

Implementation of nutrition education and rehabilitation programs (NERPs) in Viet Nam*

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Abstract

Rigorous assessments of program quality are uncommon in developing countries. We evaluated the quality of the two-week, volunteer-facilitated, caregiver-child rehabilitation “hearth,” or nutrition education and rehabilitation program (NERP), sessions in Save the Children’s integrated nutrition program in Viet Nam. Field workers observed attendance, food contribution, food preparation, meal consumption, health message delivery, hygiene, and weighing at 240 NERP days at 59 NERP centers during seven months of implementation. Participation in cooking NERP meals (75.8%), washing mothers’ and children’s hands (75.7% and 81.6%, respectively), and weighing (74.5% on days 1 and 12) were high, but attendance rates (50.3%), food contributions (20.3%), and health message delivery (20.0%) were lower than expected, all with wide variation among communes, ecology, NERP day, and NERP round. Contrary to protocol, food was often delivered to malnourished children who stayed at home to accommodate caregivers’ workloads and other constraints. While home-delivery of food prevented caregivers from learning from each other in a group, it did bring “tangible messages” (i.e., a large serving size of a new food) to the doorstep. Health volunteers were wise to stress active learning over repetitive message

delivery. In summary, these NERPs were probably typical of previous NERPs although comparable quality measures are lacking. Despite imperfect implementation, the NERP’s active-learning and local problem-solving helped achieve measurable impact on growth, diet, morbidity, and empowerment despite uncommon program challenges, such as uncharacteristically low baseline levels of malnutrition and high population dispersion. Regular quality monitoring may enhance impact even further.

Key words: Hearth, program quality, positive deviance, health volunteer, Viet Nam

Introduction

Outcome evaluations are commonly carried out at the mid- and end-point of project implementation. Rigorous assessments that document how the project was implemented in comparison to what was intended are considerably less common, especially in developing country settings. Process evaluations illuminate the association between intervention and outcomes [1]. In particular, according to Green and Lewis, “process analysis helps us to learn as much as possible about how, why, and under what conditions a program brings about certain outcomes...” [2]. An exclusive focus on outcomes ignores the process of implementation and leaves evaluators unclear about what worked, what did not, and why [3]. Studies that measure an intervention’s quality can lead to improvements in primary health care [4].

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* The ViSION (Viet Nam study to improve outcomes in nutrition) project evaluated the implementation and impact of an integrated nutrition program on the nutritional status, morbidity, diet of, and care for children 5 to 25 months old at baseline in rural Viet Nam, through a partnership among Save the Children/US (Hanoi and Westport, Conn., USA), the USAID-funded LINKAGES Project (Washington, D.C.), Emory University’s Rollins School of Public Health (Atlanta, Ga., USA), and the Research and Training Center for Community Development (Hanoi).

Nutrition education and rehabilitation program (NERP) sessions are local adaptations of “hearths” [5].* Hearths are neighborhood-based (“around a hearth”), 12-day monthly gatherings of caregiver-malnourished infant pairs for whom a trained local volunteer facilitates the adoption of better health and feeding practices for sustained, improved child nutrition. Hearths were first successfully used in Haiti to transfer nutritional rehabilitation of young children from the hospital to the community. The Vietnamese adaptation, the NERP, is a facilitated group of caregivers and toddlers who learn active feeding strategies and other key behaviors, such as food preparation, food handling, and hygiene from the health volunteer (HV) and especially from each other. NERPs help establish new norms (e.g., “Look how *much* my baby can eat! I didn’t think his stomach was that big!”), boost caregivers’ confidence through directly observing improved child affect and growth, and foster the acquisition of new skills and knowledge. Two factors that differentiate NERPs from the traditional approach to malnutrition rehabilitation are social support and a focus on building self-efficacy, which mothers of malnourished children often lack [6, 7]. In general, other nutrition education programs aim to educate mothers with the expectation that education will improve child nutrition and growth. However, as Bandura points out, “Effective personal functioning is not simply a matter of knowing what to do and being motivated to do it” [8]. NERPs provide an environment for creating new habits by facilitating the repetition of positive, culturally acceptable, financially accessible, effective behaviors. A better understanding of how the NERP sessions are implemented will provide insight into the design of nutrition programs in other settings.

In this article, we describe the results of observations conducted during NERP sessions within Save the Children’s community empowerment and nutrition program (CENP) in Viet Nam to compare implementation against design and to clarify the relationship between implementation of this critical intervention and program impact. A specific aim was to evaluate the extent that the outcomes (e.g., diet and growth) that we measured in the ViSION project [9] could be due to the NERPs.

Methods

Intervention as designed

Details of all intervention components are discussed

elsewhere [9]. While the intervention included a number of program elements, including training of trainers, growth monitoring and promotion (GMP), de-worming, positive deviance inquiries, and the NERP sessions, only NERP quality will be described here. According to training materials [10] which were used to create process evaluation indicators and to train the observation team, the goals of NERP were to transfer skills to caregivers regarding planning meals from high quality locally available foods and improving feeding and caring practices so that caregivers could rehabilitate their malnourished children and continue to improve and maintain their children’s enhanced nutritional status at home.

The first NERP included children from the baseline GMP with weight-for-age Z scores (WAZ) less than -2 . Subsequent NERPs included the same children if they had not been rehabilitated plus new children identified with WAZ less than -2 at the most recent GMP where community volunteers used the line demarcating normal versus abnormal on the single sex national road to health cards to categorize children.

Instrument development

The principal investigators, along with senior researchers from the Research and Training Center for Community Development (RTCCD) and Save the Children/US in Viet Nam reviewed training manuals, identified key NERP implementation steps, identified eight elements of successful NERPs (table 1), and developed, piloted, and revised data collection forms. The RTCCD then trained college-educated health professionals with previous data-collection experience to use the observation forms.

NERP sampling and observation

NERP sampling methods varied somewhat throughout the study period. In the first month of implementation (January), two field workers, one in each of two districts, observed all CENP activities, including one complete 12-day NERP to familiarize themselves with the intervention. After observing their assigned NERP, field workers observed other nearby NERPs within the same two communes. Thereafter, one or two field workers either randomly selected two communes daily from a list of all eligible communes and two to three NERPs from each commune (months two, three, and eight) or randomly selected both a commune and a single NERP and then, time permitting, an additional nearby NERP (months four to six). Observers did not assess NERPs in month seven. Field workers gathered data through direct observation and health volunteer interview; they did not share findings with the health volunteer or with other CENP implementers.

* Nutrition Working Group, Child Survival Collaborations and Resources Group (CORE). Positive deviance/hearth: A resource guide for sustainably rehabilitating malnourished children. Washington, D.C. In preparation for publication.

TABLE 1. Program elements for ensuring NERP quality

Program element	Standard	Rationale
NERP size (no. of caregiver-child pairs)	5–10	Helps foster interaction and participation among caregivers without overloading facilitator.
Attendance	12 days per NERP round	Interaction between caregivers and health volunteers is encouraged and new behaviors are reinforced. Two weeks is adequate for caregivers to begin to notice improvements in the recovering child's behavior and affect, further motivating families to adopt new behaviors.
Contribution of PD food	Daily	Caregivers "practice the practice" of incorporating new foods into the child's diet, thus routinizing the behavior change necessary to maintain improvements in nutritional status.
Food preparation	In rotation, 2 caregivers at a time	Caregivers practice preparing new meals, which incorporate positive deviant and other high quality foods.
NERP meal eaten at center	Daily	Promotes interaction among caregivers and health volunteer, assures that malnourished children receive supplemental meals, promotes varied active feeding maneuvers, and demonstrates how much children are able to eat.
NERP message delivered	Daily	Caregivers learn positive behaviors, such as immunizations, breastfeeding, care for sick children, and recognizing danger signs.
Hygiene	Daily	Caregivers practice hygiene behaviors, such as washing children's hands before every meal and clipping children's fingernails.
Growth monitoring	Day 1 and 12, before eating	Caregivers observe how much their children's nutritional status has changed and are encouraged to continue practicing new behaviors and preparing new recipes at home to sustain rehabilitation.

Data management and analysis

Data were entered into MS Excel (Redmond, Wash., USA, 2000) and later imported into Epi Info version 6 [11] for analysis.

Variable definitions

Variables were NERP-level, caregiver-level, or child-level observations. NERP-level variables include NERP size (the number of enrolled caregiver-child pairs), food preparation (the percent of NERPs to which one or more caregivers helped prepare the communal meal), NERP message delivery (the percent of NERPs at which health volunteers presented a behavior change message), and growth monitoring (the percent of NERPs that had child weighing on the scheduled day). Caregiver-level variables included contribution of PD food (the percent of attending caregivers plus those who had meals home-delivered who donated food) and hygiene (the percent of attending caregivers who washed their children's hands, their own hands, or did not feed the child food that fell on the floor or ground). Child-level variables included attendance (the percent of enrolled children present) and NERP meal eaten at center (the percent of children provided a NERP meal, either at the NERP or at home, who ate it at the NERP center). The NERP round refers to the month of the NERP session (1–8 = January–August).

The NERP day refers to the day of the week of the two-week NERP round (1–12 = Monday–Saturday, twice, i.e., 1 = the first Monday, 2 = the first Tuesday, 7 = the second Monday, and so on.).

We identified independent variables that might be associated with NERP quality. These included ecology, day of the NERP round, the NERP round, and commune. For example, attendance might be a function of ecology since lowland (paddy) communes are more densely populated and economically advantaged than the sparsely settled, forested midland and highland areas. Similarly, attendance might vary within the 12-day NERP schedule or by NERP round according to patterns of morbidity, food availability, or agricultural season. The commune itself could affect quality due to demographic, political, or organizational differences.

We used the chi-square statistic to assess differences in proportions. Significance for all analyses was defined as a *p* value less than or equal to 0.05.

Results

Field workers observed 282 NERP-days (days 1–12, inclusive) in all six intervention communes during seven months of the nine-month study period. We have complete data for 240 NERP-days, the basis of this report. All of the missing data come from the first NERP round when the researchers familiarized them-

selves with program implementation. Separate analyses compared NERP-days with missing data with those with complete data. There were few differences, so the days with missing observations were deleted. Observations at the 240 NERP days occurred at 59 different NERP centers, 48 of which had multiple observations (mean 4.78 ± 3.85], range 1 to 23 observations).

Size

The observed aggregate NERPs had, on average, a total of 253 enrolled children per month over the course of the study. Individual NERP size varied widely (mean

7.4 ± 3.0). Less than one third (29.2%; 70 of 240) of all NERP centers enrolled the recommended number of five to ten children. Most (60.4%) had one to four children; few (2.5%) had more than 10 children; and some (7.9%) had no children enrolled.

Attendance

Half of all children (50.3%; 891 of 1770) on NERP rosters were present on the observation day (table 2). NERP attendance was lower in months three and six than in other months (44.7% and 44.9% versus 50.3% to 66.4%, $p < .001$), and higher during the first two

TABLE 2. NERP performance: Key quality parameters, by likely determinants

Determinants	Attendance ^a		Contribution of PD food ^b		NERP meal eaten at center ^c		Food preparation ^d		NERP message delivered ^e	
	#/n	(%)	#/n	(%)	#/n	(%)	#/n	(%)	#/n	(%)
Overall	891/1,770	(50.3)	290/1,428	(20.3)	891/1,428	(62.4)	182/240	(75.8)	48/240	(20.0)
Commune										
14	207/314	(65.9)	32/291	(11.0)	207/291	(71.1)	29/32	(90.6)	4/32	(12.5)
15	116/259	(44.8)	18/228	(7.9)	116/228	(50.9)	14/24	(58.3)	4/24	(16.7)
16	93/244	(38.1)	31/200	(15.5)	93/200	(46.5)	23/28	(82.1)	3/28	(10.7)
24	88/214	(41.1)	69/201	(34.3)	88/201	(43.8)	28/38	(73.7)	2/38	(5.3)
25	221/505	(43.8)	69/316	(21.8)	221/316	(69.9)	47/75	(62.7)	22/75	(29.3)
26	166/234	(70.9)	71/192	(37.0)	166/192	(86.5)	41/43	(95.3)	12/43	(27.9)
District										
1	416/817	(50.9)	81/719	(11.3)	416/719	(57.9)	66/84	(78.6)	11/84	(13.1)
2	475/953	(49.8)	209/709	(29.5)	475/709	(67.0)	116/156	(74.3)	36/156	(23.1)
Ecology										
High-/Midland	497/1,031	(48.2)	150/920	(16.3)	497/920	(54.0)	94/122	(77.0)	14/122	(11.5)
Lowland	387/739	(52.4)	140/508	(27.6)	387/508	(76.2)	88/118	(74.6)	34/118	(28.8)
NERP day										
1–2	225/368	(61.1)	53/304	(17.4)	225/304	(74.0)	39/49	(79.6)	18/49	(36.7)
3–4	162/375	(43.2)	68/300	(22.7)	162/300	(54.0)	42/52	(80.8)	8/52	(15.4)
5–6	118/255	(46.3)	23/211	(10.9)	118/211	(55.9)	15/30	(50.0)	4/30	(13.3)
7–8	80/168	(47.6)	41/119	(34.5)	80/119	(67.2)	21/28	(75.0)	6/28	(21.4)
9–10	107/214	(50.0)	43/186	(23.1)	107/186	(57.5)	26/30	(86.7)	5/30	(16.7)
11–12	199/390	(51.0)	62/308	(20.1)	199/308	(64.6)	39/51	(76.5)	7/51	(13.7)
NERP round										
1 Jan 2000	77/116	(66.4)	15/98	(15.3)	77/98	(78.6)	7/15	(46.7)	6/15	(40.0)
2 Feb	212/394	(53.8)	72/322	(22.4)	212/322	(65.8)	43/54	(79.6)	25/54	(46.3)
3 Mar	163/365	(44.7)	45/296	(27.6)	163/296	(55.1)	36/47	(76.6)	7/47	(14.9)
4 Apr	115/261	(52.6)	46/197	(23.4)	115/197	(58.4)	32/37	(86.5)	4/37	(10.8)
5 May	123/234	(52.0)	49/202	(24.3)	123/202	(60.9)	25/35	(71.4)	4/35	(11.4)
6 June	157/302	(44.9)	53/245	(21.6)	157/245	(64.1)	28/36	(77.8)	0/36	(0)
8 Aug	44/98	(50.3)	10/75	(13.3)	44/75	(58.7)	11/16	(68.8)	2/16	(12.5)

a. #/n, no. present / no. enrolled, as %.

b. #/n, No. contributed / (no. in attendance plus no. who had NERP meal delivered), as %.

c. #/n, No. of children eating NERP meal at NERP center / no. of children who ate NERP meal, as %.

d. #/n, No. of meals at least one caregiver cooked / no. NERP days, as %.

e. #/n, No. of NERP sessions where message given / no. of NERP sessions, as %.

days than in subsequent NERP days (61.1% versus 43.2% to 51.0%, $p < .001$). Two communes had higher attendance than the other four (65.9% and 70.9% for communes 14 and 26 versus 38.1% to 44.8% for the others, $p < .001$). A few NERPs (7.9%; 19 of 240) had no children present. Curiously, despite the absence of children at these NERPs, about half the mothers contributed food (58%; 11 of 19) and helped prepare the meal (53%; 10 of 19).

Contribution of PD food

The daily food contribution was low overall (20.3%; 290 of 1428) of mothers contributing on the observation day). Stated another way, most NERPs (76.3%; 183 of 240) had at least one mother contributing on the observation day, but far fewer (26.3%; 63 of 240) had at least two mothers contributing. Contribution was higher during the third NERP round as compared to the other rounds (31.9% versus 13.3% to 24.3%, $p < .05$). Food contribution rates varied widely by commune (7.9% to 37.0%) and district (11.3% versus 29.5% for districts one and two, respectively, $p < .001$) without discernable relationship to ecology (fig. 1).

NERP meal eaten at center

Children were most likely to eat NERP meals at the NERP center (62.4%). The practice of eating at the NERP center varied across potential explanatory variables. For example, children in lowland commune 26 were 4.6 times (95% confidence interval: 2.9, 7.2) more likely to consume the NERP meal at the NERP center than counterparts from other communes. NERPs in district two again out-performed those in district one in providing center-based meals (67% versus 57.9%, $p < .001$). The January NERP round had the highest rate of children eating at the NERP center as

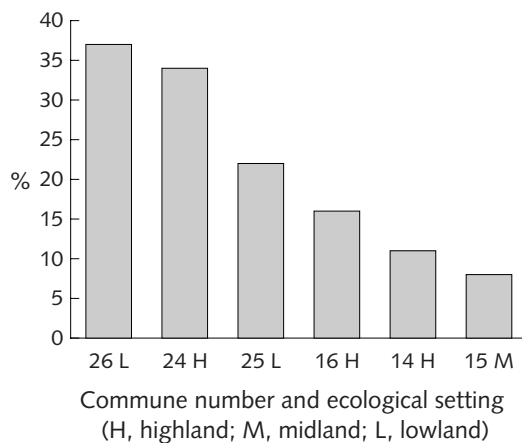


FIG. 1. Caregivers' contribution rates of PD foods to NERP sessions, by commune and ecological setting

compared to all other rounds (78.6% versus 58.4% to 65.8%, $p < .01$).

Food preparation

NERPs performed well overall in involving at least one caregiver in meal preparation (75.8%; 182 of 240). Communes 14 and 26 were far more successful than all other communes at enlisting caregivers to help with cooking (90.6% and 95.3% versus 58.3% to 82.1%; $p < .001$). The standard, meal preparation by "two caregivers at a time," was uncommon (7.1%; 17 of 240).

NERP message delivered

Health volunteers presented health messages on only 20% (48 of 240) of observed NERP days. Days one and two were more likely than days 11 and 12 to have had health messages given (36.7% versus 13.7%; $p < .05$); and messages were provided much more often at rounds one and two than at round eight (40% and 46.3% versus 12.5%; $p = .001$). In addition, NERPs in lowland hamlets presented messages more commonly than those in midland/highland hamlets (28.8% versus 11.5%, $p < .001$), and those in district one out-performed those in district two (23.1% versus 13.1%, $p = .063$).

Hygiene

Proper hygiene before meals and during feeding was consistently observed at NERP centers. Data collectors observed that most mothers washed their own hands (75.7% \pm 34.8) and their children's hands (81.6% \pm 33.9). Few mothers (6.4%) were observed to feed their children in an unhygienic way.

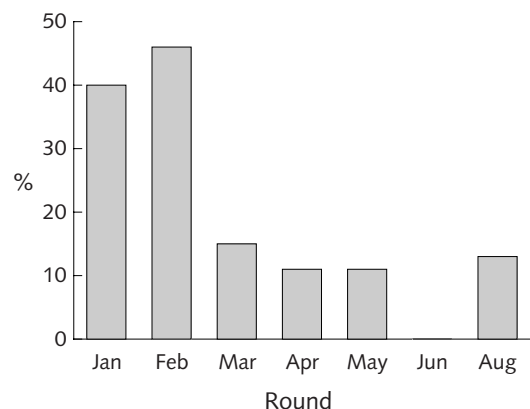


FIG. 2. NERP health message delivery versus NERP round

Figure 2 is not referenced in the text.

Growth monitoring

Health volunteers often (74.5%) weighed children at the beginning of NERP sessions. Children were weighed almost always (87.8%) before eating, consistent with the NERP protocol. Almost all (80.6%; 25 of 31) NERP sessions observed on day 12 included child weighing, and most of those weighings (92.0%; 23 of 25) occurred before the meal.

Discussion

We found mixed results when NERP implementation was compared to intervention design. Caregiver participation in cooking collective NERP meals was consistently high. Similarly, good hygiene behaviors were regularly observed. However, attendance rates at NERP sessions were not high, food was frequently delivered to families of malnourished children who stayed at home, the daily contribution of foods was less than optimal, and behavior change message delivery was quite low.

The “low attendance-good participation” NERPs were epitomized by absent children with present caregivers who contributed food and helped cook meals for home-delivery to these children. This pattern, most obvious when no children were present, occurred at all attendance rates, in all observed communes, and throughout the implementation period. We interpret this as a sign of conviction and support for the program, a phenomenon that should be further studied. We do not know how many of all NERP-eligible children were provided with NERP center meals at home, nor do we know how frequently each absent child received NERP meals. The interpretation would differ if most children received some meals at home or if most children attended all NERP sessions with only a few never attending a single session. Nevertheless, this unexpected change in implementation raises concerns. First, we do not know if absent children, in fact, received and consumed the extra meals. Second, children who received home meals did not benefit from interaction with other children, caregivers, or the health volunteer. Third, caregivers did not benefit from the social support, reinforcing norms, and increased self-efficacy often present at NERPs when caregivers feed their children together. On the other hand, it can be argued that home-delivery is better than no supplemental meal at all. The occurrence of meal delivery to the homes of malnourished children during all seasons and months suggests that neither ecology nor seasonal work demands completely explained the practice.

Most (90%) NERPs operated a system in which mothers cooked and contributed in turn, at variance to protocol. Health volunteers assigned caregivers specific days to both bring food and cook the NERP meal. Thus, the level of daily food contribution (a

caregiver-level indicator) was low despite high participation in cooking (a NERP-level indicator). While assigning food contributions and cooking to one or a few mothers makes logistical sense, circumventing the standard of daily contributions prevents caregivers from regularly “practicing the practice,” an important step in behavior change. Moreover, in about a quarter of observed NERPs, no mother contributed (23.8%), and no mother helped prepare food (24.2%).

NERP messages, intended to inform mothers about good caring, feeding, and health seeking practices, were rarely given at NERPs, perhaps because of their repetitive nature. When messages were presented, health volunteers repeated the messages from days one through six on days seven through 12 according to plan. Since most caregivers attended multiple NERPs (4.5, on average, by month six [12]), boredom with the six basic messages may have discouraged health volunteers from repeating them. Also, in the busy harvest season, mothers insisted that health volunteers let children eat immediately so they could leave for fieldwork without hearing messages. Because message delivery at best plays only a supporting role in the NERP’s behavior change approach, sub-optimal message delivery may not have greatly affected outcome. Practicing a message is more useful than talking about it.

The NERP iterations studied within the context of the ViSION project were atypical in one important way. NERPs usually only enroll children with WAZ less than -3 , but these communes had better than expected levels of child nutrition, which required adjusting the enrolment criteria to WAZ less than -2 . Caregivers of these moderately malnourished children (WAZ between -2 and -3) may have been less motivated than caregivers of severely malnourished children to faithfully attend NERPs, and health volunteers may have been less convinced of the need to rigorously implement NERPs according to standard.

Despite imperfect NERP implementation, participation in the CENP was associated with better dietary intakes [12], improvements in growth for younger malnourished children [13], and reduced rates of acute respiratory infections (ARI) [14]. Moreover, health volunteers developed confidence, and program mothers reported increased knowledge, confidence, and information sharing among their neighbors regarding childcare and feeding [15]. The NERP was key to the CENP impact given its participatory nature, hamlet level reach, 12-day duration, and monthly recurrence. The GMP may have had a NERP multiplier effect, a natural locus for NERP attenders to share their new knowledge and confidence [15].

How do these NERP findings shed light on specific CENP effects? Superficially, one could conclude that imperfect NERP implementation attenuated optimal program impact. Indeed, the impact of this CENP iteration was less than previously observed [16–18],

but the challenges were greater: the untested change to protocol (i.e., enrolling children between -2 WAZ and -3 WAZ, as well as those less than -3 WAZ), lower than expected levels of malnutrition, dispersed population, and varying political will by commune and district. The NERP quality in this “real life” effectiveness study may have been indistinguishable from prior iterations; however, comparative quality data from prior CENP implementations are lacking.

Exactly how the NERP helped to achieve certain CENP outcomes is speculative, but worth considering. Regarding the differential program effect on younger, more malnourished children [13], mothers of these children were likely more motivated both to attend NERPs and to consider behavior change than mothers of less malnourished children. Whether mothers of younger children had more time to attend NERPs than their counterparts with older children is less sure. Regarding the change in diet, such skills-building is the focus of the NERPs. While the common observation of meal home-delivery somewhat contradicts the doctrine of repeated practice for skills transfer, it may have helped adopting new behaviors in other ways. That is, key behaviors were tangibly “brought to caregivers’ doorsteps” for all family members to witness, i.e., a large serving size of a new recipe, perhaps seasoned with enthusiastic encouragement by the health volunteer or other caregiver. Moreover, when the child actually consumed this serving at home, the effect on the family would have been further magnified. Regarding the decrease in ARI (in spite of the NERP’s concentrated gathering of young children) [14], perhaps NERP hygiene messages and especially hand-washing practice reduced the spread of ARI. Perhaps some NERP absenteeism can be explained by mothers correctly keeping ill children at home, thereby reducing transmissibility. Regarding empowering health volunteers and caregivers, adopting new demonstrably effective behaviors is clearly a step toward taking control of the well being of one’s family and community [15]. Furthermore, implementing NERPs at variance to protocol may be an indicator of empowerment, that is, of local experimentation, adaptation, and improvement.

This research has limitations. Sampling was not always random, and some NERPs were over-represented. We did not use multi-variable analysis, which although necessary to identify complex statistical associations, was not required for a description of program quality accessible to programmers. Some indicators sacrificed usefulness for feasibility. For example, NERP message delivery was easy to measure, but of uncertain importance. Perhaps the health volunteers recognized that the messages were a distraction from the more important active learning and wisely

omitted them. On the other hand, developing a reliable indicator to capture participatory skills-transfer is a challenge. Obviously the presence of RTCCD field workers probably affected health volunteer performance; however, few of the indicators were directly in the health volunteers’ control except for message delivery and weighing. A carefully weighed design decision not to share the observations with the health volunteers or the CENP team allowed assessment of a typical NERP intervention (i.e., which lacked performance monitoring), but it prevented assessing NERP quality in response to feedback.

An important next step for research and program planning is to construct a single score that summarizes the quality of NERP implementation according to standard. A valid NERP score, and multi-variable analyses, are necessary to define both the predictors of NERP quality and associations between quality and program outcomes. Two additional areas need further investigation: the importance of daily food contributions versus a rotation and the delivery of food to the children’s homes versus mandatory center-based meal. These modifications may not be worse than the original design, and they may represent improvements by allowing greater compliance and permitting ill children to receive benefits.

In summary, many aspects of the NERPs were implemented according to design and were of high quality. Some aspects were either implemented differently than designed, or of poor quality, or both. We urge programmers to develop and apply simple quality indicators, perhaps like ours, to track and strengthen the implementation of this important intervention. We have no reason to believe that these NERPs were different from many previous NERPs. On balance, this evaluation gives us confidence that the NERPs were implemented in a way and with a high enough quality that many of the positive results we found on child growth, diet, and morbidity, and maternal and health volunteer empowerment in this study can be attributed to the NERPs.

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References

1. Glanz K, Lewis FM, Rimer BK, eds. Health behavior and health education: theory and practice. San Francisco, Calif., USA: Jossey-Bass Publications, 1990.
2. Greene LW, Lewis MM. Measurement and evaluation in health education and health promotion. Palo Alto, Calif., USA: Mayfield Publishing Company, 1986.
3. Britton A, Thorogood M, Coombes Y, Lewando-Hundt G, Sheldon TA, Sowden AJ, Lister-Sharp D. Search for evidence of effective health promotion. *BMJ* 1998;316: 703.
4. Reerink IH, Sauerborn R. Quality of primary health care in developing countries. *Int J for Quality in Health Care* 1996;8(2):131–9.
5. Sternin M, Sternin J, Marsh DR. Field guide: designing a community-based nutrition education and rehabilitation program using the “positive deviance” approach. Westport, Conn., USA: Save the Children and BASICS, December, 1998.
6. Goodfriend M. The importance of psychosocial pediatrics in the developing world. *Trop Doctor* 1999;29: 90–3.
7. Monroe S, Johnson S. Social support, depression and other mental disorders: in retrospect and toward future prospects. In: Veiel H, Baumann U, eds. The meaning and measurement of social support. New York: Hemisphere Publishing Corporation, 1992:93–124.
8. Bandura A. Self-efficacy: the exercise of control. New York: W.H. Freeman and Company, 1997.
9. Marsh DR, Pachón H, Schroeder DG, Ha TT, Dearden KA, Lang TT, Hien ND, Tuan DA, Thach TD, Claussenius DR. Design of a prospective, randomized evaluation of an integrated nutrition program in rural Viet Nam. *Food Nutr Bull* 2002;23(4 Suppl):34–44.
10. Save the Children Federation/US. The poverty alleviation and nutrition program (PANP) training manuals, volumes 1–10. Hanoi: Save the Children, 1997.
11. Dean AG, Dean JA, Coulombier D, Brendel KA, Smith DC, Burton AH, Dicker RC, Sullivan K, Fagan RE, Arner TG. Epi Info, version 6: A word processing, database, and statistics program for epidemiology on IBM-compatible microcomputers. Atlanta, Ga., USA: Centers for Disease Control and Prevention, 1995.
12. Pachón H, Schroeder DG, Marsh DR, Dearden KA, Ha TT, Lang TT. Effect of an integrated child nutrition intervention on the complementary food intake of young children in rural north Viet Nam. *Food Nutr Bull* 2002;23(4 Suppl):59–66.
13. Schroeder DG, Pachón H, Dearden KA, Ha TT, Lang TT, Marsh DR. An integrated child nutrition intervention improved growth of younger, more malnourished children in northern Viet Nam. *Food Nutr Bull* 2002;23(4 Suppl):50–58.
14. Sripaipan T, Schroeder DG, Marsh DR, Pachón H, Dearden KA, Ha TT, Lang TT. Effect of an integrated nutrition program on child morbidity due to diarrhea and respiratory infection in northern Viet Nam. *Food Nutr Bull* 2002;23(4 Suppl):67–74.
15. Hendrickson JL, Dearden KA, Pachón H, An NH, Schroeder DG, Marsh DR. Empowerment in rural Viet Nam: exploring changes in mothers and health volunteers in the context of an integrated nutrition project. *Food Nutr Bull* 2002;23(4 Suppl):83–91.
16. Sternin M, Sternin, Marsh D. Rapid, sustained childhood malnutrition alleviation through a “positive deviance” approach in rural Vietnam: Preliminary findings. In: Wollinka. O, Keeley E, Burkhalter RB, Bashir N, eds. The hearth nutrition model: applications in Haiti, Vietnam, and Bangladesh. Report of a technical meeting at World Relief Corporation Headquarters, June 19-21, 1996, Wheaton, Ill., USA. Arlington, Va., USA: BASICS, 1997:49–61.
17. Sternin M, Sternin J, Marsh D. Scaling up a poverty alleviation and nutrition program in Viet Nam, In: Marchione T, ed. Scaling up, scaling down: capacities for overcoming malnutrition in developing countries. Amsterdam: Gordon and Breach, 1999: 97–117.
18. Mackintosh UAT, Marsh DR, Schroeder DG. Sustained positive deviant child care practices and their effects on child growth in Viet Nam. *Food Nutr Bull* 2002;23(4 Suppl):16–25.