

# HIV/AIDS and food insecurity: deadly syndemic or an opportunity for healthcare synergism in resource-limited settings of sub-Saharan Africa?

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A syndemic refers to two or more epidemics interacting synergistically and contributing to the excess burden of disease in a population [1]. Syndemics occur when linked co-epidemics cluster by person, place or time [1]. To effectively address a syndemic, public health interventions must not only aim to prevent or control each disease individually, but they must simultaneously address the forces that tie those afflictions together and the health consequences that result [1].

In sub-Saharan Africa, an estimated 22.5 million adults and children are HIV-infected and an estimated 239 million are chronically undernourished [2]. In the 10 countries in sub-Saharan Africa with the highest adult HIV prevalence rates, both the rates of undernutrition and global hunger indexes are also high (Table 1) [3,4]. These data suggest that the prevalence of HIV/AIDS and food insecurity (defined as the persistent lack of access of quality food to meet daily needs) geographically overlap. We contend that HIV/AIDS and food insecurity compromise an unrecognized syndemic axis in many resource-limited settings in sub-Saharan Africa warranting interventions that address both disease burdens concurrently.

When analyzed in the context of antiretroviral treatment (ART), food insecurity is associated with reduced drug adherence, poorer immunologic, virologic, and clinical outcomes, as well as an increase in overall mortality. [2,5–8]. Competing demands between food and ART can also

lead to increased risk of HIV infection [5,6]. An increase in sexual risk-taking behaviors has been shown amongst food-insecure women [9,10]. Additionally, food-insecure families, especially in rural areas, are at higher risk of ‘social crises’ leading to migration or displacement, factors that also increase HIV risk [6].

In this issue of *AIDS*, Weiser *et al.* [11] report outcomes from rural Uganda examining associations between HIV-related morbidity, food insecurity, and healthcare utilization among HIV-infected patients receiving ART in a resource-limited setting. This study is the first longitudinal cohort in the literature to explore these links and builds upon an opus of seminal work by Weiser *et al.* [7–11] demonstrating the links between HIV/AIDS and food insecurity in Africa. Using the Household Food Insecurity Access Scale, Weiser *et al.* assessed levels of food insecurity by interviewing 458 participants (72% women) from the Uganda AIDS Rural Treatment Outcomes cohort [11]. Outcomes of morbidity and healthcare utilization included physical health-related quality of life, incident HIV-related opportunistic infections, total number of hospitalizations, and missed clinic visits. Notably, over 75% of the cohort was categorized as food insecure to some degree [11]. Severe food insecurity was associated with increased HIV-related opportunistic infections, increased hospitalizations, and decreased utilization of outpatient services [11]. Strikingly, 86% of patients reported foregoing food for themselves or their families to obtain ART and 17% of patients gave up ART to obtain food [11].

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**Table 1. Nutrition metrics in the 10 countries with the highest adult HIV/AIDS prevalence in sub-Saharan Africa based on WHO Health Statistics and 2010 Global Hunger Index.**

Rank	Country	Adult HIV prevalence (15–49 years) (%)	No. of HIV-infected adults	No. of HIV-infected children	Total population undernourished (%)	Prevalence of underweight children <5 years (%)	Global Hunger Index
1	Swaziland	25.9	170 000	15 000	18	6.1	10.8
2	Botswana	24.8	280 000	15 000	26	8.4	12.5
3	Lesotho	23.6	260 000	12 000	15	13.6	12.2
4	South Africa	17.8	5 400 000	280 000	5	10.1	7.3
5	Zimbabwe	14.3	1 200 000	120 000	39	14.0	20.9
6	Zambia	13.5	980 000	95 000	45	14.9	24.9
7	Namibia	13.1	180 000	14 000	19	17.5	13.6
8	Mozambique	11.5	1 400 000	100 000	37	21.1	23.7
9	Malawi	11.0	840 000	91 000	29	15.5	18.2
10	Uganda	6.5	810 000	130 000	15	16.4	15.0

Despite the important findings of this study there are several methodological limitations to consider. As with any study that uses patient self-report, there is a potential for recall and social desirability bias. Nevertheless, the message of this study is clear: HIV/AIDS global health initiatives, such as The President's Emergency Plan for AIDS Relief (PEPFAR) and The Global Fund must integrate interventions that address food insecurity in order to ensure successful and sustainable HIV treatment outcomes.

Recognition that HIV/AIDS and food insecurity constitute a syndemic axis has led several international organizations including the World Health Organization, World Food Program (WFP), United States Agency for International Development (USAID) and HIV treatment initiatives such as PEPFAR to recognize the necessity of integrating sustainable food production strategies into HIV/AIDS treatment programming [2]. We advocate that two innovative agricultural initiatives, the Academic Model Providing Access to Healthcare (AMPATH) and One Acre Fund, serve as models for HIV treatment programs to adopt or collaborate with to address food insecurity [12,13].

Academic Model Providing Access to Healthcare (AMPATH) provides ART to over 50 000 patients in 17 clinical sites in Western Kenya [12]. AMPATH found that many patients on ART also suffered from severe food insecurity, compromising treatment outcomes. To address this, AMPATH nutritionists screen new patients before commencing ART. The nutritionist determines if the patient, along with all of their dependents, is food secure or insecure. If the patient is food insecure, the nutritionist will write a 'food prescription' to cover 100% of the caloric needs of the patient and all of their dependents [12]. Using a combination of donated food (mainly from the WFP and USAID), food purchased from local farmers, and food that AMPATH grows directly on one of their six high production farms, the initiative is able to feed a family of four for the cost of \$1 USD per day [12].

As a result of this initiative, every food-insecure patient and their dependents have access to adequate food.

Another successful model that addresses food insecurity is the One Acre Fund [13]. The One Acre model empowers local farmers in Kenya and Rwanda with sustainable tools rather than simple food charity. This program, similar to a microfinance organization, offers access to education on proper farming techniques, provides higher-quality seeds and fertilizer, and gives farmers access to higher paying markets by acting as a bulk-selling agent [13]. Additionally, the One Acre Fund provides crop insurance to protect local farmers against drought or disease. To date, the One Acre Fund has helped 54 000 farm families attain an average of a 100% increase in harvest yield [13]. Though not specifically designed to partner with an HIV treatment program, this model offers an attractive option for collaboration with HIV treatment initiatives such as PEPFAR.

In summary, Weiser *et al.* [11] document the high prevalence of food insecurity among patients accessing ART in rural Uganda and the detrimental effects of this comorbidity. These findings prompt an urgent call to action by HIV treatment initiatives to address food insecurity. We advocate the adoption of upstream interventions that increase food production by empowering farmers and communities. Confronting the HIV-food insecurity syndemic axis requires integrated health service delivery models (healthcare synergism) that address both HIV treatment as well as agricultural empowerment [14,15]. Over 75% of East Africans are farmers; the solution to the food crisis is in their fields [13]. HIV treatment initiatives must collaborate or recapitulate initiatives like AMPATH and the One Acre Fund to increase food production in settings afflicted by food insecurity.

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### Conflict of interest

A.R. served on the board of directors of the AIDS Healthcare Foundation from 2009 to 2011.

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