Olney DK, Pedehombga A, Ruel MT, Dillon A. **A 2-year integrated agriculture and nutrition and health behavior change communication program targeted to women in Burkina Faso reduces anemia, wasting, and diarrhea in children 3-12.9 months of age at baseline: A cluster-randomized controlled trial.** J Nutr. 2015; doi: 10.3945/jn.114.203539.

**Introduction**

The potential for agricultural interventions to improve nutritional status has received increasing attention in recent years. However, as noted in Paper 3 of the 2013 Lancet Nutrition Series, evidence for the effectiveness of these programs is generally limited, with the exception of promotion of orange sweet potatoes (1). In particular, many studies have included small sample sizes and/or weak study designs (e.g., lack of control group, lack of baseline, non-random assignment), which limit confidence in the conclusions.

This issue of NNA summarizes an article recently published in The Journal of Nutrition which reports the results of a cluster-randomized, controlled trial designed to assess the impacts on child health outcomes of an agriculture and behavior change communication (BCC) intervention delivered to mothers (2). The authors also applied a program impact pathway framework to assess changes in intermediate outcomes along the two hypothesized impact pathways (from production to consumption of nutrient-rich foods, and from knowledge of infant and young child feeding (IYCF) and health practices to adoption of these practices).

**Methods**

The investigators conducted a randomized controlled trial to test the effects of an Enhanced Homestead Food Production (E-HFP) program implemented by Helen Keller International. Out of 55 eligible communities with access to water during the dry season, 25 were selected as control villages, 15 received the intervention with BCC messages delivered by Health Committee (HC) members, and 15 received the intervention with BCC messages delivered by Older Women Leaders (OWL). The intervention included agricultural activities (distribution of seeds, saplings, chicks, and

small gardening tools; agricultural training at demonstration farms) and a nutrition and health BCC component (messages focused on women's nutrition, anemia prevention and control, iodine intake, prevention of vitamin A deficiency, breastfeeding, complementary feeding, and nutritional care for sick or malnourished children). Participants received two home visits per months by either the HC members or OWLs to learn about optimal practices and discuss successes and challenges. The program was implemented in the intervention villages within 6 months of the baseline survey.

All women who lived in the 55 communities and had a child who was 3-12 months of age at the time of the baseline survey were invited to participate. A follow-up assessment of the same individuals was conducted 2 years after the baseline survey (i.e., when children were 24-39 months of age). The main outcomes included child anthropometry (weight and length/height), hemoglobin concentration, and reported diarrhea in the week prior to the baseline and the endline. The results were expressed by comparing the mean change from baseline to final in each of the intervention groups compared to the control group (the difference-in-difference (DID) method).

In addition, the investigators measured intermediate outcomes that were expected to change throughout the program impact pathway (that is, the chain of events that are expected to occur in order for the program to have the intended impact). These outcomes included production of fruit and vegetables, knowledge of IYCF and handwashing practices, and dietary diversity.

**Results and Conclusions:**

The baseline survey included 1481 participants from the 1767 households that participated in the baseline survey. At baseline, the children's mean age was 7.3 months and 89% were anemic (hemoglobin < 110 g/L). Stunting (31%), underweight (38%) and wasting (28%) were also common. The percentage of households who dropped out of the study was greater in the control group than in the intervention groups, so the investigators adjusted for different drop-out rates during the statistical analysis.

Following the 2-year intervention, there was a marginally significant (P=0.08) decrease in the prevalence of wasting in the HC villages, but not the OWL villages, compared to the control villages (DID = 8.8 percentage points). There were no differences among groups in change in stunting or underweight.

In the HC intervention villages, hemoglobin concentrations increased relative to the control (DID = 0.51 g/dL). The effect was marginally statistically significant in the full age group (3-12.9 months of age at baseline) and significant when restricted to younger children 3-5.9 months of age at baseline. The prevalence of anemia also decreased by 14.6 percentage points in HC villages compared to control villages, but there were not changes in hemoglobin or anemia in the OWL villages relative to control.

The reduction in reported diarrhea prevalence in the HC villages was 15.9 percentage points greater than in the control villages ($P < 0.01$). In addition, a smaller, marginally significant reduction was observed in the OWL villages compared to the control villages (DID = 9.8 percentage points; $P=0.05$).

The authors concluded that the intervention, when delivered by HC members, improved several child health outcomes. This conclusion was supported by changes in several intermediate outcomes along the program impact pathways, including increased production of certain fruits and vegetables promoted by the E-HFP program, and improvements in knowledge of IYCF practices, handwashing behaviors, and dietary diversity scores. These changes suggest that the observed differences in the main outcomes were due to the intervention, rather than to external factors or chance.

**Policy Implications:**

This study demonstrates the capacity for agriculture and nutrition BCC interventions to improve the health of young children. However, the authors also noted that malnutrition was still common in the HC group after the intervention (47% stunted, 9% wasted, and 78% anemic). The authors suggested that intervening earlier (for example, during pregnancy) and conducting the intervention for a longer period of time could help maximize the effects. For example, over the 2-year program timeline, some of the agricultural interventions (fruit trees and chickens) had not yet reached full productivity.

**NNA Editor's Comments ***

The study reported by Olney et al. (2) found that an integrated E-HFP and BCC intervention

significantly increased nutritional status and health of young children in villages where the intervention was implemented by HC members compared to control villages. Unlike much of the available evidence on the impact of agriculture and BCC intervention on health outcomes, the randomized, controlled design and use of impact pathway analysis lend strength to these results. Detailed results from process evaluations of the intervention are also available (3).

The difference in impact between villages where HC members implemented the BCC strategy compared to OWLs raises further questions. The present report did not include an evaluation of the programmatic implementation. Thus, it is not known whether one group of actors may have implemented the strategies more rigorously than the other. However, a qualitative evaluation by the same authors found that HC were more knowledgeable about anemia and were generally more confident about their knowledge then OWL. The difference in impact found in the present study highlights that not only the chosen intervention strategies are important, but also the "messenger" who delivers the BCC program.

Finally, although the intervention significantly improved indices of child health and nutritional status, the size of this effect was modest. Thus, other interventions, in addition to agriculture and behavior change communication, may be needed to minimize stunting, wasting, and anemia.

*These comments have been added by the editorial team and are not part of the cited publication.

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1. Ruel MT, Alderman HA, and the Maternal and Child Nutrition Study Group. Nutrition-sensitive interventions and programmes: how can they help to accelerate program in improving maternal and child nutrition? Lancet. 2013; 382:536-51.

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