

Impact of HIV/AIDS on human and financial capital of farm households in Benin**B. J. Gbaguidi¹⁶, J. U. I. Agbahey¹⁶, R. C. Tossou¹⁷, O. N. Coulibaly¹⁶ and G. A. Mensah¹⁸****Abstract**

The pandemic of Human Immunodeficiency Virus (HIV) affects the most active population – the young – and weakens the agriculture sector which remains the main economic hub in Benin. However, few studies focused on the impact of this pandemic on agriculture and on farm households' livelihoods in the country. In order to fill such a gap, this study was initiated to assess the impact of HIV/AIDS (Acquired Immunodeficiency Syndrome) on farm household's assets in Benin. The study area covers Klouékanmè, Toviklin and Lalo, three municipalities in Southern Benin. Three categories of farm households were identified according to the status of HIV infection: non-affected households (no member with HIV/AIDS or any other chronic illness), affected households with sick member(s) under Cotrimozazole treatment and affected households with sick member(s) under antiretroviral treatment (ARV-households). A total of 120 households were sampled equitably in the 3 categories. The results showed that HIV/AIDS induced significant decrease of the size of all affected households. The pandemic affected significantly the availability of household labour in both CTM and ARV-households. More women as head in CTM-households were observed mainly in the household structure. In both CTM and ARV households, the income was significantly lower than in non-affected households. Despite their limited income, affected households must deal with important health care costs due to the successive episodes of the illness. In conclusion, HIV/AIDS has a huge impact on farm household financial and human capital.

Key words: HIV/AIDS, agriculture, farm households, socio-economy, Benin.

Impact du VIH/SIDA sur le capital humain et financier des ménages agricoles au Bénin**Résumé**

La pandémie du VIH (Virus de l'Immunodéficience Humaine) affecte la couche la plus productive de la société et fragilise le secteur agricole qui demeure le principal secteur d'activité économique au Bénin. Cependant, peu d'études ont porté sur l'impact de la pandémie sur ce secteur et sur les conditions d'existence des ménages agricoles. Afin de combler cette insuffisance, la présente étude a évalué l'impact du VIH/SIDA (Syndrome de l'Immunodéficience Acquise) sur les actifs des ménages agricoles dans Klouékanmè, Toviklin et Lalo, trois communes du Sud-Benin. Les ménages agricoles ont été catégorisés en les trois groupes suivants : les ménages non affectés (n'ayant aucun membre infecté), les ménages affectés avec des malades sous traitement Cotrimozazole (ménages CTM) et les ménages affectés dont les membres malades sont soumis aux antirétroviraux (ménages ARV). Un total de 120 ménages a été choisi équitablement dans les 3 catégories. Les résultats ont montré que le VIH/SIDA réduisait significativement la taille des ménages, diminuait le nombre d'actifs et modifiait la structure des ménages affectés. De plus en plus de femmes chefs de ménage étaient observés, notamment au sein des ménages CTM. Le revenu des ménages était significativement plus bas au niveau des deux catégories de ménages affectés qu'au niveau des ménages non affectés. En dépit de leurs revenus bas, les ménages affectés devaient supporter des frais de santé très élevés. Somme toute, le VIH/SIDA a un important impact sur le capital humain et financier des ménages agricoles affectés.

Mots clés : VIH/SIDA, agriculture, ménages, socio-économie, Bénin.

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INTRODUCTION

Sub-Saharan Africa is the region of the world that is the most affected by HIV pandemic (Nombo, 2007). 22.4 million out of 33.4 million people living with HIV/AIDS are in this region (UNAIDS, 2010). In Benin, there is a regular increase in the number of infected cases (Kouton, 2005). Rural areas are more affected, as education on HIV/AIDS is made difficult because of the low education of the rural population, the limited access to media and to health services (UNFPA, 2002). Given that more than half of the whole population lives in rural areas and depends on agriculture for its subsistence, and that agriculture remains the main hub in Benin, the impact of HIV/AIDS on the agricultural production is not only critical for the farm households, but also for the national economy. However, most of the studies on HIV/AIDS were focused on urban areas (CVG, 2004). In order to raise the awareness on the impact of HIV/AIDS in rural areas and to assess this impact, this study was carried out. In this paper, the key findings with regard to the impact of HIV/AIDS on farm households' human and financial capital were identified and discussed.

STUDY ZONE

The choice of the study zone was based on the prevalence of HIV/AIDS and on the preponderance of farm households in each region. Based on these criteria, the region of Couffo was selected (Figure 1).

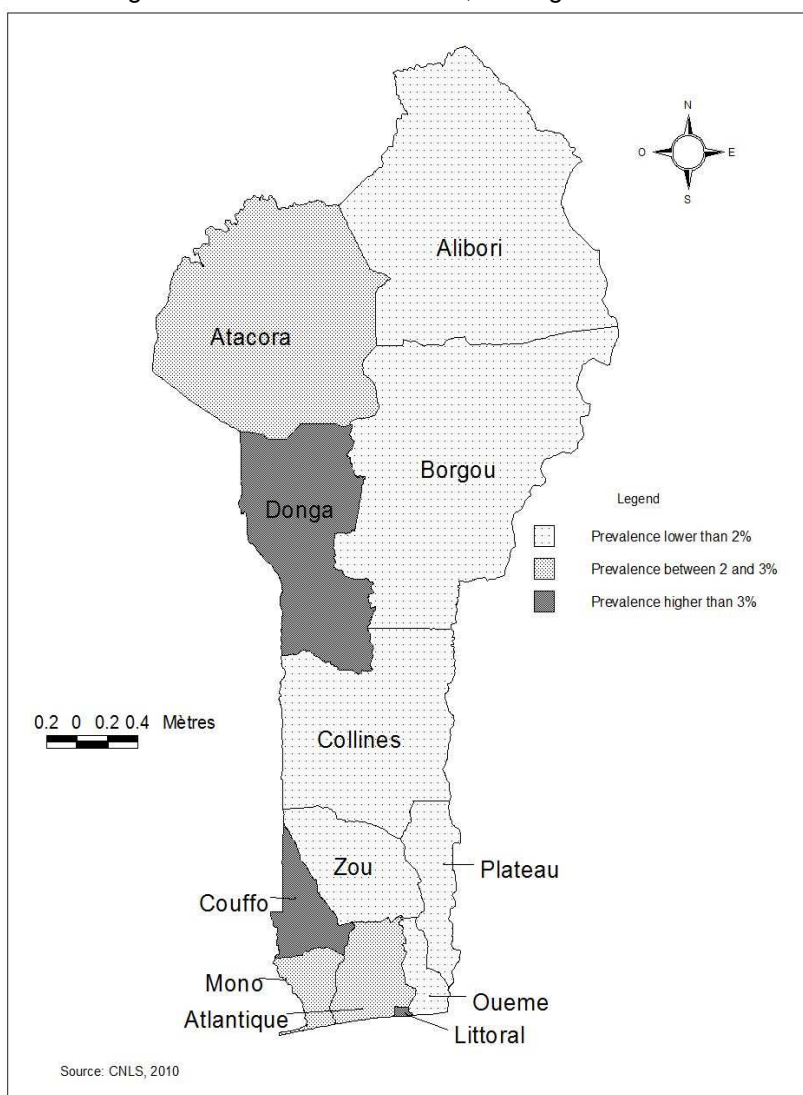


Figure 1. Benin map with the 12 regions and the HIV/AIDS prevalence in each region

Indeed, according to the global investigation implemented by the National Program on HIV/AIDS in 2002, the region of Couffo showed the highest prevalence rate: 4.3%, versus 1.0% for Alibori, 1.5% for Collines, 1.4% for Zou, 2.6% for Atacora, 1.5% for Plateau, 1.6% for Ouémé, 3.2% for Donga, 2.3% for Atlantique, 3.6% for Littoral, 0.9% for Borgou and 2.2% for Mono (Obey *et al.*, 2010).

Furthermore, the region of Couffo is known as essentially a rural and agricultural region. Indeed, the rural population represents 80% of the total population of this region (Dakpogan, 2003). In terms of health coverage, the department includes two health zones, each comprising three municipalities. The first health zone covers the municipalities of Aplahoué, Dogbo and Djakotomey. The second includes the municipalities of Klouékanmè, Toviklin and Lalo. Only the second zone was covered by the study. Such a restriction of the study area was supported by the fact that there was an existing identification work done on the People Living with HIV/AIDS (PLHAs) in this health zone. Moreover, in this health zone, there were well-functioning associations of people living with HIV/AIDS that were able to assist in identifying the HIV/AIDS-affected households.

MATERIAL AND METHODS

Choice of the units of study

The sampling unit is the farm household. The household is defined as a group of people related or not who live under the same roof, recognize the authority of the same individual called the head of the household, share the same meals, have a common source of income or gather their means in order to satisfy the household needs (Ellis, 2000). For this study, the farm household is a household whose main activity is agriculture. The selection of the households was based on the stage of evolution of the infection which is based on the HIV viral load.

The HIV viral load test is a quantitative measurement of HIV nucleic acid (RNA) which provides important information, used in conjunction with the CD4 cell count. The CD4 count helps tell how strong the immune system is, indicates the stage of the HIV disease, guides treatment, and predicts how the disease may progress. For infected persons with high HIV viral load (less than 200 CD4/T-helper cells per cubic millimeter of blood), public health guidelines recommend starting on antiretroviral (ARV) therapy. But for infected persons with low HIV viral load, (more than 200 CD4/T-helper cells per cubic millimeter of blood), public health guidelines recommend a therapy based on Cotrimozazole medicines (CTM), in order to help the infected person immune system to fight against the opportunistic diseases. A normal CD4 count is from 500 to 1,500 cells per cubic millimeter of blood. Based on the fact that the effects of HIV/AIDS on the individual should differ according to the stage of evolution of the infection, the sample was divided into three categories according to the status of the HIV infection: i) the **non-affected households** (Households where no member is suffering from HIV/AIDS or other chronic disease likely to have the same effects that HIV/AIDS.), ii) **CTM-households** (households with HIV-positive patients receiving CTM treatment and with low HIV viral load) and iii) **ARV-households** (households with HIV-positive patients receiving ARV treatment due to high HIV viral load).

The affected households were identified through the PLHAs' associations. In order to facilitate the first contact with these households, a facilitator was selected among the members of the local PLHAs' association. Here the facilitator is a member of the PLHIV association that brings us to the infected household members (usually the head) which are the access points to the affected household. The facilitator does not participate to the interview with the household unless requested by this one.

Sampling

The sample was built using a stratified random sampling method, based on the three categories of households defined above: non-affected households, CTM-households and ARV-households. Within each category, a total of 40 households were sampled. Each household involved in the study was selected according to the systematic sampling method. This technique consists of using the same interval between two selected units. From the PLHAs' lists, the affected households were selected by applying the interval (number of affected households to survey in each municipality/size of the PLHAs' association). According to the size of each PLHAs association, the number of surveyed households per association and per municipality was calculated (Table 1). Concerning the non-affected households, they were selected randomly, in the same zone with the affected households.

Table 1 Sampling

PLHAs Associations	Municipality of				Total
	Klouékanme		Toviklin	Lalo	
	Solidarité & Vie	Gbénonkpo	Agbénonhévi	Lonlongnon	
Size of Associations	64	65	62	65	256
Number of farm households	56	34	35	53	178
Number of households with member under ARV	40	11	19	27	97
Number of surveyed ARV-households	16	05	08	11	40
Number of households with member under CTM	16	23	16	26	81
Number of surveyed CTM-households	8	11	8	13	40
Total of surveyed affected households	90		35	53	178
Number of non-affected households surveyed	20		8	12	40

Note: Non-affected households: households with no infected member; **CTM-households:** households with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-households:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Model

The methodology used consisted of two approaches. The first is the synchronic or descriptive approach. This consisted of comparing the three categories of households at a certain period. This comparison was conducted for two periods: the period before the disease (pre-disease) and the disease period. In a second step, the three categories of households were compared via diachronic or historical approach. This consisted of comparing the evolution of the three categories of households between the pre-disease period and disease period. This method enables to assess the dynamic of households' characteristics over the time. Such methodology had been implemented by some authors in impact assessment (Scherr and Müller, 1991; Praneetvatakul and Waiber, 2002; Berg, 2004).

The ANOVA test was used to compare the means of the three samples of households for quantitative variables. When the ANOVA test showed a significant difference between the three samples, the t test was used for comparing means of the samples in pairs. The Chi square test was also used to compare categorical variables between the three groups of households. The data were computed with CSPRO 3.3 and were analyzed with SPSS 16.

Ethics

As this study focused on a sensitive issue (HIV/AIDS), before starting the study, a proposal was submitted to the Ethic Committee of the Ministry of Public Health and an approval was granted. During the survey, the objective of the study was explained to the participants and their consent was granted before administering the questionnaires. A consent form attached to each questionnaire was signed by the respondent before the interview. All the collected data was kept confidential and used only for this purpose. In addition, to facilitate contact with the affected households, the facilitators are selected from the PLWHAs' associations.

RESULTS

Impact of HIV/AIDS on the households' human capital

Size of the household

The comparison of the household's average size was analyzed over the time and according to the health status in both pre-disease and disease periods (Table 2). For the pre-disease period, the ANOVA test indicated that the average size of the households of the three categories of households was not significantly different at 5% significance level. So, for the pre-disease period the Hypothesis H_0 was accepted at 5% significance level. This result confirmed that before the disease period, all the surveyed households had almost the same size; so the sample was homogenous. For the disease period, the ANOVA test showed that the average size of the households did not depend on the status

of the HIV infection at 5% significance level. Thus for the disease period, the Hypothesis H_0 was accepted at 5% significance level.

However, there was observed a decrease in the size of ARV-households and CTM-households, while the size of non-affected households increased. The ANOVA test done showed a significant difference at 6% significance level for the variation in households' size between the two periods. The t test implemented indicated a non significant difference between the variation in the size of ARV-households and CTM-households ($p=0.823$). But, it showed a significant difference at 5% between affected households ($p=0.012$) and non-affected households ($p=0.043$).

The increase of the size of the non-affected households was explained by the new births, while the decrease of the size in the affected households could be explained by the deaths.

Normally, the size of the households in a long-term must decrease, because the children, once they become older get married and left the household. But in this study, because of the short period covered by the data collected (approximately 5 years), we noticed that the non affected households had increased in term of household size due to the new births. Also, the decrease in the size of affected households is maybe the result of the deaths of members rather than the departure of the oldest children.

Table 2. Average size of households according to the degree of affection

Categories of households	Average size during the pre-diseaseperiod	Average size in the disease period	Variation between the two periods
ARV-households	8.90	8.10	- 0.80
CTM-households	7.43	6.83	- 0.60
Non-affected households	7.53	8.45	0.92
F value	1.424	1.745	2.908
p-value (significance)	0.245	0.179	0.059

Note: Non-affected households: households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the average size of the households does not depend on the status of HIV infection; versus H_1 : the average size of the households depends on the status of the HIV infection.

Number of active members

The data collected were related to the number of part-time and full-time active members in each type of household (Table 3). A full-time active is someone who is older than 14 years, whose main activity is the farming, who is able to work actively at least 7 hours per day and during the whole crop season. A part-time active is someone who is older than 14 years, whose main activity is the farming but who is not able to work actively or someone whose main activity is not farming like students.

The ANOVA test indicated for the pre-disease period that the average number of full-time and part-time actives per household was not significantly different for the three categories of households at 5% significance level. This result confirmed that before the disease the households were similar. For the disease period, the difference between the three categories of households was significant at 5% as well as for the number of full-time actives and for the number of part-time actives. According to the t tests, there was no significant difference between the average number of full-time actives of ARV-households and CTM-households ($p=0.836$). But, the average number of full-time labor was highly different at 1% from non-affected households ($p=0.0001$) to CTM-households and ARV-households. This could be explained by the presence of infected persons who were active in the past, but were no more able to work for full-time.

The average number of part-time actives in the non affected households was significantly different from that of CTM-households at 5% significance level ($p=0.049$) and from that of ARV-households at 1% significance level ($p=0.0001$). In addition, the average number of part-time actives in CTM-households was significantly different from that of the ARV-households at 5% significance level ($p=0.039$). In general, it was noticed that the affected households had the highest number of part-time actives compared to the non affected households. This result was explained by the fact that the infected active members who did not work full time, because of health reasons were considered as part-time farming actives.

Table 3. Number of full-time and part-time actives

Categories of households		ARV-households	CTM-households	Non-affected households	F value	p-value (significance)
Average number of full-time actives	Pre-disease period	2.40	2.45	2.93	0.517	0.597
	Disease period	0.60	0.65	2.73	5.331	0.036
Average number of part-time actives	Pre-disease period	2.15	1.53	1.23	2.214	0.114
	Disease period	4.05	3.03	2.10	6.723	0.021

Note: **Non-affected households:** households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the average number of actives per household does not depend on the status of the HIV infection; versus H_1 : the average number of actives per household depends on the status of the HIV infection.

Age of the household's Head

The ANOVA test showed that the average age of the households' heads of the three categories was not significantly different in the pre-disease period at 5%. This result confirmed that before the affection period, all the surveyed households were similar for this characteristic. For the disease period, the ANOVA test indicated that the difference between the average ages of the households' heads of the three categories was not also significant at 5% significance level. However, it was noted an increase in the age of households' head for ARV-households and for non-affected households (Table 4). But for CTM households, it was noticed a decrease of the age of the head of the household. The increase observed in the non-affected households could be explained by the fact that these households' heads were becoming older. Concerning the ARV-households, the results observed resulted from two facts: First, in several cases the household head was the same, but he got old. Secondly, in some cases, the household head was dead and replaced by his wife/husband who was almost as old as the dead head. In most of the CTM-households, the man (previous household's head) was dead and the new head (the wife) was less old. This explained why the heads' age in the CTM households during the disease period was less than during the pre-disease period.

Table 4. Average age of the household heads

Categories of households	Average age of the household heads in the pre-disease period (years)	Average age of the household heads in the disease period (years)
ARV-households	36.20	39.60
CTM-households	38.98	38.53
Non-affected households	35.25	39.48
F value	1.232	0.124
p-value (significance)	0.296	0.883

Note: **Non-affected households:** households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the average age of the household's heads does not depend on the status of the HIV infection; versus H_1 : the average age of the household's heads depends on the status of the HIV infection.

Sex of the household's head

During the pre-disease period, the Chi square test showed that at 5% significance level, the distribution of the households' heads according to their sex was not significantly different among the three categories of households (Table 5).

This result confirmed that before the disease, all the households had the same characteristics. During the disease period, the Chi square test indicated that the distribution of the households' heads according to their sex was significantly different among the three categories of households at 1% significance level (Table 5). It was noted that the number of female-headed households remained constant in non-affected households, while in affected households their number increased. This was explained by the death of men previously heads of the households. The sex ratio (M / F) decreased from 39 to 2.1 in ARV households, from 12.3 to 0.7 in CTM households, while it remained unchanged in the case of non-affected households. This clearly indicated the impact of HIV / AIDS on household structure.

Table 5. Distribution of the households' heads according to their sex

Categories of households		ARV-households	CTM-households	Non-affected households	Chi square value	p-value (significance)
Pre-disease period	Male	39	37	35	2.883	0.237
	Female	1	3	5		
Disease period	Male	27	17	35	18.080	0.0001
	Female	13	23	5		

Note: **Non-affected households:** households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the distribution of the household's heads according to their sex does not depend on the status of the HIV infection, versus H_1 : the distribution of the households' heads depends on the status of the HIV infection.

Matrimonial status of the households heads

The Chi square test showed that the distribution of the households' heads according to their matrimonial status was highly dependent on the HIV status of the household at 1% significance level. This could be explained by the death of the partner of the household head (Table 6).

Table 6. Distribution of the household's heads according to their matrimonial status and the degree of affection in the disease period

Categories of households	Matrimonial status			
	Single	Married	Divorced or separated	Widow or widower
ARV-households	2	22	1	15
CTM-households	0	16	1	23
Non-affected households	0	38	1	1
Total	2	76	3	39
Chi square value	36.287			
p-value (significance)	0.0001			

Note: **Non-affected households:** households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the distribution of households' heads according to their matrimonial status does not depend on the status of the HIV infection; versus H_1 : the distribution of households' heads depends on the status of the HIV infection.

Educational level of the households heads

The Chi square test indicated that the distribution of the household's heads according to their educational level did not depend on the HIV status of the household (Table 7). This result could be explained by the low educational level of the respondents. About 77 of 120 households have never attended school.

Table 7. Distribution of the household's heads surveyed according to their educational level the degree of affection for the period after infection

Categories of households	Educational level			
	Did not attend school	Primary	Secondary	Other
ARV-households	22	11	6	1
CTM-households	29	6	4	1
Non-affected households	26	10	3	1
Total	77	27	13	3
Chi square value	3.594			
p-value (significance)	0.731			

Non-affected households: households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Hypotheses: H_0 : the distribution of the households' heads according to their educational level does not depend on the status of the HIV infection; versus H_1 : the distribution of the households' heads according to their educational level depends on the status of the HIV infection.

Impact on the financial capital of the households

The impact of HIV/AIDS on households' financial capital was assessed through the average income of households, the cost of medicines, the cost of transport from the residence to the hospital, the opportunity cost of time spent at the hospital for the patient and the sick guard.

Average annual income

The results of the ANOVA test indicated at 5% significance level that there was a significant difference between the average incomes of the three categories of households (Table 8). The t tests showed that there was no significant difference between the average annual income of ARV-households and CTM-households ($p=0.599$). But, the average annual income of the non-affected households was significantly different from that of both ARV and CTM households probably due to the disability of active members in the affected households.

Table 8. Average annual income of the households

Categories of households	Counts	Average annual income in the disease period (Fcfa)
ARV-households	40	355,500
CTM-households	40	320,500
Non-affected households	40	610,900
Chi square value	1.308	
p-value (significance)	0.274	

Note: Non-affected households: households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

Financial costs of HIV/AIDS

The variable "Cost of medicines" was related to the medicines bought by the infected persons to treat opportunist infections. In fact, CTM and ARV drugs were provided freely by the health care structures. However, shortages were regularly denounced by the beneficiaries. Food expenses of the patient and the caregivers were included in other expenses. "Number of days lost" included the number of days spent by the patient and the sick-guard at hospital or at home. The variable "Opportunity costs" of the sick-guard was related to the time used for looking after a patient. In other hand, if the days spent to take care of the patient were used to do the usual work, how much the sick or the sick-guard would get.

The results showed that the costs related to the pandemic are higher for ARV-households than for CTM-households (Table 9). However the t test did not show any significant difference between these two categories of households for the variables "Other costs", "Opportunity costs", "Cost of medicines", and "Transport cost". But, there was a significant difference at 5% for the variable "Number of days lost by the sick" ($p = 0.028$). This was explained by the fact that persons under antiretroviral were often sick and went to hospital more often. Concerning the variable "Days lost by the sick-guard", it was noticed that when the infected person was hospitalized, the sick-guard spent 172 days to take care of the sick. This number was not significantly different for ARV-households and CTM-households, at 5% significance level. The opportunity cost of the time spent by the sick-guard at the hospital was 255,664.5 FCFA. This opportunity cost was not significantly different for ARV-households and CTM-household at 5% significance level. The average cost of the HIV/AIDS-dead's burial in the affected households is about 235,085.1Fcf. Statistically, there was no significant difference between the two categories of affected households, at 5% significance level considering funeral expenses. Through these various costs, the financial weight of the pandemic on the affected household's budget was assessed. The affected households whose income was reduced because of the disability of the infected active members had in addition to deal with the heavy financial cost of health care.

Table 9. Financial costs of HIV/AIDS

Items	Categories of households	Average costs
Cost of medicines (Fcf)	ARV-households	3,667
	CTM-households	2,362
Transport cost (Fcf)	ARV-households	4,102
	CTM-households	3,418
Other costs (Fcf)	ARV-households	1,407
	CTM-households	1,012
Number of days lost per month by the sick	ARV-households	2.10
	CTM-households	1.45
Opportunity cost for the sick (Fcf)	ARV-households	2,466.25
	CTM-households	1,945.00
Number of days lost by the sick-guard during the last sickness	ARV-households	165.80
	CTM-households	185.40
Opportunity cost for the sick-guard (Fcf)	ARV-households	298,600
	CTM-households	165,500
Burial cost (Fcf)	ARV-households	244,850
	CTM-households	227,851

Note: Non-affected households: households with no infected member; **CTM-household:** with HIV-positive patients receiving CTM treatment and with low HIV viral load; **ARV-household:** households with HIV-positive patients receiving ARV treatment due to high HIV viral load.

DISCUSSION

The study showed a severe impact of HIV/AIDS on the affected households. Similar results were reported by Wieggers (2008), Kormawa (2005), Haddad and Gillespie (2001). According to Slater and Wiggins (2005), the several deaths caused by HIV/AIDS generate shortages of labor, which induces series of transformations, in particular a fall in the production, a reduction of the range of the activities, a reduction of the time devoted to the agricultural and extra-agricultural activities. Moreover, the agricultural knowledge and techniques die with the generation which holds this knowledge, as pointed by Umeha et al. (2001). The children – especially the girls - are frequently withdrawn from schools to help the family; a tendency which does not predict good perspectives for the future (CTA, 2003).

There was also observed for the disease period that the affected households had a significant number of widows. The significant number of widows who became heads of households is a situation which has obviously multiple consequences, because most of the women were not prepared to manage alone the households. Becoming suddenly householders constitutes a first shock, and supporting

alone all the charges of the household constitutes another shock. This opinion is shared by CVG (2004), which adds that the fact that women cannot have the right to manage and exploit the productive resources in certain communities limits their capacity to mitigate the effects of HIV/AIDS. The monopolization of the properties and the assets by the husband's parents, after the death of the husband constitutes a problem for the widow and deprives her of the necessary means to take care of the household. According to CVG (2004), rural women are threatened by HIV/AIDS at three levels: as mothers, as wives and as farmers. When they take the lead of the household, after the death of their husband, and try to develop agricultural activities, they are handicapped by the difficult access to the land property, credits and training (Adeyeye, 2006).

As for the impact of HIV/AIDS on financial capital, Jayne *et al.* (2006) found that the pandemic progressively affects the ability of households to invest in agriculture and to purchase productive assets such as oxen, ploughs and fertilizers. They noted also that many households are forced to cash their savings and to sell their food crops, livestock and even farm implements in order to cover medical care and burial expenses.

CONCLUSION

The HIV/AIDS has a deep negative impact on human and financial capital of the farm households. That induced the reduction of affected households' income, but also a reduction of their number of actives which constitutes their main source of labor force. In addition, the pandemic generates serious changes in the structure of the households. Indeed, after the death of men, their wives held the charge of household's head. These wives who were not prepared to assume such responsibilities suddenly and who have not an easy access to land, to credit cannot effectively face the many needs of their households. The results of statistical analyzes showed also that there is no significant differences between the effects of HIV / AIDS on households in which patients are under CTM or ARV treatment.

With regard to all these consequences, it is urgent to investigate the effectiveness of the subsistence strategies developed by the affected farming households and think about alternative solutions in order to mitigate the impacts of the pandemic. Such alternatives could consist of the identification of appropriate farming systems adapted to the conditions of the affected farm households. Such systems should take into consideration economic and limited labor constraint. The identification of such systems requires new and deeper studies on this problematic.

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