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Original Article

In a rural area of Bangladesh, traditional birth attendant training improved early infant feeding practices: a pragmatic cluster randomized trial

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Abstract

In rural Bangladesh, most births take place at home. There is little evidence regarding the influence of traditional birth attendants (TBAs) or community volunteers (CVs) on early infant feeding practices. We conducted a pragmatic cluster randomized controlled trial in Panchagarh District to examine the effects of training and post-training supervision of TBAs/CVs on early breastfeeding practices. Nine unions were randomized into three groups of three unions. We compared outcomes between mothers in a control group (CG), those living in unions where TBAs/CVs had received a 5-day training in early feeding practices (TG) and those living in unions where TBAs/CVs were both trained and supervised (SG). A total of 1182 mothers of infants aged 0–6 months were interviewed at baseline. After 6 months of intervention, an endline survey was conducted on a different sample of 1148 mothers of infants aged 0–6 months in the same areas. In both intervention areas, TBAs/CVs made regular home visits and attended births whenever possible. Rates of early initiation of breastfeeding, avoidance of prelacteal feeds and exclusive breastfeeding were compared between groups using cluster-controlled mixed model logistic regression. At endline, both intervention groups had significantly higher proportions of mothers who reported early initiation of breastfeeding (CG: 88%, TG: 96%, SG: 96%) and avoidance of prelacteal feeds (CG: 48%, TG: 80%, SG: 88%) compared with the control group; there were no significant differences between the two intervention groups. The endline rates of reported exclusive breastfeeding were not significantly different among groups (CG: 67%, TG: 76%, SG: 83%).

Keywords: impact evaluation, infant feeding, early initiation of breastfeeding, community-based, cluster randomized controlled trial, newborn feeding behaviours, exclusive breastfeeding, prelacteal feeding.

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Introduction

The critical role of infant feeding

It is becoming increasingly clear that high young child malnutrition rates are largely driven by nutritional stunting starting before birth and in the early months of life (Dewey & Begum 2011). The critical importance of early feeding practices is further suggested by the finding that initiating breastfeeding in the first hour of life can reduce neonatal mortality (Edmond *et al.* 2007; Mullany *et al.* 2008). Exclusive breastfeeding thereafter also has an important role in protecting against infant mortality (Black *et al.* 2003).

A relatively recent 'discovery' – at least with respect to breastfed babies not needing additional water (Almroth 1978) – and an uncommon practice, exclusive breastfeeding has been successfully promoted, although usually on a small scale, in many countries around the world (Bhandari *et al.* 2003), including Bangladesh (Haider *et al.* 2000), mainly using a peer counselling approach. This needs to be scaled up and additional approaches developed.

There is a high prevalence of undernutrition in Bangladesh, with 41% of <5-year-olds being stunted (National Institute of Population Research and Training *et al.* 2011). This high level of childhood

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malnutrition is in part attributable to suboptimal breastfeeding rates. While breastfeeding initiation and duration rates are high and the feeding of colostrum to newborns has become a more prevalent practice, rates of early initiation of breastfeeding, avoidance of prelacteal feeds and exclusive breastfeeding remain low. About 98% of women initiate breastfeeding, the median duration of breastfeeding is 31 months, and the median duration of exclusive breastfeeding is 3.5 months (National Institute of Population Research and Training *et al.* 2011).

The potential role of traditional birth attendants

While active promotion and support by the modern health sector is clearly required to achieve high rates of exclusive breastfeeding, the impact that programmes like the Baby-Friendly Hospital Initiative can have when babies are delivered at hospital is limited in Bangladesh, where 71% of deliveries occurred at home (77% in rural areas) from 2009 to 2011 (National Institute of Population Research and Training *et al.* 2011). Home deliveries are sometimes attended by recognized local traditional birth attendants (TBAs) but, perhaps because accessibility and low cost are critical issues to villagers (Murakami *et al.* 2003), more often by relatives, friends or neighbours, referred to here as community volunteers (CVs).

Over a period of two decades, the government trained 52 000 TBAs but stopped in 1998, based on evidence that this approach was unable to reduce maternal mortality rates (Murakami *et al.* 2003). This is not surprising when many of the causes of death during delivery can only be addressed through the advanced health care capacity available in hospitals (Blum *et al.* 2006). In 2004, a new training programme was initiated taking into account the weaknesses in the old programme (one of which was inadequate supervision) (Murakami *et al.* 2003). These trained TBAs are called 'skilled birth attendants' (Ahmed & Jakaria 2009). More than 7500 of them are currently working in communities across Bangladesh, but while they seem to perform well (on non-breastfeeding-related activities) (Rowen *et al.* 2011) and each assists an average of 3–4 deliveries per month (Bhuiyan *et al.* 2005), they attend less than 1% of total births (according to a panel discussion of the USAID-supported Maternal and Child Health Integrated Program consultation meeting: http://bdnews24.com/health/2013/09/07/discourse-on-safe-delivery).

Delayed initiation of breastfeeding has been associated with TBAs (Victor *et al.* 2013), as has the use of prelacteal feeds (Fikree *et al.* 2005; Thatte *et al.* 2009), but sometimes, these practices are more common among deliveries conducted by modern health workers (Horii *et al.* 2011). While the potential impact of

Key messages

- In settings where health professionals do not attend most births, traditional birth attendants and community volunteers may be able to improve early feeding practices if provided with several days of training patterned after the WHO breastfeeding curriculum. We believe our findings are robust enough to recommend that governments in countries with large numbers of TBAs consider piloting this approach.
- This pragmatic cluster randomized trial in rural Bangladesh found that such training led to increased early initiation of breastfeeding and avoidance of prelacteal feeds, measured 6 months later. Exclusive breastfeeding increased from baseline to endline in the intervention groups. Follow-up supervision nearly doubled the cost but led to only a non-significant further improvement in these early infant feeding behaviors.
- This study used a cluster randomized design which is suitable for large-scale behavior change interventions. This tends to work best in areas such as the one we studied where low incomes make travel too expensive to be common, reducing the risk of "contamination" between the groups through the spread of new knowledge, at least during the relatively short duration of this project (8 months).
- Further research is needed with a budget adequate to use a similar design but with a larger number of clusters. Our findings that supervision added too little benefit to justify the additional cost might not hold in a setting where supervisors were already available and thus that issue deserves further examination as well.

training TBAs on a number of birthing practices, post-natal factors and diseases have received research attention (Mangham-Jefferies *et al.* 2014), very little has focused on their potential to improve early infant feeding outcomes. For example, a range of breastfeeding-related issues were among a wide range taught to TBAs in India, but impact evaluation did not include these behaviours, focusing instead on mortality (Bang *et al.* 1999). One small study of TBA training in India did suggest they could reduce delays in initiation of breastfeeding (Saravanan *et al.* 2011). A study in Malawi also found evidence of small increases in initiation of breastfeeding within the first hour and in exclusive breastfeeding at 6 months from what they referred to as TBAs (women's groups and peer counsellors), although the impact of peer counselling alone was much greater (Lewycka *et al.* 2013), as has been seen elsewhere, including in Bangladesh (Haider *et al.* 2000). Shaikh *et al.* (2014) considered the potential impact of TBAs on breastfeeding outcomes likely to be positive. Others have included community-based promotion in multilevel breastfeeding promotion efforts (Bhandari *et al.* 2005; Susiloretni *et al.* 2013). One systematic review (Lassi *et al.* 2010) (repeated in Lassi *et al.* 2014) states that community-based interventions, including TBA training, tended to result in increases in early breastfeeding, but the interventions covered included a broad range, including some that were partly based at health centres. Similarly, a study in Pakistan showed impact but included both traditional and modern health care workers (Bhutta *et al.* 2008).

Thus, so little research has directly measured the impact of TBA training on early infant feeding practices that there is currently insufficient evidence to determine whether or not TBA training can improve early breastfeeding practices. This could be of great public health importance in a country like Bangladesh where the rural early neonatal mortality rate (fetal + first week of life) is about 23 per 1000 pregnancies beyond 7 months of duration (calculated from data in National Institute of Population Research and Training *et al.* 2011).

Problem statement

As far as we know, no randomized controlled trials have tested whether, in settings where most births take place outside of hospitals, TBAs could be trained to improve early feeding practices. The present cluster randomized trial tested whether a short but intensive training of TBAs and CVs, with and without follow-up supervision, could lead to improved early and exclusive breastfeeding practices in a district in north-western Bangladesh.

Materials and methods

Design

This pragmatic cluster randomized controlled trial (trial registration number NCT01407224) (based on repeated cross-sectional surveys) was conducted in Panchagarh District, about 560 km north of Dhaka, a district with very low rates of exclusive breastfeeding: 18.2% (current status 0–4 months) if prelacteal feeding is ignored and 0% if prelacteal feeding is factored in (UNICEF 2003). The cluster randomized design was chosen to reduce 'contamination' among neighbouring TBAs who had or had not been trained.

Administratively, Bangladesh is divided into 64 districts, 493 subdistricts (uppazilas) and nearly 4500 unions (sub-subdistricts). Three subdistricts were randomly selected from the five subdistricts that comprise Panchagarh District. Of the 26 unions in the three subdistricts, nine unions were randomly selected and randomized to either (1) a control group (CG), which received no intervention, (2) a group that received support from TBAs/CVS trained in early infant feeding practices (TG) or (3) a group that received support from TBAs/CVS trained in early infant feeding practices who were supervised weekly (SG). Allocation of the unions was performed via lottery by an Eminence Associates employee not involved in the study. The total study area contained a population of approximately 48 000 from 11 111 households located in 124 villages.

Based on some preliminary survey work, it was believed that if three unions were allocated to each group, a total of 1200 mothers with children ages below 6 months would result, providing a confidence interval of ±4% if the proportion initiating early breastfeeding increased from 40% to 60% at the end of the project. All samples included all eligible mothers with infants

0–6 months of age that could be located within their respective cluster boundaries at the times of the baseline and endline surveys. Because these surveys were conducted about 8 months apart, no women were included in both surveys.

Participating mothers did not know which study group they were assigned to; Eminence and other field staff and survey interviewers also did not know this, although central administrative staff did. Verbal permission from community leaders to include their area in the study was obtained, and written informed consent was obtained from all participating women. The study was approved by the ethics committee of the Bangladesh Medical Research Council.

Traditional birth attendants/CVs from the two intervention groups received a 5-day training course. TBAs/CVs from the SG were followed up, first with weekly and then later fortnightly visits by field supervisors (FSs) to discuss, observe and reinforce their new knowledge and skills as necessary, and when possible, join them at deliveries.

Field workers identified all mothers with infants aged 0–6 months in the survey areas. Those available the first time their home was visited by the survey team, a total of 1182, were interviewed at baseline from 3 June 2010 to 19 June 2010. Using the same process, on 1–15 February 2011, an endline survey was carried out on a different sample of 1148 mothers of infants aged 0–6 months living within the same areas. The pretested questionnaires explored the socio-economic situation, relevant cultural norms and values, knowledge, attitudes and practices regarding the target behaviours, reasons for not following them and barriers to changing behaviour. Two separate teams of enumerators from the Department of Nutrition, Dhaka University, were trained by the research team and conducted the interviews for both surveys. Data that were collected on practices included timing of initiation of breastfeeding, avoidance of prelacteal feeding and the age when any supplement, including water, were first given (in order to calculate the duration of exclusive breastfeeding from birth). Infant feeding pattern definitions followed those recommended by World Health Organization (WHO) (2008). Data were double entered to avoid data entry errors. FSs rechecked 5% of the questionnaires during evaluation resurveys.

Intervention

Two separate training modules were developed for the FSs and TBAs/CVs by modifying the existing WHO/United Nations Children's Fund 5-day breastfeeding counselling training guidelines (http://www.who.int/nutrition/publications/infantfeeding/9789241594745/en/) to emphasize the targeted behaviours. The training included group facilitation, role plays, case studies, group work, problem-solving discussions, demonstrations of positioning and attachment, and field trips to nearby communities to observe implementation of the recommended behaviours during several actual birthing sessions. The first 5-day training course, a training of trainers, was conducted by Training and Assistance for Health and Nutrition and Eminence among six FSs. These FSs then joined Eminence experts to conduct the same 5-day training course twice for a total of 72 TBAs/CVs in two batches.

In both intervention areas, all women in their second and third trimester of pregnancy and mothers of children aged 0–6 months were visited by TBAs/CVs for 6 months at irregular intervals, weekly when possible, promoting immediate breastfeeding after birth (within 1 h), feeding only breast milk for the first 6 months of life and avoiding prelacteal feeding. Pregnant mothers were given a cell phone number and requested to phone the trained TBAs when the mothers were in labour pain. Trained TBAs facilitated early initiation of breastfeeding, avoidance of early prelacteal feeding, skin-to-skin contact and corrected positioning and attachment of newborns when needed at deliveries they attended. However, as in all of rural Bangladesh, some deliveries were attended by no one or just by an untrained CV. At post-partum home visits, the TBAs/CVs also assessed infant feeding practices, identified difficulties and provided mothers with information on the benefits of exclusive breastfeeding. In supervision areas, the activities of TBAs/CVs were followed up by FSs. A specially designed flip chart with information on these behaviours was also used. The intervention formally began on 1 August 2010, and continued until the endline survey was conducted.

To check on the work of the FSs, Eminence headquarters staff regularly visited the field and collected information from randomly selected TBAs and mothers

in the SG, using a monitoring checklist. A midterm assessment was performed in the intervention areas 3 months after the intervention had started, 1–7 November 2010, by a seven-member team.

Data analysis

All survey data were entered using Epi Info (CDC, Atlanta, GA, USA). Data were analysed using SPSS (version 16.0; IBM Corporation, Amonk, NY, USA) and SAS (version 9.3.1; SAS Institute, Cary, NC, USA). Descriptive analyses were performed to examine demographic information, socio-economic information, maternal health history, child feeding practices, knowledge of the mothers about target behaviours and the knowledge of the TBAs.

Frequencies and proportions were calculated for categorical variables and mean ± standard deviation for normally distributed continuous variables. A wealth index was constructed from data on monthly family income; household assets, including ownership of durable goods such as televisions and bicycles; and ownership of the home using principal component analysis.

Traditional birth attendant/CV knowledge pretraining and post-training was compared using McNemar's test. Characteristics were compared between groups using chi-squared tests, accounting for cluster. Prevalences of outcomes were compared within groups from baseline to endline and between groups for unadjusted analyses using mixed logistic regression models, accounting for cluster. Covariates were selected by identifying variables associated with the outcome at a significance level of $P \leq 0.10$ using mixed logistic regression models, accounting for cluster. Prevalences of outcomes were compared within groups from baseline to endline and between groups while adjusting for potential covariates using mixed logistic regression models, accounting for cluster.

Results and discussion

Sample characteristics

During the initial screening, 1614 mothers of children 0–6 months old and 1767 pregnant women were identified as potential intervention beneficiaries. By the time of the baseline survey (conducted a month after initial screening), 432 of these children became ineligible by exceeding 6 months of age, and the 442 pregnant women who were in their first trimester were excluded because they would not yet have given birth by the time the study ended. Thus, 1182 children and 1325 pregnant women (in their second and/or third trimester) were identified as eligible for inclusion in the study. During the intervention period, we identified a total of 484 births occurring in the SG area, of which 290 (60%) were assisted by the trained TBAs. In the TG area, among 517 new childbirths, 347 were assisted by trained TBAs (67%). The intracluster correlation coefficient according to economic status was 0.24. That is, responses of individuals within the same cluster were approximately no more alike than those of individuals from different clusters. Characteristics of the six samples (the three study groups at baseline and at endline) are shown in Table 1, which also indicates the number of mother/infant pairs included in the baseline and endline surveys for each group.

Changes in TBA knowledge

Table 2 shows the changes in knowledge that occurred among the TBAs after they completed the training course. TBA knowledge improved regarding initiation of breastfeeding although not with regard to avoiding prelacteal feeding or duration of exclusive breastfeeding. However, their knowledge of early infant feeding behaviours was already high at baseline.

Changes in early infant feeding behaviours

Table 3 presents unadjusted results comparing group differences in the focus behaviours before and after the intervention, controlling only for cluster effects. For most behaviours, it can be seen that improvements in feeding practices among the intervention groups were generally larger than in the control group. In a national survey (National Institute of Population Research and Training *et al.* 2011), only 46% initiated breastfeeding within the first hour of birth, compared with over 80% in all three of our groups at baseline. [It should be noted that rates of early initiation vary a great deal depending on whether it is defined as <1 h

Table 1. Comparison of the three study groups' characteristics

Output	Baseline $N = 1182$				Endline $N = 1148$			
	Control $n = 461$ (%)	Trained TBAs $n = 400$ (%)	Trained TBAs + supervision $n = 321$ (%)	P	Control $n = 437$ (%)	Trained TBAs $n = 358$ (%)	Trained TBAs + supervision $n = 353$ (%)	P
Maternal characteristics				0.55				0.28
Age (years)								
13–19	20	22	20		23	24	19	
20–29	65	65	69		59	63	65	
30–49	15	13	12		17	13	16	
Education (years)				<0.01				0.05
0	24	18	18		17	19	20	
0–5	29	27	26		30	23	24	
6–9	42	44	47		41	46	46	
10–13	5	12	9		12	11	9	
Occupation				0.86				0.02
Housewife	94	91	92		95	93	95	
Agriculture	3	4	4		1	2	0	
Day labourer	1	2	2		1	2	0	
Other	2	3	2		3	3	4	
Monthly family income (USD)				0.9				<0.01
8.9–49	39	43	39		33	41	43	
50–99	48	45	46		41	39	42	
100–1150	12	13	15		26	20	16	
Religion				0.53				<0.01
Muslim	83	77	73		89	75	69	
Hindu	17	23	28		11	25	31	
No. of Children				0.02				0.13
1	34	39	35		37	41	34	
2	33	32	38		33	34	41	
≥3	33	30	26		30	25	26	
Infant characteristics								
Male	55	53	51	0.04	54	51	52	0.13
Age (months)				0.39				0.07
0–0.9	18	16	15		12	16	19	
1–1.9	16	20	19		17	19	20	
2–2.9	18	18	21		19	23	19	
3–3.9	22	23	23		22	22	23	
4–6.9	25	23	22		30	20	19	
Delivery characteristics								
Home birth	77	64	71	0.26	71	66	76	0.59

or ≤1 h. If it is the former, the rates in the study were lower at baseline for all groups compared with the Demographic and Health Survey (DHS data); if it is the latter, women were doing much better than the DHS data.] The proportion not giving prelacteal feeds in all three groups at baseline was much higher than the 19% found by Sundaram *et al.* (2013) in a large sample also from rural northwestern Bangladesh. The United Nations Children's Fund estimates the proportion exclusively breastfeeding currently at 63% of infants 0–6 months of age in 2008–2012 (http://www.unicef.org/infobycountry/bangladesh_bangladesh_statistics.html), similar to the levels seen in our three groups at baseline. At baseline, exclusive breastfeeding among infants 0–3 months of age in our area was slightly lower than the national average of 77.1% reported in the 2011

Table 2. Comparison of proportion of TBAs who knew item before and after training using McNemar's Test

Knowledge outcome	*N*	Pretraining % (*N*)	Post-training % (*N*)	*P*-value for McNemar's test
Early initiation of BF				
TBA knew breastfeeding should be initiated within 1 h of birth	71	72 (51)	92 (65)	<0.01
Prelacteal feeding				
TBA knew foods other than breast milk should not be given to the infant within 3 days of birth	67	88 (59)	85 (57)	0.79
Exclusive BF				
TBA knew infant should be exclusively breastfed until 6 months of age	71	86 (61)	94 (67)	0.18

TBA, traditional birth attendant.

Table 3. Comparison of primary outcomes among the three study clusters (unadjusted analyses)

Outcome	Study clusters	*N*	Baseline % (*n*)	*N*	Endline % (*n*)
Early initiation of BF (*n* = 2330)					
(<1 h after birth)	Control	461	29 (132)[1]	437	35 (153)[1]
	Trained TBAs	400	38 (150)[1]	358	60 (215)[2]
	Trained TBAs + supervision of TBAs	321	35 (111)[1]	353	68 (241)[2]
(≤1 h after birth)	Control	461	84 (386)[1]	437	88 (383)[1]
	Trained TBAs	400	81 (355)[1]	358	96 (345)[2]
	Trained TBAs + supervision of TBAs	321	84 (270)[1]	353	96 (340)[2]
No prelacteal feeding (*n* = 2330)					
Did not give food	Control	461	39 (178)[1]	437	48 (210)[1]
within 3 days of birth	Trained TBAs	400	53 (211)[1]	358	80 (286)[2]
	Trained TBAs + supervision of TBAs	321	48 (154)[1]	353	88 (312)[2]
EBF 24 h prior to interview (*n* = 2322)					
Children 0–6 months of age					
Between groups*	Control	461	61 (280)	432	67 (290)[1]
	Trained TBAs	400	63 (253)	356	76 (271)[1,2]
	Trained TBAs + supervision of TBAs	321	62 (199)	352	83 (291)[2]
Within groups†	Control	461	61 (280)	432	67 (290)
	Trained TBAs	400	63 (253)[1]	356	76 (271)[2]
	Trained TBAs + supervision of TBAs	321	62 (199)[1]	352	83 (291)[2]

Superscript numbers in the table pertain to both between group and within group comparisons (except for EBF 24 h). Different numbers indicate differences at a level of significance of $P \leq 0.05$. Where no superscript numbers are given, there are no differences. In these analyses, only cluster effects are controlled for. TBA, traditional birth attendant; EBF, exclusive breastfeeding. *Compare superscript numbers in the same column. †Compare superscript numbers in the same row.

DHS (National Institute of Population Research and Training *et al.* 2011). At endline, exclusive breastfeeding at 0-3 mo was slightly higher in the intervention areas than DHS values (data not shown).

Table 4 presents the results when the analyses were repeated controlling again for cluster but also for variables that were significant covariates, as indicated in footnotes below the table. At endline, early initiation and avoidance of prelacteal feeding increased in both intervention groups compared with both baseline levels and to the control group at endline. But the SG did not have a significantly greater change than the TG. In all samples, most initiation was stated to have taken place at about 1 h after birth. Thus, only for initiation before 1 hour were changes in the intervention group large, becoming substantially different from the control group. The proportion of 0- to 6-month-old infants that were exclusively breastfed the day before the interview

Table 4. Comparison of primary outcomes among three study clusters adjusting for covariates

Outcome	Study cluster	*N*	Baseline % (*n*)	*N*	Endline % (*n*)
Early initiation of BF (*n* = 2330)					
(<1 h after birth)‡	Control	461	29 (132)[1]	437	35 (153)[1]
	Trained TBAs	400	38 (150)[1]	358	60 (215)[2]
	Trained TBAs + supervision of TBAs	321	35 (111)[1]	353	68 (241)[2]
(≤1 h after birth)§	Control	461	84 (386)[1]	437	88 (383)[1]
	Trained TBAs	400	81 (355)[1]	358	96 (345)[2]
	Trained TBAs + supervision of TBAs	321	84 (270)[1]	353	96 (340)[2]
No prelacteal feeding (*n* = 2330)					
Did not give food	Control	461	39 (178)[1]	437	48 (210)[1]
within 3 days of birth¶	Trained TBAs	400	53 (211)[1]	358	80 (286)[2]
	Trained TBAs + supervision of TBAs	321	48 (154)[1]	353	88 (312)[2]
EBF 24 h prior to interview (*n* = 2322)					
Children 0–6 months of age††					
Between groups	Control	461	61 (280)	432	67 (290)
	Trained TBAs	400	63 (253)	356	76 (271)
	Trained TBAs + Supervision OF TBAs	321	62 (199)	352	83 (291)
Within groups	Control	461	61 (280)	432	67 (290)
	Trained TBAs	400	63 (253)[1]	356	76 (271)[2]
	Trained TBAs + supervision of TBAs	321	62 (199)[1]	352	83 (291)[2]

Superscript numbers in the table pertain to both between group and within group comparisons (except for EBF 24 h). Different numbers indicate differences at a level of significance of $P \leq 0.05$. Where no superscript numbers are given, there are no differences. In all these analyses, cluster effects are controlled for. TBA, traditional birth attendant; EBF, exclusive breastfeeding. *No covariates adjusted for. †Adjusted for maternal age, maternal education, parity and home birth (yes/no). ‡Adjusted for maternal age, maternal education, religion (Hindu/Muslim) and parity. §Adjusted for maternal age, parity and home birth. ¶Adjusted for religion, parity and infant sex. ††Adjusted for maternal age, maternal education, religion, parity, infant sex and infant age.

increased in both intervention groups compared with baseline but not in the control group. Although endline results for the intervention groups were significantly higher than the control group in Table 3, this was no longer the case when maternal age, maternal education, religion, parity, infant sex and infant age were controlled for. Although these differences did not achieve statistical significance, all three behaviours improved in the control group from baseline to endline, suggesting that there may have been some 'contamination' or knowledge transfer among TBAs in the different clusters.

Thus, TBA/CV training and TBA/CV training + supervision potentially increased early initiation of breastfeeding and avoidance of prelacteal feeding. It increased exclusive breastfeeding from baseline to endline as well, but when controlled for confounders, endline differences from the control group were not significant.

The fact that mothers were randomized (into groups) greatly reduces the risk of selection bias compared with other research designs. As in all research of this type, self-report data could be inaccurate or biased, but the fact that no women were in both the baseline and endline surveys would have reduced the Hawthorne effect, changes that occur because of awareness that one is being studied, compared with randomized controlled trials that include the same participants in both baseline and endline surveys. However, we do not know whether some mothers, knowing what the TBAs were promoting, reported practices more in line with those messages than may have been the case in reality. Because no infants included in the study were over 6 months of age, recall errors were less likely than in studies where infants have attained older ages.

Our finding that giving birth with assistance from a TBA improves early feeding practices agrees with conclusions by Lassi *et al.* (based on less-specific data) (2014). DHS data (National Institute of Population and Training & Mitra and Associates & Measure

DHS ICF International 2013) indicated that early breastfeeding initiation was higher, at 65%, when the delivery was assisted by a TBA rather than a medically trained person (37%). This could have been biased if high-risk or wealthier women are more likely to deliver in hospitals. In one recent study, a home visit during pregnancy was not able to increase early initiation of breastfeeding (Sitrin *et al.* 2015). DHS data indicated that the median duration of exclusive breastfeeding was 3.7 months for medically trained assistance at birth but 4.0 months for TBA-assisted deliveries. Giashuddin and Kabir (2004) found that birth assistance from a TBA was associated with a slightly longer breastfeeding duration than assistance from a modern health care professional (mean 31.1 compared with 28.1 months). However, all of these are observational data and may be simply a reflection that poor, rural mothers are more likely both to use TBAs and to breastfeed longer. Those who received no birth assistance at all actually breastfed even longer (Giashuddin & Kabir 2004).

One cross-sectional study conducted in rural Bangladesh (Rashid *et al.* 1999) did compare the appropriateness and accuracy of advice given by trained and untrained traditional TBAs on breastfeeding and their clients' perceptions of the care they provided. Although the trained TBAs provided more accurate information than their untrained counterparts on breastfeeding, colostrum and when to introduce solid foods, mothers' breastfeeding knowledge and practices were unrelated to whether they had been cared for by a trained or untrained TBA, whereas in the present study, practices improved after TBA training.

This study, in a setting in rural Bangladesh where the majority of births take place at home, examined the impact of a 5-day training session for TBAs and CVs on early feeding behaviours and the duration of exclusive breastfeeding. Such training may be an effective intervention for improving rates of early initiation of breastfeeding and avoidance of prelacteal feeds, and perhaps for increasing the proportion practicing exclusive breastfeeding in this setting. Follow-up supervision of TBAs more than doubled the cost of the intervention (data not shown) and did not seem to provide substantial additional benefit.

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Alive & Thrive had input in the design of the study. Kathryn Dewey (University of California, Davis) provided input on the statistical analyses and reviewed the results. Bineti Vitta assisted in the data analysis and writing and was involved in the selection of grantees for the Alive & Thrive Grants Program and the decision to fund this study. Alive & Thrive was not involved in the collection, management and interpretation of the data, approval of the manuscript or the decision to submit the manuscript for publication.

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Conflicts of interest

Shamim Talukder, Dina Farhana and Ted Greiner declare that they have no conflicts of interest. Bineti Vitta was involved in the selection of grantees for the Alive & Thrive Grants Program and was involved in the decision to fund this study.

Contributions

Shamim Talukder was involved in project design, implementation, evaluation instrument finalization, analysis and reporting. Dina Farhana was overall responsible for the training and implementation of the field trial and assisted in writing this article. Ted Greiner was

involved in the design of the research and the intervention, assisted in the field with the training and did much of the writing of this paper. Beniti Vitta assisted in the data analysis and writing. Ted Greiner and Shamim Talukder take responsibility for the integrity of the work as a whole, from inception to published article.

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