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Yohannes Mengesha Woldemichael, Jema Haji Mohamad

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SOCIO-ECONOMIC IMPACTS OF HIV/AIDS ON ETHIOPIAN HOUSEHOLDS: THE CASE OF DIRE DAWA ADMINISTRATION

[1]Yohannes Mengesha Woldemichael, [2]Jema Haji Mohamad

[1]Development Research and Business Consultant (Freelance), [2]Associate Professor of Agricultural Economics at Haramaya University

(ETHIOPIA)

[1]fev_eris@yahoo.com; [2]jemahaji@gmail.com

ABSTRACT

Dire Dawa City Administration stood second in the prevalence of HIV/AIDS among the nine regions of Ethiopia. With reference to nine kebeles in the Administration, the study focused on assessing the socio-economic impact of HIV/AIDS at households' level. Stratified into two groups, a total of 240 households were sampled in the study, from which 120 were selected randomly from the general/non-affected households and 120 were purposively selected from households that are explicitly identified to have an HIV positive adult member. The study compared HIV positive people with a control group with similar observed characteristics, using propensity score matching (PSM) approach. Results from the propensity score regression (A logit model) suggest that HIV prevalence declines with age at first and then rises. Primary and secondary school education appear to lower the risk of HIV while no schooling increases the risk. The Average Treatment Effect (ATT) estimation results showed that morbidity rate of HIV-positive individuals was higher than matched HIV negative individuals by 22 percent, which is statistically significant at 5 % level of significance. Similarly, on average, HIV/AIDS has increased the incidence of major illness (illness of duration exceeding 3 months in the year preceding the survey) in the affected households by 41 %, which is also statistically significant at 1 % level of significance. The study discusses these results in detail and draws their implications for policy makers. Moreover, following Ichino et al. (2006), the study employed a simulation-based sensitivity analysis for matching estimators.

1. INTRODUCTION

Cases of AIDS have been reported in every nation of the world. About 90% of all PLHIV live in the developing world. Particularly, AIDS has struck sub-Saharan Africa (Bartlett and John, 2009). In 2010 around 1.2 million people died from AIDS in sub-Saharan Africa and 1.9 million people became infected with HIV (UNAIDS, 2010). The HIV/AIDS epidemic in Ethiopia probably began in the late 1970s or early 1980s, with the first hospitalized AIDS patients reported in 1986, and the first sero-survey at a national scale conducted among military recruits in 1984-85 (showing a prevalence of 0.07% among 5,565 people tested). Initially, the epidemic was localized in urban areas, along the major commercial routes and among certain occupational groups. By 1988, high rates of HIV prevalence (17%) were detected among commercial sex workers residing along the main trading roads and long distance truck drivers (13%) (EHAPCO and GAMET, 2008).

By the year 2010, the national adult HIV prevalence rate for Ethiopia was estimated to be 2.4 percent and an estimated 1.2 million adult Ethiopians were living with the virus. In the same year, an estimated 14,802 people were living with HIV/AIDS in Dire Dawa Administration, making it the second most HIV affected region in the country with an adult prevalence rate of 4.9 percent (FHAPCO, 2010). Hence, with nearly 5 percent of its adult population infected with HIV, studying the socio-economic impact of HIV/AIDS on households of Dire Dawa Administration is of obvious policy relevance. Central to investigating the socio-economic impact of HIV is to understand the dynamics that arise when the household is HIV affected. In this context, this study primarily endeavors to assess the impacts of HIV/AIDS on households' socioeconomic conditions, through a comparative analysis of certain indicators such as morbidity rate, health care spending and work-time loss, between the samples of matched treated and control groups.

2. METHODS

2.1. THE STUDY AREA

Dire Dawa is one of two chartered cities in Ethiopia (the other being the capital, Addis Ababa). Organized under 38 rural and 9 urban Kebeles, Dire Dawa is also the second largest city in the Country. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Dire Dawa has a total population of 341,834, of whom 233,224 or 68.23% of the population are urban inhabitants.

Dire Dawa hosts a number of most-at-risk population groups, including female sex workers, migrant day laborers, tourists, truck drivers and their assistants, and in- and out-of school youth (Amare, 2009). The same source also asserted that transactional and cross-generational sexual practices are common in the town (large numbers of female sex workers and students practice transactional sex).

By the year 2010, the adult HIV prevalence rate of Dire Dawa Administration was estimated to be 4.9 %. While adult HIV incidence of the urban and rural Dire Dawa was 1.86% and 0.17% respectively. On the other hand, the total number of people living with HIV/AIDS in Dire Dawa ws expected to be 14,389 in urban and 414 in rural. Female and male HIV positive was expected to be 8,714 and 6,086 respectively showing that female prevalence is higher than male both in urban and rural Dire Dawa (FHAPCO, 2010).

2.2. SAMPLING

With reference to nine kebeles in the Administration, the study focused on assessing the socio-economic impact of HIV/AIDS at households' level. For better rural-urban representation of the data collected using survey method, the task of sampling was stratified into three urban and six rural kebeles.

Samples were taken from two types of households, namely HIV affected and non-affected households. In doing so, a total of 240 households were sampled, from which 120 were from the general/non-affected households and 120 were from households that are explicitly identified to have an HIV positive adult member.

HIV affected urban households were sampled in collaboration with Local NGOs working with people living with HIV. Whereas, rural health posts were the main entry point for identifying HIV affected respondents from the rural locations. Non-affected households were randomly identified from each of the nine kebeles in collaboration with Administrators of the respective kebeles.

Due to the relatively lower prevalence of HIV and limited NGO activities in rural areas, the majority of the study sample was identified from urban locations accounting to 164 households (68% of the total sample), while the remaining 76 households (32% of the total sample) were drawn from the rural kebeles.

2.3. DATA COLLECTION AND ANALYSIS

At households' level, primary data were collected on a variety of demographic, socioeconomic and health related issues of individuals and households. An econometric model called, a propensity score matching approach, was employed to quantitatively estimate the impact of HIV on the health and socio- economic outcomes of affected households. The key assumptions in the PSM approach are the Conditional Independence Assumption (CIA) and the overlap assumption. CIA states that conditional on the propensity score (predicted probability of reporting HIV-positive, conditional on the full set of predetermined variables), assignment to the treatment (HIV–positive) and control (HIV-negative) groups can be taken to be random (Rosenbaum and Rubin, 1983). If this is the case, then the difference in outcomes between treatment and control groups can be directly compared to give the effect of "treatment".

Hence, a matched comparison of health and socio- economic outcome indicators, was performed between HIV affected and non-affected households who shared similar propensity scores. In doing so, STATA 11 computing software was employed. The matching variables used in the propensity score estimation regression include household and individual level characteristics such as age, age squared, family size, share of males and dummies for marital status, schooling, place of residence and religion. Whereas, the outcome variables used in the estimation of average treatment effects (ATTs) include morbidity rates, inpatient stays, amounts spent out pocket for health care and work-time forgone by sick person.

3. RESULTS

Table 1 presents the logistic-regression implemented to generate propensity scores which are used for matching controls to treated cases. In general, results from the propensity score regression suggest that HIV prevalence declines with age at first and then rises. Primary and secondary school education appear to lower the risk of HIV while no schooling increases the risk. Among the individuals sampled for the study, it has been found that Christian household heads appear to be more likely to be HIV-positive than Muslim household heads.

Table 1. Logit estimates for propensity scores

Variables	Coef.	Std. Err.	z
Constant	9.85	2.642	3.73***
Age (in years)	-0.321	0.12	-2.92***
Age squared	0.003	0.001	2.33***
Dummy for place of residence	0.342	0.529	0.65
Dummy for marital status	-1.174	0.317	-3.70***
Dummy for no schooling	0.48	0.838	0.57
Dummy for primary schooling	-0.552	0.944	-0.58
Dummy for secondary schooling	-0.257	0.976	-0.26
Dummy for Religion	0.647	0.383	-1.69*
Share of males	-0.052	0.09	-0.59
Family size (in numbers)	0.456	0.06	-3.76***
Number of observations	240		
LR chi2(10)	53.44		
Prob > chi2	0		
Pseudo R2	0.161		

*** and * means significant at the 1% and 10% probability levels, respectively

3.1. MATCHING USING PROPENSITY SCORES

This study implements three different procedures of matching, all of which use propensity scores to control for predetermined observable differences between the treatment and control groups. These include nearest neighbor method, radius method and the kernel method (Smith and Todd 2005).

The final choice of a matching estimator for this study was guided by three criteria, as in Yibeltal (2008). These include the equal means test, referred to as the balancing test, pseudo-R2 and matched sample size. Specifically, a matching estimator which balances all explanatory variables (i.e., results in insignificant mean differences between the two groups), bears a low pseudo-R2 value and also results in large matched sample size was chosen as being the best estimator of the data considered.

Table 2. Performance of matching estimators

S.N	Matching Estimator	performance criteria		
		Balancing test*	Pseudo-R^2	Matched sample size
1	Nearest Neighbor Matching			
1.1	Without replacement	10	0.017	189
1.2	With replacement	9	0.022	219
2	Radius caliper Matching			
2.1	Caliper (0.01)	7	0.011	206
2.2	Caliper (0.25)	8	0.021	220
3	Kernel Matching			
3.1	No band width	8	0.016	220

3.2	Band width(0.25)	10	0.01	220
3.3	Band width(0.1)	10	0.012	220
3.4	Band width (0.5)	10	0.049	220

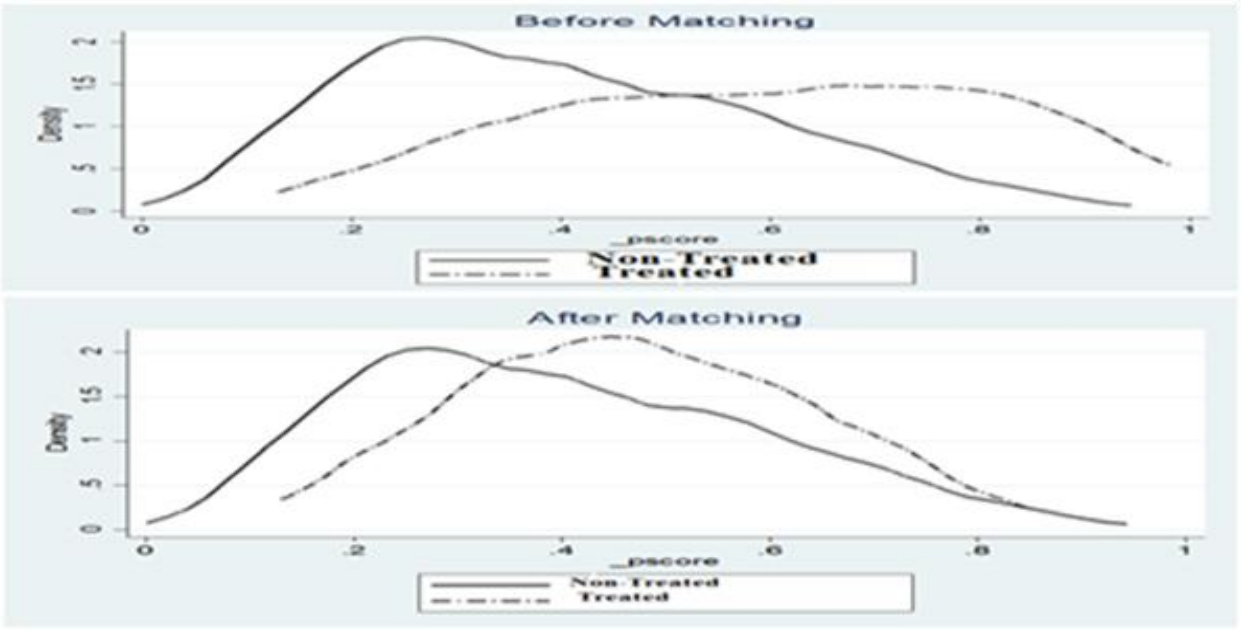
** Number of explanatory variables with no statistically significant mean differences between the matched groups of HIV affected and non-affected households*

Based on the above mentioned performance criteria, Table 2 presents the estimated results of tests of matching quality. Accordingly, the kernel matching with 0.1 band width was found to be the best estimator for the data. As can be seen from the Table, this estimator has resulted in the lowest pseudo R2 value, well balanced covariates and largest sample size by discarding only 20 unmatched households from the sample. Hence, only the results obtained from this estimator were presented and discussed in the study.

3.2. TESTING THE OVERLAP ASSUMPTION

Following Carolyn (2010), density-distribution plots of propensity scores for treated and untreated groups was employed to visually check the overlap condition and to see if the matching is able to make the distributions more similar. The distributions of the propensity scores, before and after matching as well as after the imposition of a further common support condition are plotted in Figure 1 and 2 respectively.

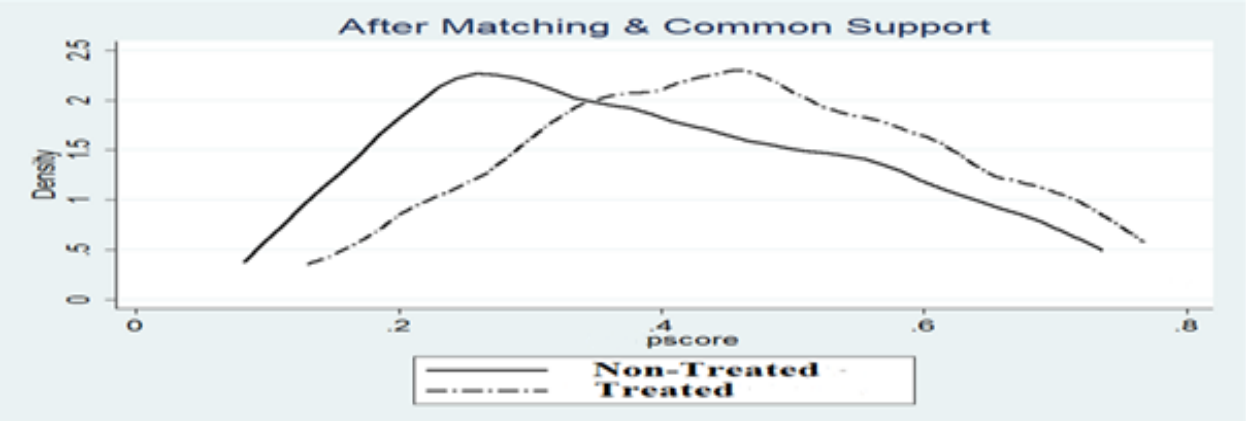
Figure 1. Distribution of propensity scores before and after matching



Visual inspection suggests that the densities of the propensity scores are more similar after matching. However, one can visually inspect that there are clear and sizeable differences in the minima and maxima of the propensity score density distributions for the treatment and comparison groups even after matching.

As a result, a further common support condition, as in Marco and Sabine (2008), is imposed to delete all observations whose propensity score is smaller than the minimum and larger than the maximum in the opposite group. Figure 3 depicts the distribution of propensity scores after the further common support condition is imposed.

Figure 2. Distribution of propensity scores after imposition of further common support



3.3. AVERAGE TREATMENT EFFECT (ATT)

Findings on the effects that HIV has on households' socioeconomic conditions was presented through estimation of certain indicators such as morbidity rate, health care spending and work-time loss, based on the sample of matched treated and control groups.

Results are based on questions referring to the 4-weeks preceding the survey and questions based on outcomes in the previous year. Irrespective of the time frames considered, the Average Treatment Effect (ATT) estimation results showed that HIV is associated with significantly increased morbidity, health care spending and lost work time, relative to outcomes in the control group.

Table 3. Estimates of average treatment effects

Outcome indicators	N. treated	N. control	ATT	Std. Err.	T
For the last four weeks					
Incidence of illness (%)	104	116	0.22	0.06	2.91**
Health care expense (birr)	104	116	32.57	14.4	2.27**
Work time lost due to illness (days)	104	116	0.794	0.46	1.72**
For the last one year					
Incidence of major illness (%)	104	116	0.412	0.06	7.36***
Health care expenses (birr)	104	116	190.61	48.1	3.96***
Work time lost due to illness (days)	104	116	7.71	3.16	2.43**

*** and ** means significant at the 1% and 5 % probability levels respectively.

For instance, morbidity rate of HIV-positive individuals was found to be higher than matched HIV negative individuals by 22 percent, which is statistically significant at 5 % level of significance. Similarly, on average, HIV/AIDS has increased the incidence of major illness (illness of duration exceeding 3 months in the year preceding the survey) in the affected households by 41 %, which is also statistically significant even at 1 % level of significance.

Furthermore, HIV-positive individuals spent nearly 32 and 190 birr extra from out of pocket than matched HIV-negative individuals in the last four weeks and one year period preceding the survey respectively. The t test results also revealed that these findings are statistically significant at 5% level of significance.

Considering the difference in work time lost due to illness, HIV positive individuals spent an extra seven days as an inpatient in the last one year period and less than an extra one day in the last four weeks period. The corresponding t values of 2.43 for the longer time frame and 1.73 for the shorter, show that the estimated ATTs are statistically significant at 5 % and 10 % level of significance respectively.

3.4. SENSITIVITY ANALYSIS

The study employed a simulation-based sensitivity analysis for matching estimators, which aimed at assessing to what extent the estimates derived under the CIA are robust with respect to specific failures of this assumption.

Although the results were found robust to specific failures of the CIA, the study concluded that non-experimental studies on the effects of a treatment (i.e., studies based on the CIA) should not be automatically accepted; rather, they should be put under the scrutiny of a sensitivity analysis, like the one proposed here, before being accepted as a guide for policy.

4. CONCLUSION

Measuring the socio- economic impacts of HIV/AIDS provides an important contribution to the limited literature on the impact of the epidemic on affected HHs especially in the study area. Hence, the matched comparison of health and socio- economic outcome has shown that HIV-affected households in Dire Dawa Administration are likely to face serious socio-economic challenges, when compared to their HIV-negative counterparts. These include the likelihood of Substantial incidence of illness, an increased work time loss and an increased out-of-pocket health care spending.

In summary, the particular findings of the study translate into significant losses to households in terms of direct medical care costs, as well as incomes foregone by sick members. Besides, the results indicated that HIV affected households do not have adequate mechanisms to cope with these financial shocks. Therefore, it is possible to conclude that the pandemic is being a great threat to the households of the study area and if the existing condition remains unchanged, it is evident that these impacts persist for the generations to come.

5. RECOMMENDATION

Based on the findings of the study, the following short and long term recommendations are forwarded.

- Facilitating a condition by which HIV affected HHs could get shelter at a reasonable price
- Increasing access of HIV-positive individuals to income generation schemes;
- Supporting PLHIV in nutrition so that adherence to ART will be enhanced and morbidity and mortality reduced among the affected individuals.
- Increasing access to palliative home based care services, especially for bed ridden patients;
- Providing formal and informal anti AIDS education that can remove the hidden stigma and create awareness about HIV/AIDS especially among communities of rural dwellers.

Finally, as this study is based only on the case of Dire Dawa Administration, it is difficult to take it as representative of the whole Country. Thus, it leads us to suggest a further in-depth study to investigate adequate information about the socio-economic impacts of HIV/AIDS at households' level.

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