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Impacts of Health Services on Agricultural Labor Productivity of Rural Households in Burkina Faso

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Abstract

This article uses an instrumental variables method to evaluate the impact of the use of health services on the productivity of rural households' farming labor in Burkina Faso. The distance from a household's homestead to the Health and Social Promotion Center (HSPC) is considered an instrumental variable. The results reveal that using an HSPC in the case of an unexpected illness during the rainy season significantly improves farming labor productivity by FCFA 3170.5880 per man-day. In terms of policy implications for improving agricultural productivity, decision-makers should focus on the availability and quality of HSPC services in rural areas.

Résumé

Cet article utilise la méthode des variables instrumentales pour évaluer l'impact de l'utilisation des services de santé sur la productivité du travail agricole des ménages ruraux au Burkina Faso. La distance de la résidence du ménage rural au Centre de Santé et de Promotion Sociale (CSPS) a été considérée comme une variable instrumentale. Les résultats révèlent que le recours aux services des CSPS en cas de survenance de maladie en saison hivernale améliore significativement la productivité du travail agricole de 3170,5880 FCFA par homme-jour. En termes d'implication politiques pour l'amélioration de la productivité agricole, les décideurs publics devraient mettre l'accent sur la disponibilité et la qualité des services des CSPS en milieu rural.

1. Introduction

Disease significantly reduces the productivity of agricultural labor in developing countries due to the loss of labor and know-how of productive adults (World Bank, 2008). In Burkina Faso, loss of labor due to illness is more frequent during the rainy season. Because of the lack of prevention programs and efficient healthcare, disease thus considerably affects the productivity of farming labor throughout the country.

With a gross rate of mortality of 11.8 percent in 2006 and a life expectancy of 57 years in 2008, the health issue remains quite worrying in Burkina Faso, especially for rural populations. The country's epidemiological profile is characterized by the persistence of a high rate of morbidity due mainly to malaria, respiratory infections, malnutrition, diarrheic diseases, and HIV/AIDS (Ministère de la santé[1], 2011). These diseases affect the productivity of rural households' agricultural labor. Without significant gains in farming labor productivity, it will be hard to alleviate hunger and poverty (Timmer, 2005).

To reduce the incidence of disease in rural areas, Burkina Faso's health policy has focused on the supply of primary health care since 2000. The budget allocated to the health sector has increased from 7.07 percent in 2000 to 15.46 percent in 2009. The average coverage in terms of area of a health and social promotion center (HSPC) decreased from 9.38 km in 2000 to 7.34 km in 2010 (Ministère de la santé[2], 2010). In spite of this tangible improvement of rural households' access to primary health care, however, Burkina Faso has still not achieved the Bamako initiative[3] that recommends a maximum coverage of 5 km per health facility.

After more than a decade of efforts to improve rural households' access to health services, there are almost no works evaluating the effects of the use of health services on farming labor productivity in Burkina Faso. This question is of great interest for a country in which almost 80 percent of the population lives in rural areas and depends on agriculture for their livelihood (Savadogo and al., 2011). In addition, the country's poverty profile indicates that most rural households live below the poverty line (Ministère de l'Economie et des Finances[4], 2010).

Despite the theoretical agreement on the effects of health services on agricultural labor, the results of existing empirical studies are quite divergent and sometimes contradictory. The work of Touzé and Vantelou (2002) as well as that of Perkins et al. (2008) have shown that negative impacts on the state of health affect farming labor productivity by reducing physical capacities, cognitive capacities, and the time of work. However, most of the previous studies have found out that public expenditures on health have no significant

[1] Ministry of Health
[2] Ministry of Health
[3] Bamako's initiative was launched in 1987 during an international conference on access to primary health care for everyone.
[4] Ministry of Economy and Finances

impact on the farming labor productivity (Fan and Hazell, 1999; Fan and al., 2002; Fan and Thorat, 2003; Rivera and Currais, 2003; Pham and al., 2006; Hassan, 2008; Karbasi and Mojarad, 2008).

The divergence of these results can essentially be explained by the existence of selection bias that limits the identification of the real effect of health on the productivity of farming labor. Due to the lack of randomized data, most of these studies have used propensity score matching, double differences, or standard instrumental variables to solve the issue of selection bias. Yet none of these methods is able to appropriately treat the problem of non-compliers. Imbens and Angrist (1994) show that the local average treatment effect (LATE) estimator can correct both of these problems.

Thus, we make use of the instrumental variables method with a LATE estimator to assess the impact of the use of health services on the productivity of agricultural labor in the case of unexpected diseases during the rainy season. For this purpose, the distance from the household's homestead to the Health and Social Promotion Center (HSPC) is considered an instrumental variable.

In Burkina Faso, HSPCs provide health coverage in rural zones. Rural households must first go through primary health centers before accessing higher level health centers. The travelling distance of a household to the health center is the main criterion for the implementation of an HSPC in rural zones. According to the Bamako Initiative launched in 1987, a household has access to a health center when the distance from its homestead to the health center does not exceed 5 km.

It is plausible that the nearer the health centers are, the more likely households will be attend an HSPC upon occurrence of a disease because reaching the health center is easier and less costly. The variable distance of the household's homestead from a HSPC may therefore influence the decision of households to attend a health center in case of disease occurrence. However, this variable (distance to an HSPC) is probably not related to the agricultural productivity of rural households. The distance to an HSPC can therefore be used as an instrumental variable in the analysis of the impact of HSPC use on agricultural labor productivity. Thornton (2008) used the distance to the HIV test results centers as an instrumental variable in the analysis of the effects of knowing HIV results on condom purchase.

The rest of the article is divided into four parts. The first section provides a literature review on the topic and presents the theoretical model of the impact assessment. The second section exposes the analysis method and presents the data. The third section presents the empirical results on the effects of health services on farming labor productivity. Finally, the fourth section draws conclusions and explanations in terms of economic policies.

2. Modeling the Effects of the Use of Health Services on Farming Labor Productivity

This section presents a literature review on the effects of farmers' states of health on their agricultural productivity, as well as the theoretical bases of the impact assessment of a public policy.

2.1 *Effects of farmers' health on agricultural labor productivity*

Empirical results on the effects of farmers' states of health on agricultural labor productivity are quite divergent. In mixed crop systems, Cole (2006) finds that the great majority of producers suffer from intense muscular fatigue and exhaustion, combined with sweat and skin infection. This state leads to a decrease in agricultural productivity because of the accumulation of days of rest. According to Pitt and Rosenzweig (1986), disease affecting younger children and old people diverts farming labor toward taking care of sick people, which contributes to the decrease in agricultural yields.

In a study carried out in Cameroon, Audibert (1986) finds out that an increase of 10 percent in the prevalence of schistosomiasis reduces rice-growing production by 4.9 percent, while malaria has no significant effect. In a similar analysis in Mali, Audibert and Etard (1998) find that health improvements have no effect on rice production, but they do modify the division of labor for different agricultural activities.

Meanwhile, in an almost experimental study in an irrigated rice-growing site affected by schistosomiasis in Mali, Audibert and Etard (2003) observe an increase of 26 percent in the production per man-day of family labor following the improvement of household health status. Similarly, Audibert et al. (2003) notice that malaria has a negative effect on the technical efficacy of cotton production in Côte d'Ivoire. However, Audibert et al. (2009) do not see a significant effect from malaria infection on coffee and cocoa production in Côte d'Ivoire.

Strauss (1986) reveals that caloric contribution has a high significant effect on the productivity of farming labor in Sierra Leone. Croppenstedt and Muller (2000) find a similar result in Ethiopia by displaying a significant link between health, nutritional status, and agricultural productivity. However, using panel data on regions in India, Deolalikar (1988) does not find the same result.

Spear (1991) finds that extended exposure to pesticides significantly hinders farmers' ability to work and reduces their management and supervision abilities. In the same way, Antle and Pingali (1994) notice that the use of pesticides in rice-growing production in Philippines has a negative effect on farmers' health status, while farmers' health has a significant positive effect on rice productivity.

Baldwin and Weisbrod (1974) show that parasitic infections cause significant undesirable effects on the productivity of farming labor. These results were confirmed years later by Weisbrod and Helminiak (1977). Meanwhile, Gilgen et al. (2001) do not find any significant effect on labor productivity from treatment of vermifuge in adult tea gatherers in Bangladesh. Their results nevertheless show that anaemia affects farmers' time of work and productivity.

Kim et al. (1997) analyze the impact of disease on the productivity of coffee planting in Ethiopia. Their results reveal that the daily wages of employees affected by cutaneous problems were lower by 10-15 percent. On Kenya's tea plantations, Fox et al. (2004) notice that seropositive workers gather less during the last two years of their lives: between 4.11 and 7.93 kg / day.

The works of Ulimwengu (2009) and Badiane and Ulimwengu (2009) make use of stochastic frontier regression techniques to evaluate the impact of farmers' states of health on agricultural productivity in Ethiopia and Uganda, respectively. Their results display positive and significant effects of health measures on the technical efficiency of agricultural production. In the case of Nigeria, Ajani and Ugwu (2008) show that the improvement of a farmer's health status leads to an increase in efficiency of 31 percent.

2.2 Theoretical model of the impact evaluation of health services on agricultural productivity

According to human capital theory, people invest in health care, education, food, and migration for profit and non-profit gains that they can draw on in both the short and long terms (Schultz, 1958; Becker, 1964). The theoretical model of reference in terms of impact assessment of public policies has been implemented by Rubin (1974). This model draws upon the basic hypothesis of a lack of distribution of the treatment effect (T) within the population. The approach of the current study consists in measuring the impact of the use of health services (T_i) on rural households' farming labor productivity (Y_i) in the case of an unexpected disease. There are two potential results that cannot be observed simultaneously for the same rural household: Y_{1i} if the rural household has used health services ($T_i = 1$) and Y_{0i} if otherwise ($T_i = 0$). For a household that has used health services, the result Y_{0i} corresponds to the counterfactual result, i.e. what might have occurred if the household had not used health services.

Farming labor productivity observed at the level of each rural household i can be deduced from the relation: $Y_i = T_i Y_{1i} + (1 - T_i) Y_{0i}$, $i = 1,..., N$, N being the number of households in which only the couple (Y_i, T_i) is being observed for each household.

The impact of the use of health services on the agricultural labor productivity of each rural household is measured by $\Delta_i = Y_{1i} - Y_{10}$. The variable of interest, Δ_i, is individual and unobservable; this renders its distribution in the population unidentifiable. However, by building a comparison group of households to reproduce the counterfactual result of the group of treated households and under some hypotheses on the triple joint (Y_{0i}, Y_{1i}, T_i), it is possible to identify some parameters of the distribution Δ_i from the density of observable variables (Y_i, T_i).

The parameter of interest of this study is Δ_{TT} which represents the average effect of the use of health services on rural households' agricultural labor productivity:

$$\Delta_{TT} = E\left(Y_{1i} - Y_{0i} \left| T_i = 1\right.\right)$$

Under the hypothesis of independence between the potential results $\left(Y_{0i}, Y_{1i}\right)$ and the variable of treatment T_i, it is possible to write:

$$\Delta_{TT} = E\left(Y_{1i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 1\right.\right) \Rightarrow \quad \Delta_{TT} = E\left(Y_{1i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 0\right.\right)$$

$$\Rightarrow \quad \Delta_{TT} = E\left(Y_i \left| T_i = 1\right.\right) - E\left(Y_i \left| T_i = 0\right.\right)$$

Δ_{TT} being estimated as the difference of the means of agricultural productivity between the group of treated households and the group of control households. This result comes from the fact that the mean productivity of agricultural labor of households that have used health centers services might have been the same as if those had not resorted to health centers services ($E\left(Y_{0i} \left| T_i = 1\right.\right) = E\left(Y_{0i} \left| T_i = 0\right.\right)$).

If the independence hypothesis between the potential results and the treatment is not valid i.e. $E\left(Y_{0i} \left| T_i = 1\right.\right) \neq E\left(Y_{0i} \left| T_i = 0\right.\right)$, then the estimator Δ_{TT} would be affected by one selection bias:

$$\begin{aligned} E\left(Y_i \left| T_i = 1\right.\right) - E\left(Y_i \left| T_i = 0\right.\right) &= E\left(Y_{1i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 0\right.\right) \\ &= \left[E\left(Y_{1i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 1\right.\right)\right] + \left[E\left(Y_{0i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 0\right.\right)\right] \\ &= \Delta_{TT} + B_{TT} \end{aligned}$$

Where $B_{TT} = \left[E\left(Y_{0i} \left| T_i = 1\right.\right) - E\left(Y_{0i} \left| T_i = 0\right.\right)\right]$ represents the selection bias.

The selection bias comes from the fact that the mean counterfactual result of households making use of health services might have not been the same as the one of households not using health services, in the absence of treatment. This is so because the group of control households is not identical to the group of treated households. To solve this problem, it is necessary to adopt an approach that helps reduce the more possible selection bias.

3. Strategy for identifying the impact of health services on agricultural labor productivity

The elimination of the selection bias and the treatment of non-compliers form the main concern of every impact assessment. To deal with these questions, this study has used a strong instrumental variable to estimate a LATE, has defined relevant variables, and has carried out tests of differences on the observable characteristics between the treatment and the control groups.

3.1 The method of instrumental variables

The method of standard instrumental variables enables us to eliminate the selection bias and deal with the problem of endogeneity of treatment (Heckman and Vytlacyl, 1999, 2005; Heckman and Robb, 1985). The method assumes the existence of at least an instrumental variable that explains the treatment but that has no direct effect on the result, once the observable characteristics have been controlled for. To assess the effects of the use of health services on farming labor productivity, we formulate the following model:

$$Y_i = \beta_0 + \beta_1 T_i + \gamma X_i + \varepsilon_i \qquad (1)$$

where Y_i represents the agricultural labor productivity

T_i represents the treatment variable that takes the value 1 for the group of treated households and 0 otherwise.

X_i is a vector of control variables.

The parameter of interest β_1 measures the impact of the use of health services on agricultural labor productivity.

Since the decision to use health services is probably correlated with the observed or unobserved characteristics, in order to correct for potential selection bias, we will estimate at the first stage:

$$T_i = \alpha_0 + \alpha_1 Z_i + \delta X_i + u_i \qquad (2)$$

where Z_i represents the instrumental variable

The standard parameter of interest is defined as:

$$\beta_{1standard} = \frac{Cov(Y,Z)}{Cov(T,Z)}$$

If early unobserved gains of the use of health services affect a household's decision to resort to health centers in the case of an unexpected illness, the standard estimator would be biased. To solve this problem, Imbens and Angrist (1994) developed the local average treatment effect (LATE) estimator. This only measures the effect of the use of health services on agricultural labor productivity for households for which the change of the instrument has an effect on the decision to use health services (compliers). Under the hypothesis of monotonicity and the absence of non-compliers, it is then possible to determine the size of compliers.

If the treatment and the instrument are binary variables, the Wald's estimator can be used to estimate the LATE:

$$\beta_{1late} = \frac{Cov(Y,Z)}{Cov(T,Z)} = \frac{E(Y \mid Z=1) - E(Y \mid Z=0)}{E(T \mid Z=1) - E(T \mid Z=0)}$$

The method of estimation in two stages has been used to estimate the effect of the use of health services on agricultural labor productivity in the case of an unexpected illness in the rainy season.

3.2 Presentation of the study data

This section presents the source and the method of data collection, defines the model's variables, and gives a descriptive analysis of farmers' characteristic data.

3.2.1 Source and method of data collection

The data collection was conducted by the Laboratory of Quantitative Analysis Applied to Development – Sahel (LQAAD-S) in the frame of a collaborative research with the International Food Policy Research Institute (IFPRI) through the "Convergence" project. This project conducts research on the maximization of the impact of social services expenditures on agricultural labor productivity and incomes in African countries.

The national scope of the study led to the subdivision of the whole rural area of Burkina Faso into six strata based on the population's social characteristics (health, education, nutrition, access to drinking water) and the concentration of non-governmental organizations in the community. Eight of the country's 45 provinces were selected on the basis of their agricultural potential and the weight of each stratum.

In each province, two departments were picked randomly, and in each department, four to five villages were randomly selected according to their size. The survey covered 36 villages; in each village, 15 households were selected randomly, for a total of 540 households. The sampling focused on the spatial distribution of the surveyed villages in order to account for the differences in behavior and regional diversities. For this study, only the 233 households which recorded at least one case of illness while farming during the rainy season were retained for the analysis.

Cross-sectional data were collected from active members of farming households between January and February 2011. The survey was conducted using questionnaires on a declarative basis, generally on the basis of historical data covering the 12 months before the survey. The data collection focused on households' socio-economic, demographic, and institutional characteristics. In accordance with the objective of the "Convergence" project, detailed data were collected regarding health, education, social safety nets, and agricultural production in rural households.

3.2.2 Definition of the model's variables

The quality of the impact evaluation relies on the choice of relevant variables liable to reduce the selection bias.

i) The result variable

Farming productivity can be defined as the agricultural productivity per unit of input (Yabi and Afari-Sefa, 2009). That input can be labor, land, or capital. In the context of this study, it is measured by the monetary value of each household's farming productivity per man-day of work. The aggregate agricultural productivity is the sum of farm-gate value of the various agricultural products, which is divided by the total number of man-days of work spent on these activities. The quantities have been valued with farm-gate prices.

ii) The treatment variable

The concern of any impact evaluation is to estimate the counterfactual situation by identifying a control group that is very comparable to treatment group. The treatment variable here has been defined in relation to the decision to resort to the services of an HSPC in the case of unexpected disease during the rainy season. A binary variable, which takes the value 1 if the household is in the treatment group and 0 otherwise, was used.

The treatment group is made up of households that had at least one sick person during the rainy season while farming that suffered from a loss of working time of some active member due to the disease, and that used the services of a Health and Social Promotion Center (HSPC). The control group is made up of households that had at least one sick member during the rainy season while farming and that suffered from a loss of working time of some active members due to the disease, but that did not resort to the services of a Health and Social Promotion Center (HSPC) or any other form of health services.

iii) Variables affecting the use of HSPC and farming productivity

The distance from the household's homestead to the health and social promotion center is considered an instrumental variable. The hypothesis is that this variable directly affects the decision to use the services of a health center in the case of an unexpected disease during the rainy season, but that it only impacts farming productivity in an indirect way. In accordance with the recommendation of the Bamako initiative, it was considered that a Health and Social Promotion Center covers all the rural households within a radius of 5 km.

Caliendo and Kopeinig (2005) show that only the variables that simultaneously influence both the decision to participate in a service and the result from that service are able to correct the selection bias linked to the difference of the results between the two groups in the lack of treatment. The theoretical and empirical literature review helps to identify the relevant variables that are likely to influence both the decision to use health center services in the case of an unexpected disease and rural households' farming labor productivity (Table 1).

Table 1: Definition of variables of the impact assessment of the use of HSPC's services on farming productivity

	Expected effects	
	Farming productivity	**Use of HSPC**
Natural capital		
Area (ha)	+	+
Amount of work per man –day	+	+
Physical capital		
Value of the equipment stock (FCFA)	+	+
Access to a main road (Km)	-	-
Access to drinking water (1=Yes, 0=no)	+	-
Distance from homestead to HSPC (Km)	-	-
Human capital		
Number of active members' years of education	+	+
Age of the head of household (years)	+/-	+/-
Size of the household	+/-	+
Proportion of household members using a mosquito net (%)	+	-
Lost time due to a disease (days)	-	+
Number of sick persons	-	+
Financial capital		
Non-farming incomes (FCFA)	+	+
Amount of received credit (FCFA)	+	+
Social capital		
Membership to a group of producers (1=Yes, 0=no)	+	+

Source: Author from the theoretical and empirical literature review

3.2.3 Descriptive analysis of the study's data

If characteristics are different between the group of treated households and the group of control households, their levels of farming labor productivity would also be different, even in the absence of the use of health services in times of unexpected disease. It is then necessary that the two groups contain the same characteristics to help identify the effect of resorting to health services on farming productivity. The objective of this section is to compare the treatment and control groups according to their observable characteristics.

Among the 233 retained households, 107 belong to the treatment group and 126 to the control group. The test of difference on the observable characteristics enable us to study the similarity between households that use the services of health centers in the case of an unexpected disease and households that do not make use of these services. Table 2 shows that the two groups are identical for most of the observed characteristics.

Nevertheless, some significant differences are observed for access to drinking water, amount of received credit, and sown area.

The data show that households which used health centers services in the case of an unexpected disease during farming activities recorded a significantly higher farming productivity, about FCFA 479 per man-day of work at the threshold of 1 percent. However, this result does not reflect the true effect of the use of health services on farming labor productivity; it is biased due to the fact that the two household groups are not similar for all of their observable and unobservable characteristics.

Table 2: Test of difference between the treatment group and control group on their characteristics

	Control Group (n=126)	**Treatment Group (n=107)**	**Test of difference**
Natural capital			
Area (ha)	3.55	4.3	* -0.75
Amount of work per man-day	346.7	375.0	-28.3
Physical capital			
Value of the equipment stock (FCFA)	115264.8	69105.84	46158.96
Access to a main road (Km)	7.68	10.43	-2.75
Access to drinking water (%)	0.64	0.52	* 0.12
Distance from homestead to HSPC (Km)	6.22	5.86	0.36
Human capital			
Number of active members' years of education	0.77	0.96	-0.19
Age of the head of household (years)	46.47	43.76	2.71
Size of the household	8.75	8.88	-0.12
Proportion of household members using a mosquito net (%)	87.00	81.33	5.67
Lost time due to a disease (days)	9.6	7.99	1.61
Number of sick people	1.63	1.71	-0.08
Financial capital			
Non-farming incomes (FCFA)	154872.2	157848.1	-2975.91
Amount of received credit	28883.3	64064.1	** -35180.8
Social capital			
Membership to a group of producers	0.47	0.52	-0.06
Agricultural productivity per man-day (FCFA)	998.11	1477.01	*** -478.90

Source: Calculations from data of Convergence / Burkina, 2011
*** Significant at a threshold of 1%, ** Significant at a threshold of 5%, * Significant at a threshold of 10%

4. Impacts of the use of a HSPC's services on farming labor productivity per man-day

Table 3 presents the results of an impact assessment of the use of HSPC services on farming labor productivity per man-day. Model (1) used least squares to estimate a multiple linear regression explaining agricultural labor productivity through the use of health services and other control variables. The Fisher's statistic indicates that the model is globally significant at the threshold of 1 percent. The use of HSPC services during an unexpected disease in rainy season significantly increases farming labor productivity per man-day to FCFA 528.8718 at the threshold of 5 percent. However, because of the selection bias and non-compliers issues, these results are biased.

Model (2) has corrected for the selection bias on observable and unobservable variables by estimating an IV standard. The Wald's chi-square statistic indicates that the model is globally significant at the threshold of 1 percent. The results show that the instrumental variable, Distance from the household's homestead to the HSPC, and its squared value both significantly influence the probability of attending an HSPC at the threshold of 5 percent. The use of HSPC services in the case of disease during rainy season significantly increases farming labor productivity per man-day to FCFA 2255.7210 at the threshold of 5 percent. However, due to the non-compliers (defiers) issue, this result is also biased.

Model (3) only considers households for which the change of the instrument has an effect on the decision to use health services (compliers). The Wald's chi-square statistic indicates that the model is globally significant at the threshold of 5 percent. The results show that households living within 5 km were more likely to use the services of an HSPC at the significant threshold of 10 percent. These results show that the benefit of attending a HSPC in the case of disease during rainy season is an increase of farming labor productivity per man-day by FCFA 3170.5880 at a significant threshold of 10 percent.

Table 3: Impact of the use of HSPC services on farming productivity per man-day

	OLS (1)	IV STANDARD (2)		IV LATE (3)	
	Farming labor productivity	**Use of HSPC (First stage)**	**Farming labor productivity**	**Use of HSPC (First stage)**	**Farming labor productivity**
Constant	** 1063.39000	-0.04999	51.91431	0.51713	-483.95540
Distance to HSPC		**** -0.13094**			
Distance to HSPC2		**** 0.00578**			
HSPC's provision of services (<5km)				*** 0.34409**	
Area	-155.45430	0.11449	** -240.95550	0.13881	* -286.25320
Area2	*** 30.42623	-0.01290	*** 38.30710	-0.01382	*** 42.48231
Value of the equipment stock	*** 69.15337	* -0.04486	*** 92.88003	* -0.04451	*** 105.45020
Value of the equipment stock2	** 0.07169	-0.00004	** 0.09393	-0.00004	** 0.10572
Area* Value of the equipment stock	*** -13.74205	* 0.00823	*** -18.18233	* 0.00821	*** -20.53475
Age of the head of the household	-11.41435	-0.01122	-5.65133	-0.00905	-2.59814
Active members' years of education	-97.76378	*** 0.49472	-373.07090	*** 0.48309	-518.92600
Active members' years of education2	14.37560	* -0.05842	47.50657	** -0.05896	65.05904
Proportion of household members using a mosquito net	175.44390	-0.54425	494.96270	* -0.66187	664.24070
Access to drinking water	* 341.12010	** -0.42659	** 559.91090	** -0.39207	** 675.82420
Household's size	5.87931	0.00403	8.25712	-0.00278	9.51686
Membership to a group of producers	15.63558	-0.08496	33.88109	-0.07498	43.54738
Access to a main road	4.80025	*** 0.02778	-9.63807	*** 0.02481	-17.28735
Access to a main road * Active members' years of education	-5.26107	** -0.01694	3.22643	-0.01584	7.72303
Number of sick people	-6.46929	0.10947	-73.14652	0.12881	-108.47150
Use of HSPC	***** 528.8718**		**** 2255.7210**		*** 3170.5880**
Number of observation	233		233		233
Fisher (16,216)	*** 2.23		-		-
R-squared	0.14		-		-
Wald Chi2 (29)	-		*** 51.30		** 44.12

Source: Calculations carried out from the project « Convergence » / Burkina, 2011.
*** Significant at the threshold of 1%, ** Significant at the threshold of 5%, * Significant at the threshold of 10%.

5. Conclusion and policy implications

The study has used the instrumental variables method to study the impact of the use of health services to treat unexpected diseases during rainy season on farming labor productivity in rural areas in Burkina Faso. The results show that using HSPC services has a significant effect on rural households' farming labor productivity. When all the possible biases are corrected, the households that use the services of an HSPC to treat their sick members during farming activities significantly improve their farming productivity by FCFA 3170.5880 per man-day. In terms of policy, decision-makers should focus on improving the availability and quality of HSPC services to improve farming labor productivity in rural areas.

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