GLOBAL LIVESTOCK CRSP

# Does the Type of Income Generating Activity Caregivers Engage in Influence Children's Animal Source Food Consumption?

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*We tested the hypothesis that children of caregivers engaged in Animal Source Food (ASF)-related Income Generating Activities (IGA) were more likely to consume ASF than children of caregivers engaged in IGA unrelated to ASF. Data were collected via interviewer administered survey questionnaires with caregivers of young children in two rural communities from each of the three ecological zones (coastal, forest transitional and interior savannah zones) of Ghana. Approximately 84% of the 529 caregivers who were interviewed engaged in IGAs: of these approximately 31% (n=156) were engaged in an ASF-related IGA. Caregivers engaged in ASF-related IGA earned about 13,000 Ghanaian cedis (US$1.42) more per week than caregivers engaged in IGA unrelated to ASF, but this difference was not statistically significant. Children's consumption of ASF differed by ecological zone. After controlling for the effect of ecological zone, children of caregivers engaged in ASF-related IGA were significantly more likely to have consumed organ meats, shellfish, and milk in the past week than children of caregivers engaged in IGA unrelated to ASF. A caregiver being engaged in an ASF-related IGA was not a significant predictor of their children's ASF diversity score. However, in the coastal and forest zones, children of caregivers engaged in ASF-related IGA tended to have higher mean dietary ASF diversity scores than children of caregivers engaged in IGA unrelated to ASF. Caregivers' engagement in ASF-related IGA may be beneficial to children's dietary ASF intakes. Therefore, efforts to promote ASF-related IGA among more caregivers in the communities studied are likely to improve children's ASF intakes.*

## Background

Animal source foods (ASF) such as meat, milk and eggs have been identified as key components in diets that build and maintain immune function, lean body mass and micronutrient status. ASF are especially critical for child nutrition, as Nutrition CRSP and GL-CRSP studies indicate micronutrient deficiencies associated with a lack of ASF can lead to impaired cognitive performance, poor growth, and even death (Murphy and Allen, 2003). Increasing ASF in children's diets is a crucial component for improved nutrition and community development.

A preliminary qualitative assessment of six rural communities in three ecological zones of Ghana found that two to five year old children do not receive a special diet but share in meals prepared for the whole family (Colecraft et. al. 2006). Consumption of ASF by these children was determined primarily by the quantity available in the household pot, which was often inadequate. The study also found that female caregivers had primary responsibility for purchasing ASF for family meals. GL-CRSP's Enhancing child Nutrition through Animal source food Management (ENAM) project adopted a microcredit strategy to improve caregivers' incomes through financial and educational support for their income generation activities. This intervention strategy is based on the assumption that improved caregivers' incomes, together with nutrition education, will enhance caregiver's purchasing power for ASF for family meals, and hence enhance the ASF quality of children's diets. This assumption is consistent with the studies that have reported a positive association between women's economic activities and children's nutritional status (Lamontagne et. al. 1998). However, other studies have reported a negative association between women's work and child nutritional status (Abbi et. al. 1991). Based on a review of 50 studies, Leslie (1988) concluded, "no consistent pattern of a negative or a positive relationship, either between women's economic activities and infant feeding practices, or between women's economic activities and child nutritional status, is evident." In the majority of studies that have assessed the relationship between women's economic engagement and child nutrition, the emphasis has been on income and time availability for child care as mediating variables. Furthermore, while quality of diet and particularly ASF intake is positively associated with child nutritional status, none of the previous studies measured children's dietary intake variables as an intermediate outcome variable.

Given that rural Ghanaian women were responsible for purchasing ASF for household meals, it was hypothesized that the type of IGA they engage in (whether related to ASF or unrelated to ASF) may provide an alternative pathway (from the income and child care pathways) by

which caregivers' economic activities can influence children's ASF intakes and, hence, nutritional status. Baseline data from the ENAM project communities provided the opportunity to test this hypothesis. The objectives of the present analysis were to:

1. Assess whether there are differences in children's consumption of different types of ASF in relation to the type of IGA (whether ASF-related IGA or IGA unrelated to ASF) their caregivers are engaged in;
2. Assess whether the children whose caregivers are engaged in ASF-related IGA have a higher mean ASF diversity score than those whose mothers are engaged in IGA unrelated to ASF; and,
3. Determine whether caregivers' ASF-related IGA significantly predict children's ASF diversity scores.

## Method

As part of the ongoing ENAM project, a baseline survey questionnaire was completed with 529 caregivers with young children (21 to 72 months) in two rural and two semi-rural communities in each of the three ecological zones (coastal savannah, forest transitional, and interior savannah) in Ghana. Data were collected on caregivers' demographic characteristics including major and minor IGA and income earnings from all IGA undertaken by the caregiver. Additionally, caregivers were asked about different ASF consumed by their children in the past seven days. Questionnaires were administered by trained data collectors via face to face interviews with caregivers in their homes. Written informed consent was obtained from each caregiver before the questionnaire was administered.

## Findings

**Socio-demographic characteristics.** Approximately 6% (n=30) of the 529 caregivers interviewed were not engaged in any IGA. Of those who were economically active, approximately 31% (n=156) were engaged in an ASF-related IGA (Table 1). Caregivers in the forest transitional zone were significantly less likely to be engaged in an ASF-related IGA compared to caregivers in the coastal and interior savannah zones. Caregivers engaged in ASF-related IGA were significantly more likely to be unmarried and to be receiving income from their IGA at the time of the survey than those who were engaged in IGA unrelated to ASF. There were no differences between caregivers with ASF-related IGA and those with IGA-unrelated to ASF with respect to proportion of female headed households, years of education completed, and total household size. Caregivers engaged in ASF-related IGA earned about 13,000 Ghanaian cedis (US$1.42) more per week than caregivers engaged in IGA unrelated to ASF, but this difference was not statistically significant. Household wealth classification was similar for the two groups.

**Children's consumption of different ASF.** There were differences in children's consumption of ASF by ecological zone and by their caregiver's IGA classification. With the exception of livestock meats, fish powder and eggs, significantly fewer children in the interior savannah zone, compared to the other two zones had consumed each of the different types of ASF in the last week ($P<0.001$). Significantly more children in the forest transitional zone had consumed red meats (including livestock meats, organ meats and bush meats) in the last week compared to those in the coastal and interior savannah zones ($P<0.0001$). Children's consumption of fish powder was lowest in the coastal savannah zone. Within the ecological zones, there were significant differences in children's ASF consumption relative to the type of IGA that their caregivers were engaged in. In the coastal zone, children of caregivers engaged in ASF-related IGA were significantly more likely to have consumed shellfish, eggs and milk in the past week compared to children whose caregivers were engaged in IGA unrelated to ASF. Consumption of snails was higher for children of caregivers not engaged in ASF-related IGA. In the forest transitional zone, significantly more children of caregivers with ASF-related IGA had consumed organ meats, shellfish and milk in the last week compared to children of caregivers in IGA unrelated to ASF. In the interior savannah zone, children of caregivers in ASF-related IGA were significantly more likely to have eaten organ meats and less likely to have eaten bush meats in the last week. After controlling for ecological zone, children of caregivers engaged in ASF-related IGA were significantly more likely to have consumed organ meats ($P=0.01$), shellfish ($P=0.005$), and milk ($P<0.008$) in the last seven days than those of caregivers in IGA unrelated to ASF. There also tended to be more children of caregivers engaged in ASF-related IGA compared to those whose caregivers were not engaged in ASF-related IGA that ate livestock meats ($P=0.08$), bush meats ($P=0.09$), and eggs ($P=0.09$).

**Dietary ASF diversity score.** Children's dietary ASF diversity score was defined as the number of different ASF consumed in the last seven days (maximum score=10). In the coastal savannah and forest transitional zones, children's mean ASF diversity score tended to be higher for children of caregivers engaged in ASF-related IGA than for children of caregivers in IGA unrelated to ASF. Children's mean ASF diversity score was lowest for children in the interior savannah zone. In linear regression analysis, living in the forest transitional and coastal savannah zones were significant positive predictors of children's dietary ASF diversity ($P<0.0005$) and household low wealth rank tended to be inversely associated with children's dietary ASF diversity score ($P=0.0977$). These three variables explained approximately 24% of the variance in children's ASF diversity score, with living in the forest transitional zone having the strongest influence (partial $R^2=20.56\%$;

P<0.0001). Caregiver's IGA type, number of years of education, weekly income, female or male household head, living in the interior savannah zone, child's age, household size, and medium/high household wealth rank were not significant predictors of children's ASF diversity score. The variance inflation factor was less than ten for all variables included in the linear regression model.

## Practical Implications

ASF provide a variety of micronutrients that are difficult to obtain from plant source foods alone, including vitamin A, vitamin B-12, riboflavin, calcium, iron, and zinc. Deficiencies in these micronutrients can result in anemia, poor growth, rickets, impaired cognitive performance, blindness, neuromuscular deficits and even death. Although fish was the most prominent ASF consumed across all three ecological zones, zonal differences in children's consumption of other ASF particularly livestock meats, organ meats and liver may reflect differential availability and access to these ASF in local markets. This has implications for education efforts to enhance the ASF diversity of children's diets. While any ASF in the diet is good, diversity is important, as different ASF have different levels of micronutrient concentrations. Fish bones are an important source of calcium for Ghanaian children and fish powder is a better source of calcium than whole fish because the bones are ground in; bones in whole fish may pose a danger to children. Educational efforts to increase consumption of fish powder in the coastal savannah may be needed.

Caregivers engaged in ASF-related IGA earned on average US$1.42 more per week than caregivers engaged in non-ASF related activities. Although this difference was not statistically significant (probably due to small sample size) the amount was sufficient for the purchase of reasonable quantities of ASF. ASF-related IGA was not a significant predictor of children's ASF diversity score in the regression analysis. However, the bi-variate analysis for the coastal and forest zones showed a tendency toward higher mean dietary ASF diversity scores for children of caregivers engaged in ASF-related IGA compared to that of children of caregivers engaged in IGA unrelated to ASF. The data does not suggest a positive association between the type of caregivers' and children's ASF intakes independent of income. The influence of income, per se, was not clearly established by the data, again, probably due to the relatively small number of caregivers engaged in ASF-related IGA. However, the data does suggest that children of caregivers, engaged in ASF-related IGA, were more likely to consume milk and organ meats than children of caregivers in IGA, not related to ASF. Promotion of ASF-related IGA among caregivers in the communities studied is likely to improve children's intakes of more micronutrient dense ASF, thereby positively impacting child growth and development in these communities.

| Characteristic | Caregivers' IGA classification | | P-Value[1] |
|---|---|---|---|
| | ASF-related IGA (N=156) | IGA unrelated to ASF (N=343) | |
| **ECOLOGICAL ZONE** | | | |
| Coastal savannah | 55.0 (55) | 45.0 (45) | |
| Forest transitional | 19.0 (38) | 81.0 (162) | |
| Interior savannah | 31.7 (63) | 68.3 (136) | <0.0001 |
| **MARITAL STATUS** | | | |
| Married | 80.7 (126)[2] | 87.9 (299) | |
| Unmarried | 19.2 (30) | 12.1 (41) | 0.0342 |
| **GENDER OF HOUSEHOLD HEAD** | | | |
| Female | 24.4 (38) | 18.1 (62) | |
| Male | 75.6 (118) | 81.9 (281) | 0.1041 |
| **Education completed (y)** | 3.4 ± 0.32[3] | 3.3 ± 0.22 | 0.7093 |
| **Household size** | 6.5 ± 0.21 | 6.7 ± 0.18 | 0.5398 |
| **RECEIVED INCOME EARNINGS FROM IGA AT TIME OF SURVEY** | | | |
| Yes | 98.1 (153) | 74.6 (256) | |
| No | 1.9 (3) | 25.4 (87) | <0.0001 |
| **Weekly income at time of survey (Ghanaian cedis[4])** | 83,325.3 ± 10,413 (153)[4] | 69,414.5 ± 5,310.00 (253) | 0.2235 |
| **HOUSEHOLD WEALTH RANK[5]** | | | |
| Low | 60.9 (95) | 64.1 (220) | |
| Medium/high | 39.1 (61) | 35.9 (123) | 0.4865 |

*Table 1. Selected socio-demographic characteristics of caregivers engaged in ASF-related IGA and caregivers engaged in IGA unrelated to ASF.*

*[1] Significance associated with Pearson Chi-Square Statistics for categorical variables, and Student's t-tests (corrected for unbalanced data) for continuous variables;*
*[2] % (n);*
*[3] mean ± SEM;*
*[4] sample size used for analysis due to missing values and extreme values;*
*[5] approximately 9,100 Ghanaian cedis=1 US dollar; Community key informants provided household wealth ranks (low, medium, high) for the caregivers' households based on their own assessment of the each household's wealth status.*

## 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 contact: 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 West and East Africa, Central Asia and Latin America.


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