

NUTRITION BULLETIN

Homestead Food Production Program improves food and nutrition security by increasing consumption of micronutrient-rich foods and family income in households with HIV/AIDS and other chronic diseases

Food insecurity and malnutrition are serious problems in Cambodia: a third of the country's population is undernourished, nearly half of all children are underweight and stunted.¹ The situation is worse among vulnerable households, which are compromised by malnutrition-related disability or illness. These households have greater nutritional and economic needs than food-secure and non-vulnerable households but often lack the capability to meet their needs. In 2005, Helen Keller International (HKI) expanded its Homestead Food Production Program (HFPP) to assist vulnerable households, particularly those affected by HIV/AIDS. This bulletin highlights the HFPP's impact on beneficiaries' food security and nutritional status.

Introduction

Cambodia has a high prevalence of infectious, wasting diseases. In 2004, Cambodia had the sixth-highest prevalence of tuberculosis (TB) in the world. Although the Cambodia Demography Health Survey (CDHS, 2005) showed a lower prevalence of HIV/AIDS (at 0.9%) than other surveys in the country, it is still the highest prevalence in Southeast Asia.¹ Both TB and HIV/AIDS are *wasting diseases*, where severe weight loss is a common symptom. In the presence of HIV/AIDS, malnutrition occurs due to reduced food intake, poor nutrient absorption, and changes in the body's metabolism. HIV/AIDS cannot be cured, nor does a vaccine exist. Public health prevention

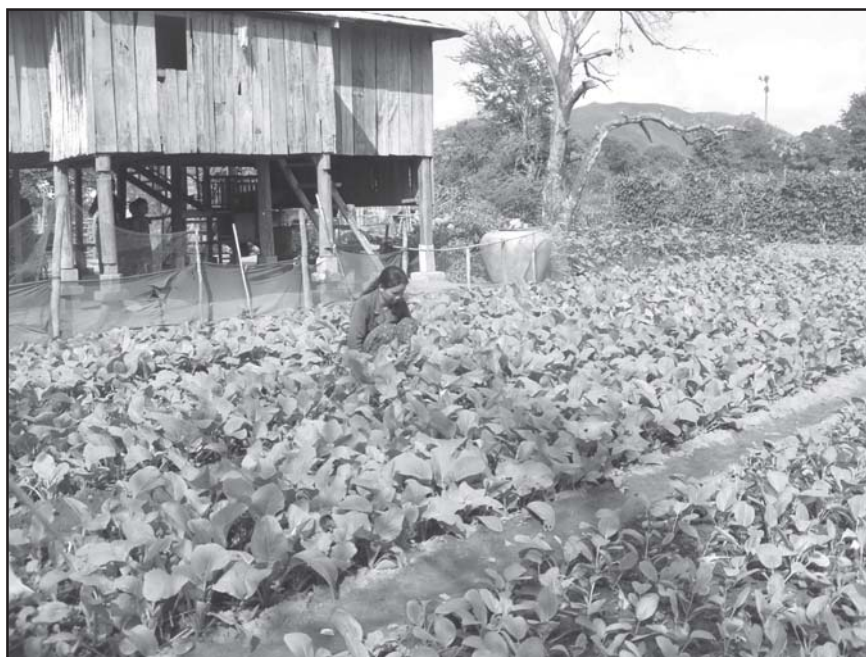
campaigns, however, have limited the spread of this disease, and anti-retroviral therapy (ART) and improved nutrition have helped those already infected.

It is becoming more widely recognized that food security and adequate nutrition are key elements in preventing the spread of HIV/AIDS. At the individual level, studies have shown how a well-balanced diet is necessary for maintaining a strong immune-system. Malnutrition – especially micronutrient-deficiencies – weakens immunity, leaving the person more susceptible to infectious diseases, including HIV.² At its worst, hunger often forces people into higher-risk situations; they may resort to migrant labor and transactional sex to survive, increasing the likelihood of their – and their community's

¹ United Nations, United Nations Development Program, Human Development Report 2006 (Gordonsville, VA: Palgrave Macmillan, 2006).

² Chandra RK, "Nutrition and the immune system: an introduction," *Am J Clin Nutr* 66 (1997): 460S-3S.

Photo: A woman tends to her household's homestead garden



– exposure to HIV.³ Food security can therefore be considered as much a public health measure as an individual one. In June 2006, the UN General Assembly convened for a high-level meeting on AIDS and committed itself to the issue of food security by: *Resolv[ing] to integrate food and nutritional support, with the goal that all people at all times, will have access to sufficient, safe, and nutritious foods to meet their dietary needs and food preferences for an active and healthy life, as part of a comprehensive response to HIV/AIDS.*⁴

Additionally, food security and nutrition play an important role in the care of people living with HIV/AIDS (PLWHA) and TB. For those receiving therapy, adequate consumption of a balanced diet ensures that medication is properly absorbed by the body. PLWHA who do not receive ART need good nutrition to prevent further erosion of their immune system and delay the need for costly therapy.⁵ Unfortunately, both food insecurity and HIV/AIDS affect low-income households, and food accessibility and availability are elusive for many PLWHA.

Recognizing that malnutrition and HIV/AIDS act synergistically, HKI undertook efforts to understand the magnitude and effects of food insecurity in households with PLWHA. Based on formative research conducted by HKI in 2004, HIV/AIDS-affected households reported that HIV/AIDS had decreased both their food production and consumption, and forced them to sell their belongings in order to purchase food and medicine.⁶ To address this situation, HKI expanded the HFPP in 2005 into

several vulnerable communities, including those affected by HIV/AIDS.

In May 2007, a final evaluation of the HFPP was conducted to determine its impact on vulnerable populations, specifically on the food security and nutritional status of the participating households. Because of the stigmatization associated with HIV/AIDS, this study targeted the whole high-risk community, including PLWHA, those with chronic diseases (such as TB and Hepatitis), and other vulnerable households (such as those with disabled individuals or orphans).

Evaluation methodology

HKI conducted a baseline survey in May 2005 and the endline survey was carried out after two years of intervention in May 2007. Both the baseline and endline surveys were conducted among 300 intervention and 200 control households, selected through multi-stage cluster sampling from 1400 total households in 35 villages according to the following criteria:

- Households with HIV/AIDS were treated as PLWHA

³ Dunkle K et al., "Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection," *Social Science & Medicine* 59 (2004): 1581-1592.

⁴ United Nations General Assembly, Draft Political Declaration – 2006 High Level Meeting on AIDS, 2006, United Nations, 9 Aug. 2007, < <http://www.un.org/ga/aidsmeeting2006/declaration.htm>>.

⁵ HIV/AIDS: A Guide for Nutritional Care and Support. 2nd Edition. Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington DC, 2004.

⁶ Helen Keller International - Cambodia, "Nutrition Bulletin: Serious food insecurity among people affected by HIV/AIDS in Cambodia to be addressed by Homestead Food Production," Volume 5, 2005.

Brief description of the Homestead Food Production Program (HFPP)

HKI has been implementing the HFPP in Bangladesh, Cambodia, Nepal and the Philippines since the late 1990s. Previous evaluations have shown that the program improves household food security by encouraging year-round production and consumption of nutritious foods. Further program benefits include increased food availability, improved food diversification, and income generation.⁷

HKI has been implementing the HFPP in 10 provinces in Cambodia since 1998. In 2005, HKI began implementing the program in five districts of Kompong Spue Province, in collaboration with two local NGOs (APCA and WOSO). HKI and its partners helped to establish 35 Village Model Gardens (VMGs), 20 Village Model Poultry Farms (VMPFs) and 1,400 HFP systems that included vegetables, fruits, animal husbandry and poultry in the high-risk communities. VMGs and VMPFs mainly provided agriculture inputs, on-site demonstrations and practical training for households. Each VMG and VMPF provided support to 30-40 households.

Project components included training in setting up gardens and poultry systems for year-round production; nutrition education; and sessions on reducing stigmatization associated with HIV/AIDS. The nutrition education sessions emphasized the importance for women to eat nutritious food during pregnancy and lactation, and to provide their children with nutritious food, including breastmilk and complementary foods. An emphasis was placed on the consumption of micronutrient rich-foods and the need for dietary diversity, with cooking demonstrations using locally-grown foods.

- In order to assess the affect of the presence of chronic disease in the household on young children's nutritional status, households with other chronic diseases (TB, Hepatitis, etc.) were required to have at least one child under five years of age living in the household to cover all the vulnerable groups
- Households with other vulnerable populations (disabled individuals and orphans *not* suffering from a chronic disease) were equally required to have at least one child under five years of age living in the household

Selected households from communities that participated in HFP (i.e. received nutrition education, input materials such as seeds and seedlings, and were exposed to best practices for farming through training) were identified as "Intervention" households. "Control" households were geographically separate from the intervention households in different villages and did not participate in HFP, but had similar demographic profiles as the intervention households as noted in the village registration books. The inclusion of a control group enabled HKI to take into account other social and economic factors outside of HFPP that may have influenced income and nutritional status during the

program period by comparing the change in intervention households from baseline to endline with the change in control households during the same period.

A pre-coded-structured questionnaire was used to collect data on food production, food consumption, income, and anthropometry measurements, along with health, nutrition and socio-economic indicators. Vitamin A intake was assessed among sub-samples by using the 24-VASQ (24-Vitamin A Semi-Quantitative) method. Confidentiality of all information has been maintained. Ethical consent for this study was granted by the National Ethics Committee.

Results

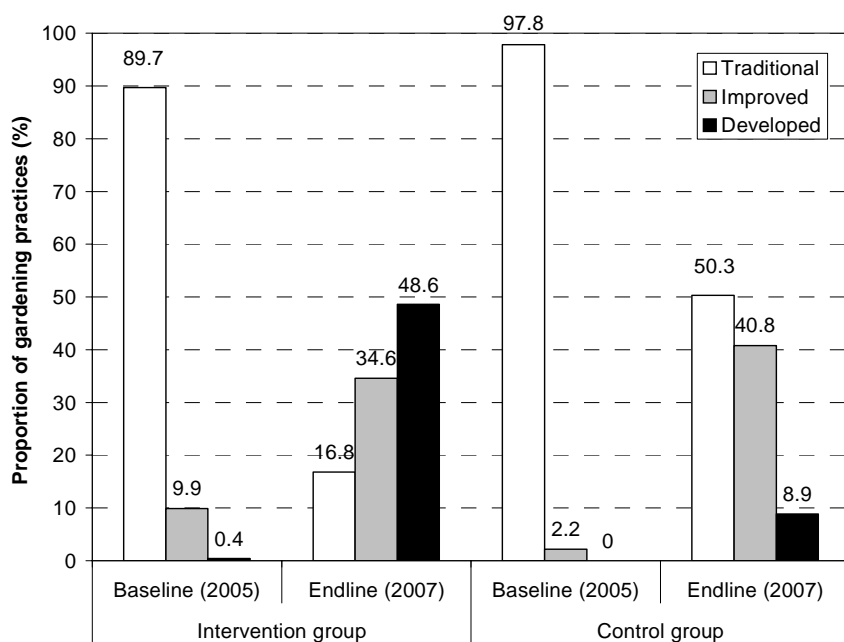
Availability and accessibility of micronutrient-rich foods

Based on their seasonal cultivation and the variety of crops raised in Cambodia, homestead gardens can be classified into three categories: traditional, improved, and developed.⁸ The majority of the homestead gardening practiced in Cambodia is traditional gardening. At baseline, almost 90% of the

⁷ Talukder A et al. (2000). Increasing the production and consumption of vitamin A-rich fruits and vegetables: Lessons learned in taking the Bangladesh homestead gardening programme to a national scale. Food and Nutrition Bulletin. United Nations University Press.

⁸ *Traditional gardens* are scattered plots that produce on a seasonal basis only gourds and a small selection of traditional vegetables. *Improved gardens* refer to those that produce a greater variety of crops on a fixed plot, but still only during certain seasons. *Developed gardens* are defined as fixed plot gardens that produce a wide variety of fruits and vegetables year-round.

Figure 1. Gardening practices during baseline and endline in intervention and control groups (n=300 for intervention and n=200 control group)



households in the intervention group cultivated traditional gardens. At endline, among this group, the proportion of households practicing traditional gardening significantly decreased to less than 17% (p value < 0.001). At the same time, the proportion of households cultivating either improved or developed gardens increased from 10.3% to 83.2% (p -value < 0.001). Homestead gardening practices changed in the same direction among households in the control group as well, but the changes were to a lesser extent (p value < 0.001) (See Figure 1).

Improved and developed gardens produce a greater variety of fruits and vegetables than traditional

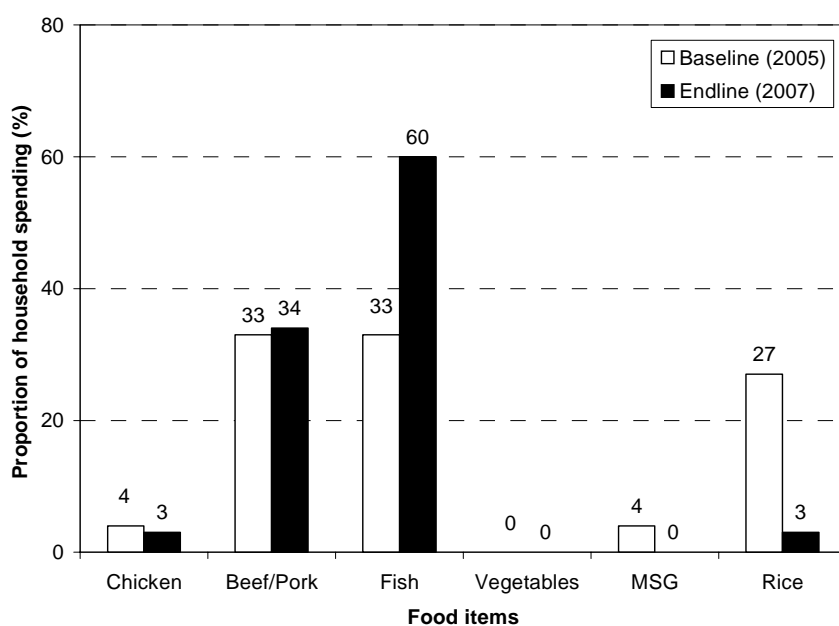
gardens. This is reflected by the greater diversity of vegetables produced by intervention households at post-intervention where the number of different vegetables grown was doubled (median at baseline and endline was 4 and 8 respectively) whereas it remained static in the control households (Table 1). The quantity of vegetables, fruit and eggs produced in intervention and control households also increased, but the increase was about double in the intervention households.

Income Generation and Utilization

Surplus produce from HFP is often sold in local markets, generating additional income for the family. Following the program intervention, the income generated from the selling of HFP produce over a three-month period reportedly increased from a median of R15,000 (US\$4) / household to a median of R70,000 (US\$18), an increase of \$14/month per household. In the case of the control group, median income slightly increased from \$5 to \$8.

The income generated from HFP activities was almost universally (91.7% of surveyed HHs) spent on food for the household. The type of foods purchased is presented in Figure 2.

Figure 2. Types of foods purchased with supplemental income



Endline survey results showed that fish was the most common food item purchased from additional income as 60% of households spent their additional income on fish. Thirty-four percent of the households spent their additional income on beef or pork. These good quality, nutritious foods are important to improve overall family nutrition. Some households also spent their additional income on nonfood items such as education, medicine, social activities, and reinvesting in food production activities (data not shown).

Table 1. Changes in food production (per household)

Variable	INTERVENTION GROUP			CONTROL GROUP		
	Baseline 2005 Median (Range)	Endline 2007 Median (Range)	P-value, Intervention group	Baseline 2005 Median (Range)	Endline 2007 Median (Range)	P-value, Control group
Varieties of vegetables produced in the last 3 months	4 (1-10)	8 (1-20)	<0.001	4 (1-10)	4 (1-20)	0.008
Amount of vegetables and fruits produced in the last month (kg)	16 (1-613)	50 (1-3004)	<0.001	15 (1-510)	26 (2-2004)	<0.001
Number of chickens produced in the last 6 months	20 (1-120)	23 (1-200)	0.308	18 (1-74)	20 (2-75)	0.83
Number of eggs produced in the last month	9 (0-50)	15 (1-57)	0.057	N.A.	N.A.	N.A.
Number of ducks produced in the last 6 months	10 (1-45)	10 (1-80)	0.246	10 (2-36)	10 (2-32)	0.098

Food Consumption/Dietary Vitamin A Intake

With regard to food consumption, at endline, the amount of fruits consumed in the last three days by the intervention households was 1.3kg higher than the amount of fruits consumed at baseline. A similar pattern was found for vegetable consumption where half of the households consumed 0.5kg more vegetables at endline than baseline. The number of eggs consumed among mothers and children under five years of age also increased. Two eggs were consumed per week by the mother and her under 5 children at baseline, whereas 3 eggs were consumed per week following the intervention. In the control group, there was no change in egg and vegetable consumption but a slightly increased consumption (0.5 kg) of fruit.

Vitamin A is an important micronutrient that is found in many natural foods. Baseline data showed that both women and children were consuming far less than the daily recommended allowance (RDA) of vitamin A, which is 500-800RE for women and 350RE for children under five respectively. Following

the intervention, despite their consumption still being below the RDA, women and children's intake of vitamin A had substantially increased in the intervention group from 143 to 373 RE in women (*p* value <0.001) and 78 to 171 RE in children (*p* value <0.001). In the control group, a positive increase was also seen (but less than intervention group), perhaps due to a general improvement in the economic situation in Cambodia during the period (Figure 3).

Health and Nutritional Status

Anthropometry measures were taken at baseline and endline among women of child-bearing age and children 12-23 months of age to assess the affect of HFP on nutritional status of vulnerable household members.⁹ In the intervention group, the prevalence of low BMI decreased from 36% to 22% among non-pregnant women. The prevalence of stunting among children 12-23 months of age in the intervention group only decreased slightly from 53% to 49%, although stunting increased by 6% in the control group during the same period.

⁹ A height-for-age Z-scores (HAZ) is a measure of linear growth, either length or height, that is compared to an international standard according to the age and gender of a child. Children with HAZ scores below 2 standard deviations from the reference are identified as having "stunted growth." While wasting suggests acute malnutrition, stunting is an indicator of chronic undernutrition. BMI is an important measurement in women of childbearing age, for thinness can prevent a woman from maintaining a healthy pregnancy or giving birth to a healthy child. Body-mass-index, or BMI, approximates a person's bodily health by measuring his or her weight adjusted for height. It is calculated by dividing the weight (in kg) by the square of the height (in meters).

Figure 4 shows the prevalence thinness among non-pregnant women and stunting among children aged 12-23 months at baseline and endline.

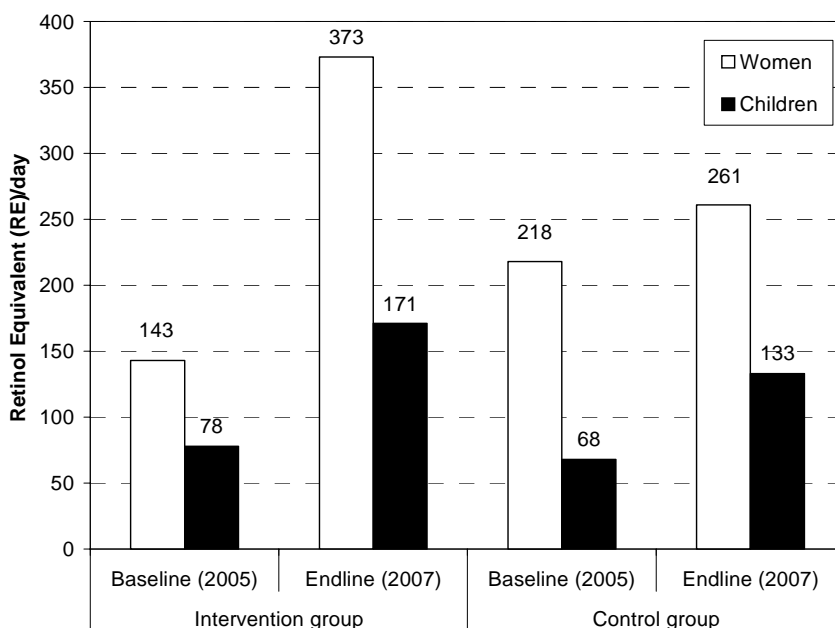
Conclusion

The HFPP seemed to improve food availability and accessibility among vulnerable households. The percentage of households managing improved or developed gardens significantly increased from 10.3% to 83.2%, which suggests that the program successfully transferred the understanding of appropriate homestead food techniques and nutrition awareness. In addition, the use of improved and developed gardens increased the variety of foods produced, including vitamin A rich foods, leading to an increase in micronutrient intake among vulnerable households.¹⁰ The income generated from the HFPP also increased household access to other high quality foods, such as fish, beef/pork, and eggs. This finding confirms previous studies on the effectiveness of HFP in alleviating both macro- and micro-nutrient deficiencies.⁷

While there is still an alarmingly high proportion of stunted children and thin women in the intervention and control groups, HFP and nutrition education appears to have had a positive affect in reducing the prevalence of these two conditions. As the BMI of women increases with the additional availability of food, it is expected that their ability to work and contribute to the well-being of the household will improve as well. The decrease in number of children who are stunted is an encouraging sign for the future as well. Chronically undernourished children are not only physically weaker than their healthier counterparts, but they are at an educational disadvantage as well. Malnourished children do not learn as well as well-fed children, and this can hamper their opportunities for employment and income generation in the future.¹¹

The HFPP results show that the program increased cultivation of improved gardens, food diversity and

Figure 3. Daily intake of vitamin A by women and children (6-59 months)



generated additional income. In addition, the results also suggest a likely positive impact on improving nutritional status among women and children and on increasing intake of vitamin A from food among the target population. However, further analysis is needed comparing the intervention and control groups to show statistically significant improvements in nutritional status in the intervention group. Although the results are very encouraging, we can not assess to what degree the change in nutritional status was due to the HFPP intervention as there may have been other influencing factors as well.

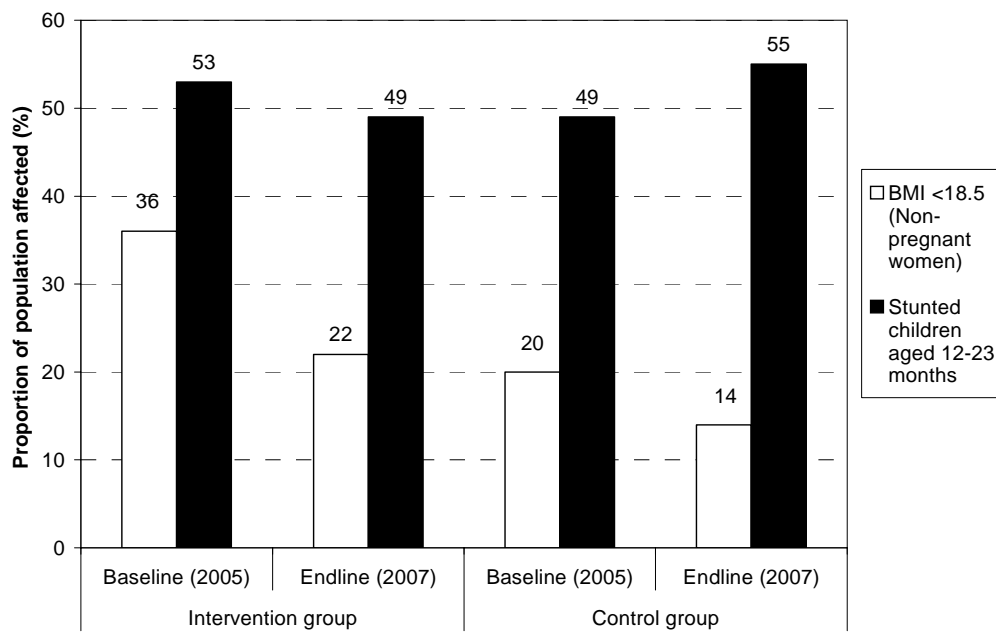
Nearly 92% of households reported spending the additional income on food, suggesting that HFP has the potential to increase household food security by enabling participants to afford a more diverse, nutritious, and plentiful diet. This is particularly important in the care of PLWHA, as HIV/AIDS increases the energy demands of those with the disease. (Table 2)

Fish, beef and pork are all rich in protein and micronutrients, but they are often inaccessible due to their high costs. However, through income generated from HFP, these food items were purchased more often at endline than at baseline, suggesting that HFP improves access to the fundamental building blocks of growth and development. As with PLWHA, a sustainable source

¹⁰ Vitamin A is especially important for growth and maintenance of healthy T and B cells (the two major cell types in the adaptive immune system), thus, vitamin A consumption is relevant and vital when caring for vulnerable individuals.

¹¹ United Nations, World Food Programme, World Hunger Series 2006 : Hunger and Learning (Italy: 2006).

Figure 4. Prevalence of thinness among non-pregnant women and stunting among children aged 12-23 months at baseline and endline



of these nutrients is especially important for the healthy growth of children living in all vulnerable households. Based on the recorded increases in the consumption of healthy foods, HFP is believed to at least partly improve the amount of metabolic energy available to PLWHA.

The benefits of HFP, however, are not limited to increased food production or consumption. While these are significant indicators of the program’s success, they fail to capture the additional benefit of income generation and greater economic freedom. In vulnerable households, a chronic disease such as HIV/AIDS may debilitate the family breadwinner, depriving the household of labor, skills, and income. Caring for those who are ill or disabled may require the time and attention of other members of the household, who are then less free to work themselves. Earnings earmarked for food are diverted to the purchase of costly medicines. Ultimately, the care of vulnerable people erodes the household’s income, leaving them increasingly vulnerable to food insecurity, malnutrition and illness. HFP-generated

income may reasonably replace the earnings that are lost.

While HFP cannot negate the difficulties caused by illness or disability, the nutritional benefits of the program suggest that it is nonetheless an important contributor to the well-being of at-risk households.

Table 2. Energy Requirements for Adults and Adolescents, and Children with HIV/AIDS¹²

Population	Increase in energy requirements ¹³
<i>Adults and Adolescents</i>	
Asymptomatic ¹⁴	10%
Symptomatic	20-30%
<i>Children</i>	
Asymptomatic	10%
Symptomatic with severe weight loss	50-100%

¹² World Health Organization (2003). WHO Technical Consultation on Nutrient Requirements for People Living with HIV/AIDS. Geneva, Switzerland: WHO.

¹³ Increase above non-HIV infected individuals of the same age, sex and physical activity level

¹⁴ According to the WHO Clinical Classification for HIV, “asymptomatic” implies no indication of illness other than a persistent swelling of the lymph nodes (small beads of tissue of the immune system). In asymptomatic individuals, it is not possible to tell by their appearance that they have HIV. “Symptomatic” refers to other physical manifestations of HIV, including weight loss, being bedridden, unexplained chronic fever and/or diarrhea, and in the later stages, an infection with an opportunistic infection (i.e – candidiasis, extrapulmonary TB). For a more complete list, see *WHO Case Definitions of HIV for Surveillance and Revised Clinical Staging and Immunological Classification of HIV-Related Disease in Adults and Children*, <<http://www.who.int/hiv/pub/guidelines/HIVstaging150307.pdf>>.

Recommendations

In light of the program's proven and multifaceted benefits, we recommend that HFPP, coupled with targeted nutrition education, be expanded to more vulnerable communities to improve their access to and consumption of high-quality micronutrient-rich foods. Specifically, we recommend the following actions:

1. Continue targeting vulnerable households for inclusion in the HFPP, especially PLWHA. These households have increased demand for nutritious foods.
2. Identify partner organizations to integrate HFPP with existing home-based care and support program for PLWHA.
3. Revitalize efforts to improve women's nutritional status. HFPP should be coupled with the national vitamin A supplementation effort to ensure women receive vitamin A capsules post-partum. Nutrition education should include the promotion of iron supplements for women and increased consumption of high-quality micronutrient-rich foods during critical periods.
4. Ensure that nutrition education promotes the knowledge that animal food sources are valuable sources of macro- and micronutrients.
5. Considering that HFPP is also a strategy for reducing poverty, increasing food security, diversifying the diet, and empowering women, expand the program to other areas.

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