Findings of 12 Innovation Grants to Improve Infant and Young Child Feeding

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ACRONYMS AND SYMBOLS

Acronyms

A&T	Alive & Thrive
BF	Breastfeeding
CF	Complementary feeding
CV	Community volunteer
d	Day(s)
DCC	Delayed cord clamping
DRC	The Democratic Republic of Congo
EASD	Eminence Associates for Social Development
EBF	Exclusive breastfeeding
EHFP	Enhanced homestead food production
EIBF	Early initiation of breastfeeding
HAZ	Height-for-age z-score
HKI	Helen Keller International
HQ	Headquarters
HS	Hand sanitizer
HSC	The Hospital for Sick Children
HSPH	Hanoi School of Public Health
I-MNPs	Improved micronutrient powders
IYCF	Infant and young child feeding
LAZ	Length-for-age z-score
LOI	Letter of interest
LMRF	Lata Medical Research Foundation
LNS	Lipid nutrient supplement
min	Minute(s)
MNPs	Micronutrient powders
mo	Month(s)
NB	Nutributter®
NGO	Non-governmental organization
NHHE	Nutrition, health, and hygiene education
PLFs	Prelacteal feeds
pp	Postpartum
SPIR	Samaritan's Purse International Relief
TAG	Technical Advisory Group
TBA	Trained birth attendant
UCD	University of California, Davis
UNC	University of North Carolina
USC	University of South Carolina
UT	University of Toronto
WASH	Water, sanitation, and hygiene
WAZ	Weight-for-age z-score
WHZ	Weight-for-height z-score
wk	Week(s)
WLZ	Weight-for-length z-score
WUSTL	Washington University in Saint Louis
y	Year(s)

Symbols

+/-	With or without
Δ	Change

EXECUTIVE SUMMARY

The Alive & Thrive (A&T) Small Grants Program took place from July 2009, when the first call for letters of interest was sent out, to February 2014, when the last final report was submitted to A&T Headquarters. The Small Grants Program involved the following activities: the creation of a Technical Advisory Group (TAG), selection and monitoring of grantees, facilitation of grantee results sharing, provision of feedback to grantees, revision of final reports, and the facilitation of grantee results dissemination.

Objectives

The objectives of the A&T Small Grants Program were to:

1. Test novel private-public partnerships and other approaches for removing obstacles to improved infant and young child feeding (IYCF) at the country level
2. Attract, identify, and help develop creative ideas to overcome barriers to improved IYCF that can be generalized to different contexts

Selection Process

Two rounds of grantee selection took place. Both rounds involved the following steps: sending out a call for letters of interest (LOIs), reviewing LOIs and selecting a subset of applicants to submit full proposals, reviewing full proposals and selecting grantees, and working with grantees to develop and strengthen proposals. The first call for LOIs was issued in 2009. In that round, over 400 LOIs were submitted, from which 20 organizations were selected to submit full proposals. From these, eight grantees were selected. In 2010, a second call was issued. Of the 238 LOIs submitted, 11 were invited to submit full proposals and of these, 4 grantees were selected. Of the 12 proposals funded, seven aimed to improve breastfeeding (BF) practices and five aimed to improve complementary feeding (CF) practices.

Grantee Profiles

Nine of the grantees were from academic institutions (eight universities and one teaching and research hospital) while the other three grantees were from non-governmental organizations (NGOs). Five of the grantees were based in universities or organizations located in low-income countries (Bangladesh, Honduras, India, Nepal, and Viet Nam), and seven were based in universities located in a high-income country (the U.S. or Canada) but partnered with organizations based in the low-income country where their research was conducted. Studies took place in ten low-income countries (Bangladesh (2), Democratic Republic of Congo [DRC] (2), Haiti, Honduras, India, Kenya, Mexico, Nepal, Nigeria, and Viet Nam). Grantees were awarded up to $100,000 in funding ranging from $38,000 to $100,000.

Research Questions and Interventions

Studies were designed to examine the impact of innovative interventions on a variety of infant and young child nutrition outcomes including breastfeeding knowledge, attitudes, and rates; complementary feeding knowledge, beliefs, and practices; morbidity; motor development; growth; and anemia or micronutrient status.

Five studies integrated their interventions into pre-existing programs such as well-child clinic visits for check-ups and immunizations, a program promoting home gardens and poultry production, and a microcredit program. Four studies used fortified complementary food products three used micronutrient powders (MNPs) and one a small-quantity lipid nutrient supplement (LNS)). Four studies used cell phones to provide

breastfeeding support. Three studies retrained hospital staff in lactation management, and three studies provided breastfeeding support through group meetings. Other innovative intervention components included the use of radio to disseminate IYCF messages, community breastfeeding knowledge contests for fathers, a complementary food cereal made from caterpillars, and hand sanitizers to prevent infection.

Key Findings

Early initiation of breastfeeding

The following interventions resulted in a statistically significant increase in **early initiation of breastfeeding rates**:

- Training traditional birth attendants (TBAs) in Bangladesh
- A breastfeeding education campaign for fathers in Viet Nam
- Baby-Friendly Hospital Initiative (BFHI) retraining of maternity hospital staff + cell phone based breastfeeding support in India
- Breastfeeding education + cell phones + song or drama creation in Nigeria

Exclusive breastfeeding

The following interventions resulted in a statistically significant increase in **exclusive breastfeeding rates**:

- Training TBAs in Bangladesh
- A breastfeeding education campaign for fathers in Viet Nam
- BFHI retraining of maternity hospital staff with or without (+/-) the distribution of a breastfeeding flyer in the Democratic Republic of Congo
- BFHI retraining of maternity hospital staff + cell phone breastfeeding support in India
- Breastfeeding education + cell phones + song or drama creation in Nigeria
- Cell phone based breastfeeding support in Kenya

Morbidity

The following interventions resulted in a statistically significant decrease in **morbidity rates**:

- BFHI retraining of maternity hospital staff in DRC, with regard to diarrhea
- Homestead food production in Nepal, with regard to diarrhea

The following studies and interventions showed a statistically significant **increase** in **morbidity rates**:

- BFHI retraining of maternity hospitals + the distribution of a breastfeeding flyer in DRC, with regard to diarrhea

Anemia

The following interventions resulted in a statistically significant decrease in **anemia rates**:

- Caterpillar cereal in DRC

Stunting or linear growth

The following interventions resulted in a statistically significant decrease in **stunting rates** or a statistically significant increase in **linear growth**:

- Nutrition, health, and hygiene education (NHHE) +/- hand sanitizer +/- MNPs in Bangladesh
- Lipid nutrient supplement for 6 months, but not for 3 months, was associated with mean length-for-age z-score

Other

- Complementary feeding radio spots + delivery of complementary feeding messages through vaccination nurses was associated with greater frequency of breastfeeding and feeding of green vegetables and beef to infants in Mexico

Program Implications

Grantees mentioned a variety of changes they would make to their intervention packages to increase impact, such as spending more time and effort collecting formative data to design more refined messages and strategies, putting systems in place to ensure successful intervention implementation, increasing the duration of the intervention, and for nutrition interventions that were integrated into other interventions, ensuring that the initial intervention was securely in place and well established.

OBJECTIVES OF THE SMALL GRANTS PROGRAM

The objectives of the Alive & Thrive (A&T) Small Grants Program were to:

1. Test novel private-public partnerships and other approaches for removing obstacles to improved infant and young child feeding (IYCF) at the country level
2. Attract and identify (and help develop) creative ideas to overcome barriers to improved IYCF that can be generalized to different contexts

Calls for letters of interest (LOIs) were issued in 2009 and 2010. Both calls requested proposals for operational research projects that would identify novel approaches to overcoming key barriers to improving IYCF at scale in low-income countries. Approaches that could potentially be extended to different countries/settings were of greatest interest. For the first call for LOIs, potential research topics included development/testing of innovative solutions to promote optimal breastfeeding initiation practices at scale, exclusive breastfeeding for 0-6 months postpartum at scale, and optimal complementary feeding practices at scale. For the second call, the focus was on operational issues related to IYCF interventions, with an emphasis on intervention "bundles" to reflect the growing consensus that integrating IYCF interventions into broader programmatic initiatives is likely to be a more cost-effective and sustainable approach than stand-alone IYCF interventions. The high priority issues for the second call for LOIs were the following:

1. Optimal ways to "bundle" different interventions (i.e., combinations of interventions that are delivered using the same delivery platform or channel), at least one of which includes IYCF
2. Optimal delivery channels for different intervention "bundles"
3. Costs and benefits of intervention "bundles"
4. Best strategies to reach the ultra-poor to improve IYCF
5. Comparison of behavior change communication strategies for better IYCF programming and advocacy

GRANTEE SELECTION PROCESS

Two rounds of grantee selection took place. Both rounds involved the following steps: sending out a call for letters of interest (LOIs), reviewing LOIs and selecting a subset of applicants to submit full proposals, reviewing full proposals and selecting grantees, and working with grantees to develop and strengthen proposals. The first call for LOIs was issued in 2009. Over 400 LOIs were submitted, from which 20 organizations were selected to submit full proposals. From these, eight grantees were selected. In 2010, a second call was issued. Of the 238 LOIs submitted, 11 were invited to submit full proposals and of these, 4 grantees were selected. Of the 12 proposals funded, seven aimed to improve breastfeeding (BF) practices and five aimed to improve complementary feeding (CF) practices. **Figures 1** and **2** summarize the details and timeline of the grantee selection process. The scoring sheet for evaluating the proposals is shown in Annex 1.

A Technical Advisory Group (TAG), comprised of eight infant and young child nutrition experts and chaired by Dr. Kay Dewey, was created in 2009. Experts with extensive international experience working in IYCF and representing a variety of institutions (academic/research, UN organizations, organizations supporting public-private partnerships) were invited to participate in the TAG. This group was heavily involved in the grantee selection process. The TAG met in person, held conference calls, and corresponded over e-mail throughout the grantee selection process.

FIGURE 1: SUMMARY OF GRANTEE SELECTION PROCESS STEPS AND TIMELINE (ROUND 1)

Jul 20, 2009 — **Call for Round 1 letters of interest sent out (LOIs)**

- Call for LOIs drafted and reviewed by A&T Headquarters (HQ), A&T partners, and the A&T Technical Advisory Group (TAG)

Sep 14, 2009 — **Deadline for submission of LOIs**

- Received ~400 LOIs

Oct 13, 2009 — **LOIs selected for full proposals**

- Created LOI evaluation checklist
- UCD conducted initial review of LOIs and categorized them as worth reviewing, maybe, or low priority
- Dr. Dewey reexamined LOIs in their entirety to ensure appropriate categorization
- "Worth reviewing" LOIs sent to TAG to review and score on a scale of 1-3
- Subset of TAG members were asked to review "maybe" LOIs to determine if they should be upgraded to the "worth reviewing" category
- 4/8 TAG members, a representative of the Gates Foundation, and the A&T Project Manager met in Bangkok, Thailand to discuss selection of LOIs to submit full proposals (Oct 6, 2009)
- 6/8 TAG members participated in a conference call to finalize selection of LOIs (Oct 13, 2009)

Outcome

- After excluding incomplete, duplicate, or incorrectly formatted LOIs, 379 LOIs were reviewed, and 54 LOIs were categorized as worth reviewing, 51 as maybe, and 274 as low priority
- 20 LOIs selected to submit full proposals

Oct 19, 2009 — **Request for full proposals sent out**

- Proposal guidelines drafted and reviewed by A&T HQ and TAG
- Included feedback in proposal requests to help guide proposal writing

Nov 30, 2009 — **Deadline for submission of full proposals**

Dec 15-16, 2009 — **Round 1 finalists selected**

- Proposal scoring sheet created
- TAG members scored proposals
- TAG met in Washington, DC (Dec 15-16, 2009) to discuss proposals and select finalists

Outcome

- 8 grantees selected

Jan 15, 2010 — **Tentative acceptance letters allowing for proposal development sent out**

Feb 17, 2010 — **Acceptance letters sent out to grantees**

FIGURE 2: SUMMARY OF GRANTEE SELECTION PROCESS STEPS AND TIMELINE (ROUND 2)

Jul 26, 2010

Round 2 call for LOIs sent out

- Call for LOIs drafted and reviewed by A&T HQ and TAG

Sep 14, 2010

Deadline for submission of LOIs

Outcome

- Received 238 LOIs

Oct 16, 2010

LOIs selected for full proposals

- UCD conducted initial review of LOIs and categorized them as high (40), medium (70), or low priority (128)
- Dr. Dewey reviewed the LOIs further and 17 high priority ranked LOIs sent to TAG for review and scoring, of which 11 invited to submit full proposal

Outcome

- Selected 11 LOIs to submit full proposals

Oct 20, 2010

Request for full proposals sent out

- Proposal guidelines edited and reviewed by A&T HQ and TAG

Nov 30, 2010

Deadline for submission of full proposals

Jan 6-7, 2011

Round 2 tentative finalists selected

- Proposal scoring sheet edited
- TAG members scored proposals
- TAG met in Washington, DC (Jan 6-7, 2011) to discuss proposals and select finalists
- TAG decided that they should work closely with applicants to develop and strengthen their proposals

Outcome

- 4 tentative grantees selected

Jan 20, 2011

Tentative acceptance letters allowing for proposal development sent out

- 1 acceptance letter sent to grantee with proposal that needed no further development
- 3 tentative acceptance letters sent to other 3 finalists as the start of the hands-on proposal development process

Apr 20, 2011

- Upon receipt of additional information, a proposal that was initially rejected was selected to submit a revised proposal and take part in proposal development with the TAG

Jun 21, 2011

- 1 tentative grantee decided not to continue proposal development due to time constraints

Various dates

Proposal development completed and remaining acceptance letters sent out

- Apr 26, 2011
- May 2, 2011
- Aug 4, 2011

GRANTEE PROFILES

The grantees represented a diverse set of institutions and partners, and they conducted their studies in diverse settings. Nine of the grantees were from academic institutions (eight universities and one teaching and research hospital) while the other three grantees were from non-governmental organizations (NGOs). Five of the grantees worked in universities or organizations that were located in low-income countries (Bangladesh, Honduras, India, Nepal, and Viet Nam), and seven were based in universities in a high-income country (the U.S. or Canada) but partnered with organizations in the low-income country where their research was conducted. Studies took place in nine low-income countries (Bangladesh (2), Democratic Republic of Congo (2), Haiti, Honduras, India, Kenya, Mexico, Nepal, Nigeria, and Viet Nam) **(Figure 3)**. Grantees were awarded up to $100,000 in funding ranging from $38,000 to $100,000. The TAG arranged for two of the grantees to obtain supplemental funding from GAIN, and one grantee had already procured funding from the World Bank. **Table 1** lists the grantee organizations and their acronyms, and **Table 2** summarizes a few characteristics of the lead organizations and projects.

TABLE 1: GRANTEE ORGANIZATIONS, ACRONYMS, AND STUDY DESCRIPTORS

Lead organization acronym	Full name of lead organization	Short study descriptor
EASD	Eminence Associates for Social Development	• TBA training study (Bangladesh)
HKI	Helen Keller International	• Homestead food production and MNPs study (Nepal)
HSC	Hospital for Sick Children	• Education, hand sanitizer, and improved MNPs study (Bangladesh)
HSPH	Hanoi School of Public Health	• Father's involvement study (Viet Nam)
LMRF	Lata Medical Research Foundation	• Cell phones study (India)
SPIR	Samaritan's Purse International Relief	• BF clubs and cell phones study
UNC	University of North Carolina	• BFHI study (DRC) • Microcredit meetings and cell phones study (Nigeria) • Caterpillar cereal study (DRC)
USC	University of South Carolina	• Radio and vaccination nurses study (Mexico)
UT	University of Toronto	• Support meetings and cell phones study (Kenya)
WUSTL	Washington University in Saint Louis	• Nutributter study (Haiti)

FIGURE 3: LOCATION OF STUDIES

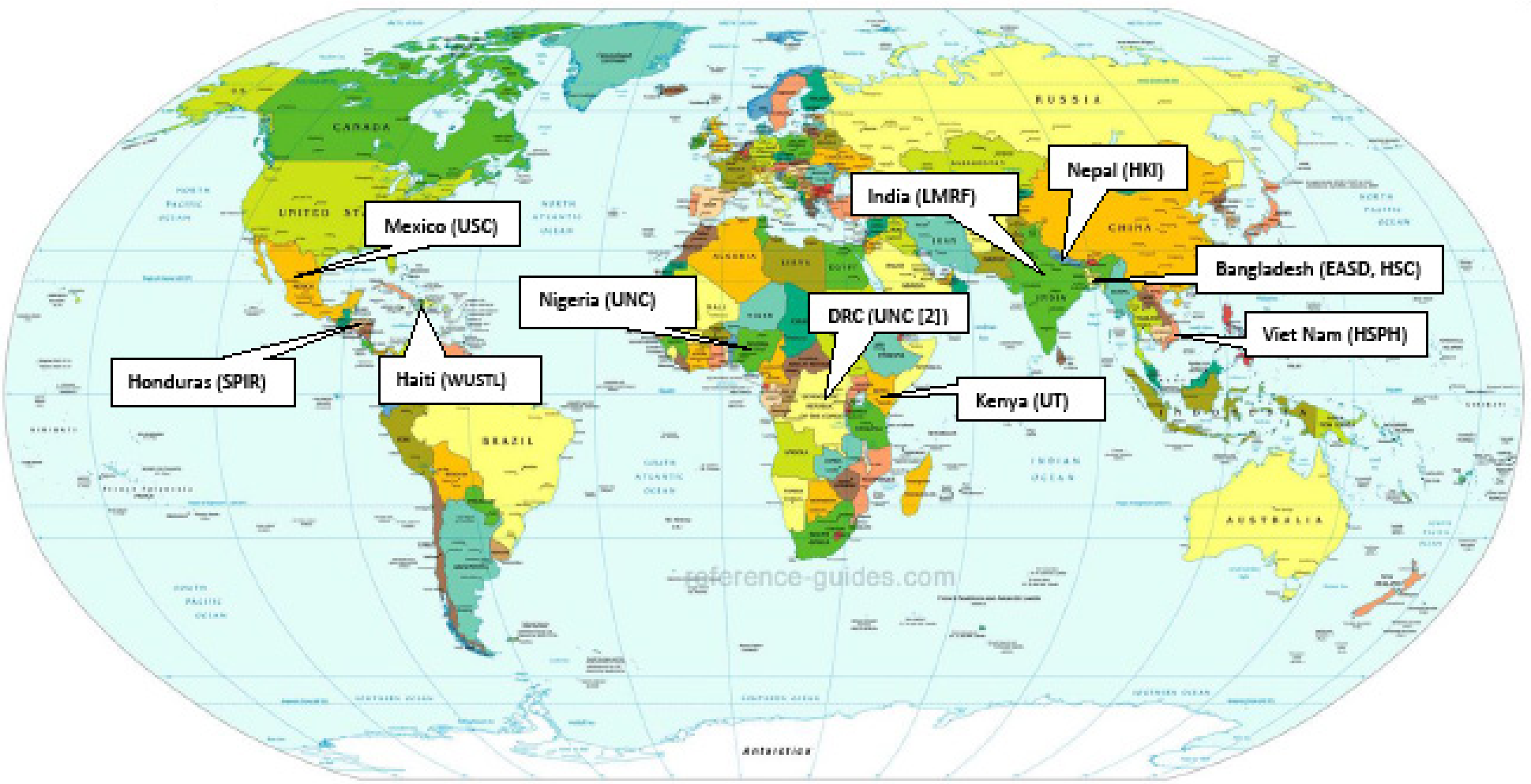

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TABLE 2: CHARACTERISTICS OF LEAD ORGANIZATIONS AND PROJECTS

Lead Organization	Organization Type	Lead Organization Location	Partner Organizations	Study Location	Principal Investigator(s)	Amount Awarded	Additional Funding Sources
EASD	NGO	Bangladesh	• Hanyang University (South Korea)	Bangladesh	• Shamim Talukder • Ted Greiner	$95,159	None
HKI	NGO	Nepal	• USAID (U.S.) • Micronutrient Initiative (Canada) • Nepal Technical Assistance Group (Nepal) • Snehi Mahila Jagaron Kendra (Nepal)	Nepal	• Pooja Pandey Rana • David Spiro • Akoto Osei	$37,895	GAIN: $49,402
HSC	Teaching and research hospital	Canada	• BRAC (Bangladesh	Bangladesh	• Stanley Zlotkin	$99,446	None
HSPH	University	Viet Nam	• The District Health Center of Chi Linh in collaboration with the Local Farm Association (Viet Nam)	Viet Nam	• Tran Huu Bich	$99,379	None
LMRF	NGO	India	• Indira Gandhi Government Medical College and Hospital (India) • Daga Memorial Government Hospital (India) • Matru Seva Sangh Mahal Hospital (India) • Matru Seva Sangh Buldi Hospital (India)	India	• Archana Patel	$99,866	World Bank: $40,000

TABLE 2: CHARACTERISTICS OF LEAD ORGANIZATIONS AND PROJECTS

Lead Organization	Organization Type	Lead Organization Location	Partner Organizations	Study Location	Principal Investigator(s)	Amount Awarded	Additional Funding Sources
SPIR	Christian international relief	Honduras	• Leonardo Martinez Hospital (Honduras) • National University of Honduras (Honduras) • La League de Lactancia Materna (Honduran BF Chapter) • Loma Linda University (U.S.)	Honduras	• Lul Janania de Perdomo	$99,922 - initially awarded $52,429 - actual expenditure	None
UNC	University	U.S.	• Kinshasa School of Public Health (DRC) • Centre for the Coordination of Social Science Research and Documentation in Africa South of the Sahara [CERDAS] (DRC) • Ministry of Health (DRC) • Salvation Army (DRC) • Bureau Diocésian des Oeuvres Médicales de Kinshasa [BDOM] (DRC)	DRC	• Marcel Yotebieng	$99,988	None
UNC	University	U.S.	• Kinshasa School of Public Health (DRC) • Institut de Recherche en Sciences de la Santé (DRC) • RTI International (U.S.)	DRC	• Carl Bose • Antoinette Tshefu	$100,000	None

TABLE 2: CHARACTERISTICS OF LEAD ORGANIZATIONS AND PROJECTS

Lead Organization	Organization Type	Lead Organization Location	Partner Organizations	Study Location	Principal Investigator(s)	Amount Awarded	Additional Funding Sources
UNC	University	U.S.	• Partners for Development (Nigeria) • 4 community-based organizations: GEREWA Women Multipurpose Cooperative Society, Rahama Women's Development Program, Women Development Association for Self-Sustainers, and Wurno Kowanaka Community Development Centre (Nigeria	Nigeria	• Peggy Bentley • Valerie Flax	$100,000	None
USC	University	U.S.	• Center for Research in Nutrition and Health of the National Institute of Public Health in Cuernavaca (Mexico) • Morelos Health Services, (Mexico)	Mexico	• Edward Frongillo	$99,905	None
UT	University	Canada	• University of Toronto (Canada) • Egerton University (Kenya) • Rollins School of Public Health (U.S.) • Nakuru Provincial General Hospital (Kenya)	Kenya	• Daniel Sellen • Elizabeth Kamau-Mbuthia • Aimee Webb Girard • Samuel Mbugua	$43,385	GAIN: $55,216.20
WUSTL	University	U.S.	• Meds and Food for Kids (U.S.) • Ministry of Health and Population (Haiti) • Konbit Santé (Haiti)	Haiti	• Lora Iannotti	$100,000	None

RESEARCH QUESTIONS AND INTERVENTIONS

Studies were designed to examine the impact of innovative interventions on a variety of infant and young child nutrition outcomes including breastfeeding knowledge, attitudes, and rates; complementary feeding knowledge, beliefs, and practices; morbidity; motor development; growth; and anemia or micronutrient status. Five studies integrated their interventions into pre-existing programs such as well-child clinic visits for check-ups and immunizations, a program promoting home gardens and poultry production, and a microcredit program. Four studies used fortified complementary food products, three used micronutrient powders (MNPs), and one a small-quantity lipid nutrient supplement (LNS). Four studies used cell phones to provide breastfeeding support. Three studies retrained hospital staff in lactation management, and three studies provided breastfeeding support through group meetings. Other innovative intervention components included the use of radio to disseminate IYCF messages, community breastfeeding knowledge contests for fathers, a complementary food cereal made from caterpillars, and hand sanitizers to prevent infection. The primary research questions and interventions of each project are summarized in **Tables 3** and **4** below.

TABLE 3: BREASTFEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
EASD | Bangladesh: TBA training study	
• Can training traditional birth attendants (TBAs) and community volunteers (CVs) increase their knowledge of optimal delivery and infant feeding practices? • Can training TBAs and CVs increase rates of delayed cord clamping (DCC), EIBF, avoidance of prelacteal feeds (PLFs), and EBF? • Can the supervision of TBAs and CVs, in addition to their training, increase rates of DCC, EIBF, avoidance of PLFs, and EBF more than training alone?	• Control • Training of TBAs and CVs ↳ TBAs and CVs received a 5-d training course based on WHO/UNICEF BF counseling training guidelines ↳ TBAs and CVs delivered messages to mothers promoting the target behaviors ▪ *During weekly home visits, for 6 mo (starting in 2nd or 3rd trimester of pregnancy)* ↳ TBAs and CVs facilitated DCC, skin-to-skin contact, avoidance of PLFs, and EIBF at any deliveries they attended • Training of TBAs and CVs + Supervision ↳ All of the interventions listed in #2 ↳ Field supervisors received the 5-d WHO/UNICEF BF training course ↳ Field supervisors encouraged and supported TBAs and CVs ▪ *During weekly then biweekly meetings, for 6 mo*

TABLE 3: BREASTFEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
HSPH | Viet Nam: Fathers' involvement study	
• Can an educational campaign to promote fathers' involvement in BF increase fathers' BF knowledge, positive attitudes towards BF, and support of and involvement in BF? • Can an educational campaign to promote fathers' involvement in BF increase rates of EIBF and EBF?	• Control • Fathers' BF education campaign ↳ osters and flyers with BF messages ▪ *Distributed and placed in hospitals and health centers* ↳ Radio programs delivering BF messages ▪ *15-min long segments, broadcast 4 times per week* ↳ Contest where fathers were tested on BF knowledge ↳ Individual counseling ▪ *During 4 home visits that took place during wife's last trimester of pregnancy, 1st wk postpartum (pp), 42 d pp, and 3.5 mo pp* ↳ Group counseling ▪ *During monthly meetings at health center* ↳ Encouragement (e.g., phone messages and visits from village health workers) and incentives to participate in program (e.g., t-shirts and mugs) ↳ Option for fathers to see or contact counselors at any time
UNC | DRC: BFHI study	
• Can retraining hospitals in BFHI steps 1-9 increase rates of EIBF and EBF and decrease rates of morbidity? • Can retraining hospitals in BFHI steps 1-9 (including the well-child clinic staff) and the distribution of a BF flyer as an alternative to the 10th step increase rates of EIBF and EBF and decrease rates of morbidity?	• Control • BFHI steps 1-9 ↳ Training of antenatal care and maternity staff using WHO/UNICEF course • BFHI steps 1-9+ ↳ Intervention listed in #2 ↳ Training of well-child clinic staff using WHO/UNICEF course ↳ Well-child clinic staff encouraged to discuss BF with mothers during well-child clinic visits as needed ↳ Distribution of BF flyer • During mothers' stay in the postpartum ward after delivery

TABLE 3: BREASTFEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
LMRF | India: Cell phones study	
• Can retraining hospitals in BFHI and providing cell phone lactation counseling to mothers increase rates of EIBF, avoidance of prelacteal feeds , and EBF; and decrease rates of bottle feeding and early and late introduction of complementary foods compared to retraining hospitals in BFHI alone?	• Control ↳ Hospital staff retrained in BFHI using Breastfeeding Promotion Network of India curriculum ↳ BF counseling by hospital staff during hospital visits ▪ *7 potential counseling sessions over 9-mo period (3rd trimester-6 mo + 1 wk postpartum [pp]): 2 sessions during prenatal visits, 1 after delivery, 3 during immunization visits (6, 10 and14 wk pp), and 1 session at 6 mo + 1 wk pp* • Cell phone BF counseling ↳ All of the interventions listed in #1 ↳ Cell phone lactation counseling ▪ *Cell phone provided upon request* ▪ *Provision of airtime* ▪ *BF text messages* ⅄ Daily for 9 mo (3rd trimester-6 mo + 1 wk pp) ▪ *BF phone calls* ⅄ 2-3 calls during 3rd trimester, 1 call within 24 h of delivery, weekly calls until 6 mo + 1 wk pp ▪ *Mother can call for BF help at any time* ▪ *Text messages and phone calls to mothers to remind them to attend hospital visits* ⅄ Sent 1 d before every scheduled visit

TABLE 3: BREASTFEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
UNC | Nigeria: Microcredit meetings and cell phones study	
• Can sending groups of women BF messages via cell phone and having them create songs and dramas for those messages increase rates of EIBF, avoidance of prelacteal feeds, and EBF; and increase maternal BF knowledge?	• Control ↳ Microcredit meetings ▪ *All pregnant women enrolled in the study attended monthly microcredit meeting groups* • BF education + Cell phone ↳ Intervention listed in #1 ↳ BF education ▪ *BF education during microcredit borrower meetings* ⅄ Monthly, 20-30 min long, 7 sessions ▪ *Distribution of BF posters and leaflets during meetings* ↳ Cell phone ▪ *Provision of cell phones to leaders of small groups (5-7 women per group)* ▪ *BF text and voice messages sent to group leaders* ⅄ Biweekly then twice every other week; sent as voice message then as text message 2 d later ▪ *BF message received by group leader shared with other group members* ▪ *Small group develops song or drama related to BF message to present at next microcredit meeting*
UT | Kenya: Support meetings and cell phones study	
• Can peer-led BF support groups increase rates of EBF? • Can cell phone based peer BF support increase rates of EBF? • Which intervention is more effective in increasing EBF rates: peer-led BF support groups or cell phone based peer BF support? • Is it feasible to implement the same study design with HIV-positive study subjects?	• Control • BF support meetings ↳ Peer-led BF support meetings ▪ *Monthly meetings (3rd trimester-3 mo postpartum)* • Cell-phone based BF support ↳ BF support provided through peer support phone calls ▪ *Biweekly phone calls (3rd trimester-3 mo postpartum)* • Mother could call or text for BF assistance at any time

TABLE 3: BREASTFEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
SPIR | Honduras: BF clubs and cell phones study	
• Can providing BF support to adolescent mothers by training hospital staff in lactation management, holding BF clubs, and communicating with mothers via cell phones increase rates of EBF compared to training hospital staff in lactation management alone?	• Control ↳ 20-h training of hospital staff in lactation management using WHO/UNICEF Breastfeeding Counselling Training Course and Freedom from Hunger's "Improving Breastfeeding – Everyone Can Help" facilitator's manual • BF clubs + Cell phone BF support ↳ Intervention listed in #1 ↳ BF clubs ▪ *BF clubs to provide BF counseling and support and identify mothers who need additional BF support* ⅄ Twice a mo for 6 mo (delivery-6 mo postpartum [pp]) ↳ Cell phone BF support ▪ *Provision of cell phone* ▪ *Text messages asking how mother is doing* ⅄ 2 texts per d for first 2 wk, then 2 texts per wk for remainder of 6 mo (delivery-6 mo pp) ▪ *Text messages promoting BF* ⅄ 2 texts per d for first 2 wk, then 2 texts per wk for remainder of 6 mo (delivery-6 mo pp) ▪ *Phone calls to check on mothers* ⅄ As-needed

Table 4: COMPLEMENTARY FEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
HKI | Nepal: Homestead food production and MNPs study	
• Can Enhanced Homestead Food Production (EHFP) reduce rates of anemia and morbidity, and increase hemoglobin levels and growth in children? • Can micronutrient powders (MNPs) in addition to the EHFP reduce rates of anemia and morbidity and increase hemoglobin levels and growth more than EHFP alone? • Is the EHFP Program a feasible platform through which to deliver MNPs?	• Control • EHFP ↳ Mothers trained on home gardening and poultry raising ↳ Mothers given seeds, sapling and chicks for establishing own home garden and poultry rearing ↳ Demonstration farms established ▪ *Farms were used to provide mothers with an ongoing supply for their home gardens and poultry activities, disseminate improved agriculture techniques, and share knowledge and skills among women* ↳ IYCF education ▪ *Monthly group meetings and home visits* • EHFP + MNPs ↳ All interventions listed in #2 ↳ MNPs distributed to mothers ▪ *120 MNP sachets for flexible consumption over an 11-mo period*

Table 4: COMPLEMENTARY FEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
HSC | Bangladesh: Education, hand sanitizer, and improved MNPs study	
• Can nutrition, health, and hygiene education (NHHE) with hand sanitizer (HS), or improved micronutrient powders (I-MNPs), or both, decrease rates of stunting, wasting, underweight, and morbidity?	• NHHE ↳ Age-appropriate, individual nutrition and hygiene education at home ▪ *First phase (0-6 mo):* ▲ 0-7 d: every other day ▲ 2nd wk-3 mo pp: weekly ▲ 3-6 mo: every other week ▪ *Second phase (6-12 mo):* ▲ 1st wk of 6th mo: every other day ▲ 2nd wk of 6th mo-8 mo: weekly ▲ 9-12 mo: every other wk ↳ Group nutrition and hygiene education ▪ *3, 6, and 9 mo* ↳ Counseling for any feeding difficulties ▪ *As needed by mother* • NHHE + HS ↳ Interventions listed in #1 ↳ Distribution of hand sanitizer ▪ *Distributed when child 0-12 mo old* • NHHE + I-MNPs ↳ Interventions listed in #1 ↳ Distribution of I-MNPs ▪ *Distributed when child 6-12 mo old; 1 sachet per day for 6 mo* • NHHE + HS + I-MNPs ↳ Interventions listed in #1, 2, 3

Table 4: COMPLEMENTARY FEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
WUSTL | Haiti: Nutributter study	
• Can Nutributter (NB) supplementation increase child length and weight, the proportion of children achieving motor development milestones, and dietary diversity; and decrease rates of morbidity? • Is 3 mo of NB as effective as 6 mo of NB?	• Control ↳ Integrated package of health services ▪ *Health services provided at prenatal, early postpartum and well-baby clinic visits* ↳ Messages on CF and hygiene ▪ *Delivered once at enrollment* • 3-mo NB ↳ Interventions listed in #1 ↳ NB for 3 mo ▪ *20 g sachet of NB daily for 3 mo* • 6-mo NB ↳ Interventions listed in #1 ↳ NB for 6 mo ▪ *20 g sachet of NB daily for 6 mo*
UNC | DRC: Caterpillar cereal study	
• Can a method be developed to produce a uniform and safe complementary food cereal made from caterpillars? • Is a complementary food cereal made from caterpillars acceptable to mothers and their infants? • Can feeding children caterpillar cereal reduce rates of stunting, iron deficiency, and anemia and increase hemoglobin levels and body iron stores?	• Control ↳ IYCF education ▪ *IYCF messages delivered weekly during home visits* • Caterpillar cereal ↳ Intervention listed in #1 ↳ Caterpillar cereal as supplementary complementary food ▪ *Cereal fed to child twice a day for 12 mo (6-18 mo of age)*

Table 4: COMPLEMENTARY FEEDING STUDIES' PRIMARY RESEARCH QUESTIONS AND INTERVENTIONS

Primary Research Questions	Interventions/Study Groups
USC | Mexico: Radio and vaccination nurses study	
• Can the delivery of IYCF messages through the radio and vaccination nurses increase the proportion of mothers' who have positive beliefs and attitudes towards optimal CF practices and who display optimal CF behaviors?	• Control • Radio + Vaccination nurses ↳ 5 IYCF messages aired on radio ▪ *Aired 441 times on 3 radio stations for 21 d* ↳ Delivery of 5 IYCF messages and distribution of magnet with 4 IYCF messages by vaccination nurse at home or in health clinic ▪ *Once*

KEY FINDINGS

The studies suggest that cell phone-based counseling was successful at improving breastfeeding practices in India, Kenya, and Nigeria. Fathers' support, traditional birth attendant training, and baby-friendly hospital interventions were also effective for improving breastfeeding outcomes in the sites where these were evaluated. Studies focused on complementary feeding behaviors as well as micronutrient, morbidity, and growth outcomes had mixed results. In Bangladesh, use of hand sanitizers significantly reduced morbidity at 0-6 months of age, and hand sanitizers, micronutrient powders or both significantly reduced stunting. In Haiti, use of lipid-based nutrient supplements for 6 months had a small but significant positive effect on linear growth (+0.13 LAZ). A caterpillar-based cereal reduced child anemia but had no significant effect on stunting in the Democratic Republic of Congo. The key findings of each study are summarized in **Tables 5a-f and 6a-c**.

The following interventions resulted in a statistically significant increase in early initiation of breastfeeding rates:

- Training traditional birth attendants (TBAs) in Bangladesh
- A BF education campaign for fathers in Viet Nam
- Baby-Friendly Hospital Initiative (BFHI) retraining of maternity hospitals + cell phone based BF support in India
- BF education + cell phones + song or drama creation in Nigeria

The following interventions resulted in a statistically significant increase in exclusive breastfeeding rates:

- Training TBAs in Bangladesh
- A BF education campaign for fathers in Viet Nam
- BFHI retraining of maternity hospitals with or without (+/-) the distribution of a BF flyer in DRC
- BFHI retraining of maternity hospitals + cell phone BF support in India
- BF education + cell phones + song or drama creation in Nigeria
- Cell phone based BF support in Kenya

The following interventions resulted in a statistically significant decrease in morbidity rates:

- BFHI retraining of maternity hospitals in DRC, with regard to diarrhea
- Homestead food production in Nepal, with regard to diarrhea

The following studies and interventions showed a statistically significant increase in morbidity rates:

- BFHI retraining of maternity hospitals + the distribution of a BF flyer in DRC, with regard to diarrhea

The following interventions resulted in a statistically significant decrease in anemia rates:

- Caterpillar cereal in DRC

The following interventions resulted in a statistically significant decrease in stunting rates or a statistically significant increase in linear growth:

- Nutrition, health, and hygiene education (NHHE) +/- hand sanitizer +/- MNPs in Bangladesh
- LNS for 6 months, but not for 3 months, was associated with mean length-for-age z-score in Haiti

CF radio spots + delivery of CF messages through vaccination nurses was associated with greater frequency of BF and feeding of green vegetables and beef to infants in Mexico

Breastfeeding studies' key findings

EASD | Bangladesh: TBA training study

Key Findings

- TBA/CV training was associated with an increase in the proportion of traditional birth attendants (TBAs)/community volunteers (CVs) who knew the recommended timing for delayed cord clamping (DCC) and EIBF, but not with a change in the proportion of TBAs/CVs who knew that prelacteal feeds (PLFs) should be avoided and that infants should be exclusively breastfed until 6 mo of age.
- The intervention groups had higher rates of maternal report of EIBF and avoidance of PLFs, but the rates of DCC and EBF were not significantly different **(see Table 5a below)**.
- DCC rates were already high in this population.
- Providing supervision to trained TBAs/CVs did not result in significantly different BF outcomes, compared to TBA training alone.

Table 5a: Outcome rates (%) in each study group* in Bangladesh TBA training study

	Control	Training of TBAs and CVs	Training of TBAs and CVs + Supervision
DCC	100	99	100
EIBF	88[a]	96[b]	96[b]
Avoidance of PLFs	48[a]	80[b]	88[b]
EBF (24 h recall)	67	76	83

*Percentages in the same row with differing superscript letters denote significant differences between groups.

HSPH | Viet Nam: Fathers' involvement study

Key Findings

- An education campaign to promote father's involvement in BF was associated with higher BF knowledge scores.
- The intervention was associated with more positive attitudes towards EIBF and EBF, but not with attitudes towards helping to support the mother to breastfeed
- For 13 of the 30 BF support actions encouraged, there was a significant difference between groups in the proportion of fathers who reported implementing those actions – all higher in the intervention group. The intervention was also associated with higher reported rates of EIBF and EBF at 6 mo, but not 4 mo **(see Table 5b)**.

Table 5b: Outcome rates (%) in each study group in Viet Nam Fathers' involvement study

	Control	Fathers' BF education campaign
EIBF*	40	81
EBF @ 4 mo (24 h recall)	23	29
EBF @ 6 mo (24 h recall)*	4	16
EBF (24 h recall)	67	76

*= significant difference between groups

UNC | DRC: BFHI study

Key Findings

- There were no significant differences in reported rates of EIBF. Both intervention groups had higher reported EBF rates than the control group at 14 wk postpartum, but only the BFHI steps 1-9 group had higher EBF rates than the control group at 24 wk postpartum.
- There were no significant differences in reported rates of diarrhea at 14 wk, but at 24 wk, the BFHI steps 1-9 group had a lower rate of diarrhea than the control group, while the BFHI steps 1-9+ group had a higher rate of diarrhea than the control group. There were no significant differences in reported rates of fever with cough at 14 or 24 wk **(see Table 5c)**.

Table 5c: Outcome rates (%) in each study group in DRC BFHI study

	Control	BFHI steps 1-9	BFHI steps 1-9+
EIBF	76	72	71
EBF @ 14 wk (24 h recall)	35	75*	47*
EBF @ 24 wk (24 h recall)	14	44*	16
Diarrhea @ 14 wk	5	6	10
Diarrhea @ 24 wk	17	9*	20*
Fever with cough @ 14 wk	13	6	8
Fever with cough @ 24 wk	26	15	24

*= significantly different from control group

LMRF | India: Cell phones study

Key Findings

- The intervention group had higher rates of EIBF and EBF at 14 wk and 6 mo, and lower rates of giving prelacteal feeds (PLFs) and bottle feeding at 6 mo.
- The intervention group also had lower rates of early and late introduction of complementary foods **(see Table 5d)**.

Table 5d: Outcome rates (%) in each study group in India cell phones study

	Control	Cell phone BF counseling
EIBF*	24	37
Gave PLFs	18	19
EBF @ 14 wk*	71	96
EBF @ 6 mo (24 h recall)*	49	97
Bottle feeding @ 6 mo (24 h recall)*	18	1
Early introduction of complementary foods*	27	0
Late introduction of complementary foods*	36	2

*= significant difference between groups

UNC | Nigeria: Microcredit and cell phones study

Key Findings

- The intervention group had higher rates of EIBF and EBF at 3 and 6 mo and lower rates of giving prelactial feeds and giving water before 6 mo of age **(see Table 5e)**. There were no significant differences in EBF rates at 1 mo. A significantly higher proportion of mothers in the intervention group had correct knowledge about key infant feeding practices.

Table 5e: Outcome rates (%) in each study group in Nigeria Microcredit and cell phones study

	Control	BF education + Cell phone
EIBF*	48	70
EBF @ 1 mo	61	71
EBF @ 3 mo*	58	71
EBF @ 6 mo*	43	64
Gave fluids in the first 3 d*	29	14
Gave water before 6 mo*	49	24

*= significant difference between groups

UT | Kenya: Support meetings and cell phones study

Key Findings

- The group receiving cell phone based BF support had higher EBF rates at 3 mo pp compared to the control group and the BF support meetings group; there was no significant difference in EBF rates at 3 mo between the BF support meetings group and the control group. There were no significant differences between groups in rates of EIBF or EBF at 1 wk pp or 6 mo pp, however, at 6 mo pp the sample size may have been too small to detect significant differences between groups **(see Table 5f)**.
- It was feasible to conduct a sub-study with a similar design with HIV-positive subjects.

Table 5f: Outcome rates (%) in each study group* in Kenya Support meetings and cell phones study

	Control	BF support meetings	Cell phone based BF support
EIBF	67	70	73
EBF @ 1 wk (24 h recall)	93	94	94
EBF @ 3 mo (24 h recall)	78[a]	83[a]	91[b]
EBF @ 6 mo (24 h recall)	40	44	33

*Percentages in the same row with differing superscript letters denote significant differences between groups.

SPIR | Honduras: BF clubs and cell phones study

Key Findings

- It was not feasible to carry out a study to determine if BF support provided to adolescent mothers through BF clubs and text messages could improve BF rates due to insecurity/safety issues and difficulty contacting mothers for intervention delivery and data collection.
- A qualitative study identified the major barriers mothers faced with respect to attending BF clubs. These included lack of money for transportation, distance to clubs, meeting schedules and locations, and difficulty taking the baby out of the home.

Complementary feeding studies' key findings

HKI | Nepal: Homestead food production and MNPs study

Key Findings

- Neither intervention had a significant effect on mean hemoglobin levels, anemia rates, or growth, possibly due to an inadequate sample size to detect differences between groups (see Table 8a below). There were no between-group differences with regard to fever, but the Enhanced Homestead Food Production (EHFP) group had a significantly lower longitudinal prevalence of diarrhea compared to the control group; diarrhea prevalence was similar between the EHFP group and the EHFP + micronutrient powders (MNPs) group and between the control group and the EHFP+ MNPs group.
- MNPs did not seem to provide any additional benefit over EHFP.
- The EHFP Program was a feasible platform through which to deliver MNPs; 91% of MNPs were successfully delivered to target children.

Table 6a: Changes in outcomes from pre- to post-intervention by study group* in Nepal Homestead food production and MNPs study

	Control	EHFP	EHFP + MNPs
Δ in hemoglobin (g/L)	+14.3	+17.9	+18.4
Δ in anemia prevalence (percentage points [pp])	-40	-49	-52
Δ in WAZ	-0.71	-0.44	-0.56
Δ in HAZ	-1.38	-1.41	-1.32
Δ in WHZ	-0.21	0.28	0.01
Δ in underweight prevalence (pp)	+12	+6	+12
Δ in stunting prevalence (pp)	+35	+40	+37
Δ in wasting prevalence (pp)	0	-2	-7
Mean longitudinal diarrhea prevalence (%)	3.1[a]	2.4[b]	2.6[a,b]
Mean longitudinal fever prevalence (%)	3.0	2.5	2.6

*Percentages in the same row with differing superscript letters denote significant differences between groups.

HSC | Bangladesh: Education, hand sanitizer, and improved MNPs study

- The intervention groups had higher mean LAZ than the control group at 12 mo, but not at 6 mo **(see Table 6bi)**.
- The intervention groups had lower stunting rates at 12 mo than the control group **(see Table 6bi)**.
- Over the period of the first 6 mo, the nutrition, health, and hygiene education + hand sanitizer (NHHE+HS) group (NHHE + HS and NHHE + HS + improved micronutrient powders [I-MNPs] combined) had a lower prevalence of upper respiratory tract infections (URTI), cough, and diarrhea compared to the control group **(see Table 6bii)**.
- At 12 mo, the groups receiving MNPs had a lower prevalence of fever than the other groups; but there were no significant differences between groups with regard to fever rates at 6 or 9 mo **(see Table 6iii)**. There were no significant differences in rates of URTI, cough, or fever between groups at 6, 9, or 12 mo.

Table 6bi: Anthropometric outcomes in each study group* in Bangladesh education, hand sanitizer, and improved MNPs study

	NHHE	NHHE + HS	NHHE + I-MNPs	NHHE + HS + I-MNPs
LAZ @ 6 mo	-2.3	-2.3	-2.2	-2.3
LAZ @ 12 mo	-2.3[a]	-1.9[b]	-1.8[b]	-2.0[c]
Moderately stunted (-3<LAZ<-2) (%)	32[a]	31[b]	22[c]	24[b,c]
Severely stunted (LAZ<-3) (%)§	24[a]	17[b]	12[c]	15[b,c]

*Means or percentages in the same row with differing superscript letters denote significant differences between groups.

§Results do not account for cluster

Table 6bii: Morbidity outcomes in each study group (0-6 mo)§ in Bangladesh education, hand sanitizer, and improved MNPs study

	NHHE	NHHE + HS
URTI @ 0-6 mo (%)*	30	34
Cough @ 0-6 mo (%)*	10	12
Diarrhea @ 0-6 mo (%)*	3	6

§=Results do not account for cluster

*= significant difference between groups

Table 6biii: Morbidity outcomes in each study group (6-12 mo) in Bangladesh education, hand sanitizer, and improved MNPs study

	NHHE	NHHE + HS	NHHE + I-MNPs	NHHE + HS + I-MNPs
Fever @ 6 mo (%)	6	7	8	6
Fever @ 9 mo (%)	10	9	8	10
Fever @ 12 mo (%)	12[a]	12[a]	8[b]	7[b]

*Percentages in the same row with differing superscript letters denote significant differences between groups.

WUSTL | Haiti: Nutributter study

Key Findings

- Generalized least squares regression modeling showed that Nutributter (NB) supplementation for 6 mo significantly increased average LAZ by 0.16 (±0.06 SE) compared to control after adjusting for child age. There were no effects of NB on WAZ, and morbidity and developmental outcomes did not differ by trial arm.
- Preliminary analyses of the IYCF questions indicate that BF frequency was significantly reduced in the 6-mo NB group compared to the other groups at some of the follow-up visit time points, whereas dietary diversity was increased. Qualitative work suggested negative perceptions of continued breastfeeding; BF was seen as a coping strategy for food insecurity.
- 3 mo of NB supplementation was less effective with respect to impacting LAZ, and equally ineffective at changing the other outcomes as 6 mo of NB supplementation.

UNC | DRC: Caterpillar cereal study

Key Findings

- There were no significant differences in rates of stunting at 6, 9, 12 or 18 mo **(see Table 6c)**.
- There were no significant differences in mean LAZ, WLZ, or WAZ at 6, 9, 12, or 18 mo.
- The intervention group had higher mean hemoglobin levels than the control group and lower rates of anemia at 18 mo **(see Table 6c)**.

Table 6c: Outcomes in each study group* in DRC caterpillar cereal study

	Control	Caterpillar cereal
Stunting @ 6 mo (baseline) (%)	33	36
Stunting @ 9 mo (%)	45	42
Stunting @ 12 mo (%)	46	47
Stunting @ 18 mo (%)	71	67
Hemoglobin (g/dL) @ 18 mo*	10.1	10.7
Anemia @ 18 mo (%)*	26	50

*= significant difference between groups

USC | Mexico: Radio and vaccination nurses study

Key Findings

- Mothers in the Radio + Vaccination nurses (intervention) group reported BF more frequently (+8 times/d) than mothers in the control group. There were no significant differences in BF rates.
- The intervention group had more positive beliefs, attitudes, and intentions regarding optimal BF and CF practices.
- Mothers in the intervention group fed their infants green vegetables and beef more often than mothers in the control group (+0.4, +0.1 d/wk, respectively). There were no significant differences in the frequency with which thick broths, chicken, and fish were fed to infants.
- Mothers in the intervention group fed their infants greater amounts of green vegetables (+11 g); there were no significant differences in the amount of beef, chicken, or fish fed to infants.

Note: The results presented above are adjusted results which account for duration of follow-up.

PROGRAM IMPLICATIONS

Grantees were asked if they were to design such a study again, what changes mighty they make to their intervention packages to increase impact. They suggested spending more time and effort collecting formative data to design more refined messages and strategies, putting systems in place to ensure successful intervention implementation, increasing the duration of the intervention, and for nutrition interventions that were integrated into other interventions, ensuring that the initial intervention was securely in place and well established. The changes suggested by each grantee are listed below.

Changes grantees would make to their intervention package to increase impact or scale up the intervention

EASD | Bangladesh: TBA training study

- None reported

HKI | Nepal: Homestead food production and MNPs study

- Ensure that the sample size is large enough to allow any differences between groups to be detected when the program is evaluated
- Collect detailed process evaluation data to assess the feasibility of distributing MNPs through agriculture and nutrition interventions
- Strengthen the poultry component of the agricultural intervention so that family flocks increase and egg production and consumption increases
- Leave ample time between the start of the homestead food production intervention and the start of MNP distribution so that the home gardens and poultry farming are fully up and running before MNP distribution begins
- Prioritize Essential Nutrition Action messages with the lowest prevalence in Nepal (i.e., feeding sick children, dietary diversity and appropriate intake, hand washing, iron consumption, timely initiation of BF, and avoidance of PLFs)
- Prioritize poultry raising and cultivation of plants with high micronutrient contents in the homestead food production intervention

HSC | Bangladesh: Education, hand sanitizer, and improved MNPs study

- None reported

HSPH | Viet Nam: Fathers' involvement study

- Establish a good sampling frame at the start of the project
- Involve village health workers and health volunteers in the intervention design
- Design appropriate slogans and logos to attract the attention of fathers and men
- Test multilevel supervision systems before implementing the intervention to ensure that program activities are implemented as planned

LMRF | India: Cell phones study

- Voice messages can be included to increase impact especially in illiterate women
- The use of cell phones to support mother's to improve infant and young child feeding (IYCF) can be adopted by the public health systems to improve practices

SPIR | Honduras: BF clubs and cell phones study

- Include other family members in interventions targeting adolescent mothers since the other family members are often involved in making decisions regarding the mother and infant
- Begin talking to adolescent mothers and key family members about BF prenatally
- Personalize phone messages to the mother to keep the mother invested in the intervention
- Provide transportation for mothers to attend BF clubs
- Hold BF clubs at school or other more convenient locations for the mothers

UNC | DRC: BFHI study

- Ensure that health care workers are equipped with appropriate skills to counsel and support optimal BF practices
- Deliver messages directly through trained individuals, especially if there is not a culture of reading

UNC | DRC: Caterpillar cereal study

- None reported

UNC | Nigeria: Microcredit meetings and cell phones study

- Carefully vet microcredit organizations before the beginning of the project to ensure that the microcredit programs to which you are adding your health components are well established
- Put a system in place for retraining or replacing credit officers who do not adequately implement the health component of the intervention
- Spend a good amount of time collecting detailed formative data to understand the key issues related to infant feeding so that stronger messages and strategies can be developed that address cultural norms

USC | Mexico: Radio and vaccination nurses study

- None reported

UT | Kenya: Support meetings and cell phones study

- Provide close support and scheduled retraining to peer leaders so that they are able to address any study challenges they might encounter and are kept up-to-date
- Establish and use clear accounting guidelines for the use of cell phones, air time, and the replacement of any lost or stolen equipment to avoid problems
- Select a call center facility with optimal working conditions (i.e., reduced traffic noise, adequate break and bathroom facilities) to provide a comfortable environment for the peer leaders
- Include the referral of mothers to peer leaders by nursing staff during regular antenatal care visits to enhance the national health care package available to all women

WUSTL | Haiti: Nutributter study

- Supplement with small quantity LNS over a longer period of time, beginning at 6 mo of age
- Apply an integrated, community-based approach
- Integrate a water, sanitation and hygiene (WASH) interventions with LNS supplementation
- Include targeted behavior change communication messaging about continued BF, feeding during illness, and WASH
- Acknowledge and address socio-economic determinants of IYCN unique to urban areas (e.g., support working women with viable child-care options)
- Dedicate funding for advocacy of activities at the national, department, and community levels to increase program longevity and policy impact

SUMMARY

These studies provide valuable information regarding novel approaches with potential to help overcome barriers to IYCF at scale in low-income countries. Most of the grantees employed rigorous randomized study designs which give strength to their findings. Because a number of the interventions implemented in these studies have not been studied extensively, or in some cases, previously, additional research is needed to examine whether the results are replicable and the interventions are effective in different settings.

ANNEXES

ANNEX 1: PROPOSAL SCORING SHEET

Criterion	Points
Strong rationale for the project	20
Innovative approach	15
Demonstrated understanding of IYCF practices, programs, policies, and infrastructure in the proposed study	10
Feasibility within given budget limits	10
Well-defined, scientifically rigorous, and realistic approach to measuring project success	10
Potential for direct translation into sustainable IYCF program delivery at scale	10
Potential for application to different countries/settings	5
Demonstrated organizational capacity	10
Demonstrated ability to manage grants and budgets	5
Budget appropriate for proposed activities	5
TOTAL SCORE	**100**

ANNEX 2: OTHER OUTCOMES PRESENTED IN FINAL REPORT THAT WERE NOT INCLUDED IN KEY FINDINGS

HSPH	• Any BF at 4 and 6 mo • EBF at 4 and 6 mo (7 d recall) • EBF to 4 and 6 mo (since birth recall) 30
LMRF	• Infant hospitalization • Infant weight • Maternal adherence to scheduled visits • Maternal satisfaction with BF counseling
UNC Nigeria	• Gave fluids before 6 mo • Bottle feeding • Maternal BF knowledge • Maternal perception of quality of intervention • Early introduction of complementary foods
UT	• EBF at 1 wk, 3 mo, and 6 mo (7 d recall) • Infant morbidity • Infant growth • EIBF and EBF in sub-study

ANNEX 2: OTHER OUTCOMES PRESENTED IN FINAL REPORT THAT WERE NOT INCLUDED IN KEY FINDINGS

HSC	• WAZ at 6 and 12 mo • WLZ at 6 and 12 mo • Longitudinal changes in LAZ and WAZ • Morbidity 0-28 d • Longitudinal prevalence of any illness
WUSTL	• Qualitative outcomes including NB acceptability, compatibility/conflict between delivered IYCF messages and traditional beliefs, household ability to purchase complementary foods, impact of NB on intra-household relations
UNC DRC Caterpillar	• Linear growth velocity • Wasting • Ferritin • Morbidity

ANNEX 3: PRIMARY RESEARCH QUESTIONS NOT PRESENTED IN KEY FINDINGS AND REASONS WHY

EASD	• Can the interventions increase maternal knowledge of optimal delivery and infant feeding practices? • Which intervention is more cost-effective: training alone or training + supervision?	• Results not presented in key findings or final report because data not complete and not analyzed correctly
LMRF	• Which intervention is more cost-effective?	• Results not presented in key findings because UCD did not have expertise to review the cost calculations and confirm they were conducted correctly

ANNEX 4: PENDING RESULTS TO BE SUBMITTED AS COURTESY ADDENDUMS

Grantee	Pending Research Questions
HSC	• Can nutrition, health, and hygiene education (NHHE) with hand sanitizer, or improved micronutrient powders (I-MNPs), or both, decrease rates of underweight and wasting; increase changes in mid-upper arm circumference and head circumference, hemoglobin; and improve cognitive development, and dietary intake outcomes?
HKI	• Can Enhanced Homestead Food Production (EHFP) or EHFP + MNPs improve IYCF practices?
UNC DRC Caterpillar	• Can feeding children caterpillar cereal increase head growth, and improve dietary and developmental outcomes

EASD | Bangladesh: TBA training study

Training and supervision of traditional birth attendants and community volunteers improved rates of early initiation of breastfeeding and avoidance of prelacteal feeds in Bangladesh

Objectives

To determine if traditional birth attendant (TBA) and community volunteer (CV) training could improve early breastfeeding (BF) practices, and if so, whether the impact was substantially greater if the relatively expensive component of post-training supervision was included.

Design, setting, and participants

This cluster randomized controlled trial took place in Panchagarh District in northern rural Bangladesh and compared BF outcomes between mothers in a control group (CG), mothers receiving support from TBAs/CVs trained in BF (TTG), and mothers receiving support from TBAs/CVs trained in BF and supervised weekly (TT+SG). Nine unions (sub-sub districts) were randomly allocated, three to each of the three groups. A total of 1182 mothers of infants aged 0-5 months were interviewed at baseline. After 6 months of intervention an endline survey was carried out on a different sample of 1148 mothers of infants aged 0-7 months living within the same clusters.

Interventions

TBAs/CVs and TBA/CV Supervisors received a 5-day BF training based on the WHO/UNICEF BF counseling training course, with extra attention to early birthing and feeding practices. Pregnant women and women with young infants received weekly home visits from TBAs/CVs for 6 months. TBAs/CVs attended the births of the pregnant women whenever possible.

Outcome measures and analysis

Rates of early initiation of breastfeeding (EIBF), avoidance of prelacteal feeds (PLFs), and exclusive breastfeeding (EBF) were compared between groups using mixed model logistic regression. Cluster was accounted for in all analyses.

Results

In the endline survey, both intervention groups had significantly higher proportions of mothers who reported EIBF (CG: 88%, TTG: 96%, TT+SG: 96%) and avoidance of PLFs (CG: 48%, TTG: 80%, TT+SG: 88%) compared to the control group; there was no significant difference between the two intervention groups. The rates of reported EBF were not significantly different among groups (CG: 67%, TTG: 76%, TT+SG: 83%).

Conclusions

TBA/CV training may be an effective intervention for improving rates of EIBF and avoidance of PLFs in this setting. The supervision of TBAs did not seem to provide a substantial additional benefit with regard to BF practices within the time frame of this study.

Collaborating institutions

- *Eminence Associates for Social Development (Bangladesh)* planned the study, provided technical input for research methodology, data collection, supervision, project management, and maintenance of quality control.
- *Hanyang University (South Korea)* planned the study, provided technical support on research methodology, data analysis, and reporting.
- *University of California, Davis (US)* helped analyze the data.

Principal investigators

- *Shamim Hayder Talukder,* MD, CEO Eminence
- *Ted Greiner,* PhD, Professor of Nutrition, Hanyang University

Project director

- *Dr. Shamim Hayder Talukder,* MD, CEO Eminence

HKI | Nepal: Homestead food production and MNPs study

The impact of an enhanced homestead food production program delivered with or without micronutrient powders on nutritional status of young children in Nepal

Objectives

To examine the impact on anemia prevalence among young children of providing an enhanced homestead food production (EHFP) program with or without micronutrient powders (MNP).

Design, setting, and participants

This cluster randomized trial took place in Baitadi District in the Far Western Region of Nepal, in a rural, remote, hilly area. Village development committees were randomized to one of three groups: 1) the control group, 2) the EHFP group, or 3) the EHFP+MNP group. Mothers (n=335) and their 6-9-month-old infants were enrolled in the study and followed for 11 months.

Interventions

The EHFP program was designed to increase the production and consumption of nutrient-rich vegetables, fruits, and animal-source foods. The program provided beneficiary families with the necessary inputs to establish home gardens and poultry rearing. Behavior change communication interventions included sharing information on homestead food production and essential nutrition actions through monthly mothers' group meetings, visits to households, demonstrations of best practices, and interpersonal communication. The EHFP+MNP group also received 60 sachets of MNPs at the start of the intervention and again 6 months later for a total supplementation period of 11 months (for flexible consumption).

Outcome measures and analysis

Changes in hemoglobin, anemia prevalence, and growth as well as longitudinal prevalence of diarrhea and fever were compared among groups using mixed model logistic and linear regression. All analyses accounted for cluster.

Results

Both intervention groups had a slightly higher but non-significant increase in hemoglobin levels compared to the control, (difference in difference: EHFP+MNP vs. control: +4.1 g/L , EHFP vs. control: +3.6 g/L, and EHFP+MNP vs. EHFP: +0.5 g/L). Anemia decreased somewhat more in the EHFP+MNP (51.5 percentage points [pp]) than in the EHFP (48.6 pp) and control (39.6 pp) groups, however, there were no significant differences in the three groups. There were no significant impacts on child growth (stunting difference in difference: EHFP+MNP vs. control: +2.4 pp, EHFP vs. control: +6.1 pp, and EHFP+MNP vs. EHFP: -3.1 pp). The adjusted mean longitudinal prevalence of reported diarrhea (defined as the proportion of home visits that the mother reported the child having diarrhea during the previous two weeks) was lower among the children in the EHFP+MNP and EHFP groups compared to the control group, but the difference was

statistically significant only for the EHFP group (EFHP+MNP: 2.6%, EHFP: 2.4%, and control: 3.1%). The longitudinal prevalence of reported cases of fever (defined as the proportion of home visits that the mother reported the child as having fever during the previous two weeks) was slightly lower among the EHFP+MNP and EHFP groups compared to the control group, although the differences were not statistically significant (EHFP+MNP: 2.6%, EHFP: 2.4%, control: 3.0%).

Conclusions and implications

This study showed a marginally significant reduction in anemia by using an enhanced homestead food production program as a platform for distribution of MNP, and a significant reduction in diarrhea with the EHFP program alone. Sample size restrictions limited the statistical power of the study to detect effects on child nutritional status.

Collaborating institutions

- *Helen Keller International (HKI Nepal)* was the prime implementer of the Action Against Malnutrition through Agriculture (AAMA) project.
- *United States Agency for International Development (US)* provided the core funding for the AAMA project through the Child Survival and Health Grants Program.
- *Micronutrient Initiative* in Nepal provided support for MNP procurement and program evaluation.
- *Nepal Technical Assistance Group (Nepal)* assisted with training of the community health workers involved in implementing the program.
- *Snehi Mahila Jagaron Kendra (Nepal)* assisted with implementation of the program

Principal investigators

- *Pooja Pandey Rana,* MPH, Helen Keller International – Nepal
- *David Spiro,* MA, Helen Keller International – Nepal
- *Akoto Osei,* PhD, Helen Keller International – Asia Pacific Regional Office

HSC | Bangladesh: Education, hand sanitizer, and improved MNPs study

Hand sanitizer with or without improved micronutrient powders combined with nutrition, health and hygiene education reduced stunting and early childhood infections among full-term low birth weight infants in Bangladesh

Objective

To investigate the independent and combined effects of hand sanitizer (HS) and improved micronutrient powders (I-MNPs) in combination with nutrition, health and hygiene education (NHHE) on reducing rates of stunting among low birth weight infants.

Design, setting, and participants

This community-based cluster randomized study had 4 groups: 1) NHHE only (control group), 2) NHHE+HS, 3) NHHE+I-MNPs, and 4) NHHE+HS+I-MNPs. Mothers (n=467) and their full-term low birth weight (LBW) infants from 48 rural sub-districts (clusters) in central Bangladesh were enrolled in the study within 24 hours of delivery and followed up until 1 year postpartum (pp).

Intervention(s)

The NHHE consisted of simple, standardized, and age- and culturally-appropriate nutrition and hygiene education that aimed to improve infant feeding and prevent infections, and was provided from 0-12 months pp. The hand sanitizer was water-based and provided to households along with training on its use from 0-6 months pp. The I-MNPs included 22 micronutrients, and mothers were instructed to feed their child one sachet per day from 6-12 months of age.

Outcome measures and analysis

Growth and morbidity were compared between groups using mixed effects regression modeling.

Results

There was a high prevalence of stunting among this cohort of LBW infants, with more than 80% of them being stunted at birth. At 12 months, the intervention groups had a significantly lower stunting prevalence than the control group (NHHE only: 56%, NHHE+HS: 48%, NHHE+I-MNPs: 34%, NHHE+HS+I-MNPs: 39%). Children in the NHHE+HS group had a significantly lower prevalence of illness at any point during the first 6 months than those in the NHHE only group (NHHE+HS vs. NHHE only; upper respiratory tract infection [URTI]: 30% vs. 34%; cough: 11% vs. 13%; diarrhea: 3% vs. 6%). At 12 months, the NHHE+HS+I-MNPs and NHHE+I-MNPs groups had a significantly lower prevalence of fever than the NHHE+HS and NHEE only groups (NHHE+HS+I-MNPs: 7%, NHHE+I-MNPs: 8%, NHHE only: 12%, NHHE+HS:13%). There were no between-group differences in the proportion of infants who were reported to have a URTI, cough, or diarrhea in the week prior to the 12-month interview (NHHE only, NHHE+HS, NHHE+I-MNPs, NHHE+HS+I-MNPs; cough: 12%, 8%, 15%, 8%; URTI: 32%, 26%, 33%, 33%; diarrhea: 9%, 3%, 1%, 2%).

Conclusions and implications

At the end of the 12 months, HS and/or I-MNPs combined with NHHE reduced stunting among full term LBW infants in rural Bangladesh compared to NHHE alone. The combination of NHHE+I-MNPs had the most robust impact. HS also reduced the symptoms of common childhood infections at 6 months. Scaling-up of integrated packages that include these types of interventions for high-risk infants could have major impact on infant health and growth in the first year of life.

Collaborating institutions

- *Hospital for Sick Children (Canada)* planned, coordinated and oversaw data collection and analysis.
- *BRAC (Bangladesh)* coordinated and oversaw the project in Bangladesh.

Principal investigator

- *Stanley Zlotkin,* MD, PhD, Faculty of Medicine, University of Toronto

Project director

- *Sohana Shafique,* PhD, Postdoctoral Scholar, University of Toronto, Faculty of Medicine, Department of Nutritional Sciences

HSPH | Viet Nam: Fathers' involvement study

A breastfeeding campaign targeting fathers was associated with increased rates of early initiation and exclusive breastfeeding in Viet Nam

Objectives

To examine whether breastfeeding (BF) education to promote fathers' involvement in BF is associated with higher rates of BF support and recommended BF practices.

Design, setting, and participants

This study used a non-randomized pre-post-test design with an intervention group and a control group. The study took place in rural communes and semi-rural townships in Hai Duong Province in northern Viet Nam, and enrolled 492 pregnant women and their husbands.

Interventions

A 1-year BF education campaign targeting fathers-to-be included the delivery of BF messages over local loud speaker systems, group counseling for fathers at health facilities, and individual counseling for fathers in their homes.

Outcome measures and analysis

Mean scores for fathers' BF knowledge and attitudes were compared between the control and intervention groups using ANCOVA. The proportion of fathers who reported doing selected BF support behaviors and the rates of early BF initiation (BF within the first hour of birth) and exclusive breastfeeding (EBF) at 4 and 6 months were compared between groups using logistic regression.

Results

Compared to fathers in the control group, fathers in the intervention group had higher BF knowledge scores and more positive attitudes towards early BF initiation and EBF, but not towards helping support the mother to BF. For 13 of the 30 BF support actions encouraged, there was a significant difference between groups in the proportion of fathers who reported implementing those actions – all higher in the intervention group. Mothers in the intervention group had significantly higher rates of early BF initiation and EBF at 4 (22% vs. 15%) and 6 months (9% vs. 1%).

Conclusions and implications

A BF education campaign targeting fathers in Viet Nam was associated with increases in fathers' BF knowledge, positive attitudes towards BF, and performance of certain supportive behaviors; as well as rates of early BF initiation and EBF. A larger, randomized study is needed to replicate these findings and provide stronger evidence for national policies. Health care staff should consider integrating fathers' counseling into maternal and child health services.

Collaborating institutions

- *Hanoi School of Public Health (Viet Nam)* designed and managed the study, analyzed the data, and published the results.
- *The District Health Center of Chi Linh* in collaboration with the *Local Farmer Association (Viet Nam)* implemented the study interventions.

Principal investigator & Project director

- *Tran Huu Bich,* MD, PhD, Deputy Dean for Research and Associate Professor, Hanoi School of Public Health

LMRF | India: Cell phones study

Cell phone-based breastfeeding counseling, coupled with retraining of hospital staff in the Baby-friendly Hospital Initiative, increased rates of early initiation and exclusive breastfeeding in India

Objectives

To examine the effect on breastfeeding (BF) rates of providing mothers with cell phone-based BF counseling in addition to maternity hospital retraining in the Baby-friendly Hospital Initiative (BFHI).

Design, setting, and participants

In this cluster randomized controlled trial, 1,037 women of low socioeconomic status were enrolled from four maternity hospitals in central India. The maternity hospitals were randomized to either BFHI retraining only (BFHI group) or BFHI retraining plus the provision of BF counseling using cell phones to mothers attending the hospitals (BFHI + CP group). Mothers who attended prenatal and postnatal visits and delivered at the same hospital were included in the study.

Interventions

Hospital staff was retrained in BFHI using the Breastfeeding Promotion Network of India (BPNI) curriculum. Auxiliary nurse midwives were trained in sending targeted SMS (text messages) and in providing BF counseling using cell phones. Mothers in the BFHI + CP group were offered study cell phones and received daily SMS, weekly calls, and need-based counseling at no charge, starting from the mother's third trimester of pregnancy to 6 months + 1 week postpartum (pp).

Outcome measures and analysis

Rates of avoidance of prelacteal feeds (no food or fluids given to the infant before the initiation of BF), early initiation of breastfeeding (initiation of BF within an hour of birth), exclusive BF, and bottle feeding (formula or animal milk fed to the baby in a bottle with a nipple) were compared between groups using logistic mixed models and accounting for cluster.

Results

Mothers in both groups had similar rates of avoidance of prelacteal feeds (BFHI + CP group: 81% vs. BFHI group: 82%). Mothers in the BFHI + CP group had significantly higher rates of early initiation of BF (37% vs. 24%) and exclusive BF (14 weeks postpartum (pp): 96% vs. 71%, 6 months pp: 97% vs. 49%). Bottle feeding rates were significantly lower in the BFHI + CP group (14 weeks pp: 1% vs 12%, 6 months pp: 1% vs 18%).

Conclusions and implications

Augmenting BFHI with cell phone-based BF support increased early initiation and exclusive BF rates and decreased bottle feeding rates in Indian women of low socioeconomic status attending urban maternity hospitals that received only retraining in BFHI. This intervention was successfully implemented by training auxiliary nurse midwives and can potentially be scaled up for incorporation into public as well as private health systems.

Collaborating institutions

- *Lata Medical Research Foundation (India)* was the lead organization and planned, implemented, monitored, and coordinated the study, including re-training in BFHI, data collection and analysis, and setting up of the cell phone counseling systems.
- *Indira Gandhi Government Medical College & Hospital (IGGMC), Daga Memorial Government Hospital, Matru Seva Sangh Mahal Hospital,* and *Matru Seva Sangh Buldi Hospital (India)* granted permission for conducting BFHI retraining of the staff and enrolling participants from the respective study sites.

Principal investigator

- *Archana Patel,* MD, PhD, DNB, MSCE

Project directors

- *Leena Dhande,* MD, Associate Professor, Department of Pediatrics, Indira Gandhi Government Medical College, Nagpur
- *Smita Puppalwar,* MSc, Administrator & Study Coordinator, Lata Medical Research Foundation, Nagpur
- *Priyanka Kuhite,* BHMS, Project Supervisor, Lata Medical Research Foundation, Nagpur

SPIR | Honduras: BF clubs and cell phones study

Providing breastfeeding support to adolescent mothers in Honduras using breastfeeding clubs and cell phones posed major challenges

Objectives

A randomized trial was designed to examine the effect of breastfeeding (BF) support provided through BF clubs and cell phones on BF rates among 500 adolescent mothers in Honduras. However, due to various challenges including high insecurity in the area, it was not possible to deliver the intervention or collect data because most of the intended beneficiaries did not attend the BF clubs and/or were not reachable by cell phone or home visits. Therefore, after enrolling 103 participants, the study was stopped, and a new qualitative study was conducted to identify factors that prevented or facilitated the study participants' attendance at BF clubs.

Design, setting, participants

Of the 60 mothers who were enrolled into the intervention group of the original study, 31 were reached and interviewed for the qualitative study.

Outcome measures and analysis

Factors that prevented or facilitated attendance of the adolescent mothers at the BF clubs were identified by reviewing interview questionnaires.

Results

Thirteen out of the 31 interviewed had attended at least one BF club. Mothers reported the following barriers to attending BF clubs: lack of money for transportation, distance to meetings, meeting schedules and locations, child being sick, and difficultly taking the baby out of the home. Mothers reported that receiving reminders about the BF club meetings facilitated their attendance.

Conclusions and implications

There are major barriers to providing BF support to adolescents in this setting through BF clubs and cell phones. Other strategies to provide BF support to this target group need to be investigated further.

Collaborating institutions

- *Samaritan's Purse International Relief (Honduras)* oversaw the entire project.
- *Leonardo Martinez Hospital (Honduras)* provided access to hospital staff for training and access to the recruitment and enrolment of the adolescent mothers in the study.
- *La League de Lactancia Materna (Honduran Breastfeeding Chapter)* provided materials for the training of the hospital staff in lactation management and materials for the training of community health promoters in breastfeeding promotion and counseling. They also provided technical revision of all materials produced, SMS messages, and an educational booklet about breastfeeding.
- *National University of Honduras (Honduras)* helped in the formative research assessment and the collection of data for the recruitment and enrolment of mothers in the study. The project was covered by the ethics board of the university. They also provided technical assistance on the review of the protocol and instruments used in the study.
- *Loma Linda University (US)* provided technical support for the development of the instruments and also overall technical support on the monitoring and evaluation of the study.

Principal investigator

- *The Late Lul Janania de Perdomo*, MD, Regional Coordinator for HIV and AIDS Programs in Latin America

Project director

- *Monica Napier*, BS, MPH

UNC | DRC: BFHI study

Implementation of the Baby-friendly Hospital Initiative Steps 1-9 in health facilities increased exclusive breastfeeding rates and decreased diarrhea rates

Objectives

To examine the effect on early initiation and exclusive breastfeeding rates of implementing the Baby-friendly Hospital Initiative (BFHI) Steps 1-9 with or without the distribution of flyers with breastfeeding messages.

Design, setting, and participants

This cluster randomized trial randomized 6 health facilities to one of three groups: 1) control group, 2) BFHI Steps 1-9 group, and 3) BFHI Steps 1-9+ group. Mothers (n=975) and their infants living in peri-urban and urban areas of Kinshasa, Democratic Republic of Congo (DRC) were followed up from 2-3 days after delivery to 24 weeks postpartum.

Interventions

For BFHI Steps 1-9, health staff from antenatal and maternity clinics were trained in BFHI using the WHO/UNICEF BFHI training course. In the BFHI steps 1-9+ group, staff from well-child clinics were also included in the training, and mothers in this group were given flyers containing culturally appropriate messages developed to address the common barriers to exclusive breastfeeding during their stay in the postpartum ward. Well-child clinic staff were also encouraged to discuss breastfeeding with the mothers during well-child clinic visits as they saw fit.

Outcome measures and analysis

Rates of early initiation of breastfeeding (initiation of breastfeeding within 1 hour of delivery [EIBF]), exclusive breastfeeding (EBF), and morbidity were compared between each intervention group and the control group using generalized estimated equations and log binomial models, accounting for cluster.

Results

Rates of EIBF were similar between groups (control, BFHI steps 1-9, BFHI steps 1-9+: 76%, 72%, 71%). At 14 weeks postpartum (pp), both intervention groups had significantly higher EBF rates than the control group with the BFHI steps 1-9 group having considerably higher rates than the other two groups (control, BFHI steps 1-9, BFHI steps 1-9+: 35%, 75%, 47%); by 24 weeks pp, only the BFHI Steps 1-9 group had significantly higher EBF rates than the control group (control, BFHI steps 1-9, BFHI steps 1-9+: 14%, 44%, 16%). There were no differences in the prevalence of fever with cough at 14 or 24 weeks between the intervention and control groups (control, BFHI steps 1-9, BFHI steps 1-9+; 14 weeks: 13%, 6%, 8%; 24 weeks: 26%, 15%, 24%) or diarrhea at 14 weeks (control, BFHI steps 1-9, BFHI steps 1-9+: 5%, 6%, 10%). At 24 weeks, the BFHI Steps 1-9 group had a significantly lower rate of diarrhea than the control group (9% vs. 17%), but the BFHI Steps1-9+ group had a significantly higher rate of diarrhea than the control group (20% vs. 17%).

Conclusions and implications

In a setting with high breastfeeding initiation, implementation of BFHI Steps 1-9 in antenatal and maternity clinics significantly increased the proportion of infants who were exclusively breastfed and reduced the rates of diarrhea at 6 months of age. The distribution of BF flyers appeared to lessen this effect.

Collaborating institutions

- *University of North Carolina at Chapel Hill (US)* provided overall financial and human subjects supervision.
- *Kinshasa School of Public Health (DRC)* oversaw the timely implementation of field activities and ensured that all activities and study requirements were met.

- *Centre for the Coordination of Social Science Research and Documentation in Africa South of the Sahara (CERDAS) (DRC)* provided expertise on qualitative methods and data analyses.
- *Ministry of Health (DRC)* provided advice and assistance as needed through the *National Nutrition Program (PRONANUT)*.
- *Salvation Army* provided staff and other assistance toward local field implementation and helped disseminate and scale up findings from the study.
- *Bureau Diocésain des Œuvres Médicales de Kinshasa (BDOM) (DRC)* provided staff and other assistance toward local field implementation and helped disseminate and scale up findings from the study.

Principal investigator & Project director

- *Marcel Yotebieng,* MD, MPH, PhD, Assistant Professor, Ohio State University

UNC | DRC: Caterpillar cereal study

A complementary feeding cereal made from caterpillars reduced anemia but not stunting among infants in the Democratic Republic of Congo

Objectives

Locally available and sustainable food interventions are needed to combat the problem of malnutrition in infants and young children in low-income countries. Through this study, our goals were to 1) develop a method for producing a uniform, safe cereal made from caterpillars, 2) test maternal and child acceptability of the cereal, and 3) determine if daily intake of the caterpillar cereal can prevent malnutrition among infants.

Design, setting, and participants

We developed a safe method for preparing a cereal made from caterpillars in accordance with international standards. We conducted an acceptability study with mother-infant pairs, followed by a cluster-randomized controlled trial in which rural communities were randomized to an intervention group or a control group. The acceptability and randomized trial were conducted in the rural Equateur Province in northern Democratic Republic of Congo (DRC).

Interventions

For the randomized trial, infants in the intervention group received caterpillar cereal daily from 6 to 18 months of age.

Outcome measures and analysis

The cereal was analyzed to determine macro and micronutrient content, and microbiologic and toxicologic analyses were performed on each batch. Maternal acceptability was assessed by having mothers score the color, consistency, smell, taste, and texture of the cereal. Infant acceptability was assessed by estimating the proportion of cereal consumed by infants over a 1-week feeding period. For the randomized trial, stunting, iron status, anemia, and morbidity were compared between study groups using generalized estimating equation extensions of robust Poisson regression for categorical outcomes and linear mixed models for continuous outcomes to account for cluster.

Results

A 30-gram portion of cereal contained 132 kcal, 3.8 mg of iron, and 3.8 mg of zinc. The cereal was free of microbiologic contaminants. Among mother-infant pairs who completed the acceptability trial (n=19), the cereal was acceptable. Among the mother-infant pairs who completed the randomized trial (n=175), at 18 months of age, compared to those in the control group, those in the cereal group had higher hemoglobin

levels (10.7 vs. 10.1 g/dL) and fewer were anemic (26% vs. 50%). There was no significant between-group difference in stunting prevalence (67% vs. 71%) or in infectious morbidity (44% vs. 66%).

Conclusions and implications

The high initial prevalence of stunting and the non-significant growth response to this micronutrient-rich food suggest that factors other than dietary deficiencies contribute to stunting in these children. Children who consumed caterpillar cereal had higher hemoglobin levels and lower prevalence of anemia.

Collaborating institutions

- *School of Medicine of the University of North Carolina at Chapel Hill (US)* planned, coordinated and oversaw data collection and analysis.
- *Kinshasa School of Public Health (DRC)* coordinated and oversaw all project interventions in DRC.
- *Institut de Recherche en Sciences de la Santé (DRC)* developed, produced, tested and packaged the caterpillar cereal.
- *RTI, International (US)* performed data analysis and provided data collection support.

Additional funding sources

- Thrasher Research Fund

Principal investigators

- *Carl Bose,* MD, Professor of Pediatrics, University of North Carolina
- *Antoinette Tshefu,* MD, MPH, PhD, Dean, Kinshasa School of Public Health

Project directors

- *Adrien Lokangaka,* MD, Country Coordinator, Kinshasa School of Public Health
- *Melissa Bauserman,* MD, MPH, Assistant Professor of Pediatrics, University of North Carolina

UNC | Nigeria: Microcredit and cell phones study

Integrating microcredit, cell phone messaging, and breastfeeding promotion increased rates of early initiation and exclusive breastfeeding in Nigeria

Objectives

We tested the effect of an integrated microcredit, cell phone messaging, and breastfeeding promotion intervention on recommended breastfeeding practices in urban and rural areas of Bauchi State, Nigeria.

Design, setting, and participants

This was a cluster-randomized controlled trial comparing breastfeeding practices in women receiving microcredit plus breastfeeding promotion (intervention) versus microcredit alone (control). Randomization occurred at the level of monthly microcredit meeting groups. All pregnant clients within the randomized groups were recruited at baseline and interviewed again when their infants were > 6 months.

Interventions

Trained credit officers led monthly breastfeeding learning sessions during regular microcredit meetings for 10 months. Text and voice messages were sent out weekly by the coordinating non-governmental organization to a cell phone provided to small groups of microcredit clients (5-6 women). The small groups created one song or drama related to a cell phone message to present during the monthly meeting.

Outcome measures and analysis

The primary outcome was exclusive breastfeeding to 6 months. Secondary outcomes included: exclusive breastfeeding to 1 and 3 months, initiation of breastfeeding within one hour of delivery, and use of fluids other than breastmilk in the first three days of life. Logistic regression models accounting for clustering were used to estimate the odds of performing behaviors in the intervention versus control group.

Results

Among the women who were interviewed during the final survey (n=390), those in the intervention group were significantly more likely than those in the control group to initiate breastfeeding within one hour of delivery (control: 48%, intervention: 70%) and to exclusively breastfeed their infants until 3 and 6 months of age (3 months – control: 58%, intervention: 71%; 6 months – control: 43%, intervention: 64%). Those in the intervention group were significantly less likely to give fluids other than breastmilk in the first three days of life (control: 29%, intervention: 14%).

Conclusions and implications

A face-to-face plus cell phone breastfeeding promotion intervention integrated into microcredit increased the likelihood that women adopted recommended breastfeeding practices. This type of intervention could be scaled up in Nigeria, where local microcredit organizations already provide services to > 500,000 clients.

Collaborating institutions

- *University of North Carolina at Chapel Hill (US)* planned, coordinated, and oversaw data collection and analysis.
- *Partners for Development (Nigeria)* coordinated and oversaw all project interventions in Nigeria, including sending out mass text and voice messages.
- *Gerewa Women Multipurpose Cooperative Society, Rahama Women's Development Program, Women Development Association for Self-Sustainers,* and *Wurno Kowanaka Community Development Centre (Nigeria)* conducted breastfeeding learning sessions during microcredit borrowers' meetings.

Principal investigators

- *Margaret Bentley,* PhD, Professor and Associate Dean for Global Health, University of North Carolina at Chapel Hill
- *Valerie Flax,* PhD, Research Assistant Professor, University of North Carolina at Chapel Hill

Project directors

- *Mekebeb Negerie,* DrPH, Deputy Country Program Director, Partners for Development
- *Alawiyatu Usman Ibrahim,* Alive & Thrive Program Officer, Partners for Development

USC | Mexico: Radio and vaccination nurses study

Targeted scripted messages delivered by nurses and radio improved infant and young child feeding in Mexico

Objectives

Scalable interventions are needed to improve infant and young child feeding (IYCF). We examined effectiveness of a theory-based communication intervention based on short scripted messages to improve IYCF in Mexico.

Design, setting, and participants

Women with children 6-24 mo were selected randomly from vaccination rosters from 6 semi-urban low-income communities in Morelos state (intervention, n=266) and 3 in Puebla state (control, n=201).

Intervention

We used a social marketing approach and theory of planned behavior to guide intervention design. Five scripted messages were delivered by vaccination nurses and radio. The messages focused on breastfeeding, food consistency, flesh-food consumption, vegetable consumption, and offering meat or vegetable that the child had rejected before. Nurses visited participants once at home to deliver all 5 scripted messages. To reinforce four messages, nurses gave study participants a colorful magnet that depicted four of the messages. Messages also were aired 7 times/day for 21 days on 3 radio stations as 30-s radio spots. Each spot focused on one message and only one message was aired per day.

Outcome measures and analysis

We used a pre-post-test design to evaluate changes in beliefs, attitudes, and intentions via 3-point scales, and in behavior with a 7-d food frequency. Mixed models were used to examine intervention-control differences in pre-post changes accounting for clustering by community.

Results

Nurses delivered scripted messages to 89% of the study participants, and 34% of study participants reported having heard at least one message on the radio. Beliefs, attitudes, and intentions about IYCF were significantly improved in the intervention communities compared to control. Intervention participants had significantly greater breastfeeding frequency (+4 episodes/d), vegetable (+0.5 d/wk) and beef consumption (+0.2 d/wk), and thicker consistency in soups (+0.7 d/wk).

Conclusions and implications

This study provides evidence that a targeted communication intervention significantly improved IYCF. The intervention used a scalable model because the strategy was low-burden and easily integrated with existing vaccination services, with simultaneous delivery via radio.

Collaborating institutions

- *University of South Carolina's Department of Health Promotion, Education, and Behavior (US)* received and managed the funds transferred, including sub-funding to the National Institute of Public Health through a sub-agreement. The university provided overall leadership for the study, designed the evaluation, led the conceptualization and design of the intervention, provided ethical oversight, and analyzed the data.
- *Center for Research in Nutrition and Health of the National Institute of Public Health (Mexico)* was the primary implementer of the study. The institution provided significant scientific guidance and was responsible for the administrative oversight for this project, including coordinating with local health authorities, hiring and training field staff, obtaining ethical approval, collecting data for the evaluation, and entering data.
- *Morelos Health Services, Community Health Directorate, Department of Health Promotion (Mexico)* was the local health authority, provided technical guidance, approved the implementation of the intervention, and allowed nurses to deliver this intervention as part of their work.

Principal investigator

- *Edward Frongillo,* Jr., PhD, Professor, University of South Carolina

Project director

- *Eva Monterrosa,* PhD, Scientific Manager, Sight and Life

UT | Kenya: Support meetings and cell phones study

Breastfeeding counseling delivered by trained peer leaders via cell phones increased rates of exclusive breastfeeding in Kenya

Objectives

To test whether participation in either peer-led support groups (PSG) or cell phone-based peer support (CPS) increases adoption and duration of exclusive breastfeeding (EBF) compared to the current standard of hospital-based support and advice during antenatal care (ANC) visits alone (standard of care [SOC]) in Nakuru Municipality, Rift Valley, Kenya.

Design, setting, and participants

752 mostly very low-income women in urban and peri-urban Kenya were enrolled into a randomized controlled trial and randomized to 1 of 3 groups: SOC, PSG, or CPS. We compared EBF rates estimated by maternal 24-hour recall of foods fed to infants at 1 week, 3 months and 6 months of age.

Interventions

Trained peer leaders completed training on national infant and young child feeding guidelines, messaging and support, and on phone counseling technique. Each counselor supported women in both groups (peer-led support and cell phone-based support). Study participants were not provided with cell phones, airtime, or any additional cell phone accessories. Women in the cell phone-based support group received a call every other week from trained peer leaders and could text for free or call as needed for support. Women in the peer-led support groups were invited to monthly meetings at non-health facility locations near their home. The peer-led groups and the phone-based support started in late pregnancy (24-32 weeks) and continued to 3 months postpartum (pp).

Outcome measures and analysis

Rates of initiation of breastfeeding within 1 hour of delivery (early initiation of breastfeeding [EIBF]) and EBF were compared between groups using Chi-squared tests.

Results

A large majority (91%) of eligible women owned or had easy access to a cell phone at baseline. There were no significant differences between groups with regard to EIBF rates (SOC: 67%, PSG: 70%, CPS: 73%) or EBF rates at 1 week pp (SOC: 93%, PSG: 94%, CPS: 94%). However, at 3 months pp, the CPS group had significantly higher rates of EBF than the other 2 groups (SOC: 78%, PSG: 83%, CPS: 91%). There were no significant differences in EBF rates between groups at 6 months pp (SOC: 40%, PSG: 44%, CPS: 33%), however, the sample size that was retained at this time point (N=360) limited the ability to detect differences between groups.

Conclusions and implications

In an urban and peri-urban Kenyan context, when added to the advice currently provided by hospital nursing staff during ANC visits, cell phone based counseling is potentially more effective in supporting EBF than monthly peer support group meetings or ANC advice alone. The higher rates of EBF at 3 months achieved among women provided with cell phone based support may be linked to more frequent help received. Additional implementation studies are needed to assess whether cell phone counseling by trained community resource persons can be as or more cost-effective than increased support for health facility-based postnatal support.

Collaborating institutions

- *University of Toronto in Ontario (Canada)* received and managed the funds transferred, including sub-funding to Egerton University through a sub-agreement, and contributed to ethical oversight and data cleaning and analysis.
- *Egerton University (Kenya)* acted as the primary implementing partner, coordinating all hiring, recruitment, intervention, data collection and data management activities.
- *Rollins School of Public Health at Emory University (US)* contributed to study design and implementation, and data capture and analysis.
- *Nakuru Provincial General Hospital (Kenya)* approved the study, and facilitated recruitment through the antenatal care clinic.

Principal investigators

- *Daniel Sellen*, PhD, Professor and Canada Research Chair, University of Toronto
- *Elizabeth Kamau-Mbuthia*, PhD, Chair of Human Nutrition, Egerton University
- *Aimee Webb Girard*, PhD, Assistant Professor, Rollins School of Public Health, Emory University
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WUSTL | Haiti: Nutributter study

A small-quantity lipid nutrient supplement increased child growth in Haiti

Objectives

To test the efficacy of a small-quantity (20 g) lipid-based nutrient supplement, Nutributter® (NB), delivered within the Ministry of Public Health and Population (MSPP) integrated package (IP) of well-baby services, for promoting young child growth.

Design, setting, and participants

In this randomized controlled trial, mothers with 6-11-month-old infants (n=589) from an urban slum of Cap Haitien were enrolled and randomized to one of three groups: control group, 3-month NB group, or 6-month NB group.

Interventions

All groups received the integrated package of well-baby services (based on the Integrated Management of Child Illnesses). Mothers were directed to feed their baby 1 NB sachet daily for 3 or 6 months.

Outcome measures and analysis

Growth was compared between groups using generalized least squares modeling. Morbidity and development outcomes were compared between groups using chi-squared test and linear regression modeling.

Results

NB supplementation for 6 months significantly increased length-for-age z score (LAZ) by 0.13 (±0.05 SE) and weight-for-age z score (WAZ) by 0.12 (±0.02) compared to the control group after adjusting for child age. The effects were sustained an additional 6 months after the end of the intervention (LAZ: 0.10±0.05; WAZ: 0.11±0.04). Relative to the control group, children in the 3-mo NB group showed significantly reduced

growth in LAZ at both the 6-month data collection time point (-0.12±0.05) and the 12-month data collection time point (-0.11±0.05), possibly due to differential drop-out of younger mothers with heavier infants within the 3-mo NB group. WAZ was similar between the 3-mo NB and control groups. The morbidity prevalence at the 6-month data collection visit did not differ by trial arm (control, 3-mo NB, 6-mo NB: fever: 19%, 17%, 18%; cough: 20%, 15%, 20%; respiratory infection: 6%, 6%, 6%; diarrhea; 19%, 20%, 13%) nor did the percentage of children who had obtained certain motor development milestones (crawls: 88%, 75%, 91%; stands with assistance: 69%, 63%, 76%; walks with assistance: 45% 41%, 59%; stands independently: 64%. 62%, 72%; walks independently: 45%, 41%, 59%) after adjustment for child age and maternal education.

Conclusions and implications

Small-quantity, fortified products used for at least 6 months may improve linear growth in an urban setting in Haiti. Effectiveness studies are now needed to examine impact of NB programming in rural areas of Haiti in combination with water, sanitation, and hygiene (WASH) and behavior change communication interventions.

Collaborating institutions

- *Washington University in St. Louis's George Warren Brown School of Social Work (US)* was the prime implementer of the study.
- *Haiti's Ministry of Health and Population (MSPP)* and *Konbit Santé (Haiti)* implemented the integrated package through community health workers and personnel at Fort St. Michel Hospital.
- *Meds and Food for Kids (US)* provided management of logistics for Nutributter procurement from Edesia Global Nutrition Solutions and distribution, and personnel administration for members of the study team in country.

Principal investigator

- *Lora Iannotti,* PhD, Assistant Professor, Washington University in St. Louis

Project director

- *Sherlie Jean Louis,* RN, Study Coordinator, Washington University in St. Louis/Notre Dame de la Sagesse Nursing School

ANNEX 6: LIST OF PUBLISHED PAPERS

Grantee	Published papers
HSPH	**Fathers as Supporters for Improved Exclusive Breastfeeding in Viet Nam.** Bich TH, Hoa DT, Målqvist M. Matern Child Health J. 2013 Oct 26. [Epub ahead of print] **Changes in knowledge of exclusive breastfeeding for first six months among fathers - Findings from a community intervention study in a rural area of Vietnam.** Bich TH, Hoa DTP, Ha NT, Vui LT, Tuan DK, Cuong NT. Vietnam Journal of Public Health. 2012 Oct; 1(1): 4-10.
UNC DRC BFHI	**Infant feeding practices and determinants of poor breastfeeding behavior in Kinshasa, Democratic Republic of Congo: a descriptive study.** Yotebieng M, Chalachala JL, Labbok M, Behets F. Int Breastfeed J. 2013 Oct 1;8(1):11. [Epub ahead of print]
UNC DRC Caterpillar	**Caterpillar cereal as a potential complementary feeding product for infants and young children: nutritional content and acceptability.** Bauserman M, Lokangaka A, Kodondi KK, Gado J, Viera AJ, Bentley ME, Engmann C, Tshefu A, Bose C. Matern Child Nutr. 2013 Apr 5. doi: 10.1111/mcn.12037. [Epub ahead of print]
USC	**Scripted messages delivered by nurses and radio changed beliefs, attitudes, intentions, and behaviors regarding infant and young child feeding in Mexico.** Monterrosa EC, Frongillo EA, González de Cossío T, Bonvecchio A, Villanueva MA, Thrasher JF, Rivera JA. J Nutr. 2013 Jun;143(6):915-22. doi: 10.3945/jn.112.169235. Epub 2013 Apr 24.
WUSTL	**Linear growth increased in young children in an urban slum of Haiti: a randomized controlled trial of a lipid-based nutrient supplement.** Iannotti LL, Dulience SJ, Green J, Joseph S, François J, Anténor ML, Lesorogol C, Mounce J, Nickerson NM. Am J Clin Nutr. 2013 Nov 13. [Epub ahead of print]