



Joint Learning Initiative on Children and HIV/AIDS JLICA

Learning Group 1 – Strengthening Families

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A REVIEW OF THE SOCIOECONOMIC IMPACT OF ANTIRETROVIRAL THERAPY ON FAMILY WELLBEING

31 August 2008

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This paper was prepared for the Joint Learning Initiative on Children and HIV/AIDS (JLICA).

The Joint Learning Initiative on Children and HIV/AIDS (JLICA) is an independent, interdisciplinary network of policy-makers, practitioners, community leaders, activists, researchers, and people living with HIV, working to improve the well-being of HIV-affected children, their families and communities.

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Preface - Learning Group 1: Strengthening Families

The work conducted in Learning Group 1 was based on the fact that families, in all their many forms, are everywhere the primary providers of protection, support and socialization of children and youth, and families exert a very strong influence on children's survival, health, adjustment and educational achievement. This influence tends to be greater under conditions of severe strain, such as is caused by HIV and AIDS, particularly in the context of poverty.

In general, functional families love, rear and protect children and buffer them from negative effects. Functional families are those that have sufficient material and social resources to care for children, the motivation to ensure that children are nurtured and protected, and are part of a community of people who provide one another with mutual assistance. Family environments are especially important for young children. It is well established that multiple risks affect the cognitive, motor and social-emotional development of children and that the quality of parenting, assisted by intervention when needed, can ameliorate such impacts.

From the start of the epidemic, families have absorbed, in better or worse ways, children and other dependents left vulnerable by AIDS-induced deaths, illness, household and livelihood changes, and migration. Similarly, families have contributed, more or less successfully, to the protection of young people from HIV infection. Under the devastating effects of the epidemic, families need to be strengthened – economically, socially and with improved access to services – to enable them to continue, and to improve, their protection and support of children and youth. Families that neglect and abuse children need to be identified and social welfare services must be provided to them.

Families, extended kin, clan and near community are the mainstay of children's protection in the face of the AIDS epidemic - as they have been in poor countries under other severely debilitating social conditions, including war, famine and natural disaster. Only a very small proportion of AIDS-affected children are currently reached by any assistance additional to support they receive from kith and kin. The most scalable

strategy for children is to strengthen the capacity of families to provide better care for more children.

The co-chairs, secretariat, lead authors and stakeholders of Learning Group 1 were guided in the work undertaken in the Learning Group by the following key questions. By and large, these are the critical research, policy and programme questions currently being debated in the field.

1. On which children and families should we focus?
2. What evidence is available on which children are vulnerable and what can be done to help them, and how good is the research?
3. What aspects of the HIV/AIDS epidemic impact on children, how and why?
4. How are families changing as a result of adult illness and death associated with HIV and AIDS?
5. In what ways are children's health, education and development affected by the HIV/AIDS epidemic?
6. What does knowledge and experience of other crises teach us about the AIDS response for children and families?
7. What can we learn from carefully evaluated family strengthening efforts in fields other than HIV and AIDS that can be usefully applied in hard hit countries in southern Africa?
8. What programmatic experience has been gained in strengthening families in the HIV/AIDS field?
9. What promising directions are there for the future and what do they suggest?
10. What mistakes have been made and what now needs to be done?

These questions form the structure of the integrated report. As indicated in the Preface, detailed data and references are to be found in the respective LG1 papers.

Twelve detailed review papers constitute the primary evidence base for the conclusions drawn and the recommendations made by Learning Group 1. The papers, their authors in alphabetical order, and their affiliations are listed below.

List of authors, affiliations and paper titles

Authors	Affiliation	Title
Adato, M Bassett, L	International Food Policy Research Institute (IFPRI) – United States of America	What is the potential of cash transfers to strengthen families affected by HIV and AIDS? A review of the evidence on impacts and key policy debates
Belsey, M	Consultant – United States of America	The family as the locus of action to protect and support children affected by or vulnerable to the effects of HIV/AIDS: A conundrum at many levels
Chandan, U Richter, L	Human Sciences Research Council (HSRC) – South Africa	Programmes to strengthen families: Reviewing the evidence from high income countries
Desmond, C	Human Sciences Research Council (HSRC) – South Africa	The costs of inaction
Drimie, S Casale, M	International Food Policy Research Institute (IFPRI), Regional Network on AIDS, Food Security and Livelihoods (RENEWAL), Health Economics and AIDS Research Division (HEARD – South Africa	Families' efforts to secure the future of their children in the context of multiple stresses, including HIV and AIDS

Haour-Knipe, M	Consultant – Switzerland	Dreams and disappointments: Migration and families in the context of HIV and AIDS
Hosegood, V	London School of Hygiene and Tropical Medicine (LSHTM), Human Sciences Research Council (HSRC) – South Africa	Demographic evidence of family and household changes in response to the effects of HIV/AIDS in southern Africa: Implications for efforts to strengthen families
Kimou, J Kouakou, C Assi, P	Ivorian Centre for Economic and Social Research (CIRES), Family Health International (FHI) - Côte d'Ivoire	A review of the socioeconomic impact of antiretroviral therapy on family wellbeing
Madhavan, S DeRose, L	University of Maryland – United States of America	Families and crisis in the developing world: Implications for responding to children affected by HIV/AIDS
Mathambo, V Gibbs, A	Human Sciences Research Council (HSRC) – South Africa	Qualitative accounts of family and household changes in response to the effects of HIV and AIDS: A review with pointers to action
Sherr, L	Royal Free and University College Medical School – United Kingdom	Strengthening families through HIV/AIDS prevention, treatment, care and support
Wakhweya, A Dirks, R Yeboah, K	Family Health International (FHI) – United States of America	Children thrive in families: Family-centred models of care and support for orphans and other vulnerable children affected by HIV and AIDS

**A REVIEW OF THE SOCIOECONOMIC
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Abstract

HIV/AIDS is a global health concern. Besides its macroeconomic impact, AIDS negatively affects families by compromising the productivity of household labour and skills, and the future of their children. An important policy in the strategy undertaken to alleviate the socio-economic consequence of HIV/AIDS is the promotion of Antiretroviral Treatment (ART). Thanks to a global initiative, ART is now becoming available for persons in need. However, this effort is still limited in light of the burden of the pandemic on family dynamics. This paper deals with the empirical findings of the socio-economic outcomes of ART treatment for the family. Using a systematic review approach, we demonstrate the issues of weak ART coverage rates and that of factors affecting effective adherence to ART, and highlight the socio-economic benefits of ART for children.

With respect to access to ART, the review shows that even though there has been an important effort to increase the global access to ART, the coverage rate remains low in Sub-Saharan Africa (23 %), Eastern Europe and Central Asia (13 %) and the Middle East and Northern Africa (5.5 %).

The paper identifies structural factors, individual characteristics and cultural constraints on adherence to ART. Structural factors are related to the availability of health facilities, communication and the quality of health care strategies, side effects and public policy. In addition, the review indicates that the age of the patient, educational level and individuals' income positively affect the likelihood of effective ART adherence. Finally, we argue that stigma, beliefs and community as well as family support and social motivations are cultural constraints that impact ART adherence.

With respect to socioeconomic returns of ART, it appears that ART prevents and ameliorates AIDS-related dementia, and improves CD4 counts of patients, with consequences for improvements in productivity and, therefore, family economic status. Moreover, having parents on ART reduces the likelihood of children's labour supply; increases children's school attendance and improves their nutritional intake. The study also highlights macroeconomic benefits from ART, including increases in the

motivation of health professionals and the promotion of long-run economic growth. On the basis of the different investigations conducted, the authors recommend the following: Improve social support; increase and decentralize distribution points for ART; strengthen home-based care; provide food during initial stage of treatment; implement a follow-up system for treating defaulters; increase solidarity in demanding ART treatment; encourage private insurance companies to not discriminate against persons living with HIV/AIDS, and increase communication.

Acronyms

ADC	AIDS Dementia Complex
AIDS	Acquired Immune Deficiency Syndrome
ART	Anti retroviral treatment
ARV	Antiretroviral
BMI	Body Mass Index
CNS	Central Nervous System
ERP	Event-Related Potentials
HAART	Highly Active Antiretroviral Treatment
HIV	Human Immunodeficiency Virus
HIVE	HIV-Associated Encephalopathy
JLICA	Joint Learning Initiative on Children and AIDS
MoH	Ministry of Health
NGO	Non Government Organization
PLWHA	Persons Living With HIV/AIDS
SSA	Sub-Saharan Africa
STI	Sexually Transmissible Infections
UNAIDS	United Nations AIDS Agency
WHO	World Health Organization

I. Introduction

1.1. Background and problem statement

Sub-Saharan Africa has the highest number of persons living with HIV/AIDS (PLWHA) globally, estimated to be 25 million (UNAIDS, 2004). The progression of the disease is marked by a weakening of the immune system and the development or increase in the degree of sickness related to AIDS. This later stage is very often associated with substantial weight loss and opportunistic infections such as *P. carini* pneumonia, Kaposi's sarcoma, and tuberculosis (Thirumurthy et al, 2006). People at this stage of the disease are likely to experience reduced productivity. This reduced productivity makes their family vulnerable to poverty.

According to the United Nations AIDS Agency (UNAIDS, 2004), 2.5 million of the 40 million infected persons worldwide are children under 15 years of age. Of these, ninety percent are born in Sub-Saharan Africa (Cornia, 2002). Unfortunately, the HIV/AIDS epidemic also results in an increased number of orphans, who may be subjected to a number of physical and psychological afflictions as a result of the death of their parents and caregivers (Miller, 2006).

In response to the alarming conditions occasioned by HIV/AIDS in most Sub-Saharan African (SSA) countries, some strong prevention actions have been initiated with the support of NGOs and international donors. These include consciousness-raising among the public about HIV/AIDS, promoting the use of condoms, building public awareness on the importance of testing, as well as promoting access to antiretroviral treatment (ART).

ART provides relief to sick individuals by reducing the likelihood of opportunistic infections and increases life expectancy. Since its introduction in 1996, highly active antiretroviral therapy (HAART) has been shown to dramatically reduce morbidity and mortality among HIV-infected individuals, although its full benefits are yet to be felt in developing countries (Laurent et al, 2002).

ART is now becoming more available and distribution is increasing, due to the development of generic medication and to international solidarity. Financial support from the Global Fund to fight AIDS, Tuberculosis and Malaria as well as funding from the US President's Emergency Plan for AIDS Relief (PEPFAR) has made it possible to considerably reduce the individual cost of treatment (UNAIDS, 2004). In 2000, for instance, the monthly cost of tri-therapy, per person, was estimated to be approximately US \$480 US per month in Côte d'Ivoire and Cameroon. This has now decreased to about US \$2 for adults, and tri-therapy is provided free of charge to children.

These developments have resulted in approximately 1 million people in developing countries receiving ARV therapy (WHO, 2005). However, there is still much room for improvement in ensuring that eligible people have access to ART. In Côte d'Ivoire for instance, only 33% of eligible adults living with HIV/AIDS, and an even lower 2% of eligible children, receive ART. The criteria for eligibility to ART is that the CD4 protein count must be below 200/mm³, at which stage, the functional capacity of individuals deteriorates (Thirumurthy et al, 2006).

ART is life-saving to people, including children living with HIV/AIDS. However, the limited accessibility of paediatric ART is still of great concern. In order to spur on efforts to increase access, inquiries on the promising, positive effects of ART need to go beyond the standard individual morbidity and mortality considerations, to demonstrate potential benefits at the aggregate level.

There exists a large body of research on the global impact of HIV/AIDS on society. Several studies have outlined potential negative effects on economic status [Haacker, (2002), Muwanga (2004), Ouatarra, (2006)] and on family dynamics [Richter et al (2004), Blibolo et al (2004)]. Blower et al (2003) show that ART improves biological outcomes, for example, by reducing mortality in clinical trials. However, since treatment of HIV/AIDS is a fairly recent phenomenon, there have been few comprehensive studies that have explored the potential social and economic benefits of antiretroviral therapy. For this reason, it is important and necessary to implement long-term research on the impact of ART on economic indicators. More specifically, there is a need for microeconomic research on the advantages of ART for developing countries.

From this perspective, our review synthesizes prominent findings on social and economic implications of ART at the household level, through a two-step procedure. Firstly, we examine the life quality of adults who make use of ART as well as that of their families. Secondly, we summarize incentives and constraints which shape ART adherence. Apart from that, the paper also focuses on the relationship between ART and mental health.

1.2. Research objectives

The main goal of this review is to bring together key empirical findings on the benefits of ART for families, especially at a microeconomic level. We wish, through this review, to provide data and documentation on the benefits of ART to decision makers and planners who can use it to facilitate the implementation of their programmes. We list the results of sound empirical studies that can help to shape global strategies for the scaling up of ART, while also supporting and maintaining families during policy implementation.

The objectives of the study are the following:

- To provide an assessment of the existing research on the socio-economic impact of ART by identifying trends and gaps in the research, and to
- Investigate how adult treatment with ART affects family income, stigma, within and outside of the family, and the wellbeing of their children.

The paper is comprised of the following sections:

Section 2: A description of the methodology;

Section 3: A summary of the determinants of adherence to ART;

Section 4: A presentation of the effects of ART on mental health;

Section 5: An analysis of the socioeconomic returns from ART;

Section 6: Recommendations and policy implications.

2. Methodology

This paper is a systematic review of the epidemiological research on the impact of ART on family wellbeing. For this purpose, we identify factors accounting for individual adherence to ART and we investigate the socioeconomic impact of ART at the family level. The methodology adopted involved:

- ❖ The identification and collection of relevant empirical research on factors that affect or constrain demand for and adherence to ART.
- ❖ The identification and collection of empirical studies on the socio-economic benefits of ART at the individual and household levels.

2.1. Documentation collection strategy

A thorough literature search allowed for the identification of relevant published and unpublished studies. These papers were assessed, the findings were extracted from individual studies in an unbiased manner and presented in a balanced and impartial summary. Following Muwanga (2004), our research strategy consisted of defining the inclusion criteria, and critically appraising the studies, data collection, and data analysis in light of these criteria.

2.1.1 Identification of the studies for inclusion

To identify the relevant literature, a search strategy was completed in four phases;

- Searching electronic databases such as JSTOR and the JLICA websites;
- Checking references for additional studies omitted during database searches;
- Exploring unpublished studies by consulting researchers and organisations working in the field, and
- Searching through conference abstracts.

The titles and abstracts of identified studies were screened based on the inclusion criteria.

Inclusion criteria

The papers taken into account in this review met the following criteria. They were:

- Primary research studies that evaluate the social and economic impacts of ART using well-defined indicators, methods of data collection, time frames and secondary data.
- Studies that model the impact of ART on the family level using valid epidemiological data.

Discussion

The selected papers were required to address the social and economic benefits of ART , and to provide meaningful findings. The appraisals of these conclusions focused on, but were not limited to:

- methodology and theoretical issues;
- sampling and data collection strategy;
- relevance for generalization and policy implementation, and
- limitations of the study.

2.2 Identification of relevant empirical research on factors affecting or constraining adoption of and adherence to ART

This part of the review explores possible determinants of ART adherence. The papers we examined included:

- Empirical studies that use primary data and that clearly identify factors influencing individual adherence to ART; for example the effects of costs, social norms, communication and so on;
- Papers that evaluate the orientation of national policies on the provision of ART;
- Papers that measure and identify the effectiveness of ART, and
- Official documents that describe trends in ART adherence.

2.3 Collection of relevant empirical investigations on the socio-economic returns from ART

To analyze the impact of adult treatment on the family we have included papers dealing with:

- the economic impact of an adult being under ART;
- the allocation of intra-household resources by adults under ART;
- the individual benefits for adults who are on ART, and the impact on their children's wellbeing;
- the effect of ART on AIDS-related dementia, and on cognitive processing in HIV infection;
- the prevention of AIDS-related dementia by HAART, and
- ART and stigma.

2.4 Data collection

This part of the review describes the sources of data and the methodology of the analysis.

2.4.1. Sources of data

The review referred to international data sets. Therefore, we collected data on the number of people receiving ART from the Global Fund to Fight HIV/AIDS, Malaria and Tuberculosis, the World Health Organization, and PEPFAR,. This information was selected using a country-by-country breakdown, and provided a broad range of information on the distribution of ARVs around the world. Although the data from these organizations do not take into account patients who receive treatment from the private health sector, they do provide reasonable information on the overall distribution of ARVs. It was noted that it was very difficult to get data on paediatric treatment. A possible explanation is that such interventions are new and therefore the data is relatively limited.

2.4.2 Methods of statistical analysis

We used a descriptive statistical approach, computing means and variance, on the basis of which we constructed graphs and depicted trends.

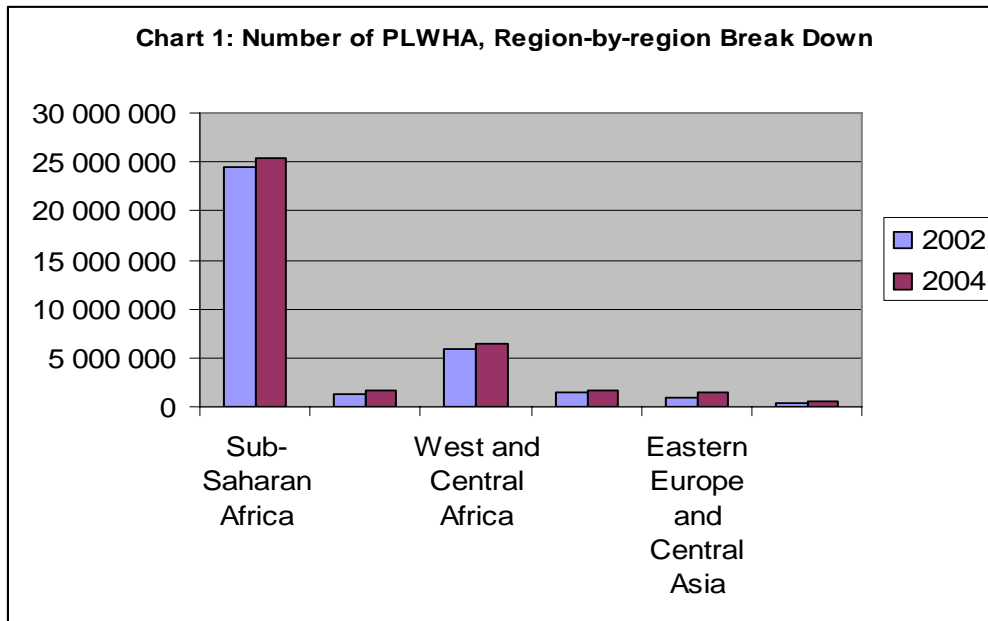
3. Brief background on HIV/AIDS and treatment

3.1 The burden of HIV/AIDS

3.1.1. The current situation of HIV/AIDS

According to the WHO (2006), around 39.4 million people are living with HIV/AIDS. Approximately 3.1 million people have died of AIDS. The number of people living with HIV/AIDS has increased over the past two years (see Chart 1). The estimated number of people living with HIV/AIDS in Eastern Asia grew by almost 50% between 2002 and 2004, an increase largely due to the growing HIV/AIDS epidemic in China. In Eastern Europe and Central Asia, there were 40% more people living with HIV in 2004 than in 2002. The main causes of this increase were Ukraine's resurgent epidemic and the ever-growing number of people living with HIV/AIDS in the Russian Federation.

The HIV/AIDS epidemic is affecting an increasing number of women and girls. Almost half of the people living with HIV/AIDS in sub-Saharan Africa are females between 15-24 years of age. In the other regions, women and girls also now represent an increasing proportion of people living with HIV/AIDS, compared with figures from five years ago.



Source: From the authors using UNAIDS (2004) data.

3.1.2 The economic impact of HIV/AIDS

In 2002, 42 million people were living with HIV/AIDS worldwide; 95% of them in developing countries. In the most severely affected countries, the epidemic begins to affect key sectors, compromising economic development and social stability (WHO, 2002).

Niang and Quarles van Ufford (2005) highlighted the demographic and socio-economic impact of AIDS in sub-Saharan African (SSA) countries. Some results indicate that AIDS is responsible for significant increases in infant mortality and decreases in life expectancy. Other authors have pointed out changes in demographic composition and the increasing poverty.

Well-known research studies have also examined the economic impact of HIV/AIDS. The World Bank (1997), Ainsworth and Over (1994), Over (1992) and Anderson et al. (1991) have all indicated negative impacts on economic growth in SSA countries.

At the macroeconomic level, wealth accumulation and economic growth could fall dramatically following decreases in average productivity and life expectancy and an

increase in health expenditures. These macroeconomic changes increase the direct, immediate indirect, and deferred indirect costs of HIV/AIDS.

Direct costs include medical expenditures for HIV/AIDS treatment, the remuneration and training of medical and administrative staff, as well as expenditures on hospital infrastructure and prevention.

Indirect costs refer to the costs of reduced productive capacities among people living with HIV/AIDS. This is due to recurrent illness, and is likely to reduce resources for their families. For the poorest families, these indirect costs are exacerbated by the direct costs of treating opportunistic diseases.

Deferred indirect costs occur in the longer term, in the absence of assistance, when the decrease in household resources as result of HIV/AIDS can begin to have even more significant consequences. Specifically, it may impact on the productive structure of the household and, in particular, its investment in education as the spouse who is 'not yet sick' devotes more time to work and less to the education of the children.

The children themselves are also sometimes constrained to work, and are sidetracked from their schooling. The shift from school attendance to labour and household production is very costly in the long run. Illnesses and multiple deaths amongst family members must also be admitted into the cost analysis. These include the costs of funerals, which can last several days and result in extended interruptions of work for the entire affected family. The final problem is that of assistance and care to orphaned children. Who will assist them financially? Who will raise and educate them? All of these questions and arguments point to the suggestion that AIDS negatively affects the economy in two ways:

1. In the short-term, through the ratio of "valid actives/total population";
2. In the long run, through the decreasing quality of the work provided by the representative worker ("human capital effect").

Empirical findings on the macroeconomic impact of HIV AIDS

Various studies have tried to capture the macroeconomic impact of HIV/AIDS in terms of Gross Domestic Product (GDP) lost. On average, the research forecasts a reduction of 1 point in the growth rate of national wealth (Bonnell, 2000). These studies are based on *ad hoc* modelling, making it possible to compare the evolution of the economy with and without the impact of HIV/AIDS. Using econometric estimates and controlling for covariates such as institutional environment, and physical and human capital, Bonnell (2000) analyzed the relationship between economic growth and the prevalence rate of HIV/AIDS in Sub-Saharan African countries. The following Tables (1 and 2) indicate the estimates for the period from 1990 to 1997.

Table 1: Relationship between economic growth and the HIV/AIDS prevalence rate

HIV/AIDS (%) Prevalence Rate (%)	Growth rate (%)	Years of life expectancy lost
5	- 0,6	4,7
10	- 0,8	9,4
15	- 1	14,1
20	- 1,2	18,8
30	- 1,4	28,2

Sources: Bonnell (2000).

Table 2: Reduction of the GNP caused by HIV/AIDS

Countries	Drop in the GDP (in point of annual growth)	Period	Source and authors
Aggregate SSA	[0,8 ; 1,4]	1990 -2025	Over (1992)
Cameroun	2	1987-1991	Kambou et al (1992)
Zambia	[1 ; 2]	1998-2000	Forgy (1993)
Tanzania	[0,8 ; 1,4]	1991-2010	Cudington (1992)
Kenya	1,5	1996-2005	Hancock et al (1996)
Mozambique	1	1997-2020	Wils et al (2001)

Source: Bonnell (2000)

Drouhin et al (2003) state that these evaluations generally neglect deferred indirect costs, for example in the accumulation and transmission of physical and human capital. The major limitation of these findings is that they do not take into account the long-run effects of HIV/AIDS. This could be explained by the fact that most of these investigations took place in the early 1990s, when it was difficult to assess the accurate magnitude of the epidemiological shock which formed “the input” of the model. Studies conducted during the early 1990s were also inclined to omit analysis of the long-term effects of HIV/AIDS on the accumulation of physical and human capital.

- **Effects on physical assets** occur because the resources committed to care for persons with HIV/AIDS are diverted from productive sectors such as public investment and private investment.
- **Impact on human capital** is seldom considered and often not quantified in studies of macroeconomic dynamics. HIV/AIDS not only reduces the productivity of the active population, especially the skilled labour force, but also impacts on the transfer of skills. This aspect of the impact of HIV/AIDS occurs primarily through family linkages, for example, when the head of the household dies, children are forced to work, as well as through schooling, for example when a teacher dies, and children spend time without teaching.

The macroeconomic effects of HIV/AIDS can be summarized as follows (see Table 3):

Table 3: Breakdown of the costs of HIV/AIDS

Type of country	Low income	Low to middle income	High income
(1) Direct costs	+	++	++
(2) Indirect cost	+++	++	+
(3) Deferred cost	+++	++	+
(4) Prevention	+	++	+++

(+:weak; ++ high; +++ very high)

Source: Drouhin et al (2003)

(1): These costs encompass medical expenditure related to HIV/AIDS, such as treatments costs; remuneration of medical and administrative personnel; expenditures on health facilities.

(2): These costs cover immediate economic impacts induced by the epidemic such as the decrease in productivity via the increase in morbidity, and reduction of life expectancy (social and moral damages).

(3): These costs result from long term major degradation of the mechanisms of development due to a decrease in the accumulation of physical and human capitals.

(4): These costs relate to the expenditures for prevention campaigns.

Table 3 summarizes the concept of a differentiated impact of HIV/AIDS on the poorest countries. High income countries are least affected and are capable of a certain amount of flexibility in their response to the disaster, whereas developing countries are likely to be confronted by extremely important “deferred costs”.

Another important aspect of HIV/AIDS is its effects on children. There is a growing number of children whose parents are dying from AIDS (see Table 4). It is not easy for these orphans to be enrolled into school because of the difficulties the caregivers (mostly their grandparents) have in paying for their school expenses (Axios International, 2001).

Table 4: Estimates of global HIV/AIDS Orphaned children

Years	Total Orphans	HIV/AIDS Orphaned (%)	Orphans below 15 (%)
1990	201,211	23.50	13.38
1995	323,161	46.50	16.25
2000	526,698	67.50	20.85.
2005	774,910	79.10	25.22

Source: UNAIDS (2006)

3.2. Access to antiretroviral therapy

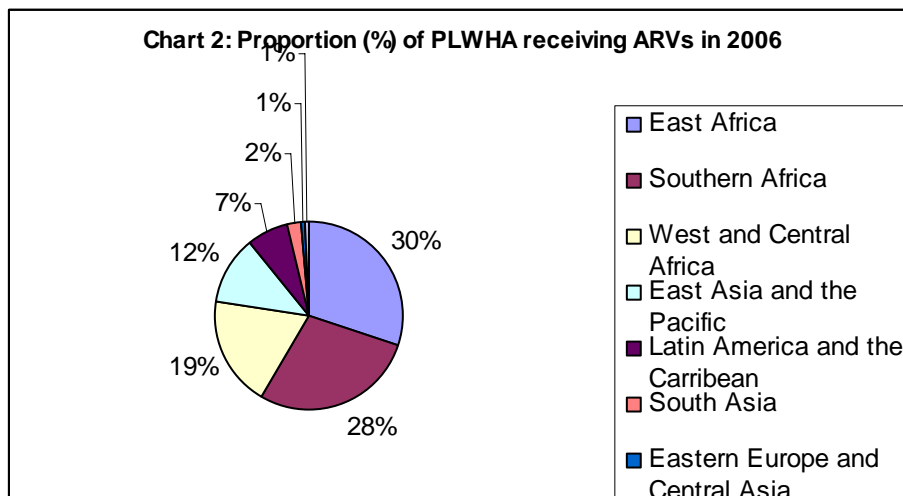
We first briefly describe the trends in ARV distribution worldwide, before presenting the elements that constitute effective access to ARVs.

The response to the HIV/AIDS epidemic includes both prevention strategies and treatment strategies. These strategies aim to avoid new infections while providing necessary care and treatment to people living with HIV/AIDS. One of the most important elements of treatment is to scale up access to antiretrovirals (ARVs) for those in need, as ART significantly reduces the rates of mortality and morbidity and thereby improves the quality of life of people in treatment.

In 1996, Brazil was one of the first countries in the developing world to implement the widespread distribution of ARVs. The implementation of such a policy meant that nearly 125,000 people received ARVs. According to the World Health Organization (2002), around 800,000 of people were receiving ARVs globally; however the majority of these (500,000) were living in the industrialized world. At the end of 2003, less than 7% of the people in developing countries who needed treatment were receiving it.

To scale up access to ARVs for those in need, the World Health Organization launched its "3 by 5" initiative, aiming to put three million people on ARVs by the end of 2005. That initiative was supported by international grants from the Global Fund and PEPFAR. However, on December 1, 2005, the programmes supported by the Global Fund reported that only 384,000 people were on ART.

Chart 2 shows the regional breakdown of the number of people on ART. East Africa has the highest proportion of people on ART, followed by Southern Africa, East Asia and the Pacific, and West and Central Africa.



Source: From the authors using UNAIDS (2006) data.

Scaling up access to ARVs will result in a significant increase in the number of people on ART. Between 2002 and 2005, the number of people receiving ARVs worldwide increased by nearly by 300,000 (see Table 5). During 2006 in Sub-Saharan Africa, this number was twenty times more compared with data five years ago.

This improvement in access to treatment has also been significant in Eastern European countries, such as Ukraineⁱ, where HIV prevalence is increasing. From May 2005 to April 2006, the number of Ukrainians receiving ART increased from 1 743 people to 3 186 people. Since August 2004, with the support of the Global Fund, there has also been expanded access to ARVs for children in Ukraine. Prior to 2004, only 56 children received ART; by December 2005 this number had increased to 369. In light of the rapid spread of HIV/AIDS in Ukraine, this level of response is regarded as insignificant.

The situation in Ukraine indicates that the issue of access to ARV is a global one and does not pertain only to developing countries. In fact, in 2006, WHO/UNAIDS (2006) estimated that there are as many as 8 million people in the world without access to treatment. As indicated in Table 5, the global coverage rate for people needing ART is only around 20%. Even though coverage has increased by 4 times since 2002, many patients are still without treatment. This broad outline also hides some disparities. While we can discern an obvious increase in the supply of ARVs in Latin America and Sub-Saharan Africa, there is an unsettling decline in the rate of coverage in the Middle East and Northern Africa.

Table 5: Number of adults on ARVs, regional breakdown.

Regions	December 2002			December 2006		
	Number of people	People in the need of	Rate of Coverage	Number of people	People in the need of ARVs.	Rate of Coverage
Sub-Saharan Africa	50,000	4,100,0	1%	1,058,0	4,600,000	23 %
Latin America and the	196,000	370,000	53%	315,000	463,255	68%
Asia	43,000	1,000,0	4%	235,000	1,468,750	16%
Eastern Europe and	7,000	80,000	9%	24,000	190,000	13 %
Middle East and	3,000	8,700	29%	4,000	75,000	5.5 %
TOTAL	300,000	5,500,0	5.5%	1,636,00	8,265,755	19.8%

Source: UNAIDS (2006)

4. The determinants of adherence to ARV

In this section, we summarize findings on the determinants of ART adherence. Adherence to ART means taking the medicines in the right quantities, at the right times, and taking all the medicines as prescribed. Poor adherence rates (less than 95%) can lead to treatment failure, poor suppression of HIV viral load, a slower rise in CD4 count (Nakiyemba et al, 2006), and the emergence of drug-resistant strains of HIV. The best response to ART is seen when adherence is 100%.

According to Carter (2005), effective adherence involves the following elements:

- Taking all the medicines which make up the ARV combination in the correct quantities;
- Taking the pills at the right times;
- Ensuring that the medication is taken with or without food, according to instructions;
- Checking for interactions with any other medication or drugs.

Even though the price of ARVs is currently low for people in need, a variety of factors, ranging from structural to individual, could potentially constrain adherence to treatment. We present empirical evidence identifying determinants of adherence at the micro and macro level.

The measurements currently used to determine adherence are pill counting, electronic drug monitoring, pharmacy refill records, biochemical markers and various self-reporting techniques such as visual analogue and recall methods. Since an ideal measurement method does not exist, most field research uses a set of measures in order to compensate for the weaknesses of each measure and to more accurately capture the information needed to determine the adherence level.

Several studies bear on the determinants of adherence to ARVs in Africa. Nakiyemba et al (2006) and Hardon et al (2006) assess sociological factors explaining the adherence to ARVs in Tanzania, Uganda and Botswana. Hasnain (2004) and Abah (2005) analyze the treatment policy in South Africa. Goldstein, Johnson and Scheepers (2006) conducted a two-step evaluation of the impact of health literacy and media campaigns on adherence to ARVs in South Africa. Adedimeji and Odutolu (2005) explored the impact of HAART on the quality of life of persons living with HIV/AIDS in southwest Nigeria. The various findings from these studies suggest that the determinant of ARV adherence can be organized into three major categories: structural factors, including health policies; individual characteristics of the patient; and cultural constraints.

4.1. Structural determinants of ARV adherence

Several factors relating to health service institutions involved in ARV provision influence effective adherence to ART. These are health facilities and policy schemes, information policies, quality of treatment and side effects relating drug up taking.

a- Health facilities and policy scheme (state health policy or private insurance policy)

Structural issues relating to access and service are of critical concern in adherence to ART. Treatment services and the quality of care are found to be better in private facilities than public ones.

b- Information policy

A decentralized information policy, mainly at the community level, is found to positively affect adherence to ART.

c- Drug regimens and side-effects

Drug regimens, side-effects and treatment fatigue may drive sub-optimal adherence ART.

Some combinations of ARVs require that the patient takes a large number of pills at one time. With extended use, this could be a problem for ARV users. Also, especially at the initial stage of the treatment, ARVs are associated with some adverse side effects such as nausea, skin rash, dizziness and "strange" dreams, which are likely to discourage people. Another critical issue that impacts negatively on patients' propensity to use ARVs effectively is the fact that the treatment is a lifelong one. This situation could lead to treatment fatigue and deter effective adherence.

4.2. Individual determinants of ARV adherence

Individual characteristics of the patients, namely their age, educational attainment and their poverty status affect their adherence to ARVs.

a- Age

It has been found that with the exception of the most elderly, adherence increases with age. There is a positive correlation between being very young and adherence to ART, as adherence among children is very good.

b- Education

A low level of general education and poor literacy may impact negatively on some patients' ability to adhere. A higher level of education has a positive impact on adherence.

c- Poverty (hunger, transportation costs and indirect costs)

The issue of treatment cost has been a major concern in the implementation of a widespread policy of ART for HIV/AIDS. Fortunately, the price of ART has dropped drastically, but there are still important indirect costs which impede on adherence to treatment. These are primarily transportation costs to treatment centres, hunger, and treatment-related monitoring tests.

Lack of money for travel constrains the ability of some patients to visit treatment centres, which may lead to missing their follow-up sessions. This transportation issue also reveals the geographical distribution constraints that patients face, highlighting the need to decentralize treatment centres.

A positive outcome of ART is that of increasing patient appetite and, in fact, some ARVs need to be taken with food. Poor patients may not have enough money to buy food, causing hunger to negatively affect their propensity to adhere to ART. Lack of food is therefore a challenge for ARV users. Finally, others indirect costs such as PCR-viral load and CD4 count tests may also hamper effective adherence.

4.3. Cultural and social determinants of ARV adherence

a- Stigma and beliefs

People with HIV/AIDS may experience negative reactions from their community or family once they are known to be ARV users. They may feel that they are being looked upon in discriminatory.

b- Social support

Community support, especially from close family members, is a key determinant of adherence to treatment. Assistance and care from family members may prevent the patient from forgetting about the scheduled time to take the drugs.

5. The socio-economic benefits of anti retroviral treatment

This section presents the impact of ART for the family, and then discusses its effects at the macroeconomic level.

5.1 The benefits of ARV treatment for the family

Based on two studies by Zivin, Thirumurthy and Goldstein (2006 and 2007), we analyzed the microeconomic impact of ART. The analysis is based on data relating to a rural ART programme in Western Kenya, in the Division of Kosirai. This division of 76 square miles is populated by 35 383 individuals living in 6 643 households. Two series of socio-economic investigations were conducted between March 2004 and March 2005 with an interval of roughly six months between the two studies.

The sample consists of two different groups of households: a control population of 503 households, selected randomly from a census of the households in the Division of Kosirai without patients on ARV, and 266 households with at least 1 HIV/AIDS patient on ARV (households of HIV). In one year, longitudinal socio-economic data were gathered on PLWHA on ART. In the 266 households with HIV treatment, there were 320 individuals (including children) who were HIV-positive and visiting Mosoriot treatment centre.

Household socio-economic data collected included children's school and educational attainment, income, employment, food consumption and anthropometric measurements. Households in the control population had on average 6 members whereas the households with HIV treatment had on average 5.4.

Concerning gender, it must be noted that the majority of the household heads in the control population were men, whereas most HIV household heads were women who had lost their husbands. The analysis of employment status was limited to the individuals who were between 18 and 65 years old.

The first study, conducted in November 2006, analyzes the socio-economic and employment implications of ART for adults in two ways: firstly the investigation of the impact of ART on the individual's own wellbeing and secondly, an inquiry into the

impact of ART on the wellbeing of the patient's household and on intra-household resource allocation.

5.1.1 ART reinforces the individual's propensity to work

The study shows clearly that the use of ARVs increases CD4 count, which increases the health of patients. Within the first period, it was found that patients on ARVs have a 24% of chance of not working in a given week, compared to 11% for the control population. Patients on ARVs provide fewer working hours than adults in the control population whose serology was not analyzed (24 hours against 35 working hours per week). Sickness contributes 8% of the under-employment in the control population, while AIDS explains 85% of the underemployment for patients on ART.

During the second period, while patients on ARV treatment are still relatively less active physically, these differences are smaller than during the first period. After 6 months of treatment, the supply of labour increased by 20% and the weekly time spent working increased by 35%. Using a difference-to-difference evaluation methodology, the study showed an increase in the participation rate of 85.4% and an increase of 26 hours of working time. This shows an important outcome of ARV treatment on treated individuals.

Most of the increase in labour supply occurred in independent non-agricultural work. In the agricultural sector, it is not statistically significant. However, income from the non-agricultural sector increased for patients on ART. It is also shown that women receiving ART have higher labour force participation than men. Being under ART increases female labour supply by 20.8% more than that of the male.

5.1.2 Parents on ART positively influence children's wellbeing

With respect to the impact of ARV treatment on the household of the patient and intra-household resources allocation, the authors show that the use of ART decreases significantly the need for children to work, and simultaneously increases their school attendance. Indeed, the work of family members (i.e. children and older people) is a poor

substitute for the work of adults who become incapacitated by HIV/AIDS. The uptake of ART by parents increases the probability of children of going to school.

On the one hand, the increase in the labour capacity of a patient has a positive income effect which reduces the likelihood to work or the working time of other household members. On the other hand, the improvement of the health of the patient reduces the burden of care and the time spent on household work by family members. This allows these members to assign more time to paid job and leisure activities. Intra-household time allocation is strongly influenced by the use of ARVs. The results of the study also show that after 100 days of ARV treatment, child labour participation rate decreases significantly, especially for children in the 8 to 12 year age group.

This reduction in child labour supply corresponds to 8.6 working hours per week. The effect is even greater when there are two adult members of the household who are receiving ARVs. In this second case, the reduction in child labour decreases by as much as 79.2%.

5.1.3 Cost-effectiveness analysis of parents on ART

The cost-effectiveness analysis shows that the annual net wage of treatment per patient is US\$325 with a cost of US\$150. When we take into account costs related to laboratory testing, treatment of opportunistic diseases, medical personnel and fixed assets, the aggregate costs rise to US\$200; however, ARV treatment remains cost-efficient.

The second study, carried out in February 2007, specifically analyzed the impact of adult ARV uptake on the schooling and nutrition of children, that is, the intergenerational effect of ARV use. Through a quasi-experimental analysis, that combined HIV patients, some on ARV treatment, and a pilot population, the authors examined whether having parents on ART had a significant effect on children living in households. The impact analysis was conducted using data on schooling, the supply of labour and the body mass index (an indicator to capture nutritional effects) for a sample of 412 children.

5.1.4. Adult ARV treatment improves children's school attendance and nutritional intake

The study shows a very high impact on the schooling of children whose parents are on ARV treatment. The increase in the weekly schooling hours of children varies from 20 to 35% in the first 6 months following the initiation of ARV treatment. Similarly, when the health of the adult improves, thanks to the use of ARVs, the child's time spent working decreases. The household income increases and there is a decrease in the expenses on treatment of opportunistic diseases. This facilitates the allocation of an important share of income to food consumption, which has a direct and positive effect on the growth of children.

5.1.5. Adult ARV treatment reduces working time for young boys and restores intra-household allocation and inter-generational equity

The third effect of ARVs at the household level is the reduction in the working time of boys when the health of their relatives improves. This outcome is explained by the fact that when the health of relatives improves, there is less need for child labour supply. The immediate consequence is an increase in school attendance for children. Reallocation of income also permits parents to better educate their children. Finally, having parents on ARV treatment results in a reduction of sub-consumption of household resources by children, and in child labour, and thereby is likely to lead to macro-economic advantages in the long run. It is also shown that eligible children who are not on ART experience difficulties in attending school, and have a lower probability of being enrolled at school. There is therefore a higher propensity to work for these children. In conclusion, it can be asserted that ARV treatment has advantages that go beyond the direct benefits experienced by the patient.

5.1.6. Antiretroviral treatment and mental health

At an advanced level of AIDS, the central nervous system (CNS) and memory may be affected. Patients with advanced AIDS often present cognitive disturbances; this is so-called AIDS-related dementia, or AIDS Dementia Complex (ADC). AIDS-related dementia can be a constraint to effective adherence to ART (Meisler et al, 1993). The

patient can forget about the appropriate time to take pills. This hinders the effectiveness of the treatment and favours the emergence of drug resistance. In addition, AIDS-related dementia reduces the productivity of patients and makes them dependant on their relatives.

Three clinical studies conducted among patients in Germany - Evers et al (1998), Husstedt et al (2002) and Evers et al (2004) - showed that ART not only prevented AIDS-related dementia, but also remedied cognitive disturbances.

These impacts are not only important for the wellbeing of families, but they also have potentially important implications for economic growth. For these reasons, AIDS treatment is likely to result in macro-economic advantages in the long run.

5.2. The macroeconomic impacts

In industrialized countries, evidence has shown that treatment has a considerable impact on the reduction of the negative socio-economic effects of HIV infection. In the developing world, however, the extensive distribution of ARV treatment has only occurred recently. Amongst developing countries, Brazil was the first to implement a national treatment program, in 1996. Since then, that program has led to a reduction of up to 50% of the HIV-related deaths.

In the most severely affected countries, it is well known that HIV/AIDS is currently responsible for 30 to 50% of hospitalizations. The use of antiretroviral drugs will make it possible to considerably reduce the incidence of opportunistic infections as well as alleviate other major epidemics such as tuberculosis. As morbidity and mortality rates decrease, it will be important to reconsider the amount of time and resources currently devoted to the care of the patients in final stage of HIV/AIDS.

In addition, HIV/AIDS has a devastating impact on health workers themselves. Consequently, treatment represents an essential tool that helps to reduce a very pernicious “double blow”, as it will also impact positively on the motivation, skills and competences of health professionals.

Beyond the specific considerations of the health sector, access to ART revitalizes communities affected by the virus, preserves families and sustains labour productivity. Maintaining the lives of parents will make it possible to ensure the education and wellbeing of future generations. Access to treatment will also help to ease discrimination, and will consequently provide strong support for communities in the fight against HIV/AIDS. People living with HIV and AIDS (PLWHA) will no longer be proscribed, but will instead, using their experience, be able to engage actively in HIV prevention. According to Libamba et al (2005), of 5 558 patients who were on ART in Malawi, 75% are still living, 8% have died and 14% are no longer on treatment. This illustrates the positive effect of ART on reduction of mortality.

Economic evaluation of ART: A cost-effectiveness analysis for Brazil and Côte d'Ivoire

The cost-effectiveness analysis utilises an economic perspective to assess various therapeutic strategies. These analyses must take into account “indirect” costs associated with AIDS and treatment costs. The impact on national budgets must also be evaluated. Similarly, it is necessary to study exhaustively the mechanisms of financing (private sector, social security, systems of assistance) which could ensure ongoing, widespread access. The cases of Brazil and Côte d'Ivoire are used to show empirically the economic effectiveness of ARVs (see Cases 1 and 2).

Case 1: Cost-effectiveness evaluation of ART in Brazil

There was a reduction of 48% and 49%, respectively, in the death rates of patients in studies of the cities of São Paulo and Rio de Janeiro. The reduction in the number of hospital admissions and duration of hospitalizations since 1997 was considerably reduced. It was estimated that these reductions represented a gain of almost US\$ 421, 774 297 during the period 1997-1998. When taking into account resources devoted to ART, savings on hospitalizations, wellbeing, and gained years of life, the cost-benefit ratio is clearly positive. Some Brazilian researchers show that between 1996 and 2003, the following results were also obtained:

- Average rates of survival for people on ART increased from 6 months to 5 years;
- Important reduction of mortality, morbidity and rate of hospitalization were achieved
- Opportunistic infections declined by 60% to 80%;
- There was improvement in the quality of the life;
- Short-term government savings of US\$ 1.1 billion in regard only to hospitalizations was avoided, and 2 US\$ billion if ambulatory care is included, while 1.8 US billion was invested to implement this policy.

Case 2: ART and private sector performance in Côte d'Ivoire

Eholie et al (2003) have investigated the effect of ART on firms' performance in the Ivorian private sector. From 2 years of observation of a cohort of HIV-affected employees of the National Electricity Company, who were on ART between 1995 and 1997, the authors observed the following:

- An increase in voluntary testing;
- Reduction of almost 60% in mortality, 78% in new infection, 81% in hospitalizations related to HIV infection, and 94% in absenteeism;
- In two years, a substantial saving of 558 000 US dollars was obtained, with the reduction of the costs of absenteeism saving up to 287 000 US dollars, and a drop in costs associated with care saving about 294 000 US. That policy was implemented for an investment estimated to 217 000 US dollars.

6. Conclusion and policy implications

The effects of AIDS are huge and multidimensional, especially in developing countries. At the microeconomic level, AIDS affects negatively the wellbeing of individuals and of households. AIDS damages the health of sick individuals, and adversely affects their families through a reduction in productivity, a restriction of the family's income, a decline in children's nutrition and schooling rates, and rendering children more likely to enter the labour market at an early age.

At the macroeconomic level, the widespread dissemination of the disease has led to a decrease in life expectancy at birth, a reduction of the proportion of adults in the population, and an increase in dependency ratios, thereby impoverishing communities and increasing governmental expenditure. Furthermore, from a social perspective, stress, dementia and the stigmatization of people living with HIV/AIDS damages their quality of life.

In the absence of a cure for HIV infection, various studies have shown that the use of ARVs has contributed significantly to a decrease in HIV/AIDS related mortality and morbidity. Antiretroviral therapy promotes a better quality of life. Approximately 800 000 persons are currently on ART, including 500 000 living in high-income countries. Access to ARVs is currently being facilitated in the developing world by a drop in the price of medicines.

However, the data and documents used in this review exhibit some limitations. Firstly, even though data on the distribution of ARVs helped to illuminate weak and unequal ARV coverage rates globally, these data are still too aggregated and do not provide country and region specifics. They also do not permit a clear understanding of the socio-professional characteristics of ARV users. Also, data on paediatric treatment are scarce; therefore it is difficult to determine the potential benefits of paediatric treatment using data from existing paediatric programmes. Furthermore, the inquiries into the effects of AIDS, and of the impact of ARVs, are generally analysed in the short term, which may not be realistic. There is a need to conduct analysis on long-term impact using longitudinal data, especially given the almost complete absence of time series analyses of AIDS in developing countries.

A second issue is the determination of the demand for ARVs. If ARVs are currently available, what determines access to or the demand for treatment? The literature does not address this question clearly. This means an inadequate level of microeconomic analysis, including studies of the characteristics of those in the need and the impacts on the beneficiaries. Likewise, while our paper has identified some socio-anthropological findings on key factors that are likely to affect adherence to antiretroviral treatment, these studies have not examined the socioeconomic characteristics of patients, nor have they established strong correlations between these factors and individual characteristics. This shortcoming in the literature is likely to greatly hamper the implementation of effective policy design to strengthen family wellbeing.

Nonetheless, this paper has included studies that have shown that the use of ARV has provided considerable positive outcomes:

- Medically, by reducing the incidence of opportunistic infections,
- At a psychic level, by alleviating AIDS-related dementia,
- From a social perspective, by increasing school attendance and nutritional intake of affected children,
- On the economic level, by increasing the productivity of infected individuals and the reduction of child labour, showing consequently that ART is cost effective at the microeconomic level and the macroeconomic level as well.

These results have widespread and global implications which favour financing and promoting the use of ARVs. Our paper has shown that the promotion of ART is cost-effective not only for firms, but also for the state, and there are thus policy implications for both the private and public sector.

As far as financing health care in the developing world is concerned, it is desirable to reduce the cost of ARVs, because this is the most effective way to increase access to ARVs. The costs of biological monitoring tests also need to be reduced. The tests currently recommended at the international level, especially the PCR - viral load and CD4 count tests - remain very expensive and their prices have not followed the decline in the prices of ARVs. The measures to reduce the costs of monitoring include the same approaches as those used to achieve lower costs for ARVs:

- The use of alternative low cost methods for testing viral load;
- Implement a follow up system to treat defaulters;
- The development of simpler tools to test cost-effectiveness;
- The implementation of programmes involving the development of regional infrastructures, i.e. an increase in reference centres which would optimize the available infrastructure;
- Requiring private companies operating in the health sector (i.e. laboratories, clinics, and insurance companies) to apply policies that take into account people living with HIV/AIDS. These policies should avoid discrimination in access to health care on the basis of HIV status.

Concerning national and international solidarity, donors should not hesitate to increase their contribution given the fact that the advantages of ARV treatment are well established. For instance, the Global Fund to fight AIDS, Malaria and Tuberculosis and PEPFAR, which are the most important donors globally, must devote a considerable share of their support (at least 40%), to the provision of ARVs, or at least offer a subsidy to make these drugs available to countries with limited resources.

The strategy to combat HIV/AIDS should not be limited to awareness and adherence to ARV treatment only, but should also include inquiry into how to finance experimental research in order to achieve a definitive cure. Research efforts exist everywhere, even in Africa, but are not encouraged or supported and patients are thus limited to traditional therapy. For this reason, research projects should be tackled globally, and international research collaboration efforts should be reinforced.

With reference to responsiveness, advertising efforts should be increased, and the socio-economically positive outcomes of ART should be highlighted so as to motivate people to adhere to ART and increase voluntary serologic control.

Regarding government interventions, the next step should be towards a policy that makes access to ARVs free of charge. That policy should also take into account the indirect costs related to treatment i.e. transportation fees, hunger, viral load monitoring, and opportunity costs i.e. time and money devoted by family to their relatives on ART. Access to ARVs at no cost will foster an increasing therapeutic coverage. It is obvious

that such a policy would be costly for the state, particularly in the developing world. However, the cost of inaction or insufficient public support for vulnerable individuals could be devastating for economic and social development. Specifically, to reduce the incidence of the epidemic and its negative impact on the family significantly, we suggest the following:

- Increase and diversify paediatric ARV programmes;
- Increase and decentralize antiretroviral treatment facilities;
- Strengthen home-based care;
- Provide food during the initial stage of treatment;
- Facilitate social support (at the community level and the family level as well);
- Popularize standards and policies for the care of affected children and people living with HIV/AIDS;
- Build the capacity of poor families through the financing of income-generating activities or the implementation of cash transfer programmes,;
- Intensify awareness campaigns and prevention of HIV/AIDS;
- Enhance prevention activities for STIs and HIV/AIDS;
- Increase voluntary testing centres;
- Intensify actions to combat stigma and discrimination against ARV users.

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ⁱ According to WHO/UNAIDS (2006), Ukraine has an HIV-prevalence rate of approximately 1.4% among adults aged 15-49.