

**THE NUTRITION-MICROCREDIT SYNERGY:
A CASE FOR MULTIPLE INTERVENTIONS AND STRATEGIES**

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ABSTRACT

Poor diet quality is the primary determinant of the high prevalence rates of malnutrition in Ghana. In this West African country, young children's diets primarily consist of cereals and roots which have both low energy and nutrient density and poor bioavailability of micronutrients. A 2008 national survey reported that over one-third of children consumed no nutrient-rich Animal Source Foods (ASF) on the previous day. An intervention to enhance children's diet and nutritional status was developed based on the assumption that improving knowledge, attitudes, and beliefs of caregivers would lead to increased use of ASF for young children only if ASF availability (presence in the communities) and accessibility (families' ability to obtain ASF through purchase, trade, hunting, or raising animals at home) were also improved. The Enhancing Child Nutrition through Animal Source Food Management (ENAM) project introduced an integrated approach of microcredit and weekly sessions of nutrition education and entrepreneurship training among rural women to increase the use of ASF in the diets of their 2- to 5-year-old children. Although the project may have not reached the poorest women in the community, the integrated activities benefited many households in diverse ways – directly through increased income and improved productivity that improved purchasing power and made foods available in the home, as well as indirectly through the empowerment of women participants. Women reported increased self-confidence, leadership skills, and social capital. Children's diets benefited the most when caregivers were engaged in enterprises related to ASF because they facilitated sharing ASF with children and the high profits from these activities increased mothers' ability to purchase other ASF from the market. Other family members also benefited from the project through women sharing loans for joint economic activities, improving the quality of the diet for the whole family, and sharing new knowledge. Integration of rural bank partners from an early stage of the project helped transfer activities to these permanent institutions to expand and sustain project activities. The ENAM project provided the evidence that an integrated package of microcredit and education can improve household food security and improve the diet and growth of young children living in rural communities.

Key words: Animal source foods, income-generating activities

The prevalence of childhood malnutrition remains elevated in Ghana with stunting rates in 2008 reaching 40% of 18- to 23-month-old children and 28% of all children below five years of age [1]. While there is a recent government initiative to implement school feeding programs throughout the country, no comparable institutional program exists to address malnutrition in the most vulnerable population – infants and young children under five years of age. Among this age group, low energy and micronutrient density of foods is a primary contributing factor to malnutrition [2]. Typical grain porridges (such as of maize or millet) that are given to sub-Saharan African infants are poor substitutes for breast milk [3]. In Nigeria, for example, porridge was estimated to provide only 40 kcal/100 g, little more than half of the energy density of the breast milk that would be replaced by these first complementary foods [4]. Although energy density improves as children transition to family foods, micronutrient inadequacy of the diet often remains a challenge [5]. In Ghana, young children's diets primarily consist of cereals and roots which have poor bioavailability of micronutrients.

The 2008 national Demographic and Health Survey (DHS) found that over one-third (36%) of children consumed no nutrient-rich Animal Source Foods (ASF) the day prior to the survey [1]. A recent in-home observational study of 131 children living in two rural communities of central and northern Ghana reported similar results; 32% of 2- to 5-year-old children consumed no animal products on the day visited [6]. Although almost one-half of these children consumed fish powder, a concentrated source of protein and calcium, the average intake in these communities was miniscule (1.5 g/day/child), providing no significant nutritional benefit to the diet [7]. Only 21% of the children consumed other types of animal-based foods and no child consumed milk or a milk product. Without micronutrient-rich foods, such as animal flesh, eggs, and milk products, in their diet, Ghanaian children living in poor rural communities cannot be expected to meet their nutrient requirements and the childhood malnutrition rates will remain high.

The inadequate dietary intakes and growth and development faltering of Ghanaian children are reproduced throughout sub-Saharan Africa and continue to be a primary limitation to national development. In response to this situation, the Global Livestock Collaborative Research Support Program of the United States Agency for International Development sponsored a two-stage grant support process. Initially, researchers in partnership with key stakeholders developed a problem model for the constraints on availability, accessibility, and utilization of ASF for young children [8]. In the second phase of the project, the Enhancing Child Nutrition through Animal Source Food Management (ENAM) project developed collaborations among many partners including universities (Iowa State University, University of Ghana, and McGill University), government institutions (Ministry of Food and Agriculture, and Ghana Health Services), non-governmental organizations (Freedom from Hunger-Ghana, and Heifer International-Ghana), private rural banks, and communities. These collaborations supported the development of an integrated intervention to address the constraints that were identified in the problem model as limiting factors for nutrition of children living in three rural regions of Ghana. The acronym ENAM worked well for this project as *enam* means animal source food in Twi, a local Ghanaian language.

Partners identified five important constraints on the use of ASF for children's diets: low income, inadequate nutrition knowledge, misconceptions about what foods are appropriate for young children, limited market access, and poor food processing and animal husbandry skills [8]. The problem model was based on the belief that improving knowledge, attitudes, and beliefs of caregivers would lead to increased use of ASF for young children if ASF availability (presence in the communities) and accessibility (families' ability to obtain ASF through purchase, trade, hunting, or raising animals at home) were also improved. The key activities to enhance child nutrition focused on improving caregivers' nutrition knowledge and increasing the productivity and income of rural caregivers.

Nutrition education is a set of 'learning experiences' that facilitate increased knowledge and behavior change to improve nutritional status and health [9]. In a systematic review of young child feeding interventions, Dewey and Adu-Afarwuah [10] analyzed studies that used only an educational intervention approach. Educational interventions typically focused on six areas: (i) continuation of breastfeeding after 6 months, (ii) consistency of food, (iii) inclusion of animal-based foods, (iv) dietary diversity, (v) responsive feeding, and (vi) hygiene. The effect of nutrition education alone on improving child growth and diet quality was mixed. The effect on weight (mean effect size = 0.28; range -0.06 to +0.96) and linear growth (mean effect size 0.20, range +0.04 to +0.64) was modest but positive. Studies in Malawi [11], India [12], and Peru [13] showed some improvement in iron and/or zinc status.

Nutrition education alone may be less effective in areas where poverty limits a caregiver's ability to act on new knowledge [9, 14]. Improving purchasing power for adequate economic accessibility may be needed. Introducing access to loans can enable women to accumulate assets and increase household income that then can be used for food and provide insurance against health shocks [15,16]. As part of Freedom From Hunger (FFH) projects on maternal and child health, MkNelly and Dunford [17, 18] reported that access to microfinance loans for small businesses increased the monthly non-farm earnings in Ghana and Bolivia. Increased income earnings were reported by 90% and 67% of participants, respectively. However, in both countries, there was a large range in economic advancement, with families reporting increased incomes of as little as US\$10/month to as much as US\$300/month. In addition, access to income within the households and household power dynamics may affect how income is spent, leading to wide disparities in food purchases. These findings suggest that not all participating families experience increases; other factors need to be considered when examining the outcomes.

This journal supplement includes a series of papers that describe the ENAM project and parallel, supplemental studies that were carried out to further understand the mechanisms by which an integrated intervention based on education and microcredit improved the well-being of Ghanaian rural households and their young children.

The ENAM project

The ENAM project was a quasi-experimental intervention to increase the use of ASF in young children's diets in rural Ghana. Using an integrated approach of microcredit and weekly sessions of nutrition education and entrepreneurship training with caregivers of 2- to 5-year-old children, the project demonstrated that poor households can improve the quality of their children's diets. By increasing the profitability of small businesses, rural women increased their purchasing power, and with more money and expanded knowledge about nutrition, they decreased household food insecurity and improved the quality of their children's diets and their children's nutritional status[19]. Some of the important lessons that have emerged from the ENAM project and are discussed in this supplement are summarized below.

Lesson 1: The intervention benefitted the poor, but perhaps not the poorest

The selection criteria for ENAM communities included: (i) availability or use of ASF typical to the agro-ecological zone, (ii) presence of community- or household-level livestock/animal-rearing activities, and (iii) logistical accessibility to the community; communities were visited and chosen with the assistance of Ghana Ministry of Food and Agriculture (MOFA) local staff. Whereas the communities were certainly poor, a comparison of the prevalence of three nutritional indicators demonstrated much higher prevalence rates of underweight and wasting in the three regions than in the study communities, suggesting that the selected sites were better off - at least in child nutrition - than other areas in the regions (Table 1).

Enrollment in the intervention communities depended on two independent decision-making steps: (i) the woman's personal decision to request a loan and participate in weekly events and (ii) the acceptance of the woman into a solidarity group of 3-5 women who guaranteed each other's loans. Although all households with children 2-5 years of age in the intervention communities theoretically were eligible for the study, caregivers with very low incomes might not have been willing to divert their time spent earning income to attend weekly meetings. Pronyk *et al.* [20] suggested also that the poorest women may lack the confidence to take on the risk of a loan and may be viewed as a high risk for loan repayment by other solidarity group members, diminishing their opportunity to be part of a solidarity group and a participant in the intervention. Both decision-making steps could have contributed to the poorest households not participating.

The ENAM project used participatory community-based wealth ranking to identify the level of poverty among study participants [21]; 55% of the intervention households were ranked as poor, only slightly lower than non-participating households (63%; group difference was not significant at baseline). However, there were other baseline indicators that suggest that a biased selection occurred in the ENAM project. Compared to families who did not participate in the study, the household heads in intervention families were more educated (40% vs. 51% had some formal education, respectively; $p < 0.05$) and the caregivers had a higher baseline weekly income (3 vs. 6 Ghana cedis [GH¢1 = US\$ 0.77], respectively; $p < 0.05$, see

Christian *et al.*[22] paper in this supplement). Although the baseline prevalence rates for the three nutrition indicators in Table 1 were not significantly different between participating and non-participating households, this may be due, at least in part, to the small sample size (the difference in wasting prevalence would have been significant if the samples were doubled, data not shown). The direction of difference in all of the nutritional indicators is consistent with the assumption that poorer households were less likely to participate.

Baseline characteristics worked synergistically with the intervention. The supplement paper by Butler *et al.* [23] suggests that the benefits of the intervention may not have been distributed equally among participants. They examined factors that influenced the success of ENAM participants. Caregivers, who already had entrepreneurial experience and resources available to them including family support, were seen as those who were able to take the most advantage of the program, including access to larger loans. Women who were doing well before ENAM did even better as a result of ENAM, including multiple businesses or investments, larger loans, better family relationships, and children's welfare.

Lesson 2: Less tangible benefits may be as important as intended benefits for beneficiaries

The specific aim of ENAM project was to increase the ASF intake and nutritional status of young children. The intervention was carried out through small group activities repeated weekly for 16 months. Behavior change most likely occurred not only directly because of increased income through access to loans and knowledge acquisition but also from the empowerment that was linked to the strengthening of social relations among women in the solidarity groups [23]. In a study in South Africa [24], a microcredit intervention was reported to help women obtain greater decision-making and communication within their family as well as greater participation in social groups. Butler *et al.*[23] in this supplement demonstrated that women's participation in ENAM group activities not only increased individuals' self-confidence and leadership skills, but also group cohesion and social capital. Anecdotal reports discussed the importance that these frequent social interactions had for improving the lives of many of the women who reported "improved relationships with customers and others... enhanced self-confidence, perceived independence, and public speaking and teaching abilities".

Lesson 3: Dietary change occurs through multiple pathways

Several of the papers in this supplement (Kobati *et al.*[25], Harding *et al.*[26], Osei-Boadi *et al.*[27]) provide evidence of the inadequacy of the diet in poor Ghanaian households. Micronutrient-rich foods including ASF were scarce, contributing to the observed deficiency in growth and development of young children. Income-Generating Activities(IGA) that were related to ASF (fish smoking, sale of prepared foods) could increase the likelihood that the child would receive ASF in the diet, because of the proximity of the food item. The United Nations International Covenant on Economic, Social and Cultural Rights includes the right to adequate

food(article 11) [28]- a right that incorporates the construct of physical accessibility (adequate access to food through agriculture, hunting/gathering, or market systems) and economic accessibility (cost associated with obtaining food does not compromise a household's ability to meet other basic needs). The paper by Christian *et al.*[22] provides a closer look at the importance of accessibility by examining the association between ASF intake and type of IGA carried out by caregivers. Children benefited the most when caregivers were engaged in ASF-related IGA. These IGA were more profitable than non-ASF-related IGA and improved household purchasing power to obtain ASF in the markets. However, after accounting for household wealth, the diversity of ASF in children's diets still was greater among those households where caregivers were engaged in ASF-related IGA, suggesting a direct benefit because of the proximity of the food. The qualitative interviews supported this interpretation. One mother reported: "*Before the project, I would sell all the fish because I wanted the money. But now, I make sure there is always some fish left at home for them [the children]...*"

Lesson 4: Participants are influenced by and influence their environment

Although the microcredit loans were targeted only to caregivers, the program affected indirectly the entire household as caregivers modified their behaviors in relation to their business and the care of their young children. The support that women received from their families influenced the success of their activities. The Butler *et al.*[23] and Hagan *et al.* [29]papers discuss the benefits from strong family support, which may have included additional capital for the business, assisting directly with the business (helping to sell to customers), or completing household chores to allow the caregiver more time to dedicate to the business. The support was reciprocal. In addition to the young children, family members benefited as some women chose to use their loans to support their husbands' economic activities (for example, purchasing a fishing net to increase the husband's fishing capacity so that there would be more fish to sell), to improve the diet for the whole family, and to share new knowledge with other family members. In the ENAM case studies, this peer teaching was described by the interviewer [23].

"She says that she teaches the ENAM nutritional education to her sister-in-law, who shares in the cooking for the household, so that no matter who cooks, the children enjoy good nutrition. A later conversation with the sister-in-law confirmed that, even though she is not in the ENAM project, she had significant knowledge of the nutritional lessons".

The papers recognize that not all family members provided positive support. Demand for financial assistance or increased conflicts over decisions existed also. The role of women in their households and communities differs across ethnic groups and societies. Interventions that empower women and strengthen the family and community are expected to have the best results.

Lesson 5: Sustainability takes planning

The future of the ENAM approach in Ghana is dependent of the existence of permanent institutions, such as the rural banks, to provide continuity of financial services and education. Three rural banks were trained by Freedom from Hunger-Ghana (using their *Credit with Education* approach) through the ENAM project and now recognize the synergistic effect of nutrition education and microcredit. Two years after the end of the ENAM project, the rural banks provided resources to continue with the nutrition education as an integral component of their on-going microcredit loan program to rural women`s groups in the three areas that were part of the ENAM project. The next step is to strengthen the existing institutions and to expand their use of the model. Expansion to other rural banks requires a permanent support mechanism that could be developed as a package offered through the national oversight institution for rural banks (ARB APEX Bank Ltd.). The package could include training of personnel on bank management skills related to microcredit and community interactions, nutrition education, and a sensitization of the mutual benefits of having educational sessions. The ENAM project provided the evidence that an integrated package of microcredit and education in rural Ghana can improve household food security and improve the diet and growth of young children. Although additional, much more targeted, interventions may be needed to engage the very poorest households, the integrated intervention is a viable approach to introduce the majority of poor households into the private financial system. Now is the time to scale up this model to benefit rural families throughout the country, and to test the model in other African countries.

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Table 1: Comparison of the prevalence of indicators of child malnutrition between the 2003 Demographic and Health Survey¹ regional statistics and baseline survey of participating communities (%)

Indicator ²	Regions ³	Intervention		Control
		Participants	Non-Participants	
Underweight	20.4-32.4	8.9	12.8	16.1
Stunted	29.4-31.7	27.9	29.8	27.4
Wasted	3.0-12.9	0.6	2.9	2.8

¹ Reference [30]

² Underweight: <-2 Z-score weight-for-age; Stunted: <-2 Z-score height-for-age; Wasted: <-2 Z-score weight-for-height

³ Combined range for the Central (coastal), Brong-Ahafo (mid-country), and Upper East (northern) regions

REFERENCES

1. **Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF Macro** Ghana Demographic and Health Survey 2008. Accra, Ghana: GSS, GHS, and ICF Macro. 2009.
2. **Black RE, Allen LH, Bhutta ZQA, Caulfield LA, de Onis M, Ezzati M, Mathers C and J Rivera for the Maternal and Child Undernutrition Study Group** Maternal and child undernutrition: Global and regional exposures and health consequences. *Lancet*. 2008; **371**: 243–260.
3. **Onofiok NO and DO Nnanyelugo** Weaning foods in West Africa: Nutritional problems and possible solutions. *Food Nutr. Bull.* 1998;**19**:27-33.
4. **Guptill KS, Barey SA, Oni GA and KH Brown** Evaluation of a face-to-face weaning food intervention in Kwara state, Nigeria: Knowledge, trial and adoption of a home prepared weaning food. *Soc. Sci. Med.* 1993; **36**: 665 – 672.
5. **World Health Organization** Complementary Feeding: Family Foods for Breastfed Children. WHO/NHD/00.1, WHO/FCH/CAH/00.6. Geneva: WHO. 2000.
6. **Kakpovbia VK** Is Feeding Style Associated with Dietary Intake and Nutritional Status in Ghanaian Children 1-3 Years of Age? MSc thesis. Montreal: McGill University. 2010. http://digitool.Library.McGill.CA:80/R/-?func=dbin-jump-full&object_id=92410¤t_base=GEN01 (Accessed on 8 January 2011).
7. **Harding KB** Dietary Intakes and Nutritional Status of Rural Ghanaian Children: Are Season and Attending Daycare Important Determinants? MSc thesis. Montreal: McGill University. 2010. http://digitool.Library.McGill.CA:80/R/-?func=dbin-jump-full&object_id=32578¤t_base=GEN01 (Accessed 8 January 2011).
8. **Colecraft E, Marquis GS, Aryeetey R, Sakyi-Dawson O, Lartey A, Ahunu B, Canacoo E, Butler LM, Reddy MB, Jensen HH and E Huff-Lonergan** Constraints on the use of animal source foods for young children in Ghana: A Participatory Rapid Appraisal approach. *Ecol. Food Nutr.* 2006; **45**: 351-377.
9. **Contento IR, Balch GI, Bronner YL, Olson CM, Lytle LA and SS Swadener** The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: A review of research. *J.Nutr. Educ.* 1995;**27**:277-422.
10. **Dewey KG and S Adu-Afarwuah** Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. *Matern.Child Nutr.* 2008;**4**(Suppl 1):24-85.

11. **Hotz C and RS Gibson** Participatory nutrition education and adoption of new feeding practices are associated with improved adequacy of complementary diets among rural Malawian children: a pilot study. *Eur. J.Clin. Nutr.* 2005; **59**:226-237.
12. **Kapur D, Sharma S and KN Agarwal** Effectiveness of nutrition education, iron supplementation or both on iron status in children. *Indian Pediatr.* 2003; **40**:1131-1144.
13. **Penny M, Creed-Kanashiro H, Robert R, Narro R, Caulfield L and RE Black** Effectiveness of an educational intervention delivered through the health services to improve nutrition in young children: A cluster-randomised controlled trial. *Lancet.* 2005;**365**:1863-1872.
14. **Ruel MT, Habicht JP, Pinstруп-Andersen P and Y Gröhn** The mediating effect of maternal nutrition knowledge on the association between maternal schooling and child nutritional status in Lesotho. *Am. J.Epidemiol.* 1992;**135**(8):904-914.
15. **Kurtz K and C Johnson-Welch** Enhancing women's contributions to improving family food consumption and nutrition. *Food Nutr.Bull.* 2001;**22**:443-453.
16. **Doocy S, Teferrab S, Norell D and G Burnham** Credit program outcomes: coping capacity and nutritional status in the food insecure context of Ethiopia. *Soc. Sci.Med.* 2005;**60**:2371-2382.
17. **MkNelly B and C Dunford** Impact of credit with education on mothers and their young children's nutrition: Lower Pra Rural Bank credit with education program in Ghana. Davis, California: Freedom from Hunger and Program in International Nutrition, University of California, Davis. 1998. <http://www.ffhtechnical.org/resources/research-reports/impact-credit-education-mothers-and-their-young-children-s-nutrition-low> (Accessed on 8 January 2012).
18. **MkNelly B and C Dunford** Impact of credit with education on mothers and their young children's nutrition: CRECER Credit with Education Program in Bolivia. Freedom from Hunger Research. Paper No. 5. Davis, Calif.: Freedom from Hunger. 1999.http://givewell.org/files/DWDA%202009/FFH/MKNelly%20and%20Dunford-Bolivia_1999.pdf(Accessed on 8 January 2012).
19. **Marquis GS, Harding KB, Colecraft EK, Lartey A, Sakyi-Dawson O, Ahunu BK, Reddy MB, Jensen HH, Butler LM and E Lonergan** Integrating economic and educational intervention activities in the ENAM project leads to improved child nutritional status in rural Ghana. *FASEB J.* 2009;**23**:352.4.

20. **Pronyk PM, Hargreaves JR and J Morduch** Microfinance programs and better health prospects for Sub-Saharan Africa. *JAMA*. 2007;298:1925-1927.
21. **Simanowitz A, Nkuna B and S Kasim** Overcoming the obstacles of identifying the poorest families: Using participatory wealth ranking (PWR), The CASHPOR House Index (CHI), and other measurements to identify and encourage the participation of the poorest families, especially the women of those families. <http://www.microcreditsummit.org/papers/povertypaper.htm> (Accessed on 8 January 2012).
22. **Christian AK, Lartey A, Colecraft E, Marquis GS, Sakyi-Dawson O, Ahunu B, and LM Butler** The relationship between caregivers' income generation activities and their children's animal source food intake. *AJFAND*. 2012;12:5746-5758.
23. **Butler LM, Kobati GY, Anyidoho NA, Colecraft EK, Marquis GS, and O Sakyi-Dawson** Microcredit-nutrition education link: A case study analysis of Ghanaian women's experiences with income generation and family care. *AJFAND*. 2012;12:5709-5724.
24. **Kim JC, Watts CH, Hargreaves JR, Ndhlovu LX, Phetla G, Morison LA, Busza J, Porter JDH and P Pronyk** Understanding the impact of a microfinance-based intervention on women's empowerment and the reduction of intimate partner violence in South Africa. *Am. J. Public Health*. 2007;97:1794-1802.
25. **Kobati G, Lartey A, Marquis GS, Colecraft EK and LM Butler** Dietary intakes of non-pregnant non-lactating women living in the Winneba and Navrongo areas of Ghana. *AJFAND*. 2012;12:5843-5861.
26. **Harding KB, Marquis GS, Colecraft EK, Lartey A and O Sakyi-Dawson** Participation in communal daycare center feeding programs is associated with improved diet quantity but not quality among rural Ghanaian children. *AJFAND*. 2012;12:5802-5821.
27. **Osei-Boadi K, Lartey A, Marquis GS and EK Colecraft** Dietary intakes and iron status of vegan and non-vegetarian children. *AJFAND*. 2012;12:5822-5842.
28. **The right to adequate food (Art.11)** The Economic and Social Council. United Nations. <http://www.unhcr.ch/tbs/doc.nsf/0/3d02758c707031d58025677f003b73b9> (Accessed on 8 January 2012).
29. **Hagan LL, Colecraft EK, Aryeetey R, Marquis GS, Nti AC and AO Danquah** Microfinance with education in rural Ghana: Men's perceptions of household level impact. *AJFAND*. 2012;12:5776-5788.

30. **Ghana Statistical Service (GSS), Noguchi Memorial Institute for Medical Research (NMIMR), and ORC Macro** Ghana Demographic and Health Survey 2003. Calverton, Maryland: GSS, NMIMR, and ORC Macro. 2004.