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ISSN 1811-1440
Urban Harvest
Working Paper Series
Paper 6 • June 2010

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ISSN 1811 -1440
Urban Harvest
Working Paper Series
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ISSN 1811-1440

Published by the International Potato Center (CIP), on behalf of Urban Harvest
CIP contributes to the CGIAR mission through scientific research and related activities on potato, sweetpotato, and other root and tuber crops, and on the management of natural resources in the Andes and the other mountain areas. Between 1999 and 2009 CIP convened Urban Harvest, the CGIAR system-wide initiative on urban and peri-urban agriculture.

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Urban Harvest and CIP acknowledge the generous support received from the German GTZ for the research on which this paper is based.

Correct citation:
Loechl, C, Lubowa, A, Cole, C, Prain, G. and J. Low. 2010
School-based nutrition education and promotion of orange-fleshed sweetpotato in urban and peri-urban areas of Kampala: Impacts and lessons learnt
Urban Harvest Working Paper Series, no 6. International Potato Center, Lima, Peru.

Cover Design
Graphic Arts
Layout
Ana Luisa Muñoz

Printed in Perú by Comercial Gráfica Sucre
Press run: 200
June 2010

Table of Contents

List of Tables

List of Figures

School-based nutrition education and promotion of orange-fleshed sweetpotato in urban and peri-urban areas of Kampala: Impacts and lessons learnt

INTRODUCTION

Vitamin A deficiency (VAD) is a major health concern in Uganda and other low-income populations where it is an important contributor to high morbidity and mortality rates, including impaired vision and blindness among young children (West 2002, Ezzati *et al*., 2002). The Ugandan Demographic and Health Survey of 2006 revealed that about 20% of children under five were vitamin A deficient (<0.825 µmol/L of Retinol-Binding Protein) (Uganda Bureau of Statistics and Macro International Inc., 2007).

Children under five years of age are at greatest risk of VAD and interventions are often targeted to this group. However, other age groups might be considered for many reasons, particularly as they can play a role in improving vitamin A status in the most vulnerable group, under-five year old children, at household level. In Uganda's capital Kampala, VAD interventions targeted primarily schoolchildren in the project: *"Promotion of Orange-Fleshed Sweetpotato Varieties through Schools in Urban and Peri-urban Communities of Kampala*", but also aimed at improving vitamin A intake and status among under-five year old children and other household members through increased production and consumption of orange-fleshed sweetpotatoes (OFSP) and other vitamin A rich foods.

Targeting schoolchildren is premised on the belief that it may be an effective means for reaching large numbers of households using a central location (school) if children prove to be effective transmitters of technologies from school to household. Furthermore, working with schoolchildren provides an opportunity to influence lifetime food preferences, as they are the future parents of the world (Andrade *et al.*, 2009). Other experiences with targeting schoolchildren are currently ongoing in South Africa. For instance, the South African government has recently incorporated the vegetable garden concept, with OFSP included, into its national school nutrition program. The program has a food production component with the goal of imparting practical skills to students on food production and natural resource management, and a nutrition education component to empower the children to make healthy lifestyle choices. As of April 2007, 6390 schools country-wide had established gardens. The program works in collaboration with the National Research Program (ARC) and FAO (Maduna 2008).

IMPLEMENTATION AND EVALUATION OBJECTIVES

Under the umbrella of the project *"Promotion of Orange-Fleshed Sweetpotato Varieties through Schools in Urban and Peri-urban Communities of Kampala"* two separately funded and implemented components were combined with the shared aim of increasing the production and consumption of OFSP varieties among urban farming households in Kampala, to increase intake of vitamin A among young children and other household members. Interventions of the two components were complimentary in nature with one focused on OFSP production technologies and the second one focused on nutrition

education interventions. The components were implemented during the same time period (2004-2006), worked with the same communities and involved significant coordination of activities.

The agriculture component

The implementation of the agricultural component started in 2004 with funding from Farm-Africa's *Mandeleo* Agriculture Technology Fund. It was implemented by a multi-stakeholder partnership led by the Department of Agricultural Extension, Makerere University. The aim was to contribute to widespread production of two OFSP varieties (*Kakamega* and *Ejumula*), among the urban and peri-urban farming communities of Kampala using schools for disseminating OFSP production technologies (rapid vine multiplication techniques, agronomy, post-harvest processing). The component was a build-up and adopted the approach of an action-research project carried out in Kampala in 2002 and 2003 entitled "*Schools as Technology Dissemination, Extension Support and Commercial Seed Production Centres for Urban and Peri-Urban Farming Communities"*, which sought to assess the appropriateness of using schools to produce and make available planting materials to urban farming communities.

As venues, schools were regarded as neutral places where communities would be comfortable to meet, share and exchange knowledge. As avenues for technology dissemination, the schools approach involved training schoolchildren at school in a practical and active way and encouraged them to transfer the acquired knowledge, technologies and innovations to their households of origin, which was expected to influence household decision making.

Based on the above approach, the component was implemented through 11 primary schools in two divisions of Kampala (Kawempe and Rubaga), with interventions tailored and targeted to pupils (grade 3-7), their science and agriculture teachers, their parents, and all interested males and females from farming households in the communities surrounding the participating schools. The two divisions were selected at a stakeholders meeting involving Kampala District Officials and project implementation partners. Rubaga and Kawempe divisions had the largest proportion of land under agriculture with the latter standing out as most affected by malnutrition according to city health authorities. In consultation with the Division Education and other officers, a list of 10 schools with potential to participate was drawn from each division and a feasibility assessment carried out on each to elect the best five. Key points in the assessment criteria included possession of at least one acre of farming land, prior participation in community development programs, willingness to host community meetings, and willingness to allow schoolchildren and teachers to participate in the project. Kampala School for the Physically Handicapped was included in the project as a special needs group. Methods used to mobilise community members were non-discriminatory as to gender, farm size, distance from school, or on any other basis. As such, community participants came from far and near, were men and women, small and large scale farmers, old and new farmers and in some cases, non-farmers.

The agricultural component used a variety of methods including presentation-question-answer meetings, on-plot demonstrations, drama, farmer-to-farmer extension, farm station visits and the distribution of posters to train and transfer knowledge and technologies to beneficiaries. The school was the principal meeting place for training and learning purposes. OFSP gardens and rapid multiplication technique (RMT) plots were

established at the schools for demonstration as well as for the multiplication of vines. Some of them were jointly established and co-owned by the school and community members, while others were separately owned by the schools or community. In the second year (2005), community members established their own private (home) RMTs, and schoolchildren who had land at home were also given vines to establish their own RMTs. Initially, the project purchased vines from established OFSP farmers from Luwero and Soroti districts to distribute to communities and schools. Afterwards, beneficiaries were encouraged to get vines from the community and private RMT plots, and share them with new project members.

Training and establishment of demonstration plots and gardens was carried out in a participatory manner but under the guidance and direction of a team of sweetpotato/agricultural and community development experts from relevant implementing partner institutions. These included the Sweetpotato Program of the National Agricultural Research Organization (NARO), the International Potato Center (CIP), Joint-Energy and Environment Project (JEEP) and Makerere University's Department of Agricultural Extension and Education (DAEE). Each school community chose four people (two farmers and two school teachers) who underwent a short course to train as trainers (TOTs) and provide reinforcement to the project expert team, and assist in the mobilization of communities and coordination of some project activities. Teachers helped to train schoolchildren and monitor schoolchildren's OFSP gardens/RMT plots using home visits. A TOT manual, translated into the main local language (Luganda), was developed to guide facilitators and trainers on how to pass on technologies and messages to farmers in a simple, practical and effective way.

The agricultural component commenced in March 2004 with a baseline study and ended in February 2006 with an end-project survey. However, due to a lax registration and tracking of participants, there is no valid record of the duration and frequency of attendance at various trainings and activities. A few farmers joined the agricultural interventions at the very beginning in 2004 and stayed with them until the end. Some farmers joined and some fell off as the project progressed. Nevertheless, as per the table below, substantial numbers of farmers and schoolchildren were reached.

Table 1: Number of active schoolchildren and farmers found growing OFSP in the end of project survey (May 2006)

School/ Community	Total number of RMTs	No. of active	
		Schoolchildren	Farmers
St. Andrews Komamboga P/S	25	45	30
Namungoona Kigobe P/S	61	40	100
Kitebi C/U P/S	34	300	60
Kabowa C/U P/S	9	120	50
Valley St. Mary's P/S	7	30	65
Cleveland and Hill P/S	1	53	60
Lubiri Nabagereka P/S	6	5	30
Ttula C/U P/S	42	25	50
Kasubi C/U P/S	0	30	60
Kisaasi P/S	12	34	63
Total	**197**	**682**	**568**

In addition to these who were reached directly by the project implementers, others were judged to be reached through the mentor-farmer or farmer-to-farmer extension system with estimates included in Orum et al. (undated); Kapinga et al. (undated).

The nutrition education component

A critical review of agricultural/food-based interventions to reduce general and specific nutrient deficiencies (Ruel and Levin, 2000; Berti, Krasevec and FitzGerald, 2004) concluded that strategies that combine food production/availability with change in nutrition behaviour and practices significantly increase the chances of achieving nutrition outcomes and impacts. Based on these conclusions, nutrition education activities were designed to build synergy with the agricultural component for increased adoption and consumption, as well as intra-household distribution of OFSP. Urban Harvest, CGIAR's system wide program on urban and peri-urban agriculture, joined the above-mentioned partnership to implement nutrition education activities that went beyond 'sensitisation'**.**

The implementation of the nutrition education component started in February 2005 in Kawempe and Nakawa divisions using the same 'schools approach' of targeting pupils, their teachers, parents and all female and male farmers in communities surrounding the selected schools, and using schools as venues for training sessions. The selection of Kawempe and Nakawa division was based on the primary motive of creating comparison groups for studying the separate and combined impacts of agricultural and nutrition education interventions. In Kawempe division, nutrition education was implemented in the same schools and targeted the same groups as the agricultural component. In Nakawa division, five primary schools were selected based on criteria used also by the agricultural component. Participant households also had to have access to farming land and had to have at least one child 2-6 years old. Thus, in Kawempe division, the aim of the nutrition education component was to build synergy for adoption and increased consumption of OFSP. In Nakawa division no agricultural interventions were implemented.

Specific objectives of the nutrition education component were as follows:

1. To increase knowledge and awareness among mothers and other child caregivers about the critical importance of vitamin A in child health and survival.
2. To promote OFSP as a 'common sense solution' to the problem of vitamin A deficiency.
3. To increase mothers' and caregivers' knowledge of other locally available plant and animal foods rich in vitamin A.
4. To highlight and change selected attitudes and practices of mothers and child caregivers that increase risk/susceptibility to vitamin A deficiency and other forms of malnutrition.
5. To impart basic skills to mothers/caregivers for the preparation of meals for children under five years.

Nutrition education and training sessions were carried out on the premises of participating primary schools. At each session, participants were registered, properly indicating their surname, first name, and name commonly used or known by in the village. This provided a basis for the correct identification of participants and analysis of the number of sessions attended. At each school and on any one training day, the training team was divided into two groups; one for the adult farmers and another for

schoolchildren. Thus, community members and schoolchildren were trained separately but during the same community visit. The schoolchildren trained were mainly those from primary year four to primary year six.

At least three training sessions were conducted for each school community. Repeat sessions were carried out for sessions that had been poorly attended. The interval between training sessions averaged 4-6 weeks although there was a five-month interval between the first and second session for Kawempe division due to logistical constraints. A complete schedule of schools and training sessions is provided in Appendix I.

Each training session was facilitated by a team composed of a nutritionist from Urban Harvest and a community nutrition educator from the nutritional rehabilitation unit of Mulago Hospital. They were supported by an agriculturalist extension worker from Kampala City Council and a social scientist from JEEP, who were both members of the agricultural interventions team. Each school community had four community members (two teachers and two farmers) who had previously undergone more intensive education and training on the same subject matter to enable them to support nutrition education activities. However, the project did not facilitate them to train community members on their own, as was the case with the agricultural component.

A simple outline was developed to guide nutrition education (see Appendix II). The education covered general nutritional facts, an introduction to the importance of vitamin A, and the identification of food and non-food sources of vitamin A, all the time highlighting the importance of OFSP. Other aspects included the use of vitamin A capsule supplements and mosquito nets. Participants also underwent practical training in the formulation of recipes and preparation of vitamin A/nutrient rich porridges and meals for young children under five. Training sessions were organised as facilitated group discussions with brief presentations followed by questions, answers, and the sharing of knowledge, experiences and concerns in a participatory and respectful environment. The average attendance of each session was 30-40 participants. Demonstrations, posters and calendars depicting plant and animal foods rich in vitamin A were also used to communicate nutrition education messages. Each participant received (to take home) a full-colour poster of vitamin A rich foods, and a cartoon poster extolling the values of OFSP.

A total of 996 parents, over 75 percent of them women and representing an equal number of households, participated in the nutrition education intervention. The number of schoolchildren trained was 657, the majority of them from primary five and six at the time of training. Records also indicate that only a fraction of pupils (about 5 percent) participated in all three sessions. In some cases training was carried out on a weekend, and some schoolchildren could not attend, but every schoolchild has participated in at least one session (A. Lubowa, personal communication).

Evaluation objectives

While the agricultural component sought to increase household production and consumption of orange-fleshed sweetpotatoes, the nutrition education component aimed to be synergistic with the agricultural component, adding impacts on knowledge, attitudes and practices relevant to child vitamin A nutrition in an urban/peri-urban context.

Hence evaluation objectives included:

1. To assess knowledge sharing among schoolchildren and their parents potentially attributable to the interventions.
2. To assess differences in vitamin A-related knowledge, attitudes and practices among mothers and other childcare givers across groups.
3. To compare consumption of orange-fleshed sweetpotatoes and other vitamin A-rich foods among 2-6 year old children in the agricultural and nutrition education intervention groups compared to a referent community in urban and peri-urban areas of Kampala.
4. To assess whether such changes were associated with dietary intakes and child anthropometric status (if data permitted).

METHODS

Design for comparisons

In keeping with a post-post comparison, a cross-sectional survey was undertaken to compare areas 'with' and 'without' different interventions. Among the five divisions in Kampala, the Central Division had been excluded, as it constitutes the central business district with mostly commercial buildings and very little crop farming activity. Implementation of the agricultural component in Rubaga and Kawempe divisions, and the nutrition education component in Kawempe and Nakawa divisions had already created 3 comparison groups. Makindye division, which also had similar farming activities, was added as a relative control where no interventions were undertaken. Hence a four-group comparison structure was available for post-project assessment of the separate and combined impacts of the agricultural and nutrition education interventions (see Table 2).

Table 2: Comparison groups created by agricultural and nutrition education interventions

GROUP	Division	Type of interventions	Number of participating schools
1	Kawempe	Agricultural Technologies/Extension & Nutrition Education	5
2	Rubaga	Agricultural Technologies/Extensions only	5
3	Nakawa	Nutrition Education only	5
4	Makindye	No intervention (control division)	5

Selection of survey households and respondents

Based on the evaluation objectives, households included in the survey had to satisfy the following criteria:

- Had at least one adult member who had participated in project activities (both nutrition education and agricultural interventions in Kawempe division, or in nutrition education activities in Nakawa division, or in agricultural interventions in Rubaga division).
- Were involved in urban farming as one of their livelihood strategies.
- Had at least one 2-6 year old child as a regular household member.

In both Nakawa and Kawempe divisions, registration of participants was carried out for each training session. Each participant also provided information on the number and names of children from 2-6 years old. These attendance registers provided the sampling frame for selection of households to include in the survey. The schedule of 2-6 year olds in each household was used to randomly select one index child per household for estimation of food consumption and vitamin A intake. In Rubaga division, registration of participants had not been systematically implemented and it was not possible to differentiate children from adults, participants from farming and non-farming households and availability, number and names of children from 2-6 years old. Thus, a mini-survey of the TOTs and local leaders was carried out to establish that information and confirm frequency of attendance in agricultural sessions. In Makindye division, selection of schools and households to participate in the survey was carried out using the approach used in Nakawa and Makindye divisions to identify the beneficiaries of the nutrition education component.

As the principal childcare givers who are also responsible for household food security and nutrition as well being the majority owners of urban farming activities, women were the main survey respondents. In most cases the woman who attended intervention activities was the principal woman (head or head's spouse) of the respondent household, and also the mother/main caregiver of the index child. This woman was therefore automatically selected for the main questionnaires on Knowledge, Attitudes and Practices (KAP), Food Frequency (FFQ) and 24-hour recall for the index child (2-6 years old) (see measures below). In a few households men were the main respondents, having been the ones who attended intervention activities and who were the main caregivers for the index children.

To evaluate intra-household knowledge transfer, abridged versions of the main questionnaire on KAP were also administered to the spouse of any respondent woman who did not participate in project activities and (where available) the schoolchildren from any households who attended one of the participating schools and also benefited from project interventions. Each respondent household provided written informed consent through the main respondent or household head. Ethical approval for the survey was obtained from the Uganda National Council for Science and Technology.

Measures

Four types of data were collected: food frequency; KAP; food consumption data using a modified interactive 24-hour recall according to the method of Gibson and Ferguson (1999); and anthropometric measurements of all index children (2-6 years old). Challenges in data collection and quality concerns in the latter case meant we decided not to proceed further with analysis. The time requirements for processing and our limited resources meant that we also had to leave the 24-hour recall data unanalyzed.

Food Frequency

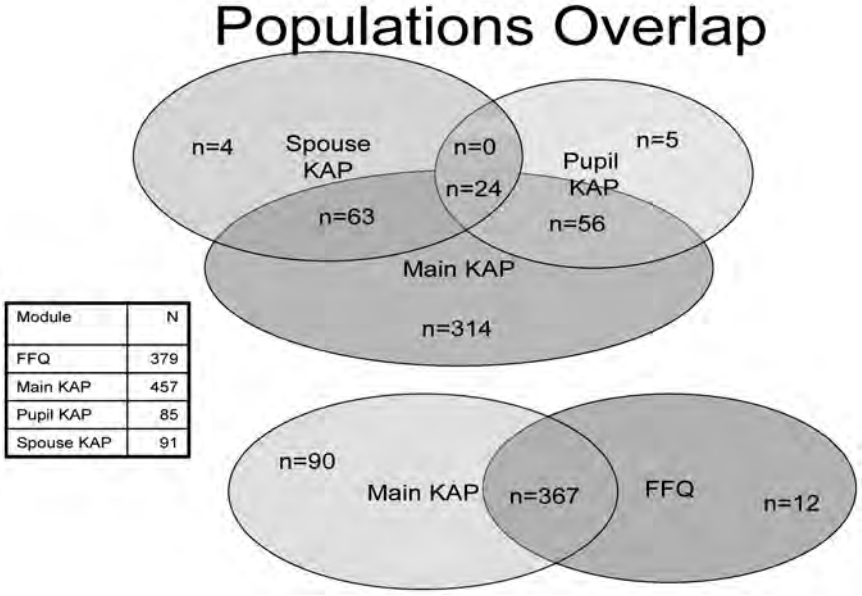
To assess any differences in consumption of vitamin-A rich foods, particularly OFSP, the Food Frequency Questionnaire (FFQ) was administered for the index child during household visits with the primary caretaker, according to the Helen Keller International method (1993) (see Appendix III).

Knowledge, attitudes and practices (KAP)

To understand the effect of nutrition education on vitamin A-related knowledge, attitudes and practices of the caregiver and the intra-household transfer of that knowledge, three different questionnaires were used to collect information from three types of respondents in the household. The first questionnaire (see Appendix IV) was administered to the main respondent, identified as the person from the household who most attended nutrition education and/or agriculture sessions. Most often, the main respondent was the principal woman of the households and also the mother of the index child. In addition to KAP, this questionnaire collected information on farming and the social and economic characteristics of the household. The questionnaire was devised by the research team, based on their understanding of important KAP issues, and contained a combination of pre-coded as well as open ended questions and was administered by graduate-level research assistants under supervision by an MSc Human Nutrition student attached to the project. Data collection was done between the 6th of July and 6th September 2006. It took an average of 1.5 hours to complete one interview and each field assistant did an average of four respondents per day.

The main respondent's KAP questionnaire was adjusted for a child from the respondent household who was a schoolchild in one of the focal schools, and for the spouse of the main respondent. However, the KAP questionnaires for the spouse and schoolchild were administered some weeks after the main KAP, so were partial (see Figure 1). The respective overlap proportions with the main KAP were 63 and 56 respectively. Given our time constraints, the low overlap proportions across all three KAPs (all three n=24), and the greater importance of schoolchildren for a school-based intervention, we limited our analyses to the main and schoolchildren KAP data. In this document the focus is on the results from the main KAP. The results of the schoolchildren KAP are presented in the Proceedings of the Symposium of the International Society for Tropical Root Crops (ISTRC), held in Lima, Peru from 9-13 November 2009 (Loechl et al., forthcoming).

Figure 1: Sample sizes of different KAP components and FFQ respondents



Module	N
FFQ	379
Main KAP	457
Pupil KAP	85
Spouse KAP	91

Analysis

Descriptive analysis of the data was conducted. The data were stratified by intervention group. Influence of occupation (urban farming versus other occupation) and education level (lower education level, i.e. no formal education up to upper primary, versus higher education level, i.e. lower secondary school up to university) was assessed for all variables, and is reported in the results section when it occurred. Inferential testing was done using Pearson's chi-square test.

Limitations of Population and Analysis

Although it would have been interesting to look at knowledge transmission from schoolchildren to main respondents and to assess whether participation of the schoolchild alone, or the schoolchild and the parent, makes a difference compared to participation of the parent alone, we faced considerable challenges. First, the sample sizes are too small: 80 of 85 schoolchildren interviewed had a main KAP, but if stratification by intervention group and attendance mode (parent & schoolchild, parent alone, schoolchild alone) is applied, the sample sizes become very small and below five in a number of cells (n=33 schoolchildren have a main KAP, but they had not participated in project activities at all). Second, in the schoolchild-alone attendance group, some adults seem to have participated in interventions as well, diluting the ability to detect a schoolchild-alone effect.

RESULTS OF MAIN KAP

Awareness of OFSP and vitamin A

All respondents in intervention Groups 1 and 2 had heard of OFSP, and mostly at the schools OFSP project. In the third intervention group, 92% had heard of OFSP, and in the control group significantly fewer respondents (77%) had heard of OFSP.

Table 3: Ever heard of OFSP by intervention group (% within intervention group)

n=457	Group 1	Group 2	Group 3	Control
Yes	100.0	100.0	92.3	76.9
No	0.0	0.0	7.7	23.1

Pearson's chi-square test: F=58.9 and p=0.000

Of those respondents who had never seen any orange-fleshed SP roots, two-thirds (75%) were in the control group; very few respondents were in Groups 1 and 2, and 22% in Group 3 (p=0.000). There is no measurable influence of occupation or education level on OFSP awareness.

Overall, 91% of respondents had heard about vitamin A, with no significant differences between the different intervention groups. However, those with higher education were more likely to have heard about vitamin A than those with lower education. This is true for all groups, but is statistically significant in Group 1 only (p=0.035).

78% had heard about vitamin A before 2004, i.e. before the project interventions started, with considerable variation between the different groups (p=0.000). Within the control group, the majority of respondents had heard about it before 2004.

Table 4: First heard about vitamin A by intervention group (% within intervention group)

n=439	Group 1	Group 2	Group 3	Control
Before 2004	66.1	74.1	78.2	93.6
2004	18.8	12.1	3.0	2.7
2005	12.5	12.9	12.9	1.8
2006	2.7	0.9	5.9	1.8

F-value=42.30; p-value=0.000

In all groups, those with higher education were more likely than those with lower education to have heard about vitamin A before 2004, i.e. before the project started (control group: majority 97%). In contrast, respondents in the intervention groups with lower education are more likely to have heard about vitamin A through the project, in 2004 and 2005. This is statistically significant in Group 1 (p=0.054).

Knowledge about vitamin A

Overall, 74% of respondents thought that children generally are the primary vulnerable group in a family and the ones who need vitamin A most (share within groups is highest in control group: 79.1%); 9.2% thought that children under 6 years of age need vitamin A most (share within groups is highest in Group 1: 16.4%). 9.1% considered pregnant women as the second most vulnerable target groups that need vitamin A most. 63% didn't know and did not indicate a second target group. Respondents with higher education levels were more likely than respondents with lower education to mention children generally, especially children under 6 years of age as the primary vulnerable group most in need of vitamin A within a family. In contrast, more respondents with lower education levels indicated that everyone in a family is in need of vitamin A, or that they didn't know. Differences by education level are statistically significant only in Group 1 (p=0.056).

Overall, 50% of respondents were not able to correctly name any health problems related to vitamin A deficiency in children; 34% indicated one and 18% at least two health problems correctly. There were no clear differences between the different groups. But the respondents with lower education were more likely than respondents with higher education to not be able to name correctly health problems that affect children with vitamin A deficiency. Higher percentages of respondents in the higher education group were able to give at least one correct answer or two correct answers. The education level influence is statistically significant in the control group only (p=0.009).

Knowledge of vitamin A rich plant foods was lowest in the control group compared to the three intervention groups. Clearly, the respondents in Group 1 were more knowledgeable than respondents in other intervention groups – nearly half of them identified three vitamin A rich foods.

Table 5: Knowledge of vitamin A rich plant foods by intervention group (% within intervention group)

n=457	Group 1	Group 2	Group 3	Control
No vitamin A rich plant food known/identified	12.9	16.7	22.1	31.6
One vitamin A rich plant food identified	18.1	39.2	24.0	38.5
Two vitamin A rich plant foods identified	21.6	19.2	33.7	12.8
Three vitamin A rich plant foods identified	47.4	25.0	20.2	17.1

F-value=59.03; p-value=0.000

More respondents in the lower education group were not able to indicate any vitamin A rich plant food, or just one vitamin A rich plant food compared to the higher education group. In contrast, respondents with higher education were more likely than respondents with lower education to identify two or three vitamin A rich plant foods. These differences are statistically significant in Group 1 (p=0.039) and the control group (p=0.059).

Similarly to the knowledge of vitamin A rich plant foods, the knowledge of vitamin A rich animal source foods was lowest in the control group compared to the three intervention groups. Clearly, the respondents in Group 1 were more knowledgeable than respondents in other intervention groups – nearly half of them could identify two vitamin A rich animal source foods and 14% three (see Table 6).

Table 6: Knowledge of vitamin A rich animal source foods by intervention group (% within intervention group)

n=457	Group 1	Group 2	Group 3	Control
No vitamin A rich animal food known/identified	10.3	16.7	8.7	19.7
One vitamin A rich animal food identified	28.4	44.2	33.7	47.0
Two vitamin A rich animal foods identified	47.4	36.7	47.1	32.5
Three vitamin A animal rich foods identified	13.8	2.5	10.6	0.9

F-value=38.07; p-value=0.000

The education influence on knowledge of vitamin A rich animal source foods is similar to the previous case (knowledge of vitamin A rich plant foods), but the differences are not statistically significant in any of the four groups. The trend is that more respondents in the lower education group compared to the higher education group were not able to indicate any vitamin A rich animal source food. Respondents with higher education were more likely to identify three vitamin A rich animal source foods.

Attitudes to vitamin A, nutrition and OFSP

*Attitude towards **vitamin A capsules**: "Some radio presenters have been telling people that giving children vitamin A capsules is a grand plan by Bazungu ("white people") to reduce the population of Africans –do you agree with this?"*

Overall, 69% of respondents did not agree and 28% didn't know. There are significant differences between the different groups (see Table 7).

Table 7: Attitude that vitamin A capsules reduce the population by intervention group (% within intervention group)

	Group 1	Group 2	Group 3	Control
Do not agree	73.3	70.0	70.2	64.1
Don't know	22.4	25.0	28.8	34.2

F-value: 26.29; p-value: 0.010

Group 1 has highest percentage of respondents who did not agree with the statement (control group the lowest) and has the lowest of those who did not know. Those with higher education in Group 1 were more likely to not agree with the statement than the ones with a lower education level (p=0.080).

*Attitude towards **vitamin A capsules**: "At the same workshop, a lady said that it is because these foods and others like carrots and orange-fleshed sweetpotato contain vitamin A which is important for eye-sight and child health. She said many families in Kampala cannot get these foods and so should make sure that their children are given vitamin A capsule supplements every 6 months. Do you agree with this?"*

Overall, 61% of respondents did agree and 20% strongly agreed. There are no significant differences between the different groups. But in the control group, significantly more respondents with higher education did agree with the statement than respondents with lower education level (p=0.039).

*Attitude towards **nutrition**: "While opening a workshop on health in Kampala last year, one LC111 chairman told the audience that some children in Uganda are becoming blind because they are not eating certain foods such as eggs, dark green leafy vegetables (DGLV), papaya and pumpkins. Do you agree with this?"*

Overall, 48% of respondents agreed, 19% did not agree and 18% didn't know. Significant differences exist between the different groups (see Table 8).

Table 8: Attitude that lack of orange fruits/vegetables and DGLV causes blindness by intervention group (% within intervention group)

	Group 1	Group 2	Group 3	Control
Do agree	50.0	40.8	52.9	47.9
Do not agree	15.5	17.5	22.1	19.7
Don't know	10.3	23.3	15.4	23.9

F-value: 25.44; p-value: 0.013

Group 1 and 3 (nutrition education) have the highest percentages of respondents who did agree with the statement. In addition, Group 1 has the lowest share of those who did not agree, and of those who did not know. Education level did have a contrasting influence depending on the intervention group – in Group 1 significantly more respondents with lower education did agree with the statement (p=0.006) and in Group 3 significantly more respondents with higher education did agree with the statement (p=0.052).

*Attitude towards **nutrition**: "Some parents in Kampala have refused to grow OFSP believing it is dangerous to health. Do you agree with this?"*

In Group 1, 90% of respondents did not agree with the statement; in the control group, only about 50% did not agree. The differences between the groups are statistically significant (p=0.000; see Table 9).

Table 9: Attitude that OFSP is unhealthy by intervention group by education level (% within intervention/education group)

Do not agree	Group 1	Group 2	Group 3	Control
Total	89.7	84.2	68.3	41.9
Lower education level 1	82.1	88.9	66.0	29.2
Higher education level 2	96.7	80.3	70.6	50.7
F (Pearson's chi-square)	6.86	1.95	0.25	9.60
p-value	0.077	0.377	0.618	0.048

The education level does not influence respondents' attitude towards growing OFSP, except in the control group. Significantly more respondents with higher education level did not agree with the statement compared to the percentage of respondents with lower education level (p=0.048).

Production

The majority of respondents of the groups that had received the agricultural intervention reported having grown OFSP (Group 1: 86%; Group 2: 92%), most of them in 2004 and 2005**;** in Group 3 half of the respondents had grown OFSP (46%) and in the control group only 10% (p=0.000). Urban farmer respondents (with better access to land) who received vines and/or nutrition education were more likely to grow OFSP than respondents with another occupation (see Table 10). This is statistically significant in Group 3 only.

Table 10: OFSP production by occupation of respondent by intervention group (% within occupation group)

Ever grown OFSP	Group 1	Group 2	Group 3	Control
Urban farmer	94.4	96.3	80.0	13.3
Other occupation	82.5	90.3	42.6	9.8
F (Pearson's chi-square)	2.98	0.98	5.10	0.18
p-value	0.084	0.323	0.024	0.674

In Group 3, the majority of respondents who had heard about OFSP and seen it but had not grown any OFSP reported that they hadn't gotten vines; in the control group, the reasons advanced were: not gotten vines or didn't know enough about OFSP.

About two-thirds of respondents in Groups 1-3 who had grown OFSP had received the vines from the schools' OFSP project; in the control group, the majority who had grown OFSP had received vines as a free donation from fellow farmers.

The main motivation for growing OFSP varied considerably between the different groups. About half of the respondents of Groups 1-3 were motivated by the nutritional value of OFSP (see Table 11), whereas in the control group respondents had chosen OFSP because of the attractive flesh color or because they wanted to try something new (p=0.000).

Table 11: Main motivation for growing OFSP by intervention group (% within intervention group)

n=268, multiple answers	Group 1	Group 2	Group 3	Control
Nutritional value of OFSP	62	46	53	0
Multiple utilization of OFSP varieties	23	28	17	9
Attractive flesh color	4	3	6	46
Wanted to try something new	3	6	17	18

F-value: 66.45; p-value: 0.000

For 51% of those who had grown OFSP the favorite variety was Kakamega, 37% preferred Ejumula, and 10% had no preference.

Overall, 66% of the respondents said that they would continue growing OFSP because of its high nutritional value, 12% because it is very high yielding and 10% because the taste is liked. The high nutritional value was mentioned by two-thirds of respondents in

Groups 1 (77%) and 3 (75%) (both groups received the nutrition intervention), by half (56%) in Group 2 and only one-third (30%) in the control group. In Group 3, which received the nutrition education but not the agricultural intervention, the high yielding argument was articulated by very few respondents only (2%).

Overall, 78% indicated that they were planning to grow OFSP in the next season. In Groups 1 and 2 this was true for the majority of respondents (90% and 85% respectively); in Group 3 and the control group, 68% in each indicated planning to grow OFSP in the next season (p=0.000). In the latter two groups vine availability was expressed as a problem. In addition, Group 3 respondents mentioned farming land availability as a constraint and in the control group about one-third of the respondents indicated not knowing enough about OFSP.

More urban farmer respondents than non-farmer respondents in the agricultural intervention groups expressed that they would grow OFSP in the next season. The differences are though not statistically significant.

Consumption

The majority of respondents in Groups 1 and 2 had eaten OFSP (97% and 98% respectively), but only 25% of respondents in the control group had consumed OFSP (Group 3: 68%) (p=0.000). Urban farmer respondents were more likely than non-farmer respondents to consume OFSP in the household if they had received the nutrition education (see Table 12). The differences are though not statistically significant.

Table 12: OFSP consumption by occupation of respondent by intervention group (% within occupation group)

Ever eaten OFSP	Group 1	Group 2	Group 3	Control
Urban farmer	100.0	96.3	80.0	26.7
Other occupation	95.0	98.9	67.0	24.5
F (Pearson's chi-square)	1.86	0.88	0.70	0.17
p-value	0.172	0.348	0.402	0.917

OFSP was mostly eaten boiled or steamed (96% of those who have eaten it), some consumed as juice (30%), some as mandazi/chapatti/cake (37%) and a few ate the steamed or boiled leaves (15%). Over 90% of respondents in the three intervention groups expressed that they would prefer to give OFSP to their children instead of other varieties grown, mainly because of the better nutritional value of OFSP and its vitamin content; in the control group still 67% would prefer to give OFSP to their children, mostly for the same reasons (p=0.013).

RESULTS ON FOOD FREQUENCY OF YOUNG CHILD 2-6 YEARS OLD

The food frequency questionnaire gathered information on patterns of consumption for 2-6 year old children of a variety of foods and food groups, with an emphasis on vitamin A-rich foods. In addition to a focus on vitamin A-rich foods, foods on the list included all possible fat sources. This is because at least a minimum amount of fat is needed in order to optimize absorption of vitamin A (Jalal et al. 1998; Ribaya-Mercado et al. 2007). Mothers were asked how many days in the last 7 days the focus child had eaten a variety of foods.

Table 13 gives results showing the proportion of 2-6 year old pre-school children in households who have had each food/group at least once in the last week, and the proportion having had the food/group 3 or more days in the last week. The former (having had food at least once) can be seen as a proxy for availability of and access to the food, either from markets or from their own production. For some very nutrient-dense foods – particularly those rich in fat-soluble vitamins and minerals for which there are large body stores – even infrequent consumption can be nutritionally meaningful. However, in general, foods eaten at least 3 days in the previous week are more likely to make a large and meaningful contribution to nutrient intakes.

The results are presented by intervention group. A meaningful difference between the intervention groups exists for the consumption of OFSP. As expected, only a few children in the control group had consumed OFSP at least one day in the last week. A higher percentage of children in the group that had received both agriculture interventions and nutrition education consumed OFSP at least one day in the last week and consumed OFSP more frequently (three days or more in the last week) than children in the two other groups that had only had one of the two interventions (Group 2 or 3). There are other statistically significant differences between the intervention groups, but it is not clear if these differences are due to the project interventions or to differences in preferences, availability and access to foods.

Staple grains, legumes and nuts

In all groups, children ate a variety of starchy staples, including matooke, cassava, jam, maize, millet, rice and wheat products (chapatti, bread etc.). Legumes, nuts and seeds provide protein and fat (especially nuts/seeds), as well as micronutrients. Sixty-four percent of the children have had legumes 3 or more days in the previous week, and 46% had groundnut or cashew (very few were reported to have other seeds regularly).

Animal source foods

Animal source foods, rich in high quality protein and bioavailable micronutrients, were not consumed regularly by at least two-thirds of the children. Milk of any type was an exception with about 60% consuming it at least 3 days in the last week. Fish, red meat and eggs were consumed at least 3 days in the last week by about one fourth of the children. Chicken and liver were rarely consumed regularly.

Fats

The main sources of fat for the majority of children were foods cooked in or fried with oil. A very high percentage of children (91%) have had such foods 3 or more days in the previous week. Most of the oil used during cooking seemed to be fortified as 88% of the children had fortified cooking oil 3 or more days in the last week. Other fat sources were consumed by at least one fourth of the children more regularly (3 or more days in the previous week): groundnut or cashew (46%), vitamin A fortified margarine (32%) and avocado (21%). These data indicate that children are getting some fat source every day, which is important from the standpoint of nutrition.

Vitamin A-rich foods

Vitamin A-rich foods on the questionnaire included several animal source foods (liver, eggs with yolk, dried small fish eaten whole); ripe mango and papaya; a variety of dark green leafy vegetables; pumpkin, carrots and yellow- and orange-fleshed sweetpotato; and several fortified products (margarine, cooking oil, other foods). Current child feeding guidance (PAHO/WHO 2003; WHO 2005) recommends that infants and young children over 6 months of age should be fed vitamin A-rich foods every day. Vitamin A in animal source foods is most bioavailable, but as noted above these foods were not eaten regularly by about 75% of the children. Vitamin A rich fruits were not eaten regularly. Nearly half of the children (47%) consumed ripe papaya at least one day in the last week, but only 14% have had papaya 3 or more days. Dark green leafy vegetables (DGLV) were eaten by the majority of children (mostly amaranthus and eggplant leaves); 83% have had DGLV in the past week, and 52% had DGLV 3 or more days. Pumpkin and carrots were eaten by about half of the children at least one day in the previous week (40% and 47% respectively), but much fewer children have had pumpkin and carrots more regularly (12% and 26% respectively).

Sweetpotato

White-fleshed sweetpotato (WFSP) was more frequently consumed than yellow (YFSP) or OFSP. Over the previous week, nearly two-thirds of children (71%) had WSP at least once, half of the children (47%) had YFSP, 31% had OFSP and 18% had both YFSP and OFSP. 20% had eaten WFSP 3 or more days in the last week, and much less had YFSP (12%) or OFSP (9%).

Fortified foods

Fortified foods can be very important sources of micronutrients, including vitamin A; these foods are recommended to fill nutrient gaps when diet quality is low. The food frequency questionnaire included questions on the fortified products that could have been available in the study area: Cerelac and other fortified complementary foods. Twenty percent of the children were reported to receive these fortified products at least one day in the last week. Few children (8%) received multivitamin pills at least once in the last week. On the contrary, as stated above, fortified cooking oil was consumed by the majority of children (94%) and vitamin A fortified margarine by half of the children (49%) at least once in the previous week.

Table 13: Frequency of consumption of foods and food groups by focus children during previous week, by intervention group

	One or more days in the last 7 days (%)						Three or more days in the last 7 days (%)					
					Equality of means or proportions test						Equality of means or proportions test	
Variable	Group 1 Ag and nutr	Group 2 Ag alone	Group 3 Nutr alone	Group 4 Control	F	(p-value)	Group 1 Ag and nutr	Group 2 Ag alone	Group 3 Nutr alone	Group 4 Control	F	(p-value)
Staple grains, roots, tubers												
Matooke, cassava, jam	99	99	96	98	3.59	(0.31)	71	81	72	81	5.35	(0.15)
Maize, millet, sorghum, other cereal	88	90	99	92	8.06	(0.045)	63	68	88	72	15.01	(0.002)
Rice	92	97	84	94	10.94	(0.012)	58	65	40	62	13.96	(0.003)
White fleshed sweetpotato	70	71	77	68	2.32	(0.51)	20	20	19	21	0.13	(0.99)
Wheat product (chapatti, bread, biscuits, cookies etc.)	99	100	97	100	6.76	(0.08)	88	94	77	91	13.37	(0.004)
Vitamin A-rich roots, tubers												
Orange-fleshed sweetpotato	52	34	39	3	57.40	(0.000)	16	9	13	0	16.06	(0.001)
Yellow-fleshed sweetpotato	47	49	47	47	0.10	(0.99)	14	16	13	8	2.68	(0.44)
Legumes, nuts												
Beans (any kind)	98	92	97	98	6.60	(0.09)	65	69	55	66	4.67	(0.20)
Groundnut or cashew	87	91	89	88	0.63	(0.89)	43	54	41	48	3.54	(0.32)
Animal source foods - vitamin A sources												
Liver	11	7	17	18	6.91	(0.08)	0	2	2	0	4.26	(0.24)
Eggs w/yolk	71	68	71	75	1.11	(0.78)	27	26	31	27	0.59	(0.90)
Dried whole fish powder (w/liver)	63	69	71	47	14.93	(0.002)	30	33	24	19	5.57	(0.13)
Other animal source foods												
Fresh/dried fish (tilapia, nile perch etc.)	64	71	78	81	8.31	(0.040)	13	16	21	20	2.88	(0.41)
Meat (beef, pork, goat, mutton etc.)	77	77	77	83	1.42	(0.70)	26	19	24	31	4.39	(0.22)
Chicken	24	21	24	29	2.04	(0.56)	1	1	1	1	0.01	(1.00)
Milk (any type), fresh/powdered/condensed, yoghurt	82	81	81	77	1.06	(0.79)	66	55	63	53	5.02	(0.17)
Vitamin A-rich fruits												
Ripe mango	17	21	21	22	0.93	(0.82)	4	3	2	2	0.99	(0.81)
Ripe papaya	50	52	34	39	7.76	(0.051)	16	14	11	12	1.01	(0.80)

Table 13: continued - Frequency of consumption of foods and food groups by focus children during previous week, by intervention group

	One or more days in the last 7 days (%)						Three or more days in the last 7 days (%)					
					Equality of means or proportions test						Equality of means or proportions test	
Variable	Group 1 Ag and nutr	Group 2 Ag alone	Group 3 Nutr alone	Group 4 Control	F	(p-value)	Group 1 Ag and nutr	Group 2 Ag alone	Group 3 Nutr alone	Group 4 Control	F	(p-value)
Vitamin A-rich vegetables												
Pumpkin	48	40	30	41	6.89	(0.08)	13	17	8	10	3.62	(0.31)
Carrots	40	47	48	52	2.69	(0.44)	22	28	25	30	1.87	(0.60)
Dark green leaves (any type)	87	87	86	73	10.34	(0.016)	55	57	56	42	5.25	(0.15)
Eggplant leaves	63	60	49	46	8.35	(0.039)	21	22	19	12	3.76	(0.29)
Amaranthus leaves	77	59	78	58	16.39	(0.001)	37	27	36	21	7.91	(0.048)
Sweetpotato leaves	5	3	2	1	3.27	(0.35)	2	1	0	0	3.65	(0.30)
Hibiscus leaves	2	1	6	7	6.26	(0.10)	0	1	0	3	5.65	(0.13)
Whole chilies	6	4	6	7	0.84	(0.84)	3	1	5	2	2.47	(0.48)
Fat sources												
Seeds (sesame, pumpkin)	17	18	23	22	1.68	(0.64)	6	9	13	6	3.24	(0.36)
Avocado	47	56	56	43	4.33	(0.23)	23	25	21	15	3.15	(0.37)
Butter	4	8	6	6	1.41	(0.70)	1	2	2	2	0.46	(0.93)
Vitamin A fortified margarine	55	43	41	55	6.01	(0.11)	37	29	30	31	1.72	(0.63)
Cod liver oil	1	3	2	2	0.98	(0.81)	1	1	1	1	0.01	(1.00)
Fortified cooking oil	96	95	98	89	7.62	(0.054)	85	90	92	85	3.19	(0.36)
Foods or sauce cooked in or fried with oil	97	99	100	97	3.68	(0.30)	84	92	96	93	8.02	(0.046)
Other fortified foods												
Packaged fortified foods such as Cerelac etc.	25	20	14	21	3.97	(0.27)	15	12	13	12	0.37	(0.95)
Multivitamin pills	4	9	7	10	2.88	(0.41)	1	3	2	7	5.97	(0.11)

Notes: Sample size is 379. In the sixth and seventh (and twelfth and thirteenth) columns, we present an F-statistic and a P-value for the hypothesis test that all four proportions are equal (Pearson\s chi-square test)

The education level did have an influence on the consumption frequency of OFSP (see Table 14). Young children in Group 1 were more likely to receive OFSP more frequently (3+ days in last week) if the respondent had a higher education level (secondary school up to university). Differences in the other groups were not statistically significant.

Table 14: OFSP consumption frequency of young children by education level of respondent by intervention group (% within education group)

	Group 1	Group 2	Group 3	Control
OFSP 3+ days last week				
Lower education level 1	6.4	11.4	8.5	0.0
Higher education level 2	26.1	7.7	17.9	0.0
F (Pearson's chi-square)	6.67	0.38	1.70	
p-value	0.010	0.539	0.192	
OFSP 1+ days last week				
Lower education level 1	51.1	34.1	34.0	2.6
Higher education level 2	54.3	34.6	43.6	3.8
F (Pearson's chi-square)	0.10	0.003	0.82	0.10
p-value	0.751	0.957	0.365	0.747

DISCUSSION

Summary of key findings

A cross-sectional survey was undertaken to compare areas 'with' and 'without' different interventions. The following four-group comparison structure was used (5 schools in each group):

- Group 1: Agricultural Technologies/Extension & Nutrition Education
- Group 2: Agricultural Technologies/Extension only
- Group 3: Nutrition Education only
- Group 4: No intervention (control)

Awareness

Respondents are aware of OFSP in the intervention groups. All respondents in Group 1 and 2 have heard of OFSP, mostly through the schools OFSP project. In the 3rd group 92% have heard of OFSP, and in the control group significantly fewer respondents (77%) have heard of OFSP. Very few respondents in Groups 1 and 2, and 22% in Group 3, have never seen any orange-fleshed SP roots.

In conclusion, the project interventions helped to make respondents aware of OFSP, but most of them knew already of vitamin A; the ones with higher education were more likely to have heard about vitamin A.

Knowledge

Knowledge of vitamin A rich plant foods is lowest in the control group compared to the three intervention groups. Clearly, the respondents in Group 1 were more knowledgeable than respondents in other intervention groups: nearly half of them could identify three vitamin A rich foods. Higher education had a positive impact on knowledge of vitamin A rich plant foods. Similarly to the knowledge of vitamin A rich plant foods, the knowledge of vitamin A rich animal source foods was lowest in the control group compared to the three intervention groups. Higher education was positively correlated with higher knowledge of vitamin A rich animal source foods.

In conclusion, project participation seems to have made a difference in knowing more details about vitamin A.

Production
The majority of respondents of the groups that had received the agricultural intervention reported having grown OFSP (Group 1: 86%; Group 2: 92%), mostly in 2004 and 2005**.** In Group 3 half of the respondents had grown OFSP (46%) and only 10% in the control group had grown OFSP. Urban farmers were more likely to have grown OFSP than the respondents with other occupations. The motivation for growing was different in the three intervention groups compared to control groups (nutritional value being predominant in intervention groups). The majority of respondents planned to plant OFSP in the next season in Groups 1 and 2. In Group 3 and the control group, many fewer respondents said that they plan to plant OFSP in the next season, mainly because vine availability was expressed as a problem.
In conclusion, access to vines and land are major determinants for OFSP production.

Consumption
The majority of respondents in Groups 1 and 2 had eaten OFSP (97% and 98% respectively), but only 25% of respondents in the control group had consumed OFSP (Group 3: 68%) – urban farmers were more likely to have eaten OFSP when they had received the nutrition education (Groups 1 and 3) than respondents with other occupations. In intervention groups, OFSP was voiced as the preferred SP variety to give to their children mainly because of its better nutritional value.
The percentage of young children (2-6 years old) that consumed OFSP at least once per week or more frequently (three days or more in the last week) was highest in Group 1. In addition, they were more likely to receive OFSP more frequently (3+ days in the last week) if the respondent had a higher education level (secondary school up to university).
In conclusion, access to vines, growing OFSP and exposure to nutrition education are key factors for the consumption of OFSP.

Schoolchildren
The results from the schoolchildren KAP are in line with the results from the main KAP respondents presented above. In intervention groups all schoolchildren had heard about OFSP (versus only 39% in the control group). All schoolchildren in Group 1 and 2 were able to at least cite one vitamin A rich food (Group 3: 82%, control group: 61%). More schoolchildren in Group 1 (77%) than in Group 2 (60%) had planted vines received at school. Schoolchildren reporting consumption of OFSP prepared at home was highest in Group 1 (100%) and in Group 3 (91%) compared to 56% in Group 2, and 75% in the control group. The majority of schoolchildren who had eaten OFSP voiced that they would prefer OFSP if they were to choose between eating OFSP and WFSP, mainly because OFSP contains vitamin A, tastes better and is sweeter. In conclusion, the results demonstrate that the impact is greatest when schoolchildren participate in both interventions (Loechl et al. forthcoming).

Implications for programs and policy

The impact demonstrated above on OFSP awareness, knowledge, production and consumption suggests that schools are useful venues for combined agricultural and nutrition interventions. Schools are centralized locations in communities and may be an effective means for reaching large numbers of households (Andrade *et al.* 2009). But with the current dataset we are not able to evaluate whether schoolchildren are effective transmitters of technologies from school to household. The data do not allow assessing the levels of adoption by parents/communities that can be specifically attributed to schoolchildren's efforts. However, the results are plausible (Habicht *et al.* 1999) and

confirm that two interventions are better than one or nothing (control group). Access to vines proves to be crucial to production and consumption of OFSP.

Another example of a school-based intervention is the national school nutrition program in South Africa. It is in its initial stages and the activities focus on the management of the gardens (Maduna, 2008). The program works in collaboration with the Agricultural Research Council and FAO and will generate important lessons regarding public sector support of school garden initiatives, and the impact on schoolchildren's knowledge and adoption of OFSP in schoolchildren's households (Andrade *et al.* 2009).

Lessons learned with respect to evaluation

At design stage

- Lack of a Monitoring & Evaluation system right from the beginning, focus was on dissemination in agricultural component.
- Post-post comparison generated interesting results, but does not allow to evaluate effectiveness of using schools as OFSP dissemination points – need for further research.
- Stick to simpler indicators when design is not rigorous; for example, quantitative dietary assessment, which requires huge resources, should not be included.
- Think about nutrition and health impact at design stage, and integrate it right from the beginning.
- Think about the pathway to behavior change, and select indicators to measure accordingly.

With respect to documentation of implementation/link to agricultural intervention

- Relates to last two points of the design lessons – integrate nutrition and health right from the beginning.
- Implementation: lack of links between different components and survey modules.
- Careful documentation of populations and links between them –population reached, population sampled.

At analysis stage

- Stratification by education level and type of occupation was important – there was relevant heterogeneity in the data set.

Further research suggestions

1. Effectiveness of using schools versus other venues – schools as avenues for OFSP dissemination. Limited work has been done so far to measure the differential impact of food-based interventions through schools. In fact, one future research area set out in a recent CIP-Social Science working paper (Andrade et al. 2009) is: "Understanding whether school children are effective entry points for knowledge and technology transmission to other household members".

2. Tracking of schoolchildren – parent interactions and assessing the levels of adoption by parents/communities that can be specifically attributed to schoolchildren's efforts, as suggested also by Kapinga *et al.* (undated).

3. Schoolchildren – household interaction - evaluate particularly if pupil girls who have to take care of younger siblings are more likely to feed them OFSP if they have learnt about the nutritional benefits of it.

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APPENDICES

I. Schedule of schools and training sessions
II. TOT Manual for nutrition education component
III. HKI FFQ
IV. Main KAP questionnaire
V. Additional relevant results

Appendix I - Schedule of schools and training sessions

DIVISION	NAME OF SCHOOL	SESSION	DAY	MONTH	YEAR
KAWEMPE	CLEVELAND HILL PRIMARY SCHOOL	1	19	2	2005
		2	14	9	2005
		3	15	10	2005
		4	5	12	2005
	KISASI PRIMARY SCHOOL	1	18	2	2005
		2	2	10	2005
		3	1	12	2005
	ST.ANDREWS KOMAMBOGA PRIMARY SCHOOL	1	22	2	2005
		2	13	10	2005
		3	20	11	2005
		4	10	12	2005
	TTULA C.O.U PRIMARY SCHOOL	1	21	2	2005
		2	12	10	2005
		3	6	12	2005
	VALLEY ST. MARY'S PRIMARY SCHOOL	1	17	2	2005
		2	1	3	2005
		3	3	12	2005
NAKAWA	KYAMBOGO PRIMARY SCHOOL	1	1	9	2005
		2	14	10	2005
		3	16	11	2005
		4	7	12	2005
	KYANJA MOSELEM PRIMARY SCHOOL	1	30	8	2005
		2	9	9	2005
		3	7	10	2005
		4	7	12	2005
	MBUYA C.O.U PRIMARY SCHOOL	1	10	9	2005
		2	8	10	2005
		3	8	12	2005
		4	10	12	2005
	POLICE CHILDREN'S SCHOOL NTINDA	1	31	8	2005
		2	11	10	2005
		3	30	11	2005
	ST. PAUL BANDA PRIMARY SCHOOL	1	5	9	2005
		2	16	10	2005
		3	30	11	2005

Appendix II – Training of trainers (TOT) manual for nutrition education component

INTRODUCTION

This manual has been prepared to aid in the training and guiding of trainers in urban and peri-urban communities to conduct nutrition education aimed at promoting orange-fleshed sweet potatoes (OFSP) and prevention of vitamin A deficiency. The content is based on a rapid assessment of nutritional knowledge and awareness related to vitamin A carried out on a small sample of Kampala residents in March 2003. The manual does not cover extension education or group management skills as these are more appropriately covered in another manual designed for training of farmers in agricultural technologies and skills related to promotion of OFSP.

Module 1:
This module will have two topics

1. Nutrition in health and disease aimed at increasing knowledge of farmers about the relation between good nutrition and good health and bad nutrition and poor health.
2. Child health and nutrition.

WHAT IS VITAMIN A?

Vitamin A is one of several vitamins (others include vitamin B complex, vitamin C, vitamin D, Vitamin E and K) which the human body needs in very small amounts but are VERY IMPORTANT for good health and development.

Vitamin A is particularly needed in the body for:

1. Proper growth and development.
2. Protection against infections and diseases.
3. Reducing severity of infections (shorter episodes).
4. Promotion of good eyesight.
5. Helping the body to stay strong and healthy.
6. Maybe helping to slow the pace of HIV disease and reducing frequency of some opportunistic infections.

What happens if a person does not have vitamin A in the body?

When a person lacks enough vitamin A in the body, the doctors say he or she is VITAMIN A DEFICIENT.

A person who is vitamin A deficient will suffer from one or more of the following conditions;

- Will not grow and develop properly.
- Will be more susceptible to infections and diseases such as coughs, diarrhea, measles.
- Might suffer from night blindness which is a condition of reduced ability to see in dim light.

- Might become totally blind.
- Will die if not treated.
- Pregnant mothers who are vitamin A deficient experience general poor health and weakness.
- Children born to mothers who are vitamin A deficient may have low birthweight, die before birth and not develop properly.
- Women who are Vitamin A deficient may suffer reproductive infertility (failure to conceive, abortions, pre-term birth, etc).
- Men and women who are Vitamin A deficient may be more susceptible to HIV infection.

Who is most affected by vitamin deficiency? Who needs vitamin A?

Vitamin A is important and needed by the whole family (Adults and children, young and old) BUT it most needed by:

- Young growing children (up to 6 years of life) because:
    - Children grow very fast and vitamin A helps in body growth and development.
    - A child's immune system (the body's defense against infections) is still young and is therefore open to risk from many infections such as coughs, measles, diarrhea, malaria, etc. Vitamin A helps to build the child's protection against these infections.

- Pregnant and breastfeeding mothers because:
    - Pregnant women with babies growing in their wombs are nourishing two people.
    - The normal changes in the mother's body during pregnancy: weight gain, need for more blood, etc., to support the growing baby.
    - In breastfeeding the mother's body manufactures milk which contains vitamin A for the baby.

- Old and sick people because:
    - Old age brings several frailties such as declining eyesight, body weakness and increased susceptibility to infections.
    - Sick people need to help their bodies repair themselves and gain strength after sickness.

WHAT CAUSES VITAMIN A DEFICIENCY

- The main cause of vitamin A deficiency in Uganda and many countries of Africa is POOR DIET which is LOW in VITAMIN A.
- Vitamin A deficiency is also caused by repeated sicknesses which use up all the vitamin A the body has stored.
- Infection by worms causes poor absorption of vitamin A leading to deficiency.

Why should the people of Uganda and Kampala be concerned about vitamin A deficiency? Why should we learn about it?

- Vitamin A deficiency is a serious health problem in Uganda which is responsible for large numbers of children in poor health, mental and physical retardation, and sometimes blindness and death.
- It affects about 20 percent (one out of every five) children and nearly 40 percent (two out of every five) of women.
- Poor people are the most affected.

If we do not take action,

- Uganda will continue to be a country of low population because of child deaths (consider all of Africa with about one third of the world's land mass has less that one sixth of the world's population.
- Uganda will have a population of short, weak and unproductive people due to poor physical and mental growth.
- Uganda as a country and individual families will have the huge financial burden of caring for a big number of constantly sick children and adults.
- The gap between the rich (who can often get enough vitamin A and other nutrients) and the poor (who are most affected by vitamin A deficiency) will grow wider as the poor will be trapped in poor health and poverty.

What should we do and what is the government of Uganda doing to reduce vitamin A deficiency?

The Strategic Health Plan of the government of Uganda has prioritized prevention and control of vitamin A deficiency. The main approaches adopted for this purpose have been:

1. Promoting increased availability and consumption of Vitamin A-rich foods by all people but especially children and pregnant/breastfeeding mothers.
2. Addition of vitamin A to widely consumed foods (food enrichment).
3. Periodic supplementation of high risk groups (mothers and children below 6 years) with high dose vitamin A capsules (mass vitamin A supplementation).
4. Periodic de-worming of susceptible groups (children) to reduce vitamin A loss.

Families have the power to reduce vitamin A deficiency by:

1. Growing and eating foods rich in vitamin A.
2. Taking children 6 months to 6 years old to receive vitamin A capsules on scheduled child-health days (twice a year).
3. Allowing their children to take vitamin A when the doctors recommend it.
4. Mothers should take vitamin A capsule within two months after birth so that their breast milk will contain vitamin A for the baby.

PROMOTING GROWING AND CONSUMING VITAMIN A-RICH FOODS TO FIGHT VITAMIN A DEFICIENCY

Growing and eating foods that are rich in vitamin A is the most SUSTAINABLE way to fight vitamin A deficiency because:

1. Natural foods are GOD-GIVEN and have no side-effects on health when consumed by adults and children.
2. Foods can SUPPLY OTHER nutrients apart from vitamin A.
3. Food is CHEAPER and can be grown by people themselves.
4. Families enjoy GREATER FREEDOM AND POWER when they can grow their own food according to their needs and tastes.

Which are the vitamin A–rich foods available to us?

- Vitamin A is available in foods from plant sources as well as animal sources.
- Animal foods contain vitamin A in its true form that is readily used by the human body. Therefore animal foods are the best sources of vitamin A.
- Plants contain vitamin A in a form of beta-carotene and other carotenoids which the human body converts to the true form after digestion.

Animal foods rich in vitamin A include:

1. Eggs (egg yolks).
2. Liver (mammal).
3. Milk.
4. Butter.

Advantage of animal source foods: They contain vitamin A in readily usable form
Disadvantage of animal source food: They are expensive and not available to everyone

Plant foods rich in beta-carotene (provitamin A)

1. Dark green leafy vegetables (nakati, ddoodo, malakwang, cassava leaves, pumpkin leaves, bean leaves, spinach, sukumawiki, etimpa, etc.).
2. Carrots.
3. Orange-colored fruits (papaya, mangoes).
4. Pumpkins.

Advantage of plant source: They are cheaper and available to both poor and rich people
Disadvantage: Plant foods rich in beta-carotene are not consumed in sufficient quantities and are rarely fed to children who need it most.

Key Message: Consumption of plant foods rich in vitamin A can supply the vitamin A required by the body as adequately as the consumption of animal foods.

Animal foods should be given to children and mothers whenever possible because they contain vitamin A in a readily usable form and contain other nutrients needed by children and pregnant and breastfeeding women. They should be the first choice where affordable.

Using orange-fleshed sweet potatoes to prevent vitamin A deficiency in Uganda = a common sense solution.

What are Orange-Fleshed Sweet Potatoes (OFSP)?

- This is a type of sweet potato whose inside flesh (NOT the skin) is orange in colour.
- The orange colour resembles that of carrots, pumpkins, ripe paw paws and mangoes and is due to the presence and high concentration of beta-carotene. Beta-carotene is the substance which the human body converts to vitamin A.
- The OFSP is a high beta-carotene, high vitamin A food source.
- OFSP is like any other sweet potato with the only differences being in:
    1. COLOUR: OFSP is orange and other sweet potatoes are white or yellow.
    2. VITAMIN A (BETA-CAROTENE) CONTENT: OFSP has a high vitamin A content while others sweet potatoes DO NOT contain vitamin A.

OFSP is grown, harvested, and eaten like any other potato.

Why promote orange-fleshed sweet potatoes?

OFSP has been dubbed a 'common sense solution' (**KIRI MU GLASI**) to the vitamin A deficiency problem in Uganda, Rwanda, Tanzania and other countries for the following reasons:

- OFSP has a high concentration of vitamin A.
- Sweet potatoes are generally cheaper and affordable compared to eggs, liver, milk and butter. Therefore OFSP is a cheaper source of vitamin A.
- Sweet potato of all varieties is already a major staple for almost 90 percent of Uganda. In Kampala, sweet potato is the major food crop grown by farmers. Therefore:
    - Most people already know how to grow it.
    - Both children and adults can eat it (compared to leafy vegetables which are mostly served to adults.

Replacing white-fleshed sweet potatoes with OFSP can therefore reduce vitamin A deficiency in a large number of people at very low cost.

Appendix III – Food frequency questionnaire

OFSP IMPACT STUDY, KAMPALA 2006
FOOD FREQUENCY FOR REFERENCE CHILD
*(based on Helen Keller International questionnaire)**

Household Identification	Division code ☐
	Parish name
	Zone name
	Household Code ☐
F01. Recall day of the week (*Monday, Tuesday, etc.)*	
F02. Date	
F03. Name or initials of interviewer	
F04. Name of interviewee (child's caregiver)	
1. Father 2. Mother 3.Grandmother 4. Other relative 5. Housemaid 6. Neighbour	☐

Question: Please tell me how many days in the past seven days ---------- ate each of the following foods. Remember that if child ate an item 2 times during the same day, it is still only considered 1 day.

Name of food item	**Number of days eaten in the past 7 days (F07)**
A. Matooke or cassava or yam *(amayuni)*	☐
B. Whole chilies (hot peppers) *(kamulali)*	☐
C. Dark green leaves (of any kind) *(enva endiirwa)*	☐
D. Cows milk/goats milk/powdered/condensed or yoghurt *(bongo, ekiviguto)*	☐
E. Carrots	☐
F. Ripe Mango *(omuyembe omwengevu)*	☐
G. Pumpkin *(ensujju)*	☐
H. Nakati (Boo in case of Luo communities)	☐

*Rosen, D.S., Haselow, N.J. and N.L. Sloan (1993), How to use Food Frequency Method to Assess Community Risk of Vitamin A Deficiency, Helen Keller International, 71 pages

Name of food item	Number of days eaten in the past 7 days (F07)
I. Ripe papaya *(epapali elyengevu)*	
J. Maize, millet, sorghum or other cereal (incl. ugali)	
K. Rice	
L. Sesame seeds or Pumpkin seeds *(entungo oba ebiryo)*	
M. White-fleshed sweet potato	
N. Eggs with yolk	
O. Fresh fish (e.g., Tilapia, Nile perch etc)	
P. Dried fish (e.g., Tilapia, Nile perch etc)	
Q. Whole Fish powder *(mukene, nkejje)*	
R. Groundnut or cashew nut	
S. Orange-fleshed sweetpotato *(lumonde owa kipapali)*	
T. Chicken	
U. Amaranthus leaves *(e.g., Ddoodo, Bbuga)*	
V. Any kind of liver *(ekibumba)*	
W. Sweetpotato leaves *(ebikoola bya malagala)*	
X. Beef or any other meats (pork, goat, mutton etc)	
Y. Butter	
Z. Beans (all kinds)	
AA. Wheat product: chapatti, bread, biscuits, cookies, bread, spaghetti (macaroni), etc.	
BB. Cod Liver Oil (seven seas)	
CC. Fortified cooking oil *(Butto wa Mukwano)*	
DD. Foods or sauce cooked in or fried with oil	
EE. Malakwang	

Name of food item	Number of days eaten in the past 7 days (F07)
FF. Vitamin A fortified margarine (e.g., Blue Band)	☐
GG. Avocado	☐
HH. Yellow-fleshed sweetpotato *(e.g. mbale, soroti)*	☐
II. Packaged fortified foods such as Cerelac, Nan, SMA or African Basic Foods: Baby Soya *(e.g., maganjo, kayebe)*	☐
JJ. Multivitamin pills *(Multivits, Food supplements, e.g., Swiss guard, GNLD, House of Health)*	☐

***Confirm that the dark green leafy vegetable data makes sense.*

If the child did not consume orange-fleshed sweet potato during the past 7 days:

F05. Why did the child not consume orange -fleshed sweet potato during the past 7 days?

_____

_____

Code: ☐

F06. Was orange-flesh sweet potato available from your fields or from the market in the month of:
(0- No 1- Yes 99- N/A, not yet the end of the month)

MAR	APR	MAY	JUNE	JULY	AUG
☐	☐	☐	☐	☐	☐

F07. *IF YES:* In the month of ___ about how many times did the reference child eat OFSP (as root or porridge)?

FREQUENCY (99=N/A)

PERIOD 1- Once a week
2- 2-3 times/week
3- 4-7 times/week 4- none

☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

F08. How much OFSP does the child eat in a day on average? _____

Use play dough to estimate ☐☐☐☐ gms

Appendix IV – Main knowledge, attitudes and practices (KAP) questionnaire

THE IMPACT OF SCHOOL-BASED COMMUNITY NUTRITION EDUCATION ON KNOWLEDGE, ATTITUDES AND PRACTICES AMONG URBAN AND PERI-URBAN FARMING HOUSEHOLDS IN KAMPALA

HH ID NUMBER ☐

1.	SURVEY IDENTIFICATION		
1.1	Interviewer's initials		
1.2	Date of Interview		----------/----------/2006
1.3	Time of interview	Start	
		End	
1.4	Intervention group code		
1.5	Location of respondent Household	Division code ☐ Parish: _____ LC1 Zone/Village: _____ GPS coordinates: East ☐ North ☐	
1.6	Total number of nutrition education sessions attended by respondent (maximum=3)		☐
1.7	Total number of agricultural sessions attended by respondent		☐

2.	RESPONDENT INFORMATION		CODE
2.2	Age of the Respondent	Age (years)	
2.3	Sex of the respondent	1. Male 2. Female	
2.4	Marital status of respondent	1.Single	
		2. Married	
		3. Divorced or separated	
		4. Widowed	
		5. Other explain	
2.5	Respondent's relationship to household head	1. Household head	
		2. Spouse	
		3. Other relative	
		4. House maid	
		5. Other (specify)	
2.6	Maximum level of education attained by respondent	1. No formal education	
		2. Lower Primary (P1-P4)	
		3. Upper Primary (P5-P7) or J1	
		4. Lower secondary school (S1-S4) or J2	
		5. Upper secondary school (S5-S6)	
		6. College (TTC, NTC)	
		7. University	
2.7	Respondents economic occupation	1. Long-term salaried employment	
		2. Casual labourer	
		3. Licensed business owner	
		4. Unlicensed (petty trader)	
		5. Urban Farmer	
		6. Domestic house worker	
		7. Other (specify)	
2.8	How long has the respondent lived in the area	1. < 12 months 2. 1-2 years 3. >2≤5 years 4. > 5≤10 years 5. > 10 years	
2.9	Before coming to Kampala, where did the respondent live?	1. Another part of Kampala 2. Another urban centre (not Kampala) 3. Rural area (outside Kampala) 4. Same area	

3.	RESPONDENT HOUSEHOLD SOCIAL & ECONOMIC CHARACTERISTICS			
3.1	How many people stay regularly in the household and share household food and income	Category	Tally	Number
		Children ≤ 2 years		
		Children >2≤6 years		
		Children >6≤15 years		
		Adults >15-45 years		
		Adults 45-60 years		
		Elderly 60+ years		
3.2	What is the MAJOR source of income for your household?	1. Salaried employment		
		2. Farming		
		3. Casual employment		
		4. Licensed trading/business		
		5. Unlicensed (petty) trading /business		
		6. Remittances from relatives or friends		
		7. Pension		
		8. Other (specify)		
3.3	What is the major source of income for meeting costs of school fees?	1. Salaried employment		
		2. Farming		
		3. Casual employment		
		4. Licensed trading/business		
		5. Unlicensed (petty) trading/business		
		6. Remittances from relatives or friends		
		7. Pension		
		8. Other specify		
		99. Not applicable		
3.4	What is the MAJOR source of meeting costs for Medical treatment of all household members?	1. Salaried employment		
		2. Farming		
		3. Casual employment		
		4. Licensed trading/business		
		5. Unlicensed (petty) trading/business		
		6. Remittances from relatives or friends		
		7. Pension		
		8. Other (specify)		
3.5	What is the MAJOR source of meeting the costs of household food?	1. Salaried employment		
		2. Farm production		
		3. Casual employment		
		4. Licensed trading		
		5. Unlicensed (petty) trading		

		6. Remittances from relatives or friends	
		7. Pension	
		8. Other (specify)	
3.6	What type of housing arrangement do you have for the house you stay in?	1. Owned	
		2. Rented	
		3. Provided by employer	
		4. User rights (no "ownership")	
		5. Other (specify)	
3.7	Construction of house roof	1. Tiled	
		2. New (*at the time of roofing*) iron-sheet	
		3. Scrap iron	
		4. Grass thatch	
		5. Other (specify)	
3.8	Construction of house walls	1. Mud walls	
		2. Concrete or brick walls	
3.9	Construction of house floor	1. Concrete floor	
		2. Earth floor	
3.10	Water source	1. Piped, in house	
		2. Piped, private outside tap	
		3. Piped, public tap	
		4. Public boreholes	
		5. Public spring well	
		6. Other (specify)	
3.11	Do you have electricity in your house?	1.Yes	
		2. No	
3.12	What would you say is the main source of energy for lighting in your house?	1. Firewood	
		2. Paraffin candles	
		3. Paraffin lanterns	
		4. Electricity	
3.13	And what is the main energy source for cooking	1. Firewood	
		2. Charcoal	
		3. Paraffin	
		4. Gas	
		5. Electricity	
		6. Other (specify)	
3.14	Do you employ a domestic servant?	1. Yes 2. No	
3.15	Key assets owned	Radio 1. Yes 2. No	
		Television 1. Yes 2. No	
		Refrigerator 1. Yes 2. No	
		Motor Vehicle 1. Yes 2. No	

		Bicycle	1. Yes 2. No		
		Motorcycle	1. Yes 2. No		
4.	LAND TENURE AND GENERAL FARMING INFORMATION				
4.1	Does the household have access to farming land in or on the outskirts of Kampala?	1. Yes 2. No			
4.2	What is the location, ownership and approximate size of land referred to in (4.1) above		Location 1. Backyard 2. Within home zone 3. Other part of Kampala 4. Outskirts of Kampala	Aggregate Size (acresor sqm)	Land tenure (Ownership) 1. Family owned kibanja 2. Family owned mailo 3. Family Leased 4. KCC/govt land (unpermitted use) 5. Kabaka's land 6. Rented 7. User rights/permission 8. Other
		Plot 1			
		Plot 2			
		Plot 3			
		Plot 4			
4.3	Did you grow any sweet potatoes on any of these plots of land last season (March-June)	1. Yes 2. No.			
4.4	If you grew any sweet potatoes, how much, what varieties and on which plots did you grow it.	Location	Varieties grown	Size of field (acres/m^2/number of mounds)	
		Backyards			
		Within home zone			
		Other part of Kampala			
		Outskirts of Kampala			
4.5	*If you did not grow sweet potatoes on any of the plots mentioned in (4.2) above*, Please state your reasons for not doing so.	1. Sweet potatoes not consumed or rarely consumed in my household			
		2. Did not have any vines			
		3. Sweet potatoes does not yield well here			
		4. Sweet potato is susceptible to disease			
		5. Land too small for sweet potatoes			
		6. Not the season for sweet potato production; eat more in other seasons			
		7. No particular reason			

		8. Other (specify)		
4.6	What other crops did you grow on these plots in the last season (March-June 2006) and how do you rank their importance to you. (*Rank # 1 as the most important to # 6 as the least important)*	Crop	Purpose 1. Mainly commercial 2. Mainly subsistence 3. Medicinal 4. Leisure 5. other	Rank
		1.		
		2.		
		3.		
		4.		
		5.		
		6.		
		7.		
4.7	What, if any, livestock do you keep?	Put a TICK √ if livestock is kept, and CROSS X if livestock is not kept		
		1. None		
		2. Improved chickens, layers		
		3. Improved chickens, broilers		
		4. Improved Chickens, broilers and layers		
		5.Local chickens or other fowl		
		6. Improved dairy cows		
		7. Indigenous cows		
		7. Goats, pigs or sheep		
		8. Other (specify)		
5.	KNOWLEDGE, PRODUCTION AND UTILIZATION OF ORANGE-FLESHED SWEET POTATOES			
5.1	Have you ever heard of orange-fleshed sweet potatoes?	1. Yes 2. No.		
5.2	If yes, what is the source of your first information about the OFSP varieties	1. School OFSP project (attended)		
		2. Other Project		
		3. Media (Radio, TV or newspapers)		
		4. Other farmer in my area		
		5. Local leader in my area		
		6. My child attending one of the schools in the OFSP project		
		7. Friends or other people		
		8. Don't remember		
		9. Other (specify)		
5.3	If at all, when did you first see sweet potato roots with orange-coloured flesh	1. Have never seen any 2. before 1980 3. 1980-1990 4. 1991-2000 5. 2001-before 2004 6. 2004 7. 2005		

		8. 2006		
5.4	Have you or any member of your household eaten orange-fleshed sweet potatoes?	1. Yes 2. No.		
5.5	If you or another household member has eaten orange-fleshed sweet potatoes, please indicate all forms in which you have eaten them. Indicate whether self prepared or bought or given from other source	Form	Eaten? 1. Yes 2. No	Prepared by: 1. Self 2. Bought 3. Promotion 4. Other
		1. Fresh boiled or steamed root		
		2. Juice		
		3. Mandazi, Chapati, cakes, or other products from OFSP flour		
		4. Steamed or boiled s. potato leaves		
5.6	Have you ever grown orange-fleshed sweet potatoes?	1. Yes 2. No.		
5.7	If you have grown OFSP, when did you grow your first crop	1. Before 2004 2. First season 2004 3. Second season 2004 4. First season 2005 5. Second season 2005 6. First season 2006 7. Not yet grown		
5.8	If you have heard and seen OFSP, but have not grown any, please give your reasons.	1. Do not grow any sweet potatoes. 2. No yet got vines 3. Sceptical about its safety to health 4. Skeptical about its effect to other crops 5. Do not know enough about it 6. Other (specify)		
5.9	If you have grown OFSP, where did you get the first vines for growing your first crop?	1. Schools OFSP Project MEETING distribution 2. School nursery bed (RMT) 3. School garden (previous crop) 4. Community nursery bed (RMT) 5. [redacted] 6. Child's nursery bed 7. Free donation from fellow farmer 8. Bought from fellow farmer 9. NGO (specify) 10. Other (specify)		
5.10	What do you think most motivated you to grow OFSP?	1. Wanted to try something new 2. Nutritional value of OFSP 3. Commercial potential of OFSP 4. Attractive flesh colour 5. Children like it		

		6. Multiple utilisation of OFSP varieties	
		7. Other (specify)	
5.11	Out of the OFSP varieties you have grown, which one is your favourite?	1. Kakamega (small leaves)	
		2. Ejumula (big leaves)	
		3. No preference	
		4. Name not known (described)	
		5. Others (specify)	
5.12	Out of the non-OFSP varieties, which one is your favourite?	1. Dimbuka	
		2. Kawogo	
		3. Kyebandula	
		4. Mbale	
		5. Soroti	
		6. Name not known but of ----------flesh colour	
		7. Other (specify)	
5.13	After growing that OFSP variety (refer to 5.6), how do you compare it with the other variety (refer 5.7)?	1. OFSP better 2. Others Better 3. No difference 4. Don't know	
		Yield (*okubala*)	
		Early maturity (*okukula amangu*)	
		Resistance to diseases	
		Resistance to drought (*okugumira omusana*)	
		Marketability (*okufuuna akatale*)	
		Taste (*okuwooma*)	
		Nutritional value (*okubamu ekirisa*)	
5.14	If you compare OFSP and other varieties you grow which would you generally prefer to give your children? Give your reasons	1. OFSP 2. Other varieties	
		Reason:	
5.15	If you were to STOP growing OFSP, what is the SINGLE most important reason you would do so?	1. Poor yields	
		2. Susceptibility to diseases	
		3. Poor marketability	
		4. Susceptibility to drought	
		5. Lack of vines	
		6. Spouse objects or prohibits	
		7. No strong reason to stop as yet	
		8. Very long maturity period	
		9. Other (specify)	
5.16	What is the SINGLE most important reason you would not stop growing OFSP?	1. Very high yielding	
		2. High marketability	
		3. High nutritional value	
		4. Aesthetic reasons (taste)	
		5. None	

		6. Other (specify)					
5.17	Did you plant orange-fleshed sweet potatoes last season (March –June)	1. Yes 2. No					
5.18	If yes, when did you plant		Week 1 (a)	Week 2 (b)	Week 3 (c)	Week 4 (d)	
		March (1)					
		April (2)					
		May (3)					
		June (4)					
5.19	Are you planning to grow OFSP next season?	1. Yes 2. No					
5.20	If not, give your reasons	1. Do not grow any sweet potatoes. 2. Not gotten any vines yet 3. Skeptical about its safety to health 4. Skeptical about its effect on other crops 5. Do not know enough about it 6. Other (specify)					
6.	KNOWLEDGE ABOUT VITAMIN A						
6.1	Have you ever heard of vitamin A?	1. Yes 2. No					
6.2	*If you have heard about vitamin A:* when and where did you first hear about it?	Year: 1. Before 2004 2. 2004 3. 2005 4. 2006					
		Source: 1. Hospital					
		2. Learned about it at School					
		3. Radio/Television					
		4. Newspaper					
		5. Schools OFSP project					
		6. Nutrition education project					
		7. Local politician/health workers					
		8. Neighbour					
		9. Other (specify)					
6.3	Health workers recommend that all members of the family should have enough vitamin A in their bodies. Who in a family do you think needs vitamin	1. ---------- 2. ----------					

	A most?	Give your reasons
6.4	The health workers also teach that children who lack vitamin A are at risk for certain diseases. Can you name health problems you know which affect children who do not have enough vitamin A in their bodies?	1. ---------- 2. ---------- 3. ---------- 4. ----------
		Codes: 1. No correct answer given 2. One correct answer given 3. At least two correct answers given
6.5	Health workers also advise that vitamin A can be found in some but not all of the foods we grow. Can you please tell me 3 plant foods that are rich in vitamin A which should be given to children to eat?	1. ---------- 2. ---------- 3. ----------
		Codes: 1. No vitamin A food known or identified 2. One vitamin A food identified 3. Two vitamin A foods identified 4. Three vitamin A foods identified
6.6	Please tell me also any animal foods which you know to be rich in vitamin A that children should be given.	1. ---------- 2. ---------- 3. ----------
		Codes: 1. No vitamin A food known or identified 2. One vitamin A food identified 3. Two vitamin A foods identified 4. Three vitamin A foods identified
6.7	Medical workers have also advised that while children and adults can get enough vitamin A by eating foods rich in vitamin A, many families are not yet able to get these foods. Can you please tell me how or from what other source children can get vitamin A?	1. ---------- 2. ---------- 3. ----------

		1. No other source known 2. At least one other source known	
6.8	As advised by health workers, vitamin A is available from some but not all the foods we eat. Please name six foods, commonly consumed in your household which are NOT rich in vitamin A.	1. ---------- 2. ---------- 3. ---------- 4. ---------- 5. ---------- 6. ----------	
		Codes: 1. No vitamin A-rich food included 2. One vitamin A-rich food included 3. At least two vitamin A-rich food included	
6.9	Have you heard about foods fortified with vitamin A in the food industry?	1. Yes 2. No	
6.10	If you have heard about it, can you name 3 foods you can buy from the market, supermarket or shop that you know to have been fortified with vitamin A?	1. ---------- 2. ---------- 3. ----------	Codes
		Codes: 1. No correct food identified 2. One correct food identified 3. At least two correct foods identified	
7.	CHILD HEALTH AND FEEDING KNOWLEDGE AND PRACTICES (w.r.t. index child)		
7.1	Who decides what foods to prepare for (index child)?	1. Father 2. Mother 3. Housemaid 4. Grandmother 5. Other specify	
7.2	Who usually prepares (cooks and serves) food or drinks for the (index child) in the morning (breakfast)?	1. Father 2. Mother 3. Housemaid 4. Grandmother	

		5. Neighbour	
		6. Other specify	
7.3	Who usually prepares (cook and serve) food or drinks for the (index child) in the afternoon (lunch)?	1. Father	
		2. Mother	
		3. Housemaid	
		4. Grandmother	
		5. Neighbour	
		6. Other specify	
7.4	Who usually prepares (cook and serve) food or drinks for the (index child) in the evening (supper)?	1. Father	
		2. Mother	
		3. Housemaid	
		4. Grandmother	
		5. Neighbour	
		6. Other specify	
7.5	For lunch, Is food served to (index child) prepared separately or taken from the family meal?	1. Prepared separately 2. Taken from family meal	
7.6	For dinner or supper, is food served to (index child) prepared separately or taken from the family meal?	1. Prepared separately 2. Taken from family meal	
7.7	What, if any, are the foods and drinks served to (index child) that are normally prepared separately?	FOOD/DRINK	CODE
		1.	
		2.	
		3.	
		4.	
		5.	
7.8	*If the food comes from the family meal:* Does the child eat from his/her own plate?	1. Yes 2. No	
7.9	On average, how many main meals (solid or semi-solid food or porridge) does (index child) eat in a day?		
7.10	On average, how many times per day does the child eat snack food of any type in between the main meals?		

7.11	On average, how many times does (index child) drink liquids (hot and cold) in a day?		
7.12	What time does the (index child) normally eat his/her last meal?	1. Early evening (6-8pm) alone or with other children but separately from adults 2. Late evening (after 8pm) with the rest of the family 3. Misses dinner because is sleeping 4. No dinner but a snack	
7.13	How many times in the last seven days has (index child) missed dinner because he was asleep?	1. None 2. Once 3. Two to three times 4. Four meals or more	
7.14	When you want to give your child porridge, what ingredients do you include?	INGREDIENT	CODE
		1.	
		2.	
		3.	
		4	
7.15	Today, there are many girls becoming mothers at a very young age and do not know enough about feeding children. Please tell me how you would advise a young mother to prepare nutritious porridge for a child using milk and maize flour as ingredients		
		1. Correct advice given 2. Unhelpful advice given 3. Respondent has no advice to give	
7.16	Children below 1.5 years are usually unable to chew meat, and mothers fear to give it to them. How would you advise a mother to go about this?		
		1. Correct advice given 2. Unhelpful advice given 3. Respondent have advice to give	
7.17	Most children suffer from flatulence and other stomach problems when they eat beans, what advice would you give to mothers to overcome this problem.		
		1. Correct advice given 2. Unhelpful advice given 3. Respondent have advice to give	
7.18	Have you heard of the word 'kitobero" applied for special preparation of children's food?	1. Yes	
		2. No	
7.19	How many times in the last seven	1. None	

	days did you prepare 'kitobero' for your child?	2. Once 3. 2-3 times 4. More than four times	
7.20	If you did not prepare kitobero for the child in the last seven days, please give reasons why.	Codes: 1 = if reason applies, 0 = reason does not apply	
		1. I do not know how to prepare it	
		2. I can't get the ingredients	
		3. It takes too much time to prepare	
		4. What I give is enough for the child	
		5. No particular reason	
		6. Other (specify)	

		1st ingredient	2nd ingredient	3rd ingredient	4th ingredient
7.21	If you have prepared kitobero in the last seven days or did not but know how to prepare it, can you list ingredients for three different types of kitobero?				
	1				
	2				
	3				
	1. No correct combination listed 2. One correct combination listed 3. Two correct combinations listed 4. Three correct combinations listed				

7.22	Does the index child have an immunisation card?	1. Yes 2. No	
7.23	How comprehensive are the vitamin A capsule supplementation schedules	Codes: 1 = yes; 2 = No 99. Not applicable	

	Observed	Reported	
1. 6 months			
2. 12 months			
3. 18 months			
4. 24 months			
5. 30 months			
6. 36 months			
7. 42 months			
8. 48 months			
9. 54 months			
10. 60 months			
11. 66 months			
12. 72 months			

7.24	If any omissions, what are the reasons for them?	1. Inaccessibility to hospital 2. Mother negative to vitamin A cap 3. Father negative 4. Both parents negative 5. Parent confident of child feeding with respect to vitamin A 6. Taken but not ticked 7. Other (specify)	
7.25	How comprehensive is the vaccination schedule (completeness of the vaccination schedule)?	Codes: 1 = yes; 0 = No	
		1. Day one	
		2. 6 weeks	
		3. 10 weeks	
		4. 6 months	
		5. 9 months	
7.26	Does the index child sleep under a mosquito net? *(Interviewer note: politely request to see the net)*	1. Yes (verified) 2. Yes (not verified) 3. No	
7.27	Some people use cloth to filter tap water to make it clean for children to drink, do you think doing this make the water safe for drinking? Give your reasons.	1. Yes 2. No	
		Reason:	
8.	ATTITUDE TOWARDS NUTRITION, VITAMIN A CAPSULES, IMMUNISATION AND USE OF MOSQUITO NETS		
8.1	Some people believe that regular consumption of green vegetables like ddoodo, nakati, and fruits like ripe mangoes, has helped many children in rural areas to suffer less from measles, coughs, and diarrhea compared to those in Kampala who do not get enough of these foods. How much do you agree with this statement? Give your reasons	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.2	Some politicians believe that although milk is expensive, all children must get it. How much do you agree with this statement? Give your reasons	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	

8.3	There is an argument that consuming large quantities of milk has something to do with the Karimojong and Bahiima being taller than the Baganda or Basoga. How much do you agree with this statement? Give your reasons	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.4	Maria has a child of 1 year of age. She makes sure the child eats breakfast, lunch and dinner each day and also gives her child a snack in the morning and in the afternoon. Her mother-in-law says she is spoiling the child and wasting her time – that the child just needs 2 big meals a day as it is still breastfeeding. How much do you agree with Maria's mother-in-law?	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.5	A lady called Nambi in Entebbe took her child for immunisation. Two weeks later, the child developed a fever and died. Nambi feels strongly that the child died because of the immunization. How much do you agree with Nambi's advice to her neighbours not to take their child for immunisation?	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.6	Some health organisations want the government to make it a punishable offence for parents to refuse to allow their children to be immunised. How much do you agree with this? Give reasons	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.7	Some radio presenters have been telling people that giving children vitamin A capsules is a grand plan by the Bazungu to reduce the population of Africans. How much do you agree with this? Give your reason.	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	

8.8	While opening a workshop on health in Kampala last year, one LC111 chairman told the audience that some children in Uganda are becoming blind because they are not eating certain foods such as eggs, nakati, paw paws and pumpkins. How much do you agree with this? Give your reasons	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.9	At the same workshop, a lady said that it is because these foods and others like carrots and orange-fleshed sweet potatoes contain vitamin A which is important for eyesight and child health. She said many families in Kampala cannot get these foods and so should make sure that their children are given vitamin A capsule supplements every 6 months. How much do you agree with this? Give your reason.	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.10	Some parents in Kampala have refused to grow orange-fleshed sweet potatoes believing it is dangerous to health. How much do you agree with this? Give your reason.	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.11	When Jane's baby was 2 months old, she would give him cow's milk in addition to her breast milk. How much do you agree with this? Give your reason	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	
8.12	Some mothers have refused to use Insecticide-treated mosquito nets believing them to be dangerous to children sleeping under them. How much do you agree with this? Give your reason.	1. I do not agree 2. I somewhat agree 3. I agree 4. I strongly agree 5. I do not know	
		Reasons	

THANK YOU VERY MUCH FOR TALKING TO ME

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Appendix V - Additional relevant results

OFSP is seen as being better (% within intervention group):

Table 15: Reasons for OFSP preference by intervention group (% within intervention group)

	Group 1	Group 2	Group 3	Control
Yield (n=270)	72	65	29	50
Early maturity (n=183)	63	72	44	33
Taste (n=270)	74	69	69	33
Nutritional value (n=270)	93	91	83	33

Other varieties are preferred (% within intervention group):

Table 16: Reasons for preferring other varieties over OFSP by intervention group (% within intervention group)

	Group 1	Group 2	Group 3	Control
Resistance to diseases (n=270)	55	59	31	25
Resistance to drought (n=270)	62	69	42	33

In terms of marketability there doesn't seem to be a clear preference for either OFSP or other varieties: overall, 37% prefer OFSP and 36% the other varieties.