

# The environmental challenge of HIV/AIDS: A perspective on the importance of addressing HIV for environmental sustainability in sub-Saharan Africa

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## ABSTRACT

HIV/AIDS affects people from every country, however the countries which are most affected by the HIV/AIDS epidemic are also some of the most highly affected by other prominent global challenges such as environmental degradation, and vice versa. This is no coincidence. This paper explores some of the direct and indirect interactions between HIV/AIDS and environmental issues which underpin this trend. These interactions include feedback mechanisms such as the loss of local biodiversity resulting in increased poverty in a community, which in turn increases vulnerability to the HIV/AIDS epidemic. Another example is the adoption of less sustainable agricultural practices in HIV/AIDS affected communities (because of reduced labour capacity) leading to decreased nutrition, which in turn also results in both a higher rate of both HIV transmission and progression of HIV to AIDS (via decreased immune system function). Once the reciprocal influence of HIV/AIDS and environmental issues on each other is acknowledged, it follows that measures taken to address either HIV/AIDS or the inter-connected global environmental challenges can be most effective when undertaken with an integrated and holistic scope.

**Keywords:** Health and environment, HIV/AIDS, sustainable development, health, livelihoods and environment, environmental policy, health and development policy.

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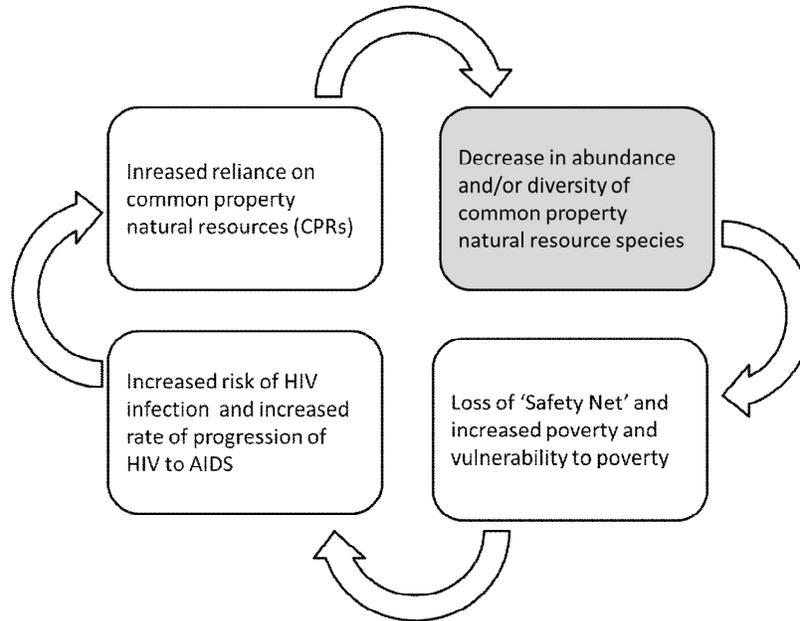
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## INTRODUCTION

HIV/AIDS was responsible for 1.47 to 1.7 million deaths and 81.5 million lost healthy life-years globally in 2010/2011 (WHO, 2012). Approximately 50.6 million people worldwide suffer from HIV/AIDS. This includes between 31.4 and 35.9 million people living with HIV/AIDS in 2011, (UNAIDS, 2012) and approximately 16.6 million children who have lost one or both parents to HIV/AIDS (calculated from UNAIDS 2010). HIV/AIDS affects people from every country; however the countries which are most affected by the HIV/AIDS epidemic are also some of the most vulnerable to other prominent global challenges such as impacts of climate change, environmental degradation and poverty, and vice versa. As this paper will demonstrate, this is no coincidence. Although HIV does not discriminate, the countries most affected by the HIV/AIDS pandemic are among the poorest in the world (UN, 2005). The rate of people living

with HIV in the least developed countries is nine times higher than the rate in more developed regions (UN, 2005). AIDS-related illness is recognized as the leading cause of death in most African countries (UN, 2010). Sub-Saharan Africa is the most affected region, constituting about 68% of all HIV infected people living in Sub-Saharan Africa (calculated from UNAIDS 2010, and UNAIDS 2011). Sub-Saharan Africa is also the poorest region of the world, with close to 50% of the population in 2008 living below \$1.25/person/day (PPP) (World Bank 2013). The prevailing difficult economic, social and environmental challenges of sub-Saharan Africa promote the spread of the HIV/AIDS pandemic in the region, and it is also well established that the HIV/AIDS pandemic contributes to greater economic and social development challenges (Masanjala, 2007). Moreover, the HIV/AIDS epidemic has direct and indirect interlinkages with



**Figure 1.** The positive-feedback cycle of HIV/AIDS decreasing common property 'safety net' resources in a community (also an environmental issue) and thus contributing to greater HIV/AIDS prevalence.

environmental issues, which have received less attention, and it is these issues which this article reviews.

## HIV INTERLINKAGES WITH ENVIRONMENTAL ISSUES

This paper explores some of the mechanisms by which HIV interacts with environmental issues, both directly and indirectly. Direct linkages, such as through the influence of HIV/AIDS on land use practices, coping with disasters (including disaster which result in the displacement of people) environmental stewardship, and livelihood opportunities are explored, as are indirect linkages, such as via the well-established interaction between HIV/AIDS and poverty, followed by the interactions between poverty and environment. These mechanisms of these interaction are expanded and substantiated individually subsequently.

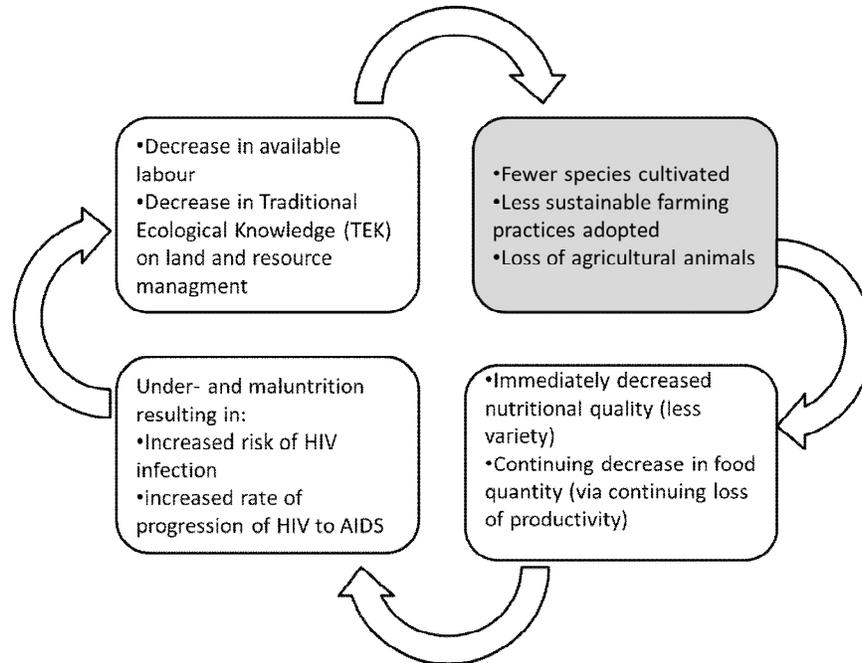
### HIV and land use practices

Natural resource collection is frequently less labour-intensive than farming, and requires little to no start-up capital. HIV/AIDS affected people and communities often become more heavily reliant on the natural resources available to them from the surrounding landscape (Barany et al., 2004; Feldbaum et al., 2006; Shackleton et al., 2006; Joyce and Lisa, 2009), especially non-animal products Kaschula and Shackleton (2012). Natural

environmental resources often serve as a "safety net" for households in difficulty (Shackleton and Shackleton 2004), including those unable to maintain their livelihood as a result of illnesses such as HIV/AIDS (Shackleton and Shackleton, 2004). The increased dependence on natural resources has been linked, both statistically and anecdotally, to a decline in the prevalence, quality, predictability, and/or accessibility of these resources (Joyce and Lisa, 2009). Reciprocally, shortages in natural resources reduce peoples coping ability, thereby leading to increased vulnerability to poverty (for example through the loss of safety nets such as wild resources) as well as poverty itself (for example through loss in soil fertility). This in turn increases HIV/AIDS risk factors (Shackleton et al., 2006; Bolton and Talman, 2010; Sawers and Stillwaggon, 2010; Lemke, 2005). Figure 1 depicts this cycle of consequences.

HIV/AIDS has also been associated with land usage changes (such as increasing dependence on low-input and high short-term yield farm management practices) which reduce biodiversity and sustainable land management (Figure 2). HIV/AIDS, as a disease most commonly infecting adults, creates a demographic change in a community structure. Rural communities burdened by HIV/AIDS often experience a decreased availability of labour and agricultural management capacity, and a loss of indigenous knowledge on both resource management and biodiversity conservation (via the morbidity or mortality of adults) (FAO, 2001; Hlanze et al., 2005; Torell et al., 2006).

Due to the acute shortage of labour (caused by both



**Figure 2.** The positive-feedback cycle of HIV/AIDS contributing to less sustainable agricultural practices (also an environmental issue), which in turn influences nutrition, and thus the prevalence of HIV/AIDS in a community.

deaths and illnesses) which arises in households affected by HIV, there is a tendency to plant fewer varieties of crop (in order to save both time and money) (FAO, 2001; Mauambeta, 2003), and to sell or slaughter livestock for immediate use, rather than to keep and maintain them for breeding (Hlanze et al., 2005). Both these practices have detrimental consequences for sustainable agricultural management (FAO, 2001; Mauambeta, 2003). This can result in losses to both the health of productive agricultural ecosystems, and to human nutrition.

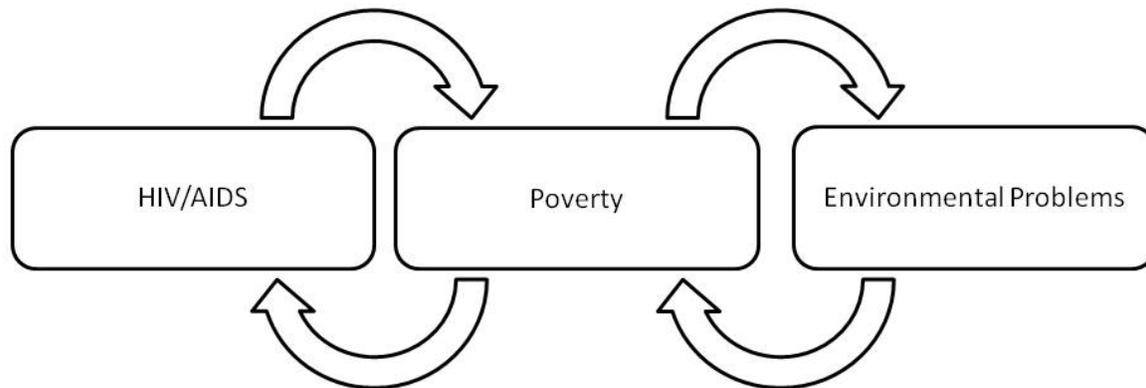
Finally, as inter-generational knowledge-sharing opportunities are lost through early deaths, traditional ecological knowledge, traditional agricultural knowledge, and traditional sustainable land management practices are also lost.

### HIV and disasters

The social and economic upheaval resulting from disasters not only increases the risk of predisposing factors for the spread of HIV infections (such as other infections and poor nutrition) but potentially also increases risk-taking, sexual and gender-based violence (including rape) and other behaviours which are linked to an increase in the occurrence of HIV/AIDS (including forcing women whose livelihoods have been disrupted to work in the sex industry) (Oxfam, 2005; IFRC, 2008). Social and environmental disasters may also result in the displacement of people, break family ties, and thus alter

sexual networking and behaviours, which in turn can facilitate the spread of HIV/AIDS (Epstein and Morris, 2011). Disasters can also result in the interruption of treatment and care regimes, the prevalence of opportunistic infections, unavailability of medical interventions to prevent mother-child transmission of the virus (antiretrovirals and caesarean sections where needed), limited availability of condoms and other preventative tools, and the lower level of priority that reproductive healthcare and information services take on in an emergency situation (IFRC, 2008). The consequences of this could include interruptions in an antiretroviral treatment regime, which in turn can increase the development of an antiretroviral resistant HIV strain (Bertozzi et al., 2006; WHO, 2010). Not only can an interruption in antiretroviral treatment result from the unavailability of antiretroviral drugs themselves, but the increased side effects of antiretroviral drugs without adequate nutrition (Bertozzi et al., 2006; Ivers et al., 2009) can result in patients discontinuing their antiretroviral treatments, even when antiretroviral drugs are available.

Another interlinkage between disasters and HIV/AIDS stems from the prevention of incidents occurring. When people responsible for preventing disasters or accidents do not believe in their own future (as is often the case for people living with HIV (Harding and Molloy, 2008) it is conceivable that HIV/AIDS prevalence may influence the likelihood of incidents occurring. Additionally, following an accident or disaster, a community with a high HIV/AIDS



**Figure 3.** The indirect connection between HIV/AIDS and environmental issues via poverty.

prevalence has a reduced capacity to mitigate damages or work towards recovery of their environment: both directly through a lack of available labour, and indirectly through the influence of HIV/AIDS on poverty, and poverty on the capacity to recover.

### INDIRECT HIV/AIDS ENVIRONMENTAL INTERACTIONS

#### Poverty and the environment

Connections between poverty and the environment have been well discussed in literature over the last two decades, including feedback mechanisms between poverty and degrading environments. Such has been represented in the environmental kuznets curve, which postulates that although environmental pressure initially increases with development, once a certain level of development is attained, environmental pressure decreases (Holden et al., 1996; Angelsen, 1997; Duraiappah, 1998; Moseley, 2001; Dinda, 2004; Stern, 2004; Gray and Moseley, 2005; Liu, 2012; Shackleton and Shackleton, 2012). Via this interlinkage with poverty, factors affecting the environment also have repercussions for HIV, and vice versa (Figure 3).

Many conditions associated with poverty both increase the transmission of HIV, and accelerate the development of HIV to AIDS. These include:

1. Nutritional deficiencies, which lowers the immune system function, thereby increasing both vulnerability to infection (Sawers and Stillwaggon, 2010) and the progression of HIV to AIDS (Marston and De Cock, 2004).
2. Co-infections, in particular with (1) diseases which increase viral shedding of infected partners such as malaria (Abu-Raddad et al., 2006; Sawers and Stillwaggon, 2010), or (2) increase vulnerability of uninfected partners (such as *Schistosomiasis hematobium*) or (3) other infections which create uro-

genital inflammation or lesions (Stillwaggon, 2009; Sawers and Stillwaggon, 2013).

3. Contamination and poor Hygiene (which increase the likelihood of infections in general) (Sawers and Stillwaggon, 2010).

4. Behaviour (voluntary and otherwise) (UN, 2005; Epstein and Morris, 2011).

HIV/AIDS epidemic, in turn, has been a significant contributor to poverty in sub-Saharan Africa through numerous well-documented impacts on households (such as undermining family resource bases and leaving children orphaned or unable to complete their education) to macro-economic effects on the labour market (Seeley et al., 2010).

Poverty, for its part, has been associated with contributing to individuals partaking in behaviors that expose them to increased risk of infection. This has been attributed to lack of knowledge on how to prevent infection (UN, 2005). However, there are also several poverty-related factors that increase exposure to HIV/AIDS which are not influenced by knowledge on prevention measures (Masanjala 2007). For instance, financial constraints can influence occupational decisions which can carry a high risk of participating in unprotected sex (including participating in the sex trade, or work in conditions which leave women vulnerable to rape), and poverty has also been linked to a lowered fear of contracting HIV/AIDS, presumably through decreased expectation in a positive future (UN, 2005, SARP Conference, 2006 [in] Mbirimtengerenji, 2007).

Another reason that poverty is associated with a higher risk of contracting HIV/AIDS is family life. The World Health Organization notes that poverty plays a pivotal role in teenage marriage, a factor that leads to the spread of sexually transmitted diseases including HIV (this can also be exacerbated by the practice of polygamy) (UNAIDS, 2010). Young girls often have no choice about having unprotected sex with their mature husbands, which makes them vulnerable to contracting HIV from their potentially infected husbands. Risk factors such as

increased risk of vaginal or cervical trauma during intercourse are also influenced by the age of women at marriage (UNAIDS, 2010; University of Illinois at Chicago, Conference Report on African Studies 2005: Teenage Marriages in Africa [in] Mbirimtengerenji, 2007). This interconnection between gender equity and HIV/AIDS in turn feeds back into the perpetuation of the poverty and HIV/AIDS cycle.

Despite the indications for behavioural factors influencing the prevalence of HIV/AIDS amongst the rural poor of Africa, Sawers and Stillwaggon believe that the main drivers behind the prevalence of HIV/AIDS in rural Africa is not behavioural patterns, but rather a consequence of physical constraints associated with poverty, such as poor nutrition, poor hygiene facilities, and the prevalence of other infections (Stillwaggon, 2009; Sawers and Stillwaggon, 2010a, b; Stillwaggon, 2012; Sawers and Stillwaggon, 2013).

Regardless of whether the prevalence of HIV/AIDS in poor communities is due to behavioural factors (both voluntary and involuntary) or circumstances, HIV/AIDS increases the burden of poverty where it already exists, and can push previously unimpoverished people into poverty by placing heavy financial burdens on families, and by breaking down inter-generational support (UN, 2005). Poverty can also prevent those who have been infected from accessing the life-long care that HIV/AIDS requires.

### Poverty and HIV progression

As mentioned in regards to HIV and sustainable agriculture (Figure 2) poor nutrition resulting from changing agricultural practice is another factor which contributes to the HIV-poverty-environment positive feedback cycle depicted above in (Figure 3). Both malnutrition and under-nutrition accelerate the progression of HIV into AIDS, as well as rendering already immune-compromised people increasingly vulnerable to opportunistic infections (IFRC, 2008). It can also increase the side effects of antiviral therapy (WHO, 2008; Ivers et al., 2009), thus decreasing compliance with treatment programs.

Reciprocally, HIV/AIDS also has a strong influence on the prevalence of poor nutrition. Children who have been orphaned due to HIV/AIDS (or are living with parents who are living with HIV and therefore unable to provide a livelihood) are likely to be poorly nourished (UNICEF, 2008; UNAIDS 2010). An estimated 16.6 million children have lost either one or both parents because of HIV/AIDS-related diseases (UNICEF, 2008; UNAIDS, 2010). Furthermore, due to a shortage of labour, food is likely to be scarce in areas highly affected by HIV/AIDS (UNICEF, 2008; UNAIDS, 2010). In times of food shortages, further problems emerge, including a disruption of education and an increase in sex-related

crimes towards women and children. These problems mentioned above may contribute to the spread of HIV/AIDS (UNICEF, 2008).

Even when adequate nutrition is available, people in the advanced stages of AIDS will suffer symptoms similar to those of under-nutrition, such as weight loss, nutrient deficiencies, and wasting. These are caused by a combination of increased metabolic demand, loss of appetite, gastrointestinal malabsorption and body mass redistribution.

A lack of vital nutrients in people living with HIV/AIDS is linked to a higher rate of mortality and HIV progression (Drain et al. 2007). When infected with HIV, people suffer regular bouts of illness. These periods of sickness are likely to alter a patient's appetite as well as increase the body's demand for nutrients (FAO, 2007). In 2011, the FAO Food Price Index reached an all time high of 230, more than doubling in a single decade, from 95 in 2001. Since the peak in 2011, food prices have dropped only slightly, and remained well above what they were in the start of the last decade, with the food price index value for 2013 being 210 (FAO, 2014). Naturally, impoverished countries have been largely affected by this increase in food costs, and many people have been unable to afford sufficient food, resulting in undernourishment as well as faster progression of HIV to AIDS (ODI, 2010; FAO, 2011).

### CONCLUSIONS

Although there is a growing trend to approach the global challenges of the 21st century holistically, the scope for doing so regarding health topics such as HIV/AIDS and environmental issues has only tentatively begun to be explored. Although HIV/AIDS, poverty and environmental issues are all deservedly high-profile issues in their own right, it is also emerging that a sustainable approach to HIV/AIDS must address inter-linkages with other global challenges, such as poverty and the environment (Beeker et al., 1998; Poku, 2002; Fenton, 2004). Likewise efforts to address environmental issues must take not only poverty into account, but must go one step further and include issues such as HIV/AIDS: which has both direct and indirect impacts on environmental issues.

This has been recognized to a certain degree, and a number of organizations which focus on tackling HIV/AIDS and undernourishment have been established. This integrated approach to fighting HIV/AIDS has had demonstrable success, assisted by support from the UN and other agencies (WHO, 2008). For example, UNICEF, along with the Department for International Development (DFID) have co-led a number of programmes in Sub-Saharan Africa, South-East Asia, and the Western Pacific region which focused on strengthening services and community involvement in order to tackle HIV/AIDS and under- and malnutrition together (UNICEF, 2010).

However, although most governments and many non-governmental organizations have programmes to address both the HIV/AIDS epidemic, and other social and environmental issues in place, but these are less effective than they could be with a more holistic approach to understanding and addressing the issues involved.

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