Early initiation of breastfeeding and its association with peer counseling and membership in breastfeeding support groups in the Philippines

Ofelia P Saniel (opsaniel@up.edu.ph)
University of the Philippines Manila College of Public Health
Veincent Christian F Pepito
University of the Philippines Manila College of Public Health
Arianna Maever L Amit
University of the Philippines Manila College of Public Health https://orcid.org/0000-0003-4571-400X

Research

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Abstract

Background: Early initiation of breastfeeding (EIBF), defined as initiation of breastfeeding within one hour after giving birth, is one of the recommended optimal breastfeeding practices. We aimed to determine whether being visited by a peer counselor during pregnancy and if mother's membership in a breastfeeding support group are associated with EIBF. We also aimed to examine the interaction between the two main exposure variables to assess their joint effects on EIBF.

Methods: We used data from the endline survey of a program implemented in the Philippines, which contained socioeconomic data from the household of the mother-newborn dyads, demographic characteristics of the mothers, and their infant and young child feeding practices. We used logistic regression methods for survey data to study these associations.

Results: Out of the 2,343 newborns, only 1,500 (63.1%) had EIBF. Upon controlling for confounders, those who were visited by a peer counselor during the prenatal period had 1.18 times greater odds of EIBF (95%CI: 0.88-1.57; p=0.26) compared to those who were not visited. On the other hand, members of breastfeeding support groups had 1.33 times higher odds of EIBF (95% CI: 0.99-1.79; p=0.06) compared to those who were not members of breastfeeding support groups. There is no interaction between the two exposure variables on their effect on EIBF.

Conclusions: The lack of association between a visit by a peer counselor during pregnancy or mother's membership in breastfeeding support groups and EIBF highlights the need for new strategies to enhance the role of peer counselors and breastfeeding support groups in promoting breastfeeding.

Background

Early initiation of breastfeeding (EIBF), defined as breastfeeding within one hour after birth, is vital in ensuring the survival of newborns (1–4). EIBF prevents up to 22% of neonatal deaths (5). EIBF also stimulates the production of breastmilk, provides antibody protection, and reduces postpartum hemorrhage (6). Further, it is linked with successful practice of other optimal breastfeeding behaviors, such as exclusive breastfeeding for six months after birth, and continued breastfeeding for at least two years with complementary feeding after six months (5,7,8).

Despite the benefits of EIBF, the overall EIBF prevalence in 24 countries included in the World Health Organization (WHO) Global Survey on Maternal and Perinatal Health in 2004 to 2008 was only 57.6%. The same survey also found that the Philippines ranked among the lowest with an EIBF prevalence of only 39.9% (6). The 2003 and 2008 Philippine National Demographic and Health Surveys reported that the prevalence of EIBF in the country was 54% and 53.5%, respectively (8). However, the 2013 Philippine National Demographic and Health Survey reported that the prevalence of EIBF in the country decreased to 49.0% (9). These figures are far from the 90% target for EIBF set by the Philippine Department of Health (DOH) by 2016 (8).

To help meet the 90% EIBF target and to improve infant and young child feeding (IYCF) practices in the Philippines, the WHO, the United Nations Children's Fund, the Food and Agriculture Organization, the International Labor Organization, and the World Food Program, in collaboration with the DOH, launched in 2009 the Millennium Development Goals - Fund 2030 Joint Programme (JP) on Ensuring Food Security and Nutrition for Children 0–24 months old in the Philippines. The overall aim of the JP was to accelerate the attainment of Millennium Development Goals 1 and 4, which focused on reducing undernutrition among children and decreasing child mortality, respectively. Other key outcomes of the JP were increased prevalence of exclusive breastfeeding and improved capacities of national and local government units and stakeholders to formulate, promote, and implement IYCF policies and programs. To attain these outcomes, several activities were implemented including the training of breastfeeding peer counselors and the engagement of breastfeeding support groups to encourage mothers to practice optimal breastfeeding behaviors during and after childbirth. After the implementation of the JP, an external agency conducted a cross-sectional study between 2012 to 2013 to assess program outcomes and impact. A 0.7% reduction in the prevalence of undernutrition was achieved after the implementation of interventions by the JP, far from its intended target of 3%. The same cross-sectional study also found that some 63.1% of mothers practiced EIBF (10); however, the effectiveness of the JP-trained breastfeeding support groups and peer counselors in promoting EIBF is unclear.

From previous studies, the determinants of EIBF include: knowledge about optimal feeding practices (11,12), mother's age (11,13,14), mother's and partner's employment status (15–17), and exposure to breastfeeding information during pregnancy (11,18). Other factors associated with EIBF are place of delivery, birth attendant, mode of delivery (12,14,17), and knowledge about breastfeeding (12,19). A systematic review on the topic confirmed the role of the aforementioned determinants on EIBF. Other factors such as place of residence, educational attainment of the parents, socioeconomic status, and newborn's gender were reported to be important determinants as well (20). None of the literature cited focused on the Philippine setting. To our knowledge, this is the first study to look at the effectiveness of interventions to promote EIBF in the country. Thus, this paper aimed to examine the association of peer counseling and membership in breastfeeding support groups in promoting EIBF in the six JP sites. In addition, we explored whether there was an interaction between prenatal peer counseling and membership in breastfeeding support groups to assess their joint effects on EIBF.

Methods

Research design and study population:

The assessment of the outcomes of the JP utilized a 'before-and-after' design. A baseline survey was carried out in early 2011 to establish the baseline levels of child undernutrition and prevalence of optimal breastfeeding practices. After this, the interventions were implemented a few months after the Baseline Survey was conducted. An Endline Survey was conducted in late 2012 to assess the effectiveness of JP interventions in improving the prevalence of optimal breastfeeding practices and in reducing undernutrition among the target population of children. The JP had six implementation sites throughout

the Philippines - Naga, Iloilo, and Zamboanga cities, and the municipalities of Ragay in Camarines Sur; Carles in Iloilo; and Aurora in Zamboanga del Sur.

For both surveys, a stratified two-stage systematic random sampling was employed to select the study participants. Each JP site served as stratum. In the first stage of sampling, barangays (i.e., Philippine term for a village) or contiguous small barangays with a minimum of 600 households were randomly selected and served as primary sampling units (PSUs). The 2010 Philippine Census was used as the sampling frame for the PSUs. From each PSU, 30 randomly selected parent-newborn dyads who satisfied the eligibility criteria (i.e., having an infant aged two years or less at the time of the survey and who agreed to participate) were included in the study. Probability-proportional-to-size sampling was used to determine the number of mother-child dyads to be selected per site.

A pre-tested structured investigator-developed paper-based interview schedules were used. These interview schedules, which were originally designed in English, were translated to the local languages (e.g. Tagalog, Bicol, Hiligaynon, Bisaya, Chavacano, and Tausug) of the different study sites. The data collectors were trained in administering the interview schedule. Face-to-face interviews were conducted using the translated interview schedules to collect socio-economic data from the target households, demographic characteristics of the mothers, and their IYCF practices for the index child.

To examine the association between the JP interventions, specifically exposure to peer counselors and mother's membership in breastfeeding support groups, and EIBF, data from the Endline Survey was used. For this survey, a sample size of 2,584 children from all six JP sites was required to detect a 3% absolute decrease, from the baseline, in the prevalence of underweight for age, using a level of significance of 0.05, 80% power, a design effect of 1.2, and an assumption of 10% non-response. The Endline Survey was similar with the Baseline Survey, but additional questions on whether the respondents had received JP interventions were included. Likewise, the inclusion-exclusion criteria and sampling method for both Baseline and Endline Surveys were more or less the same; however, 44 barangays in Zamboanga City were excluded at endline due to the deteriorating peace and order situation at the time of the Endline Survey. Only mothers who were the actual caregivers of the target children were included in this analysis. Data from other child caregivers, such as fathers, were excluded in the analysis to minimize the effect of different quality of recall that may come from having different types of child caregivers. Other details of the Endline Survey can be found in the MDG-F 2030 JP Endline Survey Final Report (10).

Operational definition of study variables:

The outcome variable in this study is early initiation of breastfeeding (EIBF). In the original interview schedule, mothers were asked how long after birth was the index child first put to the breast, and the responses were recorded in number of hours. For this analysis, we recoded this into late initiation (after one hour of birth) as the baseline, or early initiation (within one hour of birth) of breastfeeding.

The exposure variables in this study were home visit by a peer counselor during the prenatal period, and membership of the mother in a breastfeeding support group during the index pregnancy. Mobilization of

peer counselors and breastfeeding support groups were among the interventions implemented by the JP.

Probable confounders in this association of interest included place of residence, age of mother in years, total monthly household income, employment status of mother and partner, number of people living in household, number of living older siblings, mode of delivery of index child, birth attendant, place of delivery, gender of child, maternal knowledge score, and membership in the Pantawid Pamilyang Pilipino Program (4Ps). The 4Ps program is a conditional cash transfer program implemented by the Philippine government which targets economically-disadvantaged Filipino families in return for complying with set conditions on children's education and the family's utilization of health services such as prenatal check-up and child vaccination (21).

Data management and analysis:

Data quality checks, such as checks for duplicates and range checks were performed on the dataset prior to any analyses. Some quantitative variables, such as age and monthly income, were recoded to allow the assessment possible linear trends in the association between these variables and the outcome (22). Some categorical variables were recoded to ensure that estimates for subsequent regression analyses would be stable. Other categorical exposures, such as place of residence, marital status, birth attendant, and mode of delivery, were recoded to make certain that each stratum would have sufficient number of respondents. Maternal knowledge score was aggregated from seven yes-no questions. Incorrect answers or "don't know" answers were coded as incorrect and given a '0' score, while a score of '1' was given for each question answered correctly. Scores may range from 0 to 7, with higher scores implying better maternal knowledge. Lastly, variables that were thought to be correlated were combined, such as civil status of mother and work of partner.

After the data management procedures described above, the dataset was declared as survey data. The sampling weights and strata (i.e., the six study sites) were also defined. All subsequent analyses, except for non-parametric tests, were weighted. However, the counts presented in the Results section were unweighted. No observations were deleted at any point in the analysis to ensure that standard errors can be computed correctly.

The distributions of continuous variables were presented using appropriate measures of central tendency. Frequencies and proportions were used to describe the distribution of categorical data. For descriptive statistics, weighted proportions were shown; however, the counts were not weighted. The aforementioned exposure variables were cross-tabulated with the outcome variable and the association of each of these exposures with the outcome (i.e., EIBF) were tested with the Pearson's $\chi 2$ test for categorical exposures, adjusted Wald test for normally-distributed continuous variables, or the Wilcoxon rank-sum test for skewed continuous variables. The distribution of missing data was shown for each variable, but they were not included in estimating the p-values. For each of these associations, crude odds ratios (ORs) were estimated using simple logistic regression for survey data. The crude ORs and the p-values for these cross-tabulations were noted.

Each probable confounder and the outcome variable were also cross tabulated with each of the two main exposure variables using similar statistical tests as described above. Likewise, the crude ORs and the p-values for each of the cross-tabulations were noted. Probable confounders with strong evidence of association with the outcome, as well as with any of the exposures, but were not in the causal pathway of the other variables, were fitted into the final logistic model. At this point, observations with missing data for any of the variables of interest were excluded from the analysis.

In building the final model, the main exposures were fitted first. Afterwards, variables meeting the operational definition of a confounder as described above, were fitted into the model, starting with the variables with the smallest p-value in the cross-tabulations with the outcome, and so on. After this, any variable deemed to be an important confounder based on the literature (even if they have not shown any strong association with the exposure or outcome in this dataset) was forced into the model starting with the variables with the smallest p-value in their respective cross-tabulations with the outcome, and so on. Any remaining variables were fitted into the model one by one, starting with the smallest p-value in their respective cross-tabulations with the outcome. If any of these variables changed the estimate of the OR for any of the main exposures by > 10%, they were retained in the final model; otherwise, they were excluded.

Once grouped quantitative variables were fitted into the model, test for departure from the linearity assumption was carried out by observing the stratum specific ORs, and by doing an adjusted Wald test. If the test for departure from the linearity assumption was statistically significant, or the stratum-specific ORs did not show evidence of a linear trend, stratum-specific ORs were presented. Otherwise, a common linear estimate for the linear effect of the exposure on the outcome was reported (22). After testing for departure from the linearity assumption of grouped quantitative variables, the interaction between the two exposure variables were assessed (23). Any significant interaction parameters were shown, and linear combinations were used to estimate interaction parameters.

A level of significance of 0.05 was used in all analyses. Data management and analyses were carried out in Stata 14.0 (24).

Results

A total of 2,542 parent-infant dyads were included in the original study, giving a 98.4% response rate. Of these, only 2,343 (93.1%) of the households had mothers who served as the infant caregiver and thus included in the analyses. Most (77.6%) of the mothers were from urban areas. The age of the mothers ranged between 15 and 50 years old, and most were married or living with their partners (92.2%). Most (92.3%) of them were employed. During their index pregnancy, some of them (23.5%) were visited by a peer counselor and/or were reported as members of a breastfeeding support group (33.4%). When they gave birth to the index child, most of them (67.4%) delivered in health facilities and were attended by skilled professional birth attendants (75.4%). Lastly, only 63.1% of mothers have initiated breastfeeding within an hour of birth (Table 1).

Table 1
Characteristics of the study participants (n = 2,343).

Variable/Category	Frequency (%)
Visit by a peer counselor during prenatal period	
No	1,817 (75.5)
Yes	502 (23.5)
Missing	24 (1.0)
Membership in breastfeeding support groups	
No	1,683 (66.3)
Yes	650 (33.4)
Missing	10 (0.3)
Place of residence	
Urban area	2,091 (77.6)
Rural area	252 (22.4)
Age of mother in years	
15–24	813 (33.9)
25–34	1,092 (46.6)
35+	429 (19.1)
Missing	9 (0.4)
Monthly income (PhP)	
0–3,800	469 (21.3)
3,801–5,999	411 (16.6)
6,000–8,999	524 (21.0)
9,000–15,999	480 (20.8)
16,000+	459 (20.4)
Employment status of mother	
Employed	2,167 (92.3)
Unemployed	176 (7.7)
Employment status of partner	
Employed	2,090 (88.4)

Variable/Category	Frequency (%)
Unemployed	85 (3.8)
Missing/Not applicable	168 (7.8)
Marital status	
Married/Living together	2,176 (92.2)
Never married/separated/divorced/widowed	163 (7.6)
Missing	4 (0.2)
Combined variable for marital status and employment status of partner	
Single mother	163 (7.6)
Has unemployed partner/spouse	85 (3.8)
Has employed partner/spouse	2,090 (88.4)
Missing	5 (0.2)
Membership in a conditional cash incentive program of the government (4Ps)	
No	1,853 (76.8)
Yes	487 (23.1)
Missing	3 (0.1)
Mode of delivery	
Normal	2,139 (90.8)
Caesarean/other	195 (8.6)
Missing	9 (0.7)
Birth attendant	
Skilled	1,805 (75.4)
Traditional birth attendant/none/self/relatives/underboard midwife	512 (23.7)
Missing	26 (0.9)
Place of delivery	
Home-based	667 (32.2)
Facility-based	1,665 (67.4)
Missing	11 (0.4)
Gender of child	

Variable/Category	Frequency (%)
Boy	1,182 (51.5)
Girl	1,161 (48.5)
Initiation of breastfeeding	
Late	763 (35.2)
Early	1,500 (63.1)
Missing	80 (1.7)

The maternal knowledge score of the respondents ranged from 0 to 7. The distribution of this variable is left-skewed as most of the mothers had a score of 5 or higher (median = 6). The number of older siblings of the infants in the study ranged from 0 to 13. However, the distribution of this variable is right- skewed as the infants generally had few older siblings (median = 1). The household size of the respondents ranged from 2–25. However, just like the number of older siblings, this variable is also right-skewed, as the respondents lived with relatively smaller households (median = 6).

Since the aforementioned quantitative variables were skewed, we used the Wilcoxon rank-sum test to assess their association with the outcome of interest (i.e., EIBF). There was strong evidence that maternal knowledge score ($p < 0.01$) and number of older siblings ($p = 0.01$) varied according to time of breastfeeding initiation (i.e., whether early or late, Table 2). However, household size was not found to be associated with the outcome ($p = 0.99$). From the crude ORs, maternal knowledge score (crude OR: 1.33; 95% CI: 1.19–1.48; $p < 0.01$), and number of older siblings (crude OR: 1.07; 95% CI: 1.01–1.15; $p = 0.03$) were found to be associated with the outcome. Likewise, place of residence, monthly income, membership in 4Ps, mode of delivery, birth attendant, and place of delivery were all associated with EIBF. Both exposure variables - membership in breastfeeding support groups (cOR = 1.56; 95%CI = 1.17–2.08) and visit by a peer counselor during index pregnancy (cOR = 1.48; 95%CI = 1.16–1.88) - showed a statistically significant association with EIBF.

Table 2
Cross-tabulations and crude odds ratios of exposure and probable confounding variables with initiation of breastfeeding.

Variable/Category	Initiation of breastfeeding			p-value	Crude OR (95% CI)	p-value of crude OR
Visit by a peer counselor during prenatal period	Late	Early	Missing	< 0.01		
No	611 (37.3)	1,138 (60.8)	68 (1.9)		1.00 (baseline)	
Yes	147 (29.1)	346 (70.1)	9 (0.1)		1.48 (1.16–1.88)	< 0.01
Missing	5 (21.6)	16 (76.2)	3 (2.1)			
Membership in breastfeeding support groups				< 0.01		
No	580 (38.4)	1,032 (59.6)	71 (2.0)		1.00 (baseline)	
Yes	181 (29.0)	463 (70.1)	6 (0.9)		1.56 (1.17–2.08)	< 0.01
Missing	2 (17.0)	5 (74.9)	3 (8.10			
Place of residence				0.03		
Urban area	707 (38.1)	1,304 (59.8)	80 (2.1)		1.00 (baseline)	
Rural area	56 (25.3)	196 (74.8)	0 (0.0)		1.89 (1.06–3.35)	0.03

[a] p-value from Wilcoxon rank-sum test

[b] common odds ratio showing increase in odds per unit increase in level of the variable.

Variable/Category	Initiation of breastfeeding			p-value	Crude OR (95% CI)	p-value of crude OR
Age of mothers in years				0.06		
15–24	266 (36.0)	521 (62.3)	26 (1.7)		1.00 (baseline)	
25–34	365 (37.3)	694 (61.5)	33 (1.2)		0.95 (0.78–1.18)	0.66
35+	130 (29.0)	280 (68.4)	19 (2.7)		1.36 (1.00-1.86)	0.05
Missing	2 (22.9)	5 (73.9)	2 (3.2)			
Monthly income (PhP)				< 0.01		
0–3,800	129 (30.6)	322 (67.4)	18 (2.0)		1.00 (baseline)	
3,801–5,999	110 (27.1)	287 (72.0)	14 (0.9)		1.21 (0.76–1.92)	0.42
6,000–8,999	185 (39.4)	322 (58.5)	17 (1.8)		0.68 (0.47–0.97)	0.04
9,000–15,999	152 (34.4)	311 (64.1)	17 (1.6)		0.85 (0.59–1.21)	0.36
16,000+	187 (43.2)	258 (55.0)	14 (1.8)		0.58 (0.40–0.84)	< 0.01
Employment status of mother				0.97		

[a] p-value from Wilcoxon rank-sum test

[b] common odds ratio showing increase in odds per unit increase in level of the variable.

Variable/Category	Initiation of breastfeeding			p-value	Crude OR (95% CI)	p-value of crude OR
Employed	701 (35.2)	1,392 (63.1)	74 (1.7)		1.00 (baseline)	
Unemployed	62 (35.3)	108 (63.6)	6 (1.1)		1.01 (0.70–1.44)	0.97
Employment status of partner				0.47		
Employed	679 (35.6)	1,339 (62.8)	72 (1.7)		1.00 (baseline)	
Unemployed	33 (40.4)	50 (58.7)	2 (0.9)		0.82 (0.48–1.40)	0.47
Missing/Not applicable	51 (28.9)	111 (69.30	6 (1.8)			
Marital status				0.20		
Married/Living together	712 (35.7)	1,390 (62.6)	74 (1.6)		1.00 (baseline)	
Never married/ separated/divorced/ widowed	50 (29.7)	107 (68.5)	6 (1.8)		1.31 (0.86–2.01)	0.20
Missing	1 (2.7)	3 (97.3)	0 (0.0)			
Combined variable for civil status and employment status of partner				0.32		
Single mother	50 (29.7)	107 (68.5)	6 (1.8)		1.00 (baseline)	

[a] p-value from Wilcoxon rank-sum test

[b] common odds ratio showing increase in odds per unit increase in level of the variable.

Variable/Category	Initiation of breastfeeding			p-value	Crude OR (95% CI)	p-value of crude OR
Has unemployed partner/ spouse	33 (40.4)	50 (58.7)	2 (0.9)		0.63 (0.29–1.36)	0.23
Has employed partner/spouse	679 (35.6)	1,339 (62.8)	72 (1.7)		0.76 (0.51–1.16)	0.21
Missing	1 (2.1)	4 (97.9)	0 (0.0)			
Membership in 4Ps				0.04		
No	614 (36.7)	1,171 (61.5)	68 (1.9)		1.00 (baseline)	
Yes	148 (30.2)	327 (68.9)	12 (1.0)		1.36 (1.00-1.84)	0.05
Missing	1 (58.6)	2 (41.4)	0 (0.0)			
Mode of delivery				< 0.01		
Normal	627 (32.0)	1,446 (66.7)	66 (1.4)		1.00 (baseline)	
Caesarean/other	132 (68.9)	49 (26.80	14 (4.3)		0.19 (0.12–0.28)	< 0.01
Missing	4 (42.2)	5 (57.8)	0 (0.0)			
Birth attendant				0.02		

[a] p-value from Wilcoxon rank-sum test

[b] common odds ratio showing increase in odds per unit increase in level of the variable.

Variable/Category	Initiation of breastfeeding			p-value	Crude OR (95% CI)	p-value of crude OR
Skilled	606 (37.1)	1,137 (61.0)	62 (1.9)		1.00 (baseline)	
Traditional birth attendant/none/self/ relatives/underboard midwife	149 (29.1)	348 (69.9)	15 (0.9)		1.46 (1.07–1.99)	0.02
Missing	8 (37.8)	15 (59.9)	3 (2.3)			
Place of delivery				< 0.01		
Home-based	192 (28.5)	456 (70.6)	19 (1.0)		1.00 (baseline)	
Facility-based	569 (38.6)	1,038 (59.5)	58 (2.0)		0.62 (0.47–0.82)	< 0.01
Missing	2 (12.4)	6 (81.7)	3 (5.9)			
Gender of child				0.83		
Boy	381 (34.7)	763 (63.6)	38 (1.8)		1.00 (baseline)	
Girl	382 (35.8)	737 (62.7)	42 (1.5)		0.96 (0.75–1.22)	0.71
Maternal knowledge score				< 0.01[a]	1.33[b] (1.19–1.48)	< 0.01

[a] p-value from Wilcoxon rank-sum test

[b] common odds ratio showing increase in odds per unit increase in level of the variable.

Variable/Category	Initiation of breastfeeding	p-value	Crude OR (95% CI)	p-value of crude OR
Number of older siblings		0.01[a]	1.07[b] (1.01–1.15)	0.03
Household size		0.99[a]	1.00[b] (0.97–1.04)	0.82
[a] p-value from Wilcoxon rank-sum test				
[b] common odds ratio showing increase in odds per unit increase in level of the variable.				

Among the probable confounders, place of residence, maternal knowledge score, household size, number of older siblings alive, monthly income, mother's employment status, marital status, the combined variable of marital status and partner employment status, membership in 4Ps, birth attendant, and place of delivery were associated with visit by a peer counselor during the prenatal period (Additional File 1). Meanwhile, maternal knowledge score, household size, number of older siblings alive, age of mother, and membership in 4Ps were associated with membership in a breastfeeding support group (Additional File 2). Therefore, place of residence, maternal knowledge score, number of older siblings alive, monthly income, membership in 4Ps, birth attendant, and place of delivery confound the association between the exposures and outcome of interest. However, we forced other variables (e.g., age of mother, mother's employment status, mode of delivery, and gender of child) into the model because they were found to be a determinant of EIBF in the literature. We used the combined variable of marital status and partner employment status in the multivariable analysis, instead of the individual variables that comprised it, to prevent multicollinearity. For the same reason, we have also combined the variables of place of delivery and birth attendant.

To ensure that models were comparable during model-building, we excluded from the multivariable analyses some 154 observations with missing data in any of the remaining variables of interest. Thus, only included 2,189 (94.7%) respondents were included in the final analysis. For this, monthly income did not show a linear relationship with early initiation of breastfeeding ($p < 0.01$), thus we report stratum-specific estimates. In contrast, age of mother showed a linear relationship with the outcome ($p = 0.13$), thus, we present an estimate of the change in the odds of EIBF for each year of increase in the mother's age. There was also no interaction between visit by a peer counselor during prenatal period and mother's membership in breastfeeding support groups on EIBF ($p = 0.18$); as a result, we did not include EMMs in our final models (Table 3).

Table 3
Association of peer counselor visits during prenatal period and membership in breastfeeding support groups with early initiation of breastfeeding, adjusting for confounding (n = 2,189).

Variable/Category	Adjusted Odds Ratio	95% Confidence Interval	p-value
Visit by a peer counselor during pre-natal period			
No	1.00	(baseline)	
Yes	1.18	0.88–1.57	0.26
Membership in breastfeeding support groups			
No	1.00	(baseline)	
Yes	1.33	0.99–1.79	0.06
Maternal knowledge score (common odds ratio)	1.30	1.14–1.48	< 0.01
Monthly income (PhP)			
0–3,800	1.00	(baseline)	
3,801–5,999	1.24	0.75–2.04	0.39
6,000–8,999	0.78	0.55–1.10	0.16
9,000–15,999	1.04	0.69–1.56	0.85
16,000+	0.75	0.55–1.04	0.09
Combined variable for place of delivery and birth attendant			
Facility-based; skilled birth attendant	1.00	(baseline)	
Facility-based; non-skilled birth attendant	0.16	0.02–1.20	0.07
Home-based; skilled birth attendant	1.23	0.77–1.95	0.38
Home-based; non-skilled birth attendant	1.03	0.72–1.47	0.88
Number of living older siblings (common odds ratio)	1.00	0.93–1.08	0.90
Place of residence			
Urban	1.00	(baseline)	
Rural	1.54	0.84–2.82	0.16
Membership in 4Ps			
No	1.00	(baseline)	

Variable/Category	Adjusted Odds Ratio	95% Confidence Interval	p-value
Yes	0.97	0.73–1.29	0.84
Mode of delivery			
Normal	1.00	(baseline)	
Caesarean/other	0.21	0.13–0.32	< 0.01
Age of mother (common odds ratio)	1.01	0.99–1.03	0.22
Combined variable for marital status and employment status of partner			
Single mother	1.00	(baseline)	
Has unemployed partner/spouse	0.73	0.30–1.78	0.49
Has employed partner/spouse	0.79	0.45–1.39	0.41
Gender of child			
Boy	1.00	(baseline)	
Girl	1.02	0.80–1.31	0.85
Employment status of mother			
Employment	1.00	(baseline)	
Unemployment	1.12	0.52–2.40	0.77
Household size (common odds ratio)	1.00	0.96–1.05	0.92

After adjusting for confounders, the odds of early initiation of breastfeeding is 1.18 (95% CI: 0.88–1.57) times higher among mothers who were visited by a peer counselor during her prenatal period compared to those who were not. On the other hand, members of a breastfeeding support groups have 33% greater odds (OR: 1.33; 95% CI: 0.99–1.79) of initiating breastfeeding within one hour of child's birth compared to non-members of breastfeeding support groups. Both exposures were not strongly associated with early initiation of breastfeeding.

Discussion

Our reanalysis of the Endline Survey data of the JP revealed that 63% of mothers breastfed their newborns within an hour after birth which is below the 90% DOH target. There is also evidence that membership in breastfeeding support groups and visit by peer counselors only had marginal effects on promoting EIBF after confounding variables were controlled in the analysis. However, we did not find any

interaction between peer counselor visit and membership in breastfeeding support groups in promoting EIBF. In other words, the two variables affected EIBF independently of each other, that is, peer counselor visits plus mothers' membership in breastfeeding support groups did not significantly lead to more mothers initiating breastfeeding early after their delivery.

A home visit by a peer counselor during the mothers' pregnancy is to encourage them to get adequate prenatal care and to educate them this early on the positive effects of EIBF. The mothers were also coached by these peer counselors to continue breastfeeding their newborns exclusively up to six months after birth and to introduce quality complementary food only after six months but continuing breastfeeding even beyond two years after the child's birthday. Breastfeeding support groups, on the other hand, were organized in the communities to promote proper IYCF practices among the mothers with infants and children less than two years old. These groups also encouraged and supported mothers so they can initiate breastfeeding early, continue to breastfeed their infants exclusively until the baby is six months old. Together with proper complementary feeding, members of the support groups motivated each other to continue breastfeeding up to two years and beyond, if possible, to maximize the positive effects of mothers' milk on young children.

From an implementation standpoint, one of the possible reasons for the lack of association between membership in breastfeeding support groups and EIBF and/or peer counselor visit during pregnancy and EIBF was the inconsistency on how the peer counselors and the breastfeeding support groups engaged with the mothers. This could be due to poor and/or inadequate training, and/or lack of clear guidelines on how to engage mothers. While some support groups and peer counselors had been active in the intervention sites, some could have failed to engage or interact with the mothers meaningfully for the latter to initiate breastfeeding within an hour after delivery.

The importance of family- or community-based interventions to improve neonatal and child health cannot be overemphasized. Community-based interventions were shown to reduce all-cause neonatal mortality by 10–50% (25). However, a Cochrane review reported no strong evidence to conclude that non-healthcare professional-led interventions have an effect in promoting early initiation of breastfeeding (26), which is similar to the findings of this study. The findings of both the Cochrane review and this study suggest that promoting EIBF could benefit from other ways of integrating non-healthcare professionals, such as peer counselors and breastfeeding support groups, within the system. This problem is not new; a 2005 review posited the following gaps in operations research for community-based interventions to promote child health: [1] how health workers, including non-healthcare professionals, could most effectively deliver the needed services for newborns and children at the community; [2] scope of service of community health workers; [3] ways to link community health workers with referral facilities to provide care for mothers and children; and [4] how can community-based interventions be managed sustainably (27).

Among the main exposures of the study, it may be argued that the effect of membership in breastfeeding support groups is of borderline significance, and the non-significant association could be due to low

statistical power of the study. However, this is unlikely as the study had enough number of respondents considering that there was a sufficient number of respondents with the outcome of interest, according to the 'rule-of-10' (28). This is further evidenced by the narrow confidence intervals of the adjusted ORs of the main associations of interest. However, the same cannot be said for tests for statistical interaction, which are notorious for having low statistical power (29). This partly explains the absence of a statistically significant effect of the hypothesized interaction between visit by a peer counselor and membership in breastfeeding support groups and EIBF.

In measuring the effectiveness of community interventions, such as the effect of being visited by a peer counselor or membership in breastfeeding support groups on EIBF, a cluster randomized trial would be a better design to use (30). However, as the main objective of the JP wasa to decrease the prevalence of undernutrition and improve the prevalence of optimal breastfeeding practices, and not to assess effectiveness of interventions, a before-and-after evaluation design using a series of two cross-sectional studies was used. As a result, reverse causality may adversely affect the internal validity of this analysis, which is inherent in cross-sectional study designs (31). While this is not a problem for the main exposure variables and for most of the variables under consideration, this can be a problem for some confounders which may change with time, such as maternal knowledge scores.

Selection bias is also a threat to the internal validity of this study. At the design stage, we excluded some 44 barangays in Zamboanga City due to the unsafe peace and order situation. If there are systematic differences in the mother-newborn dyads in these areas relative to the mother-infant pairs included in the study, there could be a selection bias. We also excluded 154 observations due to missing data; however, considering that only about 5% of the respondents had missing data, its effect on the outcome could be minimal. Nevertheless, this analysis utilized self-reported data, the findings of the study are only as good as the reports of the mothers who took part in the study.

Another limitation of this study is residual confounding. The Endline Survey did not have any data on the educational status of the mother and opinion of other family members, which were shown to be important determinants of EIBF (20). We also failed to collect data on the number of visits of peer counselors, as well as the number of sessions held by the breastfeeding support groups, which prevented us from studying possible dose-response relationships between the exposure variables and EIBF. Despite this, we controlled for the effect of other important confounders like mode of delivery. In the cross-tabulations, the two exposures of interest were initially strongly associated with EIBF but later were found to be weakly associated with the outcome after adjusting for confounding. Other variables, such as place of residence, were important determinants of EIBF in the literature (20), and from the results of the cross-tabulations, they were observed to confound the associations of interest. In the final model, however, their confounding effects on the outcome were already controlled. This implies that there could be context-specific determinants of EIBF, which our data failed to capture (12,32).

Recommendations

The roles of peer counselors and breastfeeding support groups in promoting EIBF remain unclear. Despite this, we believe that they could still have a role in promoting EIBF. We recommend that peer counselors and breastfeeding support groups should have clear messages to deliver to target mothers - that is, to encourage pregnant mothers to see trained healthcare professionals like midwives and nurses, who were reported to be more effective in promoting EIBF (26). In doing so, they are also encouraging the mother to have more antenatal care visits, which would result to better outcomes for both the mother and the child (33).

The suggestion to integrate non-healthcare professionals in efforts to promote EIBF could be tested further in future studies. Operations research can address various information gaps on child health which could be addressed by doing community trials (34). This has been emphasized by the Cochrane review which concluded that current evidence on the effectiveness of non-healthcare professional-led interventions on EIBF are few and of very poor quality (26). Thus, methodologically-sound studies to assess the effectiveness of peer counselors and/or support groups in promoting EIBF are still needed. The need for more research on this topic to influence policies and programs is demonstrated by the low EIBF rates worldwide, including the Philippines (6).

Conclusions

After adjusting for confounders, interventions such as breastfeeding support groups and/or visits by peer counselors during pregnancy were shown to have minimal effect on promoting EIBF. These findings suggest the use of innovative strategies on how to engage and integrate peer counselors and breastfeeding support groups in a multi-pronged approach to promote EIBF. Further research is necessary to assess public health interventions that are currently being implemented to promote EIBF in order to ascertain whether or not they are effective in attaining their objective.

List Of Abbreviations

EIBF – Early initiation of breastfeeding

IYCF – Infant and young child feeding

JP – Millennium Development Goals Achievement Fund – Joint Programme on Ensuring Food Security and Nutrition for Children 0-24 months old in the Philippines

DOH – Department of Health (Philippines)

OR – Odds Ratio

WHO – World Health Organization

Declarations

Ethics approval and consent to participate

The study received ethical approval from the research ethics committees of the three institutions: Bicol Medical Center, Western Visayas Health Research and Development Consortium, and the Zamboanga Consortium for Health Research and Development.

Consent for publication

The participants consented to the publication and dissemination of study findings.

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author (opsaniel@up.edu.ph) on reasonable request.

Competing interests

The authors have no competing interests to declare.

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Author's contributions

OPS conceptualized the study with the project's senior investigators and acquired funding. OPS, with the assistance of the entire project staff, carried out the investigation and supervision of the entire study. VCFP, and AMLA were responsible for data curation, validation, and data analyses. VCFP and AMLA wrote the first draft of the paper. OPS reviewed and edited the manuscript. All authors approved the final version of the manuscript.

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