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Nonfarm enterprise participation and healthcare expenditure among farm households in rural Ghana

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Abstract

Purpose – Rural poverty remains high in many developing countries, Ghana inclusive. This has implications for healthcare affordability and utilization, and thus the attainment of universal health coverage. Nonfarm diversification is seen as a means by which rural farm households can increase incomes and smooth consumption including healthcare. The purpose of this paper is to investigate the impact of nonfarm enterprise participation on healthcare expenditure among farm households in rural Ghana.

Design/methodology/approach – Using nationally representative household data from the sixth round of the Ghana Living Standards Survey (GLSS 6), the paper employs endogenous switching regression and propensity score matching techniques to account for potential selectivity bias.

Findings – Results indicate that households that participate in nonfarm enterprises earn higher incomes and expend more on healthcare. Total household income and region of residence are significant determinants of healthcare expenditure among farm households in rural Ghana. In addition, while in nonfarm enterprise nonparticipating households the marital status of the head of household is important, for participating households the head having at least secondary education significantly influences healthcare expenditure.

Practical implications – Promoting nonfarm activities and hence raising the incomes of households in rural areas of Ghana has the potential of increasing health capital through increased investments in health. It will also positively impact access to and utilization of healthcare and ultimately contribute towards increased farm and non-farm productivity.

Originality/value – Previous studies have only examined the determinants of nonfarm enterprise participation or its impact on household welfare, poverty, inequality, food security and agricultural investments. While evidence abounds on the positive impact of rural nonfarm enterprise participation on household income, which in turn has implications for household health expenditure, the potential positive link between rural nonfarm enterprise participation and household healthcare expenditure remains unexamined.

Keywords Poverty, Endogenous switching regression, Propensity score matching, Household healthcare expenditure, Nonfarm enterprise participation, Rural Ghana

Paper type Research paper

1. Introduction

The wealth status of an individual plays an important role in his or her access to and utilization of quality healthcare (Pritchett and Summers, 1996; Murray, 2006; Fan and Habibov, 2009). However, poverty remains pervasive in many developing countries and threatens the ability of these countries to achieve universal health coverage (UHC). According to O'Donnell (2007) and Peters *et al.* (2008), the poor in developing countries suffer most from ill-health due to impoverishment. While poverty could lead to ill-health, ill-health perpetuates poverty (Peters *et al.*, 2008). The ultimate goal of healthcare systems is universal access and financial protection. The World Health Assembly resolution 58.33 seeks to promote equal access to quality healthcare for everyone who needs it (WHO, 2010). The importance of

The authors of this article have not made their research dataset openly available. Any enquiries regarding the dataset can be directed to the corresponding author.



universal access to and equity in healthcare for economic and social development is reflected in several global efforts, including the millennium development goals (MDGs) and its sequel the sustainable development goals (SDGs). In spite of these efforts, not much success has been achieved (WHO, 2010). The WHO (2010) identifies several factors, including, unavailability of resources, overdependence on out-of-pocket (OOP) payments, and inefficiency and inequity in health resources utilization, as hindering the achievement of universal healthcare.

Healthcare financing in Ghana has gone through several phases. Akazili *et al.* (2014) disclose that Ghana's healthcare financing policies since the pre-independence era have been modeled along the political ideologies of ruling governments. Thus, unlike the British colonial government, who were capitalists and so OOP payments for healthcare was practiced, the immediate post-independence socialist-oriented government focused on providing free healthcare for its citizens (Akazili *et al.*, 2014). From the late 1960s onwards, tax-financed healthcare was provided in public health facilities (WHO, 2016). However, this policy encountered quality and sustainability challenges and in the 1980s, the user fee system, which is based on OOP payments was introduced as part of the structural adjustment program (WHO, 2016). The user fee system had adverse effects on access to healthcare (Akazili *et al.*, 2014). Consequently, community-based insurance schemes emerged in the 1990s to pool risk and to improve access to healthcare. These community-based schemes gave impetus to the introduction of the National Health Insurance Scheme (NHIS) in 2003. Poverty adversely impacts Ghana's NHIS enrollment as the poor are less likely than the rich to enroll on the scheme (Akazili *et al.*, 2014; Jehu-Appiah *et al.* 2011; Dixon *et al.*, 2011). Although Ghana's NHIS is designed to be pro-poor, its sustainability is threatened by inadequate funds (Alhassan *et al.* 2016). OOP payments have therefore re-emerged at some health facilities (Owusu-Sekyere and Bagah, 2014).

Spatially, 78 percent of the poor in Ghana live in rural areas (Ghana Statistical Service, 2014), where healthcare facilities are relatively scarce and often provide limited services. Therefore, in addition to facing higher user fees, rural households are likely to encounter higher transportation costs than urban households while seeking and utilizing healthcare. Even though urban households on average expend more on healthcare in absolute terms compared to rural households, the reverse is the case in relative terms (Ghana Statistical Service, 2014). The high costs associated with seeking and utilizing healthcare could discourage poor rural households from increasing investments in health and thus, undermine existing rural poverty alleviation efforts.

In their quest to improve household welfare, rural farm households in developing countries diversify into nonfarm enterprise activities (Reardon *et al.*, 2006; Barrett and Reardon, 2000). According to Haggblade *et al.* (2010) and Rijkers and Costa (2012), rural nonfarm participation accounts for between 40 and 50 percent of total household income in Africa. Empirical evidence shows that households in developing countries participating in nonfarm enterprise activities are more food secure (Owusu *et al.*, 2010; Jabo *et al.*, 2014; Dedehouanou *et al.*, 2015; Osarfo *et al.*, 2016), have higher agriculture investments (Dedehouanou *et al.*, 2015), expend more on food (Jabo *et al.*, 2014) and have reduced poverty and improved welfare (Jabo *et al.* 2014; Kousar and Abdulai, 2013; Senadza, 2011). Yet, household health expenditure is found to be positively affected by household income (Parker and Wong, 1997; Rous and Hotchkiss, 2003; You and Kobayashi, 2011; Yildirim *et al.*, 2011; and da Silva *et al.*, 2015). That a potential positive link exists between rural nonfarm enterprise participation and household health expenditure, however, has not been inadequately explored. The novelty of our paper lies in its attempt to contribute to the extant literature by investigating the impact of nonfarm enterprise participation on household healthcare expenditure in rural Ghana. We apply the endogenous switching regression (ESR) and propensity score matching (PSM) techniques to account for potential

selectivity bias on nationally representative data consisting of 9,318 rural households. Our findings indicate that nonfarm enterprise participating households in Ghana earn higher incomes and expend more on healthcare, in affirmation of our hypothesis. The rest of the paper is organized as follows. Section 2 presents a review of related empirical literature. The empirical strategy is discussed in Section 3. Section 4 presents and discusses the results. Section 5 concludes with policy implications.

2. Related empirical literature

The determinants of nonfarm enterprise participation and its impact on several household level variables, such as, welfare, food security and agricultural investments, have been extensively studied in recent times. On the determinants of nonfarm enterprise participation, Nagler and Naudé (2014) emphasize household characteristics, individual capabilities and institutional factors as important in a household's decision to operate a nonfarm enterprise. Factors such as age and gender of the head of household, level of education of household head or members, household size, share of adults in the household, farm income, access to credit, farming experience and membership of cooperative societies, food shortage, rainfall, production technology adopted, distance to a main road, among others, have featured prominently in many studies (see for instance, Zahonogo, 2011; Rijkers and Costa, 2012; Nagler and Naudé, 2014; Osondu *et al.*, 2014). Participation in rural nonfarm enterprise activities by households in developing countries is shown to be crucial in addressing rural poverty through assessment of its impacts on household welfare, agriculture, food security, food expenditure, risk management, among others. Studies that have found positive impact of nonfarm enterprise participation on household welfare include Owusu *et al.* (2010), Kousar and Abdulai (2013), Jabo *et al.* (2014), Dedehouanou *et al.* (2015) and Osarfo *et al.* (2016). Kousar and Abdulai (2013), for instance, used ESR to investigate the impact of rural nonfarm employment on household welfare among a sample of 341 households in Pakistan. They employed the PSM technique to affirm the robustness of the results from the ESR approach. Their results showed that participation in nonfarm enterprise activities while it reduced poverty, also increased average household expenditure.

Examining the effect of off-farm self-employment on agricultural expenditure and food security in Niger, based on a sample of 1,942 rural households and applying the ESR technique, Dedehouanou *et al.* (2015), found that nonfarm participating households expended more on agricultural inputs and food than nonparticipating households. Similar findings on the impact of nonfarm participation on household food security was obtained by Owusu *et al.* (2010) and Osarfo *et al.* (2016) for rural northern Ghana, as did Jabo *et al.* (2014) for rural households in Nigeria. Korir *et al.* (2011) investigated the effectiveness of investments in nonfarm enterprise activities as risk management strategies in Kenya. Using a randomly selected sample of 100 farm households from Uasin Gishu County, they established that, unlike farm income, income from nonfarm work stabilized total household incomes. However, the OLS technique employed for the estimation suffers from potential selection bias.

Few studies have explored the determinants of household healthcare expenditure in developing countries. You and Kobayashi (2011) studied the determinants of individual OOP expenditure in China. Controlling for selection bias with the use of the Heckman selection model, their results indicate that as people age, they tend to spend more on healthcare. In addition, persons suffering ill-health, earning higher incomes, living with educated household heads, and residing in urban areas and the middle or eastern regions of China, were found to invest more in their health. Furthermore, the study disaggregated the effect of insurance programmes and found a positive effect of insurance ownership on healthcare expenditure. Malik and Syed (2012) investigated the

determinants of OOP payments in Pakistan based on the Pakistan Standard of Living Measurement (PSLM) Survey in 2004/05. The study amongst other factors, including household characteristics, found non-food household expenditure as a positive predictor of household health expenditure in Pakistan. While the literature provides evidence of the favorable impact of participation in rural nonfarm activities on rural poverty and household welfare, which in turn has implications for household health expenditure, the potential positive link between rural nonfarm enterprise participation and household healthcare expenditure remains unexamined. Our paper is novel, in that it seeks to ascertain the impact of nonfarm participation on health expenditure among farm households in rural Ghana.

3. Methodology and data

3.1 Empirical approach

Empirical literature affirm the self-selection of households into nonfarm activities (see *inter alia*, Kousar and Abdulai, 2013; Jabo *et al.*, 2014; Dedehouanou *et al.*, 2015). As such, nonfarm enterprise participating households may systematically differ from nonparticipating households. Using observational dataset where there is nonrandom selection into positions would therefore be characterized by selectivity bias. The OLS estimates of the impact of nonfarm enterprise participation on OOP health expenditure would then be inconsistent and inefficient. Following Mare and Winship (1987), we specify the analysis of covariance model as follows:

$$Y_i = \alpha_0 Z_i + \sum_k \alpha_k X_{ki} + \varepsilon_i, \quad (1)$$

where household is denoted by i ($i = 1, \dots, I$). Y_i represents outcome for the i th household, α_k measures parameters to be estimated, X_{ki} is the value on the k th measured independent variable and ε_i is stochastic disturbance term. The participation status, Z_i , enters the model as an independent dummy variable for the entire pooled sample of nonfarm participants and nonparticipants.

The decision to participate or not to participate in nonfarm enterprise is endogenous in the household health expenditure function. Thus, the paper adopts the ESR model and PSM technique to account for selection bias. Notwithstanding, while ESR model accounts for selection bias due to observed and unobserved characteristics of households (Mare and Winship, 1987), the PSM approach controls only for selection bias resulting from observed characteristics (Rosenbaum and Rubin, 1983).

The ESR model is represented as:

$$Y_{0i} = \sum_k \beta_{0k} X_{ki} + \varepsilon_{0i} \text{ if } Z_i = 0 \quad (\text{nonparticipants}), \quad (2)$$

$$Y_{1i} = \sum_k \beta_{1k} X_{ki} + \varepsilon_{1i} \text{ if } Z_i = 1 \quad (\text{participants}), \quad (3)$$

$$Z_i^* = \sum_k \prod_k X_{ki} + \varepsilon_{3i} \quad (\text{participation decision function}), \quad (4)$$

where Y_0 and Y_1 represent household health expenditure of nonparticipating and participating households, respectively; X_k is a vector of explanatory variables; the β_{0k} and β_{1k} are vectors of estimated parameters, Z_i^* is a latent dependent variable of participation, which takes the value 1, if the household participates in nonfarm enterprise and zero otherwise; \prod_k represent vector of estimated parameters from the participation equation.

The (stochastic) error terms ε_0 , ε_1 and ε_3 are assumed to follow a trivariate normal distribution with a zero mean and non-singular covariance matrix given by:

$$Cov(\varepsilon_0, \varepsilon_1, \varepsilon_3) = \begin{bmatrix} \sigma_0^2 & \sigma_{01} & \sigma_{03} \\ \sigma_{01} & \sigma_1^2 & \sigma_{13} \\ \sigma_{03} & \sigma_{13} & 1 \end{bmatrix}.$$

Given the normality assumption and the normalization constraints, the endogenous switching model can be estimated via maximum-likelihood (ML) method (Maddala, 1983; Mare and Winship, 1987). Lokshin and Sajaia (2004), observes that the Full Information Maximum Likelihood (FIML) estimation is an efficient way of estimating the ESR model, whereby the probit selection equation and the health expenditure equation are simultaneously estimated with consistent standard errors. The FIML log-linear function, as proposed by Lokshin and Sajaia (2004) is:

$$\ln L_i = \sum_{i=1}^N \left\{ Z_i \left[\ln \phi \left(\frac{\varepsilon_{1i}}{\sigma_1} \right) - \ln \sigma_1 + \ln \Phi(\theta_{1i}) \right] + (1-Z_i) \left[\ln \phi \left(\frac{\varepsilon_{2i}}{\sigma_0} \right) - \ln \sigma_0 + \ln(1-\Phi(\theta_{0i})) \right] \right\}, \quad (5)$$

where θ_{ji} equals $(X_{i\gamma} + \rho_j \varepsilon_{ji} 3. / \sigma_j) / \sqrt{1-\rho_j^2}$, j is 0 or 1, ρ_j represents the correlation coefficient between the error term ε_3 of the participation decision function and the error terms ε_0 and ε_1 of the health expenditure equations. Mare and Winship (1987) reveal that the estimated correlation coefficient (ρ_j) indicates the presence or otherwise of self-selection. There is positive selection out of nonfarm activities when $\rho_0 > 0$ and there is positive selection into nonfarm activities when $\rho_1 < 0$.

The propensity score, defined as the probability of participating in nonfarm enterprise conditional on pre-participation characteristics, such as age and education, is expressed as (Rosenbaum and Rubin, 1983):

$$p(X_i) \equiv \text{prob}(Z_i = 1 | X_i) = E(Z_i | X_i). \quad (6)$$

Equation (4) of the ESR model (probit regression estimates) is used to compute the propensity score values. Following Kousar and Abdulai (2013), we match participants with non-participants of similar propensity scores, using the nearest neighbor matching (NNM) and radius matching (RM) algorithms.

The average treatment effect on treated (ATT) is used to estimate the causal impact of nonfarm enterprise participation on OOP health expenditure. This computes the difference between the observed health expenditure for nonfarm participating households and its counterfactual health expenditure had the participating households chosen not to participate. Again, following Kousar and Abdulai (2013), the average treatment effect on treated (ATT) of nonfarm enterprise participation on health expenditure is computed as follows:

$$ATT = E\{E[Y_{1i} - Y_{0i} | Z_i = 1, p(X_i)]\} = E\{E[Y_{1i} | Z_i = 1, p(X_i)] - E[Y_{0i} | Z_i = 0, p(X_i)] | Z_i = 1\}, \quad (7)$$

where $Z_i \{0, 1\}$ is the indicator of exposure to treatment (nonfarm enterprise participation), X_i denotes the vector of pre-participation characteristics and Y_{1i} and Y_{0i} are the potential outcomes in observed and counterfactual scenarios, respectively.

3.2 Data

The study uses the sixth round of the Ghana Living Standards Survey (GLSS 6). The data were collected over a period of 12 months (from October 18, 2012 to October 17, 2013) by the Ghana Statistical Service, with technical support from the World Bank. The GLSS is modeled along the lines of the World Bank's Living Standards Measurement Survey (LSMS). The data are a nationally representative sample of 16,772 households, made up of 9,327 rural and 7,445 urban households, in 1,200 enumeration areas. The GLSS 6 data set provides detailed information on key socio-economic and demographic variables such as household characteristics, education, migration, tourism, household agriculture income and expenditures, household nonfarm enterprise, among others. Additionally, it provides information on living conditions and well-being of households in Ghana. In all, 9,318 rural farm households was used for the analysis. Table I presents description and measurement of the variables.

4. Results

4.1 Characteristics of nonfarm participating and non-participating households

Table II presents the summary statistics of the variables by participation status. The means test indicates that except for age and the locational dummy (north), rural nonfarm participating households differ significantly in characteristics from non-participating households. This systematic difference affirms the existence of sample heterogeneity suggested in the literature.

4.2 Determinants of rural nonfarm enterprise participation

The results from the participation model of the ESR and the probit regression are reported in columns 4 and 5 of Table III, respectively. The two results are qualitatively similar. The variables that significantly influence participation are total household income, age of household head, age of household head squared, male household head, education (basic) of household head, household size, ownership of livestock and farm lands, electricity consumption and receipt of remittance. The coefficient for age is positive while that of age-squared is negative, indicating that participation in nonfarm activities increase with the age of the household head up to 50 years and thereafter diminishes with further increases in age[1]. This finding lends support to Abdulai and Delgado (1999), Abdulai and CroleRees (2001) but not Dary and Kuunibe (2012) and Osondu *et al.* (2014). Male-headed households are less likely to participate in nonfarm enterprise activities than female-headed households in consonance with the findings of Dary and Kuunibe (2012) for rural Ghana and Nagler and Naudé (2014) for Nigeria. The attainment of basic education by the household head is positively correlated with nonfarm enterprise participation in rural Ghana. Wealthier rural households have a higher predicted probability of participating in nonfarm enterprise activities, suggesting the importance of "pull factors", while operating rural nonfarm enterprise also increases with household size. Abdulai and CroleRees (2001), Nagler and Naudé (2014) and Tran (2015) made similar observations. Ownership of agricultural assets (livestock and farm land), consumption of electricity and receipt of remittance are reported to have significant and positive effects on nonfarm participation among farm households.

The Wald test of independence of both the participation and health expenditure equations is statistically significant at the 1 percent level. This proves that the equations are jointly dependent, thus affirming the endogeneity problem. The Wald χ^2 test shows that the correlation coefficients (ρ_0 and ρ_1) are jointly statistically different from zero (even though ρ_1 is insignificant). Being negatively signed then reveals that nonfarm enterprise participating households benefit more from participation than the average population. Conversely, since the correlation between the health expenditure equation for nonfarm nonparticipating households and the participation equation (ρ_0) is negative and significant, households which do not participate in nonfarm activities are revealed to be worse off than

Table I.
Description and
measurements
of variables

Variable	Description	Mean	SE
Health expenditure	Log of total household health expenditure (Ghana cedis)	4.001	0.017
Participate	Nonfarm participation status of farm household: 1 = participates; 0 = otherwise	0.304	0.005
Age	Age of household head (years)	47.406	0.17
Age square	Age of household head square		
Gender	Gender of household head: male = 1; 0 = female	0.761	0.004
No education	Level of education of household head: 1 = no education; 0 = otherwise	0.549	0.005
Basic education	Level of education of household head: 1 = basic; 0 = otherwise	0.360	0.004
Secondary education	Level of education of household head: 1 = secondary; 0 = otherwise	0.091	0.003
Married	Marital status of household head: 1 = married; 0 = otherwise	0.642	0.005
Income	Log of total household income (Ghana cedis)	8.035	0.014
North	Location dummy: 1 = residing in northern Ghana (Northern, Upper East and West regions); 0 = otherwise	0.377	0.005
Household size	Number of household members	4.755	0.031
Livestock	Ownership of livestock: 1 = livestock owned; 0 = otherwise	0.459	0.005
Land	Ownership of agricultural land: 1 = land owned; 0 = otherwise	0.139	0.004
Electricity	Household consumes electricity: 1 = consumes electricity; 0 = otherwise	0.363	0.004
Remittance	Household receives remittances: 1 = receives; 0 = otherwise	0.331	0.005

Variable	Nonparticipating subsample (<i>n</i> = 6,486) mean		Participating subsample (<i>n</i> = 2,832) mean		Mean difference
	mean	SE	mean	SE	
Health expenditure ^a	3.945	0.021	4.112	0.031	-0.167***
Age	47.438	0.214	47.334	0.270	0.104
Gender	0.750	0.005	0.787	0.008	0.037***
No education	0.570	0.006	0.502	0.009	0.067***
Basic education	0.335	0.006	0.419	0.009	-0.084***
Secondary education	0.096	0.004	0.079	0.003	0.017***
Income	7.833	0.018	8.497	0.022	-0.664***
Married	0.612	0.006	0.713	0.009	-0.101***
North	0.380	0.006	0.368	0.009	-0.012
Household size	4.361	0.036	5.658	0.057	-1.297***
Livestock	0.417	0.006	0.553	0.009	-0.136***
Land	0.126	0.004	0.169	0.007	-0.043***
Electricity	0.341	0.006	0.412	0.009	-0.071***
Remittance	0.313	0.006	0.373	0.009	-0.061***

Note: ^aSample size for health expenditure estimation is 5,475

Source: Computed by authors from GLSS 6, 2012/2013

Table II.
Summary statistics
of variables by
participation status

the average population. Following Mare and Winship (1987) and Asfaw *et al.* (2012), and since $\rho_0 < 0$ and $\rho_1 < 0$, selectivity does not result from benefits derivable from the decision to participate or otherwise in nonfarm enterprise activities and thus, selection bias is less serious. We conclude, therefore, that selectivity is based on the systematic differences in the characteristics of participating and nonparticipating households.

4.3 Determinants of household healthcare expenditure

Column 1 of Table III reports the OLS estimates of the determinants of household health expenditure in rural Ghana. However, given the evidence of selection bias, the OLS estimation is unreliable. The full maximum likelihood estimation results from the ESR model of the determinants of health expenditure among nonfarm enterprise nonparticipating and participating households are reported in Columns 2 and 3 of Table III, respectively. Total household income is a significant determinant of healthcare expenditure among farm households in rural Ghana. The magnitude of the coefficient on income for nonfarm participating households (0.124) being greater than that for nonparticipating households (0.078) is read as an indication that the effect of income on household health expenditure is larger for participating households compared to nonparticipating households. By inference, any activity which increases the total income of rural farm households will likely make them expend more on health. This positive relationship between household income and health expenditure has been confirmed by Parker and Wong (1997), Rous and Hotchkiss (2003), You and Kobayashi (2011), Yildirim *et al.* (2011) and da Silva *et al.* (2015). Rural households in the three northern regions of Ghana (upper east, upper west and northern) expend less on health compared to their counterparts in southern Ghana, irrespective of participation status. The household head having secondary education positively affects healthcare expenditure in participating households only, albeit significant at 10 percent level. Malik and Syed (2012) and Brinda *et al.* (2014), obtained similar results. Households with a married household head expend more on health expenditure only in nonparticipating households.

4.4 Impact of nonfarm enterprise participation on household healthcare expenditure

The OLS results reported in Column 1 of Table III posts a positive coefficient for the participation dummy variable, even though it is insignificant. However, the evidence of selection bias renders the OLS estimates unreliable. The ESR and PSM techniques are

Table III.
Estimation results
from OLS,
endogenous switching
regression, and probit
regression models

Explanatory Variables	OLS (1) Hlthexp ^a	Endogenous switching regression model (2) (3) (4) Hlthexp ^b	Participate	Probit model (5) Participate
Participate	0.0711 (0.0536)			
Income	0.1097*** (0.0226)	0.0778*** (0.0246)	0.1912*** (0.0218)	0.1873*** (0.0167)
Age	0.0060 (0.0069)	-0.0042 (0.0071)	0.0352*** (0.0069)	0.0405*** (0.0071)
Age ²	-0.0000 (0.0001)	0.0000 (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)
Gender	-0.1123 (0.0704)	-0.0524 (0.0656)	-0.1670*** (0.0587)	-0.1535*** (0.0525)
Married	0.1275** (0.0624)	0.1256** (0.0608)	0.0365 (0.0527)	0.0401 (0.0470)
Basic education	0.0767 (0.0499)	-0.0176 (0.0555)	0.2773*** (0.0462)	0.2504*** (0.0425)
Secondary education	0.1513* (0.0838)	0.1039 (0.0810)	0.0140 (0.0761)	0.0401 (0.0700)
North	-0.2877*** (0.0833)	-0.2545*** (0.0819)	-0.4941*** (0.1124)	0.0349 (0.0473)
Household size			0.0507*** (0.0081)	0.0568*** (0.0073)
Electricity			0.1881*** (0.0593)	0.158*** (0.0390)
Livestock			0.1638*** (0.0478)	0.257*** (0.0407)
Land			0.1118* (0.0677)	0.143*** (0.0510)
Remittance			0.1841*** (0.0504)	0.162*** (0.0392)
Constant	2.9881*** (0.2197)	3.2423*** (0.2406)	3.5672*** (1.1397)	-3.549*** (0.207)
Observations	5,475	5,475	5,475	9,318
R ²	0.0329			
ρ_0		-0.3397*** (0.0832)		
ρ_1			-0.1593 (0.2513)	
<i>ESPM</i>				
Wald χ^2 (8) = 34.62	Prob > χ^2 = 0.0000	Log pseudolikelihood =		Pseudo R ² = 0.0890
Wald test of indep. eqns.:	χ^2 (2) = 14.16	Prob > χ^2 = 0.0008		
<i>Probit regression</i>				
Wald χ^2 (13) = 576.09	Prob > χ^2 = 0.0000	Log pseudolikelihood =		

Notes: ^aHealth expenditure of all households. ^bHealth expenditure of nonfarm enterprise nonparticipating households. ^cHealth expenditure of nonfarm enterprise participating households

Source: Computed by authors from GLSS 6; Standard errors in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

therefore employed to correct for the selection bias. Table IV presents the expected actual and counterfactual health expenditures (i.e. conditional expectations) of participating households. The average treatment effect on treated (ATT) is computed from the conditional expectations. It measures the difference between the average health expenditure of nonfarm participating households and their average counterfactual health expenditure had they not participated in nonfarm activities. The estimated ATT suggests that nonfarm enterprise participation significantly enables rural households in Ghana to increase expenditure on healthcare.

Based on the propensity scores, two matching algorithms – NNM and RM – were used to pair treated units with control units. The two matching methods were used to check for the robustness of the ATTs to the matching methods. The ATTs were computed using the propensity scores technique proposed by Becker and Ichino (2002). Generated from a probit model, propensity scores which satisfied the balancing property were employed. The results of the ATTs are presented in Table V. The results show that the choice of matching algorithm is relevant. This is because the two matching methods yield different results. Corroborating the conclusions drawn based on the ESR estimate, the RM method reveals that households which participate in nonfarm enterprise expend more on healthcare. However, the ATTs from the PSM are lower, suggesting that the ATTs from the PSM approach are underestimated. As sensitivity analysis Table V presents the results of RM method with radius of 0.1 and 0.5. Increasing the radius from 0.1 to 0.5 increases the ATT.

5. Conclusion

This paper used the most recent and nationally representative data set to investigate the impact of nonfarm enterprise participation on household health expenditure among farm households in rural Ghana. It also shed light on the predictors of nonfarm enterprise participation and household healthcare expenditure in rural Ghana. The results indicate that participation in nonfarm enterprise enables rural households in Ghana to expend more on healthcare. Total household income and region of residence are significant determinants of healthcare expenditure among farm households in rural Ghana. In addition, whereas the education of household head significantly affects the health expenditure of nonfarm enterprise participating households, the health expenditure of nonparticipating households is influenced by the household head's marital status. Age, gender and education of household head, total household income, the number of household members, ownership of

	Nonfarm enterprise participation decision		ATT
	To participate ^a	Not to participate ^b	
Participating household	4.1175	3.4211	0.6964***

Table IV.
Conditional expectations and average treatment effects on treated (ATTs), 2012/13

Notes: ^aObserved; ^bCounterfactual. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Source: Computed by author from GLSS 6, 2012/2013

Matching algorithms	Number of treated units	Number of control units	ATT	SE	t-Statistics
Nearest neighbor	3,318	1,307	0.071	0.046	1.559
Radius (0.1)	1,258	1,609	0.200***	0.050	3.970
Radius (0.5)	1,258	1,609	0.219***	0.049	4.516

Table V.
ATT Estimation of impact of nonfarm enterprise participation on household health expenditure

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Source: Computed by authors from GLSS 6, 2012/2013

livestock and farm land, electricity consumption and receipt of remittances are significant predictors of nonfarm enterprise participation among farm households in rural Ghana.

The evidence of a positive impact of nonfarm enterprise participation on healthcare expenditure has implications for policy. Promoting nonfarm activities and hence raising the incomes of households in rural areas of Ghana has the potential of increasing health capital through increased investments in health. It will also positively impact access to and utilization of healthcare, and enhance the achievement of UHCS. Therefore, the policy of integrated rural development should be given greater attention as it will not only result in the provision of services, including infrastructure and social amenities to rural areas but also aid in the development and promotion of nonfarm livelihood activities in the rural areas of Ghana.

Note

1. From the participation equation of the endogenous switching regression (Model 4), $\partial \text{Participate}_i / \partial \text{Age}_i = 0.0351754 - 0.0007086 \text{Age}_i = 0$, and hence $\text{Age}_i = 50$. Similar, from the probit regression (Model 5), $\partial \text{Participate}_i / \partial \text{Age}_i = 0.0404751 - 0.0008076 \text{Age}_i = 0$ and hence $\text{Age} = 50$. In either case, the second order condition for a maximum is satisfied.

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Further reading

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