



Integrating Group Counseling, Cell Phone Messaging, and Participant-Generated Songs and Dramas into a Microcredit Program Increases Nigerian Women's Adherence to International Breastfeeding Recommendations¹⁻³

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Abstract

In northern Nigeria, interventions are urgently needed to narrow the large gap between international breastfeeding recommendations and actual breastfeeding practices. Studies of integrated microcredit and community health interventions documented success in modifying health behaviors but typically had uncontrolled designs. We conducted a cluster-randomized controlled trial in Bauchi State, Nigeria, with the aim of increasing early breastfeeding initiation and exclusive breastfeeding among female microcredit clients. The intervention had 3 components. Trained credit officers led monthly breastfeeding learning sessions during regularly scheduled microcredit meetings for 10 mo. Text and voice messages were sent out weekly to a cell phone provided to small groups of microcredit clients (5–7 women). The small groups prepared songs or dramas about the messages and presented them at the monthly microcredit meetings. The control arm continued with the regular microcredit program. Randomization occurred at the level of the monthly meeting groups. Pregnant clients were recruited at baseline and interviewed again when their infants were aged ≥ 6 mo. Logistic regression models accounting for clustering were used to estimate the odds of performing recommended behaviors. Among the clients who completed the final survey ($n = 390$), the odds of exclusive breastfeeding to 6 mo (OR: 2.4; 95% CI: 1.4, 4.0) and timely breastfeeding initiation (OR: 2.6; 95% CI: 1.6, 4.1) were increased in the intervention vs. control arm. Delayed introduction of water explained most of the increase in exclusive breastfeeding among clients receiving the intervention. In conclusion, a breastfeeding promotion intervention integrated into microcredit increased the likelihood that women adopted recommended breastfeeding practices. This intervention could be scaled up in Nigeria, where local organizations provide microcredit to >500,000 clients. Furthermore, the intervention could be adopted more widely given that >150 million women, many of childbearing age, are involved in microfinance globally. This trial was registered at clinicaltrials.gov as NCT01352351. J. Nutr. doi: 10.3945/jn.113.190124.

Introduction

Exclusive breastfeeding to 6 mo is recommended by international agencies (1) to limit infant morbidity and mortality (2–5). However, only one-third of infants aged <6 mo are exclusively

breast-fed in sub-Saharan Africa (6). In Nigeria, the proportion of women who exclusively breastfeed to 6 mo is even lower than in the region and declined from 17% in 2003 to 13% in 2008 (7,8).

Given the state of breastfeeding in Nigeria, innovative and effective strategies are needed for promoting adherence to recommended breastfeeding practices. Two such strategies are microcredit and mobile health programs. Globally, microcredit organizations provide very small loans to >150 million women in low-resource settings to start or expand small businesses (9). Microcredit programs create solidarity and social capital among women through regular group meetings to repay loans and deposit savings. Solidarity and social capital are empirically linked to, among other things, improved child development,

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³ Supplemental Tables 1–3 are available from the "Online Supporting Material" link in the online posting of the article and from the same link in the online table of contents at <http://jn.nutrition.org>.

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increased mental health, reduced mortality, and higher perceptions of well-being and self-rated health (10). There is also growing evidence that health education integrated into microcredit can be effective at modifying health behaviors (11,12), including those related to breastfeeding (13,14). These types of integrated programs may work by helping participants internalize knowledge through active learning and by increasing social support for and shifting cultural norms around recommended breastfeeding practices. The strength of the evidence for the influence of integrated microcredit and health programs on health behavior is limited by weak study design (12).

Mobile health interventions that use text messages for disease management and support of lifestyle or behavior change proliferated during the past 10 y. However, the number of studies reporting results of the trials is still small. Reviews of microcredit and health (12) and mobile health (15,16) interventions found variable quality evidence and noted methodologic gaps in the literature. To our knowledge, there are not yet published reports on studies using cell phone messages about breastfeeding and none that integrate microcredit, cell phone messaging, and breastfeeding promotion.

This study sought to provide stronger evidence on the effect of health education integrated in microcredit by using a cluster-randomized controlled design, in which groups of microcredit clients who meet together on a monthly basis were randomly assigned to intervention or control. We also intended to provide pilot data on the utility of cell phone messaging for breastfeeding promotion. Our hypothesis was that women receiving a health education and mobile health intervention integrated in microcredit would be more likely than women participating in microcredit only to perform internationally recommended breastfeeding practices. Our primary study outcome was exclusive breastfeeding to 6 mo. Secondary outcomes included exclusive breastfeeding to 1 and 3 mo, initiation of breastfeeding within 1 h of delivery, and use of only colostrum or breast milk in the first 3 d of life.

Participants and Methods

Study overview. This study was a cluster-randomized controlled trial conducted within the context of women's microcredit in the Bauchi, Dass, and Ganjuwa local government areas of Bauchi State, Nigeria. The intervention was implemented by Partners for Development, an American nongovernmental organization, in collaboration with 4 local community-based organizations. Community members were recruited into microcredit in groups of 5–7 friends, neighbors, or relatives who guaranteed each other's loans. The initial loans were 5000–10,000 naira (equivalent to U.S. \$30–60), which is substantial in relation to household incomes of U.S. \$1.30 per capita per day in Bauchi (17). Clients went through a few loan cycles, taking slightly larger loans each time. Several small groups of microcredit clients met together in a larger group (~20–30 clients) for monthly meetings with their credit officer to make loan repayments and receive training in business skills.

Intervention components. The intervention consisted of 3 components: 1) breastfeeding learning sessions during microcredit meetings; 2) cell phone text and voice messages; and 3) songs and dramas created by participants. These components were provided to all women in the intervention arm regardless of their age or reproductive status. This was done in an effort to shift cultural norms around breastfeeding and with the assumption that microcredit clients who were not currently breastfeeding are likely to do so in the future or to provide breastfeeding advice and support to other women.

The 7 breastfeeding learning sessions were originally developed by Freedom from Hunger, an American nongovernmental organization providing technical support to microfinance institutions and women's

self-help groups worldwide. Formative data on local breastfeeding practices and sources of breastfeeding advice collected from midwives, community health workers, mothers, fathers, and grandmothers were used to adapt the sessions. They were also modified to allow time for the presentation of participants' breastfeeding songs and dramas. Each session used adult learning techniques and participatory activities, contained 1–3 key messages, included counseling cards developed by Nigeria's Federal Ministry of Health, and took 20–30 min to complete. Sessions covered the following: 1) recommendations for early breastfeeding initiation and exclusive breastfeeding; 2) benefits of following breastfeeding recommendations; 3) breastfeeding techniques; and 4) timing of introducing complementary foods. Trained credit officers conducted learning sessions and distributed Federal Ministry of Health breastfeeding posters and leaflets during monthly microcredit meetings for 7 mo. Three of the sessions were repeated during the subsequent 3 mo because not all of the clients who were pregnant during the baseline survey had delivered.

To reinforce the 11 key messages discussed during learning sessions (**Supplemental Table 1**), they were shortened and sent as cell phone text and voice messages to a phone provided to each small group of 5–7 women in the intervention arm. Voice messages were professionally recorded at a local radio station with a short musical clip at the beginning and end and were then pretested for clarity. Messages were sent to the cell phones twice weekly for 4 mo and twice every other week for an additional 3 mo. Each message was first sent as a voice message and 2 d later as a text. We used both formats to overcome literacy issues and to improve the chances of clients receiving the messages, particularly in areas with poor cell phone coverage.

The phone was usually given to the leader of the small group. She was instructed to share the messages with her group members weekly, by either visiting them individually or inviting them to listen as a group. Clients in the small groups lived in close proximity, which offered opportunities for them to interact and discuss the messages frequently, even outside their routine weekly or monthly meetings. To promote the internalization of the messages and develop social support for clients trying to perform them, the groups were asked to select 1 of the messages received each month and create a song or drama related to the message that they presented to the larger group during the monthly microcredit meeting.

Randomization and eligibility criteria. Block randomization was conducted at the level of the monthly meeting group. To ensure equal numbers of clusters and pregnant women in both study arms for each local partner, monthly meeting groups with similar numbers of clients and pregnant women were paired, with 1 group randomly assigned to intervention and the other to control using a Bernoulli random variable generated by 1 of the researchers.

Within the randomly assigned monthly meeting groups, microcredit clients were eligible to participate in the baseline survey if they were pregnant and aged 15–45 y. The same cohort of clients completed the final survey when their infants were aged ≥ 6 mo.

Sample size. For a 2-sample difference of proportions, a sample of 41 monthly meeting groups per study arm with a mean of 5 pregnant microcredit clients per meeting group was required to detect a difference from 7% to 22% in exclusive breastfeeding to 6 mo between the intervention and control groups at 87% power with $\alpha = 0.05$. This calculation accounts for moderate clustering ($CV = 0.5$) among clients within each monthly meeting group (18).

Data collection procedures. Baseline and final survey interviews were conducted by an independent team of trained data collectors unaware of the clients' study arm assignment. Interviews were completed with the use of paper questionnaires, and data were then double-entered to an electronic database by 2 data keyers. The baseline survey was conducted from August 2011 to November 2011, the intervention was implemented from November 2011 to August 2012, and the final survey took place from September 2012 to December 2012.

At baseline, clients were asked about their infant feeding intentions and beliefs and about antenatal care and breastfeeding advice received

during pregnancy. The final survey contained questions on their infant feeding knowledge and practices, details of the delivery, and breastfeeding advice received after delivery. Both surveys included questions on socioeconomic characteristics.

Variable definition. Our outcome variables were as follows: 1) exclusive breastfeeding to 1, 3, and 6 mo; 2) initiation of breastfeeding within 1 h of delivery; and 3) use of only colostrum or breast milk during the first 3 d of life. The exclusive breastfeeding variables were determined based on several questions. Women were considered to have exclusively breast-fed until the reported timing of introduction of fluids other than breast milk or complementary foods. When calculating outcome variables, women who responded “don’t know” were combined with those who stopped the desired behavior early (e.g., don’t know plus stopped exclusive breastfeeding before 6 mo). Data on intentions to perform these practices were collected from participants at baseline. Exclusive breastfeeding intention variables were created by using the same strategy as for practices.

Local partner organizations collected data on clients’ exposure to the intervention, including number of learning sessions attended, small group meetings held, and songs and dramas created. We were able to obtain complete data on these variables from 3 partners and partial data from 1 partner who completed intervention implementation but closed shortly after the study ended. Information on the number of cell phones that received each message was available through the bulk sending program used for message transmission.

Statistical methods. Descriptive statistics were calculated as means and proportions. Comparisons of background characteristics by study arm were performed by using linear or logistic regression models. Logistic regression models were used to determine the odds of breastfeeding intentions at baseline in the intervention compared with the control arm. ORs were also estimated for breastfeeding practices reported at follow-up. To understand the association of breastfeeding intentions with practices, we used logistic regression models controlling for study arm and tested the interaction between baseline intentions and study arm. All models accounted for clustering at the level of the monthly meeting group by using Huber-White robust SEs. The level of statistical significance was set at $P < 0.05$. Values presented in the text are means \pm SDs, proportions, and ORs (95% CIs).

Results

A total of 2158 female microcredit clients in 172 monthly meeting groups were documented at baseline (Fig. 1). After preliminary screening, 484 clients were identified as potentially eligible; 461 were found to meet the eligibility criteria on further screening. All monthly meeting groups were randomized; 40 groups in the intervention arm and 37 groups in the control arm contained eligible clients ($n = 229$ intervention, $n = 232$ control). At follow-up, 196 (86%) and 194 (84%) clients remained in the intervention and control arms, respectively.

Characteristics of clients who completed follow-up and were included in the analytic sample did not differ by study arm (Table 1), nor did those of clients interviewed at baseline (Supplemental Table 2). Clients who completed follow-up were younger, had fewer years of education, and had lower parity than those who did not complete the study (Supplemental Table 3).

Breastfeeding intentions. Among clients who completed follow-up, breastfeeding intentions at baseline did not differ by study arm (all $P > 0.48$) (Table 2). Overall, 53% intended to initiate breastfeeding within 1 h of delivery, 58% intended to give only colostrum or breast milk during the first 3 d, and 41% intended to exclusively breastfeed to 6 mo. Clients who intended at baseline to give only colostrum or breast milk during the first 3 d or to exclusively breastfeed to 6 mo had increased odds of reporting these practices

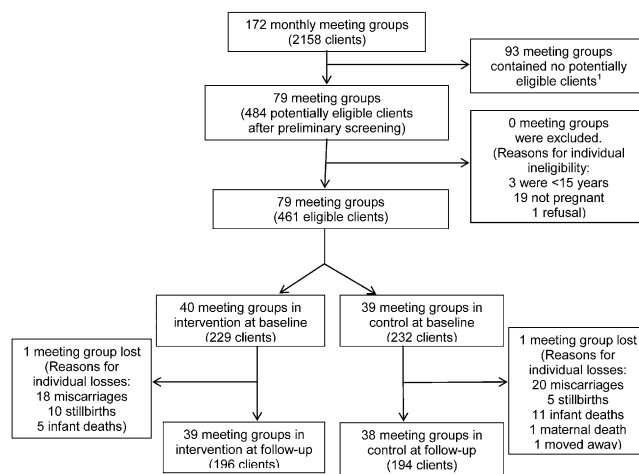


FIGURE 1 Flow of participants for the analytic sample of a cluster-randomized trial comparing breastfeeding practices of female microcredit clients receiving a breastfeeding promotion intervention vs. control. ¹The 93 meeting groups with no eligible clients were randomized but were not included in the present analysis because they contained no pregnant women at baseline.

at follow-up (both $P < 0.001$) (Table 3). We found no significant interaction between study arm and intention (all $P > 0.10$).

Breastfeeding practices. The odds of exclusive breastfeeding to 6 mo, our main study outcome, were increased in the intervention compared with the control arm ($P < 0.01$) (Table 4). The odds of exclusive breastfeeding to 3 mo ($P < 0.05$), but not to 1 mo ($P = 0.10$), were also elevated in the intervention vs. the control. The proportion of clients who exclusively breast-fed to 1 and 3 mo were very similar within each study arm, whereas the proportion of clients who exclusively breast-fed declined in both arms from 3 to 6 mo, with the difference between the arms widening over time. In terms of specific feeding practices within the first 6 mo, the intervention resulted in decreased odds of giving water (intervention, 24%; control, 49%; OR: 0.3; 95% CI: 0.2, 0.6; $P < 0.001$) and giving other fluids (intervention, 22%; control, 32%; OR: 0.6; 95% CI: 0.4, 1.0; $P < 0.05$) in the intervention compared with the control. Starting complementary feeding before 6 mo was not associated with study arm (intervention, 27%; control, 36%; OR: 0.7; 95% CI: 0.4, 1.1; $P = 0.12$).

The intervention also changed breastfeeding behaviors in the first days of life. The odds of initiating breastfeeding within 1 h

TABLE 1 Characteristics of microcredit clients who completed follow-up in a trial comparing a breastfeeding promotion intervention vs. control¹

Characteristics	Intervention ($n = 196$)	Control ($n = 194$)
Child's age, mo	8.3 \pm 1.9	8.6 \pm 1.9
Mother's age, y	25.4 \pm 6.7	25.8 \pm 5.7
Education, y	4.0 \pm 4.0	3.9 \pm 3.9
Primiparity, %	11	9
Parity, n	4.1 \pm 2.4	4.5 \pm 2.4
Married, %	97	100
Has co-wives, %	56	51
Household items, n	7.8 \pm 2.9	7.4 \pm 3.0
Rooms in household, n	4.9 \pm 2.7	4.7 \pm 2.7

¹ Values are means \pm SDs or percentages. Analysis of differences by study arm accounted for clustering by using Huber-White robust SEs. There were no significant differences in characteristics by study arm.

TABLE 2 Infant feeding intentions at baseline among pregnant microcredit clients in a trial comparing a breastfeeding promotion intervention vs. control

Baseline breastfeeding intentions	Intervention (n = 196)	Control (n = 194)	OR	95% CI ¹
	%	%		
Initiate breastfeeding within 1 h of delivery	51	56	0.8	0.4, 1.5
Give only colostrum/breast milk during the first 3 d	58	58	1.0	0.6, 1.7
Exclusively breastfed to 6 mo	42	40	1.1	0.6, 1.8

¹ The analysis accounted for clustering at the level of monthly meeting groups by using Huber-White robust SEs.

of delivery ($P < 0.001$) and giving only colostrum or breast milk in the first 3 d of life ($P < 0.01$) were increased in the intervention vs. the control arm (Table 4).

Breastfeeding knowledge. At follow-up, clients in the intervention arm had greater odds than those in the control arm of having correct knowledge about key infant feeding practices (breastfeed exclusively to 6 mo, OR: 5.8; 95% CI: 2.5, 13.3; $P < 0.001$; initiate breastfeeding within 1 h of delivery, OR: 3.1; 95% CI: 1.5, 6.6; $P < 0.01$; and give colostrum or breast milk only during the first 3 d of the infant's life, OR: 8.2; 95% CI: 2.2, 30.6; $P < 0.01$).

Exposure to the intervention. The frequency of regular microcredit meetings was similar in the intervention and control arms. All 4 local partners presented the 7 learning sessions, and 3 of the partners repeated the 3 most essential sessions to all monthly meeting groups in the intervention arm. Of the 229 clients in the intervention arm at baseline, 69% attended at least 7 breastfeeding learning sessions during microcredit meetings. A total of 156 cell phones were distributed to small groups in the intervention arm. All cell phone text and voice messages were received by 96% (149 of 156) of the phones provided by the study. Activity reports from local partners were obtained for 80% (125 of 156) of the small groups. On average, small groups met 30 ± 10 times to discuss cell phone messages and created 17 ± 5 songs or dramas. Approximately 86% (107 of 125) of small groups met at least once per week (≥ 22 times) and created at least 1 song or drama for each message (≥ 11 songs or dramas).

Discussion

In this trial, breastfeeding promotion integrated into a women's microcredit program resulted in the increased likelihood that clients in the intervention arm exclusively breast-fed to 6 mo and performed other recommended infant feeding practices. Our

TABLE 3 Association of breastfeeding intentions with practices among microcredit clients in a trial comparing a breastfeeding promotion intervention vs. control¹

Breastfeeding intentions associated with practices	OR	95% CI ²
Initiate breastfeeding within 1 h of delivery	1.5	0.9, 2.2
Give fluids other than breast milk in first 3 d	3.7	2.2, 6.0
Exclusively breastfed to 6 mo	2.4	1.6, 3.6

¹ Models controlled for study arm. There were no significant interactions between study arm and intention, so interaction terms were removed from the final models. $n = 390$ clients.

² Analysis accounted for clustering at the level of monthly meeting groups by using Huber-White robust SEs.

TABLE 4 Infant feeding practices at follow-up among microcredit clients in a trial comparing a breastfeeding promotion intervention vs. control

Breastfeeding practices	Intervention (n = 196)	Control (n = 194)	OR	95% CI ¹
	%	%		
Initiated breastfeeding within 1 h of delivery	70	48	2.6	1.6, 4.1
Gave only colostrum/breast milk during the first 3 d	86	71	2.6	1.4, 5.0
Exclusively breast-fed				
1 mo	73	61	1.6	0.6, 1.8
3 mo	71	58	1.8	1.1, 3.0
6 mo	64	43	2.4	1.4, 4.0

¹ Analysis accounted for clustering at the level of monthly meeting groups by using Huber-White robust SEs.

finding that there were significant differences in exclusive breastfeeding to 3 and 6 mo by study arm and that the difference between the arms widened during this period shows that the intervention was successful at keeping more women in the intervention arm on track when Nigerian women typically introduce other fluids and complementary food to their infants (8). Our results align with those of studies that changed infant feeding practices by providing group breastfeeding counseling (19–22) or a package of health education topics integrated into microcredit (13,14). The present research differed from other integrated microcredit and health studies in that it included only 1 health education topic and had a fully randomized design.

Despite the success of the intervention, some clients in both study arms already ceased to exclusively breastfeed by 1 mo. The early decline in exclusive breastfeeding in both study arms was mainly related to women introducing fluids, especially water, in the neonatal period. The pattern stabilized until 3 mo, after which some clients started giving their infants complementary foods or other fluids. These patterns are consistent with the Nigeria Demographic and Health Survey (8) and other studies in Nigeria (23–26). However, the proportion of women in this study who were still exclusively breastfeeding at 1, 3, or 6 mo was higher than other reports. This could be related to their participation in microcredit, which likely makes them different from the general population, or to the presence of the U.S. Agency for International Development's Targeted States High Impact Project in Bauchi State since 2009. The Targeted States High Impact Project focuses on health system strengthening in maternal and child health, and exclusive breastfeeding is 1 of its components.

This study showed that the use of group cell phones for breastfeeding messaging is feasible and can be part of an effective behavior-change intervention package. The cell phone messages prompted clients in the small groups to discuss recommended breastfeeding practices and provide support for breastfeeding mothers in their microcredit groups, which may have contributed to the success of the intervention. A recent review reported that breastfeeding support provided via telephone (but not necessarily by cell phone) increased exclusive breastfeeding at 3 and 6 mo (27). A study in India that specifically used cell phones to provide lactation support and breastfeeding-related text messages also showed that these interventions had a beneficial effect on exclusive breastfeeding measured at several points of time (28). Together, these studies suggest that breastfeeding messaging or support offered by cell phone could potentially be a low-cost strategy for improving breastfeeding practices in a variety of settings.

The main strengths of this study were its use of a cluster-randomized design with a control group and its focus on a single health topic. A recent review of microcredit and health interventions found that most studies in this area had no comparison group and many combined several topics, making it difficult to tease out their influence on outcomes (12). The approach of providing an intervention to all women in microcredit, even if they were not pregnant or breastfeeding, could also be considered a strength. In contrast to many health education or behavior-change interventions, which use resources to identify individuals and intervene in a selected target population, providing an intervention to all women in an existing program would facilitate scaling up. Furthermore, it is likely that the social support and linkages within existing groups contribute to the success of the intervention and may help spread its benefits to other community members (12).

Our study design had some potential limitations. First, breastfeeding practices were measured since birth rather than during the past 24 h. Although we recognize the possibility of recall issues (29), this study used a randomized design so any threats to validity related to the precise estimation of the outcomes affect both groups equally. Second, we note that the amount of intervention activities may have varied by partner organization; however, even with variations in exposure within and between partners, the results indicate that exposure to the intervention was sufficient to influence feeding behaviors. Third, the intervention included 3 components (breastfeeding learning sessions, cell phone messages, and songs/dramas created by participants), and the study was not designed to determine whether 1 of these or a combination is most effective. Additional research is needed to measure whether a single component is sufficient or whether the whole package is required to produce the desired outcomes.

In conclusion, this study documented the success of a breastfeeding promotion intervention integrated into a microcredit program in modifying breastfeeding practices in northern Nigeria. Similar interventions could be performed in other parts of Nigeria, where microcredit programs are common. Furthermore, the intervention could be adopted more widely given that >150 million women, many of childbearing age, are involved in microfinance globally. This type of intervention has the potential to make a large impact in rural areas where other forms of breastfeeding support may be quite limited. Additional research is needed to determine whether the intervention has the same effect in other countries and to measure cost effectiveness.

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