REVIEW PAPER

Food security among people living with HIV: a review of programs and evidence in resource-limited settings

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Abstract

Food insecurity, which is prevalent among people living with human immunodeficiency virus (PLHIV), predicts poor treatment and health outcomes. In resource-limited settings, various programs have been implemented to improve access to food and mitigate adverse effects. This study aims to review existing food security programs and assess their evidence of effectiveness in improving food security, medication adherence, and other health outcomes of PLHIV in resource-limited settings. We conducted a review of the published literature on food security and HIV. We narrowed our review of food security programs to interventions that had been implemented in resource-limited settings. Programs can be classified into three categories – food assistance, livelihood development, and combined food assistance and livelihood support. Programs have varying degrees of feasibility and sustainability. The three programs also differ in terms of available empirical evidence to support effectiveness. Of the three categories, food assistance is the most evaluated program, followed by livelihood development and combined food and livelihood support. Current programs offer promising results in increasing access to food and improving key treatment and health outcomes, including adherence to antiretroviral therapy and nutrition. Future programmatic interventions should be appropriate and relevant to the needs and characteristics of PLHIV and their local contexts. Future programs, particularly those that provide livelihood assistance, also need to be rigorously evaluated to increase what we know about impacts on food security, medication adherence, and other health outcomes.

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Key words: HIV infection, food security, food assistance, livelihood, medication adherence.

Introduction

Food insecurity, defined as inadequate access to safe and nutritious food [1], is highly predominant among people living with human immunodeficiency virus (PLHIV) in resource-limited countries [2-6]. High prevalence of food insecurity among PLHIV presents a significant social and public health issue. Research in sub-Saharan Africa (SSA) has shown that food insecurity is associated with adverse health outcomes, including nonadherence to HIV treatment [2, 3, 7], and higher risk of morbidity and mortality [8-11]. Given these adverse effects of food insecurity and its critical role in increasing survival and enhancing quality of life, programs have been developed to improve food security among PLHIV.

The objective of this study is to review the literature on food security programs for PLHIV, and to assess their effectiveness and relevance to PLHIV in resource-limited settings.

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This review is based on prior studies, and addresses gaps in knowledge associated with synthesis of current research on food security programs for PLHIV [12-15]. Firstly, our review focused on programs that have been implemented in resource-limited countries, or countries classified as low- and lower-middle-income by the World Bank. Secondly, we included all types of food security programs, regardless of their primary objective. We defined a food security program as any scheme that provides access to food for PLHIV. Unlike prior studies [12-14], we did not limit our review to only food assistance or nutrition supplementation programs. Using guidelines defined in previous comprehensive papers [15, 16], we included, in our review, livelihood programs that have been integrated with HIV treatment and that have been designed to increase the ability of PLHIV to produce or obtain food. Thirdly, we examined evidence of program effects beyond treatment adherence and food access. For example, we reviewed program effects on psychosocial outcomes, which may represent a mediating link between access to food and treatment adherence. Lastly, we assessed food security programs using practice-related and operational indicators that may guide and improve development of future interventions.

Description of the status of knowledge

We divided current status of knowledge into two parts. In the first part, we described three general types of food security programs for PLHIV. In the second, we evaluated food security programs based on design and current evidence of effectiveness.

Types of food security programs for PLHIV

Food security programs for PLHIV in resource-limited settings can be classified into three general categories: food assistance, livelihood development, and combined food and livelihood support.

Food Assistance Programs

In our review, we categorized programs that provide any type of food assistance, whether a transfer through food baskets or targeted nutrition supplementation, as one type of intervention. Therefore, Food Assistance Programs (FAPs) include supplementary food support (or food baskets) and nutrition supplementation (or therapeutic feeding). Supplementary food support is targeted to food-insecure PLHIV and in some cases, to their dependents. Nutrition supplementation targets undernourished PLHIV and those with precipitous weight loss. Nutrition supplementation provides specially designed foods that are high in nutrients for rapid nutritional rehabilitation before or during treatment. FAPs reflect a biomedical approach to address downstream health consequences of food insecurity. Although FAPs have historically targeted populations regardless of HIV status, recent programs have expanded to cover PLHIV. For instance, in Zambia, food support is part of HIV care and treatment [17, 18]. Food-insecure ART patients receive monthly food rations for six to 12 months. Similarly, FAPs have been linked with HIV treatment programs in Ethiopia [19], Kenya [20], Malawi [21], Mozambique [22], Rwanda [23], and Uganda [24]. Outside SSA, FAPs have also been implemented in Bolivia [25], Haiti [26], Honduras [27], and Vietnam [28].

Livelihood Development Programs

Livelihood Development Programs (LDPs) focuses on identifying and promoting economic means to achieve food security, particularly through income generation and asset accumulation. Livelihood interventions that have been integrated with HIV programs, cover a broad set of activities designed to strengthen capabilities required for means of living. LDPs are varied and can include one or more of the following components: direct transfer of cash or productive assets (e.g., farming and livestock input and materials), technical skills training related to a specific livelihood or employment, life or soft skills training (including financial literacy), and access to formal financial products and services (including savings and loans). Although LDPs for PLHIV share many similarities with livelihood programs for the broader population, LDPs are distinctive because they are linked with HIV treatment. LDP participation is generally conditioned on being enrolled in a HIV treatment program. A growing number of LDPs have been implemented in SSA including Cote d'Ivoire [29], Ethiopia [30], Kenya [31, 32], Namibia [33], Uganda [34], and Zambia [35].

Combining Food Assistance and Livelihood Support Programs

The third type of program combines food assistance and livelihood support with HIV treatment. Generally, Combining Food Assistance and Livelihood Support Programs (C-FALSPs) provide food assistance right before or immediately after ART initiation. ART patients also receive livelihood support and training after the food supplementation phase. C-FALSPs are designed to address the immediate food needs of ART patients, and to facilitate a more sustainable way to access food beyond the duration of food assistance. However, C-FALSPs have not been implemented as widely as FAPs and LDPs. A review of the literature yielded one example of a C-FALSP in SSA: the Academic Model Providing Access to Health (AMPATH) in Kenya. AMPATH is one of the first HIV care programs to implement a comprehensive HIV treatment program with food supplementation and livelihood support for food-insecure ART patients and their dependents [5]. The program provides up to 100% of caloric needs for a period of six to 12 months. Before the end of the food assistance phase, patients are transitioned to another program: the Family Preservation

Table 1. Characteristics of food security programs for PLHIV based on program design and evidence of effectiveness

Indicator	Types of food security programs for people living with HIV					
	Food assistance		Livelihood development		Combined food assistance and livelihood support	
	Strength	Limitation	Strength	Limitation	Strength	Limitation
Program design						
Feasibility	✓		✓		✓	
Household food security		×	✓		✓	
Adherence motivation	✓		✓		✓	
Quantity and quality of food		×	✓		✓	
Replicability	✓			×		×
Stability of access to food		×	✓		✓	
Suitability	✓			×	✓	
Immediacy of food benefits	✓			×	✓	
Program effectiveness						
Research evidence	✓			×		×
Effect on adherence	✓			×		×
Potential effects beyond adherence		×	✓		✓	
Sustainability of effects		×	✓		✓	

Initiative (FPI). FPI assists patients who graduated out of the food support program with skills training in relevant income-generating activities. FPI trains ART patients on various livelihood activities, and provides access to microcredit and technical expertise to improve agricultural techniques. Furthermore, a unique feature of AMPATH are its high-production farms that serve two main functions: a. to complement AMPATH's food supply, and b. to use as learning tools to teach livelihood participants how to increase agricultural production [5, 36].

Assessment of programs for food security of PLHIV

We assessed the three types of food security programs, based on program design and evidence of effectiveness in improving access to food, medication adherence, and other health outcomes. Table 1 summarizes the strengths and limitations of food security programs for PLHIV, based on program design and evidence of effectiveness.

Program design

Feasibility

PLHIV's chronic health condition may limit full and active participation in various program activities, and demonstrates that a practical program for PLHIV is crucial. All three programs have been demonstrated to be practical and feasible.

Ability to address individual and household food insecurity

Many FAPs provide food only to individual patients and rarely address food insecurity at a household level. Provision of food to ART patients only, while other household members remain food insecure, poses ethical dilemmas, and may lead to unintended negative consequences. Evidence suggests that food insecurity at the household level compels ART patients to share food ration with other household members [37]. Because of food sharing, the food ration may not last as intended, and ART patients may not receive enough food and nutrition needed for their health and treatment.

Motivating treatment adherence

Each program may have a motivating effect on adherence. For instance, some FAPs have combined the time of food and medication collection in order to encourage patients to obtain their medications as scheduled [5, 22]. LDPs and C-FALSPs can also combine the timing of livelihood training sessions with clinic attendance to motivate patients to collect medications as scheduled and to regularly attend clinical follow-ups.

Quantity and quality of food

Access to food does not guarantee that recommended food will be consumed. The quantity and quality of food is equally important. For instance, the quantity of food pro-

vided by FAPs may not be sufficient when food is shared with other household members. Food sharing is common among HIV-affected households in resource-limited settings because of food insecurity at the household level [20, 38]. Quality of food and actual food intake can also be an issue, when food rations have no similarities with the local diet. For instance, nutrition supplementation programs may provide ready-to-use therapeutic foods (RUTF) that have no similarities with local diets. As a result, PLHIV may not regularly consume the supplement due to its strange or medicinal taste. For instance, ART patients in Kenya reported mixing RUTF with other food to mitigate the medicinal taste, so that the supplement is more consistent with patients' diet [37]. Skipping or mixing the supplement with other food reduces the efficacy of food supplementation. An evidence also suggests that quality and quantity of food remains a barrier to patient satisfaction with FAPs [20, 22]. In contrast, LDPs may allow PLHIV and their households to have more control and options with the food they eating.

Replicability

Programs have variable degrees of replicability. As the most widely implemented and integrated with HIV treatment, FAPs may be easier to replicate than LDPs and C-FALSPs. FAPs use existing programmatic models supported by international aid organizations. Compared with FAPs, LDPs may be more operationally challenging to replicate. Limited financial and human resources (e.g., training workers and facilities) have consistently emerged as critical barriers to replication and implementation of LDPs [32, 39]. For instance, many health workers are not trained on livelihood approaches, so the programs have to be delivered by separate training agents who have the knowledge in livelihood development and income-generating activities.

Of the three programs, C-FALSPs may be the most challenging to replicate because little is known about the process and strategies to implement C-FALSPs. Organizations may experience additional challenges combining food assistance and livelihood components. Barriers include financial and human resource-constraints, inadequate guidelines to determine who, when, and how to transfer participants from food support to livelihood activities, and poor integration of health and economic data of ART patients [16, 39]. For instance, organizations may have weak monitoring and evaluation systems that may not be capable of tracking economic and health indicators that can be used to make decisions on which, when, and how to transfer ART patients from one program to the other. However, combination programs may address some challenges that are common in separate programs. Horizontal integration of food security programs can take advantage of existing resources to reduce operational costs. In Kenya, for instance, AMPATH food production farms are used as a source of food and learning tools [5].

Stability of access to food

Each program varies in its ability to provide a stable access to food, and to achieve immediate and long-term food security. FAPs provide the least stable access to food, usually lasting only between six to 12 months. LDPs may provide a more stable alternative to FAPs. Unlike individual FAPs, in which PLHIV must find other means to obtain food after 12 months, or standalone livelihood programs, in which PLHIV must find other means to obtain food, while in waiting to receive income or food from their income-generating activities, C-FALSPs may provide more stable access to food in the immediate and long-term periods. C-FALSPs have the benefits of direct provision of food to immediately restore nutrition and improve weight, as well as opportunities to create a more stable and sustainable way of obtaining food.

Suitability

Every program has varying degrees of suitability to different groups of PLHIV. Livelihood activities may not be appropriate for PLHIV who are severely undernourished or experiencing rapid weight loss because they may not have the physical capacity to attend training and carry out farming activities. Similarly, labor-intensive activities may not be appropriate for PLHIV with limited strength and stamina. Instead, FAPs are more suitable for undernourished PLHIV, since immediate access to food can have exponential effects on nutrition rehabilitation. C-FALSPs may be suitable for ART patients with different physical strength and nutrition status. For instance, PLHIV who cannot attend training or participate in farming activities because of limited strength and stamina, can initially complete the food supplementation phase, and regain energy and strength before transitioning to livelihood activities. This horizontal integration of programs provides a more holistic continuum of care that enables patients to regain physical capacity before engaging in income-generating activities that require more energy.

Compared with FAPs, LDPs include a variety of activities that may not be relevant to all participants and their environments. Program planners need to be actively engaged with community stakeholders to identify locally viable income-generating activities. What works in urban areas may not work in rural parts. Similarly, a farming-related livelihood may not always be the most viable option in rural areas. A more interactive and participatory approach with local stakeholders may lead to more appropriate and locally specific solutions.

Immediacy of food benefits

FAPs (and the food assistance component of C-FALSPs) results in quicker, direct effects on nutrition and health because nutrient-rich foods are guaranteed to be received. FAPs may promptly alleviate nutritional deficits that accompany food insecurity and HIV, and may be particularly beneficial for undernourished PLHIV. On the other hand, livelihood

activities such as farming, often require time to produce benefit (e.g., crops require an entire season of growth before harvest), and any benefits may not necessarily translate into food security and better nutrition. Unlike FAPs, LDPs do not guarantee that food will be available and that a nutritious diet will be consumed.

Program effectiveness

Research evidence

FAPs remain the most evaluated food security program with substantial empirical support. Prior studies in SSA and other resource-limited regions have investigated and systematically reviewed the impact of FAPs on treatment adherence, food security, and other health outcomes, including weight, survival, immunologic, and quality of life [12, 13, 15, 18]. To date, few rigorous evaluations have been completed to examine effects of LDPs and C-FALSPs. Although, a few LDPs had shown promising findings [30, 31, 34], little remains known about the effect of LDPs and C-FALSPs on adherence.

Unlike food assistance, livelihood development may have effects beyond adequate access to food and better health. By having opportunities to be economically productive, and by obtaining food in more socially acceptable ways, PLHIV may experience higher self-esteem, greater self-efficacy, and a more optimistic view of the future. Having a productive livelihood may also empower PLHIV to be more engaged in political and social activities. Furthermore, the ability to obtain food independently, as opposed to solely relying on food assistance, may reduce stigma of HIV infection. Empirical evidence supports these hypotheses. In SSA, participation in livelihood programs have contributed to improved self-esteem, greater self-efficacy, better standing in the community, and reduced stigma [34, 40, 41].

Sustainability of effects

For some programs, positive effects may only be evident during the duration of the program. For instance, FAPs' short duration may not be able to sustain any positive effects on adherence and other health outcomes beyond the period of food supplementation. Evidence suggests that observed benefits from FAPs have not been sustained after the end of the program [20, 42]. This finding may not be surprising, given that any benefits occur primarily because of the food that participants receive. Although little is known about program duration of LDPs and C-FALSPs, these programs may be able to sustain positive benefits over a longer period. Livelihood programs are geared towards creation of economic strategies that tackle underlying determinants of food insecurity. For C-FALSPs, the effect of food supplementation on ART adherence and health may continue beyond the duration of the food assistance component, because patients may be more motivated to take their medications as they learn how to build opportunities to create a more sustainable access to food.

Discussion

Programs for food security of PLHIV differ, based on design and current evidence on effectiveness. Each has its own strengths and limitations, and no single program may be considered the most optimal in all cases. Food assistance programs are feasible with motivating effect on adherence, can be easily replicated, and provide immediate access to nutrient-rich foods. On the other hand, FAPs rarely address food security at the household level, may not provide foods that are consistent with the local diet, and do not provide long-term and stable access to food. Additionally, positive effects may not be sustainable, since the access to food is temporary. The six-to-12-month supply of food is highly transitory when compared to the lifelong duration of ART. The short-term nature of FAPs may not be surprising because these programs are promoted as a biomedical approach and designed to address the downstream consequences of food insecurity. Although the program intent is supplementary and temporary, in practice, FAPs remain a critical source of food for PLHIV.

In contrast to FAPs, LDPs are designed to tackle the underlying determinants of food insecurity, such as lack of income and productive assets. LDPs have been demonstrated to be feasible with a motivating effect on adherence and may provide a more stable and long-term access to food. However, LDPs do not guarantee food supply, as access to food depends on the success of income-generating activities or producing food. Similarly, access to food is not immediate, as it takes longer for a livelihood to generate income and produce food than food assistance. Also, LDPs' focus on PLHIV requires innovative thinking about how to make training activities more appropriate to PLHIV. LDPs that are highly labor-intensive may not be appropriate to PLHIV with limited strength and stamina. Dual management of HIV treatment and livelihood activities can be challenging, with patients skipping treatment to work or perform income-generating activities [25].

In theory, a combination of food assistance and livelihood support as a continuum of care may be a more effective way to meet immediate needs of PLHIV and achieve long-term food security. C-FALSPs offer a promising solution to address both immediate and long-term food insecurity because C-FALSPs come with all the advantages of FAPs and LDPs. However, in practice, little is known about C-FALSPs. Limited data are available to determine effects of C-FALSPs and their replicability across various geographic settings. Further, combination programs may be the costliest to deliver and implement.

Implications for practice and research

Findings have important implications for practice and research. Firstly, food security programs should not only address the economic needs of target populations but should also consider appropriateness to health characteris-

tics of PLHIV. Food assistance and livelihood support for PLHIV, in contrast with similar programs for the general population, require innovative approaches that consider the health conditions of PLHIV, and the food and nutritional demands of HIV and ART. Programs should also be relevant to the socioeconomic contexts and cultural environment of PLHIV. For instance, a livelihood program should be designed carefully, so that vulnerable groups (e.g., women and those living in extreme poverty) are not excluded. Program planners and other practitioners need to be actively engaged with local stakeholders to identify and promote feasible income-generating activities.

Secondly, programs must be implemented with fidelity and rigorously evaluated. However, the amount of available empirical evidence lags behind the number of food security programs that have been implemented in low and lower-middle income countries. There are two major evidence gaps: 1) little is known on whether a combination of food assistance and livelihood support program may lead to better adherence and food security outcomes; and 2) there is limited evidence on the impact of livelihood programs on treatment adherence. More research is needed to address these concerns. Similarly, further research is needed to examine whether LDPs' impact differs, based on program design and components. Because LDPs can include several types of economic training and support, it is critical to determine the comparative effects of different livelihood components, and to identify the optimal combination of activities.

Thirdly, there are additional programs that can be adapted as a food security intervention for PLHIV in resource-limited settings. Examples include the graduation model [43] and standalone cash transfer programs, which can be unconditional or conditional [44]. For example, a conditional cash transfer program may specify that cash can only be used to buy food or purchase certain types of food, while the amount of cash transfer can be equivalent to the value of a food basket [45]. However, the potential of cash transfer programs or the graduation approach as a food security intervention for PLHIV has not been widely examined [15].

Conclusions

Advancements in antiretroviral therapy have transformed HIV from an acute, life-threatening illness to a manageable, chronic condition. However, future progress may not be achieved if barriers to treatment success are not addressed. One critical barrier is food insecurity. Although current programs offer promising results, these food security programs can be strengthened if food-related needs of PLHIV at different stages of HIV infection, as well as their treatment and health statuses are considered. A combination of food assistance and livelihood support may be an appropriate strategy to tackle immediate and long-term needs of PLHIV. In addition, other programs, particularly those that address underlying determinants of food insecurity, should be explored and adapted for PLHIV. As PLHIV live longer and healthier lives, they will require opportunities that provide stable and sustainable access to food.

Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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