. The role of the healthcare professionals and the father could be important for breastfeeding outcomes.

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Background

Studies have demonstrated the advantages of breastfeeding for the health of the infant, with short-term benefits such as the protection against acute illnesses (American Academy of Pediatrics, 2012) and long-term effects concerning the incidence of chronic diseases (Horta and Victora, 2014). The advantages for the health of the breastfeeding mother are also important (American Academy of Pediatrics, 2012). These benefits impact the community and the economy (Bartick, 2011).

International organisations, like the World Health Organization (WHO) and UNICEF (United Nations Children's Fund) (2003), have developed strategies and issued practise guidelines regarding the protection, promotion and support of breastfeeding. A number of studies have been conducted worldwide to identify factors associated with breastfeeding initiation, duration and exclusivity, which can be different between countries. According to the

literature from the last two decades, in developed countries, a mother is more likely to breastfeed if she is older, married and of higher educational and socio-economic levels (Scott and Binns, 1999). The mother's employment can be an obstacle to breastfeeding (Dennis, 2002), which can be moderated by the duration of maternity leave (Skafida, 2012) and a breastfeeding friendly work environment (Whalen and Cramton, 2010). The perception of insufficient milk usually resulting from breastfeeding mismanagement (Thulier and Mercer, 2009), infant health problems (Thulier and Mercer, 2009), nipple problems (Vogel et al., 1999), breastfeeding difficulties (DiGirolamo et al., 2005), obesity of the mother (Turcksin et al., 2014) and smoking (Amir and Donath, 2002), have been negatively associated with breastfeeding. Health care practises that are included in the ten steps to successful breastfeeding and the "baby-friendly hospital initiative", are associated with increased breastfeeding duration and exclusivity (Martens, 2012). Researchers have also studied psychosocial factors, like self-efficacy (Blyth et al., 2002; Semenic et al., 2008), breastfeeding intention (Donath and Amir, 2003; Bai et al., 2010), breastfeeding attitudes (Scott et al., 2004) and support in the family environment (Scott et al., 2001) and by health professionals (Renfrew et al., 2012a), which can be modified by interventions. Interventions can affect

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breastfeeding initiation (Dyson et al., 2005) and duration (de Oliveira et al., 2001).

There is no information on breastfeeding determinants in Cyprus. The aim of this study was to identify the determinants of breastfeeding initiation, duration and exclusivity in Cyprus.

Methods

Study design

A quantitative cross-sectional study took place between 4 March 2014 and 15 April 2014 in Nicosia, Cyprus. The data was collected from mothers who visited healthcare centres for mothers and babies in the urban area of Nicosia to vaccinate their babies.

Data collection

Data was collected by personal interview using a questionnaire. The interview approach was chosen, as it was considered to be more practical and less time consuming for the mothers, who had to take care of their babies at the same time. Also the questions were better understood by mothers that did not speak Greek as a first language. The questionnaire was pilot tested first with 30 mothers and, since no corrections were made, the data was included in the study. The personal interviews were all conducted by the same person. The mean duration of the interview was 5–10 min. In general, the mothers were willing and interested in participating in the study.

Questionnaire

The questionnaire that was used was developed for the National Survey for Breastfeeding Frequency and Determinants (Gaki et al., 2009), which was conducted by the Institute of Child Health in Greece from 2007 to 2008. The questionnaire was adjusted for use in the present study, by deleting questions that were not applicable to Cyprus. No translation was needed. It included three groups of questions that covered (a) perinatal information, (b) infant feeding and (c) demographic and socio-economic factors. There were 37 questions of which 18 required a yes or no answer, 17 were multiple choice questions and two questions were about the age of the mother and baby.

Ethics

All mothers were informed of the purpose of the study and provided verbal informed consent before participation. The study was approved by the Cyprus Ministry of Health, after obtaining approval by the Cyprus National Bioethics Committee and the Office of the Commissioner for Personal Data Protection. Permission to use the questionnaire was given by the creators.

Study sample

Inclusion criteria

In the study, the participants were 128 Greek-speaking mothers of infants aged 6–18 months visiting the healthcare centres during the study period.

Sampling procedure

There are seven healthcare centres for mothers and babies in the urban area of Nicosia. As there was no data available on all infants aged 6–18 months that lived in the urban area of Nicosia, random sampling could not be applied; thus, a convenience sample was used in the study (Etikan et al., 2016). To reduce systematic error, the number of completed questionnaires from each centre was proportional to the number of children enlisted in the centre during the previous year, therefore ensuring that the sample was more representative of the population. All the mothers visiting the

Table 1
Sample characteristics (n=128).

Study variables	N (%)
Mother's age	
18–28	13 (10.2)
29–30	53 (41.4)
31–34	44 (34.4)
>34	18 (14.1)
Cypriot mother	
Yes	76 (59.4)
No	52 (40.6)
Mother married/living with father	
Yes	125 (97.7)
No	3 (2.3)
Mother's educational level	
Secondary	52 (40.6)
Tertiary	76 (59.4)
Father's educational level	
Secondary	66 (51.6)
Tertiary	62 (48.4)
Yearly family income (Euro)	
0–19,500	50 (39.1)
19,501–28,000	30 (23.4)
28,001–36,300	20 (15.6)
>36,301	28 (21.9)
Mother employed	
Yes	100 (78.1)
No	28 (21.9)
Maternity leave	
Yes	91 (91)
No	9 (9)
Twin pregnancy	
Yes	8 (6.3)
No	120 (93.8)
Infant gender	
Male	69 (50.7)
Female	67 (49.3)
Maternity unit	
Private	51 (39.8)
Public	77 (60.2)
Type of delivery	
Cesarean	62 (48.4)
Vaginal	66 (51.6)
Birth weight<2500 gr.	
Yes	17 (13.3)
No	111 (86.7)
Pregnancy age	
Preterm	19 (14.8)
Term	109 (85.2)
NICU	
Yes	18 (14.1)
No	110 (85.9)
Rooming-in	
Yes	69 (53.9)
No	59 (46.1)
Breastfeeding initiation in the 1st hour	
Yes	47 (39.5)
No	72 (60.3)
In-hospital formula supplementation	
Yes	82 (64.1)
No	46 (35.9)
Formula prescription	
Yes	8 (6.3)
No	120 (93.8)
Free formula sample	
Yes	39 (30.5)
No	89 (69.5)
Support by health professionals	
Yes	86 (72.3)
No	33 (27.7)
Support in the family environment	
Yes	61 (51.3)
No	58 (48.7)
Antenatal breastfeeding intention	
Yes	115 (89.8)
No	13 (10.2)

Table 1 (continued)

Study variables	N (%)
Pacifier use	
Yes	98 (76.6)
No	30 (23.4)
Smoking	
Yes	28 (21.9)
No	100 (78.1)
Breastfeeding experience >1 month	
Yes	47 (36.7)
No	81 (63.3)

centres on the days the researcher was present were asked to participate in the study. Only six out of 134 mothers that were contacted refused to participate, so the response rate was 95.5%.

Variables

The initiation or not of breastfeeding, breastfeeding at three months (yes/no), breastfeeding at six months (yes/no) and exclusive breastfeeding at one month (yes/no) were defined as the dependent variables. Breastfeeding initiation was defined as the placement of the infant at the breast at least once or breast milk feeding after pumping. Exclusive breastfeeding was defined as the feeding of the infant with only breast milk and nothing else except oral rehydration salts and drops or syrups of vitamins, minerals or medicines according to WHO definitions (WHO, 2008a). The independent variables were derived from the data collected by the questionnaire. For statistical analysis purposes, age was transformed from a continuous to an ordinal variable based on quartiles, thus creating the age categories 18–28, 29–30, 31–34 and >34.

Statistical analysis

Continuous variables are expressed as means (standard deviations), whereas categorical variables are expressed as absolute and relative frequencies. Chi-square or Fisher's exact test were used to examine the association between two categorical variables. The variables that were identified as statistically significant by the bivariate analysis were introduced in a backward stepwise elimination logistic regression model (Hosmer et al., 2013). Multivariate analysis was used to control potential confounding between independent variables. The results from the multivariate logistic regression were presented as odds ratios, 95% confidence intervals and p-values. A two-sided p-value of less than 0.05 was considered statistically significant. Data analysis was performed using IBM SPSS 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp).

Results

Descriptive results

The mean age (standard deviation) of the participating mothers was 30.6 (± 4.5) years. Demographic characteristics of the mothers and infants and the perinatal data are shown in Table 1. The most commonly reported reason mothers wanted to breastfeed was that they considered breastfeeding to be the best form of feeding for the infant (98.3%, $n = 113$). The most commonly reported reason mothers did not want to breastfeed was a previous negative experience with breastfeeding.

Breastfeeding initiation

From the participating mothers, 93% ($n = 119$) initiated breastfeeding and 36.7% ($n = 47$) initiated exclusive breastfeeding. The

bivariate associations between the study variables and breastfeeding initiation are shown in Table 2. Accordingly, admission to the Neonatal Intensive Care Unit (NICU) ($p = 0.022$) and antenatal breastfeeding intention ($p < 0.001$) were associated with breastfeeding initiation. Multivariate analysis identified that non admission to the NICU was associated with increased breastfeeding

Table 2

The associations between the study variables and breastfeeding initiation.

Study Variables	Breastfeeding Yes N (%)	Initiation No N (%)	p-Value ^a
Mother's age			0.904
18–28	31 (91.2)	3 (8.8)	
29–30	30 (93.8)	2 (6.2)	
31–34	33 (91.7)	3 (8.3)	
>34	25 (96.2)	1 (3.8)	
Cypriot mother			0.738
Yes	70 (92.1)	6 (7.9)	
No	49 (94.2)	3 (5.8)	
Mother married/living with father			0.999
Yes	116 (92.8)	9 (7.2)	
No	3 (100)	0 (0)	
Mother's educational level			0.999
Secondary	48 (92.3)	4 (7.7)	
Tertiary	71 (93.7)	5 (6.6)	
Father's educational level			0.166
Secondary	59 (89.4)	7 (10.6)	
Tertiary	60 (96.8)	2 (3.2)	
Yearly family income			0.543
0–19,500	47 (94)	3 (6)	
19,501–28,000	26 (86.7)	4 (13.3)	
28,001–36,300	19 (95)	1 (5)	
>36,301	27 (94)	1 (3.6)	
Mother employed			0.999
Yes	93 (93)	7 (7)	
No	26 (92.9)	2 (7.1)	
Maternity leave			0.999
Yes	84 (92.3)	7 (7.7)	
No	9 (100)	0 (0)	
Twin pregnancy			0.451
Yes	7 (87.5)	1 (12.5)	
No	112 (93.3)	8 (6.7)	
Infant gender			0.744
Male	59 (93.7)	4 (6.3)	
Female	57 (91.9)	5 (8.1)	
Maternity unit			0.999
Private	48 (94.1)	3 (5.9)	
Public	71 (92.2)	6 (7.8)	
Type of delivery			0.314
Cesarean	56 (90.3)	6 (9.7)	
Vaginal	63 (95.5)	3 (4.5)	
Birth weight <2500 gr.			0.341
Yes	15 (88.2)	2 (11.8)	
No	104 (93.7)	7 (6.3)	
Pregnancy age			0.130
Preterm	16 (84.2)	3 (15.8)	
Term	103 (94.5)	6 (5.5)	
NICU			0.022
Yes	14 (77.8)	4 (22.2)	
No	105 (95.5)	5 (4.5)	
Rooming-in			0.732
Yes	65 (94.2)	4 (5.8)	
No	54 (91.5)	5 (8.5)	
Antenatal breastfeeding intention			<0.001
Yes	112 (97.4)	3 (2.6)	
No	7 (53.8)	6 (46.2)	
Smoking			0.105
Yes	24 (85.7)	4 (14.3)	
No	95 (95)	5 (5)	
Previous breastfeeding experience >1 month			0.153
Yes	46 (97.9)	1 (2.1)	
No	73 (90.1)	8 (9.9)	

The p-values in bold text are statistically significant.

^a Fisher's exact test.

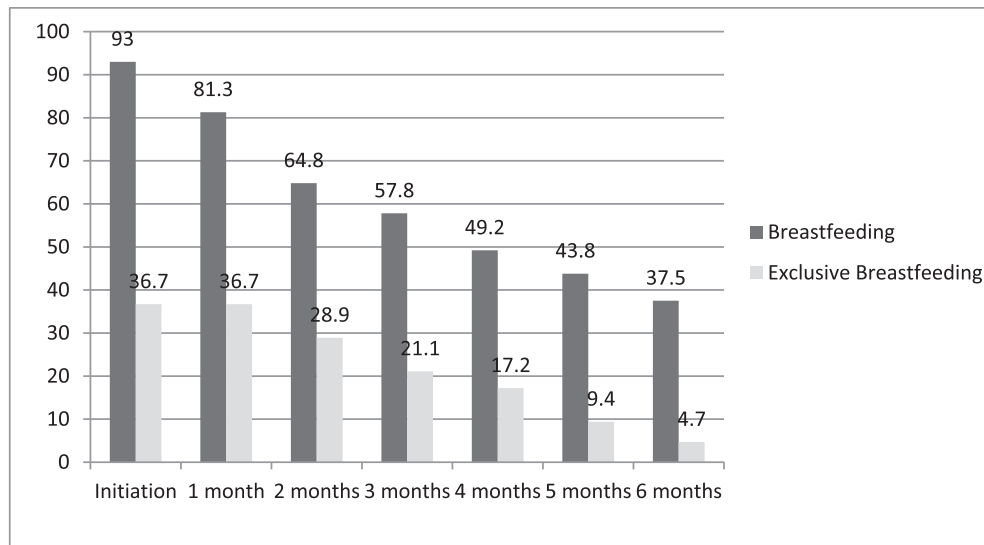


Fig. 1. Duration of breastfeeding and exclusive breastfeeding.

initiation (odds ratio = 6.06, 95% confidence interval = 1.41 to 26.32, $p = 0.016$).

Breastfeeding duration

Breastfeeding and exclusive breastfeeding duration are depicted in Fig. 1. At six months, 37.5% ($n = 48$) of the mothers were still breastfeeding and 4.7% ($n = 6$) were still exclusively breastfeeding their infants. The most commonly reported reasons for breastfeeding cessation were insufficient milk (39.8%, $n = 37$) and the return of the mother to work (15.1%, $n = 14$).

According to bivariate analysis, mother's age ($p = 0.011$), father's educational level ($p = 0.011$), in-hospital formula supplementation ($p < 0.001$), pacifier use ($p = 0.029$) and previous experience with breastfeeding for more than one month ($p = 0.013$) were associated with breastfeeding at three months (Table 3).

Multivariate analysis identified that in-hospital formula supplementation was negatively associated with breastfeeding at three months, whereas father's tertiary educational level and previous experience with breastfeeding for more than one month were positively associated with breastfeeding at three months (Table 4).

According to bivariate analysis, mother's age ($p = 0.041$), breastfeeding initiation in the first hour ($p = 0.021$), in-hospital formula supplementation ($p = 0.001$), formula prescription ($p = 0.041$), antenatal breastfeeding intention ($p = 0.041$), pacifier use ($p = 0.001$) and previous experience with breastfeeding for more than one month ($p = 0.004$) were associated with breastfeeding at six months (Table 5).

Multivariate analysis identified that in-hospital formula supplementation and pacifier use were negatively associated, whereas previous experience with breastfeeding for more than one month was positively associated with breastfeeding at six months (Table 6).

Breastfeeding exclusivity

From the mothers that initiated breastfeeding, 39.5% ($n = 47$) were still exclusively breastfeeding at one month. According to bivariate analysis, father's educational level ($p < 0.001$), yearly family income ($p = 0.024$), infant gender ($p = 0.040$), breastfeeding initiation in the first hour ($p < 0.001$), in-hospital formula supplementation ($p < 0.001$), free formula samples ($p < 0.001$) and

pacifier use from the first month ($p = 0.033$) were associated with exclusive breastfeeding at one month (Table 7).

Multivariate analysis identified that in-hospital formula supplementation and free formula samples were negatively associated, and father's tertiary educational level was positively associated with exclusive breastfeeding at one month (Table 8).

Discussion

The breastfeeding initiation rate in the present study was high when compared to other countries with high initiation rates, like Canada (Gionet, 2003) and Australia (AIHW, 2011), but breastfeeding duration was far from the international recommendation for exclusive breastfeeding for six months (WHO/UNICEF, 2003).

Admission to the NICU was negatively associated with breastfeeding initiation. This may reflect a lack of knowledge of the importance of human milk for premature infants (Thulier and Mercer, 2009), and a lack of support and practical help regarding milk pumping from healthcare professionals. In the present study, mothers with infants in the NICU reported receiving support from healthcare professionals less frequently. Care in a special neonatal unit was also negatively associated with breastfeeding outcomes in other studies (Ladomenou et al., 2007). As reported in an Australian study (Scott et al., 2006a), as breastfeeding initiation approaches universality, social determinants identified as important in populations with initiation rates less than 80% become less apparent.

In-hospital formula supplementation was negatively associated with breastfeeding at three and six months and exclusive breastfeeding at one month. This finding is in accordance with other studies in which in-hospital formula supplementation was also associated with decreased duration and exclusivity of breastfeeding (Erkkola et al., 2009). In another study, mothers who used formula based on an informed choice were more likely to stop breastfeeding than those who used formula because of medical indications (Agboado et al., 2010). In the present study, in-hospital formula supplementation was reported by 64.1% of the mothers; this high rate suggests that, in most cases, no medical indication existed.

Free formula samples from the maternity unit were negatively associated with exclusive breastfeeding at one month. Free samples were reported by 30.5% of the mothers, and more frequently by those who gave birth in the private sector.

Table 3

The associations between the study variables and breastfeeding at three months.

Study variables	Breastfeeding at Yes N (%)	3 months No N (%)	p-Value
Mother's age			0.011^a
18–28	13 (41.9)	18 (58.1)	
29–30	18 (60)	12 (40)	
31–34	26 (78.8)	7 (21.2)	
>34	17 (68)	8 (32)	
Cypriot mother			0.331 ^b
Yes	41 (58.6)	29 (41.4)	
No	33 (67.3)	16 (32.7)	
Mother married/living with father			0.556 ^c
Yes	73 (62.9)	43 (37.1)	
No	1 (33.3)	2 (66.7)	
Mother's educational level			0.272 ^b
Secondary	27 (56.2)	21 (43.8)	
Tertiary	47 (66.2)	24 (33.8)	
Father's educational level			0.011^b
Secondary	30 (50.8)	29 (49.2)	
Tertiary	44 (73.3)	16 (26.7)	
Yearly family income (Euro)			0.129 ^b
0–19,500	28 (59.6)	19 (40.4)	
19,501–28,000	12 (46.2)	14 (53.8)	
28,001–36,300	14 (73.7)	5 (26.3)	
>36,301	20 (74.1)	7 (25.9)	
Mother employed			0.147 ^b
Yes	61 (65.6)	32 (34.4)	
No	13 (50)	13 (50)	
Maternity leave			0.999 ^c
Yes	55 (65.5)	29 (34.5)	
No	6 (66.7)	3 (33.3)	
Twin pregnancy			0.999 ^c
Yes	4 (57.1)	3 (42.9)	
No	70 (62.5)	42 (37.5)	
Infant gender			0.812 ^b
Male	36 (61)	23 (39)	
Female	36 (63.2)	21 (36.8)	
Maternity unit			0.657 ^b
Private	31 (64.6)	17 (35.4)	
Public	43 (60.6)	28 (39.4)	
Type of delivery			0.490 ^b
Cesarean	33 (58.9)	23 (41.1)	
Vaginal	41 (65.1)	22 (34.9)	
Birth weight < 2500 gr.			0.450 ^b
Yes	8 (53.3)	7 (46.7)	
No	66 (63.5)	38 (36.5)	
Pregnancy age			0.280 ^b
Term	8 (50)	8 (50)	
Preterm	66 (64.1)	37 (35.9)	
NICU			0.448 ^b
Yes	10 (71.4)	4 (28.6)	
No	64 (61)	41 (39)	
Rooming-in			0.590 ^b
Yes	39 (60)	26 (40)	
No	35 (64.8)	19 (35.2)	
Breastfeeding initiation in the 1st hour			0.065 ^b
Yes	34 (72.3)	13 (27.7)	
No	40 (55.6)	32 (44.4)	
In-hospital formula supplementation			<0.001^b
Yes	36 (49.3)	37 (50.7)	
No	38 (82.6)	8 (17.4)	
Formula prescription			0.999 ^c
Yes	4 (57.1)	3 (42.9)	
No	70 (62.5)	42 (37.5)	
Free formula sample			0.083 ^b
Yes	17 (50)	17 (50)	
No	57 (67.1)	28 (32.9)	
Support by health professionals			0.295 ^b
Yes	51 (59.3)	35 (40.7)	
No	23 (69.7)	10 (30.3)	
Support in the family environment			0.434 ^b
Yes	40 (65.6)	21 (34.4)	
No	34 (58.6)	24 (41.4)	
Antenatal breastfeeding intention			0.103 ^c
Yes	72 (64.3)	40 (35.7)	

Table 3 (continued)

Study variables	Breastfeeding at Yes N (%)	3 months No N (%)	p-Value
No	2 (28.6)	5 (71.4)	
Pacifier use			0.029^b
Yes	51 (56.7)	39 (43.3)	
No	23 (79.3)	6 (20.7)	
Smoking			0.168 ^b
Yes	12 (50)	12 (50)	
No	62 (65.3)	33 (34.7)	
Previous breastfeeding experience >1 month			0.013^b
Yes	35 (76.1)	11 (23.9)	
No	39 (53.4)	34 (46.6)	

The p-values in bold text are statistically significant.

^a Chi-square test for trend.^b Chi-square test.^c Fisher's exact test.

While many studies reported an association between the mother's educational level and breastfeeding duration (Kristiansen et al., 2010), in the present study, an association with the father's educational level was identified with breastfeeding at three months and exclusive breastfeeding at one month. The father's educational level was associated with breastfeeding duration in a study from Greece (Bouras et al., 2013). A possible explanation given was that, in Greek society, fathers with higher levels of education provided better environmental factors for their wives, were more informed about the advantages of breastfeeding and had a more supportive attitude; this may also apply to Cyprus.

Pacifier use was negatively associated with breastfeeding duration in a number of studies (Scott et al., 2006b). In the present study, pacifier use was negatively associated with breastfeeding at six months, which is consistent with previous studies.

Previous breastfeeding experience for more than one month was positively associated with breastfeeding at three and six months. According to a study from Denmark, women who breastfed a previous child for less than five weeks had a cessation rate almost eight times higher than mothers who breastfed a previous child for more than 17 weeks (Kronborg and Vaeth, 2004). As self-efficacy theory states, as presented by Dennis (1999) in relation to breastfeeding behaviour, breastfeeding self-efficacy can be increased by previous successful breastfeeding experience, and is associated with increased breastfeeding duration and exclusivity (Blyth et al., 2002). The theory was confirmed by studies that showed an increase in the self-efficacy of women that breastfed successfully for four months, and a decrease in those who had breastfeeding difficulties (Semenic et al., 2008). The most commonly reported reason mothers chose not to breastfeed in the present study was a previous negative experience with breastfeeding, which is consistent with the mentioned studies.

Table 4

Multivariate logistic regression with breastfeeding at three months as the dependent variable.

Independent variable	OR	95% CI for OR	p-Value
In-hospital formula supplementation (no: reference category)	0.308	0.120 to 0.796	0.015
Father's educational level (secondary: reference category)	2.822	1.183 to 6.733	0.019
Previous breastfeeding experience for more than 1 month (no: reference category)	2.857	1.150 to 7.096	0.024

OR: odds ratio CI: Confidence Interval.

Table 5
The associations between the study variables and breastfeeding at six months.

Study Variables	Breastfeeding at Yes N (%)	6 months No N (%)	p-Value
Mother's age			0.041^a
18–28	8 (25.8)	23 (74.2)	
29–30	10 (33.3)	20 (66.7)	
31–34	19 (57.6)	14 (42.4)	
>34	11 (44)	14 (56)	
Cypriot mother			0.396 ^b
Yes	26 (37.1)	44 (62.9)	
No	22 (44.9)	27 (55.1)	
Mother married/living with father			0.999 ^c
Yes	47 (40.5)	69 (59.5)	
No	1 (33.3)	2 (66.7)	
Mother's educational level			0.200 ^b
Secondary	16 (33.3)	32 (66.7)	
Tertiary	32 (45.1)	39 (54.9)	
Father's educational level			0.073 ^b
Secondary	19 (32.2)	40 (67.8)	
Tertiary	29 (48.3)	31 (51.7)	
Yearly family income			0.267 ^b
0–19,500	17 (36.2)	30 (63.8)	
19,501–28,0000	8 (30.8)	18 (69.2)	
28,001–36,3000	11 (57.9)	8 (42.1)	
>36,301	12 (44.4)	15 (55.6)	
Mother employed			0.501 ^b
Yes	39 (41.9)	54 (58.1)	
No	9 (34.6)	17 (65.4)	
Maternity leave			0.999 ^c
Yes	35 (41.7)	49 (58.3)	
No	4 (44.4)	5 (55.6)	
Twin pregnancy			0.999 ^c
Yes	3 (42.9)	4 (57.1)	
No	45 (40.2)	67 (59.8)	
Infant gender			0.596 ^b
Male	22 (37.3)	37 (62.7)	
Female	24 (42.1)	33 (57.9)	
Maternity unit			0.533 ^b
Private	21 (43.8)	27 (56.2)	
Public	27 (38)	44 (62)	
Type of delivery			0.826 ^b
Cesarean	22 (39.3)	34 (60.7)	
Vaginal	26 (41.3)	37 (58.7)	
Birth weight < 2500 gr.			0.248 ^b
Yes	4 (26.7)	11 (73.3)	
No	44 (42.3)	60 (57.7)	
Pregnancy age			0.179 ^b
Preterm	4 (25)	12 (75)	
Term	44 (42.7)	59 (57.3)	
NICU			0.707 ^b
Yes	5 (35.7)	9 (64.3)	
No	43 (41)	62 (59)	
Rooming-in			0.935 ^b
Yes	26 (40)	39 (60)	
No	22 (40.7)	32 (59.3)	
Breastfeeding initiation in the 1st hour			0.021^b
Yes	25 (53.2)	22 (46.8)	
No	23 (31.9)	49 (68.1)	
In-hospital formula supplementation			0.001^b
Yes	21 (28.8)	52 (71.2)	
No	27 (58.7)	19 (41.3)	
Formula prescription			0.041^c
Yes	0 (0)	7 (100)	
No	48 (42.9)	64 (57.1)	
Free formula sample			0.768 ^b
Yes	13 (38.2)	21 (61.8)	
No	35 (41.2)	50 (58.8)	
Support by health professionals			0.124 ^b
Yes	31 (36)	55 (64)	
No	17 (51.5)	16 (48.5)	
Support in the family environment			0.330 ^b
Yes	22 (36.1)	39 (63.9)	
No	26 (44.8)	32 (55.2)	
Antenatal breastfeeding intention			0.041^c
Yes	48 (42.9)	64 (57.1)	
No	0 (0)	7 (100)	

Table 5 (continued)

Study Variables	Breastfeeding at Yes N (%)	6 months No N (%)	p-Value
Pacifier use			0.001^b
Yes	29 (32.2)	61 (67.8)	
No	19 (65.5)	10 (34.5)	
Smoking			0.087 ^b
Yes	6 (25)	18 (75)	
No	42 (44.2)	53 (55.8)	
Previous breastfeeding experience >1 month			0.004^b
Yes	26 (56.5)	20 (43.5)	
No	22 (30.1)	51 (69.9)	

The p-values in bold text are statistically significant.

^a Chi-square test for trend.

^b Chi-square test.

^c Fisher's exact test.

The most commonly reported reason for breastfeeding cessation was, as in many previous studies (Bouras et al., 2013), insufficient milk. As inadequate milk supply is more commonly associated with secondary causes from breastfeeding mismanagement (Thulier and Mercer, 2009), it appears that there is a lack of information on optimal breastfeeding practises among new mothers.

The second most commonly reported reason for breastfeeding cessation was the mother returning to work. According to the Ministry of Labour and Social Insurance, in Cyprus, the maternity allowance is 18 weeks. Mothers who wish to breastfeed for longer may find it difficult to continue to breastfeed after returning to work and to breastfeed exclusively for six months, especially if their work environment is not breastfeeding friendly.

The present study has some limitations. The cross-sectional study design could not identify causal associations between determinants and outcomes, however it did provide information about breastfeeding rates and determinants. Another limitation was recall bias due to the retrospective collection of data. According to a review (Li et al., 2005), maternal recall was a valid and reliable estimate of breastfeeding initiation and duration, especially when the duration of breastfeeding was recalled after a period of less than three years, although the validity and reliability of maternal recall for the age at introduction of food and fluids other than breast milk were less satisfactory. Mothers of infants up to the age of 18 months were included in the present study and all interviews were conducted by the same person to ensure a consistent technique.

The use of a convenience sample was a limitation, although an effort was made to reduce systematic error by completing a number of questionnaires proportional to the number of children enlisted in each centre during the previous year. The study sample included mothers that visited the healthcare centres of the urban area of Nicosia and not from other towns, rural areas or mothers who had their infants vaccinated in the private sector. Thus, generalising the

Table 6
Multivariate logistic regression with breastfeeding at six months as the dependent variable.

Independent Variable	OR	95% CI for OR	p-Value
In-hospital formula supplementation (no: reference category)	0.371	0.162 to 0.850	0.019
Pacifier use (no: reference category)	0.270	0.104 to 0.698	0.007
Previous breastfeeding experience for more than 1 month (no: reference category)	2.832	1.231 to 6.513	0.014

OR: odds ratio CI: Confidence interval.

Table 7

The associations between the study variables and exclusive breastfeeding at one month.

Study Variables	Exclusive Yes N (%)	Breastfeeding at one month No N (%)	p-Value
Mother's age			0.268 ^a
18–28	10 (33.3)	21 (67.7)	
29–30	11 (36.7)	19 (63.3)	
31–34	15 (45.5)	18 (54.5)	
>34	11 (44)	14 (56)	
Cypriot mother			0.805 ^b
Yes	27 (38.6)	43 (61.4)	
No	20 (40.8)	29 (59.2)	
Mother married/living with father			0.561 ^c
Yes	45 (38.8)	71 (61.2)	
No	2 (66.7)	1 (33.3)	
Mother's educational level			0.130 ^b
Secondary	15 (31.2)	33 (68.8)	
Tertiary	32 (45.1)	39 (54.9)	
Father's educational level			<0.001 ^b
Secondary	13 (22)	46 (78)	
Tertiary	34 (56.7)	26 (43.3)	
Yearly family income (Euro)			0.024 ^b
0–19,500	17 (36.2)	30 (63.8)	
19,501–28,0000	6 (23.1)	20 (76.9)	
28,001–36,3000	7 (36.8)	12 (63.2)	
>36,301	17 (63)	10 (37)	
Mother employed			0.303 ^b
Yes	39 (41.9)	54 (58.1)	
No	8 (30.8)	18 (69.2)	
Maternity leave			0.484 ^c
Yes	34 (40.5)	50 (59.5)	
No	5 (55.6)	4 (44.4)	
Twin pregnancy			0.242 ^c
Yes	1 (14.3)	6 (85.7)	
No	46 (41.1)	66 (58.9)	
Infant gender			0.040 ^b
Male	18 (30.5)	41 (69.5)	
Female	28 (39.4)	29 (50.9)	
Maternity unit			0.987 ^b
Private	19 (39.6)	29 (60.4)	
Public	28 (39.4)	43 (60.6)	
Type of delivery			0.241 ^b
Cesarean	19 (33.9)	37 (66.1)	
Vaginal	28 (44.4)	35 (55.6)	
Birth weight<2500 gr.			0.277 ^b
Yes	4 (26.7)	11 (73.3)	
No	43 (41.3)	61 (58.7)	
Pregnancy age			0.202 ^b
Preterm	4 (25)	12 (75)	
Term	43 (41.7)	60 (58.3)	
NICU			0.758 ^b
Yes	5 (35.7)	9 (64.3)	
No	42 (40)	63 (60)	
Rooming-in			0.103 ^b
Yes	30 (46.2)	35 (53.8)	
No	17 (31.5)	37 (68.5)	
Breastfeeding initiation in the 1st hour			<0.001 ^b
Yes	28 (59.6)	19 (40.4)	
No	19 (26.4)	53 (73.6)	
In-hospital formula supplementation			<0.001 ^b
Yes	13 (17.8)	60 (82.2)	
No	34 (73.9)	12 (26.1)	
Formula prescription			0.702 ^c
Yes	2 (28.6)	5 (71.4)	
No	45 (40.2)	67 (59.8)	
Free formula sample			<0.001 ^b
Yes	5 (14.7)	29 (85.3)	
No	42 (49.4)	43 (50.6)	
Support by health professionals			0.214 ^b
Yes	31 (36)	55 (64)	
No	16 (48.5)	17 (51.5)	
Support in the family environment			0.474 ^b
Yes	26 (42.6)	35 (57.4)	
No	21 (36.2)	37 (63.8)	

Table 7 (continued)

Study Variables	Exclusive Yes N (%)	Breastfeeding at one month No N (%)	p-Value
Antenatal breastfeeding intention			0.160 ^b
Yes	46 (41.1)	66 (58.9)	
No	1 (14.3)	6 (85.7)	
Pacifier use			0.266 ^b
Yes	33 (36.7)	57 (63.3)	
No	14 (48.3)	15 (51.7)	
Pacifier use from the 1st month			0.033^b
Yes	20 (30.8)	45 (63.3)	
No	27 (50)	27 (50)	
Smoking			0.489 ^b
Yes	8 (33.3)	16 (66.7)	
No	39 (41.1)	56 (58.9)	
Previous breastfeeding experience >1 month			0.275 ^b
Yes	21 (45.7)	25 (54.3)	
No	26 (35.6)	47 (64.4)	

The p-values in bold text are statistically significant.

^a Chi-square test for trend.

^b Chi-square test.

^c Fisher's exact test.

Table 8

Multivariate logistic regression with exclusive breastfeeding at one month as the dependent variable.

Independent variable	OR	95% CI for OR	p-Value
In-hospital formula supplementation (no: reference category)	0.106	0.040 to 0.278	<0.001
Free formula sample (no: reference category)	0.252	0.073 to 0.868	0.029
Father's educational level (secondary: reference category)	4.554	1.710 to 12.132	0.002

OR: odds ratio CI: Confidence Interval.

results to the whole population of Cyprus should be done with caution. There were factors that were not measured, mostly psychosocial factors, which were identified as important determinants of breastfeeding in other studies. An important limitation was the small sample size, which was due to the time and resources available. The high response rate of 95.5% is considered a positive element.

Conclusions

Although breastfeeding initiation rates in the present study were high, breastfeeding duration was far from the international recommendation of exclusive breastfeeding for six months. Therefore, it is evident that, in Cyprus, actions are needed for breastfeeding promotion, so that society can benefit from the advantages of breastfeeding regarding the health of the infants and mothers, and the economic benefits in the health system (Renfrew et al., 2012b) and the wider economy (Bartick, 2011).

Care in the NICU was the only factor associated negatively with breastfeeding initiation. To increase breastfeeding initiation, special attention should be given to mothers with infants in the NICU concerning information, support and practical help in maintaining lactation.

Healthcare practises, such as in-hospital formula supplementation and free formula samples, were the most important factors that were negatively associated with breastfeeding duration and exclusivity, along with pacifier use, making the role of the healthcare professionals in neonatal units important for optimal breastfeeding outcomes. Based on the demographic factors, only the father's educational level was found to be associated with

breastfeeding duration and exclusivity. The implementation of the ten steps for successful breastfeeding and the “International Code of Marketing of Breast Milk Substitutes” (WHO, 2008b), and the promotion of actions for the certification of maternity units as “baby friendly” could result in the increase in breastfeeding duration and exclusivity, as the results from other countries show (Martens, 2012). The interventions for breastfeeding promotion should be addressed to not only the mother but also the father, who can play an important role in breastfeeding outcomes.

Finally, the design of studies with a sample from all Cyprus towns, from rural areas and the participation of the private sector would be useful to acquire results more representative of the population. In addition, a reduction of recall bias could be achieved with cohort studies. Furthermore, the measurement of psychosocial factors, like self-efficacy, would be useful. Considering the appropriate study design, the economic benefits of breastfeeding for Cyprus could be measured to provide important information for future policies for the protection, promotion and support of breastfeeding.

Ethical statement

The study was approved by the Cyprus Ministry of Health and all the participants provided oral informed consent to participate in the study.

Funding

No external funding

Conflicts of interest

None.

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