



International Journal of Agricultural Sustainability

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tags20>

Strengthening capacity for sustainable livelihoods and food security through urban agriculture among HIV and AIDS affected households in Nakuru, Kenya

N. Karanja^a, F. Yeudall^b, S. Mbugua^c, M. Njenga^a, G. Prain^d, D. C. Cole^e, A. L. Webb^f, D. Sellen^g, C. Gore^h & J. M. Levyⁱ

^a Urban Harvest/CIP SSA, P.O. Box 25171-00630, Nairobi, Kenya

^b Ryerson University, School of Nutrition and Centre for Studies in Food Security, 350 Victoria Street, Toronto, ON, M5B 2K3, Canada

^c Egerton University, Department of Human Nutrition, P.O. Box 536-20115, Egerton, Njoro, Kenya

^d Urban Harvest/CIP, Apartado Postal 1558, Lima 12, Peru

^e University of Toronto, Dalla Lana School of Public Health, Department of Public Health Sciences, Health Sciences Building, 155 College Street, Toronto, ON, M5T 3M7, Canada

^f Hubert Department of Global Health, Rollins School of Public Health, Emory university, Atlanta, GA

^g Dalla Lana School of Public Health and Department of Anthropology, University of Toronto and Department of Nutritional Sciences, University of Toronto, Toronto, ON, M5S 2S2, Canada

^h Ryerson University, Department of Politics and Public Administration and Centre for Studies in Food Security, 350 Victoria Street, Toronto, ON, M5B 2K3, Canada

ⁱ University of Toronto, Department of Anthropology, 19 Russell Street, Toronto, ON, M5S 2S2, Canada

Published online: 08 Jun 2011.

To cite this article: N. Karanja, F. Yeudall, S. Mbugua, M. Njenga, G. Prain, D. C. Cole, A. L. Webb, D. Sellen, C. Gore & J. M. Levy (2010) Strengthening capacity for sustainable livelihoods and food security through urban agriculture among HIV and AIDS affected households in Nakuru, Kenya, *International Journal of Agricultural Sustainability*, 8:1-2, 40-53

To link to this article: <http://dx.doi.org/10.3763/ijas.2009.0481>

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

Strengthening capacity for sustainable livelihoods and food security through urban agriculture among HIV and AIDS affected households in Nakuru, Kenya

N. Karanja¹, F. Yeudall^{2*}, S. Mbugua³, M. Njenga¹, G. Prain⁴, D. C. Cole⁵, A. L. Webb⁶, D. Sellen⁷, C. Gore⁸ and J. M. Levy⁹

¹ Urban Harvest/CIP SSA, P.O. Box 25171-00630, Nairobi, Kenya

² Ryerson University, School of Nutrition and Centre for Studies in Food Security, 350 Victoria Street, Toronto, ON M5B 2K3, Canada

³ Egerton University, Department of Human Nutrition, P.O. Box 536-20115, Egerton, Njoro, Kenya

⁴ Urban Harvest/CIP, Apartado Postal 1558, Lima 12, Peru

⁵ University of Toronto, Dalla Lana School of Public Health, Department of Public Health Sciences, Health Sciences Building, 155 College Street, Toronto, ON M5T 3M7, Canada

⁶ Hubert Department of Global Health, Rollins School of Public Health, Emory university, Atlanta, GA

⁷ Dalla Lana School of Public Health and Department of Anthropology, University of Toronto and Department of Nutritional Sciences, University of Toronto, Toronto, ON M5S 2S2, Canada

⁸ Ryerson University, Department of Politics and Public Administration and Centre for Studies in Food Security, 350 Victoria Street, Toronto, ON M5B 2K3, Canada

⁹ University of Toronto, Department of Anthropology, 19 Russell Street, Toronto, ON M5S 2S2, Canada

The promotion and support of urban agriculture (UA) has the potential to contribute to efforts to address pressing challenges of poverty, under nutrition and sustainability among vulnerable populations in the growing cities of sub-Saharan Africa (SSA). This may be especially relevant for HIV/AIDS-affected individuals in SSA whose agricultural livelihoods are severely disrupted by the devastating effects of the disease on physical productivity and nutritional well-being. This paper outlines the process involved in the conception, design and implementation of a project to strengthen technical, environmental, financial and social capacity for UA among HIV-affected households in Nakuru, Kenya. Key lessons learned are also discussed. The first has been the value of multi-stakeholder partnerships, representing a broad range of relevant experience, knowledge and perspectives in order to address the complex set of issues facing agriculture for social purposes in urban settings. A second is the key role of self-help group organizations, and the securing of institutional commitments to support farming by vulnerable persons affected by HIV/AIDS is also apparent. Finally, the usefulness of evaluative tools using mixed methods to monitor progress towards goals and identify supports and barriers to success are highlighted.

Keywords: agriculture; food security; HIV/AIDS; livelihoods; peri-urban; urban

Introduction

Rapid urbanization, unemployment and poverty have led to an increasing dependence by the urban poor on urban agriculture (UA) as a key livelihood strategy (Rakodi and Lloyd-Jones, 2002; Maxwell, 1995; Maxwell *et al.*, 1999; Cole *et al.*, 2008b; Prain *et al.*, forthcoming). Agricultural food production by the

urban poor can enhance food security, provide additional income, and reduce vulnerability to economic shocks, environmental degradation and chronic instability in access to basic resources (Maxwell, 1995; Dennery, 1996; Cole *et al.*, 2008b; Prain *et al.*, forthcoming). In sub-Saharan Africa (SSA), it is projected that by 2015 half of the population will be living in urban centres and that poverty will move

*Corresponding author. Email: fyeudall@ryerson.ca

increasingly from rural to urban areas (Cohen, 2004). These changes come at a time when the social dimension of agricultural production and sustainability is being re-emphasized and popular attention to food security has been heightened following the dramatic rise in world food prices in 2008 (Lyson, 2004; Swaans *et al.*, 2006; Bawden, 2007; Pralle, 2008).

The capability of a household to produce, consume and sell food depends on the complement of 'assets' or forms of capital at its disposal (Bebbington, 1999; Prain *et al.*, forthcoming). Such assets include access to land for food production, equipment and seeds to cultivate, human health and knowledge to enable people to tend and produce crops, and a supportive set of social relations. Households also need to be free from social, institutional, legal or political barriers to food production and marketing. Securing assets and achieving support from institutions is particularly challenging for poor urban households affected by HIV/AIDS (Loevinsohn and Gillespie, 2003; Swaans *et al.*, 2006). Persons living with HIV/AIDS (PLWHA) in resource-limited settings often lack access to the foods required for optimal food and nutrition while on antiretroviral therapy (Castleman *et al.*, 2003), yet often lack the energy to engage with institutions or obtain assets to produce such foods. Hence, potential negative relationships between HIV/AIDS and food and nutrition security are mediated through livelihoods (Gillespie and Kadiyala, 2005; Masaria, 2007). Participatory and interdisciplinary strategies to mitigate the impact of HIV/AIDS on livelihoods, food security and agricultural sustainability remain underdeveloped though promising (Swaans *et al.*, 2006, 2009; Panagides *et al.*, 2007; AED, 2008). Strategies must include interventions to reduce vulnerability to economic shocks, environmental degradation and stochasticity in resource access due to a range of insults that may originate at the global, national, regional, community or household level (Loevinsohn and Gillespie, 2003).

Here we describe the development and implementation of an international collaborative project to strengthen agricultural sustainability, social assets, food security and livelihoods among HIV/AIDS-affected households in the city of Nakuru, Kenya. The project came to be called SEHTUA for 'Sustainable Environments and Health Through Urban Agriculture'. We drew on documents and project notes, reports, monitoring and evaluation activities and meeting minutes to set out a timeline using RAPID methods (www.odi.org.uk/RAPID/), similar to that described in a case study in Kampala (Hooton *et al.*, 2007). Figure 1 summarizes key external events, policy activities, research and

capacity building, partnerships and funding, since 2003. The accompanying narrative provides context and additional information.

Origins of SEHTUA

Urban Harvest

The Consultative Group on International Agricultural Research (CGIAR)'s system-wide programme on urban and peri-urban agriculture, Urban Harvest (UH), is hosted by the International Potato Centre (CIP). System-wide programmes seek to catalyse sharing of disciplinary skills in different international and national research organizations in collaborative efforts with other stakeholders. Urban Harvest is the only system-wide programme addressing the reduction of food insecurity and poverty in urban and peri-urban areas through more sustainable agriculture and improved natural resource management.¹ Urban Harvest's research for development strategy has been organizationally collaborative, interdisciplinarily constituted and action-research oriented. Such characteristics resonate strongly with recent thinking in urban governance and UA and is in keeping with the newer approaches to food security among those affected by HIV/AIDS (McCarney and Stren, 2003; Gillespie and Kadiyala, 2005; Prain, 2006; Swaans *et al.*, 2009).

Project setting

Nakuru is Kenya's fourth largest municipality with a population of 302,784 (CBS *et al.*, 2004). In line with earlier findings in six Kenyan towns (Lee-Smith *et al.*, 1987), 35 per cent of Nakuru households farmed in town, 27 per cent grew crops and 20 per cent kept livestock (some doing both, hence sum >35 per cent) (Foeken and Owuor, 2000; Foeken, 2006). Common crops in Nakuru include maize, kale (*sukuma wiki*), beans, onions, spinach, tomatoes and Irish potatoes, while chicken, cattle, goats, ducks and sheep are common livestock (Foeken, 2006). Approximately 40 per cent of Nakuru residents are affected by poverty which limits their capacity to engage in UA (Kiarie, 2009). Poorer segments of the urban population (who have less access to land) are often less well represented among urban farmers than those who are better off, a trend particularly true for livestock keepers (Tevera, 1996; Mukisira, 2005). Indeed, a recent survey of mixed crop-livestock farmers observed a much higher rate of home ownership supporting a relationship between wealth and livestock farming in Nakuru (Karanja *et al.*, forthcoming).

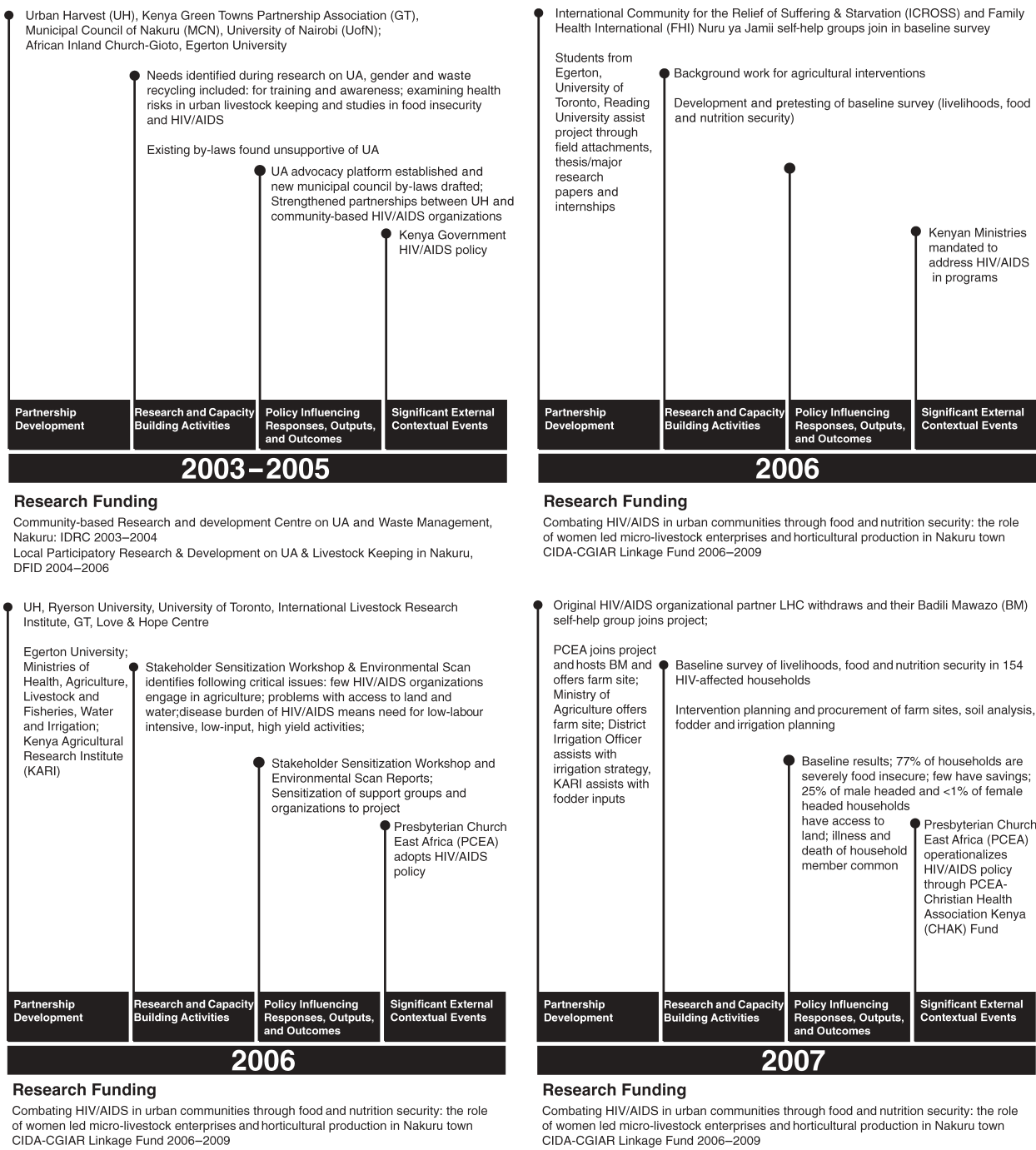
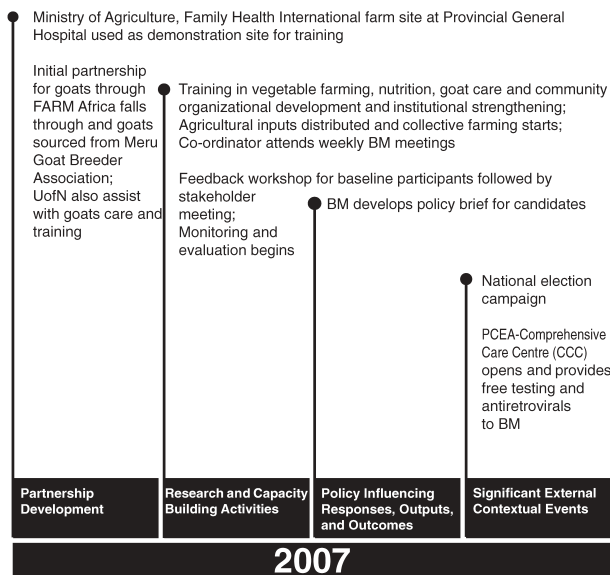


Figure 1 | Process of development and implementation of the Sustainable Environments, Health and Urban Agriculture Project (SEHTUA)

Early Urban Harvest collaborations

In 2004, UH partnered with the Municipal Council of Nakuru (MCN) and affiliated local groups to conduct a series of studies aimed at sustainable integration of urban solid waste with UA systems. *Community*

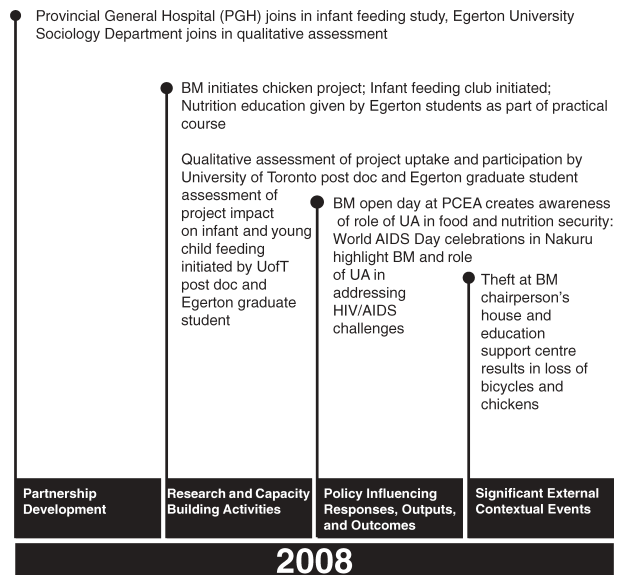
Based Research and Development Centre on Urban Agriculture and Waste Management in Nakuru was carried out by Kenya Green Towns Partnership Association (Green Towns) and UH to address the issue of waste recovery and recycling for income,



Research Funding

Combating HIV/AIDS in urban communities through food and nutrition security: the role of women led micro-livestock enterprises and horticultural production in Nakuru town CIDA-CGIAR Linkage Fund 2006–2009

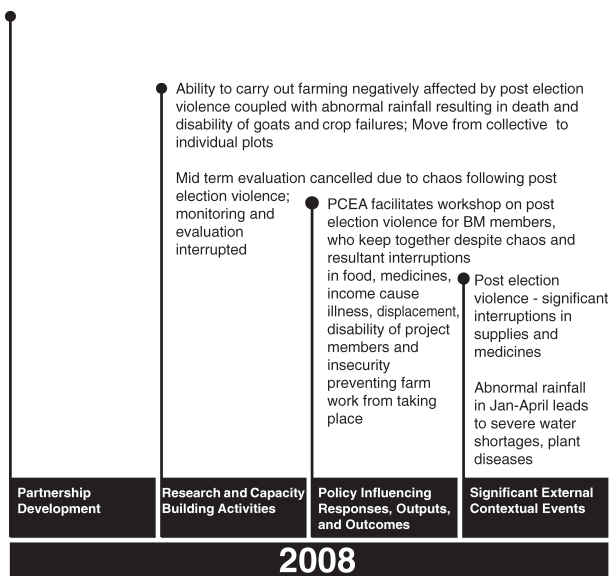
In-kind support from UoT based computing and software analysis facilities from Canada Research Chairs program, Ontario Innovation Trust and Canadian Foundation for Innovation



Research Funding

Combating HIV/AIDS in urban communities through food and nutrition security: the role of women led micro-livestock enterprises and horticultural production in Nakuru town CIDA-CGIAR Linkage Fund 2006–2009

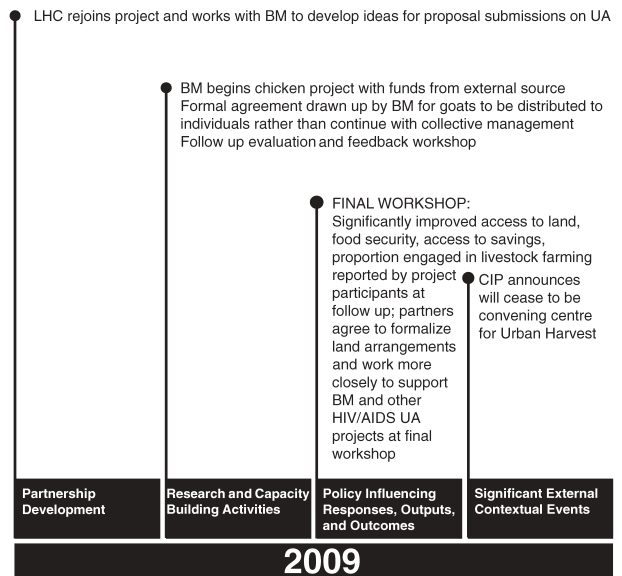
Two Canadian post doctoral fellows partially fund work from Canadian Institutes for Health Research fellowship grants



Research Funding

Combating HIV/AIDS in urban communities through food and nutrition security: the role of women led micro-livestock enterprises and horticultural production in Nakuru town CIDA-CGIAR Linkage Fund 2006–2009

BM receives grant from Scotland Faith Based Organization (FBO) to fund development of education and support centre (BMGCHI); BM purchases land and begins construction of centre



Research Funding

Combating HIV/AIDS in urban communities through food and nutrition security: the role of women led micro-livestock enterprises and horticultural production in Nakuru town CIDA-CGIAR Linkage Fund 2006–2009

BM receives grant from Canadian FBO to fund chicken project at BMGCHI site

Figure 1 | *Continued*

employment, food security and environmental quality. This project involved a preliminary health hazard assessment study, conducted by the Department of

Land Resource Management and Agricultural Technology, University of Nairobi. Meetings were held with active waste recycling groups, faith-based

organizations, NGOs, development partners, government departments, the MCN, and individual urban farmers. During stakeholder meetings involving the MCN, the Director of the Environment indicated that there was no support for UA in Nakuru's current environmental by-laws.

Urban farmers selected to participate in project training courses identified the need for research on urban organic waste, including livestock manure recycling and re-use. Hence, *Local Participatory Research and Development on Urban Agriculture and Livestock Keeping in Nakuru* was developed by the same group of partners to assist urban farmers and youth groups involved in waste recycling to improve their livelihoods and contribute to urban food security. Drawing on experience in another project in Nairobi, UH was able to share expertise in organic waste management and assist the process of reviewing municipal environmental by-laws (Njenga *et al.*, forthcoming).

Focus on HIV/AIDS-affected families

The Rift Valley provincial HIV prevalence stands at 7 per cent, higher than the national adult prevalence rate of 5.1 per cent. Women are disproportionately affected: 8.7 vs. 4.6 per cent among men nationally (NASCOP, 2008). In keeping with the Kenya National HIV/AIDS Strategic Plan (NASCOP, 2003), efforts to mitigate the impact of the pandemic on vulnerable households through an agricultural and nutrition for health project were deemed highly desirable. Building on UA–health linkages in the SSA region work in Kampala in particular (Cole *et al.*, 2008b), co-hosting an IDRC sponsored regional workshop on UA and health (Boischio *et al.*, 2006) and ongoing collaborative work with the University of Nairobi, UH and partners obtained funding in early 2006 from the Canadian International Development Agency CGIAR-CANADA Linkage Fund. Additional funding for SEHTUA was gleaned through research support to post-doctoral students from the Canadian Institutes for Health Research and the Canada Research Chairs programme.

SEHTUA aim and objectives

The aim of SEHTUA was to strengthen understanding of the links between agricultural sustainability and HIV/AIDS through an investigation of the potential of UA to mitigate the negative livelihood and food security effects of HIV/AIDS on households. Given the multidimensional, multilevel and multi-sectoral nature of the impact of HIV/AIDS on individuals, households and communities, SEHTUA

adopted an integrated approach with the following objectives:

1. Determine the role of crop and livestock production in urban livelihoods of HIV/AIDS-affected households;
2. Assess pathways by which crop and livestock production impact on food and nutrition security of HIV/AIDS-affected households;
3. Develop and evaluate strategies to improve livelihoods and food and nutrition security of HIV/AIDS-affected households, including through small livestock and horticultural production systems and dietary diversification and modification activities;
4. Enhance the capacity of local authorities and caregivers in food and nutrition security approaches in relation to HIV/AIDS-affected communities; and
5. Identify policy constraints and needs for strengthening livelihoods, food and nutrition security and social inclusion of HIV/AIDS-affected households.

SEHTUA partners and organization

Sensitization workshop

In keeping with the participatory nature of the project, the first major milestone was a sensitization workshop for stakeholders in mid-2006. The diverse set of stakeholders (see Table 1) included households, community organizations, community leaders, university researchers, international organizations, and local, provincial and national government officials. Working group discussions included (i) suitable agricultural technologies and interventions; (ii) potential stakeholders and mechanisms for involvement; and (iii) food and nutrition security issues of households with young children. Participants identified several challenges to practising urban agriculture for PLWHA and discussed potential mechanisms for overcoming them (SEHTUA, 2006).

Research institute, academic and agency partners

Urban Harvest provided overall project leadership. The Nairobi-based International Livestock Research Institute (ILRI) backstopped livestock studies. The Toronto-based Canadian universities Ryerson University and University of Toronto were responsible for leading livelihood, food and nutrition security studies. MCN oversaw HIV/AIDS national policy implementation within the district, Love and Hope Centre (LHC), a faith-based organizational partner working with PLWHA, provided contact with HIV/AIDS-affected persons

Table 1 | Stakeholder organizations attending sensitization workshop by sector

Sector	Organization
Self-help groups	Jamii Orphan Group Semeria Self-Help Group Together Hands Craft Self-Help Group Upendo Mpya Self-Help Group
Community-based organizations	AIC Rehabilitation Centre Catholic Diocese of Nakuru Kenya Green Towns Partnership Association Netreach Tumaini na Fadhili
Government	Kenya Agricultural Research Institute (KARI) Njoro Ministry of Agriculture Ministry of Health and Social Services Ministry of Livestock & Fisheries Development Ministry of Water and Irrigation Nakuru Municipal Council – Environment Nakuru Municipal Council – Public Health
Academic and research organizations	CIP Urban Harvest Egerton University International Livestock Research Institute (ILRI) Ryerson University University of Nairobi University of Toronto

participating in support groups, while Green Towns supported community organizational development and leadership training. At the initiation of the project, LHC was focused on awareness creation regarding prevention of spread of HIV/AIDS through training and did not consider livelihood empowerment an urgent matter. Livelihood activities of BM described in the following section, for example, were undertaken quite independently of LHC. The organization was more involved in emergency food distribution than livelihoods and withdrew from the project in December 2007. However, towards the end of the project LHC accepted that they had underrated the need for empowering beneficiaries to support themselves instead of relying on handouts, and offered to work with the project beneficiaries.

In keeping with SEHTUA's commitment to knowledge transfer and capacity building, Egerton University,

the University of Nairobi and the Dairy Goat Breeders Association of Kenya, Nakuru Chapter, joined the team. They provided expertise in animal and human nutrition, gender and group dynamics, livestock–crop interactions, animal health and animal health–environment interactions. The Kenyan and Canadian universities also facilitated access to graduate and undergraduate students to work on distinct aspects of SEHTUA.

Numerous government partners were also important. The Ministries of Agriculture, Livestock and Fisheries Development, and Health and Social Services were crucial in supporting the agricultural and health components respectively. Initial linkages with the MCN on environment-relevant UA policy issues were extended to include the Department of Public Health, a leader in HIV/AIDS prevention and monitoring in conjunction with the National AIDS Control Council (NACC).

Community-based partners

Love and Hope Centre identified the Badili Mawazo Self Help Group (BM) as a group with which to work. Originally affiliated with LHC, BM is an HIV/AIDS psychosocial and welfare development group for PLWHA; the group officially registered as an independent Community Based Organization with the Ministry of Social Services in March 2006. Shortly thereafter, BM partnered with the Presbyterian Church of East Africa (PCEA), Nakuru West Parish, which provided meeting space and other supports. In the words of their founding chairperson:

The formation of Badili Mawazo was necessitated by the need of PLWHA to come together to help fight stigma and discrimination and form a welfare group through which they can collectively undertake income generating activities to help raise the living standards of its members and their families, who for half of the members also include orphans. This is important as some members lost their previous jobs due to HIV/AIDS, while the majority continue to make their living in the informal sector through precarious and unreliable small businesses (Badili Mawazo, 2008).

To this end they actively participate in skills training and seek partnerships to help households develop diverse and robust livelihood strategies. Since its inception, multiple livelihoods initiatives (besides crops and goat production described subsequently) have been pursued independently of the SEHTUA project, as summarized in Table 2.

The diversity of BM's initiatives combined with the training and support from SEHTUA, represent the

Table 2 | Overview of non-SEHTUA Badili Mawazo livelihood activities

Livelihood activities	Partnerships for implementation
Bead jewellery making and bag weaving	
Bakery project (cakes and mandazi)	
Chicken farming	UNGA Farms, group savings and donations from faith-based organizations in Scotland and Canada
Micro-finance	Kenya Rural Enterprise Program (K-REP)
Soya producing, processing and other food processing at cottage industry level	
Wool spinning	Kenya AIDS NGO Consortium (KANCO)

acquisition of important assets that have contributed to the resilience of the group and its members. BM has been able to survive shocks including: the violence following the December 2007 elections which saw some of their members displaced and others struggle with access to health care and supplies of food and medicines; repeated theft of assets; and crop and livestock failure. Through contacts with local groups (such as ROCK-Bridge Ministries Kenya), partner agencies and visiting scientists and students working with the project, the group purchased a parcel of land to build the Badili Mawazo Greenbank Centre for Hope and Innovation (BMGCHI). The Centre currently includes a meeting house, caretaker house, pit latrine, chicken house and fencing, in addition to room for vegetable gardening and other micro livestock raising initiatives. Several funding proposals have been submitted by the group to both local (Constituency AIDS Control Council – Global fund 2009 and National AIDS Control Council – Total War on AIDS 2009) and international (Stephen Lewis Foundation) organizations.

BM’s involvement in chicken farming is indicative of its ability to mobilize multiple supports, and to adapt and apply lessons learned. The original chicken project was funded by a donation from UNGA Farms (a local feed company) to purchase exotic layers as a source of food and potential income through the sale of eggs. After the donation of feed ran out, BM determined that it would not be economically viable to

continue and decided to sell the chickens, bank the money and later start afresh with indigenous chickens. As of the writing of this manuscript, 43 households currently benefit from indigenous chicken production and expansion to additional households is planned.

Organization of SEHTUA

Urban Harvest and Ryerson University as co-principle investigators, plus senior scientists from ILRI and University of Toronto, held meetings at the beginning of the project in Kenya and Canada to agree on respective roles. Initially it was felt that the local co-ordinator for the project should be linked to MCN, to ensure integration of the project in local government. However, the complexity of research for development necessitated a more research-oriented person, so a co-ordinator from Egerton University was hired and a co-ordinating office established in Nakuru in September 2006. SEHTUA management adhered to many of the principles and guidelines for interactive approaches in agriculture innovation in the context of HIV/AIDS proposed by Swaans and colleagues (2006, 2009). In line with the ‘farmer first’ approach of UH and CGIAR (Scoones and Thompson, 2009), this included a commitment to coalition and capacity building, reflecting respect for local knowledge and different disciplinary backgrounds. Personal commitment on the part of SEHTUA personnel reflected their attachment to BM members and a shared vision of UA for sustainable livelihoods and health.

Engagement of BM executive committee members in decision making around SEHTUA activities strengthened both BM and SEHTUA implementation. On the other hand, when mistrust among BM members was detected, SEHTUA called upon Green Towns to work with UH on Community Organizational Development and Institutional Strengthening (CODIS) training. The training enhanced BM project management, leadership, gender sensitivity and conflict resolution skills, leading to greater stability and organizational growth and increased the competitive ability of some members who were able to take up formal employment.

A commitment to an iterative SEHTUA implementation process allowed flexibility in management team participation and accommodated change in both personal circumstances (maternity leave of a co-principle investigator) and organizational priorities. The project was completed on target despite some significant changes in the policy and funding environment that occurred during the last year of the project. During 2008, as part of a reorganization of the CGIAR, its new visioning document paid very little attention to

the impact of urban growth and migration on the levels and location of poverty and rural agriculture and none to agriculture as a food security strategy of the urban poor (CGIAR, 2008). As a result of a reformulation and narrowing of its own research strategy, CIP removed research for development on urban and peri-urban agricultural systems from its research agenda and indicated that it would cease to convene Urban Harvest from 2010 (CIP, 2009). This left the SEHTUA project outside the research priorities of both entities, creating a new funding challenge for going to scale with this project.

SEHTUA implementation

Baseline survey

To better understand the current situation and household practices, a baseline survey generated information on agricultural practices, livelihoods and food and nutrition security of HIV/AIDS-affected households. Agricultural practice questions were based on earlier UH work in Kenya and internationally. Livelihood security adopted the Sustainable Livelihoods Approach, amplified to include outcome measures of age-specific mortality and child illness (de Haan *et al.*, 2002; Andersen *et al.*, 2008). Food security status was assessed using the FANTA Household Food Insecurity Access Scale (Coates *et al.*, 2006) and the household diet diversity scale. Nutrition security was assessed through the dietary intake (via 24-hour recall) and anthropometric measures (weight, height, mid-upper arm circumference, triceps skin-fold measure) of an index child between the ages of 2 and 5 years in the household (Mbugua *et al.*, 2008b).

Participants were drawn from the three main HIV/AIDS support organizations in Nakuru, namely: Catholic Diocese of Nakuru (LHC), ICROSS (International Community for the Relief of Suffering and Starvation), and Family Health International (FHI) Nuru ya Jamii group. The study covered 11 out of the 15 administrative wards in the municipality (Kaptembwo, Shabab, Rhonda, Shauri Yako, Langa Langa, Lake View, Bondeni, Kivumbini, Menengai, and Nakuru East). Exclusion criteria included a household with a child who was very sickly based on current or chronic illness, as this could confound the nutrition security indicators of the household. Recruitment issues were addressed jointly by Love and Hope Centre, Badili Mawazo Executive Committee, the MCN's Public Health Department's HIV/AIDS section which houses the Constituency AIDS Control Committee (CACC) and assisted in linking with ICROSS, and Family Health International based self-help groups.

Results of the baseline survey have been reported elsewhere (Andersen *et al.*, 2008; Cole *et al.*, 2008a; Mbugua *et al.*, 2008b). Briefly, participating households commonly experienced severe food shortage and food insecurity (77 per cent), eviction (37 per cent), hospitalization (34 per cent), job loss (26 per cent), and/or death of an adult (17 per cent). Female-headed households (45.2 per cent of sample) reported more crises (mean 2.83; 95 per cent; CI 2.52–3.13) compared to male headed households (mean 2.10; 95 per cent; CI 1.80–2.40), more illness over the last month (67.1 vs. 57.1 per cent), greater perceived lack of medical care (50 vs. 40 per cent) and less access to land for farming (22.9 vs. 44.7 per cent). The gender differences observed reinforced the focus on inclusion of women in project activities and prompted a gender analysis described in detail elsewhere (Njenga *et al.*, 2009b).

Mean household dietary diversity score in terms of food groups was 8.1 out of a maximum of 15, and was negatively correlated with food insecurity. In terms of frequency of consumption, plant-based foods were generally consumed more frequently than animal source foods (a better source of highly bio-available micronutrients), with the exception of dairy products. Non-vitamin A-rich vegetables were consumed more frequently than Vitamin A-rich and other fruits, although oils and fats (which are required for plant-based sources of vitamin A to be absorbed efficiently) were consumed by almost all participants. Prevalence of stunting (HAZ < -2SD) and underweight (WAZ < -2SD) was 33.1 and 26.0 per cent, respectively, higher than the national average in the most recent national demographic survey (30.6 and 19.1 per cent respectively; CBS *et al.*, 2004).

Agricultural interventions and nutrition education

Given limited access to land, the project engaged partners (PCEA and the Ministry of Agriculture) to access adequate land. In addition, the project rented an urban parcel of land. Details of each agricultural intervention are described in more detail elsewhere (Njenga *et al.*, 2009b) and are described briefly below. The National AIDS Control Council advocates a three-pronged approach to optimize nutritional outcomes among PLWHA, including medical nutritional therapy, assurance of food and nutrition security, and nutrition education. Final year nutrition undergraduate students from Egerton University conducted the first nutrition training; content was based on the five themes proposed in the Kenyan National Guidelines on Nutrition

and HIV/AIDS. These included the importance of good nutrition, living positively, infection control and food safety, fighting illness through diet, and infant and maternal nutrition in HIV/AIDS (NASCOP, 2006). Subsequent education sessions were provided by the nutritionists from the Provincial General Hospital – Comprehensive Care Centres.

Urban agriculture: horticulture

Eighty households participating in the intervention were divided into two clusters, namely those with and those without their own farming space. Prior to the introduction of the vegetables, participants were trained on vegetable production, utilization and marketing by the agricultural officer in charge of the municipality. Consultations were held between the District Irrigation Officer and the SEHTUA team regarding crop husbandry and irrigating approaches for the vegetable plots. Although one aim was to re-introduce African indigenous vegetables, in keeping with the participatory methodology, participants also chose to grow exotic vegetables. Vegetables grown therefore included: black nightshade, cowpeas, spider plant, amaranthus, and bush okra as well as kales/collards, spinach, cucumber, carrots, onions and beetroots. Inputs for vegetable growing included certified seed from the World Vegetable Centre, fertilizer, manure and implements, together with labour for initial land preparation. Water supply was a challenge, particularly for one larger farm, where irrigation was not available for many crop cycles, reducing yields.

Monitoring and evaluation was implemented to assess participation, use of vegetables and profitability. A qualitative assessment of participants’ and former participants’ experiences of the intervention was led by a Canadian post doc paired with a Kenyan graduate student. Fifty-two individual semi-structured interviews included current participants (n = 26) and former participants who could be located and were willing to participate (n = 26). Examples of some typical experiences voiced by participants are provided in Table 3. Participation in farm labour was often difficult due to illness among PLWHA and the considerable distance of some farms from participants’ living quarters. Poverty among BM members posed a challenge, as agricultural work not directly related to a harvest had a high opportunity cost. For example, people would have to forgo other livelihood activities such as informal selling, in order to go to the farm. In terms of vegetable use, household consumption by participants was important, as was sharing with family and other BM members and sale to neighbours and others, as a source of income. For profitability, a gross margin analysis

Table 3 | **Participants’ stories**

Jane*	<ul style="list-style-type: none">• A 40-year-old mother of six, once a second-hand clothes dealer.• Diagnosed as HIV-positive 2 years ago, she spent all her capital on treatment.• She later joined Badili Mawazo (BM), ... six other women at Manyani, where she learned how to grow vegetables.• ‘Besides taking antiretroviral drugs, the traditional vegetables make me stronger every day.’• I do not buy vegetables since I started growing my own.• ‘I sell the surplus vegetables and the money I earn lets me meet my children’s needs and buy recommended food like eggs, white meat and wheat.’ Average sales from BM US\$15 and for home consumption worth US\$10 per month.
Jackson*	<ul style="list-style-type: none">• A father of two, he worked as a guard and a small-time hawker in Nakuru town, but he was getting weaker and weaker.• ‘I had to stay out in the cold all night sometimes on an empty stomach,’ he said. ‘A medic advised me to quit this strenuous job.’• As a founder of Badili Mawazo, he has learned to care for the dairy goats.• ‘It changed my social and economic life tremendously.’• He is happy with what he does and enjoys milking his dairy goat.

*Real names have been concealed for ethical reasons.
Source: Mbugua *et al.*, 2008a.

conducted by a University of Nairobi agriculture student as a field attachment showed that both indigenous and exotic varieties were profitable to grow (Wanjiku, 2007).

Micro livestock: dairy goat keeping

For the micro-livestock intervention, 40 households were selected in a participatory manner by BM. Sensitization workshop participants (see Table 1) came to a consensus to choose dairy goats, in recognition of the need for high-value, low-input livestock that would provide quick returns and respecting concerns regarding potential avian flu. Considerable planning was undertaken by a post-masters’ student interning at ILRI (Ferguson, 2007). After an initial analysis of existing goat projects and breeds in Nakuru, Kenyan-Toggenburg were selected. An a priori human health risk scoping assessment was conducted by a

University of Toronto postgraduate student (Chris, 2007) to supplement local consultations with experts to determine the potential sources and ways to mitigate any health risks associated with goat rearing by persons with HIV/AIDS (Kang'ethe *et al.*, forthcoming).

Establishment of fodder banks was the most important activity to be undertaken prior to arrival of the goats so as to ensure availability of sufficient quality feed. After much debate, planting materials comprising sweet potato vines (*Ipomea batata*) and napier grass (*Pennisetum cladistenum*) were selected. They were supplied by the Kenya Agricultural Research Institute, through the National Beef Research Station, Lanet, and five acres of napier and two acres of sweet potato vines were sown.

Goats were procured through the Meru Goat Breeding Association. Prior health screening involved physical examination, collection of blood and faeces for laboratory analysis of *Brucellosis* and *Cryptosporidiosis*. To prepare, goat houses with provisions for feeding area, water, exercise and sleeping were constructed. The Department of Public Health, Pharmacology and Toxicology, University of Nairobi and the Catholic Dioceses of Nakuru provided initial guidance on goat care at a special workshop. Following a one-month acclimatization period, goats were distributed to three clusters, as decided by BM and the SEHTUA team.

Morbidity and mortality among the goats and their offspring was an ongoing challenge. This could partly be attributed to pre-existing conditions (reproductive tract anomaly in one, prior pasteurellosis suspected in several) as well as adverse weather conditions (drought) that reduced fodder yields. Disruption in the scheduled goat care following the post-election violence in early 2008 was a major challenge, and the lack of high quality fodder coupled with the dry season resulted in loss of one goat and eight abortions/stillbirths. Inconsistent participation in goat raising in one cluster due to distance of the farm remained a challenge, as did unequal contributions attributed to sickness and other factors. In response, further training was provided to BM members and the services of a Nakuru-based veterinarian were sought.

In the participatory monitoring and evaluation system, BM members kept daily records and held weekly meetings with the local SEHTUA team. In addition, farm visits by the SEHTUA co-ordinator and occasional visits by the overseas partners enabled the team to address many challenges in a timely fashion. For example, challenges in the regular transportation of fodder or market organic waste for goat feed was resolved through the provision

of bicycles to two BM members and paying them a small stipend to regularly provide feed to each goat-keeping cluster.

Professional and researcher capacity building

In addition to the capacity building of BM members described above, professional development of young scientists has been a focus of SEHTUA. Both Kenyan and expatriate students have made important contributions through a combination of field attachments, course work assignments, major research papers, internships, and masters theses (see Table 4). Two post-doctoral fellows contributed expertise and additional funding to the project through the qualitative assessment described under 'urban agriculture' above and in an assessment of infant feeding and HIV/AIDS. The latter project, involving a Kenyan masters student, will examine SEHTUA impact on infant feeding practices in comparison with non-project participants.

Dissemination activities and preliminary results

Badili Mawazo shared their experiences with SEHTUA at an urban agriculture meeting hosted by the Nairobi and Environs Food Security, Agriculture and Livestock Forum (NEFSALF), during World AIDS Day celebrations, and at a special BM Day at the PCEA. A second feedback workshop involving key stakeholders and BM members was organized recently to share successes, challenges and future opportunities. Presentations included participant experiences, partnership development, social and cultural implications on uptake of interventions, infant feeding and HIV/AIDS policies. During discussions, BM participants mentioned the building of social networks, gaining improved self-esteem, increasing money in their household budget, obtaining a regular vegetable supply and accessing goats through their own sweat as benefits of participation.

The workshop's final session included a discussion of the sustainability of the agricultural and livelihood initiatives of BM. Commitment to continued technical support to BM were made by several partners including Egerton University, University of Nairobi, Ministry of Agriculture, LHC, PCEA and ROCK Bridge Ministries. A commitment to pursue the formalization of access to collective farm plots owned by the PCEA and Ministry of Agriculture and for Egerton University and University of Nairobi to support BM in responding to a call for proposals from the National AIDS

Table 4 | Professional and research capacity building: university students

Graduate level: thesis

Egerton University: Human Nutrition	MSc thesis: Food and nutrition insecurity status of HIV/AIDS-affected households in Nakuru Municipality
Egerton University: Human Nutrition	MSc thesis: Infant feeding, knowledge, attitudes and practices among counsellors and mothers of known HIV status in Nakuru municipality
Egerton University: Sociology	MA thesis: Socio-cultural implications on uptake of urban agricultural interventions by HIV/AIDS-affected households: a case of poor urban households in Nakuru Municipality, Kenya

Graduate level: major research paper

University of Toronto: Anthropology	MA research paper: Livelihoods and health status of HIV/AIDS-affected households in Nakuru Kenya
-------------------------------------	---

Graduate level: coursework

University of Toronto: Public Health Sciences	Community Medicine: an assessment of the potential human health risks associated with Urban Harvest Nakuru Project
---	--

Graduate level: field attachment

Egerton University: Institute of Women, Gender and Development Studies	Gender and Development Postgraduate Diploma
--	---

Graduate level: internship

Cornell University: International Agriculture and Rural Development	MPS volunteer internship: stakeholder involvement
Reading University: International and Rural Development	Post-MSc internship: goat intervention

Undergraduate level: field attachment

Makerere University: Social Work
University of Nairobi: Agriculture and Veterinary Science

Undergraduate level: extension course

Egerton University: Human Nutrition (four students)

Undergraduate level: internship

Egerton University: Human Nutrition
University of Alberta: Human Geography
University of Nairobi: Veterinary Medicine
University of Toronto: Environment and Health

Co-ordinating Committee and Catholic Relief Services were also among the outcomes of the discussion.

Based on preliminary analysis of a repeat survey, increased access to land for agriculture, livestock, technical support services, banking facilities, health facilities and social clubs all seemed to have occurred among participating households. Among those not participating in the interventions, farming activities and participation in social groups had both increased,

suggesting some diffusion of knowledge from participants to non-participants. Indicators of household food security improved among participants, while a slight decline among non-participants was noted. Overall, results indicated a positive contribution of SEHTUA to food security and several livelihood capitals among HIV/AIDS-affected households taking part in the agricultural interventions (Njenga *et al.*, 2009a).

Reflection and discussion

In recent years, scholars have produced impressive, cross-disciplinary efforts to evaluate the social, institutional, and ecological outcomes and impacts of agricultural sustainability initiatives (Tiwari *et al.*, 2008). Over a longer period it has been argued convincingly that the sustainability of agri-food systems requires a commitment to build on and integrate the knowledge of food producers and consumers (Prain, 2006; Bawden, 2007; Pralle, 2008; Scoones and Thompson, 2009). Preliminary results from SEHTUA indicate the value of multi-stakeholder investments that bring together affected households, partners from municipal and provincial government and the community, and universities and research institutes. Supporting 'civic' dimensions in action research is not only consonant with agricultural sustainability, but also in keeping with integrated approaches involving diverse sectors in programmes promoting food security and livelihood sustainability with PLWHA (Lyson, 2004; Gillespie and Kadiyala, 2005; Swaans *et al.*, 2006; Panagides *et al.*, 2007).

Projects aiming to link agricultural sustainability and livelihoods are intensive with respect to resources, personnel and financial commitments, both from participants and project partners. Nonetheless, our experience suggests that the investment in a collaborative process can produce desired returns with respect to improved food security, agricultural sustainability and livelihoods, ultimately decreasing the vulnerability of households. BM's improved access to food and income, and increased knowledge through training and capacity building, represent positive changes in forms of capital (natural, human and social) essential to human livelihoods (Rakodi and Lloyd-Jones, 2002). Further, the structured commitments by partners

to BM are in keeping with key indicators of sustainability of health promotion interventions (Pluye *et al.*, 2004), which bode well for agricultural livelihoods continuing to be an important resource for PLWHA.

Acknowledgements

First and foremost we want to thank the participants, primarily the Badili Mawazo Self Help Group and particularly the executive without whom there would have been no project, along with the ICROSS and Nuru Ya Jamii Self Help Group members. You were our inspiration. Special thanks to the original proposal partners, in particular T. Randolph (ILRI) and the Love and Hope Centre staff and the many partners listed in Figure 1. Several friends of the project provided invaluable support, including E. Kang'ethe, P. Tuitoek, D. Lee-Smith and P. Munyao. Thanks also to the many students who provided invaluable input and enthusiasm to the project including R. Lavergne, N. Andersen, J. Ferguson, K. LaFleche, L. Kramer, K. Chrichton-Struthers, A. Cherobon, G. Muirithi, H. K. Njunga, M. R. Kiome, J. K. Chege, E. M. Mwanja, A. Chris, W. Gachie, E. Wamuhu, J. M. Kariuki, M. G. Wanjiku, I. Kigen, C. Mwai and G. Muiga. Thanks finally to the Canadian International Development Agency for the primary funding, and additional funding from the Canadian Institutes for Health Research and Canadian Research Chair program.

Note

1. The International Food Policy Research Institute, one of the CGIAR Centres based in Washington, has also conducted research on food systems and urban poverty.

References

- AED (Academy for Educational Development), 2008, *Nutrition, Food Security and HIV – A Compendium of Promising Practices* [available at www.fantaproject.org].
- Andersen, N., Mbugua, S., Sellen, D., Cole, D., Karanja, N., Yeudall, F., Prain, G., Njenga, M., 2008, 'Applications of the sustainable livelihoods framework to assess households affected by HIV/AIDS in Nakuru, Kenya', in: *XVII International AIDS Conference Abstract Book*, Vol. 1 (p. 253) [available at www.aids2008.org].
- Badili, Mawazo, 2008, 'Stephen Lewis Foundation Grant Proposal', Unpublished project document available on request from the corresponding author.
- Bawden, R. J., 2007, 'A paradigm of persistence: a vital challenge for the agricultural academy', *International Journal of Agricultural Sustainability* 5 (1), 17–24.
- Bebbington, A., 1999, 'Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty', *World Development* 27 (12), 2021–2044.
- Boischio, A., Clegg, A., Mwagore, D. (eds), 2006, *Health Risks and Benefits of Urban and Peri-urban Agriculture and Livestock (UA) in Sub-Saharan Africa*, Urban Poverty and Environment Series Report #1, International Development Research Centre, Ottawa.
- Castleman, T., Seumo-Fosso, E., Cogill, B., 2003, *Food and Nutrition Implications of Antiretroviral Therapy in Resource Limited Settings*, Academy for Educational Development (AED), Food and Nutrition Technical Assistance Project (FANTA), Washington, DC.
- CBS (Central Bureau of Statistics), Ministry of Health and ORC Macro, 2004, *Kenya Demographic and Health Survey 2003*, CBS, MoH and ORC Macro, Calverton, MD.
- CGIAR, 2008, *Visioning the Future of the CGIAR*, Report of Working Group 1 (Visioning) to the Change Steering Team of

- the CGIAR, 6 June, 2008, CGIAR, Washington, DC [available at www.cgiar.org/changemanagement/pdf/wg1_VisioningChange_Final_Report_June6.pdf].
- Chris, A., 2007, 'An Assessment of the Potential Human Health Risks Associated with Urban Harvest Nakuru Project', Unpublished project document available on request from the corresponding author.
- CIP, 2009, *The Strategic and Corporate Plan of the International Potato Center, 2009–2018*, CIP, Lima.
- Coates, J., Swindale, A., Bilinsky, P., 2006, *Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide*, Food and Nutrition Technical Assistance (FANTA) Project, AED, Washington, DC.
- Cohen, B., 2004, 'Urban growth in developing countries: a review of current trends and a caution regarding existing forecasts', *World Development* 32 (1), 23–51.
- Cole, D., Andersen, N., Samuel, M., Karanja, N., Yeudall, F., Njenga, M., Sellen, D., Prain, G., SEHTUA, 2008a, 'SEHTUA: community based action research project to strengthen livelihood and food security for households affected by HIV/AIDS through urban agriculture', in: *XVII International AIDS Conference Abstract Book*, Vol. 1 (p. 319) [available at www.aids2008.org].
- Cole, D., Lee-Smith, D., Nasinyama, G. (eds), 2008b, *Healthy City Harvests: Generating Evidence to Guide Policy on Urban Agriculture*, CIP/Urban Harvest and Makerere University Press, Lima, Peru.
- De Haan, A., Drinkwater, M., Rakodi, C., Westley, K., 2002, *Methods for Understanding Urban Poverty and Livelihoods* [available at www.livelihoods.org].
- Dennery, P., 1996, 'Urban food producers' decision-making: a case study of Kibera, City of Nairobi, Kenya', *African Urban Quarterly* 11 (2 & 3), 189–200.
- Ferguson, J., 2007, 'Urban Harvest Nakuru Project. Dairy goat Report', Unpublished project document available on request from the corresponding author.
- Foeken, D., 2006, *To Subsidise My Income? – Urban Farming in an East-African Town*, Brill, Boston, MA & Leiden.
- Foeken, D., Owuor, S., 2000, *Urban Farmers in Nakuru, Kenya*, ASC Working Paper No. 45, Africa Studies Centre, Leiden, and Centre for Urban Research, University of Nairobi.
- Gillespie, S., Kadiyala, S., 2005, *HIV/AIDS and Food and Nutrition Security. From Evidence to Action. Food Policy Review 7*, International Food Policy Institute, Washington, DC.
- Hooton, N., Lee-Smith, D., Nasinyama, G., Romney, D., Atukunda, G., Azuba, M., Kaweesa, M., Lubowa, A., Muwanga, J., Njenga, M., Young, J., 2007, *Championing Urban Farmers in Kampala. Influences on Local Policy Change in Uganda. Process and Partnership for Pro-poor Policy Change*, ILRI Research Report No. 2, ILRI, Nairobi (Kenya).
- Kiarie, S., 2009, 'HIV and AIDS Policy in Kenya – Nakuru Municipal Council', Unpublished project document available on request from the corresponding author.
- Kang'ethe, E. K., Njehu, A., Karanja, N., Njenga, M., Gathuru, K., Karanja, A., forthcoming, 'Benefits and selected health risks of urban dairy production in Nakuru, Kenya', in: G. Prain, N. Karanja, D. Lee-Smith (eds), *Africa Urban Harvest: Agriculture In and Around African Cities 2002–2006*, IDRC/Urban Harvest/CIP.
- Karanja, N., Njenga, M., Gathuru, K., Karanja, A., Munyao, P., forthcoming, 'Crop–livestock–waste interactions in Nakuru, Kenya', in: G. Prain, N. Karanja, D. Lee-Smith (eds), *Africa Urban Harvest: Agriculture In and Around African Cities 2002–2006*, IDRC/Urban Harvest/CIP.
- Lee-Smith, D., Mutsembi, M., Lamba, D., Gathuru, P.K., 1987, *Urban Food Production and the Cooking Fuel Situation in Urban Kenya*, National Report, Mazingira Institute, Nairobi.
- Loevinsohn, M., Gillespie, S., 2003, *HIV/AIDS, Food Security and Rural Livelihoods: Understanding and Responding*, RENEWAL Working Paper No. 2, May [available at www.ifpri.org/renewal/pdf/RENEWALWP2.pdf].
- Lyson, T.A., 2004, *Civic Agriculture: Reconnecting Farm, Food and Community*, Tufts University Press, Medford, MA.
- Masariala, W., 2007, 'The poverty–HIV/AIDS nexus in Africa: a livelihood approach', *Social Science and Medicine* 64, 1032–1041.
- Maxwell, D., 1995, 'Alternative food security strategy: a household analysis of urban agriculture in Kampala', *World Development* 23 (10), 1669–1681.
- Maxwell, D., Ahiadeke, C., Levin, C., Armar-Klemesu, M., Zakariah, S., Lamptey, G. M., 1999, 'Alternative food security indicators: revisiting the frequency and severity of 'coping strategies'', *Food Policy* 24 (2), 411–429.
- Mbugua, S., Karanja, N., Njenga, M., 2008a, 'Gardens of hope for victims of HIV/AIDS in Nakuru, Kenya', in: *Urban Grown* (Newsletter of the Kansas City Centre for Urban Agriculture) [available at www.kccua.org/urbangrown/ug-10-08.htm].
- Mbugua, S., Andersen, N., Tuitoeke, P., Yeudall, F., Sellen, D., Karanja, N., Cole, D., Njenga, M., Prain, G., SEHTUA, 2008b, 'Assessment of food security and nutrition status among households affected by HIV/AIDS in Nakuru Municipality, Kenya', in: *XVII International AIDS Conference Abstract Book*, Vol. 1 (p. 493) [available at www.aids2008.org].
- McCarney, P., Stren, R. E. (eds), 2003, *Governance on the Ground: Innovations and Discontinuities in Cities of the Developing World*, Johns Hopkins University Press, Baltimore, MD.
- Mukisira, E., 2005, 'Opening Speech', in: G. Ayaga, G. Kibata, D. Lee-Smith, M. Njenga, R. Rege (eds), *Prospects for Urban and Peri-urban Agriculture in Kenya*, Urban Harvest–International Potato Centre, Lima.
- NASCOP (National AIDS/STD Control Programme), 2003, *Kenya National HIV/AIDS Strategic Plan 2005/6 to 2009/10. A Call to Action* [available at www.aidskenya.org].
- NASCOP (National AIDS/STD Control Programme), 2006, *Kenyan National Guidelines on Nutrition and HIV/AIDS* [available at www.aidskenya.org].
- NASCOP (National AIDS/STD Control Programme), 2008, *Kenya AIDS Indicator Survey 2007 KAIS Preliminary Report* [available at www.aidskenya.org].
- Njenga, M., Karanja, N., Gathuru, K., Mbugua, S., Fedha, N., Ngoda, B., 2009a, 'The role of women-led micro-farming activities in combating HIV/AIDS in Nakuru, Kenya', in: A. Hovorka, H. de Zeeuw, M. Njenga (eds) *Women Feeding Cities: Mainstreaming Gender in Urban Agriculture and Food Security*, Practical Action Publishing, Rugby, UK.
- Njenga, M., Karanja, N., Mbugua, S., Muriithi, G., Cherobon, A., SEHTUA, 2009b, *Combating HIV/Aids in Urban Communities through Food and Nutrition Security: The Role of Women Led Micro-Livestock Enterprises and Horticultural Production in Nakuru Town*, Feedback from Workshop held on 11 June, Jumuia Guest House–Nakuru, Kenya.
- Njenga, M., Romney, D., Karanja, N., Gathuru, K., Kimani, S., Carsan, S., Frost, W., forthcoming, 'Recycling nutrients from organic wastes in Kenya's capital city', in: G. Prain, N. Karanja, D. Lee-Smith (eds), forthcoming, *Africa Urban Harvest: Agriculture In and Around African Cities, 2002–2006*, IDRC/Urban Harvest/CIP.
- Panagides, D., Graciano, R., Atekyereza, P., Gerberg, L., Chopra, M., 2007, *A Review of the Nutrition and Food Security in HIV and AIDS Programs in Eastern and Southern Africa*, Equinet discussion paper number 48 [available at www.equinetfrica.org].
- Pluye, P., Potvin, L., Denis, J.L., 2004, 'Making health programs last: conceptualizing sustainability', *Evaluation and Program Planning* 27, 121–133.

- Prain, G., 2006, 'Participatory technology development for urban agriculture: collaboration and adaptation along the urban-rural transect', in: R. van Veenhuizen (ed.), *Cities Farming for the Future – Urban Agriculture for Green and Productive Cities*, RUAF Foundation, IDRC and IIRR, Leusden.
- Prain, G., Karanja, N., Lee-Smith, D. (eds), forthcoming, *African Urban Harvest: Agriculture In and Around African Cities, 2002–2006*, IDRC/Urban Harvest/CIP.
- Pralle, J., 2008, 'Agricultural sustainability: concepts, principles and evidence', *Philosophical Transactions of the Royal Society B* 363, 447–465.
- Rakodi, C., Lloyd-Jones, T., 2002, *Urban Livelihoods: A People-Centred Approach to Poverty Reduction*, Earthscan/DFID, London.
- Scoones, I., Thompson, J. (eds) 2009, *Farmer First Revisited. Innovation for Agricultural Research and Development*, Practical Action Publishing, Rugby, UK.
- SEHTUA (Sustainable Environments and Health Through Urban Agriculture), 2006, *Combating HIV/AIDS in Urban Communities Through Food and Nutrition Security*, Report of the Sensitization Workshop organized by Urban Harvest, CIP, SSA, Ryerson University and University of Nairobi.
- Swaans, K., Broerse, J., Bunders, J., 2006, 'Agriculture and HIV/AIDS: a challenge for integrated and interactive approaches', *Journal of Agricultural Education and Extension* 12 (4), 231–247.
- Swaans, K., Broerse, J., Meincke, M., Mdhara, M., Bunders, J., 2009, 'Promoting food security and well-being among poor and HIV/AIDS affected households: lessons from an interactive and integrated approach', *Evaluation and Program Planning* 32, 31–42.
- Tevera, D. S., 1996, 'Urban agriculture in Africa: a comparative analysis of findings from Zimbabwe, Kenya and Zambia', *African Urban Quarterly* 11 (2 & 3), 181–188.
- Tiwari, K. R., Nyborg, I. L. P., Sitaula, B. K., Paudel, G. S., 2008, 'Analysis of the sustainability of upland farming systems in the Middle Mountains region of Nepal', *International Journal of Agricultural Sustainability* 6 (4), 289–306.
- Wanjiku, M. G., 2007, *Sustainable Environments and Health Through Urban Agriculture (SEHTUA) Urban Harvest-Nakuru Project*, A field attachment report submitted in partial fulfillment for the requirements of the degree of Bachelor of Science in Agriculture, College of Agriculture and Veterinary Sciences. University of Nairobi.