



Impact of off-farm income on food security and nutrition in Nigeria

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ABSTRACT

While the poverty implications of off-farm income have been analyzed in different developing countries, much less is known about the impact of off-farm income on household food security and nutrition. Here, this research gap is addressed by using farm survey data from Nigeria. Econometric analyses are employed to examine the mechanisms through which off-farm income affects household calorie and micronutrient supply, dietary quality, and child anthropometry. We find that off-farm income has a positive net effect on food security and nutrition. The prevalence of child stunting, underweight, and wasting is lower in households with off-farm income than in households without. Using a structural model, we also show that off-farm income contributes to higher food production and farm income by easing capital constraints, thus improving household welfare in multiple ways.

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Introduction

Reducing food insecurity continues to be a major public policy challenge in developing countries. Almost 1 billion people worldwide are undernourished, many more suffer from micronutrient deficiencies, and the absolute numbers tend to increase further, especially in Sub-Saharan Africa (FAO, 2008). Recent food price hikes have contributed to greater public awareness of hunger related problems, also resulting in new international commitments to invest in developing country agriculture (e.g., Fan and Rosegrant, 2008). Obviously, agricultural development is crucial for reducing hunger and poverty in rural areas, but non-agricultural growth can be important as well (Diao et al., 2007). Specifically for African countries, with strong population growth and increasingly limited agricultural resources, the potential role of the rural off-farm sector deserves particular consideration. Smallholder farm households usually maintain a portfolio of income sources, with off-farm income being a major component (Barrett et al., 2001). But often a clear policy strategy to promote the off-farm sector is lacking.

In the available literature, considerable attention has been given to the poverty implications of off-farm income in developing countries (e.g., Block and Webb, 2001; de Janvry and Sadoulet, 2001; Lanjouw et al., 2001). In contrast, much less is known on food security and nutrition effects (Chang and Mishra, 2008). Nutrition impacts might be positive, because off-farm income contributes to higher household income and therefore better access to food. But

the impacts might also be negative, at least when controlling for total household income, as working off the farm could potentially reduce household food availability due to the competition for family labor between farm and off-farm work (e.g., Pfeiffer et al., 2009; Huang et al., 2009). A few empirical studies have looked into related linkages, but all of them are confined to issues of household food expenditure or calorie availability. For instance, Reardon et al. (1992) found that diversification into the non-farm sector improves calorie consumption in Burkina Faso. Ruben and van den Berg (2001) obtained similar results for Honduras, and Ersado (2003) showed that non-farm income diversification is associated with a higher level of consumption expenditure in Zimbabwe. We are not aware of studies that have analyzed nutritional impacts from a broader perspective, also taking into account dietary quality, micronutrient consumption, and nutritional outcomes. Here, we address such issues, building on a detailed survey of farm households in Nigeria.

We hypothesize that off-farm income contributes to better nutrition in terms of calorie and micronutrient supply and child anthropometry. In the next section, we present the household survey data. Then, we carry out a descriptive analysis of various nutritional indicators, differentiating between households with and without off-farm income, before using a set of regression models to test the hypothesis more formally. Issues of endogeneity are taken into account by using instrumental variable approaches. In a separate section, we also estimate a system of structural equations, in order to better understand the causal linkages between off-farm income and household nutrition. The last section concludes and discusses policy implications.

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Data and sample characteristics

Household survey

Data used in this article are from a comprehensive survey of farm households in Kwara State, north-central region of Nigeria, which was conducted between April and August 2006. We chose Kwara State because of its considerable socioeconomic heterogeneity and location; it is the gateway between the northern and southern regions, and it has a good mixture of the three major ethnic groups in Nigeria. These factors tend to encourage the development of off-farm activities. Moreover, the nationwide living standard measurement survey conducted in 2004 shows that Kwara State is among the six poorest in Nigeria in terms of prevalence of undernourishment and income poverty (NBS, 2006). The state has a total population of about 2.4 million people, 70% of which can be classified as smallholder farmers. The farming system is characterized by low quality land and predominantly cereal-based cropping patterns. Most farm households are net buyers of food, at least seasonally (KWSC, 2006).

Our sample consists of 220 farm households which were selected by a multi-stage random sampling technique. Eight out of the 16 local government areas in Kwara State were randomly selected in the first stage.¹ Then, five villages were randomly chosen from each selected local government area, and finally, five households were sampled in each of the resulting 40 villages, using complete village household lists provided by the local authorities. Personal interviews were carried out with the household head, usually in the presence of other family members. A standardized questionnaire was used that covered information on household expenditure, consumption, farm and off-farm income, socioeconomic characteristics, and various institutional and contextual variables. Farm income covers commodity sales and subsistence production, both valued at local market prices. Respondents were asked to specify in detail all inputs used, outputs obtained, and prices for the different crop and livestock activities over the 12-months period prior to the survey. Off-farm income includes agricultural wages, non-agricultural wages, self-employed income, remittances, and other income such as capital earnings and pensions. These were recorded separately for all household members, also covering a 12-months period, in order to avoid a seasonality bias.

Food consumption data were elicited at the household level covering 105 food items. Quantities consumed include food from own production, market purchases, and out-of-home meals and snacks. While also here it would be desirable to have annual data that are free from seasonality effects, it is well known that the accuracy of food consumption data is negatively correlated with the length of the recall period (e.g., Bouis, 1994). Hence, we decided to use a 7-day recall in our survey. The interviews were carried out in the lean season, during which household food consumption is often below the annual average. Therefore, the prevalence of malnutrition derived from the data might be somewhat overestimated. This is not a serious problem in our context, because – rather than establishing the prevalence of malnutrition on a representative basis – we are primarily interested in the nutritional impact of off-farm income. However, it is possible that off-farm income helps to better smooth food intake over the year and reduce the consumption decline during the lean season. In that case, our data would overestimate the impact of off-farm income on calorie and nutrient supply for the year as a whole. This should be kept in mind when interpreting the results. Yet the advantage is that we also collected anthropometric data from pre-school chil-

dren. Height-for-age in particular is an indicator of chronic food insecurity, which fluctuates much less seasonally than food consumption. In the 220 sample households, we obtained weight and height data from 127 children up to 60 months of age.

Sample characteristics

Table 1 shows summary statistics of selected household variables. The average household size of five adult equivalents (AE) is consistent with the national average in Nigeria reported by NBS (2006). About 10% of the households are headed by women. The educational status is slightly higher than the national average, which can probably be explained by the fact that the density of elementary schools is relatively high in rural areas of Kwara State. The mean farm size of 1.9 ha is comparable to the national average of 2 ha. The infrastructure variables indicate that many of the farm households do not have access to electricity, tapped water, or a tarred road. The mean distance to the nearest market place is 11.7 km.

Total annual household income is approximately 30 thousand naira (250 US\$) per AE over all income sources. This is somewhat lower than the national average in Nigeria. Farming accounts for half of this total; the other half consists of different off-farm sources. This off-farm income share fits reasonably well into the recent literature from Sub-Saharan Africa (e.g., Barrett et al., 2001; Woldenhanna and Oskam, 2001). In our sample, the role of off-farm income increases with overall household income: while for the poorest income quartile, off-farm income accounts for 31% of total income, it accounts for 60% in the richest quartile. The most important component is self-employed income, which makes up almost half (48%) of total off-farm income. Self-employed activities comprise handicrafts, food processing, shop-keeping, and other local services, as well as trade in agricultural and non-agricultural goods. The rest of the off-farm income is made up of agricultural wages (27%), non-agricultural wages (12%), remittances (11%), and other sources.

Descriptive analysis

Calorie and micronutrient supply

Food quantities consumed at the household level were converted to calories using the locally available food composition table (Oguntona and Akinyele, 1995). Only in very few cases, where certain food items were not included in the local table, USDA (2005) data were used. Resulting calorie values were divided by the number of AE in a household, in order to obtain numbers that are comparable across households of different size.² We define a food secure household as one whose calorie supply per AE is greater than or equal the minimum daily calorie requirement for adult men of 2500 kcal (FAO/WHO/UNU, 1985). Households with lower calorie intakes are considered to be undernourished. In terms of micronutrients, we concentrate on iron and vitamin A, for which deficiencies are particularly widespread in Sub-Saharan Africa (Mason et al., 2005). As for calories, levels of iron and vitamin A supply per AE were calculated based on local and USDA food composition tables. Yet, unlike for calories, we did not compute the prevalence of micronutrient deficiencies, because this would have required vague assumptions on bioavailability, especially for iron. For our purpose it suffices to examine factors that influence gross micronutrient consumption levels.

¹ Local government area is the smallest administrative unit in Nigeria, usually made up of several wards. A ward consists of several villages that are often composed of people of related ethnicity and culture.

² This procedure implicitly assumes that food is distributed equally within each household. More detailed analysis of intra-household distribution is not possible with our data.

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