

# Behavior change interventions and child nutritional status

EVIDENCE FROM THE PROMOTION OF IMPROVED COMPLEMENTARY FEEDING PRACTICES

JUNE 2011



Photos: The Manoff Group (left); Ram Shrestha, IYCN (center); PATH/Evelyn Hockstein (others)

# Behavior change interventions and child nutritional status

EVIDENCE FROM THE PROMOTION OF IMPROVED  
COMPLEMENTARY FEEDING PRACTICES

JUNE 2011

LITERATURE REVIEW

This document was produced through support provided by the United States Agency for International Development, under the terms of Cooperative Agreement No. GPO-A-00-06-00008-00. The opinions herein are those of the author(s) and do not necessarily reflect the views of the United States Agency for International Development.

IYCN is implemented by PATH in collaboration with CARE;  
The Manoff Group; and University Research Co., LLC.

455 Massachusetts Avenue NW, Suite 1000  
Washington, DC 20001 USA  
Tel: (202) 822-0033  
Fax: (202) 457-1466  
Email: [info@iycn.org](mailto:info@iycn.org)  
Web: [www.iycn.org](http://www.iycn.org)

## Table of contents

---

Acronyms .....	iv
Executive summary.....	v
Introduction.....	1
Search methods .....	3
Behavior change interventions for improved complementary feeding practices and growth .....	7
Behavior change communication in nutrition programs.....	11
Planning and implementing behavior change communication .....	13
Situation analysis/formative research .....	13
Behavior change strategy .....	15
Communications strategy.....	16
Messages and audience .....	16
Communications materials and channels.....	18
Program implementation.....	19
Training.....	19
Complementary feeding behavior change communication.....	20
Monitoring and evaluation.....	22
Sustainability.....	24
Recommendations.....	25
References.....	27

## Acronyms

---

BCC	behavior change communication
CBC	communication for behavior change
CFBC	complementary feeding behavior change communication
CHW	community health worker
FGD	focus group discussion
GMP	growth monitoring and promotion
HAZ	height-for-age
HIV	human immunodeficiency virus
IDI	in-depth interview
IMCI	integrated management of childhood illness
IYCN	Infant & Young Child Nutrition Project (USAID's flagship project)
NERP	nutrition education and rehabilitation
PDI	positive deviance inquiry
TIPs	trials of improved practices
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WAZ	weight-for-age

## Executive summary

---

The period of complementary feeding (6–23 months) is a time when young children are most vulnerable to undernutrition and consequent growth faltering. Feeding of children during this time, commonly referred to as complementary feeding, involves providing food in addition to breastmilk to meet the nutritional demands for childhood growth. It is well recognized that an underlying cause of child undernutrition is inappropriate feeding practices. Changes in behaviors related to feeding practices are possible through well-designed and implemented behavior change communication programs. This review analyzes complementary feeding behavior change interventions aiming to improve complementary feeding practices and child nutritional status. Recommendations are made for their effective design and implementation. Critical to the success and sustainability of interventions is involving the needs and interests of the community. Key components include the following:

- **Situation analysis/formative research:** There are many approaches to conducting formative research that can effectively identify positive and negative feeding practices, the locally available resources for addressing problems, barriers to and facilitators of improved behavior adoption, and the communications channels for reaching people. Methods employed include reviews of existing data, in-depth interviews, focus group discussions, observations, dietary recalls, recipe trials, market surveys, trials of improved practices, and positive deviance inquiry. The key is that the approaches are participatory and involve negotiating with numerous households to identify the best context-specific practices.
- **Behavior change strategy:** While approaches can vary, behavior change strategies are often developed from existing information and formative research findings. The beneficiaries' needs and interests should shape the strategy. Commonly, strategies include the behaviors to be promoted, components of the communications strategy, training, behavior change activities, and any other activities (changes in services or policies) that will reduce barriers to adoption of improved behaviors.
- **Communications strategy (messages and audience, communications materials and channels):** Messages being promoted should be specific, with clear and practical instructions; be based on a few recommendations rather than too much information; promote behaviors that are culturally acceptable and feasible; promote locally available and affordable foods; be motivating and show the benefits of adopting behaviors; and suggest ways of overcoming constraints. Messages and communications materials and channels should be developed in collaboration with beneficiaries during formative research. Influential community members and family decision-makers should be considered when developing messages, as caregivers will be more likely to accept and use practices if they are supported at the community and household levels. Both interpersonal and mass media channels will vary depending on the environment.
- **Program implementation (training, behavior change activities, monitoring and evaluation, sustainability):** Individual counseling for primary caregivers with context-specific messages and ongoing support is effective in changing behaviors. While one-on-one nutritional counseling has been shown to be a more effective approach to changing behaviors, some group counseling/group education can have a positive impact. A key

component of both is negotiating behavior change by encouraging caregivers to use their own resources to address problematic feeding practices. Successful negotiated behavior change is dependent on health workers having adequate counseling skills and time to conduct routine follow-up visits with caregivers. This also requires ongoing training for and frequent supervision of staff.

## Introduction

---

Infant and young child nutrition is of great importance because of the astounding number of children younger than 5 years worldwide who are stunted, underweight, wasted, or suffer from intrauterine growth retardation—178 million, 112 million, 55 million, and 13 million, respectively.<sup>1</sup> Recent literature has highlighted the relationship between stunting and an increased risk of impaired cognitive<sup>2</sup> and motor<sup>3</sup> development, as well as morbidity<sup>4</sup> and mortality.<sup>5</sup> The consequences often persist; linear growth faltering that is not addressed at an early age can lead to children being locked into a shorter growth trajectory, limiting their future growth and development potential.<sup>6</sup> Size, wasting, and stunting at birth is associated with increased risk of hypertension, coronary heart disease, stroke, and non-insulin dependent diabetes.<sup>7,8</sup> In addition to increased risk of chronic disease, cognitive impairment, and retarded growth, undernutrition before the age of 2 years contributes to reduced productivity in adulthood.<sup>9,10</sup> It is estimated that more than 50 percent of childhood deaths can be attributed to undernutrition.<sup>11</sup>

Undernutrition, generally manifested as linear and ponderal growth faltering, most commonly occurs during the first two years of life.<sup>6</sup> Global trends show that linear growth faltering, defined as length/height-for-age more than two standard deviations below an international reference median, starts at birth.<sup>6</sup> However, it can occur as early as the second trimester of gestation, and continue through the second or third year of life.<sup>12</sup> Low length/height-for-age is an indication of poor dietary intake and frequent infection over an extended period of time. Faltering in ponderal growth, defined as weight-for-age more than two standard deviations below an international reference median, tends to start at 3 months of age, declines rapidly until 12 months, then more slowly until 18 months, at which point catch-up growth begins.<sup>13</sup> Low weight-for-age is a reflection of both stunting and wasting.

Children in developing countries are most vulnerable to growth faltering during the period when complementary foods are initiated, often coinciding with decreased breastmilk consumption<sup>14</sup> and increased micronutrient deficiencies and diarrheal illness.<sup>15</sup> Inappropriate care and feeding practices are recognized as some of the underlying causes of undernutrition.<sup>16</sup> More specifically, lack of knowledge of optimal feeding practices and cultural beliefs contribute to deteriorating child nutritional status.<sup>17-19</sup> Common inappropriate complementary feeding practices include introducing foods too early or too late, limiting the diversity of foods, and providing an inadequate quantity of food.<sup>20,21</sup>

One approach to improving complementary feeding practices focuses on changing behaviors of those who directly (caregivers) or indirectly (extended family members, community members) influence child nutritional status. To varying degrees, systematic reviews of complementary feeding interventions have shown that community-based culturally appropriate nutrition education interventions can improve complementary feeding practices, dietary intake, and growth.<sup>15,22,23</sup> However, the design and implementation of effective complementary feeding behavior change interventions has not been well documented. This paper aims to review complementary feeding behavior change interventions that had a positive impact on growth and outline their design and implementation components. The efficacy trials, effectiveness studies,



and program evaluations included in this review primarily measured the intervention effect on height-for-age (HAZ), except for several studies deemed to have high-quality evidence that measured only weight-for-age (WAZ) status. Table 1 includes the studies used in this review. It is important to note that the studies included in this review provide an overview of similarly focused programs from diverse settings but that the search was not exhaustive in the sense of including every documented intervention. Additional literature, both gray and unpublished, related to complementary feeding and the United States Agency for International Development's (USAID) Infant & Young Child Nutrition (IYCN) Project partners' experience was added to support key findings and recommendations.

The IYCN Project is USAID's flagship project on infant and young child nutrition. The five-year project (2006–2011) aims to improve nutrition for mothers, infants, and young children, and promote HIV-free survival of infants and children. IYCN builds on 25 years of USAID leadership in maternal, infant, and young child nutrition. The project focuses on proven interventions that are effective during pregnancy through the first two years of life. This paper will further strengthen the IYCN Project and others' capacity to effectively change behaviors toward improving complementary feeding practices using locally available resources.

## Search methods

---

The literature was obtained by starting with two systematic reviews of complementary feeding interventions, by Caulfield et al.<sup>22</sup> and Dewey and Adu-Afarwuah.<sup>15</sup> From these reviews, relevant citations specifically focused on behavior change communication (BCC)/nutrition education interventions were identified. Relevant references were further extracted from their respective bibliographies. Following the initial search technique, multiple searches were conducted in the PubMed database and other databases to identify studies and program evaluations related to complementary feeding, behavior change, and nutrition education. Gray literature and unpublished supporting data were found in Google Scholar. Further literature was sought from reliable websites such as those of the World Health Organization, United Nations Children's Fund (UNICEF), World Bank, and the LINKAGES Project. Selection criteria included interventions aiming to improve child nutritional status with positive growth outcomes using HAZ or WAZ scores, developing country contexts, and a primary focus on complementary feeding practices, BCC, and/or education interventions.

**Table 1. Complementary feeding behavior change communication interventions.**

Location	Situation analysis/ formative research	Communications strategy		
		Messages	Materials, channels, activities	Effect size
China	Earlier needs assessment	Breastfeed exclusively for the first 4-6 months; initiate breastfeeding right after birth; bottle-feeding can be dangerous and breastfeeding is free; give breastmilk on demand; first complementary food should be egg yolk with breastmilk in the beginning, thereafter give thickened rice porridge and other foods for growth; baby needs breastmilk through the first year and other foods daily after 4-6 months to grow well and be healthy; use home-produced foods and the family diet as the basis for complementary feeding, along with breastmilk after 4 months; promoted animal-source foods.	Growth monitoring and promotion, home counseling, village nutrition educators, feeding guidebook, growth chart.	+0.76 WAZ +0.64 HAZ
Peru	Formative research	Three key messages delivered by all health center staff to caregivers of young children: <ul style="list-style-type: none"> <li>• Puree satisfies and nourishes the baby; at each meal, give the thick food first.</li> <li>• Add a special food to the baby's serving (chicken liver, eggs, fish).</li> <li>• Teach your child to eat with love, patience, and humor.</li> </ul>	Home and clinic visits, cooking/feeding demonstrations, field workers, health clinic providers, flipcharts, recipe flyers.	+0.194 WAZ* +0.272 HAZ*
India	Formative research (household trials)	Start complementary foods at 6 months, specific foods, meal frequency and amounts to be fed at different ages while continuing breastfeeding, ways to encourage children to eat more, handwashing before a meal, continuing feeding during illness.	Home and clinic visits, community volunteers, midwives, health clinic providers, community meetings, cooking/feeding demonstrations, village rallies, school debates, street plays, nutrition fairs, posters, flipcharts, feeding guide, counseling guide.	+0.32 cm, mean length

\* Adjusted for birth weight and socioeconomic factors.

Location	Situation analysis/ formative research	Communications strategy		
		Messages	Materials, channels, activities	Effect size
Nicaragua	Not available	Maintaining/Improving growth, breastfeeding, child feeding, illness care, hygiene, taking into account the age of the child, if the child gained weight the previous month, and if the child had been ill.	Growth monitoring and promotion, clinic visits, educational workshop, nurse, doctor, food security transfer.	+0.13 HAZ
Bangladesh	Formative research (focus group discussions)	Importance of food security, caring practices, personal hygiene, and disease control for child nutrition; benefits of enriched dishes.	Group education, posters, pictures, leaflets, growth monitoring and promotion card, cooking/feeding demonstrations, nutritionist.	+0.28 WAZ (education group only)
Iran	Preliminary studies	Environmental health, personal hygiene, ways to obtain clean drinking water, effective use of vaccination programs, appropriate use of the child growth chart, daily intake of all food groups as stated in the food pyramid, appropriate food preparation, essential foods during pregnancy and lactation.	Group education, literate daughters, female volunteers.	+0.80 WAZ +0.97 HAZ
Bangladesh	Formative research (focus group discussions) and preliminary studies	Using the UNICEF model: <ul style="list-style-type: none"> <li>• Prevention, recognition, and control of diarrhea and acute respiratory infections.</li> <li>• Quantity and quality of foods.</li> <li>• Interaction with children in an affable manner and increasing verbal communication.</li> </ul>	Group education, cooking/feeding demonstrations, community meetings, community health workers, teaching manuals, flipcharts.	+0.66 WAZ +0.23 HAZ
Vietnam	Positive deviance inquiry	UNICEF's 'Facts for Life', including recommendations on breastfeeding, food variety, complementary feeding, and health care.	Growth monitoring and promotion, nutrition education and rehabilitation program sessions, home visits, community volunteers.	+0.20 WAZ <sup>†</sup>
Brazil	Epidemiological and ethnographic studies, formative research (in-depth interviews, household trials)	Increase the frequency of breastfeeding and complementary feeding, give animal protein and micronutrient-rich foods (eggs, chicken liver, shredded chicken, beef), add oil to food, increase the energy and nutrient density of food by giving mashed beans instead of broth and thick <i>papa</i> (potato dish) instead of soup.	Clinic counseling, health clinic providers, counseling card, reminder card.	+0.31 WAZ

<sup>†</sup> For children less than -2 Z and less than 15 months.

Location	Situation analysis/ formative research	Communications strategy		
		Messages	Materials, channels, activities	Effect size
China	Clinical records, surveys, registration records, formative research (in-depth interviews)	Benefits of breastfeeding; timing of introduction of complementary feeding; continuing breastfeeding through the first year; nutritional value of foods; symptoms and hazards of malnutrition; quality and quantity of complementary foods; giving children animal-source proteins that are available, affordable, and not usually fed to infants.	Group education, community education, home visits, cooking/feeding demonstrations, health clinic providers, feeding guidance, recipe booklet.	+0.69 cm (length)
Dominican Republic	Formative research	Breastmilk only until 4 months; at 5-9 months, also feed three times/day if child is growing well; feed four times/day + fruit (banana, orange, mango) if child is not growing well; give thick foods (add little water), since “water fills but does not nourish”; feed children 9-24 months three times/day + two snacks of family food; continue breastfeeding; if not growing well, give family foods (do not add water), feed four times/day + two snacks, continue breastfeeding.	Growth monitoring and promotion, home counseling, group education, community volunteers, community health workers, individual and community growth charts, counseling cards, reminder sheets for mothers, flipcharts and cassettes, posters, bulletins, stickers.	+0.24 WAZ (0–11 months) +0.36 WAZ (12–23 months)
Mali	National surveys, rapid ethnographic studies	Breastmilk only until 4 months, no water until after 4 months, promotion of vitamin A-rich foods, use small feeding bowl, supervise feeding, feed patiently and persistently.	Growth monitoring and promotion, village-based stories and drama, five-step counseling approach, flipcharts, weekly radio program and spot announcements.	+0.41 WAZ +0.87 HAZ
Indonesia	Assessment using market, anthropological, and nutrition techniques	Breastmilk only until 4 months; feed from both breasts; at 5-9 months, feed enriched <i>bubur campur</i> (rice porridge) four times/day; feed patiently; at 9-24 months, feed adult food four times/day, including <i>tempe</i> (fermented soybean cake), tahu (tofu), or fish, and green vegetables; offer snacks; continue breastfeeding as long as possible.	Growth monitoring and promotion; home and clinic counseling; community health workers; midwives; community, religious, and women’s group leaders; store owners; radio program.	+0.35 WAZ +0.30 HAZ
Bangladesh	Formative research (observations)	Continue breastfeeding; frequent and persistent feeding of foods; hygiene, including food storage and washing hands and utensils before cooking and feeding.	Home-based cooking/feeding demonstrations, community volunteers, technical workers.	+0.46 WAZ

## **Behavior change interventions for improved complementary feeding practices and growth**

---

Child health and nutritional status is dependent on appropriate caregivers' feeding and caring practices,<sup>24</sup> adequate household food security,<sup>25</sup> access to health services and sanitation,<sup>26</sup> and other factors. Caring practices that are strong determinants of child nutritional status include care of pregnant and lactating women, breastfeeding and young child feeding, care during child illness, psychosocial care of the child, food storage and preparation, and hygienic practices.<sup>27</sup> The extent to which these are performed depends on the resources available to the caregiver at the household level, such as education, knowledge, and beliefs around child care; good health and nutritional status; mental health, minimal stress, and self-confidence; autonomy, control of resources, and intra-household allocation; time and a reasonable workload; and social support from family and the community.<sup>27</sup> Improving child health and nutritional status can be accomplished by addressing inappropriate feeding and caregiving practices through BCC programs,<sup>28</sup> also known as 'communication for behavior change (CBC)' programs.<sup>17,29</sup> The former term is used throughout this paper, as it is most commonly used in literature today, while the latter is used in reference to a set of behavioral change guidelines that can be applied to nutrition-related programs; the guidelines are discussed in greater detail in the following section.

Behavior change interventions aiming to improve complementary feeding practices and growth are commonly referred to as 'nutrition education' in literature today. Nutrition education in this sense is more than just educating individuals or delivering information about healthy practices. It involves working with communities to understand their perceptions and constraints and ultimately identifying solutions for addressing nutritional problems. This may require improving the self-efficacy of caregivers, or changing physical and social environments to support positive behavior change. For the purpose of this paper, 'complementary feeding behavior change communication (CFBC) interventions' will be used to refer to this class of interventions, often with nutrition education components and varying behavior change strategies toward improving feeding practices.

Improvements in infant and young child feeding practices and growth are possible by making caregivers aware of childhood nutritional problems and enhancing their confidence and skills in order to take action. One of the strengths of CFBC is working with communities to use their own resources to address problematic feeding practices. In most cases, the proportion of families for which behavior change interventions are unable to address problems leading to mild and moderate malnutrition is approximately 20 percent.<sup>30</sup> While not in all interventions, there have been examples of 'educational' (or CFBC) interventions without food supplementation in impoverished settings that were effective in improving child growth.<sup>31-33</sup> When context-specific infant feeding messages promoting the use of local foods are delivered directly to mothers through counseling, significant improvements in complementary feeding practices and dietary intake are possible.<sup>34</sup> Providing clear and motivating information about the benefits of modifying feeding behaviors can be sufficient for facilitating adoption of improved practices.<sup>35</sup> In the Bangladesh Integrated Nutrition Project, despite widespread food insecurity, mothers were able to provide the recommended complementary foods from their own resources, as they were highly motivated by the nutrition education.<sup>31</sup>

**When context-specific infant feeding messages promoting use of local foods are delivered directly to mothers through counseling, significant improvements in complementary feeding practices and dietary intake are possible.<sup>34</sup>**

Behavior change approaches to improving complementary feeding practices can be cost effective in reducing undernutrition rates.<sup>32,36</sup> A study in Peru found that the marginal cost of a health facility-based nutrition education program was \$6.12 per child reached and \$55.16 per case of stunting prevented.<sup>36</sup> Other estimates are that nutrition education costs approximately \$1 to \$23 per beneficiary and \$1 to \$5 per beneficiary for breastfeeding promotion.<sup>37</sup>

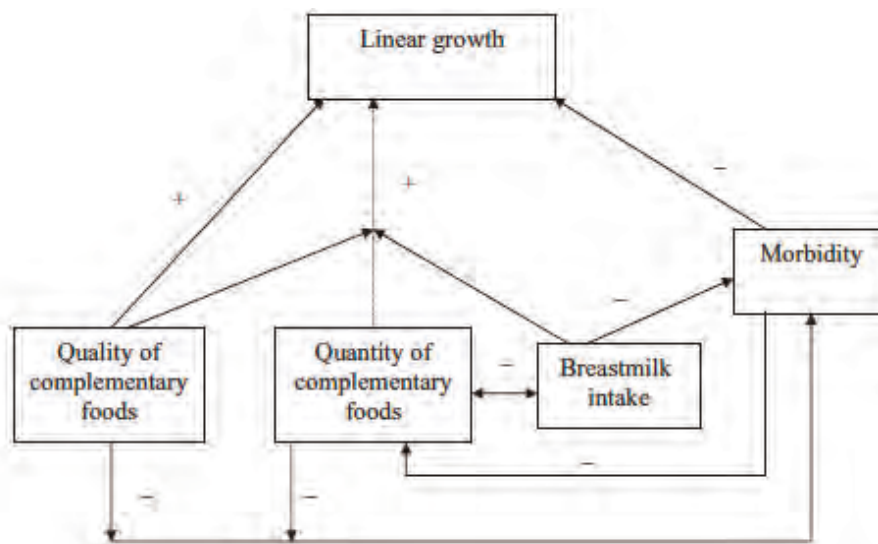
According to Favin and Griffiths, four elements inherent to behavior change programs that have had a positive impact on child feeding practices are (1) changing behaviors (not just supplying information); (2) promoting improved behaviors, taking into account the target community's needs; (3) creative solutions; and (4) a comprehensive strategy with a communications component.<sup>29</sup> Traditionally, nutrition education programs have delivered information to mothers with the expectation that they would put into practice their new knowledge. The information was general and did not take into account the cultural context. As a result, the ability of educational interventions to demonstrate an impact on growth—among other outcomes—has been inconsistent.

In order to better understand why many behavior change programs promoting appropriate complementary feeding practices have had little impact on growth, it is necessary to know other related factors that inhibit growth or impede an intervention effect. Possible reasons given by both researchers and program implementers include research methodology flaws, such as the intervention duration being too short to measure an impact; using a sample too small to detect the effects produced by a short-duration intervention, or inadequate evaluation design due to the research design (cross-sectional), or lack of information on potential confounding variables; targeting interventions too early (before 6 months) or too late (after 12 months); growth constraints such as reduced breastfeeding rates, increased morbidity, and the intergenerational effects of maternal stunting<sup>20</sup>; the type of food promoted; targeting a group with low prevalence and severity of malnutrition<sup>38</sup>; and failure to overcome constraints at the household and community levels (socioeconomic factors) to practicing optimal feeding behaviors. Essentially, postnatal interventions may address only some of the factors leading to impaired growth; a more effective strategy would have both prenatal and postnatal approaches.<sup>20</sup>

Furthermore, while educating communities on proper feeding, caring, and health-seeking practices has the potential to improve growth, the effect may not support catch-up growth to attain international standards. This may be due in part to socioeconomic factors requiring a more comprehensive program.<sup>39,40</sup> However, if the point of the behavior change intervention is to prevent mildly or moderately malnourished children from slipping further into a more undernourished state, then a marginal impact on growth may be a substantial achievement. We know that these children make up the majority of all malnutrition-related child mortality.<sup>41</sup> More research is needed to determine how interventions can have an even greater impact on growth.

According to Dewey and Adu-Afarwuah,<sup>15</sup> in order for complementary feeding interventions to have an impact on stunting rates, all proximal factors directly linked to linear growth must be considered. Figure 1 illustrates a conceptual framework<sup>15</sup> for these proximal factors, showing that both the quality and quantity of food is important; by increasing only the quantity of food without adequate quality, nutrients are not sufficient to support linear growth. The relationship between food intake and linear growth is modified by breastmilk intake; as complementary food intake increases, breastmilk consumption often declines. Finally, morbidity can directly impact linear growth. Both acute and chronic infections can cause micronutrient deficiencies through anorexia, nutrient malabsorption, direct nutrient loss, increased metabolic requirements, and impaired transport to tissues, as well as alter long bone growth.<sup>42</sup> Acute infections such as diarrhea<sup>43</sup> and pneumonia,<sup>44</sup> and chronic diseases such as gut helminthes,<sup>45,46</sup> HIV,<sup>47</sup> and *Helicobacter pylori*<sup>48</sup> are associated with impaired linear growth. The more severe the infection, the greater the magnitude of the disruption in nutrient utilization. Frequency and timing of infection also factor into the impact on linear growth. One study found that the greater the number of diarrheal episodes experienced between birth and 2 years of age, the greater the shortfall in height at 2–7 years, with the strength of the correlation diminishing as the child aged.<sup>49</sup> Similarly, intestinal helminthiasis during the first two years of life has been associated with growth shortfalls beyond 3 years of age.<sup>49</sup>

**Figure 1. Conceptual framework for factors affecting linear growth.<sup>15</sup>**



Current nutritional status may also influence whether an intervention is effective in improving growth. It is logical to assume that in targeting children who are at least moderately malnourished (WAZ <-2), interventions may have a greater effect on their nutritional status as opposed to better-nourished children.<sup>31,50</sup> A pooled analysis found that child feeding ‘educational interventions’ had only a minimal impact on weight and linear growth, and hypothesized that programs targeting children of lower socioeconomic status reaped the most benefits.<sup>15</sup> Similarly, the Red de Proteccion social program in Nicaragua found that the poorest children benefited the most from their program interventions, without specifying whether or not they were the most malnourished.<sup>51</sup>



Furthermore, the age of children targeted in these interventions can modify the growth effect. Studies have demonstrated that nutrition interventions have the greatest impact on younger children (<15 months and <12 months, respectively).<sup>50,52</sup> An integrated child nutrition program in Vietnam found that there was a protective effect on younger and more malnourished children whose body weight and height deteriorated less than their counterparts.<sup>50</sup> This may have been due to several factors: children's growth rate is the highest in early infancy, growth faltering is most intense between 6 and 15 months, and preventing stunting is easier than reversing its effects.<sup>50</sup> This supports the idea that nutritional programs aiming to improve child growth should target children younger than 2 years, and particularly during the vulnerable period of 6-12 months.

Additionally, promotion of exclusive breastfeeding during the first six months of life may contribute to improved breastfeeding practices thereafter.<sup>21</sup> In all five countries in which the Weaning Project was implemented, the practice of giving traditional prelacteals and introducing food early in order for women to re-engage in income-generating opportunities was common.<sup>29</sup> A study in Kenya found that 46.4 percent of women introduced complementary foods during the infant's first month, primarily due to returning to work and breastmilk insufficiency.<sup>53</sup> This gives further support to targeting women during pregnancy with messages on age-appropriate breastfeeding and complementary feeding practices in order to achieve an impact by preventing a growth deficit.

## Behavior change communication in nutrition programs

---

BCC fosters behavior change at the individual, household, and community levels, with the goal of improving health. Within the context of complementary feeding, BCC can be applied to a nutrition objective of improving infant and young child feeding practices. Social marketing is an approach used in BCC to identify socially acceptable and feasible practices and products that will promote health behavior. It can be viewed as a methodology for building a strategy that will lead to sustainable behavior change through voluntary action of the target audience. The social marketing process consists of developing a strategy based on a ‘marketing mix’ of product, price, place, and promotion, which is shaped by the interests of the target group. The *product* does not have to be tangible; it can be a new or modified behavior along with its associated benefits. *Price* includes weighing the benefits against the barriers or costs in adopting a behavior. *Place* involves making the promoted behavior accessible and convenient. Finally, *promotion* is how the target group is informed of the behavior or product.

Social marketing can draw on a variety behavior change theories. While the interventions in this review have limited information, based on their descriptions, several social marketing approaches were built on the Social Cognitive Theory. In using Social Cognitive Theory, a program considers factors that influence a person’s uptake of a promoted behavior. This includes examining the interplay between human behavior, the environment, and personal factors.<sup>54</sup> Key constructs in this theory center on a person’s self-efficacy to take control and overcome obstacles in which to adopt a health behavior. People’s expectation in adopting the promoted behavior is another concept. The theory considers that people learn not only through their own experiences but by watching the outcome of others’ actions. Finally, it emphasizes giving the target group the knowledge and skills to be able to perform the health behavior.

Formative research is a key component to planning a behavior change strategy. It is essential to understanding existing attitudes, perceptions, and practices within the community social context; constraints to adopting desired practices; and ways to overcome the resistance. It goes beyond traditional educational approaches in which general information is supplied just to target populations by allowing the target population’s needs and interests to shape the BCC strategy. BCC requires that all communication, education, and training components of the project support the behavior change strategy. The process involves learning from the community every step of the way. Individuals will not change behaviors unless they see them as a benefit to their well-being.

While there are general recommendations on optimal complementary feeding practices,<sup>38</sup> there is a paucity of information on how effective CFBC interventions are designed and implemented. According to Favin and Griffiths,<sup>29</sup> to be effective, they should follow a series of steps, as outlined in the box below. These are similar to other recommendations for designing and implementing successful young child feeding programs.<sup>35,38</sup> For the purpose of this review and due to information limitations, the steps are grouped together. Greater detail on conducting each step is presented elsewhere.<sup>29</sup>

## **Basic steps in planning and implementing communication for behavior change<sup>29</sup>**

1. Situation analysis/formative research:
  - Carry out communications situation analysis.
  - Determine broad communication for behavior change objectives based on overall project goals.
  - Review existing information and analyze information gaps.
  - Complete assessment of institutional capabilities and decide on basic responsibilities.
  - Plan and conduct initial formative research.
  - Complete initial formative research.
2. Behavior change strategy:
  - Design a comprehensive behavior change strategy, including its communications component, and link to training needs, products, etc.
3. Program implementation:
  - Conduct stakeholder meetings to complete the behavior change strategy.
  - Assign responsibilities for materials preparation, training, and remaining research, including monitoring and evaluation.
  - Prepare message and media plans; conduct additional formative research if needed.
  - Draft, pre-test, and finalize messages and materials.
  - Produce the communication for behavior change materials.
  - Prepare to implement communications and other components of the behavior change strategy, including training.
  - Plan, conduct, and analyze a baseline survey.
  - Implement communications activities.
  - Monitor and adjust project activities.
  - Plan and conduct an impact evaluation.
  - Disseminate project achievements and lessons learned.

# Planning and implementing behavior change communication

---

## Situation analysis/formative research

Prior to designing a complementary feeding behavior change intervention, a key step is gathering existing information about the target population: socioeconomic and demographic characteristics, positive and negative infant and young child feeding practices, related beliefs and attitudes, barriers and motivations to changing behaviors, current maternal and child health programs, and the success of behavioral interventions to date. Ethnographic interviews, national surveys, and clinic reports are commonly used as starting points. By doing this, areas that require further research emerge. Generally, qualitative research is carried out to gather perceptions, experiences, and practices of the target community. Specifically, formative research identifies what the target group does and why, the social pressures and expectations that exist, whether changing specific practices is feasible, the existing barriers to changing behaviors and ways to overcome them, and information sources that have the most influence on the target group. Findings from formative research lay the foundation for a behavior change strategy, including messages and program activities aimed toward changing non-optimal complementary feeding practices.

During formative research, various qualitative and quantitative methods could, and several

***Good formative research cannot be stressed enough to learn the language, food, culture, and also the context...to develop a good intervention.*** ~On implementing nutrition education in government health centers in Peru<sup>55</sup>

should, be employed: review of existing data, in-depth interviews (IDIs), focus group discussions (FGDs), observations, dietary recalls, recipe trials, market surveys, trials of improved practices (TIPs), and positive deviance inquiry (PDI). Table 2 provides a snapshot of the purpose of using each method in assessing infant feeding behaviors. A mixed methods approach in health research can bring together the strengths of both qualitative and quantitative approaches and address the complex factors that influence health.<sup>56</sup> Quantitative methods can gather data and present statistical information, while qualitative methods can

explore behaviors and perceptions in greater detail. The majority of interventions in this review carried out formative research to design their programs.<sup>21,31,32,50,57-61</sup> In China, local health care providers were interviewed on infant feeding patterns and local beliefs surrounding food selection and preparation.<sup>58</sup> In Indonesia, market, anthropological, and nutrition techniques were used to identify current infant feeding practices and local resources, as well as motivations for behavior change.<sup>61</sup>

**Table 2. Methods used to assess infant feeding behaviors and practices.**

Methods	Purpose
<b>Quantitative techniques</b>	
Review of existing data	Identify existing information on current feeding practices and knowledge gaps on which to focus research.
Market surveys	Gather costs and determine availability of food products and fuel.
24-hour dietary recalls	Assess the food and nutrient intake of an individual, and evaluate the effectiveness of a nutrition program; provide a basis for discussion and negotiation of practices.
<b>Qualitative techniques</b>	
In-depth interviews	Gather detailed personal, confidential, or sensitive information; reveal knowledge, attitudes, and current practices; identify motivators for and barriers to optimal feeding practices.
Focus group discussions	Gather a wide range of views from small groups of people from similar backgrounds; explore peoples' beliefs, attitudes, and opinions about infant feeding and acceptability of promoted practices.
Household observations	Identify actual practices and motivators for and barriers to optimal practices; assess the physical environment (water source, hygiene, food availability).
Recipe trials	Gather information regarding new food-related practices or modified recipes; involve caregivers in the process.
Trials of improved practices	Determine which recommended improved feeding practices are feasible and acceptable; involve caregivers in the process.
Positive deviance inquiry	Identify positive feeding, caring, and health-seeking practices being used by caregivers of well-nourished babies in poor communities.

When feasible, formative research should consist of several phases: exploratory research (IDIs, FGDs, observations, recipe trials); TIPs; and confirmatory research (FGDs to confirm the findings and feasibility of applying them on a large scale).<sup>29,35</sup> The information collected during these phases contributes to the development of a baseline survey, which will later assist in evaluating the impact of the intervention.

A recipe trial is an exploratory research method for gathering information regarding a new food-related practice or a modified recipe. Usually, small groups of mothers are directly involved in developing and testing an improved complementary food with their children. A guidebook for conducting recipe trials is available.<sup>35</sup> This, coupled with anthropological techniques such as unstructured, open-ended interviews, has shown to be an effective means to developing improved complementary foods to be promoted in interventions.<sup>62,63</sup> According to Kanashiro et al., there are four critical steps to developing an improved complementary food: (1) collecting cultural information regarding locally available foods (normally through informal interviews); (2) forming nutritionally adequate combinations of the foods; (3) involving mothers in developing recipes from the food combinations; and (4) receiving feedback about the recipes following household trials, during which the mothers prepare and feed the dishes to their children.<sup>62</sup>

Information gathered from IDIs, FGDs, observations, dietary recalls, and/or recipe trials is used to formulate recommendations for improved complementary feeding practices that are likely to be acceptable to the target population. To test the practices, acceptability and feasibility trials are conducted. TIPs is a commonly used method.

TIPs (i.e., household trials<sup>35</sup>) test the acceptability and feasibility of an improved or current practice. In TIPs, a researcher makes several visits to homes of a small sample of caregivers. The initial visits are to observe and interview the caregivers about their feeding and caring practices. The second visit is to negotiate a change in practice that will be tried for a short period of time. Following the trial period (a week or two), the researcher assesses what the caregivers did or did not do and why and what they liked or disliked, and identifies barriers and benefits and the potential for continuing the practice. The behaviors adopted by the majority of households are those that will be promoted through the behavior change strategy. In both India and Brazil, child feeding recommendations were developed following a standard approach to identifying feeding problems and locally acceptable solutions,<sup>21,64</sup> followed by conducting TIPs to test the recommended feeding practices.



Formative research being conducted with mothers of children 6-24 months in the Federal Capital Territory, Nigeria. Photo: Oluseyi Akintola.

Another formative research technique for identifying positive feeding and caring practices is the PDI. The PDI is a participatory approach that identifies key growth-promoting behaviors practiced by families whose children are nutritional ‘positive deviants’ in communities in which malnutrition is common. A positive deviant is a child who is well nourished despite sharing the same social, economic, and environmental conditions as other children. In an integrated nutrition program in Vietnam, community volunteers used question and observation guides when visiting positive deviant and negative deviant families.<sup>65</sup> The positive feeding, caring, and health-seeking behaviors identified through the PDI informed recommended behaviors at both growth monitoring and promotion (GMP) sessions and nutrition education and rehabilitation (NERP) sessions, in which caregivers were provided with the opportunity to develop skills linked to these behaviors. A field guide on conducting a PDI is available.<sup>66</sup>

## **Behavior change strategy**

Once non-optimal feeding practices, constraints and facilitators of behavior change, and recommended practices are identified through formative research and other available information, a behavior change strategy is developed. Usually, the strategy consists of messages about specific behaviors to be promoted to the target audiences, communications materials and channels, and training and communications/program activities. CFBC interventions, as the primary activity, as well as training, are described in the “Program implementation” section below.

Several decision-making tools and behavior change strategy matrices for organizing formative research findings and planning the program strategy are available.<sup>28,29,35</sup> The box below lists recommendations from program experience for developing a behavior change strategy.

**Recommendations for developing a behavior change strategy, from formative research conducted on infant feeding practices in several countries<sup>29</sup>**

- **Balance foods and practices:** Give attention to both appropriate practices and improved food.
- **Target practices:** Improved practices specific to each age group should be identified through qualitative research.
- **Recognize the first days of life:** Target behaviors from the beginning: prelacteal feeding and early introduction of food.
- **Feeding during and after illness:** This is usually the most challenging time for feeding behaviors.
- **Assess what households can do for themselves:** Trials of improved practices will show which behaviors families are capable of changing, given their resources and skills.
- **Identify barriers to change:** Both environmental (food availability, cooking equipment, health workers' inappropriate advice) and attitudinal (mother's lack of control or time) barriers should be addressed.
- **Identify facilitators of change:** By listening to people, you will learn what would encourage them to adopt improved behaviors (e.g., fathers buying nutrient-rich foods, food vendors/store owners as valuable sources of information when purchasing food).

## **Communications strategy**

### **Messages and audience**

While the behavior change messages promoted in the interventions varied, the most commonly emphasized messages were:

- Exclusive breastfeeding for the first four to six months.
- Continued breastfeeding (some interventions promoted continuing through the first year and others promoted continuing for as long as possible).
- Addition of special micronutrient-rich or animal-source foods to infants' meals.
- Changing meal frequency and amounts with age.
- Feeding patiently and persistently.
- Hygienic practices for food preparation and storage, as well as feeding.

Promoted messages need to be specific, with clear and practical instructions; be based on a few recommendations rather than too much information; promote behaviors that are culturally acceptable and feasible; promote locally available and affordable foods; be motivating and show the benefits of adopting behaviors; and suggest ways of overcoming constraints.<sup>35</sup> Most critical to effectively changing behaviors is the specificity of the messages. Rather than delivering general advice to caregivers, feeding practices should be negotiated during formative research in order to construct messages of specific practices that are possible to implement. Additionally,



messages should reach the target audience frequently and be delivered through multiple channels of communication.

In Brazil, mothers were instructed to give mashed beans instead of broth, and thick *papa* (potato dish) instead of soup, in order to increase the energy and nutrient density of their infants' diets.<sup>64</sup> In Peru, formative research revealed a cultural preference for giving children low-energy broth.<sup>57</sup> This practice was countered with three key messages: (1) give puree at the beginning of each meal because it satisfies and nourishes; (2) teach your child to eat "with love, patience and humor"; and (3) add available and affordable animal-source foods (chicken liver, eggs, and fish) to the infant's diet.<sup>57</sup> Experience in Peru shows that messages should not only emphasize 'what' to feed but 'how' to feed.<sup>55</sup> In contrast with general advice about adding animal-source foods, in

**Messages promoted in complementary feeding behavior change interventions need to be specific, with clear and practical instructions; be based on a few recommendations rather than too much information; promote behaviors that are culturally acceptable and feasible; promote locally available and affordable foods; be motivating and show the benefits of adopting behaviors; and suggest ways of overcoming constraints.**<sup>35</sup>

Vietnam, caregivers were encouraged to add specific foods found in rice paddies (shrimp, crab, and greens) to their infants' diets.<sup>50</sup> In China, households of pregnant women were advised that only breastmilk is best for the first four to six months, and to continue breastfeeding at least through the first year.<sup>67</sup> Additionally, they were encouraged to give hardboiled egg yolk mixed with breastmilk daily as the first complementary food, so the child would grow well and be healthy.<sup>67</sup>

A concern with complementary feeding activities is that increased consumption of solid foods will displace breastmilk intake. Interventions need to consider developing messages about maintaining breastmilk intake through the first two years of life. Chinese infants whose mothers received messages

about exclusive breastfeeding and continuing to breastfeed throughout the first year of life (among other messages concerning the quality and quantity of complementary foods) weighed more and were longer at 12 months of age compared to the non-intervention group.<sup>67</sup> In addition, messages concerning optimal health and hygiene practices are necessary for reducing the burden of infection, a major component in the etiology of malnutrition.<sup>68</sup> In Bangladesh, the behavior change messages included preventing, recognizing, and controlling diarrhea and acute respiratory tract infections.<sup>32</sup> Hygiene messages such as washing hands before a meal,<sup>21,40,50</sup> washing utensils and proper food storage,<sup>40</sup> and the health risk of bottle-feeding<sup>67</sup> were promoted across several programs.

Research shows that complicated, time-consuming, or expensive practices are unlikely to be adopted. Brown et al. found that messages promoting enriched foods that required little time and money were more likely to be adopted, whereas those that were more expensive and required more preparation time were likely to be ignored.<sup>40</sup> Here, they were more willing to add a small spoonful of oil to the food than to prepare a dish of rice, vegetables, oil, fish, egg, and milk requiring 30-45 minutes of preparation time.



A final key component to message development is that messages should be audience specific—both in terms of the children’s ages and reaching influential figures in the caregivers’ and children’s lives. In the Dominican Republic, feeding recommendations varied according to children’s ages, feeding patterns, and nutritional status.<sup>59</sup> Experience has shown that it is helpful to first classify messages according to primary, secondary, and tertiary audiences.<sup>29</sup> Mothers and caregivers who routinely prepare food and feed children are considered to be the *primary* audience. Fathers, grandmothers, and other family members who influence feeding practices are the *secondary* audience. At the *tertiary* level are community members such as store owners, community and religious leaders, and health workers, who could influence care and feeding practices. Some of the messages may be used to train the audience members in providing nutritional counseling; other members may need context-specific messages to support improved feeding practices. In Mali, men were targeted with messages on buying special foods for family consumption, such as leafy green vegetables and liver.<sup>60</sup>

### **Communications materials and channels**

Many of the interventions worked primarily through local community volunteers (commonly referred to as community health workers, or CHWs) or health care service personnel to provide individualized support to caregivers. To avoid overburdening health workers with additional tasks, counseling was often carried out by community volunteers who were devoted to simply providing nutritional counseling, primarily through monthly home visits. Experiences from child survival programs have shown that few and clearly defined tasks allow CHWs to be effective in their work.<sup>69</sup> Furthermore, community-based interventions are most effective in rapidly reducing undernutrition rates when the ratio of CHWs to households is low (1:10).<sup>70</sup> In the case of incorporating nutritional counseling into existing health care clinics in Peru, three key, age-specific messages, developed from formative research, were used during clinic visits.<sup>57</sup> While individual counseling with caregivers was the key method used to change feeding behaviors, messaging through other media was used to reinforce the individual counseling. Mass media is effective in disseminating appealing information, but interpersonal communication is more influential in persuading someone to adopt a behavior.<sup>71</sup> Furthermore, mass media not only increases awareness of the CFBC intervention, but also augments the credibility of educators in their counseling.<sup>35</sup>

The materials and channels used to communicate messages varied from program to program. Most programs used several media channels as part of their approach, which has been shown to lead to greater behavior change.<sup>72</sup> Using multiple communications channels—both interpersonal and mass media strategies—increases the likelihood that an innovation will be adopted and institutionalized.<sup>54</sup>

Radio stations and spot announcements broadcasted general health and nutrition messages that supported the individual counseling messages in Mali.<sup>60</sup> In India, local authorities organized village rallies, school debates, street-side plays, and nutrition fairs to promote optimal complementary feeding practices.<sup>21</sup> Educational workshops for caregivers in Nicaragua promoted optimal household sanitation and hygiene, nutrition, reproductive

**Using multiple communication channels—both interpersonal and mass media strategies—increases the likelihood that an innovation will be adopted and institutionalized.<sup>54</sup>**

health, and breastfeeding.<sup>51</sup> In Indonesia, local store owners helped to disseminate messages to the general public.<sup>61</sup> In the Dominican Republic, community volunteers were selected as the main communications channel because they are regarded as reliable sources of advice on general child care matters.<sup>59</sup>

In the successful interventions summarized here, the communications materials were designed to meet the needs of particular situations. A counseling guide consisting of common feeding problems and locally acceptable solutions was provided to health workers in India to assist in counseling during home visits.<sup>21</sup> In Mali, five storybooks illustrating the benefits of vitamin A-rich foods, using a separate bowl for the child, supervising children while they eat, feeding sick children patiently and persistently,



Photo: Faith Thuita.

and the importance of prenatal and postpartum care for both mother and baby were used by village health workers to introduce nutrition concepts and model appropriate behaviors.<sup>60</sup> In the Dominican Republic, a set of 12 counseling cards with drawings depicting recommended behaviors, questions for community volunteers to ask mothers, and tips for advising mothers were used in individual growth monitoring home visits.<sup>59</sup> Health volunteers in Vietnam used ‘food squares’ and ‘clover leaf diagrams’ to illustrate the four extra daily meals to be given to children during the rehabilitation period, and to outline the good food, child care, and health care behaviors practiced in the area.<sup>65</sup> The specific media through which CFBC was delivered is further described in the following section.

General guidelines for selecting media channels and the target audience are available.<sup>29</sup> It is important to note that messages and communications materials should be pre-tested with the target audience (mothers, fathers, mothers-in-law, local authorities, health workers) and revised prior to widespread utilization. FGDs and key informant interviews are cost-effective ways to receive feedback from the target group. Guidelines are available on this process.<sup>29</sup>

## **Program implementation**

### **Training**

Training on technical information and counseling skills is imperative for community members to become agents of behavior change. It is important that they perceive undernutrition as a public health problem in the community in order to motivate implementation of an intervention.<sup>55</sup> In one of the earliest health behavior change theories (the Health Belief Model), emphasis is placed



Photo: Faith Thuita.

on improving an individual's perception of their risk to a specific health outcome as a component of changing behavior.<sup>54</sup> Behavior change agents thus need to be well trained in order to identify and deliver the context-specific information that is needed to influence the caregiver's perception of the child's risk of undernutrition.

Several types of training were used among the interventions. In India, health care workers were trained on communication skills, detecting feeding problems, and negotiating with caregivers on locally adapted feeding recommendations.<sup>21</sup> Community agents in Mali were trained on a five-step counseling approach with mothers, fathers, and community leaders using an illustrative manual on negotiation techniques.<sup>60</sup> Additionally, they were trained on small group animation techniques. In China, village committee leaders, caregivers, and other key family members were involved in group training sessions on the benefits of appropriate breastfeeding and complementary feeding practices.<sup>58</sup>

Training should be ongoing, coupled with close supervision. Until the skills are 'internalized', counseling staff need routine support.<sup>73</sup> These factors increase the likelihood of effective and sustainable work.<sup>69</sup> In China, village nutrition educators were trained three times throughout the intervention on exclusive and continued breastfeeding practices, appropriate complementary feeding practices, growth monitoring, and communication skills.<sup>67</sup>

Training of CHWs and facility-based health personnel should be integrated, so messages used with community members are consistent and roles and responsibilities are clear.<sup>69</sup> Because there is often high turnover of health personnel, a training system built into government health clinic interventions has been proven successful in providing adequate training for all new staff.<sup>55</sup> Small government-paid salaries or stipends for attendance at trainings can serve as financial incentive to improve the performance and continuity of CHWs' work.<sup>74</sup> Non-financial incentives include apparel, skills acquisition, and manageable hours.<sup>69</sup> It is well recognized that training, supervision, logistics, management, and remuneration for CHWs is costly, but that CHWs play an important role in increasing coverage for health programs.<sup>69</sup> Manuals exist for training CHWs in BCC to improve infant and young child feeding.<sup>35,75</sup>

*In Peru, nurses, physicians, and assistants were trained together on appropriate counseling, providing an immediate collaborative spirit for the intervention. ~On implementing nutrition education in government health centers in Peru<sup>55</sup>*

### **Complementary feeding behavior change communication**

As indicated earlier, many of the interventions carried out their behavior change activities through community volunteers, CHWs, and health care service providers. Nutritional counselors or educators provided caregivers with specific support tailored to the ages and nutritional status

of their children, either through home visits or clinic visits. Additionally, many interventions facilitated small group education through cooking and feeding demonstrations.

Experience has shown that individual counseling with messages tailored to the specific situation coupled with adequate support leads to behavior change,<sup>35,76</sup> and is more effective than group education.<sup>73</sup> Individual counseling is beneficial in that it allows for unhurried time with the caregiver. Negotiating behavior change with caregivers based on their situation rather than giving general instructions is a key component to its success. However, this is not always possible given the skill and time requirements. Successful counseling—and negotiated behavior change—is dependent on the counseling skills of the worker and routine follow-up visits with the caregiver.<sup>73</sup> In Peru, choosing a few key, age-appropriate messages proved to be more practical, as it lessened demands on health clinic workers.<sup>55</sup>

**Successful counseling—and negotiated behavior change—is also dependent on the counseling skills of the worker and routine follow-up visits with the caregiver.<sup>73</sup>**

Although not as effective as individual counseling, group counseling or group education also allows for negotiated behavior change, as was done in the NERP in Vietnam.<sup>50</sup> Caregivers of malnourished children practiced preparing and feeding an energy- and nutrient-dense meal consisting of locally available and affordable ingredients (shrimp, crabs, greens), while the community volunteer educated them on good

caregiving practices. After the session, follow-up visits were conducted at the homes of the children to discuss the barriers to or benefits of trying the improved practices.<sup>50</sup> Key to the success of this type of intervention is targeting communities with at least a 30 percent rate of moderate malnutrition among children younger than 2 or 3 years.<sup>73</sup> A field guide on NERP sessions is available.<sup>66</sup>

On the basis of formative research findings, many programs included cooking and feeding demonstrations in their CFBC interventions. These sessions not only empower women with the skills and knowledge to prepare enriched foods, but also address financial and time constraints by promoting nutrient-rich, locally available, affordable ingredients. Caregivers practice preparing the food, learn about appropriate consistency and amount, and identify how to encourage their children to eat it. The types of foods promoted has varied. In China, caregivers learned the benefits of improving *huhu* (a traditional soup) by adding local ingredients such as carrots, onions, cabbage, potatoes, pumpkin, eggs, and cooking oil.<sup>58</sup> *Chop-chop*, a dish promoted in Bangladesh, was made from readily available ingredients (wheat flour, brown sugar, and oil) and required little cooking time. Also in Bangladesh, *khichuri* (an enriched dish) was made from inexpensive rice, lentils, eggs, and vegetables.<sup>32</sup> Both in Bangladesh and Vietnam, calorie- and nutrient-rich dishes were prepared with local ingredients brought to the demonstrations by mothers.<sup>31,50</sup>

**Cooking and feeding demonstrations not only empower women with the skills and knowledge to prepare enriched foods, but also address financial and time constraints by using nutrient-rich, locally available, affordable ingredients.**





Photo: Christine Demmelmaier.

Integrating CFBC interventions into GMP and health programs—such as integrated management of childhood illness (IMCI) and the Hearth Model—are two of the most prevalent approaches to improving complementary feeding and child growth, as demonstrated by these interventions.<sup>50,51,57,59,64,67</sup> Experience has shown that within the IMCI strategy, ‘nutrition education’ (or CFBC) is a mechanism for achieving improved breastfeeding and complementary feeding practices.<sup>77</sup> With regard to GMP, activities were traditionally carried out at crowded

health centers, which limited counseling opportunities and presented time and money constraints. Despite several criticisms of GMP,<sup>78</sup> these interventions have shown that regular growth monitoring and nutrition counseling home visits can improve complementary feeding practices.<sup>57,59,61,67</sup> Critical to the success of GMP is caregiver understanding of growth patterns, counseling with follow-up, and well-designed counseling materials.<sup>73</sup> Selection, training, and supervision of health staff or community volunteers are also paramount to GMP success.<sup>73</sup>

Although not demonstrated in these select interventions, there is evidence to show that individual peer counselors can improve exclusive breastfeeding practices.<sup>79</sup> The process is participatory in that the communities select their respective counselors. Future research should consider this as a possibility for improving complementary feeding practices.

Finally, by involving influential community members and family decision-makers in the intervention, caregivers are more likely to accept and use practices that will improve child nutrition.<sup>32,39,40,58</sup> This approach recognizes that women need support in making behavioral changes and often cannot use family resources or participate in educational events without the consent of family members. An intervention for nomadic ethnic groups in Iran found that by including the tribal leaders and educated daughters of the target families—people highly regarded in the society—they were successful in changing mothers’ feeding habits.<sup>39</sup> In Bangladesh, where women have limited decision-making power in the household, monthly community meetings were held for male heads of households, older family members (grandmothers), and local leaders to include them in the decision-making process of the intervention.<sup>32</sup> In Indonesia and Mali, men were sensitized on the nutritional needs of women and children and encouraged to buy nutrient-rich foods for the entire family.<sup>60,61</sup>

### **Monitoring and evaluation**

While it is not within the scope of this paper to go into great detail about monitoring and evaluation, a few things should be said. As BCC activities are being carried out, operational effectiveness (coverage, leakage, efficiency, sustainability) as well as impact (behavior change, child growth) should be measured.<sup>80</sup> Frequent supervision of staff and monitoring of activities are critical to proper implementation of CFBC. Much of the success of the CHWs in Indonesia was due to supervision; here, project staff and government administrative units at various levels

**Frequent supervision of staff and monitoring of activities are critical to proper implementation of complementary feeding behavior change interventions.**

played an important role in monitoring the progress of the program: the performance of the health educators, the contact women had with the project's communications channels, and mothers' recall of the messages.<sup>61</sup> In the Dominican Republic, a nutrition surveillance and internal evaluation system was established to document the implementation of field activities and to monitor the nutritional and health status

of the communities.<sup>59</sup> Field staff record routine weights in a record book, which feeds in to a monthly report on program activities and monitoring indicators. The flow of information from field sites to regional supervisors to the central level provides for program adjustments to be made during monthly and trimestrial meetings.

Several of the interventions engaged local health authorities in the program monitoring and supervision of health workers. In India, health workers at every level of the health center and district health authorities were engaged in carrying out nutritional counseling for mothers during home visits, during immunization clinics and sick child visits, and at neighborhood monthly meetings for caregivers of children younger than 2 years.<sup>21</sup> In China, maternal and child health doctors were responsible for supervising the work of each of the village educators in their respective areas.<sup>67</sup>

Baseline and final evaluations serve to measure the impact of behavioral changes over time, the number of messages received, and the beneficiaries reached. Performance monitoring, media

surveys, and qualitative research are also useful in measuring message dissemination and target audience recall of messages. In addition to measuring outcomes of interventions, it is important to measure the implementation to know how successful programs are carried out. Process evaluations are shown to lead to more effective design and implementation of nutrition education programs.<sup>81</sup> Process indicators such as dose delivered, fidelity to intervention protocol, barriers to implementation, and



Photo: Evelyn Hockstein.

context were useful in evaluating the implementation of a nutrition education intervention integrated into governmental health centers in Peru.<sup>82</sup> All findings should be considered when follow-on programs or new programs are designed. Guidelines for properly managing CBC activities are available.<sup>29</sup>

## Sustainability

For target communities to maintain new behaviors, there must be an element of sustainability in nutrition interventions, in terms of community ownership and utilization of existing resources. Rather than initiating a new program, nutrition education can be integrated into an existing program (e.g., GMP, IMCI), as several of these interventions did.<sup>21,50,51,59-61,67</sup> Messages promoted across maternal and child health programs should be consistent with each other and reflect current published research findings.<sup>80</sup>

Sustainability is an integral part of the rehabilitation sessions (“hearths”) of the positive deviance approach in that all participants contribute locally available and affordable foods and materials. Similarly, mothers attending cooking and feeding demonstrations in Bangladesh brought ingredients to practice preparing and feeding their children new dishes.<sup>31</sup> Promoting optimal complementary feeding practices using locally available foods increases the likelihood that practices will be sustained. Mothers have expressed appreciation for nutrition counseling upon learning that usual family foods can be enriched to provide their infants with improved diets.<sup>34</sup>

Many of the interventions with positive impacts on growth reached the target population through existing health services and community organizations, and through community-selected volunteers.<sup>21,51,57,67</sup> In the case of interventions incorporated into government health clinics, strategic and financial government support are key components to successful implementation.<sup>55</sup> By involving the government in deciding how an intervention is to be delivered, health service providers are more likely to be evaluated by governmental bodies on their work. Furthermore, financial support ensures a continued supply of resources (e.g., educational materials).

One program provided a cash incentive to caregivers who attended health and nutrition educational workshops and brought their children to health facilities for preventative care appointments.<sup>51</sup> This may work during the life of a program, but once the incentive is no longer offered, families may discontinue use of the services. In Peru, nutrition education was incorporated into existing health facilities where no new personnel were added, incentives were kept to a minimum, and the focus was on improving the existing system rather than introducing new workers.<sup>57</sup> By focusing on all personnel involved in infant and young child feeding, collective responsibility is established and more credibility is given to the intervention.<sup>55</sup>

Sustainability has to be considered from the start of designing a program, including minimizing external resources to the greatest extent possible.<sup>55</sup> It has been suggested that having access to a well-organized and professional health service may be a prerequisite for an effective nutrition education intervention.<sup>57,61</sup>

***Concentration on changing the health service, not just individuals...feeds into the idea of an integrated intervention where all health workers/health services...[working with]... infant[s] are involved. This works to build a “culture of nutrition,” where the intervention is a shared responsibility, and [gives] it more credibility/importance within the clinic. ~On implementing nutrition education in government health centers in Peru<sup>55</sup>***

## Recommendations

---

The growth and development of a child is heavily determined by the care and feeding practices they receive during their formative years. The first two years of life is a critical window of opportunity, when infants are most vulnerable to ponderal and linear growth faltering; after which, reversing the effects of linear faltering is very difficult.<sup>83</sup> Culturally appropriate behavior change interventions aiming to improve complementary feeding and caring practices can have a substantial impact on preventing child undernutrition.<sup>6</sup>

Findings from this review suggest that there are several aspects necessary for effective design and implementation of complementary feeding behavior change interventions. Evidence has shown that following the steps outlined in this paper and involving beneficiaries throughout the process increases the impact of BCC interventions.<sup>29,80</sup> The most salient points derived from this review include:

- **Situation analysis/formative research:** There are many approaches to conducting formative research that can effectively identify positive and negative feeding practices, the locally available resources for addressing problems, barriers to and facilitators of improved behavior adoption, and communications channels for reaching people. Methods employed include reviews of existing data, IDIs, FGDs, observations, dietary recalls, recipe trials, market surveys, TIPs, and PDI. The key is that the approaches are participatory and involve negotiating with numerous households to identify the best context-specific practices.
- **Behavior change strategy:** Although each approach was different, almost every intervention developed behavior change strategies from existing information and formative research findings. The beneficiaries' needs and interests should shape each strategy. Commonly, strategies include the behaviors to be promoted, components of the communications strategy, training, behavior change activities, and any other activities (changes in services or policies) that will reduce barriers to adoption of improved behaviors.
- **Communications strategy (messages and audience, communications materials and channels):** Overall, messages should be specific, with clear and practical instructions; be based on a few recommendations rather than too much information; promote behaviors that are culturally acceptable and feasible; promote locally available and affordable foods; be motivating and show the benefits of adopting behaviors; and suggest ways of overcoming constraints.<sup>35</sup> In most of these interventions, the messages and associated audiences, and communications materials and channels were developed in collaboration with beneficiaries during formative research. Influential community members and family decision-makers should be considered when developing messages, as caregivers will be more likely to accept and use practices if they are supported at the community and household levels. Both interpersonal and mass media channels should be identified according to the specific environment.
- **Program implementation (training, behavior change activities, monitoring and evaluation, sustainability):** Individual counseling for primary caregivers with context-specific messages and ongoing support of them is effective in changing behaviors. Many of the programs carried out individual counseling with caregivers through home and clinic



visits. While one-on-one nutritional counseling is shown to be a more effective approach to changing behaviors, some group counseling/group education can have a positive impact. Group counseling took place mainly through cooking and feeding demonstrations. A key component of both is negotiating behavior change by encouraging caregivers to use their own resources to address problematic feeding practices. Successful negotiated behavior change is dependent on health workers having adequate counseling skills and time to conduct routine follow-up visits with caregivers. This also requires ongoing training for and frequent supervision of staff.

Several of the interventions integrated CFBC into existing GMP and health programs. Using existing facilities and health workers or community volunteers already closely engaged with the community contributes to the sustainability of an intervention. Furthermore, programs have the potential to be sustainable when households are encouraged to optimize use of existing community and family resources toward improving nutrition.

On the basis of this review and supportive evidence, it can be concluded that complementary feeding behavior change programs without external food support can result in improved child nutritional status. While interventions have shown to have a modest impact on growth, further research is needed to identify behavior change approaches that would have an even larger impact on growth. Part of this may include increasing the frequency of support so that when a feeding problem occurs, it can be resolved immediately. Increased support—whether through an individual or group approach—will depend on interventions that can be sustained at the community level.

## References

---

1. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, Mathers C, Rivera J. Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet*. 2008;371(9608):243–260.
2. Mendez MA, Adair LS. Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood. *Journal of Nutrition*. 1999;129(8):1555–1562.
3. Pollitt E, Husaini MA, Harahap H, Halati S, Nugraheni A, Sherlock AO. Stunting and delayed motor development in rural West Java. *American Journal of Human Biology*. 1994;6(5):627–635.
4. Grantham-McGregor SM, Walker SP, Himes JH, Powell CA. The effect of nutritional supplementation and stunting on morbidity in young children: the Jamaican study. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 1993;87(1):109–113.
5. Fawzi WW, Herrera MG, Spiegelman DL, el Amin A, Nestel P, Mohamed KA. A prospective study of malnutrition in relation to child mortality in the Sudan. *American Journal of Clinical Nutrition*. 1997;65(4):1062–1069.
6. Shrimpton R, Victora CG, de Onis M, Lima RC, Blossner M, Clugston G. Worldwide timing of growth faltering: implications for nutritional interventions. *Pediatrics*. 2001;107(5):1–7.
7. Barker DJP. *Mothers, Babies and Health in Later Life*. Second edition. New York, NY: Churchill Livingstone; 1998.
8. Leon D. Fetal growth and adult disease. *European Journal of Clinical Nutrition*. 1998;52: S72–S82.
9. Haas JD, Brownlie TI. Iron deficiency and reduced work capacity: a critical review of the research to determine a causal relationship. *Journal of Nutrition*. 2001;131(2S-2):S676–S688.
10. Haas JD, Martinez EJ, Murdoch S, Conlisk E, Rivera JA, Martorell R. Nutritional supplementation during the preschool years and physical work capacity in adolescent and young adult Guatemalans. *Journal of Nutrition*. 1995;125(4):1078–1089.
11. Caulfield LE, de Onis M, Blossner M, Black RE. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. *American Journal of Clinical Nutrition*. 2004;80(1):193–198.
12. Branca F, Ferrari M. Impact of micronutrient deficiencies on growth: the stunting syndrome. *Annals of Nutrition and Metabolism*. 2002;46(Suppl 1):8–17.
13. Victora CG, de Onis M, Hallal PC, Blössner M, Shrimpton R. Worldwide timing of growth faltering: revisiting implications for interventions. *Pediatrics*. 2010;125(3):473–480.
14. Pelto GH, Levitt E, Thairu L. Improving feeding practices: current patterns, common constraints, and the design of interventions. *Food and Nutrition Bulletin*. 2003;24(1):45–82.

15. Dewey KG, Adu-Afarwuah S. Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. *Maternal & Child Nutrition*. 2008;4(Suppl 1):24–85.
16. United Nations Children’s Fund (UNICEF). *Strategy for Improved Nutrition of Children and Women in Developing Countries: A UNICEF Policy Review*. New York, NY: UNICEF; 1990.
17. Allen L, Gillespie S. *What Works? A Review of the Efficacy and Effectiveness of Nutrition Interventions*. United Nations Administrative Committee on Coordination/Standing Committee on Nutrition, Nutrition Policy Paper No. 19, in collaboration with the Asian Development Bank; 2001.
18. Engle PL. Infant feeding styles: barriers and opportunities for good nutrition in India. *Nutrition Reviews*. 2002;60(5 Pt 2):S109–S114.
19. Moore AC, Akhter S, Aboud FE. Responsive complementary feeding in rural Bangladesh. *Social Science & Medicine*. 2006;62:1917–1930.
20. Dewey K. The challenges of promoting optimal infant growth. *Journal of Nutrition*. 2001;131(7):1879–1880.
21. Bhandari N, Mazumder S, Bahl R, Martines J, Black RE, Bhan MK. An educational intervention to promote appropriate complementary feeding practices and physical growth in infants and young children in rural Haryana, India. *Journal of Nutrition*. 2004;134(9):2342–2348.
22. Caulfield LE, Huffman SL, Piwoz EG. Interventions to improve intake of complementary foods by infants 6 to 12 months of age in developing countries: impact on growth and on the prevalence of malnutrition and potential contribution to child survival. *Food and Nutrition Bulletin*. 1999;20(2):183–200.
23. Shi L, Zhang J. Recent evidence of the effectiveness of educational interventions for improving complementary feeding practices in developing countries. *Journal of Tropical Pediatrics*. 2011;57(2):91–98.
24. Kumar D, Goel NK, Mittal PC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. *Indian Journal of Pediatrics*. 2006;73(5):417–421.
25. Saha KK, Frongillo EA, Alam DS, Arifeen SE, Persson LA, Rasmussen KM. Household food security is associated with infant feeding practices in rural Bangladesh. *Journal of Nutrition*. 2008;138(7):1383–1390.
26. Humphrey JH. Child undernutrition, tropical enteropathy, toilets, and handwashing. *The Lancet*. 2009;374(9694):1032–1035.
27. Engle PL, Menon P, Haddad L. *Care and Nutrition: Concepts and Measurement*. FCND Discussion Paper No. 18. Washington, DC: International Food Policy Research Institute; 1996.
28. Menon P, Ruel MT, Loechl C, Pelto G. From research to program design: use of formative research in Haiti to develop a behavior change communication program to prevent malnutrition. *Food and Nutrition Bulletin*. 2005;26(2):241–242.

29. Favin M, Griffiths M. *Communications for Behavioral Change in Nutrition Projects: Nutrition Toolkit Module Number 9*. Washington, DC: The World Bank; 1999.
30. Prabhat J, Mills A. *Improving Health Outcomes of the Poor: The Report of Working Group 5 of the Commission on Macroeconomics and Health*. Geneva, CH: World Health Organization; 2002.
31. Roy SK, Fuchs GJ, Mahmud Z, Ara G, Islam S, Shafique S, Akter SS, Chakraborty B. Intensive nutrition education with or without supplementary feeding improves the nutritional status of moderately-malnourished children in Bangladesh. *Journal of Health, Population and Nutrition*. 2005;23(4):320–330.
32. Roy SK, Jolly SP, Shafique S, Fuchs GJ, Mahmud Z, Chakraborty B, Roy S. Prevention of malnutrition among young children in rural Bangladesh by a food-health-care educational intervention: a randomized, controlled trial. *Food and Nutrition Bulletin*. 2007;28(4):375–383.
33. Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E, Haider BA, Kirkwood B, Morris SS, Sachdev HP, Shekar M. What works? Interventions for maternal and child undernutrition and survival. *The Lancet*. 2008;371(9610):417–440.
34. Paul KH, Muti M, Chasekwa B, Mbuya MNN, Madzima RC, Humphrey JH, Stoltzfus RJ. Complementary feeding messages that target cultural barriers enhance both the use of lipid-based nutrient supplements and underlying feeding practices to improve infant diets in rural Zimbabwe. *Maternal & Child Nutrition*. 2010:1–14.
35. Dicken K, Griffiths M, Piwoz E. *Designing by Dialogue: A Program Planner's Guide to Consultative Research for Improving Young Child Feeding*. Washington, DC: United States Agency for International Development Health and Human Resources Analysis for Africa Project; 1997.
36. Waters HR, Penny ME, Kanashiro HC, Robert RC, Narro R, Willis J, Caulfield LE, Black RE. The cost-effectiveness of a child nutrition education programme in Peru. *Health Policy and Planning*. 2006;21(4):257–264.
37. Horton S. Unit cost, cost-effectiveness, and financing of nutrition interventions. 1992. Available at: [http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469382&piPK=64165421&menuPK=64166093&entityID=000009265\\_3961003064921](http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469382&piPK=64165421&menuPK=64166093&entityID=000009265_3961003064921).
38. Dewey K. *Guiding Principles for Complementary Feeding of the Breastfed Child*. Washington, DC: Pan American Health Organization and the World Health Organization; 2003.
39. Salehi M, Kimigar SM, Shahbazi M, Mehrabi Y, Kolahi AA. Assessing the impact of nutrition education on growth indices of Iranian nomadic children: an application of a modified beliefs, attitudes, subjective-norms and enabling-factors model. *British Journal of Nutrition*. 2004;91(5):779–787.
40. Brown LV, Zeitlin MF, Peterson KE, Chowdhury AMR, Rogers BL, Weld LH, Gershoff SN. Evaluation of the impact of weaning food messages on infant feeding practices and child growth in rural Bangladesh. *American Journal of Clinical Nutrition*. 1992;56:994–1003.

41. Pelletier DL, Frongillo EA, Habicht JP. Epidemiologic evidence for a potentiating effect of malnutrition on child mortality. *American Journal of Public Health*. 1993;83(8):1130–1133.
42. Stephensen CB. Burden of infection on growth failure. *Journal of Nutrition*. 1999;129(Suppl 2):S534–S538.
43. Martorell R, Habicht JP, Yarbrough C, Lechtig A, Klein RE, Western KA. Acute morbidity and physical growth in rural Guatemalan children. *American Journal of Diseases of Children*. 1975;129(11):1296–1301.
44. Victora CG, Barros FC, Kirkwood BR, Vaughan JP. Pneumonia, diarrhea, and growth in the first 4 y of life: a longitudinal study of 5914 urban Brazilian children. *American Journal of Clinical Nutrition*. 1990;52(2):391–396.
45. Hlaing T. Ascariasis and childhood malnutrition. *Parasitology*. 1993;107:125–136.
46. Stephenson LS. *Impact of Helminth Infections on Human Nutrition: Schistosomiasis and Soil-transmitted Helminths*. New York, NY: Taylor and Francis Co.; 1987.
47. Saavedra JM, Henderson RA, Perman JA, Hutton N, Livingston RA, Yolken RH. Longitudinal assessment of growth in children born to mothers with human immunodeficiency virus infection. *Archives of Pediatric & Adolescent Medicine*. 1996;149(5):497–502.
48. Murray LJ, McCrum EE, Evans AE, Bamford KB. Epidemiology of *Helicobacter pylori* infection among 4742 randomly selected subjects from Northern Ireland. *International Journal of Epidemiology*. 1997;26(4):880–887.
49. Moore SR, Lima AA, Conaway MR, Schoring JB, Soares AM, Guerrant RL. Early childhood diarrhea and helminthiases associate with long-term linear growth faltering. *International Journal of Epidemiology*. 2001;30(6):1457–1464.
50. Schroeder DG, Pachon H, Dearden KA, Ha TT, Lang TT, Marsh DA. An integrated child nutrition intervention improved growth of younger, more malnourished children in Northern Viet Nam. *Food and Nutrition Bulletin*. 2002;23(4):50–58.
51. Maluccio JA, Flores R. *Impact Evaluation of a Conditional Cash Transfer Program: The Nicaraguan Red de Protección Social*. FCND Discussion Paper No. 184. Washington, DC: International Food Policy Research Institute; 2004.
52. Schroeder DG, Martorell R, Rivera JA, Ruel MT, Habicht JP. Age differences in the impact of nutritional supplementation on growth. *Journal of Nutrition*. 1995;125(Suppl 4):S1051–S1059.
53. Lakati A, Binns C, Stevenson M. The effect of work status on exclusive breastfeeding in Nairobi. *Asia-Pacific Journal of Public Health*. 2002;14(2):85–90.
54. Glanz K, Rimer BK. *Theory at a Glance: A Guide for Health Promotion Practice*. National Cancer Institute; 2005.
55. In a conversation with Robert RC (October 19, 2010) regarding experience with implementing a nutrition education intervention in a health-based facility.
56. Morgan DL. Practical strategies for combining qualitative and quantitative methods: applications to health research. *Qualitative Health Research*. 1998;8(3):362–376.

57. Penny ME, Creed-Kanashiro HM, Robert RC, Narro MR, Caulfield LE, Black RE. Effectiveness of an educational intervention delivered through the health services to improve nutrition in young children: a cluster-randomized controlled trial. *The Lancet*. 2005;365(9474):1863–1872.
58. Shi L, Zhang L, Wang Y, Caulfield LE, Guyer B. Effectiveness of an educational intervention on complementary feeding practices and growth in rural China: a cluster randomized controlled trial. *Public Health Nutrition*. 2009;13(4):556–565.
59. Catholic Relief Services, CARITAS. *Growth Monitoring and Education: Impact Evaluation of an Effective Applied Nutrition Program in the Dominican Republic, 1983–1986*. Washington, DC: United States Agency for International Development; 1988.
60. Fishman C, Golaz A, Kante D, Dolo K. *Knowledge, Attitudes, Reported Practices and Anthropometric Indicators of Children’s Nutritional Status: Final Evaluation Report*. Washington, DC: Academy for Educational Development; 1996.
61. Sejahtera YI. *The Weaning Project: New Strategies to Improve Infant Feeding Practices: Evaluation of the Indonesian Weaning Project*. Washington, DC: The Manoff Group; 1989.
62. Kanashiro HC, Fukumoto M, Bentley ME, Jacoby E, Verzosa C, Brown KH. Use of recipe trials and anthropological techniques for the development of a home-prepared weaning food in the central highlands of Peru. *Journal of Nutrition Education*. 1991;23(1):30–35.
63. Bentley ME, Dickin KL, Mebrahtu S, Kayode B, Oni GA, Verzosa CC, Brown KH, Idowu JR. Development of a nutritionally adequate and culturally appropriate weaning food in Kwara State, Nigeria: an interdisciplinary approach. *Social Science & Medicine*. 1991;33(10):1103–1111.
64. Santos I, Victora CG, Martines J, Goncalves H, Gigante DP, Valle NJ, Pelto G. Nutrition counseling increases weight gain among Brazilian children. *Journal of Nutrition*. 2001;131(11):2866–2873.
65. Marsh DR, Pachon H, Schroeder DG, Ha TT, Dearden K, Lang TT, et al. Design of a prospective, randomized evaluation of an integrated nutrition program in rural Viet Nam. *Food and Nutrition Bulletin*. 2002;23(4):34–44.
66. Sternin M, Sternin J, Marsh D. *Designing a Community-Based Nutrition Program Using the Hearth Model and the Positive Deviance Approach: A Field Guide*. Westport, CT: Save the Children Foundation; 1999.
67. Guldan GS, Fan HC, Ma X, Ni ZZ, Xiang X, Tang MZ. Culturally appropriate nutrition education improves infant feeding and growth in rural Sichuan, China. *Journal of Nutrition*. 2000;130(5):1204–1211.
68. Keusch GT, Scrimshaw NS. Selective primary health care: strategies for control of disease in the developing world. XXIII. Control of infection to reduce the prevalence of infantile and childhood malnutrition. *Reviews of Infectious Diseases*. 1986;8(2):273–287.
69. Haines A, Sanders D, Lehmann U, Rowe AK, Lawn JE, Jan S, Walker DG, Butta Z. Achieving child survival goals: potential contribution of community health workers. *The Lancet*. 2007;369(9579):2121–2131.

70. Mason J, Hunt J, Parker D, Jonsoon U. Investing in child nutrition in Asia. *Asian Development Review*. 1999;17(1,2):1–32.
71. Lefebvre RC, Flora JA. Social marketing and public health intervention. *Health Education Quarterly*. 1988;15(3):299–315.
72. Bhandari N, Mazumder S, Bahl R, Martines J, Black RE, Bhan MK. Use of multiple opportunities for improving feeding practices in under-twos within child health programmes. *Health Policy and Planning*. 2005;20(5):328–336.
73. McNulty J. *The Status of Programs and Research to Improve Complementary Feeding*. Washington, DC: Academy for Educational Development, Center for Nutrition; 2006.
74. Bhattacharyya K, LeBan K, Winch P, Ten M. *Community Health Worker Incentives and Disincentives: How They Affect Motivation, Retention and Sustainability*. Arlington, VA: Basic Support for Institutionalizing Child Survival project for the United States Agency for International Development; 2001.
75. LINKAGES Project. *Behavior Change Communication for Improved Infant Feeding: Training of Trainers for Negotiating Sustainable Behavior Change*. Washington, DC: Academy for Educational Development; 2004.
76. Guptill KS, Esrey SA, Oni GA, Brown KH. Evaluation of a face-to-face weaning food intervention in Kwara State, Nigeria: knowledge, trial, and adoption of a home-prepared weaning food. *Social Science & Medicine*. 1993;36(5):665–672.
77. Winch PJ, Leban K, Casazza L, Walker L, Percy K. An implementation framework for household and community integrated management of childhood illness. *Health Policy and Planning*. 2002;17(4):345–353.
78. Victora CG. The association between wasting and stunting: an international perspective. *Journal of Nutrition*. 1992;122(5):1105–1110.
79. Nankunda J, Tylleskar T, Ndeezi G, Semiyaga N, Tumwine JK. Establishing individual peer counseling for exclusive breastfeeding in Uganda: implications for scaling-up. *Maternal & Child Nutrition*. 2010;6(1):53–66.
80. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food and Nutrition Bulletin*. 2003;24(1):5–28.
81. Robert RC, Gittelsohn J, Creed-Kanashiro HM, Penny ME, Caulfield LE, Narro MR, Black RE. Process evaluation determines the pathway of success for a health center-delivered nutrition education intervention for infants in Trujillo, Peru. *Journal of Nutrition*. 2006;136(3):634–641.
82. Robert RC, Gittelsohn J, Creed-Kanashiro HM, Penny ME, Caulfield LE, Narro MR, Black RE. Implementation examined in a health-center delivered, educational intervention that improved infant growth in Trujillo, Peru: successes and challenges. *Health Education Research*. 2007;22(3):318–331.
83. Martorell R, Kettel KL, Shroeder DG. Reversibility of stunting: epidemiological findings in children from developing countries. *European Journal of Clinical Nutrition*. 1994;48(Suppl 1):S45–S57.







Infant and Young Child Nutrition Project  
455 Massachusetts Ave., NW  
Washington, DC 20001

**[www.iycn.org](http://www.iycn.org)**