



Impact of Social and Behavior Change Communication in Nutrition Specific Interventions on Selected Indicators of Nutritional Status

Eileen Kennedy*, Jennifer Stickland, Meghan Kershaw and Sibhatu Biadgilign

Friedman School of Nutrition Science and Policy, Tufts University, USA

Abstract

The United Nations Decade of Action on Nutrition has focused on elimination of malnutrition in all its forms. To achieve this goal, countries are focusing on nutrition specific and sensitive programs. This paper reviews studies in three thematic areas - malnutrition, micronutrient supplementation, and infant and young child feeding practices (IYCF) to assess the effects of nutrition specific strategies combined with a social and behavioral change communication component on diet and nutritional status.

Introduction

The United Nations Decade of Action on Nutrition (2016-2025) emphasized both nutrition specific and nutrition sensitive interventions to alleviate malnutrition [1]. While there are a number of nutrition specific approaches that have been proven to be successful and efficacious [2], it is unlikely that agreed upon nutrition related objectives such as in the Sustainable Development Goals [3] and the World Health Assembly targets [4] will be achieved without a dual strategy of implementing nutrition specific and sensitive interventions simultaneously.

Nutrition specific approaches are those that address the immediate causes of malnutrition - inadequate dietary intake and illness. This could include, but not be limited to, the management of moderate and acute malnutrition, maternal and child micronutrient supplementation, and infant and young child feeding practices. Additionally, a key component of a strong, synergistic approach for improving the health and nutritional well-being of mothers and children is the inclusion of Social and Behavior Change Communication (SBCC) [5].

SBCC is a method of promoting positive change and employs a collection of tools and approaches that are informed by communication, behavior theory and marketing to improve adoption of and sustained changes in behavior. SBCC can serve as a stand-alone intervention but is increasingly used in combination with nutrition strategies to improve nutritional status. There is currently a

paucity of evidence on the impacts of SBCC implemented in combination with nutrition specific interventions.

This review focuses on interventions targeting childhood malnutrition, micronutrient deficiencies, and infant and young child feeding practices among women and children up to two years of age. Global initiatives such as the Scaling Up Nutrition Movement (SUN) have focused specific attention on the first 1,000 days of a child's life, including implementing nutrition specific interventions [6]. The review is limited to programs which have combined a nutrition specific approach with SBCC as an element in the program, including activities such as advocacy, mass communication, interpersonal communication, group-based approaches and community/social mobilization. The purpose of this review is to synthesize studies on direct nutrition interventions which have included an SBCC component and summarize the lessons learned. The current paper is a companion piece

***Corresponding author:** Eileen Kennedy, D.Sc. Friedman School of Nutrition Science and Policy, Tufts University, 150 Harrison Avenue, Boston, MA 02111, USA, Tel: 617-636-4046

Accepted: October 25, 2018: **Published online:** October 27, 2018

Citation: Kennedy E, Stickland J, Kershaw M, et al. (2018) Impact of Social and Behavior Change Communication in Nutrition Specific Interventions on Selected Indicators of Nutritional Status. J Hum Nutr 2(1):34-46

Table 1: Selected Nutrition specific interventions areas by specific practices.

Intervention area	Specific practices
Malnutrition	<ul style="list-style-type: none"> ■ Management of severe acute malnutrition ■ Management of moderate acute malnutrition ■ Preventative zinc supplementation
Maternal and child micronutrient supplementation	<ul style="list-style-type: none"> ■ Vitamin A supplementation ■ ANC folic acid supplementation ■ Fortification ■ Maternal multiple micronutrient supplementation ■ Micronutrient powder ■ Sprinkles ■ Dietary supplementation ■ Dietary diversification ■ Maternal balanced energy ■ Energy protein supplementation
Infant and young child feeding practices	<ul style="list-style-type: none"> ■ Exclusive breastfeeding ■ Complementary feeding ■ Complementary food ■ Optimum breastfeeding ■ Minimum dietary diversity ■ Minimum acceptable diet

to the synthesis of SBCC approaches in nutrition sensitive interventions (in press).

Methodology

Two approaches were used to identify the studies to be used in this review: analysis of the literature focusing on recent reviews of the impact of SBCC on nutrition specific programs, and searches on OVID and PubMed to identify additional studies using the key words shown in [Table 1](#) for childhood malnutrition, maternal and child micronutrient supplementation, and infant and young child feeding practices (IYCF) [Table 2](#) describes the classification of types of SBCC approaches and search terms employed. The literature review includes both published and “gray” literature. The gray literature represents final reports and other documents relevant to the purpose of the review. The studies reviewed here are not exhaustive, but rather, are descriptive of the different kinds of programs and interventions relevant to the sectors identified.

Results: Malnutrition, Micronutrient Supplementation, and IYCF

Some overarching themes will be summarized for malnutrition, maternal and child micronutrient supplementation, and IYCF, in Section IV. Before this, however, the relevant data from each thematic area will be analyzed.

Table 2: Social and behavior change programs approach and activities.

SBCC methods	Specific activities listed
Advocacy	<ul style="list-style-type: none"> ■ Religious leaders ■ Decision makers ■ Policy makers ■ Opinion leaders ■ Professional groups ■ Religious associations
Mass Communication	<ul style="list-style-type: none"> ■ Drama ■ Radio/TV spots ■ Community radio/video ■ Magazine ■ Posters ■ Brochure ■ Reminder stickers ■ Mass media ■ Social marketing ■ Social media ■ Strategic communication
Interpersonal Communication	<ul style="list-style-type: none"> ■ Individual counseling sessions ■ Client provider/physician ■ Home visits ■ Household outreach ■ Peer educators
Group-based approaches	<ul style="list-style-type: none"> ■ Social support ■ Social networks ■ Social norms ■ Normative change ■ Community conversation ■ Group education ■ Caregivers support group
Community/Social Mobilization	<ul style="list-style-type: none"> ■ Campaigns ■ Special events ■ Community engagement ■ Community interventions ■ Community outreach ■ Social mobilization ■ Social movements

Malnutrition

The malnutrition interventions listed in [Table 3](#) target pregnant women, caregivers, and/or preschool aged children and aim to improve diet quality and child nutritional status, which are assessed using anthropometry and knowledge transferred. The SBCC activities identified are centered primarily on nutrition education and counseling provided at health facilities, home visits, and community sessions, using interpersonal and group-based communication.

While the target audience and forms of SBCC are similar in the studies, there are several differences in re-

Table 3: Key Aspects of Malnutrition, Micronutrient Supplementation, and IYCF Studies with SBCC Component.

Study	Study Size	SBCC Approach Used/Methods	Evaluation Methods	Outcome Measured	Results/Findings
Malnutrition					
Wilner, et al. [10] Malawi	600 caregivers	Interpersonal communication and group-based approach Caregivers of children under 2 y were given oil and SBCC messages to promote proper preparation and feeding of CSB porridge	Cross-sectional study	Receipt of targeted SBCC messages; improved preparation and feeding of CSB porridge	More than 99% of caregivers reported learning about the correct preparation of CSB porridge while > 80% of caregivers, volunteers and healthcare workers reported discussion of SBCC messages.
Tomedi, et al. [9] Kenya	Intervention (129); non-intervention (147)	Group-based approach Education on complementary feeding and hygiene combined with food rations	Quasi-experimental design	Weight-for-length Z-score (WHZ), height-for-age Z-scores (HAZ), weight-for-age Z-scores (WAZ)	The intervention group had a lower prevalence of wasting (0% vs. 8.9%, P = 0.0002) and underweight (6.3% vs. 23.0%, P < 0.0001)
Ickes, et al. [8] Uganda	122 caregivers and children < 2 years of age	Interpersonal counseling Supplemental feeding provided along with caregiver education by trained health workers	Post-program comparison group study	Knowledge transferred and IYCF practices	Children from the post-program (PP) group had higher diet diversity scores and frequency of meals than children in the comparison group. The PP caregivers also exhibited greater knowledge of healthful child feeding practices.
Jensen, et al. [11] Guatemala	63 households with children < 2 years	Interpersonal and group counseling Monthly food rations provided with nutrition education	Qualitative research based on pre and post project semi-structured interviews	Self-reported food recall, food frequency questionnaire, and knowledge transferred	Study households reported higher consumption of recommended foods and changed household food choices based on foods that were rationed and education received.
Jilcott, et al. [7] Uganda	215 underweight children < 5 years of age	Interpersonal counseling Supplemental feeding provided along with caregiver education by trained health workers	Qualitative research based on pre and post project semi-structured interviews	Weight gain velocity, and qualitative data from key-informant interviews	The mean weight gain of children was 2.5 g/kg/day, which was not as high as other similar studies.
Medoua, et al. [25] Cameroon	833 children aged 6-59 months	Group-based approach Caregivers received nutrition counseling at enrollment and each follow-up visit	Comparative randomized controlled efficacy trial study	Recovery rate and duration of treatment	73% and 85% of children treated with CSB+ and RUSF respectively, recovered from moderate acute malnutrition, with no significant difference between groups. Despite lower rations, recovery rates were comparable to similar studies, most likely due to nutrition education.
Nikièma, et al. [12] Burkina Faso	1,349 children ages 6-24 months with MAM	Interpersonal communication Weekly context-appropriate child-centered counseling (CCC)	Cluster randomized controlled trial	MAM management	The recovery rate after the intervention was significantly lower with CCC (57.8%) than with CSB++ (74.5%) and RUSF (74.2%). Mothers' attendance at health facilities was also substantially lower in the CCC arm inferring that recovery from MAM would have been better if caregiver attendance at CCC sessions was ensured.

Micronutrient Supplementation					
Inayati, et al. [13] Indonesia	215 mildly wasted children	Social mobilization Intensive and non-intensive nutrition education (INE, NNE)	Village randomization	Weight-gain, length of stay, WHZ, height-for-age, hemoglobin level, and morbidity status	Children in the INE+MNP group showed the highest weight gain, significantly higher than the INE group. WHZ scores increased in all groups except NNE. Anemia and frequency of illness decreased in both INE+MNP and INE groups. Weekly INE intervention had a positive impact on nutrition knowledge and practices of caregivers.
Aboud, et al. [14] Bangladesh	302 children aged 8 to 20 months	Group based approach Control group nutrition education; intervention groups also received peer education in RFS or RFS + MNP	A cluster-randomized field trial	Development & nutritional outcomes that include weight, height, self-feeding and mouthfuls eaten	Developmental and nutritional outcomes were significantly higher in the intervention groups vs. the control. No major difference in the outcomes of the two intervention groups, however, the MNP group showed greater weight gain.
Guyon, et al. [18] Madagascar	1,200 at baseline and 1,760 at end	Interpersonal communication, community mobilization, and mass media	Cross-sectional household surveys	Increase uptake of micronutrient supplements and improved IYCF practices	The rate of iron-folic acid supplementation during pregnancy increased from 32% to 76% and the rate of postpartum vitamin A supplementation increased from 17% to 54% (p < 0.001 for all changes). Significant increases also seen in breastfeeding and frequency of child feeding practices.
Kumar, et al. [15] South India	645 children ages 5-15 years	Three groups in which either MMN-fortified salt or nutrition education was provided. The control group received no intervention.	Randomized control trial	Biochemical measurements for vitamin A and iron status	After 8 months, the micronutrient group showed significant increases in hemoglobin, retinol and ferritin levels and decreases in the prevalence of anemia (46.0% to 32.6%), iron deficiency (66.9% to 51.3%) and iron deficiency anemia (35.2% to 31.0%). The nutrition education group did not see any significant improvements.
Rao, et al. [16] India	317 non-pregnant of childbearing age (15-35 y)	Group based approach Two groups received group nutrition education sessions and demos on iron-rich recipes using kitchen gardens. Anemic women comprised the supplemental group receiving IFA tablets		Prevalence of anemia	There was a significant improvement in hemoglobin levels of both the supplemented and non-supplemented groups (71.6% and 38.2% respectively). Hb levels were higher among women with greater participation in group meetings, as well as use of recipes in home and consumption of green leafy vegetables. Impact of the education group reduced after the first year. Improvements in the non-supplemented group were due to dietary diversity alone.
Haldar, et al. [17] India	58 primary school children	Group based approach IFA supplementation given to both study and control groups; nutrition education was also given to the study group.	Quasi-experimental study	Prevalence of anemia	Overall prevalence of anemia decreased from 66% to 26.5%, with no gaps between the two groups. IFA supplementation may have masked the effect of nutrition education, however, education continued after IFA was stopped and positive effects were still observed. The gains achieved by IFA may have been maintained because of the continued education.
Nguyen, et al. [19] Bangladesh	2,600 recently delivered women	Interpersonal counseling (IPC) and community mobilization IPC provided along with nutrition-focused MNCH or standard MNCH program	Cluster-randomized program evaluation	Consumption of diversified foods and IFA and calcium supplements	Significant improvements in maternal dietary diversity observed in the nutrition-focused versus standard MNCH group. Consumption of IFA and calcium supplements also increased significantly in the nutrition-focused group.

Infant and Young Child Feeding Practices (IYCF)					
Satzinger, et al. [30] Malawi	240 participants: mothers, fathers and grandparents of children under two years of age	Focus group, observation and semi-structured interviews Intergenerational approach to address child nutrition issues through learning, practice and dialogue	Qualitative research based on pre and post project semi-structured interviews	Self-reported changes in IYCF practices	Participants reported changes in child feeding practices that included improved dietary diversity, exclusive breastfeeding and increased frequency of feeding. Respondents attributed the changes to their participation in the group discussions.
Negash, et al. [24] Ethiopia	200 mother-child pairs	Group based approach A complementary feeding education program using Alive & Thrive materials and demonstrations on meal preparation	A baseline survey-cross sectional	Knowledge and practice of mothers with young children	At 6 months, knowledge and practice regarding complementary feeding improved in the intervention group but not the control. The intervention group also showed improvements in meal preparation and dietary diversity. Changes in height and weight did not differ between the two groups.
Newman, et al. [26] Guatemala, Pakistan, Zambia and the Democratic Republic of Congo	1,236 caregivers divided into two groups: Meat and Cereal	Interpersonal communication Educational messages given to caregivers during home visits to enhance child complementary feeding practices	Cluster randomized controlled trial	Linear growth velocity	As message recall increased, linear growth velocity increased, regardless of the treatment group. The process evaluation revealed few differences between treatment groups overall. Findings suggest that interventions initiated during the period of complementary feeding have limited impact on stunting. Earlier, multi-faceted approaches are needed.
Muluaem, et al. [25] Ethiopia	160 mother-child pairs	Group based approach & interpersonal communication Nutrition education with discussions and recipe demonstrations for the intervention group	Quasi-experimental	Knowledge, attitude, and adoption of practices by mothers (KAP); anthropometric measures of children	After 3 and 6 months of nutrition education, mean KAP scores of mothers increased compared to the control site. Significant improvements in children's mean weight, weight for height, and weight for age occurred in the intervention group only.
Salud, et al. [20] Philippines	312 mothers of infants < 2 months of age	Interpersonal communication Peer counseling intervention for mothers not exclusively breastfeeding	Cross sectional nature before and after the intervention	Exclusive breastfeeding practices	The number of exclusively formula-fed infants decreased seven-fold and mixed-fed infants decreased by 37% (P < 0.001). Overall, 69.5% of the 148 nonexclusively breastfeeding infants changed feeding methods after 3 home visits, 76% of whom changed to EBF. Community-based peer counseling was associated with a drastic improvement of EBF.
Thakur, et al. [23] Bangladesh	184 LBW babies and their mothers	Interpersonal communication Nutrition education	Randomized control	Growth of LBW babies, early initiation and exclusive breastfeeding	After 2 months, the length of the LBW babies increased significantly in the intervention group vs. the control (50.2 ± 1.3 cm vs. 48.7 ± 1.6 cm, P < 0.001). Early initiation of breastfeeding rates was significantly higher in the intervention group (59.8% vs. 37.2%, P < 0.001), as was the rate of EBF (59.8% vs. 37%, P = 0.003). Children in the intervention group also suffered less from respiratory illness (39% vs. 66%, P < 0.001).

Tylleskär, et al. [21]	2,579 mother-infant pairs	Interpersonal communication	Cluster randomized control trial	Prevalence of EBF and diarrhea	The prevalence of EBF was about twice that of the control group based on 24-hr or 7-day recall. At ages 12 weeks and 24 weeks the ratio for diarrhea prevalence versus the control in all three countries was 0.95 (0.78-1.17).
Burkina Faso, Uganda, and South Africa		Breastfeeding counseling during home visits by trained peer counselors			
Jenkins, et al. [32]	462 adults (> 15 years)	Advocacy	Cross sectional	Knowledge of benefits of exclusive breastfeeding	Road show exposure was associated with correct EBF knowledge, more positive EBF social norms, and EBF beliefs and attitudes. Road show exposure was more strongly associated with EBF knowledge among men (P-value for gender exposure group interaction = 0.03).
Zimbabwe		Mass campaign combining traditional education, counseling and outreach with a road show 'edutainment' intervention			
Kimani-Murage, et al. [33]	8,523 mother-child pairs from three different studies	Interpersonal counseling	Quasi-experimental, longitudinal and cluster randomized trial	Exclusive breastfeeding	Results for EBF from birth to 6 months were 66.9 (95% CI 45.4-96.4), 84.3 (95% CI 40.7-174.6) and 3.9 (95% CI 1.8-8.4) for the MIYCN-Intervention, MIYCN-Control, and Comparison group, respectively, compared with the Pre-intervention group. There is potential effectiveness in promoting EBF in urban poor settings where health care access is limited.
Kenya		MIYCN-control vs. intensive program with counseling by trained CHWs			
Sinha, et al. [34]	N/A	Social mobilization	Systematic review and meta-analysis	Early initiation, exclusive, and continued breastfeeding rates	Intervention delivery in multiple settings produced higher improvements in breastfeeding rates. Greatest improvements were seen when counseling or education were provided concurrently in home and community, health systems and community, respectively. Support in hospital was the most effective intervention to improve rates of breastfeeding.
Global		Nutrition counseling or education			
Khan, et al. [35]	3,188 pregnant women	Interpersonal communication	Randomized controlled trial	Duration of exclusive breastfeeding	The average duration of exclusive breastfeeding was 135 days in the EBF counseled group and 75 days in the usual health message group (p < 0.001). Corresponding figures at six months were 15.3% and 6.4% respectively. Prenatal and micronutrient supplements did not modify the effects of counseling.
Bangladesh		Counseling sessions on breastfeeding or the usual health messages with or without food and micronutrient supplementation			
Singh, et al. [36]	980 mother-child pairs	Interpersonal communication	Quasi-experimental design	Breastfeeding and complementary feeding practices	Earlier and exclusive breastfeeding improved with increasing number or quality of visits by either level of health care provider. Age-appropriate consumption of complementary foods was positively associated with parental education and contact with health workers.
India		Standard nutrition and health package alone			

Horii, et al. [29] Niger	2,091 women aged 15-49 years with at least one child 0-23 months old	Interpersonal communication, advocacy, social mobilization, and community led social change Community-based, BCC program with a mass media campaign, home visits by community volunteers, individual counseling during antenatal visits by health workers, and peer education by mothers	Cross-sectional study	Initiation of breastfeeding within the first hour of birth	Mothers in the intervention group were 2.2 times more likely to initiate early breastfeeding compared to those who were not. Home visits by community volunteers did not have a significant effect. Mothers who were actively involved in EBF promotion as peers were more likely to initiate breastfeeding within the first hour of birth. Overall, participants who were involved in more than 4 SBCC activities initiated breastfeeding 2.7 times more than those who did not.
Rawat, et al. [27] Vietnam	500 children ages 6-23.9 months and 1,000 children ages 24-59.9 months	Interpersonal counseling (IPC) with a national mass media (MM) campaign and community mobilization (CM) Social franchising within the government health system	A cluster-randomized, non-blinded evaluation	Anthropometric indicators and complementary feeding practices	The intervention group with intensive community mobilization showed greater improvements in complementary feeding practices than the group with non-intensive CM. In the MPAs, greater improvements in the intensive than in the non-intensive group were seen for minimum dietary diversity and minimum acceptable diet. Significant impacts on child growth were not observed.
Qureshi, et al. [22] Nigeria	179 mother-child pairs	Advocacy and interpersonal communication Female volunteers educating mothers about breastfeeding during home visits	Randomized community trial	Knowledge and practice of exclusive breastfeeding	Results showed that counseling via home visits increased the duration of EBF for six months.
Aaron, et al. [28] Ghana	919 caregiver-child pairs	Social marketing and mass communication Assessed effectiveness of behavior change communication and demand creation activities to promote a complementary food supplement product for infants and young children	Cross-sectional coverage surveys	Coverage of complementary food supplement	Delivery Model 1 with BCC was successful in achieving and sustaining high (86%) coverage during project implementation; coverage fell to 62% within 3 months of the BCC and demand creation activities ending. Delivery Model 2 using a market-based approach was successful in raising awareness of the product (90%), but effective coverage was low (9.4%).
Menon, et al. [37] Bangladesh	1,000 children 0-5.9 months old	Mass communication Intensive interpersonal counseling (IPC), mass media (MM), and community mobilization (CM)	Cluster-randomized, non-blinded evaluation	Complementary feeding practices and anthropometric measurements	Results showed greater improvement in CF in the intensive than the non-intensive group. In the intensive group, CF practices were high: 50.4% for minimum acceptable diet, 63.8% for minimum diet diversity, 75.1% for minimum meal frequency, and 78.5% for consumption of iron-rich foods. Timely introduction of foods also improved. Significant, non-differential stunting declines occurred in both the intensive (6.2 pp) and non-intensive (5.2 pp) groups.

Younes, et al. [38]	162 women's groups	Group based Community mobilization through participatory women's groups	Randomized controlled trial, before-and-after study design	Changes in knowledge and practices related to IYCF practices	Results showed significant improvements in mothers' knowledge of hygiene and disease management. Significant increases were also observed in exclusive breastfeeding for at least 6 months and mean duration of breastfeeding. There were no differences in dietary diversity scores.
Nguyen, et al. [19]	11,722 mothers of infants < 6 months	Social mobilization Mass media campaign using television spots	Repeated cross-sectional surveys	Exclusive breastfeeding (EBF)	Results demonstrated that exposure to television spots was associated with higher EBF in Alive & Thrive-intensive areas. Mothers who could recall at least 1 message were more likely to report EBF. In A&T-non-intensive areas, only recall of at least 3 messages was associated with higher EBF.

search design. First, the methodologies of the interventions vary; for example, nutrition messages delivered to groups at the point of food distribution versus personal conversations during home visits. Second, the level of participant engagement differs; some approaches are interactive and participatory in nature, while others utilize more traditional presentation styles. Third, some interventions are child-centered, and others focus primarily on the caregiver. Finally, in addition to using healthcare workers, some studies also employ local peer educators to reinforce key nutrition messages by modeling practices and coaching mothers one-on-one.

In the studies evaluating the effect of supplementary feeding and nutrition education on children's weight gain and growth, results were somewhat inconsistent. Jilcott, et al. [7] observed significant weight gain among the children targeted, while Ickes, et al. [8] saw a high proportion of children who remained underweight post-intervention. Tomedi, et al. [9] reported a significant decrease in the prevalence of child wasting and underweight, but no positive effect was seen on stunting. In fact, linear growth significantly declined.

Differences in study length and sample size could account for the disparity in outcomes. The larger and longer-term interventions saw greater increases in height, indicating that broader scale approaches are needed to produce a significant impact. Child age and/or the degree of malnutrition at the time of intervention was also possibly a factor. In Tomedi [9], more than a quarter of the children were already stunted at the time the study began. Similarly in Ickes [8] the children recruited were significantly underweight, most likely accounting for the continued prevalence of low weight in the study group post-program.

Where knowledge transfer was the indicator, study outcomes were more consistent. Participants in Wilner, et al. [10] reported learning how to correctly prepare fortified porridge for their children based on training they

received. In Jensen, et al. [11], household consumption of vegetables and tubers increased, along with knowledge about proper food preparation and the nutritional benefits of certain foods. Ickes, [8] also reported increased adoption of improved feeding practices. In each study, the knowledge demonstrated was related to specific educational messages delivered through the interventions.

A primary aim of this review was to evaluate the impact of SBCC activities added to childhood malnutrition interventions. While results of several of the studies showed positive results, it is difficult to deduce the added benefit of including SBCC since it was usually provided in conjunction with other activities, such as supplementary feeding, and not measured independently. The exception was in Nikiema, et al. [12] who compared the impact of child-centered counseling (CCC) versus the provision of fortified food in the treatment of MAM. Results showed that the supplementary food rations were more effective, although the authors acknowledge that the CCC group had a significantly lower attendance rate, which very likely accounted for the poor outcome. The SBCC activities also varied in length and intensity, making it difficult to determine whether the provision of SBCC in itself or the amount given accounted for effectiveness. An item of note, however, is that the positive effects observed from using multiple, concurrent SBCC approaches suggest that there is an additive benefit to employing various and complementary modes of communication in nutrition interventions.

Maternal and child micronutrient supplementation

Table 3 summarizes studies reviewed on maternal and child micronutrient supplementation approaches. Most interventions involved the delivery of some form of supplementation, with or without nutrition education. Various SBCC methods were used to provide nutrition education on a range of levels.

Inayati, et al. [13] assessed the impact of intensive and

non-intensive nutrition education given to Indonesian children with or without micronutrient powder (MNP). The SBCC component included either weekly sessions with practical cooking exercises in a culturally-appropriate intensive education group (INE) or monthly programs in a group with non-intensive education (NE). Results showed that participation in the intensive group with supplementation was associated with higher weight gain and improved nutrition knowledge of caregivers. Both INE groups also showed a higher reduction in the frequency of anemia and illness among children, with or without supplementation. Weight-for height Z scores increased in all groups except where there was only nutrition education, although the improvements made in the NE+MNP group were not very significant.

A similar project implemented by Aboud, et al. [14] delivered a brief behavior change program consisting of three arms: a control group that received 12 informational sessions on health and nutrition and two intervention groups that received the same series of sessions with an additional interactive component - with or without MNP. In the interactive component, peer educators were employed to demonstrate child feeding practices and coach mothers while they practiced themselves. Social support was also provided in small group settings where mothers shared experiences and problem solved together.

The results showed that developmental and nutritional outcomes were significantly higher in the intervention groups that received the added-on SBCC component; the intervention + MNP group showed higher weight gain, suggesting that supplementation had the strongest impact. But even though the MNP group gained more weight, the authors caution that supplementation may not be as effective in circumstances where overall diet diversity and intake is low. The authors also note that due to low education levels, mothers may not benefit from knowledge transfer without getting the opportunity to practice the skills. This could account for why the basic flip-board method used in Aboud [14] did not effect any significant change.

Several studies measured the uptake of micronutrient supplements and the effect on anemia and/or vitamin A status. In Kumar, et al. [15], two treatment groups - multiple micronutrient supplementation (MMN) or nutrition education - were compared to a control. After eight months, the MMN group showed significant decreases in anemia and iron deficiencies; the nutrition education group showed no significant improvements. In contrast, Rao [16] found that both supplemented and nutrition education groups showed significant improvements in hemoglobin levels, with a greater increase among women who were given iron and folic acid (IFA) tablets. Furthermore, in both groups, iron levels were higher

for women who participated the most in meetings and who reported applying what they learned from cooking demonstrations in their homes.

In Haldar, et al. [17], IFA therapy was provided to study and control groups, with nutrition education also provided to the study arm. The overall prevalence of anemia significantly decreased in both groups, but it was difficult to deduce the impact of the education component since IFA supplementation may have masked the effects. It is promising to note, however, that the positive impact on anemia was still observed when IFA was stopped and SBCC continued, suggesting that progress gained by supplementation may have been sustained by continued education.

An integrated program promoting micronutrient supplementation within the Essential Nutrition Actions (ENA) framework applied SBCC activities across multiple points. In Guyon, et al. [18], trained volunteers provided nutrition education during home visits and in group sessions. Health providers and community health workers used printed pamphlets and children's booklets to communicate SBCC messages. Community mobilization through local events and concerts incorporated ENA themes through folk songs and activities. And a quarterly mass radio campaign reinforced key recommendations, which were harmonized across all sectors. This strategy of using multiple SBCC approaches to coordinate the consistent delivery of activities and messages maximized the impact of the outreach through the delivery of consistent themes, which resulted in large scale improvements in uptake of micronutrient supplements and IYCF practices.

Nguyen, et al. [19] used a similar integrated approach in their study using a nutrition-focused maternal, neonatal and child health (MNCH) program compared to a standard MNCH intervention. The nutrition-focused model utilized community health workers to deliver intensive, case specific interpersonal counseling to pregnant women and their family members. Health volunteers accompanied the workers to help with cooking demonstrations and to follow up with participants. IFA and calcium tablets were provided for free and women were counseled on the benefits of supplementation. "Husbands' forums" and community events were held periodically to promote the importance of nutrition for pregnant women and the benefits of IFA and calcium. Results showed a significantly greater uptake of IFA and calcium in the nutrition-focused MNCH group, and increased dietary diversity was also observed.

Although several of the studies referenced saw an improvement in micronutrient status, it is difficult to measure the independent effects of the SBCC components since they were not directly assessed or because of the combined effect with the supplements taken. Over-

all, better outcomes were observed in interventions that provided micronutrient supplementation, suggesting that nutrition education alone may not be as effective in combating micronutrient deficiencies. But the short duration of the studies may have been a limiting factor, preventing any opportunity to observe the potential long-term impacts that education might have on improving micronutrient status.

Infant and young child feeding practices

Table 3 summarizes studies reviewed on Infant and Young Child Feeding approaches. Optimal IYCF practices are defined as early initiation of and exclusive breastfeeding (EBF), dietary diversity, and appropriate complementary feeding. The studies reviewed here examine the effects of nutrition-focused SBCC activities on these practices as indicated by improved knowledge of mothers and caregivers, intention to breastfeed, duration of exclusive breastfeeding, and child growth assessed using anthropometry measures.

In Salud, et al. [20] and Tylleskär, et al. [21], peer counseling was used to promote exclusive breastfeeding among mothers of infants, many of whom were already using formula to feed. In both studies, the rate of EBF drastically increased compared to the control groups, and in some cases, positive changes in feeding practices were observed after only three home visits. A similar study by Qureshi, et al. [22] enlisted female volunteers to educate mothers about breastfeeding during home visits. After six months of counseling, all infants up to six months old were exclusively breastfed, compared to only 30% prior to the intervention. The authors conclude that counseling is an effective strategy to promote EBF for nursing mothers, but they also point out that particular attention needs to be given to working mothers, young women, and poorly educated mothers since these groups demonstrated lower rates of exclusive breastfeeding over time.

Thakur, et al. [23] examined the effect of nutrition education on the growth of low birth weight (LBW) babies in a study in Bangladesh. Mothers of LBW babies were identified in hospital and assigned to either an intervention or control group, with participants in the intervention group receiving nutrition education and EBF counseling over a period of six months. Ultimately, the weight and length of the babies in the intervention group significantly increased compared to the control, demonstrating that nutrition education on breastfeeding can play a positive role in reducing malnutrition in LBW children.

Negash, et al. [24] assessed whether an interactive, complementary feeding education intervention would improve the knowledge and practice of mothers of young children in Ethiopia. Twice monthly for six

months, women in the intervention group received educational sessions to promote IYCF messages using Alive and Thrive materials, along with recipe demonstrations and tastings of barley and maize porridge with broad beans. Findings revealed that at six months, knowledge and practice (KAP) scores regarding complementary feeding significantly improved in the intervention group compared to the control, as well as dietary diversity and mean intake of energy. There were no changes in height and weight between the two groups.

Mululem, et al. [25] also used an interactive, nutrition education program with recipe testing to promote pulse-based complementary feeding of children for six months. Like Negash [24], the KAP scores of mothers in the intervention group increased after three and six months. But significant improvements in children's mean weight, weight for height, and weight for age were also observed, demonstrating improvement in nutritional status indicators of children whose mothers received nutrition education. The rate of stunting, however, was not impacted. The authors attribute this to the short length of the study. Newman, et al. [26] go further to point out the limited potential of interventions initiated during the period of complementary feeding to impact stunting, calling for the delivery of earlier and more comprehensive programs to produce significant and sustained change.

Using an enhanced complementary feeding program, Rawat, et al. [27] studied the impact of health system-based counseling on IYCF practices. The intervention combined interpersonal communication (IPC) and a national mass media (MM) campaign with either intensive or non-intensive community mobilization (CM) to promote CF. Results showed greater improvements in complementary feeding practices in the group with intensive CM, with notably higher increases in dietary diversity. Changes in child growth, however, were not observed. The authors concluded that in order to impact child stunting, strategies are needed to increase utilization of services provided by health care systems.

Aaron, et al. [28] examined the impact of social marketing and SBCC on the uptake of a complementary food supplement using a sales-based approach in Ghana. One model used health extension workers to deliver BCC messages and local traders from a microfinance initiative to sell food supplements. A second model used a local social marketing company to create demand in areas supported by BCC, but not delivered through health workers. Results found that the first model was successful in achieving high coverage of the food supplement, whereas the second model was successful only in raising awareness, not in promoting usage. The authors suggest that even though social marketing has marked potential

to spread educational messages, it is not a substitution for health workers who may be associated more with feelings of care and confidence and thus more effectively able to promote adoption of new practices, such as incorporating complementary food supplements into their household diets.

Discussion

The continued importance of nutrition specific approaches for improvement in diet and nutrition has prompted numerous studies focusing on a wide range of topics, including among many, the management of maternal and child malnutrition, micronutrient supplementation, and IYCF practices.

Findings from the studies reviewed indicate that nutrition specific interventions have had a positive impact on nutrition. For the most part, they have incorporated some level of social behavior change communication within broader programs and in conjunction with other nutrition activities. The aim of this review was to evaluate the impact of nutrition specific interventions that have included an SBCC component.

Several predominant themes have emerged from this review. First, there is some question as to which indicators are most appropriate to determine overall effectiveness. In the studies reviewed, different indicators produced varying levels of success, as in cases where child growth or knowledge transfer were measured to assess the impact of the interventions. Of primary concern is the length of the intervention and the time at which it is implemented. The lack of linear growth observed in the studies reviewed may be due to the short intervention period, as well as the advanced age of the children. Greater improvements are found when younger children are targeted, before stunting is already prevalent [9].

A second issue identified in the review is the inability to clearly determine the impact of SBCC. Lacking in the studies was a method to evaluate the specific effects of SBCC activities since they were but one component of the intervention. Wilner, [10] found that SBCC messages were successfully communicated via multiple contacts, but since they were provided in conjunction with supplementary food rations, it was difficult to distinguish the individual effects of each. A more focused assessment could help elucidate whether the presence of SBCC alone or the way in which it is delivered produces the desired result. Future research should examine both the separate and combined impact of SBCC on nutrition practices and child growth outcomes, as well as different intensities of the approaches in order to effectively inform nutrition specific programs [8].

Other challenges observed in this review were the

varying levels of participant adherence and engagement in the interventions. In one of the few studies that attempted to evaluate the effect of SBCC alone on child nutritional status [12], the particularly low adherence rate in the counseling arm prompted the authors to postulate that if attendance had been better, the malnutrition recovery rate of the children would have been higher. Participant engagement also appeared to be a contributing factor to the success of SBCC activities. Programs that allowed mothers and caregivers opportunities for interaction through problem solving, small group discussion, and hands-on experience, helped translate learning into practice. Through active involvement, knowledge improved, as did the women's ownership of their own change and behavior [29]. These activities also proved to be more helpful for less educated mothers for whom traditional instruction is not as effective [14].

A key focus observed in this review was the inclusion of culturally-appropriate SBCC. Sensitivity to local norms helps address the tension that can arise between traditional knowledge and science, which is commonly experienced in health interventions [30]. Formative research that draws from local knowledge can strengthen interventions by acknowledging existing perceptions related to nutrition and utilizing familiar approaches to deliver appropriate SBCC messages [31]. In Inayati [13], key themes were communicated using locally-recognizable pictures and metaphors that helped participants understand messages in their own context.

Finally, despite the broad array of methods for implementing SBCC (Table 2), the majority of the studies reviewed relied on interpersonal, household, and/or group approaches. Those that did utilize additional methods such as social networking, radio campaigns, community events, and existing health systems, underscored the need and potential of using a combination of methods to consistently and effectively promote SBCC messaging across social, economic and cultural levels [18,32].

Lessons Learned and Way Forward

The synthesis of SBCC in nutrition specific interventions indicates some clear lessons learned. First, the studies in this review have used a variety of indicators. Rather than a plethora of metrics, some agreement on the indicator most appropriate for the intervention launched would allow an easier comparison across studies. For example, if the targeted behavior is initiation and length of exclusive breastfeeding, the most appropriate indicator of effectiveness would be breastfeeding behaviors. An additional issue with breastfeeding is ascertaining exclusive breastfeeding. Often mothers do not realize that provision of water or beverages like weak tea, is not exclusive breastfeeding. There has been a tendency in many studies to use stunting as a key indicator; unless the intervention is targeted to

children under two years of age and of a long duration, this is unlikely to be the appropriate indicator.

The SBCC in this review has typically involved a multi-component intervention. Disaggregating the specific contribution of SBCC to improve diet and/or nutrition is difficult. Even more challenging is evaluating effects of SBCC that involve a variety of techniques. As shown in Table 3, many nutrition specific interventions are not only multi-faceted but multi-dimensional in use of SBCC techniques.

Implementation research has not typically been a key component of nutrition specific interventions. This lack of detail on the exact mode of SBCC delivery complicates arriving at concrete conclusions about the preferred structure of an SBCC program.

A critical issue in deriving solid conclusions about SBCC is a better understanding of what has been termed dose/response. Many of the studies in this review mix individuals who had one level of exposure compared to those who had multiple applications of the interventions. This hinders the ability to define the minimum numbers of contacts that are needed in order to attain a significant effect on the targeted behavior.

Despite these challenges, this review provides a framework for the way forward. SBCC approaches which have achieved their goals are likely to be those with a clear behavior change that has been targeted. For a number of studies in this review, a lack of clarity in expected outcomes precludes a definitive conclusion about the ultimate effects. In addition, evidence suggests that there may be a dose/response to the intervention, indicating that there is a minimum level of exposure to the SBCC that is needed. Here again, lack of detail on the interventions, as implemented, makes definitive conclusions about effective interventions problematic. This review provides a framework for SBCC interventions that can provide guidance in launching future approaches.

Acknowledgement

This article was made possible through support provided by Feed the Future, the U.S. Government's Global Hunger and Food Security Initiative, through the U.S. Agency for International Development, under the terms of agreement No. AID-663-A-11-00017. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the U.S. Agency for International Development.

References

1. United Nations (2016) Decade of Action on Nutrition. FAO, Rome, Italy.
2. Bhutta ZA, Das JK, Rizvi A, et al. (2013) Evidence-based in-

terventions for improvement of maternal and child nutrition: what can be done and at what cost? *Lancet* 382: 452-477.

3. United Nations (2015) Sustainable Development Goals. New York, USA.
4. World Health Organization (2015) World Health Assembly Targets. Geneva.
5. USAID (2014) Multi-Sectoral Nutrition Strategy 2014-2025. Washington D.C., USA
6. Scaling Up Nutrition (2012) Framework of Action. Geneva.
7. Jilcott SB, Ickes SB, Ammerman AS, et al. (2010) Iterative design, implementation and evaluation of a supplemental feeding program for underweight children ages 6-59 months in Western Uganda. *Matern Child Health J* 14: 299-306.
8. Ickes SB, Baguma C, Brahe CA, et al. (2017) Maternal participation in a nutrition education program in Uganda is associated with improved infant and young child feeding practices and feeding knowledge: a post-program comparison study. *BMC Nutrition* 3: 32.
9. Tomedi A, Rohan-Minjares F, McCalmont K, et al. (2012) Feasibility and effectiveness of supplementation with locally available foods in prevention of child malnutrition in Kenya. *Public Health Nutr* 15: 749-756.
10. Wilner L, Suri D, Langlois B, et al. (2017) Effective delivery of social and behavior change communication through a Care Group model in a supplementary feeding program. *JHPN* 36: 34.
11. Jensen ML, Frongillo EA, Leroy JL, et al. (2016) Participating in a food-assisted maternal and child nutrition and health program in rural Guatemala alters household dietary choices. *J Nutr* 146: 1593-600.
12. Nikiéma L, Huybregts L, Kolsteren P, et al. (2014) Treating moderate acute malnutrition in first-line health services: an effectiveness cluster-randomized trial in Burkina Faso. *Am J Clin Nutr* 100: 241-249.
13. Inayati DA, Scherbaum V, Purwestri RC, et al. (2012) Combined intensive nutrition education and micronutrient powder supplementation improved nutritional status of mildly wasted children on Nias Island, Indonesia. *Asia Pac J Clin Nutr* 21: 361-373.
14. Aboud FE, Akhter S (2011) A cluster-randomized evaluation of a responsive stimulation and feeding intervention in Bangladesh. *Pediatrics* 127: 1191-1197.
15. Kumar MV, Nirmalan PK, Erhardt JG, et al. (2014) An efficacy study on alleviating micronutrient deficiencies through a multiple micronutrient fortified salt in children in South India. *Asia Pac J Clin Nutr* 23: 413-422.
16. Rao S (2014) Potential of Community Based Approach for Prevention of Anaemia among Women of Childbearing Age from Rural India. *Journal of Food and Nutrition Sciences* 2: 270-276.
17. Halder D, Chatterjee T, Sarkar AP, et al. (2012) A study on impact of school-based health and nutrition education in control of nutritional anemia among primary school children in rural West Bengal. *Indian J Community Med* 37: 259-262.
18. Guyon AB, Quinn VJ, Hainsworth M, et al. (2009) Implementing an integrated nutrition package at large scale in Madagascar: the Essential Nutrition Actions framework. *Food Nutr Bull* 30: 233-244.

19. Nguyen TT, Alayón S, Jimerson A, et al. (2017) The Association of a Large-Scale Television Campaign With Exclusive Breastfeeding Prevalence in Vietnam. *Am J Public Health* 107: 312-318.
20. Salud MA, Gallardo JI, Dineros JA, et al. (2009) People's initiative to counteract misinformation and marketing practices: the Pembo, Philippines, breastfeeding experience, 2006. *J Hum Lact* 25: 341-349.
21. Tylleskär T, Jackson D, Meda N, et al. (2011) Exclusive breastfeeding promotion by peer counselors in sub-Saharan Africa (PROMISE-EBF): a cluster-randomised trial. *Lancet* 378: 420-427.
22. Qureshi AM, Oche OM, Sadiq UA, et al. (2011) Using community volunteers to promote exclusive breastfeeding in Sokoto State, Nigeria. *Pan Afr Med J* 10: 8.
23. Thakur SK, Roy SK, Paul K, et al. (2012) Effect of nutrition education in exclusive breastfeeding for nutritional outcome of low birth weight babies. *Eur J Clin Nutr* 66: 376-381.
24. Negash C, Belachew T, Henry CJ, et al. (2014) Nutrition education and introduction of broad bean-based complementary food improves knowledge and dietary practices of caregivers and nutritional status of their young children in Hula, Ethiopia. *Food Nutr Bull* 35: 480-486.
25. Mulualem D, Henry CJ, Berhanu G, et al. (2016) The effectiveness of nutrition education: Applying the Health Belief Model in child-feeding practices to use pulses for complementary feeding in Southern Ethiopia. *Ecol Food Nutr* 55: 308-323.
26. Newman JE, Garces A, Mazariegos M, et al. (2014) Theory-driven process evaluation of a complementary feeding trial in four countries. *Health Educ Res* 29: 297-305.
27. Rawat R, Nguyen PH, Tran LM, et al. (2017) Social Franchising and a Nationwide Mass Media Campaign Increased the Prevalence of Adequate Complementary Feeding in Vietnam: A Cluster-Randomized Program Evaluation. *J Nutr* 147: 670-679.
28. Aaron GJ, Strutt N, Boateng NA, et al. (2016) Assessing Program Coverage of Two Approaches to Distributing a Complementary Feeding Supplement to Infants and Young Children in Ghana. *PLoS One* 11: e0162462.
29. Horii N, Habi O, Dangana A, et al. (2016) Community-based behavior change promoting child health care: a response to socio-economic disparity. *J Health Popul Nutr* 35: 12.
30. Satzinger F, Bezner Kerr R, Shumba L (2009) Intergenerational participatory discussion groups foster knowledge exchange to improve child nutrition and food security in Northern Malawi. *Ecology of Food and Nutrition Ecol Food Nutr* 48: 369-382.
31. Kodish K, Aburto N, Hambayi MN, et al. (2015) Identifying the sociocultural barriers and facilitating factors to nutrition-related behavior change: formative research for a stunting prevention program in Ntchisi, Malawi. *Food Nutr Bull* 36: 138-153.
32. Jenkins AL, Tavengwa NV, Chasekwa B, et al. (2012) Addressing social barriers and closing the gender knowledge gap: exposure to road shows is associated with more knowledge and more positive beliefs, attitudes and social norms regarding exclusive breastfeeding in rural Zimbabwe. *Matern Child Nutr* 8: 459-470.
33. Kimani-Murage EW, Norris SA, Mutua MK, et al. (2016) Potential effectiveness of Community Health Strategy to promote exclusive breastfeeding in urban poor settings in Nairobi, Kenya: a quasi-experimental study. *J Dev Orig Health Dis* 7: 172-184.
34. Sinha B, Chowdhury R, Sankar MJ, et al. (2015) Interventions to improve breastfeeding outcomes: a systematic review and meta-analysis. *Acta Paediatr* 104: 114-134.
35. Khan AI, Kabir I, Eneroth H, et al. (2017) Effect of a randomised exclusive breastfeeding counselling intervention nested into the MINIMat prenatal nutrition trial in Bangladesh. *Acta Paediatr* 106: 49-54.
36. Singh V, Ahmed S, Dreyfuss ML, et al. (2017) Non-governmental organization facilitation of a community-based nutrition and health program: Effect on program exposure and associated infant feeding practices in rural India. *PLoS One* 12: e0183316.
37. Menon P, Nguyen PH, Saha KK, et al. (2016) Combining Intensive Counseling by Frontline Workers with a Nationwide Mass Media Campaign Has Large Differential Impacts on Complementary Feeding Practices but Not on Child Growth: Results of a Cluster-Randomized Program Evaluation in Bangladesh. *J Nutr* 146: 2075-2084.
38. Younes L, Houweling TA, Azad K, et al. (2015) The effect of participatory women's groups on infant feeding and child health knowledge, behaviour and outcomes in rural Bangladesh: a controlled before-and-after study. *J Epidemiol Community Health* 69: 374-381.