Public Health Nutrition: 23(6), 961–970 doi:10.1017/S1368980019003719

Increase of breast-feeding in the past decade in Greece, but still low uptake: cross-sectional studies in 2007 and 2017

Zoi Iliodromiti[1], Irini Zografaki[2,†], Dimitris Papamichail[2,†], Theodora Stavrou[2], Eleni Gaki[1], Chryssa Ekizoglou[1], Eleni Nteka[1], Panagiota Mavrika[1], Spilios Zidropoulos[1], Takis Panagiotopoulos[2] and Ioanna Antoniadou[1,*]

[1]Department of Social and Developmental Paediatrics, Institute of Child Health, 38–40 Mesogeion Street, 11527 Athens, Greece: [2]Department of Child Health, National School of Public Health, Athens, Greece‡

Submitted 16 April 2019: Final revision received 19 July 2019: Accepted 19 August 2019: First published online 17 January 2020

Abstract

Objective: To estimate breast-feeding prevalence in Greece in 2007 and 2017, compare breast-feeding indicators and maternity hospital practices between these years, and investigate breast-feeding determinants.

Design: Two national cross-sectional studies (2007 and 2017) using systematic cluster sampling of babies with the same sampling design, data collection and analysis methodology.

Setting: Telephone interview with babies' mothers or fathers.

Participants: Representative sample of infants who participated in the national neonatal screening programme (*n* 549 in 2017, *n* 586 in 2007).

Results: We found that breast-feeding indicators were higher in 2017 compared with 10 years before. In 2017, 94 % of mothers initiated breast-feeding. Breast-feeding rates were 80, 56 and 45 % by the end of the 1st, 4th and 6th completed month of age, respectively. At the same ages, 40, 25 and <1 % of babies, respectively, were exclusively breast-feeding. We also found early introduction of solid foods (after the 4th month of age). Maternity hospital practices favouring breast-feeding were more prevalent in 2017, but still suboptimal (63 % experienced rooming-in; 51 % experienced skin-to-skin contact in the first hour after birth; 19 % received free sample of infant formula on discharge).

Conclusions: We observed an increasing trend in all breast-feeding indicators in the past decade in Greece, but breast-feeding rates – particularly rates of exclusive breast-feeding – remain low. Systematic public health initiatives targeted to health professionals and mothers are needed in order to change the prevailing baby feeding 'culture' and successfully implement the WHO recommendations for exclusive breast-feeding during the first 6 months of life.

Keywords
Greece
Breast-feeding
Infant formula
Infant food
Prevalence
Trends
Maternity hospitals

The benefits of breast-feeding for mother and child are well established[1]. It is estimated that 823 000 child deaths and 20 000 breast cancer deaths per year at a global level could be avoided by implementing breast-feeding promotion policies[2]. One of the operational targets outlined in the Global Strategy for Infant and Young Child Feeding is to ensure that health and other relevant sectors protect, promote and support exclusive breast-feeding for 6 months and continued breast-feeding up to 2 years of age or beyond, while providing women access to the support they require – in the family, community and workplace – to achieve this goal[3].

The Baby Friendly Hospital Initiative, launched by WHO and UNICEF in 1991, aims to create a health-care environment where breast-feeding is the norm[4]. This is accomplished, *inter alia*, by enabling mothers to make an informed choice and by supporting early initiation of breast-feeding[4]. Compliance of maternity hospitals with the International Code of Marketing of Breast-milk Substitutes is an integral aspect of the Baby Friendly Hospital Initiative[5,6]. More than 160 countries have implemented this initiative worldwide[7].

†These authors contributed equally.

‡As of 7 May 2019 the National School of Public Health was merged with the University of West Attica and operates as School of Public Health, Department of Public Health Policy (affiliation: Department of Public Health Policy, School of Public Health, University of West Attica, Athens, Greece).

**Corresponding author:* Email ianton50@yahoo.com

© The Authors 2020

Public Health Nutrition

Studies conducted in high-income countries during the last two decades have identified a range of maternal and infant characteristics and hospital practices related to the initiation and duration of breast-feeding. Positive associations have been found for older age, higher educational level and immigrant status of the mothers, and for rooming-in and early skin-to-skin contact at the maternity hospital. Maternal smoking, being a single mother, preterm birth, low birth weight, caesarean section and supplementary feeding with formula milk during the hospital stay, as well as the distribution of free samples of breast-milk substitutes, are recognised negative predictors of breast-feeding[8–11].

The aim of our study was to estimate breast-feeding prevalence in Greece in 2007 and 2017, to compare breast-feeding indicators[12] and maternity hospital practices between these years, and contribute to the evaluation of the impact of changes in breast-feeding policies during this period. In addition, we aimed at investigating breast-feeding determinants for the decade 2007–2017.

Methods

We carried out two national cross-sectional studies, one in 2007[13] and one in 2017[14], by using systematic cluster sampling of babies and carrying out telephone interviews with one of their parents when the babies were 6–9 months old. We used the same sampling design, data collection and analysis methodology in both studies.

Sampling design

As sampling frames we used lists of babies that participated in the neonatal screening programme, which is carried out by the Institute of Child Health and covers more than 98 % of births taking place in Greece[15]. In the 2007 study, the sampling frame included babies born from April to July of that year, and in the 2017 study babies born between June and October 2016.

The lists of all babies (one for each study period) that we obtained in order to use them as sampling frames did not include parents' telephone number(s), and we had to get these by contacting the maternity hospital where each baby in the sample was born. In order to minimize the number of maternity hospitals that had to be contacted, we decided to select our samples of babies using systematic cluster sampling, not simple random sampling[16]. As clusters we used 'artificial' groupings consisting of babies positioned consecutively in the list of all babies. In these lists newborns were sorted by district (Nomenclature of Territorial Units for Statistics third level region, NUTS-3) and by maternity hospital, while we further sorted them within each hospital assigning them a random order.

Based on assumptions regarding the expected prevalence of study variables (p = 50 %), the desired precision of prevalence estimates (d = 5–6 %) and of confidence intervals of estimates (95 %), the design effect due to cluster sampling (d_{eff} = 2) and the expected participation rate (r = 70–75 %), we calculated the size of the sample that should be drawn for each study period (870 newborns)[16,17]. We decided to use clusters of fifteen babies each (i.e. in total fifty-eight clusters in the sample; for 2007 it was feasible to round this to sixty), and divided the number of babies in the list of all babies by the total number of clusters to obtain the sampling interval (k). Subsequently, we carried out systematic sampling of clusters of newborns as follows: we drew a random number (from 1 to k) to identify the first baby of the first cluster to be included in the sample and then repeatedly added k to identify the first babies of all the subsequent clusters of the sample; the clusters consisted of these 'first' babies together with the next fourteen in the list of all babies[16].

Using this sampling method, we were able to draw representative samples of babies born in the study periods. In summary, we selected a sample of 900 newborns (in sixty clusters) for the 2007 study and a sample of 870 newborns (in fifty-eight clusters) for the 2017 study.

Information collection

We performed telephone interviews with the mothers – and in a few cases (5 %) the fathers, when the mothers were not available – of the sample infants when they had completed 6 months of age. We used a structured questionnaire designed to obtain information on infant feeding from birth until the day of the interview, which would allow us to calculate the main breast-feeding indicators. The questionnaire also contained questions on practices in the maternity hospitals that affect breast-feeding, on perinatal factors, on maternal and infant health status, and on demographic and socio-economic factors (for the full questionnaire in Greek, see appendices of previous reports[13,14]). The same questionnaire was used in both studies.

In both studies, the questionnaire was piloted by giving it to a random sample of mothers who were not included in the final sample.

Definition of breast-feeding indicators

We calculated breast-feeding indicators based on WHO definitions[12].

1. Breast-feeding initiation: the percentage of infants who are breast-fed in the first 24 h from birth.
2. Exclusive breast-feeding (EBF): the percentage of infants who receive only breast milk and no other form of foods or liquids, except for oral rehydration solutions, drops, syrups (vitamins, minerals, medicines).
3. Breast-feeding: the percentage of infants who receive breast milk with or without any other type of food or drink, including breast-milk substitutes (non-human milk and formula); hereafter referred to as 'any breast-feeding'.

Public Health Nutrition

We also calculated the following indicators, which we considered relevant for assessing feeding practices in Greece.

4. Breast-feeding without breast-milk substitutes: the percentage of infants who receive breast milk with or without any other type of food or drink, except for breast-milk substitutes (non-human milk and formula).
5. Introduction of solid/semi-solid foods: the percentage of infants who have received solid/semi-solid foods.

Statistical analysis

We carried out data entry using EpiData version 3.1 (The EpiData Association, Odense, Denmark). The analysis was carried out using the statistical software package Stata version 11.

We calculated descriptive statistics for each study separately and calculated 95 % confidence intervals taking account of the fact that cluster sampling was performed. Further, we created a pooled data set with the data of both studies and performed univariate analysis for selected breast-feeding indicators and selected predictive factors. We calculated prevalence ratios accounting for the sampling design. We performed multiple logistic regression analysis in the pooled data set. Outcome variables were: (i) EBF at 1st completed month of age; and (ii) any breast-feeding at 6th completed month of age. Initial regression models included variables that had a statistically significant association with the selected breast-feeding indicators in the univariate analysis. Maternal age was included as a continuous variable. In the case of collinear variables, we included one of them in the model (low birth weight, not preterm birth; prescription for infant formula, not free sample for infant formula on discharge). We removed variables one at a time from the initial models on the basis of significance testing ($P < 0{\cdot}10$) with the adjusted Wald test. Adjusted odds ratios were calculated taking the sampling design into account.

Results

In 2017, 549 dyads (mother/father and infant) participated in the study out of 870 in the sample (response rate: 63 %). The corresponding response rate in the study conducted in 2007 was 65 % (586/900). The infants' age at the time of the interview was 6–9 completed months. The percentage of non-Greek origin mothers was almost the same in the two studies and in general there were no differences between the two samples regarding geographical region, maternity hospital type (public/private), gestational age, birth weight and mode of delivery. Differences were observed between the two studies regarding percentages of infant gender and maternal characteristics such as age, educational attainment, smoking, private insurance and employment during pregnancy (Table 1).

In the 2017 study about 95 % of the mothers initiated breast-feeding in the first 24 h from birth. Any breast-feeding remained above 50 % by the end of the 4th month and gradually decreased to 45 % at the 6th completed month of age (Fig. 1(a) and online supplementary material, Supplemental Table S1).

Almost two-thirds of mothers were exclusively breast-feeding in the first 24 h, but EBF dropped to 50 % by the end of the first week. At the end of the 1st completed month of age 40 % of the infants were exclusively breast-feeding; thereafter there was a continuous decline reaching 25 % at the end of the 4th month, followed by a steeper decline resulting in <1 % at the end of the 6th month (Fig. 1(b) and online supplementary material, Supplemental Table S1). However, one in four infants was breast-feeding without having ever received any breast-milk substitute by the 6th completed month of age (Fig. 1(c) and Supplemental Table S1).

In comparison to the 2007 study, all of the above breast-feeding indicators were higher in the 2017 study, across all categories of main known breast-feeding determinants (Fig. 1 and online supplementary material, Supplemental Tables S1 and S3). In both studies an early introduction of solid/semi-solid foods was observed beginning after the 4th completed month of age, although in the 2017 study 41 % of infants received solid/semi-solid foods by the end of the 5th month compared with 55 % in 2007. By the 6th completed month of age almost all infants had already received solid/semi-solid foods (Fig. 1(d) and Supplemental Table S2).

According to mothers' reporting, about 50 % or more experienced skin-to-skin contact with their babies within the first hour of birth or rooming-in at the maternity hospital in 2017. These percentages are significantly higher compared with those from the 2007 study. In 2017, almost half of the mothers were given a prescription for infant formula on discharge and about a fifth received a free sample. These respective percentages were importantly higher in the previous study (Table 2).

Table 3 presents the results of univariate analysis in the pooled data set for selected predictive factors using as outcome variables EBF at the 1st completed month of age and any breast-feeding at the 6th completed month of age.

In the multivariable analysis of the pooled data, female infant gender, higher maternal age, maternal tertiary education, maternal private insurance and skin-to-skin contact within the first hour of birth were found to have an independent positive association with EBF at the 1st completed month, while caesarean section, maternal smoking, low birth weight and prescription for infant formula had a negative association. Any breast-feeding at the 6th completed month was positively associated with maternal tertiary education, Albanian origin and skin-to-skin contact; maternal smoking, low birth weight and prescription for infant formula were negatively associated. Of note, participation in the 2017 study (compared with participation in the 2007 study) was found to

Public Health Nutrition

Table 1 Characteristics of mothers and infants in the two national breast-feeding prevalence studies in Greece (2007 and 2017), by study year

	2017			2007		
	n/*N*	%	95 % CI	*n*/*N*	%	95 % CI
Maternal age (years)						
16–24	47/542	8·7	6·2, 12·0	52/582	8·9	6·5, 12·2
25–34	315/542	58·1	53·9, 62·2	389/582	66·8	63·4, 70·1
≥35	180/542	33·2	28·9, 37·8	141/582	24·2	20·6, 28·3
Maternal country of origin						
Greece	469/543	86·4	81·7, 90·0	501/583	85·9	81·3, 89·6
Albania	39/543	7·2	5·0, 10·2	43/583	7·4	4·9, 10·9
Other	35/543	6·4	4·3, 9·6	39/583	6·7	4·9, 9·0
Region of hospital						
Attica	221/549	40·3	28·5, 53·3	248/586	42·3	30·3, 55·4
Central Greece	91/549	16·6	8·6, 29·6	92/586	15·7	8·4, 27·5
Northern Greece	180/549	32·8	21·8, 46·1	176/586	30·0	19·5, 43·3
Aegean islands and Crete	57/549	10·4	4·7, 21·3	70/586	11·9	5·6, 23·6
Maternal educational attainment						
Primary, secondary and post-secondary education	271/542	50·0	45·0, 55·0	372/583	63·8	58·7, 68·6
Tertiary education	271/542	50·0	45·0, 55·0	211/583	36·2	31·4, 41·3
Private insurance						
Yes	61/528	11·6	8·5, 15·6	144/583	24·7	18·8, 31·7
No	467/528	88·4	84·4, 91·5	439/583	75·3	68·3, 81·2
Maternal employment during pregnancy						
Yes	320/543	58·9	54·0, 63·7	381/583	65·3	60·5, 69·9
No	223/543	41·1	36·3, 46·0	202/583	34·7	30·1, 39·5
Maternal smoking at the time of interview						
Yes	119/545	21·8	18·9, 25·1	184/584	31·5	27·9, 35·3
No	426/545	78·2	74·9, 81·1	400/584	68·5	64·7, 72·1
Infant gender						
Male	314/549	57·2	53·5, 60·9	291/586	49·7	45·4, 54·0
Female	235/549	42·8	39·1, 46·5	295/586	50·3	46·0, 54·6
Gestational age (weeks)						
<33	15/521	2·9	1·3, 6·3	6/580	1·0	0·5, 2·2
34–36	40/521	7·7	5·5, 10·6	52/580	9·0	6·9, 11·6
≥37	466/521	89·4	84·8, 92·8	522/580	90·0	87·2, 92·2
Birth weight (g)						
<2000	14/549	2·6	1·2, 5·4	7/585	1·2	0·5, 2·7
2000–2499	34/549	6·2	4·4, 8·6	37/585	6·3	4·4, 8·9
≥2500	501/549	91·3	87·7, 93·9	541/585	92·3	89·8, 94·5
Maternity hospital type						
Public	268/549	48·8	36·2, 61·6	270/586	46·1	33·7, 59·0
Private	281/549	51·2	38·4, 63·8	316/586	53·9	41·0, 66·3
Mode of delivery						
Vaginal birth	253/548	46·2	42·2, 50·2	296/585	50·6	46·3, 54·9
Caesarean section	295/548	53·8	49·8, 57·8	289/585	49·4	45·1, 53·7

increase by a factor of about two the odds of breast-feeding as expressed by the above indicators, independently of all the other factors studied (Table 4).

Discussion

We report here the results of two national cross-sectional studies on breast-feeding prevalence and maternity hospital practices in Greece, carried out a decade apart (2007 and 2017), using the same sampling, data collection and analysis methodology. To our knowledge, these are the only nationwide studies on these issues conducted in Greece.

We used systematic samples of babies born in the country in the respective study periods and, due to the common methodology used in 2007 and 2017, we were able to derive comparable indices regarding breast-feeding (WHO indicators) and related practices. We sought information on the babies' age at the time when they started or stopped the feeding practices under investigation retrospectively. The relevant information was collected when the babies were 6–9 months of age. This is a limitation of the present study.

We showed that during the decade 2007–2017 a substantial improvement in all breast-feeding indicators studied took place. In 2017 the great majority of mothers initiated breast-feeding in the first 24 h from birth, while rates of any breast-feeding remained above 50 % by the end of the 4th month. EBF was found to be consistently higher compared with 2007, with the exception of the 6th month indicator. Early introduction of solid/semi-solid foods may explain the almost zero levels of EBF at 6 months

Public Health Nutrition

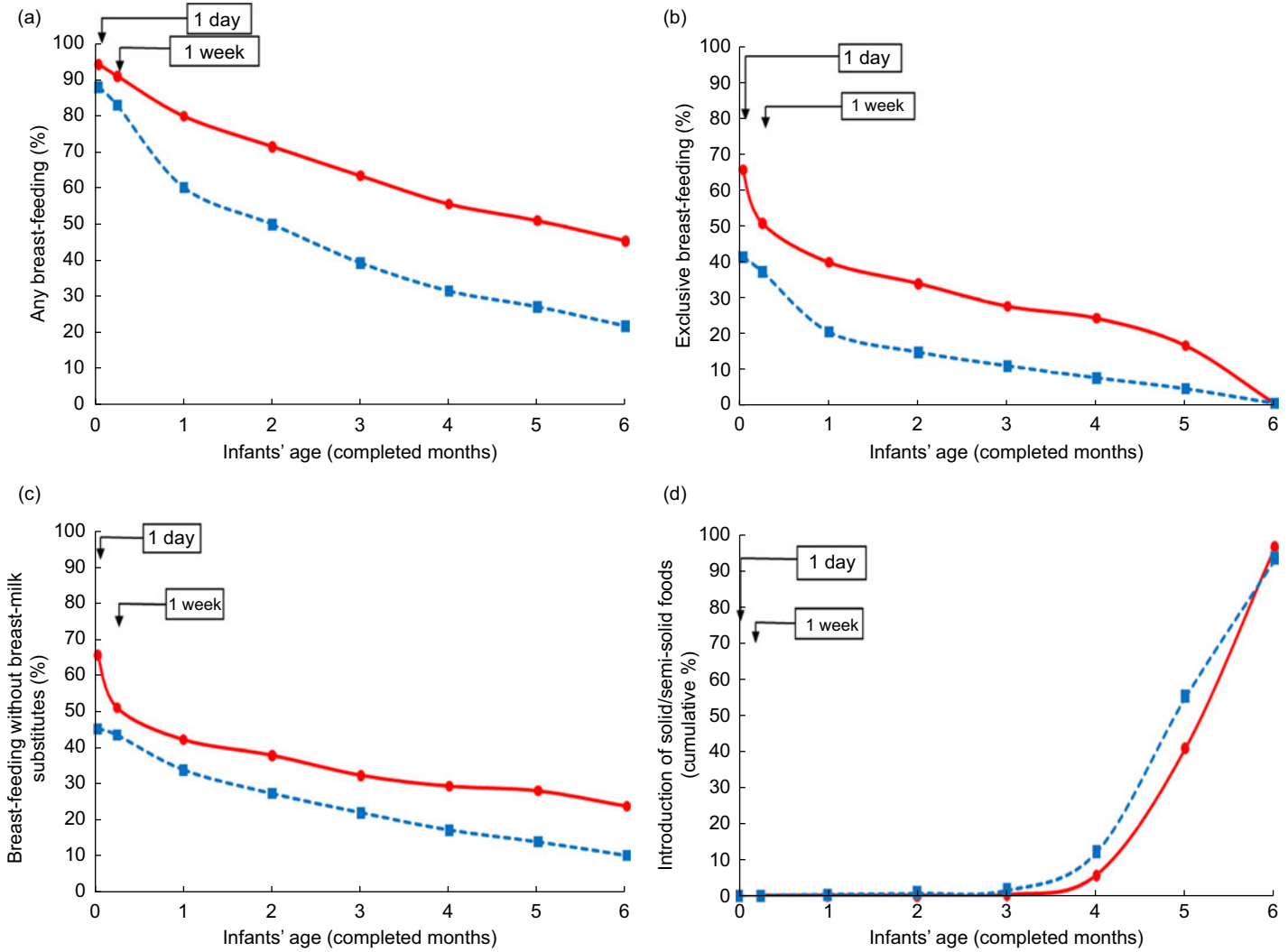

Fig. 1 (colour online) Breast-feeding indicators and introduction of solid/semi-solid foods by infants' age (in completed months) and study year (—●—, 2017, *N* 549; - -■- -, 2007, *N* 586) in the two national breast-feeding prevalence studies in Greece: (a) any breast-feeding; (b) exclusive breast-feeding; (c) breast-feeding without breast-milk substitutes; and (d) introduction of solid/semi-solid foods (cumulative percentage)

Table 2 Selected maternity hospital practices in the two national breast-feeding prevalence studies in Greece (2007 and 2017), by study year

	2017			2007			*P* value (χ^2 test)
	n/*N*	%	95 % CI	*n*/*N*	%	95 % CI	
Skin-to-skin contact within first hour of birth							
Yes	275/541	50·8	46·0, 55·6	157/586	26·8	22·0, 32·1	
No	266/541	49·2	44·4, 54·0	429/586	73·2	67·9, 78·0	<0·0001
Rooming-in							
Yes	346/546	63·4	54·2, 71·7	284/585	48·5	36·8, 60·5	
No	146/546	26·7	19·3, 35·8	265/585	45·3	34·1, 57·0	
Not applicable*	54/546	9·9	6·7, 14·4	36/585	6·2	4·4, 8·5	0·0137
Prescription of formula milk on discharge from maternity hospital							
Yes	258/523	49·3	44·1, 54·6	383/577	66·4	59·3, 72·8	
No	265/523	50·7	45·4, 55·9	194/577	33·6	27·2, 40·7	0·0002
Free sample of infant formula on discharge from maternity hospital							
Yes	102/527	19·4	15·9, 23·4	207/576	35·9	28·4, 44·2	
No	425/527	80·6	76·6, 84·1	369/576	64·1	55·8, 71·6	0·0001

*Infant in neonatal intensive care unit.

of age, given the finding that about 25 % of the infants were breast-feeding without having ever received any breast-milk substitute by this age. The increasing trend in all breast-feeding rates was observed across all levels of main predictive factors.

The results of recent local studies in Greece are in line with our findings. High rates of breast-feeding initiation (80–95 %) and rates of any breast-feeding (about 85 % during the 1st month, reaching 20 % at the end of the 6th month postpartum) have been found. The reported rates for EBF during the 1st month have ranged from about 20 to 40 % and dropped to almost zero by 6 months of age[18–20].

Increasing breast-feeding rates have been observed in other European countries during the last 20 years, such as Scotland[21], France[22], Ireland[23], England[24] and Germany[25]. In Sweden, where breast-feeding rates were already high, an opposite trend has been observed[26]. The breast-feeding rates we found in Greece in 2017 tend to be higher than those in some other European countries like France or the UK, but remain lower than in Scandinavian countries or Japan[8]. EBF at the age of 6 months is lower than the median estimate for WHO European Region countries[27] and lags behind WHO targets[28], although consistent with findings reported in other European countries[29–31]. Low prevalence of EBF after the age of 4 months in the WHO European Region has been attributed to early introduction of complementary feeding[27].

Mothers participating in our 2017 study reported significantly higher rates of early skin-to-skin contact with their babies and rooming-in, compared with the 2007 findings. Regarding use of breast-milk substitutes, we noted a significant decreasing trend, although there is a lot of room for further improvement, as indicated by the steep decline we found in EBF during the first week of age. Improvements in hospital practices have been observed in other European countries[32] but the use of breast-milk substitutes in the maternity ward continues to be an obstacle in achieving higher breast-feeding rates[33].

We found that maternal educational attainment was a significant predictive factor for breast-feeding; this association is in fact one of the most consistent associations in the relevant literature[8,10,34,35]. We identified private insurance of the mother, an indicator of socio-economic status, to be independently associated with higher EBF at the 1st month. While education and social class are usually correlated, education has been found to have a more direct influence on breast-feeding outcomes than occupation-based social class[36]. We found that certain maternity hospital practices influence breast-feeding uptake, in line with findings of other studies. Early skin-to-skin contact has been shown to have a positive association with breast-feeding[10], while caesarean section[18,37] and supplying breast-milk substitutes adversely affect breast-feeding initiation and duration[10]. In a previous study in Greece, maternity hospital practices were found to be more significant breast-feeding predictors than sociodemographic factors[37].

The association we observed between female infant gender and EBF at the 1st month of age has been also observed in other studies, but is not a consistent finding[10,11,38,39]. In our study, Albanian mothers were found to have three times the odds of any breast-feeding at 6 months compared with Greek mothers. In many studies, immigrant mothers were found to breast-feed more than natives[11,19,40]; country of origin has also been found to affect breast-feeding practices[40]. The advantage of immigrant women regarding breast-feeding may be due to cultural differences[40] and has been found to attenuate with acculturation[8].

Our finding that the time of the study (2017 compared with 2007) was independently associated with the main breast-feeding indicators is of particular importance. It suggests that, apart from changes in maternity hospital practices or maternal characteristics (such as the improvement in educational level or the decrease in smoking rates),

Public Health Nutrition

Table 3 Univariate analysis: main breast-feeding indicators by selected predictive factors. Pooled analysis of data from the two national breast-feeding prevalence studies in Greece (2007 and 2017)

	EBF1				ABF6			
	n/*N*	%	PR	95 % CI	*n*/*N*	%	PR	95 % CI
Study								
2007	119/575	20·7	Ref.	–	129/586	22·0	Ref.	–
2017	204/510	40·0	1·93	1·53, 2·44	246/542	45·4	2·06	1·71, 2·49
Mode of delivery								
Vaginal delivery	189/527	35·9	Ref.	–	202/545	37·1	Ref.	–
Caesarean section	133/557	23·9	0·67	0·56, 0·80	171/581	29·4	0·79	0·68, 0·93
Infant gender								
Male	154/574	26·8	Ref.	–	200/599	33·4	Ref.	–
Female	169/511	33·1	1·23	1·03, 1·47	175/529	33·1	0·99	0·84, 1·17
Maternal age (years)								
16–24	19/94	20·2	Ref.	–	30/99	30·3	Ref.	–
25–34	197/672	29·3	1·45	0·95, 2·20	225/700	32·1	1·06	0·75, 1·50
≥35	105/313	33·5	1·66	1·09, 2·51	116/318	36·5	1·20	0·84, 1·72
Maternal country of origin								
Greece	283/938	30·2	Ref.	–	296/965	30·7	Ref.	–
Albania	22/77	28·6	0·95	0·63, 1·42	47/82	57·3	1·87	1·49, 2·34
Other	16/67	23·9	0·79	0·50, 1·25	28/73	38·4	1·25	0·95, 1·64
Maternal educational attainment								
Primary, secondary and post-secondary education	146/618	23·6	Ref.	–	170/639	26·6	Ref.	–
Tertiary education	175/462	37·9	1·60	1·31, 1·97	199/479	41·5	1·56	1·30, 1·87
Private insurance								
No	247/874	28·3	Ref.	–	308/902	34·1	Ref.	–
Yes	70/198	35·4	1·25	0·97, 1·61	58/203	28·6	0·84	0·66, 1·05
Maternal employment during pregnancy								
No	110/401	27·4	Ref	–	130/421	30·9	Ref.	–
Yes	210/681	30·8	1·12	0·92, 1·38	241/699	34·5	1·12	0·93, 1·34
Maternal smoking at the time of interview								
No	268/790	33·9	Ref.	–	336/822	40·9	Ref.	–
Yes	54/294	18·4	0·54	0·41, 0·71	37/301	12·3	0·30	0·22, 0·40
Maternity hospital type								
Public	147/503	29·2	Ref.	–	185/532	34·8	Ref.	–
Private	176/582	30·2	1·04	0·82, 1·31	190/596	31·9	0·92	0·74, 1·13
Preterm birth								
No (≥37 weeks)	291/950	30·6	Ref.	–	331/984	33·6	Ref.	–
Yes (<37 weeks)	20/109	18·3	0·60	0·42, 0·87	27/112	24·1	0·72	0·49, 1·04
Low birth weight								
No (≥2500 g)	313/997	31·4	Ref.	–	362/1037	34·9	Ref.	–
Yes (<2500 g)	10/88	11·4	0·36	0·18, 0·71	13/91	14·3	0·41	0·25, 0·67
Skin-to-skin contact within first hour of birth								
No	137/605	22·6	Ref.	–	185/628	29·5	Ref.	–
Yes	185/415	44·6	1·97	1·62, 2·39	186/430	43·3	1·47	1·27, 1·70
Rooming-in								
No	115/488	23·6	Ref.	–	135/499	27·1	Ref.	–
Yes	208/595	35·0	1·48	1·18, 1·87	238/625	38·1	1·41	1·12, 1·77
Prescription for infant formula on discharge from maternity hospital								
No	180/442	40·7	Ref.	–	201/455	44·2	Ref.	–
Yes	136/619	22·0	0·54	0·44, 0·66	161/639	25·2	0·57	0·47, 0·69
Free sample of infant formula on discharge from maternity hospital								
No	263/765	34·4	Ref.	–	285/788	36·2	Ref.	–
Yes	54/298	18·1	0·53	0·40, 0·69	76/309	24·6	0·68	0·54, 0·85

EBF1, exclusive breast-feeding at the 1st completed month of age; ABF6, any breast-feeding at the 6th completed month of age; PR, prevalence ratio; ref., reference category.

factors that have been accounted for in the multivariable analysis, other changes have occurred in Greece during this decade which also played a role in the increasing trend in breast-feeding rates.

In the period 2007–2017, several breast-feeding promotion activities took place. A national breast-feeding promotion programme named 'Alkyoni' was implemented by the Institute of Child Health[41], which included national awareness campaigns, educational activities for health professionals and parents, and a breast-feeding helpline. In addition, technical support for the Baby Friendly Hospital Initiative was provided to health-care facilities and at this time five maternity hospitals in Greece have been designated as baby friendly, while in several others, practices promoting breast-feeding (such as rooming-in and skin-to-skin contact during the first hour from birth)

Public Health Nutrition

Table 4 Multivariable analysis: main breast-feeding indicators by selected predictive factors. Pooled analysis of data from the two national breast-feeding prevalence studies in Greece (2007 and 2017)

	EBF1 (*N* 1041*)		ABF6 (*N* 1080*)	
Predictive factor	Adjusted OR	95 % CI	Adjusted OR	95 % CI
Study				
2007	Ref.	–	Ref.	–
2017	1·97	1·37, 2·84	2·19	1·65, 2·90
Maternal age				
Continuous variable	1·03	1·00, 1·06	NA†	
Infant gender				
Male	Ref.	–	NA†	
Female	1·49	1·11, 2·00		
Maternal educational attainment				
Primary, secondary and post-secondary education	Ref.	–	Ref.	–
Tertiary education	1·64	1·15, 2·35	1·81	1·30, 2·51
Caesarean section				
No	Ref.	–	NA†	
Yes	0·68	0·50, 0·92		
Maternal smoking at the time of interview				
No	Ref.	–	Ref.	–
Yes	0·57	0·39, 0·83	0·23	0·15, 0·34
Private insurance				
No	Ref.	–	NA†	
Yes	2·01	1·30, 3·11		
Low birth weight				
No	Ref.	–	Ref.	–
Yes	0·36	0·16, 0·80	0·26	0·13, 0·53
Skin to skin contact within first hour from birth				
No	Ref.	–	Ref.	–
Yes	2·23	1·55, 3·22	1·54	1·18, 2·00
Prescription for infant formula on discharge from maternity hospital				
No	Ref.	–	Ref.	–
Yes	0·48	0·35, 0·66	0·49	0·36, 0·65
Maternal country of origin				
Greece	NA†		Ref.	–
Albania			3·75	2·01, 7·00
Other			1·58	0·93, 2·67

EBF, exclusive breast-feeding at the 1st completed month of age; ABF6, any breast-feeding at the 6th completed month of age; ref., reference category.
*Participants with no missing values for any of the variables were included in the model.
†Not applicable (variable not included in the final regression model, see 'Methods' section).

have been introduced gradually. Due to an organized effort to promote breast-feeding in the community, more than 250 businesses (restaurants, shops, pharmacies) have also been designated as baby friendly[41]. Further, during the past decade numerous important local initiatives to promote breast-feeding have been taken across the country.

With regard to policy changes, new legislation was set up by the Ministry of Health and the Ministry of Labour. It includes laws aiming at maternity leave protection, breast-feeding promotion in the workplace, and the introduction of a written informed consent signed by the mother for the provision of a breast-milk substitute prior to discharge from the maternity hospital[14]. A new child health booklet[42] (in which the WHO growth charts were adopted) was developed and new guidelines for the follow-up of children in primary health care were issued[43]. In 2018 the Ministry of Health published guidelines with regard to complementary feeding initiation, recommending EBF for the first 6 months of age[44].

Our study provides evidence that the above initiatives and policies had a positive effect on breast-feeding uptake, while additional factors may have also contributed. During the past decade the values of a more 'natural way of life' have become more prevalent in Greece, which has probably favoured breast-feeding uptake. In addition, the study period (2007–2017) coincides with the recent financial crisis in Greece (2008 onwards), which might have also affected breast-feeding positively, as has been shown elsewhere[45].

Implications

In conclusion, our study shows that despite the increasing trend observed in all breast-feeding indicators in the past decade in Greece, the WHO recommendation for EBF during the first 6 months of life has not been adopted by mothers and promoted adequately by health-care professionals. Instead, introduction of human milk substitutes in the first

months of life is predominant and early introduction of solids after the 4th month of age is considered the 'norm'. To change the prevailing baby feeding 'culture', a variety of policies, initiatives and educational activities targeted to health professionals and mothers are required.

The sharp decline in breast-feeding rates during the first week of life, along with the high percentage of mothers given free samples of formula milk, underlines the importance of compliance with the provisions of the International Code for the Marketing of Breast-milk Substitutes. In addition, the Baby Friendly Hospital Initiative in Greece needs to be expanded to more maternity clinics and include mother-friendly care services. A breast-feeding supportive environment in primary health care with baby-friendly physicians' offices is essential, together with projects aiming at baby-friendly communities using a whole-of-society approach. The development of an operational action plan on breast-feeding promotion, with objectives aligned with the Sustainable Development Goals[46], is instrumental.

Acknowledgements

Acknowledgements: The authors would like to thank Antigoni Souli for the valuable secretarial support she provided; Konstantinos Koutentakis and Giasemi Sarafidou for their contribution to data analysis; and express their gratitude to the mothers and other family members of the study infants for their participation in the study. *Financial support:* The study was supported financially by the Institute of Child Health, Athens, Greece and by the Ministry of Health, Greece. The funders had no role in the design, analysis or writing of this article. *Conflict of interest:* I.A. is the coordinator of, and C.E., E.N. and S.Z. have participated in 'Alkyoni', a national breast-feeding promotion programme run by the Institute of Child Health, Athens, Greece. I.A., T.P. and T.S. are or have been members of the Greek National Breastfeeding Committee. Z.I. has received remuneration by ELPEN Pharma for covering registration fees of an international conference. The other authors have no conflict of interest. *Authorship:* I.A. conceived the idea of the study. T.P. and D.P. designed the sampling scheme, and T.P., D.P., S.Z. and Z.I. adapted it for the 2017 study. I.A., T.P., E.G. and D.P. designed the questionnaire, and I.A., T.P., Z.I. and D.P. adapted it for the 2017 study. E.G. collected the data for the 2007 study, and Z.I., C.E., E.N. and P.M. for the 2017 study. D.P. and T.P. carried out the analysis for the 2007 study, and I.Z., D.P., T.S. and, T.P. for the 2017 study. I.Z., D.P., T.S. and T.P. wrote the manuscript. All authors contributed to the interpretation of the findings, critically revised the paper for important intellectual content and approved the final version. *Ethics of human subject participation:* This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving study participants were approved by the Medical Ethics Committee of the Institute of Child Health, Athens, Greece. Verbal informed consent was obtained from all participants at the beginning of the telephone interviews; verbal consent was witnessed by at least one other person and formally recorded.

Supplementary material

To view supplementary material for this article, please visit https://doi.org/10.1017/S1368980019003719

References

1. American Academy of Pediatrics (2019) Benefits of Breastfeeding. https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Breastfeeding/Pages/Benefits-of-Breastfeeding.aspx (accessed January 2019).
2. Victora CG, Bahl R, Barros AJD *et al.* (2016) Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* **387**, 475–490.
3. World Health Organization & UNICEF (2007) *Planning Guide for National Implementation of the Global Strategy for Infant and Young Child Feeding*. Geneva: WHO.
4. World Health Organization & UNICEF (2009) *Baby-Friendly Hospital Initiative: Revised, Updated and Expanded for Integrated Care*. Geneva: WHO.
5. World Health Organization (1981) *International Code of Marketing of Breast-Milk Substitutes*. Geneva: WHO.
6. World Health Organization (2018) Ten steps to successful breastfeeding (revised 2018). http://www.who.int/nutrition/bfhi/ten-steps/en/ (accessed January 2019).
7. Pérez-Escamilla R, Martinez JL & Segura-Pérez S (2016) Impact of the Baby-friendly Hospital Initiative on breastfeeding and child health outcomes: a systematic review. *Matern Child Nutr* **12**, 402–417.
8. Ibanez G, Martin N, Denantes M *et al.* (2012) Prevalence of breastfeeding in industrialized countries. *Rev Epidemiol Sante Publique* **60**, 305–320.
9. Dennis C-L (2002) Breastfeeding initiation and duration: a 1990–2000 literature review. *J Obstet Gynecol Neonatal Nurs* **31**, 12–32.
10. Yngve A & Sjöström M (2001) Breastfeeding determinants and a suggested framework for action in Europe. *Public Health Nutr* **4**, 729–739.
11. Ajetunmobi O, Whyte B, Chalmers J *et al.* (2014) Informing the 'early years' agenda in Scotland: understanding infant feeding patterns using linked datasets. *J Epidemiol Community Health* **68**, 83–92.
12. World Health Organization (2008) *Indicators for Assessing Infant and Young Child Feeding Practices. Part 1: Definitions. Conclusions of a Consensus Meeting held 6–8 November 2007 in Washington, DC, USA*. Geneva: WHO.
13. Gaki E, Papamichail D, Sarafidou G *et al.* (2009) *National Study of Prevalence and Determinants of Breastfeeding in Greece*. Athens: Institute of Child Health; available at http://epilegothilasmo.gr/wp-content/uploads/2018/07/Ekthesi_Ethnikhs_Meleths_Thilasmou.pdf (accessed December 2019).
14. Iliodromiti Z, Papamichail D, Ekizoglou C *et al.* (2018) *National Study of Prevalence and Determinants of Breastfeeding in Greece*. Athens: Institute of Child Health; available at http://epilegothilasmo.gr/wp-content/uploads/2018/03/meleti_breastfeeding_-2018_17_final.pdf (accessed December 2019).

Public Health Nutrition

15. Rodwell C & Aymé S (editors) (2014) *2014 Report on the State of the Art of Rare Disease Activities in Europe – Part V: Activities of European Member States and other European countries in the field of rare diseases*. EUCERD, European Union; available at http://www.eucerd.eu/upload/file/Reports/2014ReportStateofArtRDActivitiesV.pdf (accessed January 2020).
16. Lemeshow S, Hosmer DW Jr, Klar J *et al.* (1992) *Adequacy of Sample Size in Health Studies*. Chichester: Wiley.
17. Carlin JB & Hocking J (1999) Design of cross-sectional surveys using cluster sampling: an overview with Australian case studies. *Aust N Z J Public Health* **23**, 546–551.
18. Vassilaki M, Chatzi L, Bagkeris E *et al.* (2014) Smoking and caesarean deliveries: major negative predictors for breast-feeding in the mother–child cohort in Crete, Greece (Rhea study). *Matern Child Nutr* **10**, 335–346.
19. Tavoulari E-F (2015) Immigrant status as important determinant of breastfeeding practice in Southern Europe. *Cent Eur J Public Health* **23**, 39–44.
20. Bakoula C, Nicolaidou P, Veltsista A *et al.* (2007) Does exclusive breastfeeding increase after hospital discharge? A Greek study. *J Hum Lact* **23**, 165–173.
21. Skafida V (2014) Change in breastfeeding patterns in Scotland between 2004 and 2011 and the role of health policy. *Eur J Public Health* **24**, 1033–1041.
22. Bonet M, Kaminski M & Blondel B (2007) Differential trends in breastfeeding according to maternal and hospital characteristics: results from the French National Perinatal Surveys. *Acta Paediatr* **96**, 1290–1295.
23. Brick A & Nolan A (2014) Explaining the increase in breastfeeding at hospital discharge in Ireland, 2004–2010. *Ir J Med Sci* **183**, 333–339.
24. Oakley LL, Kurinczuk JJ, Renfrew MJ *et al.* (2016) Breastfeeding in England: time trends 2005–2006 to 2012–2013 and inequalities by area profile: breastfeeding time trends and inequalities. *Matern Child Nutr* **12**, 440–451.
25. Libuda L, Bolzenius K & Alexy U (2017) Breastfeeding trends in healthy infants since 1990 – results of the DONALD study. *Eur J Clin Nutr* **71**, 1016–1018.
26. Magnusson M, Lagerberg D & Wallby T (2016) No widening socioeconomic gap within a general decline in Swedish breastfeeding: no widening socioeconomic gap in Swedish breastfeeding. *Child Care Health Dev* **42**, 415–423.
27. Bagci Bosi AT, Eriksen KG, Sobko T *et al.* (2016) Breastfeeding practices and policies in WHO European region member states. *Public Health Nutr* **19**, 753–764.
28. World Health Organization & UNICEF (2014) *Global Nutrition Targets 2025: Breastfeeding Policy Brief*. Geneva: WHO.
29. Economou M, Kolokotroni O, Paphiti-Demetriou I *et al.* (2018) Prevalence of breast-feeding and exclusive breast-feeding at 48 h after birth and up to the sixth month in Cyprus: the BrEaST start in life project. *Public Health Nutr* **21**, 967–980.
30. Erkkola M, Salmenhaara M, Kronberg-Kippilä C *et al.* (2010) Determinants of breast-feeding in a Finnish birth cohort. *Public Health Nutr* **13**, 504–513.
31. Grimshaw KEC, Aksoy B, Palmer A *et al.* (2015) Prospective food diaries demonstrate breastfeeding characteristics in a UK birth cohort: prospective diaries of breastfeeding nature. *Matern Child Nutr* **11**, 703–711.
32. Forrester-Knauss C, Merten S, Weiss C *et al.* (2013) The baby-friendly hospital initiative in Switzerland: trends over a 9-year period. *J Hum Lact* **29**, 510–516.
33. Biggs K, Hurrell K, Matthews E *et al.* (2018) Formula milk supplementation on the postnatal ward: a cross-sectional analytical study. *Nutrients* **10**, 608.
34. Theofilogiannakou M, Skouroliakou M, Gounaris A *et al.* (2006) Breast-feeding in Athens, Greece: factors associated with its initiation and duration. *J Pediatr Gastroenterol Nutr* **43**, 379–384.
35. Bouras G, Mexi-Bourna P, Bournas N *et al.* (2013) Mothers' expectations and other factors affecting breastfeeding at six months in Greece. *J Child Health Care* **17**, 387–396.
36. Skafida V (2009) The relative importance of social class and maternal education for breast-feeding initiation. *Public Health Nutr* **12**, 2285–2292.
37. Pechlivani F, Vassilakou T, Sarafidou J *et al.* (2007) Prevalence and determinants of exclusive breastfeeding during hospital stay in the area of Athens, Greece: exclusive breast-feeding initiation in Greece. *Acta Paediatr* **94**, 928–934.
38. Vanderlinden K, Levecque K & Van Rossem R (2015) Breastfeeding or bottled milk? Poverty and feeding choices in the native and immigrant population in Belgium. *J Immigr Minor Health* **17**, 319–324.
39. Lande B, Andersen L, Baerug A *et al.* (2007) Infant feeding practices and associated factors in the first six months of life: the Norwegian infant nutrition survey. *Acta Paediatr* **92**, 152–161.
40. Kelly YJ, Watt RG & Nazroo JY (2006) Racial/ethnic differences in breastfeeding initiation and continuation in the United Kingdom and comparison with findings in the United States. *Pediatrics* **118**, e1428–e1435.
41. Institute of Child Health (2013) Breastfeeding – Alkyoni. http://epilegothilasmo.gr/ (accessed January 2019).
42. Institute of Child Health (2015) *Child Health Booklet*. Athens: Ministry of Health.
43. Antoniadou-Koumatou I, Panagiotopoulos T & Attilakos A (2015) *Guidelines for the Follow Up of Children in Primary Health Care*. Athens: Institute of Child Health.
44. Directorate of Public Health, Department of Non Communicable Diseases and Nutrition (2018) *Guidelines for Introduction of Solid Foods at the First Year of Life*. Athens: Ministry of Health.
45. Elo IT & Grummer-Strawn LM (1993) Changes in breast-feeding initiation and duration in Peru, 1977–1986. *Soc Biol* **40**, 224–243.
46. United Nations (2015) T*ransforming Our World: The 2030 Agenda for Sustainable Development*. New York: UN.

Public Health Nutrition