Baby-friendly hospital practices are associated with duration of full breastfeeding in primiparous but not multiparous Iranian women

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Abstract

There is evidence that the Baby-Friendly Hospital Initiative (BFHI) results in improved breastfeeding outcomes in Western countries, but little is known of its impact in Middle-Eastern countries. This study investigated the impact of BFHI practices on duration of full breastfeeding in a cohort of 700 Iranian mothers recruited between June 2014 and March 2015 from maternity hospitals in Shiraz and followed-up prospectively for 6 months. At baseline, mothers self-reported exposure to 7 of the BFHI Ten Steps to Successful Breastfeeding (Steps 3 to 9). Data on breastfeeding outcomes were collected at baseline, 1, 3, 4, and 6 months postpartum. Cox regression analysis was conducted to determine the impact of individual and cumulative BFHI Steps on the duration of full breastfeeding, defined as the number of weeks since discharge that an infant received only breast milk and no complementary formula or food. Mothers reported experiencing on average 3.9 (SD 1.13, range 1 to 7) Steps, and only 28% of infants were fully breastfed at 6 months. There was a protective inverse relationship for primiparous (p for trend = .022) but not multiparous mothers (p for trend = .069), between the number of Steps a woman was exposed to and the likelihood of her discontinuing full breastfeeding within 6 months postpartum. Greater exposure to BFHI practices potentially could increase primiparous mothers' chances of fully breastfeeding to 6 months. Continual monitoring of the BFHI Steps and repeated education of healthcare staff are required to ensure that Iranian mothers receive adequate breastfeeding support.

KEYWORDS

Baby-Friendly Hospital Initiative, breastfeeding duration, hospital practices, parity

1 | INTRODUCTION

The Baby-Friendly Hospital Initiative (BFHI) is a global programme jointly developed by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) and was launched in 1991 (World Health Organization/UNICEF, 2009). A key component of the WHO/UNICEF Global Strategy for Infant and Young Child Feeding (World Health Organization/UNICEF, 2003), the goal of the BFHI is to guarantee the best start in life for all infants by improving breastfeeding outcomes through ensuring maternity hospitals protect, promote, and support breastfeeding (Saadeh, 2012). A maternity facility can be designated Baby-Friendly when it complies with the International Code of Marketing of Breast-milk Substitutes (World Health Organization, 1981) and adheres to the Ten Steps to Successful

Breastfeeding (hereafter referred to as the Ten Steps; World Health Organization/UNICEF, 2009).

There is a generous body of global evidence that implementation of these Baby-Friendly maternity care practices results in improved breastfeeding outcomes including breastfeeding initiation, duration, and exclusivity (Howe-Heyman & Lutenbacher, 2016; Martens, 2012; Munn, Newman, Mueller, Phillips, & Taylor, 2016; Perez-Escamilla, Martinez, & Segura-Perez, 2016; Sinha et al., 2015). Additionally, the PROBIT cluster-randomised trial (Kramer et al., 2001) provides evidence that the BFHI has a positive impact on some but not all infant and child health outcomes examined (Martens, 2012). Most of this evidence comes from Western countries, but little is known about the impact of the BFHI in Middle-Eastern countries (Erkul, Yalcin, & Kilic, 2010).

In 1991, the Iranian Minister of Health established the National Committee for Breastfeeding and the National Centre for Breastfeeding Promotion (Kalantari & Roudsari, 2013). As a direct result of these initiatives, Iran was an early adopter of the BFHI and has the greatest number of BFHI accredited hospitals among Middle Eastern countries (World Health Organization, 2017). As of 2006, 82% (466/566) of hospitals were accredited as Baby-Friendly, with more than 8 in every 10 children being born in a Baby-Friendly hospital (Olang, Farivar, Heidarzadeh, Strandvik, & Yngve, 2009). In Iran, breastfeeding is the culturally accepted norm, and roughly 9 out of 10 children are breastfed for 12 months and beyond (Olang et al., 2009). Nevertheless, in 2010, the proportion of children exclusively breastfed to 6 months of age was 53.1% in total, and 27.8% and 62.8% in the urban and rural areas, respectively (Rashidian et al., 2012). Thus, exclusive breastfeeding rates, particularly in urban areas of Iran, fall well short of the WHO recommendation for infants to be exclusively breastfed to 6 months of age (World Health Organization/UNICEF, 2003).

The aim of this study was to investigate the extent to which a cohort of urban, Iranian mothers experienced Baby-Friendly hospital practices and, in turn, the impact of individual and cumulative practices on the duration of full breastfeeding to 6 months postpartum.

2 | METHODS

The data were collected in the Shiraz Infant Feeding Study, a prospective cohort study of Iranian mothers, which has been described in detail previously (Zarshenas, Zhao, Poorarian, Binns, & Scott, 2017). Briefly, the study was conducted from June 2014 through March 2015 in Shiraz, in southwest Iran. Mothers were consecutively approached and recruited via face-to-face interview within 48 hr of delivery from the maternity wards of the three main public and two private maternity hospitals servicing the city. Recruitment from each hospital was proportional to the total number of annual births in that hospital. Eligibility criteria included mothers who were older than 18 years and had given birth to a healthy, full-term (≥ 37 weeks) singleton baby weighing 2,500–4,000 g. Mothers who were too ill to answer questions, not living in Shiraz, and whose infants were admitted to the neonatal intensive care unit for more than 72 hr were ineligible to participate. Participants were followed up at 1, 3, 4, and 6 months postpartum when they attended their local Maternal and Child Health clinics for postnatal care.

All baseline and follow-up data were collected via face-to-face interview by the principal researcher (MD) and six student midwives who were trained as research assistants to recruit women and conduct interviews. The baseline questionnaire collected information on a variety of hospital practices that correspond with the BFHI Ten Steps (World Health Organization/UNICEF, 2009) and other sociodemographic and biomedical factors previously shown to be associated with breastfeeding duration (Dennis, 2002; Scott & Binns, 1998). Information on current feeding method (breastfeeding only, mixed feeding, and formula feeding only) and the provision of any prelacteal or supplemental feeds during the hospital stay was collected at baseline. Information on current feeding method and any changes to

Key messages

- Among primiparous, but not multiparous Iranian women, there was a protective inverse relationship between the number of Baby-Friendly Hospital Initiative (BFHI) Steps that a woman was exposed to and the likelihood of her discontinuing full breastfeeding within the first 6 months postpartum.
- Delivery by caesarean section was a barrier to experiencing Steps 4 and 6.
- Continual monitoring of adherence to the BFHI Steps by hospitals and repeated education of medical and nursing staff are required to ensure that mothers are exposed to the BFHI Steps. Improved adherence to these practices is likely to result in longer duration of full breastfeeding.

feeding practices since baseline, or the last Maternal and Child Health clinic visit, was collected at each follow-up visit. This included the age in weeks when complementary feeding, including infant formula, other beverages, and soft or semi-solid foods, commenced. Therefore, the data collected reflect “age since birth” and not feeding practices in the last 24 hr.

2.1 | Outcome variable

The WHO definition (World Health Organization, 2008) was used to define exclusive breastfeeding. Exploratory analysis of the data revealed that relatively few infants were exclusively breastfed from birth with many having received prelacteal feeds and/or supplementary formula feeds whilst in hospital; yet by the time of the baseline interview, the majority were receiving breast milk only. As the baseline interview was typically conducted on the second day following delivery and most women are discharged within 48 hr of delivery, the method of feeding recorded at this time was assumed to be the method of feeding at discharge from hospital. For the purposes of this analysis, therefore, the breastfeeding outcome investigated in this study was the duration of full breastfeeding, which was defined as the number of weeks from discharge that an infant received only breast milk and no complementary formula or food.

2.2 | Explanatory variables

Four of the five hospitals from which women were recruited were BFHI accredited, accounting for 90% of the births. Exploratory analysis of the data revealed that the majority of BFHI Steps investigated were not practiced at the level prescribed in the BFHI Global Criteria (World Health Organization/UNICEF, 2009), which are used to demonstrate adherence by hospitals to each of the Ten Steps. Therefore, we did not investigate the impact of BFHI status per se, but instead, we determined the association of the duration of full breastfeeding with maternal recall of seven hospital practices explored in the baseline questionnaire that align with seven of the Ten Steps (Table 1—Steps 3 to 9). Other explanatory sociodemographic and biomedical variables

adjusted for in the multivariable analyses included maternal age (<25, 25–29, and ≥30 years), level of education (primary to secondary, high school, and university), prepregnancy employment status (employed, unemployed), prepregnancy maternal weight status (normal: BMI < 25 kg/m²; overweight/obese: BMI ≥25 kg/m²), parity (primiparous, multiparous), method of delivery (vaginal, caesarean section), and infant sex and birth weight (2,500–2,999, 3,000–3,499, and 3,500–4,000 g).

Data were analysed using the IBM SPSS Statistics for Windows, Version 24.0 (IBM Corp. Released 2013. Armonk, NY: IBM Corp USA). A chi-square test of independence was used to explore the bivariate association of maternal characteristics (age, education, employment status, weight status, method of delivery, and parity) and infant characteristics (gender, birth weight) with each of the seven Steps. The relationship between each BFHI Step and the likelihood of discontinuing full breastfeeding was investigated in a bivariate Cox proportional hazard regression analysis. Exposure to the seven Steps was summed and the total number of Steps categorised as ≤2 Steps, 3–4 Steps, and ≥5 Steps. Survival analysis and the Log-rank test were performed to determine if there was a difference in the duration of full breastfeeding according to the categorised number of BFHI Steps a woman was exposed to. Finally, a multivariable Cox regression analysis was conducted with time to cessation of full breastfeeding as the “event” of interest. The purpose of this analysis was to investigate whether the number of BFHI steps was associated with duration of full breastfeeding, independent of potential confounding, but not to identify influential predictors for full breastfeeding. Potential confounders were selected based on prior information (Greenland & Pearce, 2015), and all factors adjusted for in the multivariate regression models have been reported widely in the literature (Dennis, 2002; Scott & Binns, 1998). Initially, a base model (Model 1) using the categorised number of BFHI Steps as the primary explanatory variable and duration of full breastfeeding as the outcome was fitted. Other explanatory variables were sequentially added in blocks to determine the extent to which the impact of the number of BFHI Steps on breastfeeding duration was attenuated after adjustment for these other determinants. In

the second model, the base model was adjusted for mother's age, education, and prepregnancy employment status; the third model was further adjusted for method of delivery and maternal prepregnancy weight status; and in the fourth and final model, infant sex and birth weight were added. Both the bivariate and the multivariable Cox regression analyses were carried out for the total sample and then stratified for parity.

The study was approved by the Curtin University Human Research Ethics Committee (HR 31/2014) and the Local Research Ethics Committee of the Shiraz University of Medical Sciences (209/2014). All participants received verbal and written study information, provided signed informed consent, and were advised that their participation was voluntary and that they could decline to participate, or withdraw at any time, without prejudicing their care or that of their infant.

3 | RESULTS

In total, 1,571 women were screened for eligibility, and of the 719 eligible women, 700 (97.4%) agreed to participate (Figure S1). Of these, 672 attended the first month follow-up visit, 662 the third and fourth month visits, and 660 the sixth month visit (94.3% end of study retention rate). The majority of recruited mothers were less than 30 years of age (59.3%), educated to high school level or less (61.3%), primiparous (54.6%), and had delivered by either elective (35.4%) or emergency (34.7%) caesarean section. Mothers reported experiencing on average 3.9 (SD 1.13, range 1 to 7) of the BFHI Steps, and the majority of mothers recalled experiencing four or less BFHI Steps (71.0%; Table 2). Almost all mothers (98.6%) initiated breastfeeding, and on discharge from hospital, 74.3% were fully breastfeeding and 23.0% mixed feeding. At 6 months of age, 87% of infants were still receiving breastmilk, but only 28% of infants were fully breastfed.

The bivariate analysis revealed a number of significant associations between maternal characteristics and self-reported exposure to individual BFHI practices (Table 3). For instance, older mothers more

TABLE 1 WHO/UNICEF Ten Steps to Successful Breastfeeding and the way in which each Step was assessed

Assessed	BFHI Steps	Mother self-reported
✗	1. Have a written breastfeeding policy that is routinely communicated to all health care staff.	
✗	2. Train all health care staff in the skills necessary to implement this policy.	
✓	3. Inform all pregnant women about the benefits and management of breastfeeding.	Attending an antenatal class
✓	4. Help mothers initiate breastfeeding within a half hour of birth.	Putting her infant to her breast within 30 min of birth
✓	5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.	Receiving assistance with positioning and/or attaching her infant
✓	6. Give newborn infants no food or drink other than breast milk, unless medically indicated.	That her infant had received nothing other than breast milk whilst in hospital
✓	7. Practice rooming-in: Allow mothers and infants to remain together 24 hr a day.	That her infant remained with her 24 hr a day
✓	8. Encourage breastfeeding on demand.	Being encouraged to breastfeed on demand
✓	9. Give no artificial teats or pacifiers to breastfeeding infants.	That her infant was not given a pacifier in hospital
✗	10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.	

TABLE 2 Sample characteristics (*n* = 700)

	<i>n</i>	%
Maternal age (year)		
<25	150	21.4
25–29	265	37.9
≥30	285	40.7
Maternal education		
Primary to secondary	142	20.3
High school	287	41.0
University	271	38.7
Maternal prepregnancy employment status		
Employed	125	17.9
Unemployed	575	82.1
Maternal prepregnancy weight status ^a		
Normal weight	408	58.3
Overweight or obese	292	41.7
Method of delivery		
Vaginal	209	29.9
Elective caesarean section	248	35.4
Emergency caesarean section	243	34.7
Parity		
Primiparous	382	54.6
Multiparous	318	45.4
Infant sex		
Male	353	50.4
Female	347	49.6
Infant birth weight (g)		
2,500–2,999	224	32.0
3,000–3,499	320	45.7
3,500–4,000	156	22.3
BFHI Steps ^b		
Mean number of steps (SD)	3.9 (1.13)	(range 1–7)
≤ 2 steps	64	9.1
3–4 steps	433	61.9
≥ 5 steps	203	29.0

Note. BFHI = Baby-Friendly Hospital Initiative; BMI = body mass index.

^aNormal = BMI <25 kg/m², Overweight/obese = BMI ≥25 kg/m².

^bBFHI Steps 3 to 9 assessed.

often reported being encouraged to feed on demand ($p < .01$), whereas fewer overweight or obese women initiated breastfeeding within 30 min of delivery ($p < .05$). Fewer university educated women attended an antenatal class ($p < .01$) or initiated breastfeeding within 30 min ($p < .001$), but more reported that their infants had been given a pacifier ($p < .001$). In contrast, fewer of the less educated women received assistance to breastfeed ($p < .001$), and more of their infants received food or drink other than breast milk ($p < .01$). Compared with multiparous mothers, more first-time mothers received assistance to breastfeed ($p < .001$), but fewer reported being encouraged to demand feed ($p < .01$). Compared to women who had delivered vaginally, more women who delivered by caesarean section received assistance to breastfeed ($p < .01$), but fewer attended an antenatal class ($p < .05$), initiated breastfeeding within 30 min of delivery ($p < .001$), or were encouraged to feed on demand ($p < .01$). Finally, fewer infants

delivered by caesarean section received no food or drink other than breastmilk ($p < .05$).

The bivariate Cox regression analysis revealed that overall women who reported initiating breastfeeding within 30 min of birth (Step 4) and that their infants had received nothing other than breast milk (Step 6) were significantly less likely to have discontinued full breastfeeding at any time in the first 6 months than their counterparts who reported not experiencing these Steps (Table 4). When stratified by parity, these associations were still evident for both primiparous and multiparous mothers. Primiparous mothers, but not multiparous mothers, who reported being encouraged to breastfeed on demand (Step 8) were significantly less likely to have discontinued full breastfeeding compared with primiparous mothers who were not encouraged to demand feed.

The univariate survival analysis revealed a significant difference in the duration of full breastfeeding (Log-rank test $\chi^2 = 21.414$, $df = 2$, $p < .001$) according to the number of BFHI Steps to which a woman was exposed (Figure 1). The median duration of full breastfeeding for women exposed to five or more Steps was 21.1 weeks, compared to 6.6 weeks for those exposed to three or four Steps and 2.2 weeks for those exposed to two or less Steps.

The multivariable Cox regression analysis revealed a strong protective inverse dose–response relationship (p for trend $\leq .001$) between the number of BFHI Steps a woman reported being exposed to and the likelihood of her discontinuing full breastfeeding within the first 6 months postpartum (Table 5). The effect size was attenuated slightly (p for trend = .005) after adjustment for other known determinants of breastfeeding duration. In the fully adjusted model, women who had experienced five or more Steps were 40% less likely (adjusted hazard ratio 0.60; 95% confidence interval 0.42, 0.85) to have discontinued full breastfeeding within the first 6 months, compared with women who had experienced two or less Steps.

When stratified by parity, the dose–response association was significant for both first-time mothers (p for trend = .003) and multiparous mothers (p for trend = .022) in the base model. Although attenuated (p for trend = .022), the dose–response relationship remained significant for primiparous women; however, it was no longer significant for multiparous mothers (p for trend = .069) in the final fully adjusted model (Model 4). In the final model, compared to primiparous mothers who had experienced two or less BFHI Steps, the hazard of discontinuing full breastfeeding in the first 6 months postpartum reduced by 48% (adjusted hazard ratio 0.52; 95% confidence interval 0.32, 0.84) for the primiparous mothers who had experienced five or more BFHI Steps.

4 | DISCUSSION

Although the majority of Iranian hospitals are BFHI accredited, to our knowledge, this is the first Iranian study to investigate the impact of BFHI practices on breastfeeding outcomes. Although the initiation of breastfeeding in this cohort was near universal and 9 out of 10 infants were still being breastfed at 6 months of age, only a quarter of infants were fully breastfed at 6 months of age. Consistent with the findings of other studies (Perez-Escamilla et al., 2016), there was a strong protective inverse dose–response relationship between the number of BFHI Steps that a woman reported being exposed to

TABLE 3 Exposure to Baby-Friendly hospital practices by participant characteristics

Characteristic	Step 3 Attended an antenatal class %	Step 4 First BF within 30 min %	Step 5 Assisted to BF %	Hospital practice ^a Step 6 No food or drink other than BM %	Step 7 Rooming- in %	Step 8 Encouraged to feed on demand %	Step 9 No pacifier %
Total	12.1	32.1	73.3	29.9	98.9	54.6	92.3
Maternal age							
<25	14.0	38.0	75.3	25.3	98.0	50.7**	94.7
25–29	12.5	32.8	73.2	31.3	99.2	49.1	92.8
≥30	10.9	28.4	72.3	30.9	98.9	61.8	90.5
Maternal education							
Primary to secondary	19.0**	47.9***	57.0***	22.5**	97.9	59.2	91.5 ***
High school	12.2	32.4	74.6	35.9	99.0	55.4	96.9
University	8.5	23.6	80.4	27.3	99.3	51.3	87.8
Maternal employment status							
Employed	12.8	26.4	78.4	27.2	98.4	51.2	88.8
Unemployed	12.0	33.4	72.2	30.4	99.0	55.3	93.0
Maternal weight status ^b							
Normal weight	11.3	35.5*	75.0	30.1	99.0	54.2	92.9
Overweight or obese	13.4	27.4	70.9	29.5	98.6	55.1	91.4
Method of delivery							
Vaginal	16.3*	83.7***	65.5**	35.9*	98.1	63.6**	94.3
Caesarean section	10.4	10.2	76.6	27.3	99.2	50.7	91.4
Parity							
Primiparous	11.5	29.8	80.9***	28.5	98.4	49.2**	92.1
Multiparous	12.9	34.9	64.2	31.4	99.4	61.0	92.5
Infant gender							
Male	11.6	35.7*	72.5	29.2	99.2	54.7	93.5
Female	12.7	28.5	74.1	30.5	98.6	54.5	91.1
Infant birth weight (g)							
2,500–2,999	8.0 **	24.6	73.2	27.2	98.7	52.7	91.1
3,000–3,499	12.2	35.6	74.4	33.8	99.4	53.4	94.1
3,500–4,000	17.9	35.9	71.2	25.6	98.1	59.6	90.4

Note. BF = breastfeed; BM = breast milk; BMI = body mass index.

^a7 of 10 Steps to Successful Breastfeeding were assessed.

^bNormal = BMI <25 kg/m², Overweight/obese = BMI ≥25 kg/m².

*Chi square *p* value <.05,

**Chi square *p* value <.01,

***Chi square *p* value <.001.

and the likelihood of her discontinuing full breastfeeding in the first 6 months postpartum.

This study addresses a limitation of the majority of earlier studies, which have not considered the differential effect of the BFHI on primiparous and multiparous mothers (Perez-Escamilla et al., 2016). When the analysis was stratified by parity, this dose-response relationship was significant for primiparous women but not multiparous women, after adjusting for potential confounding factors. Primiparous mothers who reported being exposed to five or more BFHI Steps were half as likely to have discontinued full breastfeeding at any time in the first 6 months postpartum compared with those who were exposed to two or less Steps. As proposed by Perez-Escamilla et al. (2016),

primiparous and multiparous women are likely to have different breastfeeding protection, promotion, and support needs. For instance, primiparous women are more likely to report early breastfeeding problems compared with multiparous mothers (Hackman, Schaefer, Beiler, Rose, & Paul, 2015) and are therefore more likely to require and request assistance.

This lack of a protective association among multiparous mothers is not surprising in Iran and other Middle-Eastern countries; where breastfeeding initiation is near universal, the majority of children are breastfed well into their first year of life (Abuidhail, 2014; Al-Kohji, Said, & Selim, 2012; Musaiger & Abdulkhalek, 2000; Olang et al., 2009) and breastfeeding duration has been reported to be positively

TABLE 4 Bivariate association of individual Baby-Friendly practices and duration of full breastfeeding: Full sample and stratified by parity

BFHI Step experienced	All			Primiparous mothers			Multiparous mothers		
	CHR	95% CI	p value	CHR	95% CI	p value	CHR	95% CI	p value
Step 3. Inform all pregnant women about the benefits and management of breastfeeding	0.98	0.74, 1.28	.855	1.03	0.72, 1.47	.876	0.91	0.59, 1.38	.644
Step 4. Help mothers initiate breastfeeding within a half-hour of birth	0.65	0.53, 0.80	<.001	0.74	0.57, 0.96	.023	0.57	0.42, 0.77	<.001
Step 5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.	1.22	0.99, 1.50	.059	1.20	0.88, 1.62	.250	1.17	0.88, 1.56	.288
Step 6. Give newborn infants no food or drink other than breast milk, unless medically indicated.	0.67	0.55, 0.82	<.001	0.68	0.52, 0.89	.005	0.66	0.48, 0.89	.007
Step 7. Practice rooming-in, allow mothers and infants to remain together 24 h a day	0.77	0.32, 1.87	.566	0.51	0.21, 1.25	.141	20.29	NR	.441
Step 8. Encourage breastfeeding on demand	0.87	0.73, 1.04	.136	0.79	0.62, 0.99	.046	1.06	0.80, 1.40	.709
Step 9. Give no artificial teats or pacifiers to breastfeeding infant	0.81	0.59, 1.11	.191	0.85	0.55, 1.30	.442	0.77	0.47, 1.24	.277

Note. CHR = Crude Hazard Ratio; CI = confidence interval.

NR = not reported, all but two multiparous women roomed-in, hence extremely wide 95%CI due to rare event bias.

associated with multiparity (Al-Hreashy et al., 2008; Al-Sahab et al., 2008; Batal, Boulghourjian, Abdallah, & Afifi, 2006; Dashti, Scott, Edwards, & Al-Sughayer, 2014). However, this finding is not necessarily generalisable to other countries with lower breastfeeding initiation rates, shorter breastfeeding duration rates, and/or where multiparity has not been found to be associated with breastfeeding outcomes (Bai, Fong, & Tarrant, 2015; Donnan et al., 2013; Lok, Bai, & Tarrant, 2015; Pang et al., 2016).

Although four of the five hospitals participating in this study were accredited as BFHI, not all of the Steps to Successful Breastfeeding investigated in this study were reported by mothers as being practiced at levels expected of BFHI hospitals (World Health Organization/UNICEF, 2009). Three Steps, in particular, appeared to be poorly adhered to, namely, Step 3—inform all pregnant women about the benefits and management of breastfeeding; Step 4—help mothers initiate breastfeeding within a half hour of birth; and Step 6—give newborn infants no food or drink other than breast milk, unless medically indicated. It should be noted that assessment of Step 3 was based on the number of women reporting that they had attended an antenatal class, but mothers may have been exposed to this step individually

during antenatal clinic visits, and hence, exposure to this step is likely to have been underestimated. Nevertheless, high workloads and staff shortages mean that health care providers have only a few minutes with each woman during antenatal visits to provide advice and answer a woman's questions, which would limit the extent and quality of breastfeeding advice provided during these visits (Mohammad-Alizadeh et al., 2009).

Low adherence to Steps 4 and 6 may be explained in part by the high rate of caesarean section deliveries reported by 7 out of 10 women in this study. There is evidence that delivery by caesarean section can result in delayed mother–infant interaction and hence is a barrier to the initiation of breastfeeding within 30 min of delivery (Step 4; Rowe-Murray & Fisher, 2002). Similarly, prolonged separation from the infant and difficulties in positioning the infant to breastfeed following a caesarean section may result in infants being offered food and drinks other than breast milk (Step 6; Zanardo et al., 2010). The Global Criteria for the BFHI (World Health Organization/UNICEF, 2009) take into account the potential impact of caesarean section on mother–infant contact in the immediate postpartum period. Nevertheless, it is expected that for BFHI accreditation that adherence to Step 4 will be reported by 80% of randomly selected mothers with vaginal births or caesarean sections without general anaesthesia and 50% of mothers who have had caesarean deliveries with general anaesthesia (World Health Organization/UNICEF, 2009). Although the criterion for Step 4 was met in this study for those mothers who had vaginal births, only 1 in 10 mothers who delivered by caesarean section reported initiating breastfeeding within 30 min. There is evidence that it is possible to achieve this criterion regardless of method of delivery, and hospitals need a clear postoperative breastfeeding care plan for women undergoing a caesarean section, which is strongly supported and enacted by all levels of hospital management and staff (Rowe-Murray & Fisher, 2002).

Lack of exposure to Steps 4 and 6 were both significantly associated with risk of discontinuing full breastfeeding before 6 months postpartum, for both primiparous and multiparous mothers. This confirms the findings of studies in the USA, which have demonstrated that lack of exposure to Steps 4 and 6 was associated with shorter breastfeeding duration (DiGirolamo, Grummer-Strawn, & Fein, 2008; Nickel, Labbok, Hudgens, & Daniels, 2013) and that these Steps are the among the

FIGURE 1 Duration of full breastfeeding by number of Baby-Friendly Hospital Initiative Steps

TABLE 5 Association of the number of Baby-Friendly practices and duration of full breastfeeding: Full sample and stratified by parity

	All			Primiparous			Multiparous		
	HR	95% CI	<i>p</i> value	HR	95% CI	<i>p</i> value	HR	95% CI	<i>p</i> value
Model 1 bivariate			<.001 ^a			.003 ^a			.022 ^a
≤2 BFHI Steps	1.0			1.0			1.0		
3–4 BFHI Steps	0.85	0.63, 1.15	.305	0.75	0.50, 1.12	.153	0.95	0.60, 1.49	.821
≥5 BFHI Steps	0.57	0.41, 0.79	.001	0.48	0.30, 0.76	.002	0.67	0.41, 1.09	.102
Model 2			<.001 ^a			.003 ^a			.012 ^a
≤2 BFHI Steps	1.0			1.0			1.0		
3–4 BFHI Steps	0.81	0.60, 1.10	.178	0.74	0.49, 1.11	.148	0.82	0.52, 1.32	.417
≥5 BFHI Steps	0.54	0.39, 0.76	<.001	0.48	0.30, 0.76	.002	0.57	0.35, 0.94	.029
Model 3			.003 ^a			.018 ^a			.051 ^a
≤2 BFHI Steps	1.0			1.0			1.0		
3–4 BFHI Steps	0.84	0.62, 1.14	.251	0.76	0.51, 1.15	.195	0.85	0.53, 1.36	.499
≥5 BFHI Steps	0.59	0.42, 0.83	.003	0.52	0.32, 0.83	.006	0.62	0.37, 1.04	.072
Model 4			.005 ^a			.022 ^a			.069 ^a
≤2 BFHI Steps	1.0			1.0			1.0		
3–4 BFHI Steps	0.84	0.62, 1.14	.269	0.76	0.50, 1.14	.140	0.86	0.54, 1.37	.469
≥5 BFHI Steps	0.60	0.42, 0.85	.004	0.52	0.32, 0.84	.007	0.63	0.38, 1.07	.086

BFHI = Baby-Friendly Hospital Initiative; HR = hazard ratio; CI = confidence interval.

Model 2 = Model 1 + maternal age, education, and employment status

Model 3 = Model 2+ method of delivery and maternal weight status

Model 4 = Model 3+ infant sex and birth weight

^a*p* for trend.

hardest to comply with (Merewood, Mehta, Chamberlain, Philipp, & Bauchner, 2005). Although these and other studies have reported negative associations between individual Steps and breastfeeding outcomes, Perez-Escamilla et al. (2016) warn against focussing attention solely on a single step, as lack of implementation of Step 6 for instance is likely to be an indication of lack of adherence to Steps 1 through 9 because each of the Ten Steps is highly interrelated.

A limitation of this study is that it is based on maternal self-report of both the explanatory and outcome variables. Therefore, the results reflect the care that a mother perceived she received and not necessarily the care she received (Nickel et al., 2013). A mother's recall of care may be influenced by maternal recall and positive responses biases or, in some situations, indication bias whereby, for example, a woman who had difficulties mastering breastfeeding may be more likely to recall being shown how to position and attach her infant than a woman who did not have difficulties (Perez-Escamilla et al., 2016). However, this information was collected in a similar manner and at the equivalent time that women would be randomly selected in the maternity wards for the self-appraisal of the Global Criteria for the BFHI (World Health Organization/UNICEF, 2009) and thus is comparable to the data collected to assess compliance with the BFHI Ten Steps. It is possible that the method of feeding at discharge may have been misclassified, as some of the women who reported breastfeeding only at the time of the baseline interview may have changed to mixed feeding prior to discharge. Although, this change in feeding practice would have been detected at the first follow-up interview at 1 month postpartum and accounted for in the survival analysis. Although duration of breastfeeding was self-reported, this information was collected longitudinally at 1, 3, 4, and 6 months postpartum and there is evidence that

maternal recall of breastfeeding duration is valid and reliable when duration is recalled after a short period (Li, Scanlon, & Serdula, 2005). A further limitation is that it was not possible to assess adherence to all Ten Steps. This is a commonly reported limitation of studies of this kind as women cannot be expected to know whether a hospital has a written breastfeeding policy, which is routinely communicated to all health care staff (Step 1) or if all health care staff are trained in the skills necessary to implement the policy (Step 2; DiGirolamo et al., 2008; Tarrant et al., 2011). Furthermore, we did not assess community support (Step 10), which appears to be key to sustaining postdischarge breastfeeding outcomes over the longer term (Perez-Escamilla et al., 2016).

5 | CONCLUSIONS

This study supports the global evidence that adherence to the BFHI Ten Steps is associated, in a dose–response manner, with longer duration of full breastfeeding. In this cohort of Iranian women, this association was significant only for primiparous women, but lack of an association for multiparous is not necessarily generalisable to other countries with lower breastfeeding initiation rates and shorter duration of breastfeeding. Although four of the five hospitals participating in the study were BFHI accredited, maternal report of exposure to a number of Steps fell short of the BFHI Global Criteria used to assess adherence to the Ten Steps. Continual monitoring of the BFHI Steps by hospitals and repeated education of medical and nursing staff are required to ensure that mothers are exposed to the BFHI Steps. Improved adherence to these practices is likely to result in longer duration of full breastfeeding among Iranian mothers.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

MZ was the project lead for this study and managed the collection, entry, and processing of data. JAS and CWB were responsible for the conception of the study. MZ analysed the data with assistance from YZ and JAS. MZ and JAS co-wrote the initial version of the manuscript, and YZ and CWB provided feedback. All authors critically reviewed and approved the final version of the manuscript.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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