Title	Effect of a hospital policy of not accepting free infant formula on in-hospital formula supplementation rates and breast-feeding duration
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Objectives: To investigate the effect of public hospitals in Hong Kong not accepting free infant formula from manufacturers on in-hospital formula supplementation rates and breastfeeding duration.

Design: Prospective cohort study.

Setting: In-patient postnatal units of four public hospitals in Hong Kong.

Subjects: Two cohorts of breastfeeding mother-infant pairs (n=2560). Cohort 1 (n=1320) was recruited before implementation of the policy to stop accepting free infant formula and Cohort 2 (n=1240) was recruited after policy implementation. Participants were followed prospectively for 12 months or until they stopped breastfeeding.

Results: The mean number of formula supplements given to infants in the first 24 hours was 2.7 in Cohort 1, and 1.17 in Cohort 2 (SD=3.11 and 1.94, respectively, $P<0.001$). The proportion of infants who were exclusively breastfed during the hospital stay increased from 17.7% in Cohort 1 to 41.3% in Cohort 2 ($P<0.001$), and the risk of breastfeeding cessation was significantly lower in Cohort 2 (HR=0.81; 95% CI, 0.73 to 0.9). Participants who non-exclusively breastfed during the hospital stay had a significantly higher risk of stopping any or exclusive breastfeeding. Higher levels of formula supplementation also increased the risk of breastfeeding cessation in a dose–response pattern.

Conclusions: After implementation of a hospital policy to pay market price for infant formula, rates of in-hospital formula supplementation were reduced and the rates of in-hospital exclusive breastfeeding and breastfeeding duration increased.

Introduction

The recommendation for exclusive breastfeeding for the first six months of life is based on the nutritional and immunological importance of breastfeeding for optimal health, growth and development [1; 2] and the well documented risks of infant formula feeding[3; 4]. Although breastfeeding initiation rates have increased substantially in most developed countries over the past several decades, early breastfeeding cessation is common and rates of exclusive breastfeeding remain low[5; 6]. Many healthy breastfeeding newborns are supplemented with infant formula before leaving hospital, with rates ranging from 23 to 82%[7; 8; 9; 10; 11; 12; 13]. Supplements are often given for non-medical reasons[14] such as maternal fatigue, instrumental or operative deliveries, and perceived insufficient milk[7; 8; 11]. Early infant formula supplementation disrupts the establishment of breastfeeding by reducing the frequency of breastfeeding and the amount of breast milk removed from the breasts, which often necessitates further supplementation[15].

Excessive marketing and promotion of infant formula, including the provision of free or heavily discounted products to hospitals and medical providers, may contribute to the high rates of in-hospital formula supplementation and the subsequent reduced rates of exclusive breastfeeding[16]. In 1989, the World Health Organization (WHO) and UNICEF developed a set of guidelines for maternity care facilities to protect, promote and support breastfeeding[17]. The WHO later launched the Baby Friendly Hospital Initiative (BFHI), which outlined minimum global criteria for accreditation as a Baby-Friendly Hospital. The BFHI stipulates that hospitals should not accept free or heavily discounted infant formula products from manufacturers, and must pay market price for all breast milk substitutes[18]. Despite this BFHI guideline, financial incentives mean many hospitals that are not BFHI accredited continue to accept infant formula products from the manufacturers[16]. Research has highlighted that early infant formula supplementation is one of the strongest predictors of early breastfeeding cessation[8; 11; 19; 20; 21]. Providing mothers with infant formula samples upon hospital discharge

has also been shown to shorten breastfeeding duration[22; 23]. It is widely believed that hospitals' acceptance of free infant formula encourages non-medically indicated supplementation[24; 25]. Although a number of studies have found that the BFHI improves hospital practices[26; 27; 28] and breastfeeding outcomes[21; 29; 30], none have specifically examined the impact of hospitals stopping the acceptance of free infant formula. This suggests that there is no direct evidence to support this belief. Given the pervasiveness of infant formula promotion globally, it would be beneficial to have further evidence of the benefits to breastfeeding mothers and infants when hospitals stop the acceptance of free infant formula.

Breastfeeding initiation rates in Hong Kong are above 85%[31]. However, overall breastfeeding duration remains short and rates of exclusive breastfeeding are low[32]. Historically, all Hong Kong hospitals have accepted free infant formula from manufacturers. In 2006, all public and most private hospitals adopted a policy to purchase infant formula at market price as a step toward becoming more baby-friendly. This was a significant change and provided a unique opportunity to study the effect of the policy on hospital practices and breastfeeding outcomes. The present study aimed to assess the effect of stopping free infant formula in public hospitals on (1) the number of supplemental feeds given to breastfeeding babies during their hospital stay, (2) the proportion of infants who are given formula supplements during their hospital stay, and (3) the overall duration and exclusivity of breastfeeding. Additionally, in a pooled analysis we aimed to assess the overall effect of the amount of in-hospital infant formula supplementation on the duration of any or exclusive breastfeeding.

Methods

Design, Setting and Participants

The present study employed a prospective cohort design. Two cohorts of breastfeeding mothers in the immediate postpartum period were recruited from four public

hospitals in Hong Kong, one before and the second after the change in the infant formula policy. All Hong Kong residents have access to free, high-quality antenatal, postnatal, and well-child health care, and maternal and infant mortality rates are some of the lowest in the world[33]. Hong Kong has eight public and ten private hospitals that offer obstetric services, none of which are BFHI accredited. The normal length of postnatal stay in public hospitals is approximately 48 hours for a vaginal birth and 72 hours for a caesarean birth. The Hong Kong Hospital Authority (HA), a subvented government organization, manages all public hospitals; while private hospitals are managed by various charitable, philanthropic and religious organizations. Public hospitals accounted for 67.8% of all births to Hong Kong mothers in 2011[34]. Over the past decade, a high proportion of patients who gave birth in private hospitals in Hong Kong were birth tourists from Mainland China[35]. Participant recruitment was therefore limited to public hospitals.

The HA proposed the infant formula policy change in 2006, with implementation planned for 2007. However, other constraints on the obstetrics services in Hong Kong hospitals[35] meant implementation was delayed until April 2010. The first cohort of breastfeeding mothers (Cohort 1) were recruited in 2006-07, before the planned implementation of the new infant formula policy, and served as the pre-policy baseline group. Following the policy implementation, a second cohort of breastfeeding mothers (Cohort 2) were recruited in 2011-12, as the post-policy group. All study protocols, including selection criteria, participant recruitment, data collection procedures, and follow-up intervals were exactly the same for both cohorts. Eligibility criteria were: (1) An intention to breastfeed; (2) a singleton pregnancy; (3) Cantonese speaking; and, (4) no serious medical or obstetric complications. Further exclusion criteria for the newborn were: (1) Less than 37 weeks gestation; (2) a five-minute Apgar score less than 8; (3) birth weight less than 2500 grams; (4) severe medical conditions or congenital malformations; (5) admission to the special care baby

unit for 48 hours or more after delivery; or, (6) admission to the neonatal intensive care unit after delivery.

Data Collection

Data were collected directly from participants while in hospital, and through telephone follow-up after discharge. Data collection included: (1) Baseline demographic data; (2) maternal and infant data; (3) in-hospital infant feeding data; (4) follow-up infant feeding data at 1, 2, 3, 6, 9, and 12 months postpartum or until the participant stopped breastfeeding completely; and, (5) final breastfeeding status data.

Study Variables

During the postnatal hospitalization, infants were considered exclusively breastfed if they received no solids, no breast milk substitutes, and no water or other liquids (other than vitamins or medications)[36]. For non-exclusively breastfeeding infants, the proportion of total daily feeds that were breast milk was computed. As most new mothers were discharged after 48 hours, in-hospital feeding data were collected for the first 48 hours of admission. Non-exclusively breastfed infants supplemented with infant formula or other milk substitutes were classified as either high-partial breastfeeding (>80% to <100% of feeds were breastfeeds), medium-partial breastfeeding (20 to 80% of feeds were breastfeeds), or low partial breastfeeding (<20% of feeds were breastfeeds)[37].

After hospital discharge, breastfeeding status was assessed at the intervals outlined above through telephone interviews. Participants were asked about the amount and type of feedings given to the infant in the 24-hour period before the interview[36]. Infants were categorized as exclusive breastfeeding, partial breastfeeding or exclusive formula feeding. Exclusive breastfeeding was defined according to the definition outlined above[36]. If the participant had stopped breastfeeding altogether during that follow-up interval, she was asked to report the total duration of any and exclusive breastfeeding in weeks. As the present study aimed to examine the effect of in-hospital formula supplementation on the duration of any and

exclusive breastfeeding, exclusive breastfeeding duration was computed based on how the mother reported feeding her baby after leaving the hospital and did not include in-hospital formula supplementation[38].

Sample Size Calculation

The sample size calculation was based on primary comparisons of the duration of exclusive or any breastfeeding over a 12-month period. To account for multiplicity, the nominal level of significance for calculating the sample size for each outcome was taken as 2.5% (by Bonferroni adjustment) to control the overall false positive error rate to within 5%. The results of a previous Hong Kong study[39] indicated the median duration of exclusive breastfeeding was 3.5 weeks and that of any breastfeeding was 6 weeks. Based on other research[40], an increase of 1.5 weeks in the median duration of both exclusive and any breastfeeding was estimated to indicate a clinically significant improvement in breastfeeding outcomes. This means that to detect such a difference with 80% power by a log-rank test, 170 women per group were needed to compare exclusive breastfeeding 510 women per group to compare any breastfeeding. Factoring in a loss-to follow-up rate of 25%, approximately 700 to 800 mother-infant pairs were needed in each cohort to obtain a final sample size of 510 per group.

Statistical Analyses

Descriptive statistics were used to compare the sociodemographic characteristics of the two study cohorts. The effect of the policy on in-hospital formula supplementation rates and on overall patterns of breastfeeding were assessed using t-tests for continuous variables and chi-square tests for categorical variables. Kaplan-Meier survival curves were constructed to compare the overall duration of any or exclusive breastfeeding between the two cohorts, and to assess any dose-response relationship between the amount of in-hospital formula supplementation and the time to cessation of any or exclusive breastfeeding in the total sample. All Kaplan-Meier survival curves were compared using a log-rank test of equality or

a trend test of the survival functions, whichever was appropriate[41]. Finally, to assess independent associations between the infant formula policy, the amount of in-hospital formula supplementation, and the duration of any or exclusive breastfeeding, unadjusted and fully adjusted multivariable Cox proportional hazards regression analyses were performed [42]. The proportional hazards assumption was tested by assessing the log-log plots of estimated survival curves. For the multivariable analyses, three models were constructed with potential confounders added in turn based on subject matter relevance[43]. Model 1 adjusted for key socio-demographic variables (maternal age and education, family income, length of residence in Hong Kong, returning to work postpartum and study site), Model 2 further adjusted for maternal and birth data (parity, attendance at antenatal childbirth and breastfeeding classes, and delivery type), and Model 3 further adjusted for breastfeeding-related variables (intention to exclusively breastfeed, participant's own breastfeeding status, previous breastfeeding experience, and husband's infant feeding preference). The variables entered into the multivariable models were selected because they were factors that have been shown to significantly affect breastfeeding duration in this population[32; 39] or they were characteristics that significantly differed between the two study cohorts ($P<0.05$). In multivariable models using the pooled sample of participants, further adjustment was made for study cohort. For all analyses, participants who were lost to follow-up were censored at the time of last contact. All data were analysed using Stata version 13.1 statistical software (Stata Corp, College Station, Tx, USA) with a 5% level of significance used in all statistical tests.

In all multivariable models we adjusted for key sociodemographic variables (maternal age, education, family income, length of residence in Hong Kong, parity, previous breastfeeding experience, planning to exclusively breastfeed, husband's feeding preference, and returning to work postpartum) that have been shown to significantly affect breastfeeding duration in this population

Results

From June 2006 to July 2007, 1417 mother-infant pairs were recruited from four study sites to form Cohort 1 baseline sample. Following policy implementation in April 2010, a second cohort of 1287 mother-infant pairs were recruited from the same four study sites. A total of 2560 mother-infant pairs were included in the final analysis (Figure 1).

The sociodemographic characteristics of both cohorts are presented in Table 1. There were no differences in participant age and the education levels of the two cohorts. Participants in Cohort 2 were more likely to be multiparous, have previous breastfeeding experience, and be planning to exclusively breastfeed. Cohort 2 participants were also less likely to have attended antenatal childbirth and breastfeeding classes and be intending to return to work within 6 months postpartum. The husbands of participants in Cohort 2 were less likely to explicitly prefer exclusive breastfeeding for the infant and more likely to have no particular infant feeding preference.

The mean number of infant formula supplements given to infants in the first 24 hours of life was 2.62 (standard deviation; SD=2.43) before policy implementation and 1.17 (SD=1.94) after implementation (P<0.001). In Cohort 1, the mean proportions of breast milk feeds given to infants in the first 24 hours of life, in the second 24 hours of life, and for the total hospital stay were 64.4% (SD=34.7), 72.0% (SD=27.0), and 68.2% (SD=27.0), respectively. In Cohort 2, the mean proportions of breast milk feeds given to infants were 83.3% (SD=29.1), 86.2% (SD=23.0), and 84.2% (SD=23.2), respectively. All comparisons were statistically significant at a level of P<0.001. After implementation of the infant formula policy, more mothers (41.3% versus 17.7%) exclusively breastfed during hospitalization (Figure 2).

The median duration of breastfeeding increased from 8 to 12.5 weeks after policy implementation. Figure 3 shows that the risk of breastfeeding cessation was significantly lower after the policy implementation (P<0.001), but that there was no significant change in

the risk of stopping exclusive breastfeeding (*P*=0.58). Even after adjusting for potential confounding variables (Table 2), infants in Cohort 2 had an approximately 20% lower risk of cessation of any breastfeeding (hazard ratio; HR=0.81; 95% confidence interval; CI, 0.73 to 0.90) but there was no change in the risk of stopping exclusive breastfeeding (HR=1.01; 95% CI, 0.93 to 1.11).

In the pooled sample, infants who were supplemented with infant formula had an increased risk of cessation of any and exclusive breastfeeding with higher levels of supplementation than infants who received no in-hospital formula supplementation (exclusive breastfeeding) (Figure 4). In the fully adjusted model, infants who received high-partial breastfeeding during the hospital stay (<20% infant formula) had an approximately 30% increased risk of breastfeeding cessation (HR=1.29, 95% CI, 1.15 to 1.46) and infants who received medium-partial (20-80% infant formula) and low-partial breastfeeding (>80% infant formula) had a 65% to 75% increased risk discontinuing breastfeeding (Table 3) than infants who were exclusively breastfed. The effect of in-hospital formula supplementation on the overall duration of exclusive breastfeeding was similar. Infants who were high-, medium- and low-partially breastfed had an increased risk of breastfeeding cessation of approximately 20%, 50% and 75%, respectively. The log-log plots for all Cox regression models showed that the proportional-hazards assumption was not violated.

Discussion

After public hospitals implemented a policy of paying market price for infant formula, in-hospital formula supplementation of breastfeeding babies significantly decreased, the overall risk of breastfeeding cessation decreased, and the median duration of breastfeeding increased from 8 to 12.5 weeks. Overall, breastfeeding duration was significantly longer after policy implementation, even after adjusting for confounding variables. However, the overall duration of exclusive breastfeeding was unchanged, despite the finding that significantly more participants in Cohort 2 had intended to exclusively breastfeed. Over the first 6 months, only

about one-half of all breastfeeding mothers in both cohorts were breastfeeding exclusively. Similarly, Feldman-Winter et al.[23] also found that removing free infant formula samples from discharge packs given to new mothers increased overall breastfeeding duration but failed to increase exclusive breastfeeding duration. Although breastfeeding intention is a strong predictor of the overall duration of any breastfeeding[44; 45], exposure to hospital practices that are consistent with the BFHI has been shown to strongly affect women's achievement of their exclusive breastfeeding goals[38; 46]. Thus, further improvement in hospital practices that support breastfeeding would likely help to improve exclusive breastfeeding rates. It is also possible that breastfeeding mothers do not receive enough support once back in their communities[47], and formula supplements provide reassurance to anxious new parents[48]. High rates of maternal employment may also affect rates of exclusive breastfeeding, with infant formula often introduced in preparation for a return to work[49]. In addition, infant formula companies have successfully perpetuated and reinforced the now widely accepted myth that many mothers do not produce sufficient breast milk to exclusively breastfeed and that some formula supplementation is required to meet infant nutritional needs[16].

The present study highlighted that infants supplemented during postpartum hospitalization are substantially less likely to breastfeed at any time point compared with exclusively breastfed infants. Evidence of a dose-response relationship between the amount of in-hospital formula supplementation and the overall duration of any or exclusive breastfeeding was also found; a finding that has not previously been shown. This pattern suggests that protecting infants from formula supplementation in the early postpartum period may substantially improve breastfeeding duration, which is consistent with previous research[50; 51; 52]. However, some researchers have suggested that early supplementation with infant formula may be an indicator rather than a cause of breastfeeding difficulties[53]. Nevertheless, infant formula supplementation occurs too frequently in healthy breastfeeding newborns, and even after implementation of the policy, almost 60% of infants received

formula before hospital discharge. Few infants in this study would meet the criteria for medically indicated supplementation[14; 54] as they were all full-term, healthy newborns without any major medical complications. Many supplements were given in the first 24 hours after birth, earlier than most medical indications for supplementation would be apparent (i.e., excess weight loss, delayed lactogenesis, hyperbilirubinemia, or significant dehydration)[14]. Therefore, further reductions in the in-hospital formula supplementation rates of breastfeeding newborns are required to meet the BFHI standard of only providing supplements when medically necessary. In addition, new mothers and health workers should be clearly informed of the health risks associated with formula supplements and the negative effect of these supplements on breastfeeding continuation[55].

The infant formula policy implementation was widely discussed and publicized during the extended interval between the decision and the actual implementation. Although there were no other major breastfeeding policy changes implemented in public hospitals during the interval between data collection, there were many discussions at the institutional level about how to make public hospitals more baby-friendly and about the process of obtaining BFHI accreditation. Thus, it is possible that the increased awareness about the reasons for the policy and the negative consequences of indiscriminate infant formula supplementation contributed more to the changes observed than the perceived financial incentives. However, removing free infant formula from hospitals communicates to all staff that the hospital supports breastfeeding. It also reinforces the message that infant formula is not harmless and that breastfeeding babies should only be provided with supplements when medically necessary. It is also important to note that removing the free supply of infant formula necessitates improving other hospital practices that support breastfeeding. In another separate study[56], there was also substantial improvement in the early initiation of breastfeeding after the infant formula policy change. Although cause and effect cannot be established in observational studies such as this, we believe the findings of this current study do support the WHO

position that the provision of free infant formula to hospitals encourages and promotes formula supplementation[18].

To the knowledge of the authors, this is the first study to specifically evaluate the effect of stopping free infant formula on in-hospital formula supplementation rates and breastfeeding duration. Participant dropout rates in the present study were low in both cohorts, and breastfeeding follow-up data were collected on 95.4% of the sample. However, the present study has some limitations. First, participation was voluntary and it is possible that women who had a more positive view of breastfeeding were more willing to take part. Data on those who refused to participate, or the proportion of eligible mothers who chose not to participate are not available. However, the pattern of refusal was observed to be similar in both cohorts. Second, breastfeeding continuation data were collected by maternal self-report and it is possible that mothers did not accurately report the duration of any or exclusive breastfeeding. The regular follow-up in the present study is likely to have minimized any recall bias and previous research has found that maternal reporting of breastfeeding initiation and duration is accurate for up to 20 years after the period of breastfeeding[57; 58]. Third, the lack of a comparison group does limit the attribution of observed changes directly to the new formula policy. However, as the policy was implemented in all public and most private hospitals at the same time, recruiting participants for a comparison group was not possible. Finally, because this study evaluated breastfeeding rates in two different time periods, and the 5-year period between recruitment of the two study cohorts also limits the ability to attribute the changes in breastfeeding practices directly to the change in infant formula policy. Although implementation of the policy was first scheduled in 2007, numerous delays meant that there was an unexpected extended interval between pre- and post-policy data collection. It is possible that breastfeeding practices may have naturally improved over this time period, independent of the policy change. However, breastfeeding data collected for another study[59] from the same hospitals with the same participant selection criteria, immediately prior to the

policy implementation, show that there was no change in breastfeeding duration in the time interval between planned and actual policy implementation (see Figure S1). Furthermore, as previously highlighted, the delay in policy implementation did provide public hospital management and staff with more time to have in-depth discussions about the rationale for the policy, how to improve hospital breastfeeding practices, and how to become more baby-friendly.

Conclusion

The present study shows that rates of formula supplementation were significantly reduced and breastfeeding duration increased after hospitals stopped accepting free infant formula from manufacturers. However, the duration of breastfeeding in Hong Kong mothers still remains far short of the recommended 6 months of exclusive breastfeeding and continued breastfeeding thereafter for up to 2 years. To further improve hospital practices, institutional commitment is required to ensure that all new mothers receive adequate postnatal breastfeeding support consistent with WHO guidelines. Evidence-based guidelines on indicators for introducing infant formula that are consistent with the BFHI ten steps will also help to further decrease the rates of formula supplementation to expected levels.

Figure Caption List

Fig. 1 Participant recruitment flow diagram

Fig. 2 In-hospital pattern of breastfeeding by study cohort

Fig. 3 Kaplan-Meier survival estimates of the duration of (a) any breastfeeding and (b) exclusive breastfeeding by study cohort

Fig. 4 Kaplan-Meier survival estimates of the duration of (a) any breastfeeding and (b) exclusive breastfeeding by the amount of in-hospital breastfeeding

Fig. S1 Kaplan-Meier survival estimates of the duration of any breastfeeding in the two study cohorts and during the interval between the planned and actual policy implementation

Note: The 2006-7 and 2011-12 cohorts are Cohort 1 and Cohort 2 in the study, respectively. The 2010 cohort (n=499) were recruited in a study conducted during the A/H1N1 pandemic to investigate influenza like illness and influenza vaccine uptake in pregnant women and respiratory infections in infants up to 6 months of age [(59)]. Breastfeeding data were collected up to 6 months postpartum but have not been previously published.

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Table 1 Comparison of the characteristics of the two study cohorts

Demographic Variable	Total N (%) N=2560	Cohort 1 N (%) N= 1320	Cohort 2 N (%) N= 1240	p value
Maternal age				.193
18-24 years	161 (6.3)	88 (6.7)	73 (5.9)	
25-29 years	611 (23.9)	303 (23.0)	308 (24.5)	
30-34 years	1138 (44.5)	609 (46.1)	529 (42.7)	
≥ 35 years	650 (25.4)	320 (24.2)	330 (26.6)	
Maternal education				.181
Primary	78 (3.1)	47 (3.6)	31 (2.5)	
Secondary	1464 (57.2)	763 (57.8)	701 (56.5)	
University degree or above	1018 (39.8)	510 (38.6)	508 (41.0)	
Monthly family income (HKD)†				.004
<$15,000	499 (19.8)	287 (22.4)	212 (17.1)	
$15,000-$29,999	873 (34.6)	430 (33.5)	443 (35.7)	
≥ $30,000	1152 (45.6)	567 (44.2)	585 (47.2)	
Length of Residence in Hong Kong				<.001
< 5 years	239 (9.3)	147 (11.1)	92 (7.4)	
5 to ≥ 15 years	740 (28.9)	329 (24.9)	411 (33.2)	
Since birth	1581 (61.8)	844 (63.9)	737 (59.4)	
Return to work ≤ 6 months post-partum				<.001
No	788 (30.8)	347 (26.3)	441 (35.6)	
Yes	1772 (69.2)	973 (73.7)	799 (64.4)	
Parity				.012
Primiparous	1471 (57.5)	790 (59.9)	681 (54.9)	
Multiparous	1089 (42.5)	530 (40.2)	559 (45.1)	
Attended antenatal childbirth class				<.001
No	1140 (44.5)	459 (34.8)	681 (54.9)	
Yes	1420 (55.5)	861 (65.2)	559 (45.1)	
Attended antenatal breastfeeding class				<.001
No	1440 (56.3)	614 (46.5)	826 (66.6)	
Yes	1120 (43.8)	706 (53.5)	414 (33.4)	
Delivery type				<.001
Spontaneous vaginal delivery§	1929 (75.4)	953 (72.2)	976 (78.7)	
Assisted vaginal delivery	164 (6.4)	104 (7.9)	60 (4.8)	
Planned caesarean delivery	217 (8.5)	114 (8.6)	103 (8.3)	
Emergency caesarean delivery	250 (9.8)	149 (11.3)	101 (8.2)	
Planning to exclusively breastfeed				<.001
No	745 (29.1)	474 (35.9)	271 (21.9)	
Yes	1815 (70.9)	846 (64.1)	969 (78.2)	
Participant breastfed as a child				.039
No	1435 (56.1)	714 (54.1)	721 (58.2)	
Yes	1125 (44.0)	606 (45.9)	519 (41.9	
Previous breastfeeding experience				.001
No	1621 (63.3)	877 (66.4)	744 (60.0)	
Yes	939 (36.7)	443 (33.6)	496 (40.0)	
Husband's Infant feeding preference				<.001
Breastfeeding only	1343 (52.5)	815 (61.7)	528 (42.6)	
Infant Formula & mixed feeding	340 (13.3)	255 (19.3)	85 (6.9)	
No preference	877 (34.3)	250 (18.9)	627 (50.6)	
Study site				<.001
Hospital A	716 (28.0)	394 (29.9)	322 (26.0)	
Hospital B	609 (23.8)	339 (25.7)	270 (21.8)	
Hospital C	627 (24.5)	290 (22.0)	337 (27.2)	
Hospital D	608 (23.8)	297 (22.5)	311 (25.1)	

HKD, Hong Kong Dollar; †1 HKD = 7.78 USD; § Spontaneous vaginal delivery refers to a birth without the use of drugs or other methods to induce labor and delivery, and a birth without the use of forceps or vacuum extraction.

Table 2 Association between study cohort and duration of any and exclusive breastfeeding

Study cohort	Unadjusted HR (95% CI)	Model 1 HR (95% CI)[†]	Model 2 HR (95% CI)[‡]	Model 3 HR (95% CI)[§]
	Any Breastfeeding			
Cohort 1	1	1	1	1
Cohort 2	0.81 (0.74-0.88)	0.82 (0.74-0.90)	0.79 (0.72-0.87)	0.81 (0.73-0.90)
	Exclusive Breastfeeding			
Cohort 1	1	1	1	1
Cohort 2	0.98 (0.91-1.06)	0.99 (0.91-1.08)	0.98 (0.90-1.07)	1.01 (0.93-1.11)

HR, hazard ratio; CI, confidence interval

[†]Adjusted for maternal age, maternal education, family income, length of residence in Hong Kong, returning to work, and study site

[‡]Further adjusted for parity, childbirth class attendance, breastfeeding class attendance and delivery type

[§]Further adjusted for intention to exclusively breastfeed, participant's own breastfeeding status, previous breastfeeding experience and husband's infant feeding preference.

Table 3 Association between in-hospital proportion of breastfeeding and duration of any and exclusive breastfeeding

Amount of in-hospital breastfeeding	Prevalence (%)	Any Breastfeeding			
		Unadjusted HR (95% CI)	**Model 1 HR (95% CI)[†]**	**Model 2 HR (95% CI)[‡]**	**Model 3 HR (95% CI)[§]**
Exclusive	29.1	1	1	1	1
High-partial	27.5	1.34 (1.20-1.51)	1.34 (1.19-1.51)	1.34 (1.19-1.51)	1.29 (1.14-1.46)
Medium-partial	37.9	1.75 (1.57-1.95)	1.75 (1.56-1.96)	1.79 (1.59-2.02)	1.68 (1.49-1.90)
Low-partial	5.5	1.86 (1.53-2.27)	1.81 (1.48-2.21)	1.97 (1.58-2.44)	1.73 (1.39-2.16)
		Exclusive Breastfeeding			
Exclusive	29.1	1	1	1	1
High-partial	27.5	1.26 (1.14-1.40)	1.28 (1.15-1.42)	1.28 (1.15-1.42)	1.22 (1.10-1.36)
Medium-partial	37.9	1.44 (1.31-1.58)	1.52 (1.37-1.68)	1.56 (1.40-1.73)	1.47 (1.32-1.64)
Low-partial	5.5	1.74 (1.45-2.09)	1.80 (1.49-2.17)	1.91 (1.56-2.33)	1.69 (1.38-2.07)

HR, hazard ratio; CI, confidence interval

[†]Adjusted for maternal age, maternal education, family income, length of residence in Hong Kong, returning to work, study site and study cohort

[‡]Further adjusted for parity, childbirth class attendance, breastfeeding class attendance and delivery type

[§]Further adjusted for intention to exclusively breastfeed, participant's own breastfeeding status, previous breastfeeding experience and husband's infant feeding preference.