



**Nutrition Education with Microcredit
Provided to Caregivers of Pre-School Children:
Effect on Children's Animal Source Food Intake**

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This project examined the effect of providing micro-credit with nutrition education given to caregivers of children two to five years of age. The caregivers were recruited into one of three groups i) Participants (PT; n=108) who received the intervention of micro-credit with nutrition education; ii) Non-participants (NPT; n=98) who lived in the same community as the participants but did not receive the project intervention; and iii) Controls (CNT; n= 238) who lived in other communities that were not part of the intervention community and did not receive the intervention. Socio-demographic data were collected at baseline and each caregiver received four follow-up visits at four monthly intervals. At each visit dietary data were collected using a food frequency questionnaire and weighed food records. Baseline characteristics including wealth rank status did not differ significantly among groups. By the third follow up, children whose caregivers received the project's intervention (PT) had significantly higher intakes of protein, calcium and zinc. PT children consistently had high animal source food (ASF) diversity at each follow up period compared to the NPT and CNT groups. The combination of micro-credit with nutrition education was effective in improving children's ASF intakes among these low-resource rural communities.

Background

A pilot study carried out in three ecological zones of Ghana identified the primary constraints to the incorporation of animal source foods (ASF) into children's diet (Colecraft et al. 2006). Following this, the ENAM project (Enhancing Child Nutrition through Animal Source Food Management) under the Global Livestock Collaborative Research Support Program (GL-CRSP) was initiated with the objective of addressing these constraints. ASF have several benefits. They are a rich source of high quality protein and bioavailable micronutrients such as calcium, iron, zinc and vitamin A. ASF are an exclusive source of vitamin B₁₂ (Neumann and Harris, 1999). Several studies have shown positive associations between children's ASF intake and physical growth, cognitive development, and school performance (Dagnelie et al. 1994, Hirota et al. 1992, Murphy et al. 1994, Teegarden et al. 1999).

Micronutrient deficiencies are widespread among Ghanaian children under five years. About 75% of children age six to 59 months are anemic and about 72% are vitamin A deficient (Ghana Demographic and Health Survey 2003, Ministry of Health, 1999). Micronutrient deficiencies have serious consequences including damage to the immune system, frequent infections, ill health, and poor growth (Gibson and Holtz 2001, Allen and Gillespie 2001).

The ENAM project employed microcredit with nutrition education targeted at mothers as an intervention to improve children's ASF intake. The rationale was that as mothers' income increases, combined with improvement in their nutrition knowledge, they are likely to incorporate ASF in their children's diet. The main hypothesis of the project was that children whose caregivers received the project intervention (micro-credit with nutrition education) would have higher ASF intakes than children whose caregivers did not receive the intervention.

Method. Women with children between two and five years and living in one of the following ENAM project areas were eligible: Winneba (Coastal), Techiman (Forest belt) and Navrongo (Northern Savanna). The women were recruited into one of three groups: i) Participants (PT; n=108) who received the intervention of micro-credit with nutrition education; ii) Non-participants (NPT; n=98) who lived in the same community as the participants but did not receive the project intervention; and iii) Controls (CNT; n= 238) who lived in other communities that were not part of the intervention community and did not receive the intervention. Using structured questionnaires socio-demographic data were collected at baseline. After that, each mother received four follow up (FUP) visits at four monthly intervals

(FUP1 at four months after baseline, FUP2 eight months after baseline; FUP3 12 months after baseline and FUP4 16 months after baseline).

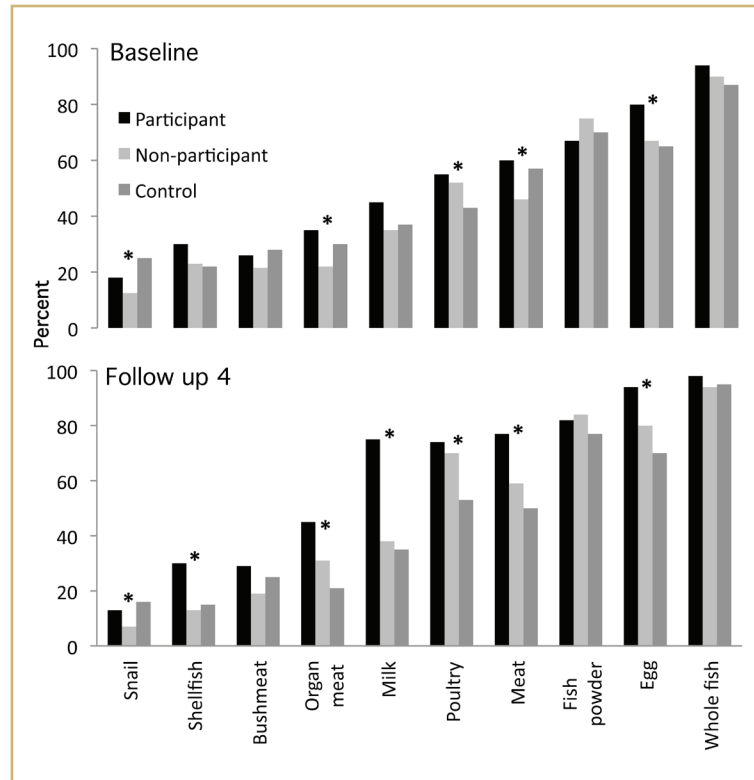
Dietary data collection. Information on the children's intake was collected using food frequency questionnaire (FFQ) and 12-hour weighed food record (WFR). FFQ was used to collect information on the frequency of consumption of selected food items with emphasis on ASF. Using WFR, all foods eaten by the child for two days (one working day and one non-working day) were weighed by a trained assistant in the participant's home for a 12-hour period each day.

Major Findings

Baseline characteristics with respect to male-headed households, wealth ranking (low or medium), occupation, and number of children under five years did not differ significantly between the intervention and the control communities.

Dietary intake. At baseline, with the exception of calcium, which was higher in the participant group compared to the control, none of the nutrient intakes were significantly different (Table 1). However at FUP3, the PT group had significantly higher intakes of protein, calcium and zinc. Figure 1 shows that by FUP4 a higher percentage of the PT children were consuming significantly more ASF than those in the control communities. The children's ASF consumption was captured by an ASF diversity score defined as the number of different ASF consumed in the last seven days (a maximum score of 10). A score of 1 was assigned if a type of ASF was consumed and 0 if none was

Figure 1. Types of Animal source foods consumed at baseline and follow up 4.



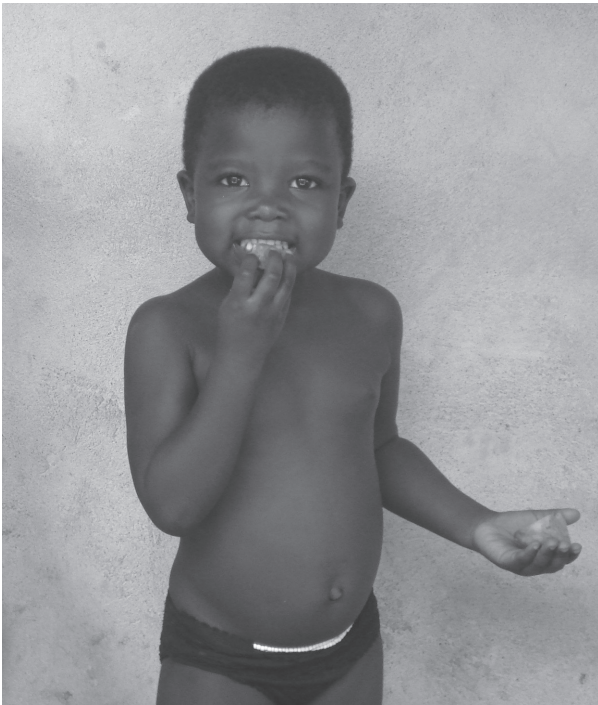
consumed from that category. Figure 2 shows that the PT children consistently had high ASF diversity at each follow-up period compared to the NPT and CNT children. The magnitude of the increase in ASF diversity score between baseline and FUP4 was significantly higher for the PT children (3 to 6) than for the CNT children whose value remained consistently around 2 (Figure 2).

Practical Implications

The findings indicate that the intervention of micro-credit with nutrition education was effective in improving

Table 1. Dietary intakes of study children based on 2-day weighed food records.

	Baseline						Follow up 3					
	Participant		Control		p-value	Participant		Control		p-value		
	mean ± SD		mean ± SD			mean ± SD		mean ± SD				
Energy, Kcal	1118	± 47	1009	± 43	0.09	1097	± 59	941	± 64	0.14		
Protein, g	32.5	± 2.1	25.8	± 1.6	0.12	27.0	± 1.8	20.1	± 1.8	0.008		
Vitamin A, ug RE	500	± 63	465	± 67	0.70	545	± 86	525	± 79	0.87		
Calcium, mg	229	± 24	172	± 12	0.03	185	± 17	123	± 11	0.004		
Zinc, mg	7.5	± 2.1	6.1	± 0.9	0.52	5.2	± 0.5	3.9	± 0.4	0.048		
Iron, mg	12.4	± 0.8	11.4	± 0.7	0.39	12.3	± 1.0	10.1	± 0.9	0.112		



A child having an afternoon snack in one of the ENAM communities in Ghana. Through nutrition education training, the project teaches caregivers important lessons on child nutrition and health. The lessons highlight the importance of giving children healthy snacks, such as fruits or eggs, in between meals to ensure they are meeting their daily nutrient requirements. Photo by Kimberly Harding.

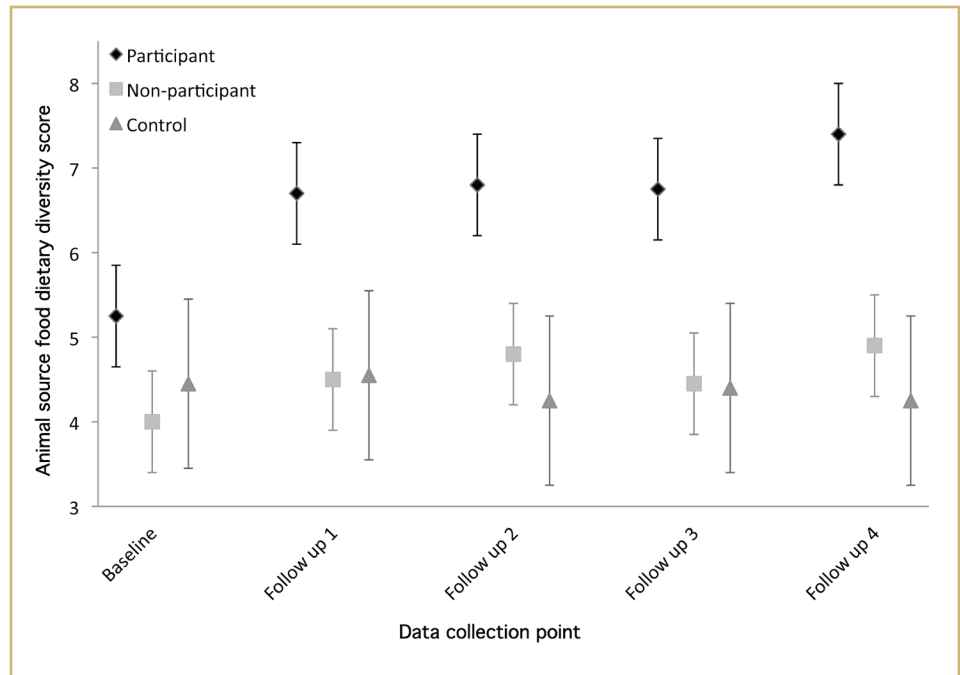
children's ASF intake. The improvement in ASF intake was also seen in the micronutrient intake, especially calcium and zinc. An improvement in the children's diet was seen by 12 weeks (FUP3) after the intervention.

An earlier report of this project found that children of caregivers in ASF-IGA had higher mean dietary ASF diversity scores than children of caregivers engaged in IGA unrelated to ASF (Christian 2008). Assisting women with micro-credit enhanced their ability to purchase ASF.

The addition of the nutrition education component empowered the mothers to make informed decision about incorporating ASF in their children's diet. Interestingly, the non-participants living in the same community increased the ASF to their children to some extent (although lower than the PT group), an indication that some knowledge diffusion may have taken place.

This implies that in disadvantaged communities, such as those participating in the ENAM project, nutrition education alone without support for caregiver income generating activities (IGA) is not likely to yield the expected impact on child ASF intake and subsequently on child nutritional status. A proposed pathway for the effect of the interventions is that nutrition education increased caregiver nutrition knowledge and access to micro-credit improved caregiver's ability to afford different ASF. Alternatively, if caregiver's IGA was ASF-linked, it is likely to increase ASF availability and subsequently lead to an improvement in children's ASF intake.

Figure 2. Animal source foods dietary diversity score by follow up periods for Participants, Non-participants and Control groups.



Further Reading

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The GL-CRSP Enhancing Child Nutrition through Animal Source Food Management (ENAM) project was established in 2003 and, through research, training and outreach, monitors the multiple pathways that might increase availability, accessibility and utilization of animal source foods in the targeted communities of Ghana. The project is led by Dr. Grace Marquis, Iowa State University and McGill University. Email: grace.marquis@mcgill.ca.



The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East and West Africa, Central Asia and Latin America.

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