



# Implications of Non-Farm Work to Vulnerability to Food Poverty—Recent Evidence From Northern Ghana

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**Summary.** — Using survey data from northern Ghana, this study seeks to establish the impact of participation in non-farm work on the vulnerability of resource poor households to food poverty. Vulnerability to food poverty is assessed based on expected future food expenditure of households. The potential endogeneity problem associated with participation in non-farm work by households is overcome using a novel instrumental variable approach. Analysis of the determinants of expected future food expenditure is done using a standard Feasible Generalized Least Squares (FGLS) method. Demographic and socioeconomic variables, location variables, and household facilities are included in the model as control variables. Our study finds that participation in non-farm work significantly increased the future expected food consumption, thereby alleviating the vulnerability of households to food poverty. Our study also confirms that current food poverty and future food poverty, i.e., vulnerability to food poverty, are not independent from each other. Non-farm work plays a crucial role in providing the means to overcome the risk of food poverty in these resource poor households. Policies that promote off-farm income generating activities, such as small businesses and self-employment, as well as the creation and support of businesses that absorb extra labor from the farm, should be encouraged in the study region. Because households in the study region are exposed to above average levels of hunger and food poverty, the study recommends the government of Ghana and development partners to take measures that enhance the resilience of these resource poor households.

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*Key words* — vulnerability, food poverty, instrumental variable, northern Ghana, FGLS

## 1. INTRODUCTION

The Ghanaian economy has achieved sustained growth, averaging about 6% annually since 2001 (World Bank, 2014). In terms of poverty and food security, Ghana met its Millennium Development Goal (MDG) of halving the proportion of hungry people in 2002 and was scheduled to achieve its MDG poverty target in 2015. Based on this remarkable achievement, the World Bank re-classified Ghana as a lower middle income country (World Bank, 2012). However, these achievements are uneven across the country. For example, the northern section of the country, especially the area above the latitude 8°N, has some unpleasant statistics. A significant proportion of the farming and rural population still experiences extreme forms of poverty and food insecurity (Zereyesus, Ross, Amanor-Boadu, & Dalton, 2014). This is problematic because agriculture is the primary source of livelihood for about 50% of households in the country (Quaye, Hall, & Luzadis, 2010), accounting for about one third of the GDP (Breisinger, Diao, & Thurlow, 2009).

The minor in poverty and food insecurity in the north may be largely reflective of the region's much higher rate of subsistence farming, which is dependent on climate sensitive factors, and much lower rate of urbanization. Migrants from northern Ghana to major urban centers in the south in pursuit of "greener pastures" have also been much less successful relative to their southern peers, owing largely to their lower levels of education and skills (World Bank, 2013).

There is a high risk of poverty in northern Ghana, and climate variability is one of the causes (Acheampong, Ozor, & Owusu, 2014). Farmers in northern Ghana are more susceptible to climate variability due to farm characteristics, such as

low income from rain fed agriculture, inadequate information, lack of know-how, lack of access to sufficient and improved farm implement and supplies, storage facilities for water and produce, and other infrastructure. (Acheampong *et al.*, 2014). These farming households are also very vulnerable to macroeconomic shocks such as rapid food price spikes and exchange rate fluctuations.

Farming, the mainstay for many resource-poor households, is inherently risky; it exposes farm households to greater vulnerability to poverty. Assessing the vulnerability to food poverty, a forward-looking measure instead of a static form of poverty, provides a better assessment of food poverty under uncertainty (Pritchett, Suryahadi, & Sumarto, 2000). Kurosaki (2002) observes that farming households in Pakistan employ various coping mechanisms against any risk of poverty incidence, and he notes that households who have better risk coping mechanisms were less vulnerable relative to households with less effective risk coping mechanisms. Kurosaki (2002) also finds that households without risk coping mechanisms experience large reductions in consumption, remain landless, and expose their children to absenteeism in school.

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The non-agricultural sector can play an important role in reducing households' poverty and food insecurity. The empirical support of the impact of non-farm work on poverty and food security in developing countries is well documented (Awoniyi & Salman, 2011; Babatunde & Qaim, 2010; Ersado, 2006; Hoang, Pham, & Ulubasoglu, 2014; Imai, Gaiha, & Thapa, 2015; Owusu, Abdulai, & Abdul-Rahman, 2011; Ruben, 2001). Research shows that non-farm income could provide self-insurance against shocks that may happen to the households, overcome farm credit constraints, enhance farm investment, absorb labor surplus, and ultimately move households out of poverty through increased total income (Barrett, Reardon, & Webb, 2001; Emran & Hou, 2013; Ferreira & Lanjouw, 2001; Hoang *et al.*, 2014; Oseni & Winters, 2009; Owusu *et al.*, 2011; Reardon, Berdegue, & Escobar, 2001; Ruben, 2001).

Much of the empirical evidence focuses on the relationship between non-farm income and poverty in general. On the other hand, research assessing the relationship between non-farm income and vulnerability to food poverty has been limited. In the study area, almost 40% of households have experienced a moderate to severe form of household hunger, an extreme case of household food insecurity (Zereyesus *et al.*, 2014). Given that food security is the primary objective of such impoverished households, it is of paramount importance to examine the impact of non-farm income on these farm households' current and future food consumption. The concept of participation in non-farm work in rural areas includes all economic activities, except agriculture, livestock, fishing, and hunting (Lanjouw & Feder, 2001). For the current study, a farming household is considered to be participating in non-farm work if a household head and/or the spouse of a household head participate in running a small business, are self-employed (i.e., weaving, sewing or textile production), or work as employees.

The study aims to achieve two distinct but related objectives. First, it examines the effect of a household's participation in non-farm work, represented by a binary variable, on the extent of vulnerability to food poverty in the study area. An instrumental variable (IV) method is used to overcome the endogeneity problem associated with non-farm work participation and food consumption expenditure. The IV estimation is done in three steps. Given a set of valid instruments, the parameters of interest are estimated by: first fitting a binary response model (e.g., probit) of non-farm work participation on the instruments, followed by computing the fitted probabilities of non-farm work participation, and then using these fitted probabilities as instruments in the regression model (Adams, Almeida, & Ferreira, 2009).

The second objective of the study tests whether current food poverty and future food poverty, i.e., vulnerability to food poverty, are independent from each other. This is done by estimating the overall prevalence of food poverty and the extent of vulnerability to food poverty in the study area. Given that food expenditure accounts for a significant proportion of the household income in northern Ghana, these households are particularly susceptible to current and future food poverty. Research shows that poverty and vulnerability to poverty may not be directly related to each other (e.g., Novignon, Nonvignon, Mussa, & Chiwaula, 2012). However, when it comes to food poverty, there is some evidence that suggests that households currently food poor are more likely to experience food poverty in the future than households that are not currently food poor. For example, Ozughalu (2014) found that households in Nigeria that were food poor at the time were also exposed to greater food poverty in the future as compared

to non-food poor households. Using the instrumented non-farm work participation described above, a Feasible Generalized Least Squares (FGLS) method is employed to analyze determinants of expected future food expenditure. Results show that participation in non-farm work significantly increased the future expected food consumption of household, thereby reducing their vulnerability to food poverty. It turns out that food poverty and vulnerability to food poverty are also dependent on each other.

The rest of this study is organized in the following manner. The next section develops the conceptual framework, the endogeneity test on non-farm work participation, and the estimation strategy used. This is followed by the discussion of the data and methods used to construct the variables of interest. The results section presents the descriptive statistics of the primary variables and the main empirical results of the estimations. The summary and conclusions section wraps up the study by highlighting the main findings and pointing to specific recommendations for action.

## 2. CONCEPTUAL FRAMEWORK, ENDOGENEITY TEST, AND ESTIMATION STRATEGY

### (a) *Conceptual framework*

The farm household is defined as an economic unit that makes production and consumption decisions (De Janvry & Sadoulet, 2016). Following the farm household model (FHM) literature, a representative household maximizes expected utility ( $U$ ) from the consumption of goods, including food, ( $G$ ) and leisure ( $l$ ) (Chang, Huang, & Chen, 2012; Singh, Squire, & Strauss, 1986). The expected utility function is maximized subject to cash income, labor use, and total time constraints. The total time available to the household ( $T$ ) is equal to its time allocated to on-farm work ( $L_1$ ), non-farm work ( $L_2$ ), and leisure ( $l$ ). The household's total cash expenditure is constrained by total cash income, with the following full-income constraint:

$$P_G G + w_r l = w_r T + \pi + w_m L_2 + E \quad (1)$$

Here  $P_G$ ,  $w_r$ , and  $w_m$  are the price of the consumed goods, household reservation wage rate, and market wage rate, respectively. The left-hand side of Eqn. (1) shows the household's total expenditure on food and the purchase of its own time (i.e., the opportunity cost of leisure). The right-hand side of Eqn. (1) consists of total time valued at the household's reservation wage rate ( $w_r T$ ), profit from farming ( $\pi$ ), non-farm work income ( $w_m L_2$ ), and all other non-labor income ( $E$ ), respectively. Maximizing the households' utility function with respect to  $L_1, L_2$  and  $l$ , subject to the full-income constraint, involves taking the partial derivatives to attain the first-order conditions that maximize the household's total utility. The optimal labor allocation functions for the farm work and non-farm work are expressed by  $L_1(w_m, w_r, P_G, P_y; A)$  and  $L_2(w_m, w_r, P_G, P_y; A)$ , respectively (e.g., Chang *et al.*, 2012; Owusu *et al.*, 2011).  $P_y$  is the price of agriculture output, and  $A$  represents household and location characteristics. The optimal allocation of labor implies that a household will supply labor to the farm where the value of the marginal product of on-farm family labor equals the competitive non-farm wage,  $w_m$  (Chang *et al.*, 2012).

Non-farm work participation is determined when the utility of participating in non-farm work exceeds that of not participating. An individual  $i$  will have a positive number of non-farm work hours if the market wage ( $w_m$ ) is greater

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