

MAINSTREAMING NUTRITION WITH AGRICULTURE IN UGANDA

Role of Agriculture in Improving the Nutritional Status of Women and Children



UGANDA NATIONAL ACADEMY OF SCIENCES

Workshop Report





Mainstreaming Nutrition with Agriculture in Uganda

Role of Agriculture in Improving the Nutritional Status of Women and Children

UGANDA NATIONAL ACADEMY OF SCIENCES

A4 Lincoln Flats Makerere University

P O Box 23911 Kampala Uganda

Tel: +256-414-533 044 Fax: + 256-414-533 044

Website: www.ugandanationalacademy.org E-mail: info@unas.or.ug / unas@unas.or.ug

© Uganda National Academy of Sciences, March 2011.

ISBN:9970-866-08-4

Photo Credit: © 2008 Otushabire Tibyangye, Courtesy of Photoshare

Caption: Children in Uganda eat a meal.

Support for this project was provided to the Uganda National Academy of Sciences through the US National Academies' African Science Academy Development Initiative who received a generous grant from the Bill and Melinda Gates Foundation to conduct this workshop.

Except as otherwise permitted by written agreement, no part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise—without the prior permission of the copyright owner, The Uganda National Academy of Sciences.

Uganda National Academy of Sciences (UNAS) is an autonomous body that brings together a diverse group of scientists from the physical, biological, social and behavioural sciences to work together in an interdisciplinary and trans-disciplinary manner. The main goal of UNAS is to promote excellence in science by offering independent evidence-based advice for the prosperity of Uganda. UNAS was granted a Charter to operate as the National Academy of Uganda by H.E. Yoweri Kaguta Museveni the President of the Republic of Uganda in January 2009.

UGANDA NATIONAL ACADEMY OF SCIENCES

COUNCIL

PROF. PAUL E. MUGAMBI, President
PROF. ELLY N. SABIITI, Vice-President
PROF. EDWARD K. KIRUMIRA, Treasurer
PROF. JUSTIN EPELU-OPIO, Secretary General
DR. HAM-MUKASA MULIRA, Member
PROF. WILLIAM B. BANAGE, Member
PROF. PATRICK R. RUBAIHAYO, Member
PROF. JAMES NTOZI, Member
PROF. PEN-MOGI NYEKO, Member
PROF. LIVINGSTONE S. LUBOOBI, Member
PROF. JULIUS K. ZAKE, Member
DR. PAUL NAMPALA, Executive Secretary (ex-officio)

STAFF

PAUL NAMPALA, Executive Secretary
FRANKLIN MUYONJO, Programme Officer
ZAAM SSALI, Programme Officer
NOAH NYENDE, Research Officer
FRANCIS BUWEMBO, Parliamentary Liaison Officer
HARRIET NANFUMA, Administrative Assistant
PATRICK OCHAPET, General Support Staff

Reviewers

This workshop summary report was reviewed in draft form by independent reviewers chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Uganda National Academy of Sciences (UNAS) Council. The purpose of this independent review was to provide candid and critical comments to assist UNAS in producing a credible workshop summary that meets institutional standards. The reviewer's comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

The Uganda National Academy of Sciences thanks the following individuals for their participation in the review process:

Judith Kimiywe, Associate Professor and Chairperson, Department of Food, Nutrition and Dietetics, Kenyatta University, Kenya

Reynaldo Martorell, Professor of International Nutrition at Rollins School of Public Health, Emory University, USA

Per Pinstруп-Andersen, Professor of Food, Nutrition and Public Policy at Cornell University, USA and Professor of Development Economics at Copenhagen University, Denmark

Patrick Rubaihayo, Professor Emeritus, Plant Breeding and Biotechnology, Makerere University, Uganda and Fellow of the Uganda National Academy of Sciences

The review of this report was overseen by the UNAS leadership that was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered.

Preface

The origins of this workshop date back to June, 2008 when a meeting between the International Food Policy Research Institute (IFPRI) and the U.S./Uganda African Science Academy Development Initiative (ASADI)¹ staff was set up in Uganda to discuss food and nutrition security in Uganda. A subsequent meeting took place with the Uganda World Food Program team involved with the Purchase for Progress (P4P) program. From these meetings, a draft concept note on how an academy-convened committee might address the issue of nutrition security was developed and refined after detailed consultation with other stakeholders in Africa, Europe and the U.S.

Planning Meeting

Drawing from ideas in the concept piece, the Uganda National Academy of Sciences (UNAS) then convened a half-day meeting to discuss how they might organise and fundraise for a workshop addressing nutrition security. This meeting was held in Munyonyo, Uganda in January 2010 with support from the ASADI project and was chaired by a UNAS Fellow, Dr. Fina Opio from the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA). Its purpose was to bring together different sectors and disciplines to begin discussing and promoting a unified message on how to improve nutrition in Uganda. The meeting drew participation from experts in agriculture, nutrition, economics, gender, land reform and policy and included well-respected scientists and policy makers. Discussions at the planning meeting indicated a need for the main sectors contributing to nutrition and agriculture to work together. Other topics of concern were also raised in the areas of nutrition and HIV; nutrition security; fortification research in agriculture; and community-based agriculture programs.

At the close of the meeting, it was agreed that the UNAS workshop would analyse past and present (national and international) agricultural project and policy efforts meant to improve the nutritional status of women and children under two years of age in Uganda. UNAS then convened a multi-sector, multi-disciplinary planning committee to provide expert advice in developing the agenda and recruiting speakers as well as key participants.

Workshop Planning Committee

Chaired by Professor John T. Kakitahi from the College of Health Sciences at Makerere University, the 18 planning committee members included experts in the following fields: agriculture, agricultural economics, food science, public health and nutrition, nutrition, gender, and land reform. It also included a parliamentarian and 3 representatives of government agencies. Other members were drawn from international agencies. Individual members include:

Prof. John Tuhe Kakitahi, Chair, Makerere University

Dr. Robert Mwadime, Food And Technical Assistance 2 Project

Dr. Todd Benson, International Food Policy Research Institute

¹ ASADI is a 10 year effort by the U.S. National Academies with funding from the Bill and Melinda Gates Foundation, to build the capacity of national academies in Africa to provide evidence-based science advice to their governments and to their nations.

Dr. Wilberforce Kisamba Mugerwa, National Planning Authority
Dr. Elizabeth Madraa, Ministry of Health
Ms. Julia Tagwireyi, UN-World Food Programme
Mr. Geoffrey Ebong, UN-World Food Programme
Prof. Joyce Kakuramatsi-Kikafunda, Makerere University
Prof. John H. Muyonga, Makerere University
Ms. Brenda Shenute Namugumya, Food And Technical Assistance 2 Project
Dr. Juliet Kiguli, Makerere University
Prof. Consolata Kabonesa, Makerere University
Dr. Abby Sebina-Zziwa, Makerere University Institute of Social Research
Dr. Esther Obaikol, Uganda Land Alliance
Hon. Oliver Wonekha, Parliament of Uganda
Mr. Alex Bambona, Ministry of Agriculture, Animal Industry and Fisheries
Dr. Fina A. Opio, ASARECA
Ms. Tanya Khara, UNICEF, Uganda Country Office

This Committee was supported by the following Workshop Planning Staff:
Patricia Cuff, Senior Program Officer, U.S. National Academies
Zaam Ssali, Programme Officer, Uganda National Academy of Sciences
Christian Acemah, Senior Program Associate, U.S. National Academies
Harriet Nanfuma, Administrative Assistant, Uganda National Academy of Sciences

The Workshop

The workshop planning committee met 6 times between April and August 2010 to refine the agenda and to identify speakers for each presentation. During the course of their deliberations, the planning committee selected a series of topics for scrutiny at the workshop. These topics addressed nutrition and agriculture in Uganda as well as lessons learnt from previous experiences in trying to link the health and agricultural sectors in Uganda and other parts of Africa.


In many ways this workshop signifies the beginning of a new, more unified era in addressing the role of agriculture in improving the nutritional status of women and children in Uganda. This report is a summary of what took place during those 2 days at the meeting in Kampala where experts from multiple sectors shared thoughts, experiences and ideas on the *nutritionalisation* of agriculture in Uganda.

Acknowledgements

The Uganda National Academy of Sciences and the Workshop Planning Committee on *Nutritionalisation of Agriculture in Uganda* wish to express their warmest appreciation to the individuals and organisations who gave valuable time to provide information and advice. The Workshop Planning Committee is indebted to the UNAS staff (in particular Zaam Ssali – who was the project officer) for the part they played coordinating the preparations of the workshop and in the production of this report. UNAS gratefully acknowledges the U.S. National Academies’ (US NAS) African Science Academy Development Initiative (ASADI) who received funding from the Bill and Melinda Gates Foundation in support of this workshop. In particular, we would like to thank Shelly Sundberg for her support of the conference and guidance in development of the workshop and its agenda; and Dan Sellen for drafting and synthesising key messages of the workshop. Special thanks are also extended to Patricia Cuff and Christian Acemah at US NAS for their close collaboration with the UNAS staff in planning, implementing and disseminating all workshop activities, and to the reviewers who volunteered their time to provide candid and critical comments to ensure that the report is accurate, effective, and credible. Elizabeth Namaganda and Nandawula Stella assisted with transcripts of the workshop activities.



Prof. John T. Kakitahi, *Fellow of the Uganda National Academy of Sciences*
UNAS Workshop Planning Committee



Prof. Paul E. Mugambi, *Fellow of the Uganda National Academy of Sciences*
President, Uganda National Academy of Sciences

List of Acronyms

AED	Academy for Educational Development, Washington D.C.
AHSPR	Annual Health Sector Performance Report
AIDS	Acquired Immune Deficiency Syndrome
ASADI	African Science Academy Development Initiative
CAP	Community Action Plans
CAADP	Comprehensive African Agriculture Development Programme
CBGMP	Community-Based Growth Monitoring and Promotion
CCW	Community Care Worker
CED	Chronic Energy Deficiency
DSIP	Development Strategy and Investment Plan
EU	European Union
FANTA-2	Food and Nutrition Technical Assistance II
FAO	Food and Agricultural Organisation
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
GINA	Gender Informed Nutrition Agriculture
GOU	Government of Uganda
HSSP	Health Sector Strategic Plan
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorder
IDP	Internally Displaced Persons
IFPRI	International Food Policy Research Institute
IMR	Infant Mortality Rate
IYCF	Infant and Young Child Feeding
LBW	Low Birth Weight
MDG	Millennium Development Goal
MMR	Maternal Mortality Ratio
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MOH	Ministry of Health
NARO	National Agricultural Research Organisation
NCFN	National Committee on Food and Nutrition (Nigeria)
NCHS	National Centre of Health Statistics
NECDP	Nutrition and Early Childhood Development Program
NEEDS	National Economic Empowerment and Development Strategy (Nigeria)

NEPAD	New Partnership for African Development
NGO	Non-governmental Organisation
NPA	National Planning Authority
NDP	National Development Plan
OFSP	Orange-Fleshed Sweet Potato
PEAP	Poverty Eradication Action Plan
PMA	Plan for the Modernisation of Agriculture
TANA	The Agriculture–Nutrition Advantage Project
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
UFNC	Uganda Food and Nutrition Council
UFNS	Uganda Food and Nutrition Strategy
UFSI	Uganda Food Security Initiative
UN	United Nations
UNAS	Uganda National Academy of Sciences
UNICEF	United Nations Children’s Fund
UNPAC	Uganda National Programme of Action for Children
UPHOLD	Uganda Program for Human and Holistic Development
UPRS	Uganda Poverty Reduction Strategy
USAID	United States Agency for International Development
VAD	Vitamin A Deficiency
WFP	UN-World Food Programme
WHO	World Health Organisation

Table of Contents

Chapter		Page
	SUMMARY	1
1	THE UNAS WORKSHOP	7
2	BACKGROUND	11
	Malnutrition in Uganda	12
	Agriculture for Health and Prosperity	23
3	NUTRITIONALISATION OF AGRICULTURE	27
	Linking Agriculture with Nutrition Outcomes	28
4	INTERNATIONAL POLICIES, PROGRAMS AND PERSPECTIVES	37
5	NATIONAL FRAMEWORKS FOR COORDINATION	46
6	OUTCOMES AND IDEAS	56
	The Way Forward	61
	REFERENCES	64
	GLOSSARY OF TERMS	69
	APPENDICES	70
	Appendix A: List of Participants	70
	Appendix B: Workshop Agenda	74
	Appendix C: Speaker Biographies	80

Tables, Figures and Boxes

Tables		Page
Table 3.1	Previous efforts in Uganda to link nutritional issues into agricultural designs	32
Table 6.1	Ten core concepts for linking agriculture with nutrition outcomes	57
 Figures		
Figure 2.1	Stunting rates in selected countries in East Central and Southern Africa, 2003-2007	13
Figure 2.2	Change in prevalence of physical indicators of under-nutrition among Ugandan children under 5 years, 1995-2006 (WHO Standards)	14
Figure 2.3	Comparison of micronutrient deficiencies in Uganda, 2001 and 2006	14
Figure 2.4	Regional differences in diarrhoea rate in Uganda	15
Figure 2.5a	Regional disparities in children's vulnerability to under-nutrition in Uganda, 2006	17
Figure 2.5b	Regional disparities of vitamin A deficiency in children and women of child bearing age in Uganda, 2006	17
Figure 2.5c	Regional disparities in women's vulnerability to chronic energy deficiency in Uganda, 1995-2006	18
Figure 2.6	The window of opportunity to prevent lifetime consequences of early under-nutrition	20
Figure 2.7	Literacy by age and sex in Uganda, 2006	26
Figure 2.8	Simplified model of gendered pathways linking agriculture and nutrition	26
Figure 3.1	Conceptual model linking agriculture to nutrition outcomes	28
Figure 3.2	The 1990 UNICEF conceptual framework of the determinants of child under-nutrition	29
Figure 5.1	Institutional coordination framework	54
 Boxes		
Box 6.1	Requirements for effective <i>nutritionalisation</i> in Uganda	58

Summary

Failure to prevent under-nutrition early in life exacts a high social and economic cost that cannot be recouped because of the irreversibility of early deficits and their unavoidable negative effects later in the lifespan. A malnourished infant can have lifelong deficits in physical growth and development, health, learning abilities, and physical activity. At community and national levels such suffering and losses in human potential translate into social and economic costs that also place major constraints on future development. Recent estimates of the national cost of disease burden due to under-nutrition in Uganda show roughly 310 million U.S. dollars worth of productivity lost each year due to the accumulated effects of stunting caused in childhood, low birth weight, iodine deficiency disorders, and iron deficiency anaemia. This represents over 4 percent of Uganda's Gross Domestic Product (GDP).

Nutritionalisation of agriculture is a term developed by the conference planning committee to capture the concept of incorporating nutrition outcomes into the design and planning of agricultural policies, programs and systems. It stems from past assumptions that improved nutrition would follow naturally from the gains achieved through increases in agricultural production. However, what appeared to be an implicit assumption did not always follow. The conference and this summary report are the committee's attempt to bring to light those issues that have practical significance for nutrition-related agricultural programs, interventions, investments, and policies; and to look for bidirectional linkages between agriculture and health that might generate ideas of how Uganda could develop greater multi-sector coordination for the improvement of nutrition especially in vulnerable populations like women and children.

Malnutrition in Uganda

Quantifying Malnutrition

Uganda experiences high stunting (38 percent) and moderately high wasting (6 percent) rates in children under 5. The prevalence of stunting reached an alarming 48 percent in children between the ages of 24 and 35 months with heights that fall far enough below the normal range for their age to signal chronic under-nutrition (UBOS and ORC Macro, 2006). This reflects problems related to feeding of children less than two years.

The prevalence of malnutrition and food insecurity in Uganda varies by region (UBOS and ORC Macro, 2006). Stunting (height-for-age $<-2SD$) is highest in Northern and Southwest Uganda whereas the number of children under five who are under-weight (weight-for-age $<-2SD$) is highest in the East Central, Northern and Southwest regions. Similar to the other indicators of poor nutrition, the prevalence of chronic energy deficiency (CED)—defined as body mass index (BMI) of less than 18.5 kg/m²—also varies across regions among non-pregnant women of childbearing age (ages 15-49 years). The highest prevalence of CED is among women in the north and eastern regions.

There is evidence that high agricultural production and greater income are not guarantees for improving nutrition (McKinney, 2009; Kikafunda and Bambona, 2005). The Southwest

for example is the food basket for Uganda but shows the highest percentage of stunting among areas of the country. It appears that agriculture is necessary but not sufficient to successfully address the nutritional challenges faced in Uganda.

Double-burden of Malnutrition

There is concern that Uganda is now experiencing a “double burden of malnutrition” with high rates of under-nutrition and growing rates of overweight/obesity within the country and even within households. In general, the double burden is attributed to dietary simplification, the nutrition transition, and inadequate access to quality foods. Given the identification of over- and under-nutrition within the same household regardless of income, strategic thinking will be required to address MDG 1: eradicate extreme poverty and hunger by raising the incomes of the poor.

Agriculture for Health and Prosperity

The agricultural sector is a major contributor to Uganda’s prosperity and accounts for almost one quarter of the Gross Domestic Product (GDP). Certain areas of Uganda are considered “breadbasket” regions; and national balance sheets indicate that Uganda is a net food producer and should be self-sufficient in meeting national food demand. Although agriculture is a critical sector of the economy for employment, a majority of households—particularly in rural Uganda—are also involved in farming that provides food directly for household consumption.

Gender Disparities in Agriculture

Women in Uganda and other parts of sub-Saharan Africa provide the bulk of the agricultural labour and are mostly responsible for producing and acquiring food consumed by their families, yet women bear the brunt of food insecurity and malnutrition. Many of these inequities persist because of the arrangements of work and human rights in the agricultural sector.

Women, Agriculture and Health

Incorporating gender issues into aspects of the food supply chain can optimise women’s nutritional status and enhance prenatal and infant nutrition and health. This can be accomplished through a variety of interventions that acknowledge and promote the importance of food crops that are normally grown by women. By widening the focus of agricultural research and extension beyond male-dominated cash crops; and by acknowledging and promoting the importance of food crops that are normally grown by women, strategies such as food crop diversification, cultivation of crops, rearing of small livestock, development of backyard fish ponds, and agro-forestry can be employed to increase the food base and supplement staple foods.

Often, women in Africa are responsible for caring for the children and producing food consumed by their families while also contributing to cash crop agriculture. This is very time-consuming and without adequate assistance, not only is her nutrition compromised but so are her children’s as she adapts time-saving feeding methods that minimise interactions

with her child. Because of their poor nutritional status—and especially without access to safe water and good sanitation—women and their children suffer greatly from the vicious cycle of malnutrition and infections. Bouts of respiratory infections and diarrhoea further exacerbate calorie, iron and other nutrient deficiencies and add to a mother’s already compromised ability to work. Empowering men to assist women in ways that lighten their work load can have an impact on improving the nutrition of women and their children by allowing women more time to feed themselves and their children. Time-saving innovations such as ready-to-eat food products for children and agricultural labor-saving technologies, as well as food based guidelines to help low income families diversify and optimise their diets may also improve the nutritional status of women and their children.

Linking Agriculture with Nutrition Outcomes

Agriculture plays a key role in nutrition and health. However, experience shows that investing in agricultural production and growth has not necessarily translated into improved nutrition of especially women and children. A number of agricultural, income-generating projects have been implemented in Uganda and other parts of Africa with variable results on improvements in the nutritional status of the most vulnerable persons (Berti et al., 2004; Maxwell, 1994). Currently, many programs and policies focusing on improving nutritional outcomes through agricultural and other investments carry enormous potential.

Conceptual Models

Conceptual models help explain the relationship between food production and malnutrition. Two such models are from USAID’s Feed the Future Initiative that shows the overlap between nutrition and agriculture components; and the UNICEF model that references child nutritional status as a conceptual frame for addressing the underlying causes of malnutrition from a cross sectoral and policy level.

International Support and Opportunities for Partnership

Efforts are underway by multi-national organisations like the United Nations, the European Union, and the World Bank as well as individual countries such as the U.S. and Canada. Two common characteristics of many recent initiatives put forth by organisations are (1) their dual focus on nutrition for development and the role of agriculture in strengthening nutrition; and (2) their focus on sustainability. In addition, donors are making fundamental commitments to *country led processes* that address poverty and under-nutrition through agriculture and technology. The opportunities for countries to set the agenda with ideas generated within government and on the ground are expanding and the international community offers an increasing source of support and partnership in nutritionalisation of agriculture.

African Initiatives

Three initiatives with particular relevance to Uganda are the Maputo Declaration, New Partnership for African Development (NEPAD), and the Comprehensive African Agriculture Development Programme (CAADP). The Maputo Declaration recognises the fundamental importance of agricultural development to economic growth, poverty

eradication and the elimination of hunger in Africa. NEPAD is responsible for driving economic integration in Africa, and its framework document includes agriculture as a sectoral priority. And CAADP, established by the African Union assembly in 2003, is the agricultural programme of NEPAD that focuses on “improving food security, nutrition, and increasing incomes in Africa’s largely farming based economies.”

National Policy

Uganda has a well-articulated national plan for development that demands attention to hunger and nutrition both in terms of the targets adopted and the underlying requirement to boost nutrition to achieve key objectives of the plan. Requirements for achieving the objectives of this plan are identified as including, at a minimum, adequate care for children and resources to allow everyone in the population to attain their full potential in terms of productivity, health, and educability.

National Development Plan

The current National Development Plan (NDP) is for the period 2010/2011 to 2014/2015. It is the country’s medium term strategic planning framework that stipulates the current development status, challenges, opportunities, development priorities and implementation strategies. In the Plan, nutrition falls under the thematic areas of both health and agriculture development. Nutrition is identified in the NDP as a cross-cutting issue and therefore a responsibility of non-governmental (NGOS) and community-based organizations (CBOs); the private sector; and Government ministries departments and agencies (MDAs) including the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Health (MOH), Ministry of Education and Sports, and Ministry of Gender, Labour and Social Development, among others. MAAIF and the MOH are the lead ministries in food security and nutrition issues and are mandated by the constitution to set minimum standards, ensure quality and develop relevant policies.

Housing the Nutrition Policy

Despite the clear framework expressed in the NDP, currently there is no specific home for the Uganda Food and Nutrition Policy within government raising general concerns about lack of ownership and specific concerns about a lack of linkage to agriculture. Several participants at the workshop suggested nutrition had become orphaned within government and with the dissolution of the Department of Home Economics; nutrition was demoted to a mere unit with very few staff within the Ministry of Agriculture, Animal Industry and Fisheries. On the other hand, some viewed this “lack of home” as an opportunity for cross-sectoral programming.

Outcomes and Ideas

The Workshop brought together a well-selected and appropriately-informed set of presenters who offered varying opinions, interpretations and perspectives. Many presentations focused on successes and challenges of previous and ongoing programs, policies and governance structures aimed at linking maternal, infant and child nutrition to different kinds of support and interventions in agriculture in Uganda and beyond. Those thoughts were compiled and led to some general outcomes and a way forward.

Requirements for Nutritionalisation in Uganda

A number of “needs”, were identified by the workshop participants, for successful integration of nutrition into all sectors of government (see Box 6.1). Although the agricultural sector was of particular interest, the audience was keen to “nutritionalise” beyond the single sector.

BOX 6.1

Requirements for Effective Nutritionalisation in Uganda

Workshop participants oriented toward six key messages indicating there is a need for:

- the right mix of policies and interventions that can lead to nutrition security for all individuals within a region;
- multi-sectoral approaches and coordination in addressing mother and child malnutrition;
- nutrition education and sensitisation at all levels and in all sectors;
- inclusion of men in gender and health-related issues for improving nutrition outcomes of women and children;
- empowering and more directly involving the community in crafting nutrition interventions;
- greater sustainability and adoption of nutrition programmes within agriculture and all other sectors (“mainstreaming nutrition”); and
- advocates and champions at all levels and in multiple sectors to promote nutrition agendas.

Improving Food Value Chain Systems

Sustainable scale-up of successful pilot innovations in post-harvest storage, processing and production methods depends heavily on national leadership and coordination for developing and promoting appropriate postharvest infrastructure and marketplace demand. MAAIF is positioned at the centre of agricultural activity. As such, MAAIF has the potential for leadership and coordination of specific nutrition-related interventions as part of its ongoing focus on agricultural value chains development. Some of these interventions might include:

- sealing cracks in the “leaky food pipeline” to reduce gross on- and off-farm storage and transport losses of crops;
- enhancing preservation to diminish post harvest losses to pests and spoilage and minimize micronutrient loss through proper storage;
- limiting food contamination by toxins and disease pathogens;
- facilitating food distribution through markets;

- nutrient enhancement through blending, food fortification or bio-fortification to increase the nutritional value of foods in terms of nutrients density and diversity; and
- improving nutrient bioavailability to increase the uptake of key nutrients by the consumer.

Harnessing Existing Governmental Capacity

The Uganda Food and Nutrition Policy was developed jointly by the Ministry of Agriculture, Animal Industries and Fisheries and the Ministry of Health and was approved by Cabinet in 2003. Following its approval, a Food and Nutrition Bill was drafted in order to operationalise the UFNP; however, the bill still awaits approval by Cabinet.

This Bill, if presented to Parliament and passed into law, would provide for the formation of a Food and Nutrition Council to promote food security in the country. The Council would constitute the formal public sector coordination body, taking on a key advocacy role from within government. This Council could be the place where scientists, policymakers and practitioners collaborate, promote, design and operationalise projects that focus on the nutritionalisation of agriculture; concretising the National Development Plan elements, and move forward the draft Food and Nutrition Security Act. Unfortunately, the Nutrition Council cannot be operationalised without the Food and Nutrition Bill.

In the absence of a Food and Nutrition Bill, The National Planning Authority (NPA) has taken on a key role for improving nutrition security in Uganda as the implementers and evaluators of the National Development Plan. This new five year strategic framework received input from multiple sectors and includes nutritional strategies, interventions and indicators. These and other markers can be used to monitor improved health and nutrition for economic development. At a cost of 54 trillion shillings, the ambitious plan will need to avoid waste and financial leakages in order to maximise the impact of the Plan for those at greatest risk for malnutrition.

Other frameworks that may be useful for joint interventions include The Uganda Policy Guidelines on Infant and Young Child Feeding (2009); the National Health Policy (2010); and the Health Sector Strategic Plan (HSSP III). However, it is important that nutritionalisation efforts also be embedded in District Plans since it is at the district level where critical implementation arrangements are made. By building capacity and collaborating more effectively at this level, the importance of developing and finalising implementation proposals in consultation with district officers becomes apparent.

The Way Forward

Participants suggested a number of ways the information presented at this meeting could be operationalised to improve nutrition outcomes of vulnerable populations in Uganda. It starts by creating an awareness of the importance of nutrition through education and advocacy. Educating the public as well as all sectors and levels of government generates a demand for action that advocates and champions can take forward to ensure funding streams are adequate and appropriately allocated in a way that benefits those in greatest need of assistance. Advocates could also push to include nutrition inputs and outcomes in agricultural programs, policies and systems to better ensure accountability.

The UNAS Workshop

Despite recognition of the severe social, economic and health consequences of malnutrition on pregnant women and young children, malnutrition remains a major challenge for these groups in Uganda. Agricultural development—particularly in agrarian societies like Uganda—is often relied upon as a way of improving household incomes and the nutritional status of all in the home. However, experience shows that investing in agricultural production and growth does not necessarily translate into improved nutrition especially among women and children. The lack of impact has commonly been attributed to cultural and educational gaps that disproportionately affect women and girls; although another reason is poor cross-sectoral communication that impedes the integration of nutrition into agricultural systems, projects and policies. Many believe that strengthening and expanding linkages within and across disciplines and sectors can eventually lead to improved agricultural development designs that could more closely monitor the health and nutritional status of the most vulnerable in the home. In fact, this was a main purpose of the workshop and planning committee convened by UNAS and described in this chapter.

UNAS Multi-sector Committee

In an effort to strengthen cross-sectoral linkages, the Uganda National Academy of Sciences convened a committee of experts from multiple sectors to begin a dialogue on how food and nutrition security might be improved in Uganda (see the Preface for a full description of the committee). A number of issues and topics arose during the course of their deliberations; however, the committee agreed that addressing the role of agriculture in improving the nutritional status of women and children was key to any future actions.

Nutrition/Agriculture Workshop

The academy then sought and obtained funding to run a 2-day workshop titled *Nutritionalisation of Agriculture in Uganda: The Role of Agriculture in Improving the Nutritional Status of Women and Children*. This workshop took place August 11-12, 2010 at the Commonwealth Resort, Munyonyo, Kampala, Uganda. It attracted 110 participants from academia, government, civil society, international agencies and media (see lists of participants in Appendix A). Participants included Ugandan and U.S. government representatives, experts in nutrition and agriculture, health and nutrition managers and workers, representatives of non-governmental and international aid agencies, and African and non-African science academy representatives. Six countries were in attendance with four from Africa (Uganda, Kenya, Tanzania and Nigeria) and two from the Americas (United States, Canada).

Workshop Aims

Through invited presentations and discussion, this workshop sought to address the following five areas:

- causes of malnutrition;
- linkages between agriculture and health sectors;
- overcoming weaknesses of previous multi-sectoral collaborative efforts;
- importance of nutrition on the political agenda; and
- incentives for collaboration.

The workshop also aimed to promote networking among policy makers, researchers, scientists, academicians, and other key stakeholders in nutrition/health and agriculture in Uganda and beyond; and to begin forming the basis for developing evidence-based policies that better ensure the mainstreaming of nutrition knowledge, goals and activities with the agriculture sector. This was accomplished through specific objectives noted below.

Workshop Objectives

The goal of the workshop was to provide a neutral setting wherein networking between and among sectors and disciplines could occur in an effort to promote linkages that would lead to improving the nutritional status of women and children in Uganda. The 3 specific objectives for the workshop were as follows:

Specific objective 1. To bring together multi-sectoral stakeholders to discuss national and international efforts to assess how agriculture's past interventions have incorporated nutrition outcome measures.

Specific objective 2. To review the performance of nutrition and agriculture coordination bodies and the implementation of policies and interventions put in place in an effort to improve nutritional outcomes.

Specific objective 3. To discuss how the information presented at the workshop could be operationalised in order to improve nutritional outcomes for vulnerable populations in Uganda.

Workshop Flow

The workshop started with a keynote address that set the stage for the ensuing presentations and discussions. Subsequent presentations were divided into seven sessions over two days (see Workshop Agenda in Appendix B). Activities included a roundtable discussion with scientists and policymakers responding to expert observations on the present state of nutritionalisation of agriculture in Uganda and elsewhere in Africa. This highlighted cross cutting issues that impede policy implementation for effective contribution of agriculture to improved nutrition outcomes.

On the second day of the workshop, participants were divided into four groups, each with the responsibility of developing an action plan that applied the lessons learnt at the workshop to policymaking. The themes of the four groups included:

- policy and programming to operationalise and monitor nutrition in the National Development Plan and other interventions;
- opportunities and challenges for the agriculture sector to embrace nutrition outcomes;
- knowledge translation to improve nutrition outcomes of vulnerable populations in Uganda; and
- appropriate allocation of resources to respond to the needs of the different regions within Uganda.

Presenters offered varying data and perspectives on the rationale for linking nutrition and agriculture. Some presentations focused on the evidence for several different types of malnutrition in Uganda, their specific distribution among vulnerable populations, and their underlying causes. Others addressed the scientific rationale and the existing policy and governance frameworks for linking nutrition and agriculture in Uganda and elsewhere. While still others examined the lessons learnt from previous efforts to achieve and document nutritional impacts of agricultural interventions and reviewed efforts by government to engage in cross-sectoral dialogue, coordination, and funding.

Workshop Summary Report

In keeping with other convening activities of the academy, this workshop was not designed to develop recommendations². Rather, it was planned with the intent of encouraging networking and open dialogue between and among disciplines and sectors who could take key messages of the workshop forward through a more integrated approach.

² The academy employs a much more rigorous process for issuing recommendations in the name of UNAS.

This workshop summary report is a reflection of the workshop and the planning that went into it. As such, key messages and priorities have been synthesised based on the presentations and discussions at the meeting but no formal recommendations are provided. A thorough fact check of the data used by presenters and published in this report was conducted by the academy staff to better ensure accuracy; and when indicated, supplemental information on projects, policies and programs were provided with appropriate citations in an effort to give a more complete description than could be provided by speakers due to time constraints.

The report is divided into 6 chapters. The first chapter gives a description of the workshop and some of the preparatory thinking that went into the design and format of the agenda. Chapter two illustrates the nutritional and agricultural situation in Uganda today which provides the background for the next three chapters. These chapters look at international and national policies, frameworks, projects and systems that do or could be used to link the health and agriculture sectors to address nutrition outcomes. The final chapter reflects on the ideas and thoughts coming from the discussions at the workshop to describe some general outcomes of the workshop and a way forward. Although the chapters draw heavily from the structure of the workshop agenda (see Workshop Agenda in Appendix B), they do not directly reflect it in an attempt to avoid confusion and minimise redundancy in the report. Similarly to avoid confusion, the title of the report differs from the title of the workshop.

Background

There are strong economic, scientific and humanitarian arguments for the benefits of agricultural and health interventions designed and implemented to improve nutrition security of women and children. Such potential benefits include: (i) lowered infant and maternal mortality rates among the poor; (ii) increased human capacity to function as children and adults; (iii) national and household level savings from treating ailments attributable to malnutrition; and (iv) the economic value of productivity gains made possible when everyone in society achieves their full physical and mental potential and maintains health and wellbeing. Uganda is an agrarian society and as such stands to benefit greatly in health and income from investments in agriculture. This chapter lays the foundation for the report by describing the agricultural and health situation in Uganda and how investments in agriculture could improve the nutritional status of all Ugandans particularly those most vulnerable to malnutrition.

Malnutrition in Uganda

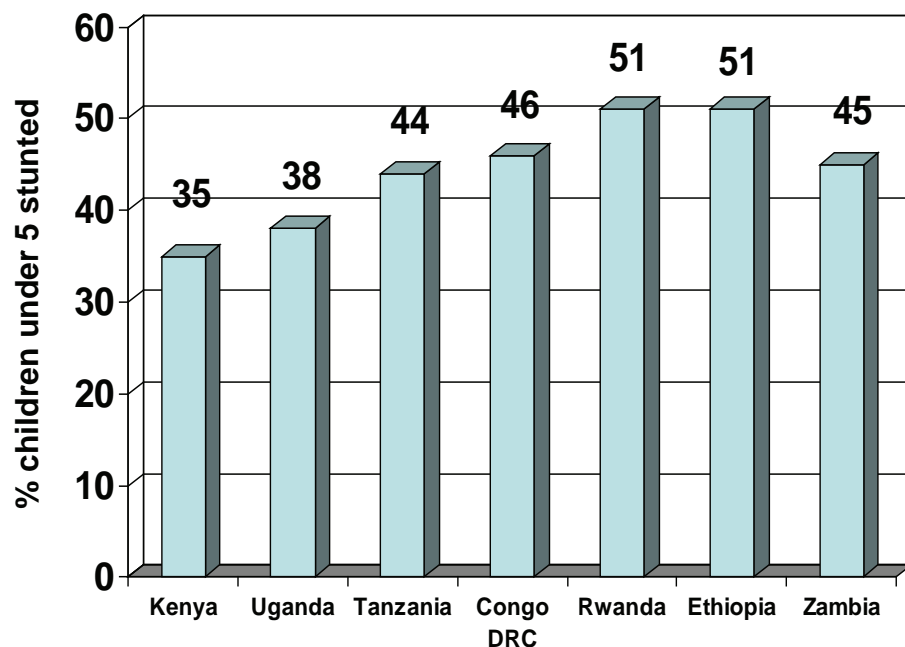
Failure to prevent under-nutrition early in life exacts a high social and economic cost that cannot be recouped because of the irreversibility of early deficits and their unavoidable negative effects later in the lifespan. A malnourished infant can have lifelong deficits in physical growth and development, health, learning abilities, and physical activity. At community and national levels such suffering and losses in human potential translate into social and economic costs that also place major constraints on future development. Recent estimates of the national cost of burden of disease attributable to underlying under-nutrition make it possible for policy-makers to apply rigorous cost/benefit analyses in the process of making decisions about how to mainstream nutrition programming.

Quantifying Malnutrition

According to FAO, under-nourishment refers to the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out a light physical activity (FAOSTAT, 2011). The highest proportion of under-nourished people in the world resides in sub-Saharan Africa, at 30 percent in 2010 (FAO, 2010). This means that 239 million people in the region are believed to be suffering from chronic hunger and malnutrition resulting in five million child deaths annually (FAO, 2011). In all of Africa, roughly 31 million children under five years are under-weight and 40 percent of the 142 million children are stunted (an effect of chronic malnutrition) (Black et al, 2008).

At the country level, Uganda experiences high stunting (38 percent) and moderately high wasting (6 percent) rates in children under five. In her presentation at the workshop Ms. Juliet Aphane, the Nutrition Officer with Nutrition and Consumer Protection Division UN Food and Agriculture Organisation, shows rates that she says are unacceptably high given the level of expertise and other available resources in the country. The prevalence of stunting reached an alarming 48 percent in children between the ages of 24 and 35 months with heights that fall far enough below the normal range for their age to signal chronic under-nutrition (UBOS and ORC Macro, 2006). This reflects problems related to feeding of children less than two years as a later figure will show (Figure 2.6). Ms. Aphane goes on to stress the importance of taking immediate action citing evidence that shows when stunting occurs before and during the first two years of life, the damage to physical and cognitive development is usually irreversible. Stunting has been linked to increased illness and death, reduced cognitive ability, fewer days of school attendance in childhood, and to lower productivity and lifetime earning potentials as adults. Uganda has had a lower prevalence of stunting than many other countries in east and southern Africa for whom comparable data are available (see Figure 2.1). Despite this, stunting in Uganda is still unacceptably high.

Figure 2.1. Stunting rates in selected countries in East Central and Southern Africa, 2003-2007



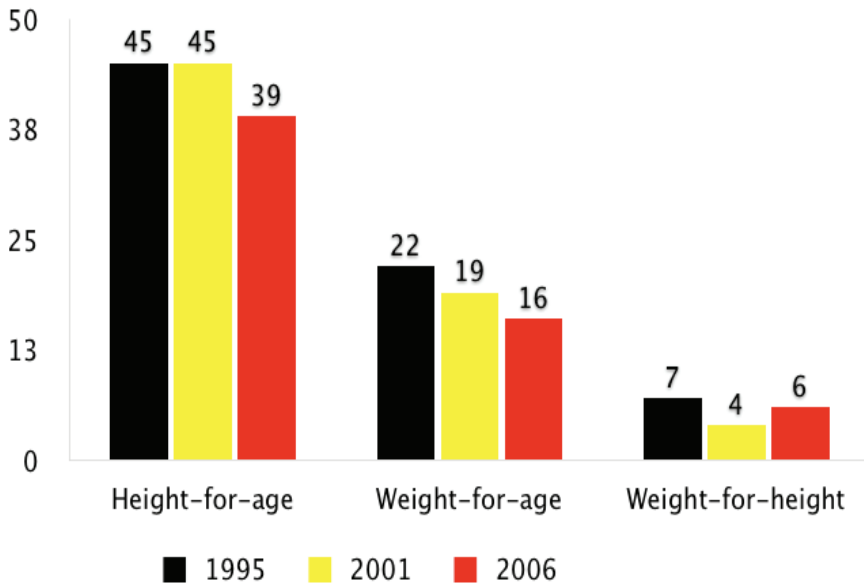
Source: UNICEF (2009).

The overall nutrition situation in Uganda is not unique in sub-Saharan Africa or other developing countries outside of Africa. Using their definition noted above, FAO estimates a total of 925 million people globally are currently under-nourished. Although slightly lower than the previous year, it is still unacceptably high and higher than before the food and economic crises of 2008-2009. At close to one billion, this level of under-nutrition could have potentially devastating effects on the productivity and economy of severely affected nations.

Changes Over Time

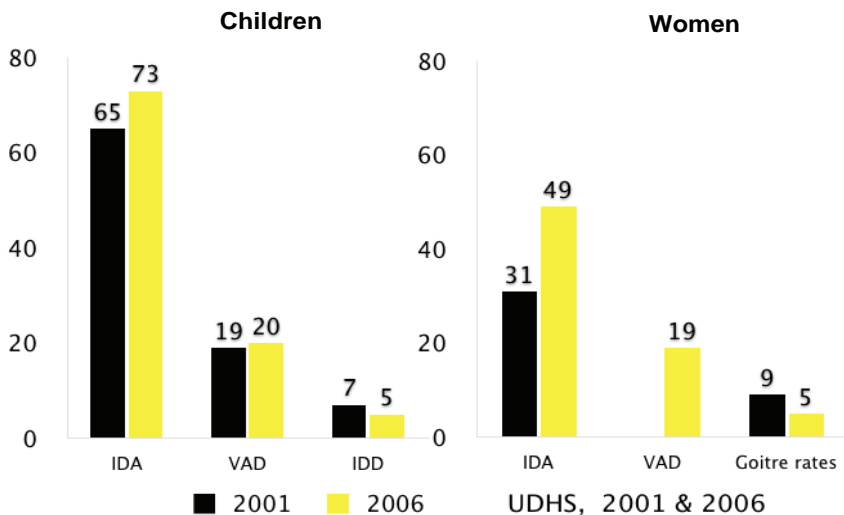
Over the last 15 years, three nationally representative surveys have been conducted on infant and young child feeding practices in Uganda (UBOS and ORC Macro, 1996; 2001; 2006). These surveys demonstrate Uganda's continued efforts to monitor the number of under-nourished children in the country. Trends show modest decreases in stunting (percent low height-for-age), under-weight (percent low weight-for-age) and wasting (percent low weight-for-height) (see Figure 2.2), but no real change in prevalence of micronutrient deficiencies of iron (IDA), vitamin A (VAD) or iodine (IDD) (see Figure 2.3).

Figure 2.2. Change in prevalence of physical indicators of undernutrition among Ugandan children under 5 years, 1995-2006 (WHO Standards)



Adapted from: UGAN et al. (2010); UBOS and ORC Macro (1996; 2001; 2006).

Figure 2.3. Comparison of micronutrient deficiencies in Uganda, 2001 and 2006



Adapted from: UGAN et al. (2010); UBOS and ORC Macro (2001; 2006).

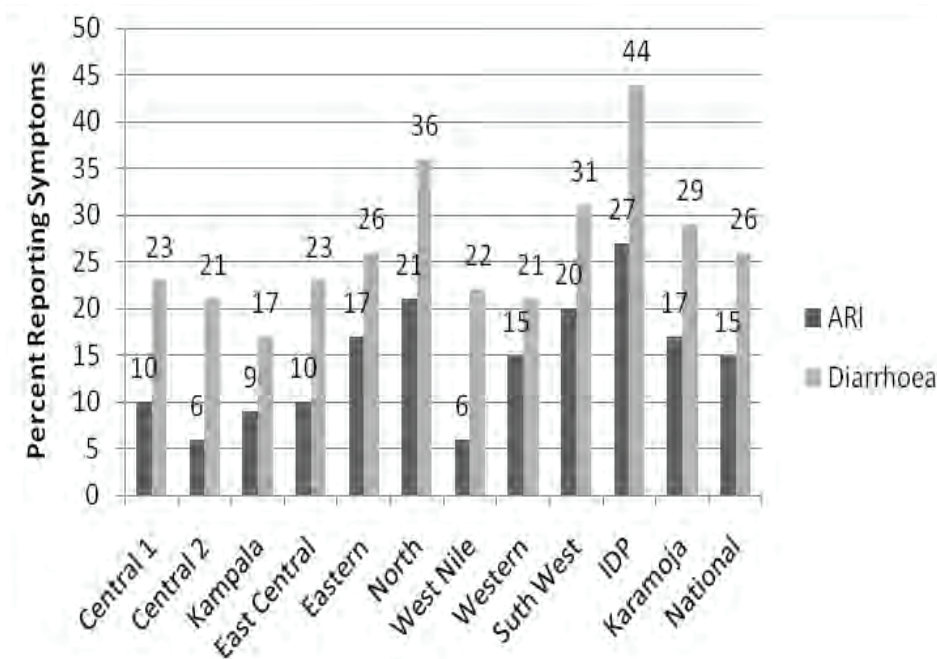
The two main indicators for monitoring hunger in the first Millennium Development Goal (MDG 1) are the prevalence of under-weight children under five years of age and the proportion of the population living below the minimum level of dietary energy consumption (UNDP and UNDP/Uganda, 2007). Although the proportion of under-weight children was modestly reduced between 1995 and 2006, the proportion of the population unable to meet the recommended food caloric intake actually increased ten percentage points (from 58.7 percent in 1999 to 68.5 percent in 2006). Using these indicators, it appears that Uganda is not on-track to meet the MDGs for nutrition by 2015.

Illness in the Community

Contaminated food and water are major causes of diarrhoea among children. This weakens the immune system and leaves the child vulnerable to other infections. Diarrhoea is most prevalent among young children and has been associated with a 19 percent decrease in dietary intake in preschool children (about 175 kcal and 4.8g protein per day) (Martorell et al., 1980). The loss of nutrients from poor intestinal absorption and the reduction in food consumption often result in stunting in children with ongoing bouts of diarrhoea.

Improved agricultural practices, especially irrigation and post-harvest quality control have the potential to reduce the contamination of food and water that contributes to child malnutrition through the diarrhoea pathway and the vicious cycle of malnutrition and infections. It is possible that large regional disparities in diarrhoeal rates and respiratory infections (see Figure 2.4) may be mitigated through such efforts.

Figure 2.4. Regional differences in diarrhoea rate in Uganda



Source: FANTA-2 (2010); UBOS and ORC Macro (2006).

Seasonality

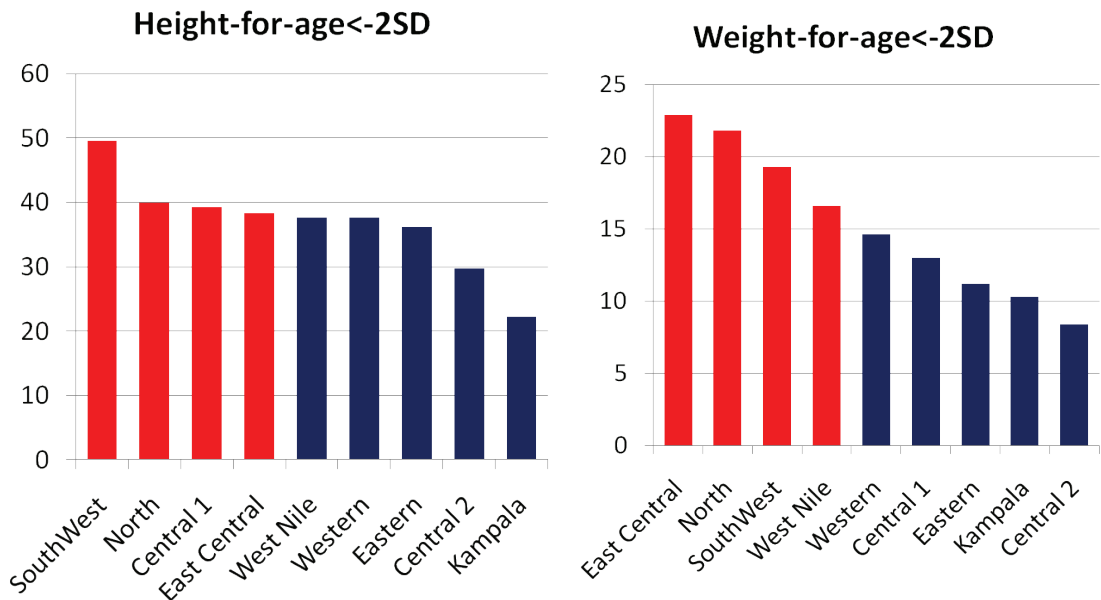
In Uganda, climatic seasonality strongly affects food availability in almost all communities. In addition to food accessibility, seasonality also affects labor demands as well as rates of infection and illness that are linked to changes in disease exposure risk and seasonal availability of staff at rural health centers. According to the work of Dr. Robert Mwadime (Senior Regional Nutrition Advisor for the Food and Nutrition Technical Assistance II Project (FANTA-2)) and his team of researchers, a complex negative synergism exists between season, illness and vulnerability by age group among children in Uganda. For example, diarrhoea is most prevalent at weaning age (6-12 months) and in the rainy season. And, Dr. Mwadime continues, not just diseases but quality of care for diseases also changes with the seasons. The specific mix and relative influence of mediating factors linked to seasonality may vary by region, but the following four factors are almost always involved:

- food accessibility (access to jobs, price changes, quality of food);
- labour demands (energy/ nutrient needs, caretakers time);
- disease patterns (diarrhoea, malaria, acute respiratory infection, measles); and
- quality of health care (annual leave, accessibility).

Region

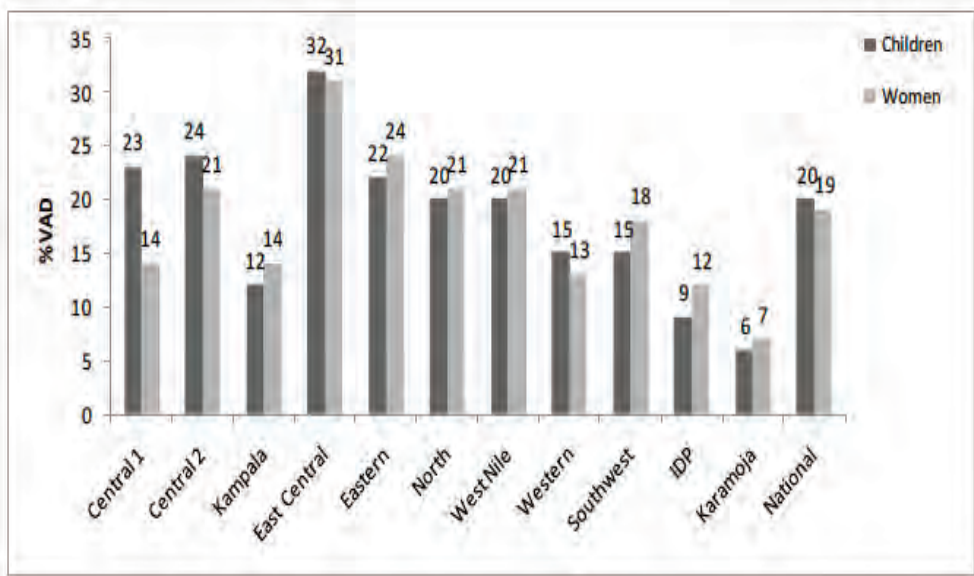
In Uganda, the prevalence of malnutrition and food insecurity varies by region (UBOS and ORC Macro, 2006). Stunting (height-for-age z-score $<-2SD$) is highest in Northern and Southwest Uganda whereas the number of children under five who are under-weight (weight-for-age z-score $<-2SD$) is highest in the East Central, Northern and Southwest regions (see Figures 2.5a). Data from 2006 shown in Figure 2.5b, illustrate vitamin A deficiency levels are similar among children and women within regions with the highest prevalence among children and women in East Central Uganda (32 and 31 percent, respectively).

Figure 2.5a. Regional disparities in children’s vulnerability to under-nutrition in Uganda, 2006



Adapted from: UGAN et al. (2010); UBOS and ORC Macro (2006).

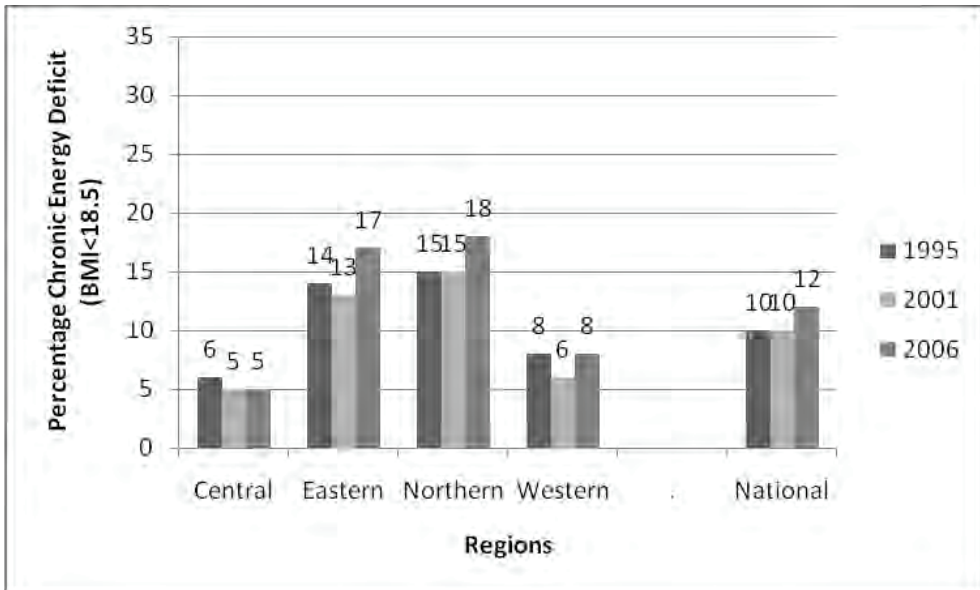
Figure 2.5b. Regional disparities of vitamin A deficiency in children and women of child bearing age in Uganda, 2006



Source: FANTA-2 (2010); UBOS and ORC Macro (2006).

Similar to the other indicators of poor nutrition, the prevalence of chronic energy deficiency (CED)—defined as body mass index (BMI) of less than 18.5 kg/m²—also varies across regions among non-pregnant women of childbearing age (ages 15-49 years). The highest prevalence of CED, noted in Figure 2.5c, is among women in the north and eastern regions.

Figure 2.5c. Regional disparities in women’s vulnerability to chronic energy deficiency in Uganda, 1995-2006



Source: FANTA-2 (2010); UBOS and ORC Macro (1996; 2001; 2006).

As pointed out by the Representative of the Prime Minister, Hon. Gabriel Opio, data provide evidence that high agricultural production and greater income are not guarantees for improving nutrition (McKinney, 2009; Kikafunda and Bambona, 2005). The Southwest for example is the food basket for Uganda but shows the highest percentage of stunting among areas of the country. He goes on to say that agriculture is necessary but not sufficient to successfully address the nutritional challenges faced in Uganda. This sentiment is echoed by Dr. Elizabeth Madraa, from the Ministry of Health, who recognises why the prevalence of stunting is high in the North—given all the problems faced there by wars and other disasters—but like Hon. Opio, she could not explain the high rates of stunting in the Southwest. Although the full answer to this confusing fact is unknown, immediate causes of malnutrition for children in Uganda continue to be the high disease burden resulting from malaria, diarrhoeal disease and acute respiratory infections, as well as inadequate dietary intake resulting from suboptimal infant feeding practices (FANTA-2, 2010).

The rate of decline for under-weight children is slower than the rate of change for stunting (UBOS and ORC Macro, 2006; FANTA-2, 2010). In general, rural children—and children whose mothers have less than a secondary education—are more prone to stunting or low weight-for-heights than other children; and rural women are more than twice as likely as urban women to be under-nourished (14 percent of rural women versus 6 percent of women in urban areas).

Similar to stunting and wasting, food insecurity also varies by region. The North suffers from the highest levels of food insecurity, followed by parts of East and East Central regions and parts of Southwest (FANTA-2, 2010). According to Dr. Mwadime, even in food secure regions of Uganda, there are pockets of food insecurity and vice versa. Interestingly, the most recent statistics from the demographic and health survey (2006) show a growing trend of overweight and obesity among women. There is a national prevalence of 17 percent obese and overweight among women (up from 8 and 12 percent in 1995 and 2001, respectively) with the highest percentage of overweight or obese (BMI > 25) women in urban (34 percent) than in rural areas (13 percent) (UBOS and ORC Macro, 2001). Although some believe there is a link between childhood stunting and obesity/overweight later in life, it appears social and cultural factors—such as reduction in physical exercise, change in dietary habits, and breastfeeding practices—may be major contributing factors in the rising rates.

Double-burden of Malnutrition

There is concern that Uganda is now experiencing a “double burden of malnutrition” with high rates of under-nutrition and growing rates of overweight/obesity within the country. This is further expanded by the response of Dr. Madraa to Mwadime’s presentation, “we are not only seeing malnutrition but we are also seeing over nutrition . . . in the same household which means that we are more commercialising agriculture than growing food for consumption. And when all these foods are being sold off, the money cannot buy what the family needs to eat.” Increasingly, health clinics are reporting stunted and malnourished children while mothers are overweight or obese. The trend appears to be most common in southwestern Uganda where diets lack high-quality protein and micronutrients (Harshbarger, 2009). In general, the double burden is attributed to dietary simplification, the nutrition transition, and inadequate access to quality foods. Margaret Masette from the National Agricultural Research Organisation (NARO) reports work on product development (through breeding and value-addition processes) that could potentially address some of these problems at the household level; however consumer acceptance, pricing and packaging may inhibit their success (see Chapter 5 for more details on this work of NARO).

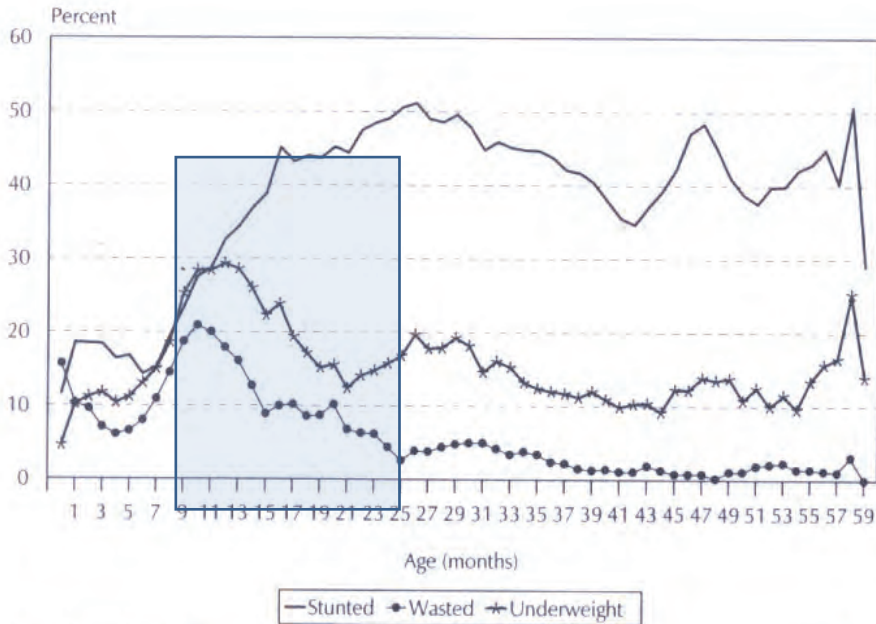
Given the identification of over- and under-nutrition within the same household regardless of income, strategic thinking will be required to address eradicating extreme poverty and hunger by raising the incomes of the poor (MDG 1). Ensuring that adequate amounts of diverse types of foods are available, affordable and accessible to all will better ensure good nutrition for everyone in the home.

Maternal, Infant and Child Nutrition

Women’s nutritional status has a strong bearing on the outcome of a pregnancy and thus should be optimised to enhance infant nutrition and health says FAO representative Juliet Aphane. Data from Uganda Bureau of Statistics (2006) show that 12 percent of women of child bearing age are chronically energy deficient. The consequences of intrauterine malnutrition can result in low birth weight. Low birth weight infants have a higher risk of subsequent growth retardation, morbidity and mortality compared to normal weight infants. Dr. Mwadime and Professor Joyce Kakuramatsi-Kikafunda, Department of Food Science and Technology, Makerere University, both note a window of opportunity to

prevent lifetime consequences of early under-nutrition beyond which the physical and cognitive effects can never be reversed. This “window of opportunity” stretches from conception up to two years of age (see Figure 2.6).

Figure 2.6. The window of opportunity to prevent lifetime consequences of early under-nutrition



Note: Includes children below -2 SD from the WHO Child Growth Standards

Source: FANTA-2 (2010); UBOS and ORC Macro (2006).

As indicated previously, under-nutrition starts before birth for many children in Uganda. Approximately 11 percent of children are born already stunted and roughly 16 percent are wasted at birth (FANTA-2, 2010). Shown in Figure 2.6, stunting rates remain above 15 percent from the third month of life, with a sharp increase at 7 months and a peak at about 26 months (to about 50 percent). These changes coincide with the timing of a need to introduce adequate complementary foods to breastfed infants (i.e., at 6 months), and the minimum recommended duration of continued breastfeeding (24 months).

Drawing data from the most recent Uganda Demographic Health Survey (2006), Ms. Aphane informs the audience that only 60 percent of children under the age of 6 months were exclusively breast fed. If breastfeeding is fully exploited, for most infants in this age category, food security can be ensured. In the same study, lack of dietary diversity—particularly animal source foods which are essentially rich in vitamin A, iron, zinc and calcium—was identified in the feeding of the complementary foods to infants and young children. The fruit and vegetable content of children’s diets were also inadequate. Availability of nutritious safe foods, high-quality infant and young child feeding practices and acceptable maternal nutrition are some of the key elements necessary for attaining and maintaining a good nutritional status in young children. Interestingly, it also appears that a mother’s educational attainment is a contributing factor of stunting at birth with 41

percent of children born to mothers without education being stunted versus only 23 percent of children born to mothers with secondary or higher education (UBOS and ORC Macro, 2006). Other associations of infant under-weight are linked to maternal reproductive factors including young maternal age, short spacing between births, and high fertility.

Women’s Reproductive Health

Uganda has a relatively high fertility rate (6.7 births per woman), which in the absence of strong economic growth, contributes to poverty and malnutrition. Many agricultural families desire large families for many reasons, but paramount among these are the labour value of children for small-holder agriculture which means that agriculture as currently practiced may be linked to high fertility.

Frequent pregnancies affect the health and welfare of the woman; and a woman’s nutritional status influences the outcome of her pregnancy and the birth weight of her child. With each subsequent birth (especially after the fifth), there is an increased risk of growth retardation, morbidity and mortality that is a result of intrauterine malnutrition due to maternal under-nutrition. Stunting is highest among children born less than 24 months after their older sibling (41 percent) (FANTA-2, 2010). The proximate effects leading to malnutrition of these children include:

- early stopping of breastfeeding;
- less time for feeding older siblings; and
- less food for the many children.

Similarly, there is an effect of family size on children’s nutrition through postnatal pathways. High fertility among poor households with few assets for agriculture and other resources tends to transmit poor nutrition across generations and in the words of Mr. Stanlake Samkange of the United Nations World Food Programme (WFP), cause an “inter-generational cycle of hunger.” Although direct evidence is sparse, it is highly plausible that high fertility and narrowly spaced births—that may result from lack of women’s autonomy and unmet need for family planning—increase vulnerability to both poor child care and household food insecurity.

Children born to teenagers are also at great risk of being low birth weight and malnourished in childhood. Uganda is particularly vulnerable given that roughly half the girls deliver a child before the age of 18 and the country has the highest teenage pregnancy rate in sub-Saharan Africa. Many parts of Uganda, especially the Northern and Eastern regions, are experiencing high rates of adolescent pregnancy and high total fertility rates (UBOS and ORC Macro, 2006).

Complementary Feeding

There appears to be a need for nutrition education on the practical basics of good nutrition. Late initiation of breastfeeding and the use of prelacteal feeds are quite common in Uganda as well as early introduction of foods and liquids and inappropriate complementary feeding. The choice of complementary foods within households is driven by complex factors of budget, time availability and also concepts shared at the community level of what constitutes good food and appropriate nutrition. Little work has been done on the

perceived economic and nutritional advantages and disadvantages of foods commonly consumed by children in Uganda. What is known is that many communities value food staples such as matooke, maize and cassava, yet these are of low nutritional value.

Results from the most recent Demographic and Health Survey (2006) indicate that foods given to infants and young children of the age when complementary feeding is needed generally lack dietary diversity. Specific limitations of the diets of Ugandans at this particular stage of growth and development are a lack of animal source foods and also fruits and vegetables. Nutritional studies of the ability of home-prepared foods to meet critical micronutrient needs show that this is difficult to achieve even by adding orange, carrot, amaranth and meat to traditional matooke and maize-based diets. Increased diversity in children's diets may gradually raise their micronutrient intake, but it is difficult to meet iron requirements from common diets alone unless there is substantial intake of animal products.

Gender

Women's nutritional status affects their ability to perform family care and nurturing duties as well as household food production activities. Given that 80 percent of the African continent's population relies on agriculture for their livelihood and women play a significant role in this area it is not surprising that agricultural productivity is compromised when women are nutritionally deficient. The unfortunate irony is that women provide most of the agricultural labor and yet they bear the brunt of food insecurity, hunger, malnutrition and the disease burden, such as HIV infection.

In relation to national development, Ms. Aphane of FAO describes research that shows economic growth and development are reduced if gender inequalities are not addressed. Studies conducted in 2002 and 2009 show that gender inequality in education and employment reduces rates of economic growth (Klasen, 2002; Klasen and Lamanna, 2009). Similarly, gender inequality in relation to access to productive resources and input in agriculture also reduce efficiency and rural development. This was actually shown by studies done in 1994 and 2007 (Udry, 1994; Blackden et al., 2007). Ms. Aphane emphasises the importance of enhancing the status of women in the rural production system, family and society to attain food security and sustainable agricultural development. Likewise, to adequately and sustainably address nutrition in the family and agricultural issues on the farm, an effective and meaningful involvement of women is necessary.

Just as women need to be involved, Professor Consolata Kabonesa—Head of the Department of Women and Gender Studies, Makerere University—emphasises the need to involve men in developing strategies that could help them better understand the heavy burdens carried by women trying to provide balanced nutritious meals to all members of their family. In this way she says, men will recognise the high workloads of the women and their need for assistance. Dr. Mwadime from FANTA-2 similarly stresses a woman's lack of "time" as a major impediment to improving her nutritional status. His research group conducted interviews that showed women spend up to 17 hours per day on household chores including food production. As an example, Dr. Mwadime describes a lady in Northern Uganda who spends hours on the farm then returns home to cook the best food for the husband that entails a very energy and time-consuming process. Once her husband is seated, she must then take time at the end of her long day to feed the children

on that “quality” food. She told Mwadime’s team that, “I am needed to do everything including fetching water for my husband ... [and] washing the shirts and clothes” along with all the other things she has to do to keep her husband happy. It is because of these time restrictions she goes on to say that “I have to take short cuts in everything.” Some of those shortcuts compromise the feeding and nurturing of her children.

When Dr. Mwadime’s team calculated the energy required just for this mother to collect water needed for her daily cooking and chores, they determined that she requires 18,000 calories per month for this one task which if not taken, is enough for her to lose roughly 2 kilograms of weight each month. This is the situation in which many women in Uganda try to maintain a good nutritional status amidst great demands on their time and energy.

Agnes Kirabo, Vice Chairperson of the Uganda Land Alliance, raises another issue dealing with land. She says that community political decisions drive the land policies at the local level and thus determine where and who are going to grow crops, who is going to use the harvests and for what purposes. Compared with men, women face a number of costly constraints ranging from lower wages for agricultural work to lack of access to land, working capital, technology, and marketing channels (The World Bank, 2008). The general agreement at the workshop is that male involvement in child care and household productive activities could offset malnutrition in Uganda, and the attitudes and empowerment of both men and women is critical to improving nutrition for all in the country.

Agriculture for Health and Prosperity

The agricultural sector is a major contributor to Uganda’s prosperity and accounts for almost one quarter of gross domestic product (24.3 percent versus 24.7 percent industry and 51 percent services) (CIA, 2009). Although the country is noted for its high agricultural productivity, climatic seasonality strongly affects output; and the three broad agroclimatic zones (humid, subhumid, and semi-arid) are characterised by different agricultural systems (Lal et al., 2005).

Agricultural Production

Agricultural yields and total production have increased in recent years making agriculture a key driver of economic growth that has contributed to a reduction in poverty rates in Uganda in recent years. Government expenditures on agricultural support and extension account for a significant proportion of their total budget.

The leading agricultural products are coffee (the principal export commodity, accounting for the bulk of export revenues), tea, cotton, tobacco, cassava (tapioca), potatoes, corn, millet, pulses, cut flowers, beef, goat meat, milk, and poultry (CIA, 2010). Industrial production directly related to agriculture includes sugar, brewing, tobacco, and cotton textiles. Many presenters at the conference refer to certain areas of Uganda as “breadbasket” regions. In fact, national balance sheets indicate that Uganda is a net food producer and should be self-sufficient in meeting national food demand. Although agriculture is a critical sector of the economy for employment, a majority of households—particularly in rural Uganda—are also involved in farming that provides food directly for household consumption. The representative for the Honorable Prime Minister Opio points out what

he calls “the obvious” that agriculture is the principal way most Ugandans obtain their livelihood. From their farming, he goes on to say, Ugandan households obtain food which they can consume directly and get their income. With these profits they can purchase a more diverse and nutritious basket than they themselves could produce.

Micronutrient Fortification

Presentations by NARO’s Margaret Masette and Anna-Marie Ball from Harvest Plus cover their work in micronutrient fortification of plants. Although technology has advanced significantly through the years, Masette highlights a common message expressed throughout the conference that the issue of consumer (and farmer) acceptance of bio-modified products is still a challenge. In Uganda, the people are accustomed to the hard sweet potato so the orange-fleshed sweet potato was not welcomed because of its soft texture. Professor Israel Folorunso Adu of the Nigerian Agriculture-Nutrition Linkage Project finds a similar challenge in Nigeria where he cites culture and traditions as impediments to acceptance of the new model of fortifying food. According to Ball, for there to be acceptance, “the sweet potato should [already] be an important staple in diets. If a secondary staple, at least 50 percent [of the] households should be growing it and [educators need to] remember to teach on behaviour change.” Her point is that it is easier to modify an existing behavior than to create a new one. So for example, if a farmer is already growing yellow or white sweet potato, it would not be very difficult for them to adapt to growing orange sweet potato. Conversely, if there are people who want to grow bananas for matooke, it will be harder for them to make that transition to growing sweet potatoes. She also acknowledges that farmers will need training in viable methods for vine preservation and consumers will need special nutrition messages that focus on how orange-fleshed sweet potatoes can reduce the risk of vitamin A deficiency. She goes on to say that building the awareness of the orange-fleshed sweet potato as a major source of vitamin A through “orange” branding has worked well in Mozambique and Uganda so a similar message is being used in Kenya in hopes of gaining better acceptance by farmers and consumers in the country.

Post-harvest Processing and Handling

Professor John Muyonga, Head-Department of Food Science and Technology at Makerere University, addresses post-harvest processing—the intentional alteration of food properties—and handling which he defines as any action taken between the time of harvest and consumption of the food. During this time, certain undesirable changes can occur leading to (1) quantitative loss whereby food becomes unavailable for the consumer, and/or (2) qualitative loss whereby certain nutrients are diminished or food is contaminated. This loss of crops has been termed the “leaky food pipe” which in Uganda, has accounted for up to 50 percent of post harvest losses.

Grain can be lost due to spillage during transportation and from contamination by moulds, insects, rodents and birds during storage. In fact, much of the maize and cassava in Uganda is contaminated with aflatoxin because of the way grain and other dry products are often stored and handled. Nutrients are also lost due to long and improper storage. For example, storing sweet potatoes in a dark room will better retain the beta-carotene than storing them in open areas exposed to light. Professor Muyonga concludes that the way food is handled after harvest has a major bearing on the benefit actually derived from the food and better

processing can lead to nutrient enhancement, better bioavailability, and preservation. In this way food can be kept longer which means that a greater percentage of the food will be available to the consumers.

Investing in Agriculture

In his opening speech, Ambassador Jerry P. Lanier of the United States Embassy to Uganda reminds the audience that in July 2009, global leaders called for increased investment in agriculture and rural development because it is “absolutely necessary for security, economic growth, prosperity and stability.” The ambassador goes on to say that Uganda has the potential to become Africa’s biggest agro base and the U.S. wants to help Uganda get there.

Through the U.S. Government’s Global Hunger and Food Security Initiative, or “Feed the Future,” as well as the Global Health Initiative, U.S. is renewing its commitment to invest in sustainably reducing hunger and poverty through agricultural-led growth and improved nutrition. In fact, the Ambassador says, “President Obama has pledged over 3.5 billion dollars globally for agricultural development and food security to leverage resources of host country governments and other development partners in support of a common approach.” The U.S. government will continue to promote country-developed plans that support resource-based programmes in partnerships to achieve the MDGs of halving the number of people suffering from hunger and poverty by 2015. Ambassador Lanier emphasises that the U.S. government will increase investments in agricultural development while maintaining support for humanitarian food assistance. He urges the Government of Uganda to increase investments in nutrition as the two countries move forward in partnership together.

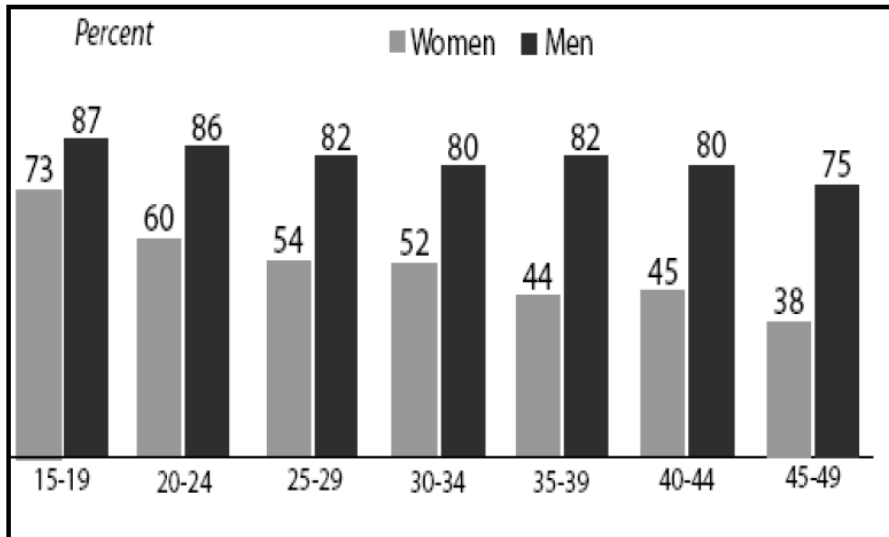
Gender Disparities in Agriculture

As noted previously, women in Uganda and other parts of sub-Saharan Africa provide the bulk of the agricultural labor and are mostly responsible for producing and acquiring food consumed by their families, yet women bear the brunt of food insecurity and malnutrition. Many of these inequities persist because of the arrangements of work and human rights in the agricultural sector and can be broken down into 6 areas.

First, access to ownership of land is held overwhelmingly by men (92 percent) (FANTA-2, 2010; Bosworth, 2003). Second, although the educational gap between sexes is diminishing (see Figure 2.7), disparities in education and literacy persist placing women at a disadvantage as efficient farmers (UBOS and ORC Macro, 2006). Third, qualitative research provides data that—particularly at household but also at community level—women make few of the decisions about the use of resources such as productive assets, goods and foods produced and their sales. And they make few of the decisions about intra-household distribution of the resources (FANTA-2, 2010; The World Bank, 2005; UBOS and ORC Macro, 2006). Fourth, evidence suggests that gender disparities are both a cause and an effect of high fertility and a large unmet demand for family planning. Indications are that such disparities are linked to the high rates of under-nutrition. Fifth, work roles associated with agriculture tend to be strongly gendered, with men dominating income-generation and cash-management and women doing much of the value addition in food processing and managing home diets. Figure 2.8 provides a model of pathways linking

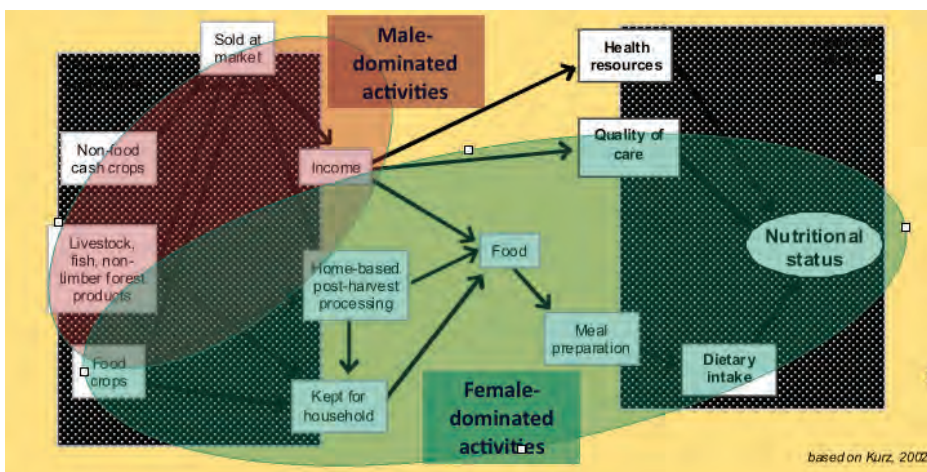
agriculture and nutrition through gender-related activities. Although the figure has dietary intake included, a more complete picture would also list “dietary intake and quality” as well as the time demands on women that play a crucial role in the nutritional status of her and her family. Finally sixth, there are reports that gender based domestic violence against women can contribute to household disparities and impact the nutritional status of those in the home (UNICEF, 2000; UBOS and ORC Macro, 2006).

Figure 2.7. Literacy by Age and Sex in Uganda, 2006



Source: FANTA-2 (2010); UBOS and ORC Macro (2006).

Figure 2.8. Simplified model of gendered pathways linking agriculture and nutrition



Adapted from Kurz, 2002 and used with permission from Dr. Todd Benson (2010).

Nutritionalisation of Agriculture

Nutritionalisation of agriculture is a term developed by the conference planning committee to capture the concept of incorporating nutrition outcomes into the design and planning of agricultural policies, programs and systems. It stems from past assumptions that improved nutrition would follow naturally from the gains achieved through increases in agricultural production. However, what appeared to be an implicit assumption did not always follow. The conference and this chapter in particular are the committee's attempts to bring to light those issues that have practical significance for nutrition-related agricultural programs, interventions, investments, and policies; and to look for bidirectional linkages between agriculture and health that might generate ideas for how Uganda could develop greater multi-sectoral coordination for the improvement of nutrition security especially for women and children.

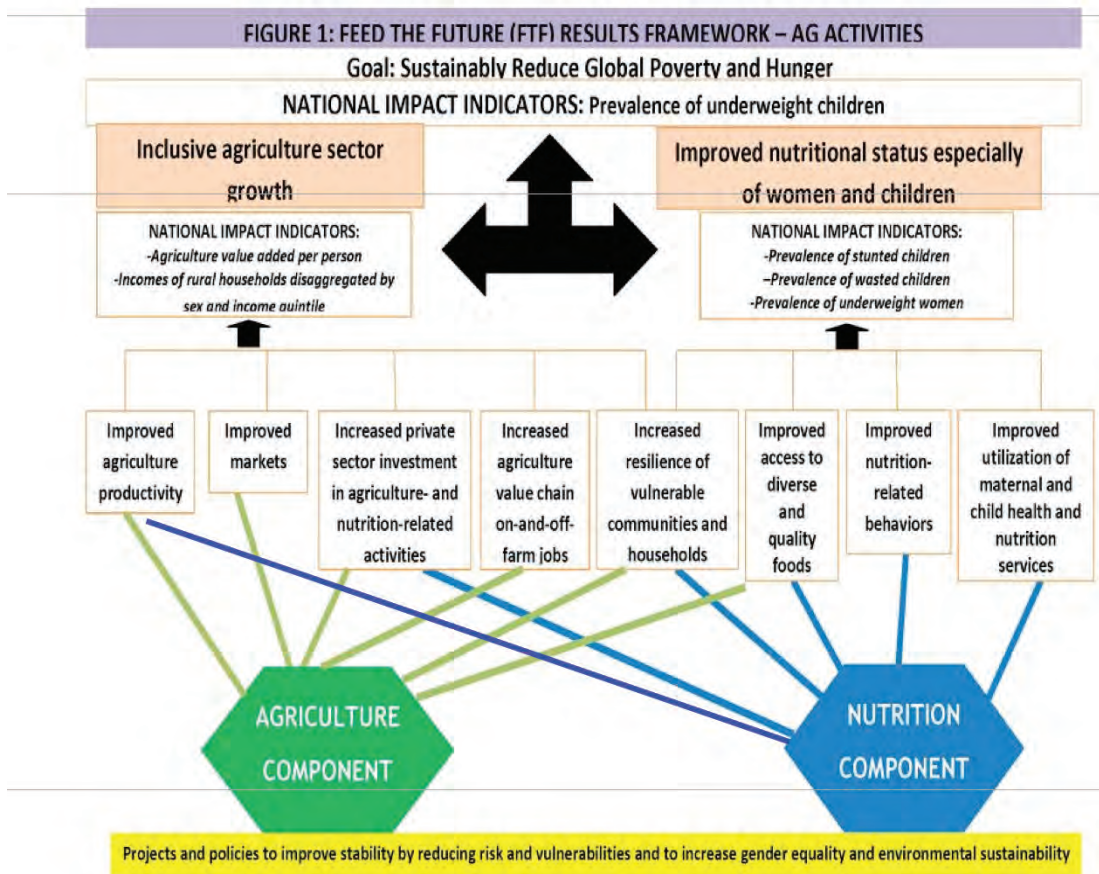
Linking Agriculture with Nutrition Outcomes

Agriculture plays a key role in nutrition and health. A number of agricultural, income-generating projects have been implemented in Uganda and other parts of Africa with variable improvements in the nutritional status of the most vulnerable persons (Berti et al., 2004; Maxwell, 1994). Currently, many programs and policies focusing on improving nutritional outcomes through agricultural and other investments carry enormous potential.

Conceptual Models

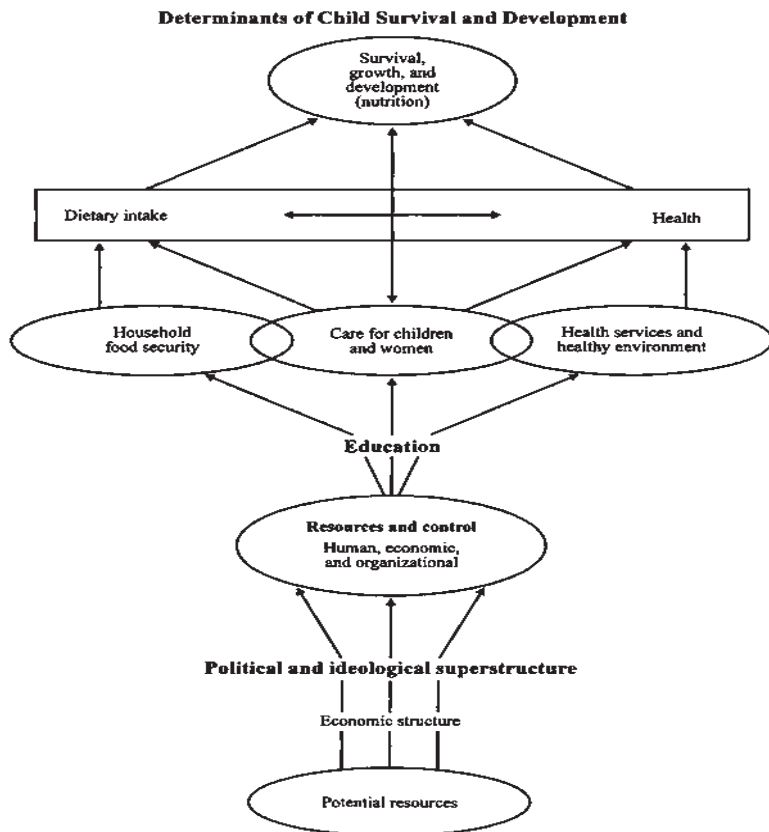
Conceptual models help explain the relationship between food production and malnutrition. One such model is in the presentation by Megan Rhodes and Brian Conklin, Team Leaders for USAID’s Uganda Feed the Future Initiative. While this model seen in Figure 3.1 does show the overlap between nutrition and agriculture components, Dr. Mwadime and Dr. Todd Benson from the International Food Policy Research Institute (IFPRI) in Uganda endorse the UNICEF model. Illustrated in Figure 3.2, this model references child nutritional status as a conceptual frame for addressing the underlying causes of malnutrition from a cross sectoral and policy level.

Figure 3.1. Conceptual model linking agriculture to nutrition outcomes



Source: U.S. Government (May, 2010).

Figure 3.2. The 1990 UNICEF conceptual framework of the determinants of child under-nutrition



Source: UNICEF (1990).

Economic Impact of Malnutrition

The extent to which malnutrition in Uganda affects productivity and the economy of Uganda is a topic of concern to several participants. According to Dr. Madraa from the Ministry of Health, the largest consequence of malnutrition affects the physical labor. She and Mr. Alex Bambona (Head of Nutrition and Home Economics at the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)) cite data showing an annual loss of roughly 38 million U.S. dollars of productivity as a result of iron deficiency anaemia. Although other sources cite a slightly lower loss to the economy of 34 million, the negative impact of malnutrition is clear (Republic of Uganda, 2011; UGAN et al., 2010). In fact, it is estimated that Uganda loses roughly 310 million U.S. dollars worth of productivity each year due to the accumulated effects of stunting caused in childhood, low birth weight, iodine deficiency disorders, and iron deficiency. At over 4 percent of the GDP, this economic consequence of malnutrition is well understood by the Honorable Opio through his remarks given by his noteworthy Representative (NPA, 2010).

Mr. Bambona also comments that having a nutritionally compromised workforce means that agriculture is negatively affected much more so than the other sectors of the economy. Also picking up on the theme of improved nutrition for increasing productivity is Professor Judith Kimiywe, Chairperson for the Department of Food, Nutrition and Diabetics Kenyatta University, Nairobi. She notes that in Kenya there is an emphasis not only on productivity but also on increasing the incomes of the people.

Speaking on behalf of Honorable Hope Mwesigye (MAAIF Minister), Mr. Sunday Mutabazi James (Commissioner of Farm Development) describes a recent development strategy of MAAIF. Improving production and productivity is the first program of this strategy. Through their development strategy, the Ministry hopes to make sure that food is not only available to improve nutrition security but also to improve incomes in the homes of those in need.

Nutrition-Agriculture Paradox

The nutrition-agriculture paradox arises from findings suggesting that rural farm households—who are virtually the major source of food—are also the most malnourished. And women who are the main producers of food especially at the household level, most commonly show signs of iron deficiency anaemia (49 percent). The paradox is that rather than agriculture providing adequate nutrition to allow the working population to achieve its maximum human health and economic potential, malnutrition weakens the capacity of the workforce to perform.

Evidence seems to suggest this paradox is due to the uneven distribution of food, constraints related to seasonality factors, poverty, and inequality in wealth and diseases rather than a lack of basic nutrition knowledge among female primary caregivers. Furthermore, indications are that the increasing commercialisation of agriculture has resulted in households growing food for the markets rather than for consumption. This has put pressure on land use and on women's time allocation and autonomy in decision-making, an unintended negative consequences of agricultural development that impacts the nutritional situation particularly of women and children in the home.

Addressing the Paradox through Linkages

The challenge of addressing the paradox can be met at least in part through exploitation of new opportunities linking agriculture with nutrition outcomes. In this way, the nutritional status of women and children can be monitored while income-generating and other agricultural projects and policies are implemented or scaled-up.

Although hunger, malnutrition and food insecurity have been on the international agenda for years, understanding and strengthening the links between nutrition/health and agriculture has not been a high priority of policymakers. For example, Michelle McNabb, Director of the Food Security Initiative of the Academy for Educational Development (AED) in Washington D.C., discusses in her presentation a 1937 League of Nations report on “the relationship of nutrition to health and agricultural economic policy.” According to McNabb, this shows that attempts have been made to link agricultural and nutrition policies for more than 70 years. There was a period of interest in the 1980s as well as a steady stream of projects in a number of countries over the last 30 years. But yet despite

these years of experience, groups are still asking how to effectively link and coordinate agriculture with nutrition.

McNabb comments that just as communication between two people who speak the same language but different dialects is impeded, communication between agriculture and nutritional health experts—who have different terminologies and world views—is also hampered. A way around this communication gap is to find people educated in both areas that can essentially function as messengers. Meeting participants propose incorporating nutrition education into the agricultural curriculum of universities and into the messages of agricultural extension workers as potential routes to bridging this gap.

Dr. Kisamba-Mugerwa, Chairperson of the National Planning Authority (NPA) and former Minister of the MAAIF, agrees that coordination and an integrated approach is necessary. Nutrition needs to be part of the plans and strategies of ministries (including MAAIF, Ministry of Local Government, Ministry of Labour Gender and Social Development, Ministry of Education and Sports, and Ministry of Health), district local authorities, non-governmental organisations, community-based organisations, and the private sector. As Chairperson of the NPA, Dr. Mugerwa is responsible for the National Development Plan—a five year framework for guiding public action on development/poverty reduction in Uganda—that recognises nutrition as a cross cutting issue. The danger, he cautions, is allocation of funds is not cross-cutting so most of the departments and Ministries have a tendency to look only at their own core activities. As a result, inter-linkages with other sectors are weak and can compromise how cross-cutting issues like nutrition are dealt with.

Connecting Sectors

In keeping with their presentation on connecting agriculture and nutrition for economic growth, Rhodes and Conklin describe USAID's Feed the Future initiative that has been bringing together experts in health, economics, agriculture, and energy to work as a single unit. Although Ms. Rhodes admits there were challenges to bringing different sector-based terminologies and perspectives together, in the end, the value of the investment was immense. Now the team is much better equipped to address issues of agriculture and nutrition put forth by the Obama administration's Feed the Future Initiative. And, she goes on to say, better equipped to partner with Ugandan colleagues and the Government of Uganda in a more comprehensive way because of this multi-sectoral team.

The representative of the Prime Minister of Uganda (Honorable Gabriel Opio) similarly expresses the need for a multi-sectoral approach to ensure the nutritional well being of Uganda. As Prime Minister, he says, his office is responsible for ensuring that various sectors of Government work in a coordinated and effective manner to address Uganda's development challenges including that of the malnutrition.

In the Prime Minister's view, the work of the agricultural sector must be undertaken in a complementary and harmonised manner with other sectors. However, despite the importance of the contribution of agriculture to improved nutrition, he says the agriculture sector rarely communicates with the other sectors whose efforts contribute to improved nutrition—health, education, and water and sanitation, most notably. Seldom are the nutrition-related activities of these key sectors integrated or coordinated. Agricultural

policies address natural resource management, farmers’ livelihoods, food security, and food safety, while public health policies in the health sector tend to revolve around the provision of preventative and curative care within clinic-based health systems. Agriculture is driven by an economic development rationale while health aims to maximise human development. These fundamentally different societal functions have kept the sectors apart. Although, he also says, the responsibility does not stop with agriculture. Nutritionists are also needed to work across sectors in order to effectively address the large and dynamic challenge of development in Uganda and Africa as a continent.

In his presentation, Dr. Todd Benson expresses his perspective that nutrition is not a sector although it is often treated as one. Nutrition is a policy issue that requires cross sector coordination and action from the agricultural, educational, health, water and sanitation sectors. He does say there are professional nutritionists working in nutrition but that does not constitute a sector; and in agreement with the Prime Minister, the agriculture sector cannot overcome malnutrition alone. Agriculture is only one of multiple sectors underlying determinants of whether or not a child will be malnourished. Children need proper nutritional care and a healthy environment with access to appropriate health services.

Previous Interventions Linking Agriculture and Nutrition

In Dr. Joyce Kikafunda’s introduction she notes that a number of nutrition interventions have been implemented by the government of Uganda and international partners that attempted to integrate nutritional issues into agricultural designs. These previous efforts provide some experience on which to consider challenges and lessons learnt that might help to inform future activities. Four of these examples include the following and are detailed in Table 3.1:

- Uganda Food Security Initiative
- The Micronutrient Program
- The Agriculture Nutrition Advantage
- The Gender Informed Nutrition Agriculture

Table 3.1. Previous efforts in Uganda to link nutritional issues into agricultural designs

Uganda Food Security Initiative (UFSI)
<p>UFSI was piloted by Africare-Uganda in five districts in the Southwest between 1999 and 2006. People in this crowded, impoverished, rural area relied on small holder subsistence agriculture despite its rugged and steep terrain. The project dealt with food insecurity through multi-sector interventions and sought to increase the quantity of food produced, reduce post-harvest losses, improve farm family access to food by raising family income, and enhance the quality of food consumed at home. An estimated 21,252 households (roughly 150,000 people) in 144 villages in the Districts of Kabale, Kisoro, Ntungamo, Kanungu, and Rukungiri were targeted (Anderson et al., 2006).</p>

Outcomes/ Lessons Learnt: UFSI was successful because households adopted better feeding practices with improved dietary diversity, and indicators of sanitation and hygiene improved. Also, there was a reduction in stunting of children 24-25 months of age (36 to 30 percent), and a decrease in under-weight children 0-25 months (28 to 22 percent). Although the project recorded some remarkable successes some challenges were noted regarding funding and ensuring sustainability. Among the lessons learnt, UFSI evaluators felt the multi-sectoral approach was critical to their project design and maximised the impact of their interventions dealing with the underlying problem of food, health and the related causes of malnutrition.

The Micronutrient Program (MOST)

The MOST Strategy supported a broad cluster of country programs including: fortification, supplementation, food-based strategies (orange-fleshed sweet potato - OFSP), behavioral change approaches, operations research and other studies, and monitoring and evaluation. In Uganda, MOST provided technical assistance in vitamin A supplementation, food-based activities, and anaemia prevention and control. Its aim was to improve the nutritional status of children and women, advance household food security, and increase income. The many partners to MOST included the Ministry of Health, USAID, Makerere University, NARO, and the Volunteer Efforts for Development Concerns (VEDCO).

Outcomes/ Lessons Learnt: The multiple strategies employed by MOST to ensure adequate intake of vitamin A in Uganda had complementary effects in reaching different groups of the population (Sserunjogi and Harvey, 2005). New varieties of OFSP had good yields and increased household food security. And although the new crop was not popular with adults due to the taste, texture and color, children ate them and benefited from them nutritionally while the women benefited from the learning process.

A major lesson learnt from the project involved cost. Equipment required for fortification was very expensive so the expenditures needed for the program were difficult to meet especially because many of the small scale industries were spread out geographically. Since fortification is a multi-sectoral venture, it was necessary to involve all stakeholders from the start and obtain political commitment. In addition, industrialists needed training and re-training on the nutrition implementation and monitoring of quality assurance indicators and outcomes.

The Agriculture Nutrition Advantage (TANA)

The TANA project ran from 2001 through 2004. It aimed to strengthen and expand linkages between nutritionists and agriculturalists through gender sensitive approaches, to reduce hunger and under-nutrition in five African countries including Uganda. A study under the TANA project was directed to assess the extent to which the agriculture and nutrition communities in each country work as partners to reduce malnutrition; to gauge the potential gains from increased collaboration; and to understand the various constraints to such collaboration.

Outcomes/Lessons Learnt: At a policy level, the initiative succeeded in securing inclusion of nutrition in the Poverty Eradication Action Plan as a cross-cutting issue; and a national Plan for the Modernisation of Agriculture sub-committee (Food security) was renamed to Food and Nutrition Security with more focus on nutrition than ever before. Despite the successes, researchers of the study also uncovered significant barriers that impeded teamwork and accomplishment of the project's goals. These included: (1) resource allocation and planning processes within the bureaucracy; (2) differing sector mandates and priorities; (3) differing sector worldviews; and (3) capacity constraints for nutritional analysis within sectors (Benson, 2008; The World Bank, 2007).

The Gender Informed Nutrition Agriculture (GINA)

GINA was a community-based approach of linking Agriculture, Nutrition and Gender in 3 districts in Southwest Uganda between 2005 and 2008. GINA's overall goal was to improve nutrition outcomes of children under five years of age. GINA was designed to promote, facilitate and measure uptake of several activities that cross-cut nutrition, agriculture, hygiene and sanitation. These included: backyard and community gardening, growing and consuming nutrient-enriched food crops (OFSP), and increased consumption of home/community-produced animal protein (rabbits), monthly child weighing, and caregiver counseling. There was a strong focus on gender informed activities and gender analysis of the outcomes. Although 80 percent of participants were women, the project recognised and facilitated men and women working together to raise their children, and men were trained and were vigorously involved in growth monitoring and promotion.

Outcomes/Lessons Learnt: Experience from GINA demonstrated that it is possible and productive to incorporate nutrition activities into District Development Plans. Radio programmes proved an effective channel. The formation of Nutrition and Agriculture Groups was very important, and for sustainability, researchers learnt that it is necessary to link these groups to existing programs such as those focused on micro-finance or National Agricultural Advisory Services. A number of challenges were also encountered during GINA implementation: radio programmes proved relatively expensive; project coverage was smaller than planned; the period of implementation and support proved too short to effect lasting behavioural change; the agriculture component met with varied success at the household level due to difficulties in managing diseases of both crops and small stock (OFSP and rabbits); and recruitment of Community Growth Promoters was based on a model of volunteerism which proved unsustainable after funding for other project components ended.

The HarvestPlus OFSP project

HarvestPlus was a Challenge Program within the Consultative Group on International Agricultural Research (CGIAR) system. Its primary goal was to encourage bio-fortification of staple foods through conventional breeding to increase crop contents of bio-available micronutrients such as vitamin A, zinc and iron. The rationale was that even people with limited resources buy foods based on staple crops; therefore, micronutrient enhancement of staple crops has the potential of shifting the micronutrient quality of diets for a whole population. HarvestPlus focused on three main micronutrients including pro-vitamin A, zinc and iron; and in Africa, the targeted crops were (and are) orange sweet potatoes, orange and vitamin A maize, pro-vitamin A cassava, and high iron beans.

Among HarvestPlus activities in Uganda has been a randomised control study testing the most cost effective strategies for farmer adoption and consumer acceptance of bio-fortified orange-fleshed sweet potatoes. This was conducted in three districts, Bukedea, Kamuli and Mukono reaching more than 10,000 farmers through farmers groups. Over 60 percent of target farmers were women. Farmers were taken through trainings in production of sweet potato (with a focus on vine conservation and management of potato diseases), nutrition training (with a focus on preserving OFSP as part of the food system through dietary diversification, and in marketing (with a focus on boosting small holder incomes). The study tested for differences in impact of a full extension of a program that also included radio and other area-wide activities for one versus two years. Similar studies were conducted in Mozambique.

Outcomes/Lessons Learnt: In Uganda, the project showed increased adoption and cultivation of the OFSP. Introduction of the sweet potato resulted in a significant increase in total vitamin A intakes among young children, older children, and women that is attributable to the increased intake of vitamin A from OFSP, constituting roughly 44-60 percent of the total vitamin A intakes.

Researchers learnt that HarvestPlus has the potential of being sustainable and highly cost effective because it requires only an upfront investment in the breeding for increased micronutrients and establishing markets and farmer adoption. When production is combined with value addition activities, market linkage and social marketing, this value chain approach can increase the income levels of rural farming households. Another discovery for the researchers was that it is much easier to modify an existing behaviour than to create a new one so targeting adoption of modified existing crops is a more effective strategy. Incentives and support for adoption should include strong agricultural outreach to deal with maintenance breeding and disease management. Market development is not critical for the initial adoption although it may be for diffusion and long-term acceptance. In Uganda, the sweet potato has been successfully linked to the vitamin A message that was well-disseminated by Ministry of Health; and consumer adoption has been driven in part by this building awareness of vitamin A and OFSP as a major source of vitamin A through “orange” branding.

These few past agricultural interventions with a nutrition component (noted in Table 3.1) provide too little data to draw firm conclusions but they do show that interventions can achieve a positive impact on indicators of maternal and child nutrition. However, according to Prof. Kikafunda, challenges for most of these programs are linked to sustainability both in terms of finances and human resources because most if not all these programs are donor funded. The donors bring what is called “seed money” or “pilot money” which is not expected to be an ongoing source of funds says Kikafunda. In addition, some of the international programs employ their own technical assistants so when those experts leave, there is an issue with getting trained local workers from within Uganda. This means that scaling-up is also a challenge. A pilot program may be very successful in one district, or two or three but when it is expanded throughout the whole of Uganda, what happens? The implementation period is too short to demonstrate an impact and because of poor linkages between line sectors, there is little coordination in ways that address the issues leading to malnutrition. Professor Adu of Nigeria echoes the need for sustainability in his country and Ms. McNabb from AED encourages the participants to learn about sustainability from previous programs, initiatives and studies such as those presented by Prof. Kikafunda.

International Policies, Programs and Perspectives

The last 15 years have witnessed a number of international policy initiatives that use agriculture to address food and nutrition challenges. Two of arguably the most influential initiatives include the World Food Summit in 1996 that was called in response to the continued existence of widespread under-nutrition and growing concern about the capacity of agriculture to meet future food needs (FAO, 1996); and the United Nations Millennium Development Goals (MDGs) that was adopted by heads of State and Government when they gathered at the UN Headquarters in 2000 (United Nations, 2000). The MDGs have been a major driving-force for a number of international initiatives. This chapter explores these initiatives as well as global investments in agriculture for improving food security, and looks at the health and agricultural conditions in two other African countries as comparisons to Uganda.

Global Leadership in Food Security

Leaders attending the G8 2009 summit in L'Aquila, Italy in July 2009 responded to a spike in global food prices and recent financial market turmoil by calling for increased investment in agriculture and rural development. This investment they said is absolutely necessary for food security, broader economic growth, prosperity, and stability. They signed the L'Aquila Joint Statement on Global Food Security in which the G8 countries agreed to “partner with vulnerable countries and regions to help them develop and implement their own food security strategies, and together substantially increase sustained commitments of financial and technical assistance to invest in those strategies” and commit to mobilising 20 billion U.S. dollars over three years to agricultural development (G8, 2009). Individual G8 countries submitted financial commitments to address several specific objectives.

International Support and Opportunities for Partnership

Efforts are underway by multi-national organisations like the United Nations, the European Union, and the World Bank as well as individual countries such as the U.S. and Canada. Two common characteristics of many recent initiatives are (1) their dual focus on nutrition for development and the role of agriculture in strengthening nutrition; and (2) their focus on sustainability. In addition, donors are making fundamental commitments to country led processes that address poverty and under-nutrition through agriculture and technology. The opportunities for countries to set the agenda with ideas generated within government and on the ground are expanding. Rwanda and Bangladesh are specifically mentioned at the workshop as countries that quickly responded to this new landscape for the support of national development through country leadership.

The international community offers an increasing source of support and partnership in nutritionalisation of agriculture as evidenced by recent and current involvement of international agencies such as the UN system, foreign governments and international donors. The following are two examples of international support and opportunities for enhanced partnerships.

The UN World Food Program

At the workshop the UN-World Food Programme (WFP) Representative and Country Director in Uganda, Mr. Stanlake Samkange, describes WFP's commitment to nutrition, outlines its activities on the ground to help nutritionalise agriculture, and defines some strategies for collaboration that could move forward the Nutritionalisation of Agriculture.

He begins by stating that WFP recently shifted from being a food aid to a food assistance agency by employing new tools to address hunger and tackle its underlying causes. In Uganda, their five year Country Strategy identifies three priority areas—agriculture and market support, emergency humanitarian action, and food and nutrition security—in which nutrition cross-cuts as both a key input and expected outcome. The *Agriculture and Market Support* priority area encompasses the Purchase for Progress (P4P) component of WFP-Uganda's Country Strategy and targets over 900,000 beneficiaries with a major focus on market infrastructure, post harvest handling and local purchases. WFP's procurement and distribution systems are improving the nutritional intake of vulnerable populations while

enhancing the capacity of the Ugandan private sector to produce and profit from selling fortified maize meal. Through its local purchases of food, transport and other services and the many people it employs, WFP is an increasingly important player in Uganda's economy both within the agriculture sector and beyond.

WFP-Uganda's *Emergency Humanitarian Action* priority area addresses the needs of Extremely Vulnerable Individuals (EVIs) suffering from acute food and nutrition deficiencies in the context of shocks. It also provides supplementary and therapeutic feeding activities to children aged 6-59 months and gets appropriate micronutrients to pregnant and lactating women. Their *Food and Nutrition Security* priority area supports the Government in addressing Uganda's chronic hunger and micronutrient deficiencies, focusing specifically on breaking the inter-generational cycle of hunger by targeting children between 0 to 2 years of age.

Other WFP activities include community-based, mother-and-child health and nutrition interventions. At these intervention sites pregnant or lactating women receive food for themselves and their children only after attending antenatal and postnatal health clinics ("service first, food last") that emphasise nutrition and food security education. WFP-Uganda's agriculture and market support aims to diversify food rations to improve their nutritional quality and variety using locally available foods to improve the quality of life of small holder farmers, and to deliver benefits on both the supply side and the demand side of the agriculture value chain.

WFP is working with Governments, partners, and others to nutritionalise agriculture by emphasising livelihood activities with a nutritional impact. For example, they have established partnerships with MAAIF, FAO and the World Vegetable Centre through a local vegetable gardens programme. And they are working to increase national capacity to produce fortified maize meal for distribution to refugees and internally displaced persons (IDPs). WFP has upgraded its Nalukolongo milling facility so it can produce fortified maize meal, and they purchased four new milling machines with extruders that are to be installed in Gulu, Tororo and Nalukolongo. At the national level, WFP is supporting and encouraging the expansion of local private sector capacity to produce fortified maize meal by facilitating public-private partnerships (PPP) with MAAIF, GAIN, the private sector and academic institutions. In addition, WFP is promoting the production, consumption and marketing of bio-fortified, nutrient-rich staple crops in Southwest Uganda by working in partnership with MAAIF, Harvest Plus, FAO, and USAID. And lastly, WFP is working with the Ministry of Education, Ministry of Health and other partners to develop education and sensitisation campaigns. One example is the "Great Start" Campaign to enhance nutrition and health awareness in a traditionally food surplus area where stunting among children is disproportionately high. The campaign builds on the work of UNICEF and others in partnership with the Ministry of Health and the Ministry of the Local Government.

The United States

In his presentation, U.S. Ambassador Jerry Lanier summarises a general consensus that hunger is one factor robbing individuals, families and communities of health and productive lives; and a comprehensive approach to achieving nutritional security requires deployment of health, agriculture and economic sectors. He notes three specific aspects of

Uganda's National Development Plan that the U.S. continues to support. These include: (i) addressing food insecurity during emergencies; (ii) providing support for economic strengthening to provide food and nutrition security; and (iii) improving the health services in Uganda focusing on nutrition interventions. The U.S. is committed to helping Uganda become Africa's "bread basket" he says, and he underscores the U.S. response to recent global calls for investment in agriculture and rural development through a Global Hunger and Food Security Initiative, the Global Health Initiative, and a 3.5 billion U.S. dollar pledge globally for agricultural development and food security. According to Ambassador Lanier, the U.S. Government will increase investment in agricultural development while maintaining support for humanitarian food assistance and continuing promotion of country-developed plans that support results-based programs and partnerships to achieve MDG 1. He urges the Government of Uganda to increase government investment in nutrition and to build a foundation of good governance for open markets and trade. He identifies poor water and sanitation, large unmet needs for family planning, high population growth and systemic challenges of access to quality health services as threats to continued successes in HIV/AIDS, health and education. He expresses his intentions of maintaining a strong cooperation and dialogue between the U.S. and Uganda, and thanks those present for contributions already made to address hunger, malnutrition and poverty.

An example of U.S. support for nutritionalisation of agriculture is the Feed the Future program described in Chapter 3. This initiative—aimed at reducing poverty (MDG 1) by reducing under-nutrition—is specifically designed to support activities that are country-led, coordinated with Development Partners, integrated and/or scalable, sustainable with measurable results, and that will likely provide a high return on investment.

African Initiatives

Three initiatives with particular relevance to Uganda are the Maputo Declaration, New Partnership for African Development (NEPAD), and the Comprehensive African Agriculture Development Programme (CAADP). A more detailed description of each is provided below.

Maputo Declaration

Crafted by members of the African Civil Society in July 2003, this declaration called for action in attaining and realising a people-centred African Union. Aspects of this declaration were endorsed by African Heads of State and Government as the "Maputo Declaration on Agriculture and Food Security in Africa" (African Union, 2003). The Declaration recognised the fundamental importance of agricultural development to economic growth, poverty eradication and the elimination of hunger in Africa. Signatories committed to strengthening the development of agriculture and related value added activities, rural development and food security at national and regional levels. They supported the formulation of programmes under the ACP-EC (African, Caribbean and Pacific Countries-European Community) Development Cooperation Framework that include safety nets and maintenance of food reserves. They also called upon FAO and other partners to provide and/or increase technical and other forms of assistance and they placed their highest priority to investments in water control and management with a view to increasing agricultural productivity and ensuring a more stable agricultural output. Most prominent among their

decisions regarding agriculture was the commitment to allocate “at least 10 percent of national budgetary resources to agriculture and rural development policy implementation within five years.”

New Partnership for African Development (NEPAD)

Adopted by African Heads of State and Government of the Organisation of African Unity in Lusaka, Zambia in 2001 and ratified by the African Union in 2002, NEPAD is an implementing agency of the African Union (NEPAD, 2011). It was devised by African leaders to “pursue new priorities and approaches to the political and socio-economic transformation of Africa.” As implemented, it is responsible for driving economic integration in Africa, and its framework document includes agriculture as a sectoral priority. This document recognises that “the urgent need to achieve food security in African countries requires that the problem of inadequate agricultural systems be addressed, so that food production can be increased and nutritional standards raised” and also that “improvement in agricultural performance is a prerequisite of economic development on the continent.” As an objective within agriculture, the framework calls for food security for all people and increased access of the poor to adequate food and nutrition. It also identifies a number of structural constraints affecting the sector including: climatic uncertainty; the rapid drop in bilateral donors and multilateral institutional investments in agriculture since the 1970’s; provision of irrigation equipment and rural infrastructure such as roads and rural electrification; institutional support in the form of research centres and institutes; the provision of extension and support services, and agricultural trade fairs; and the regulatory framework for agriculture including the encouragement of local community leadership in rural areas and the involvement of these communities in policy and the provision of services (NEPAD, 2011).

Comprehensive African Agriculture Development Programme (CAADP)

Established by the African Union assembly in 2003, CAADP is the agricultural programme of NEPAD that focuses on “improving food security, nutrition, and increasing incomes in Africa’s largely farming based economies” (CAADP, online). It aims to do this by raising agricultural productivity by at least 6 percent per year and increasing public investment in agriculture to 10 percent of national budgets per year. Activities are organised and managed under four key “pillars” or focus areas for agricultural improvement and investment. These pillars include: (1) Land and Water Management; (2) Market Access; (3) Food Supply and Hunger; and (4) Agricultural Research.

Pillar 3 of the CAADP looks to make agriculture programmes of African countries more nutrition conscious. Its aims are to increase food supply and reduce hunger across the region by raising smallholder productivity and improving responses to food emergencies. The Pillar focuses on the chronically food insecure, and on populations vulnerable to and affected by various crises and emergencies in order to ensure that the CAADP agenda simultaneously achieves the agricultural growth agenda and MDG 1 targets for addressing poverty and hunger. This focus draws together the central elements of the CAADP vision to ensure that growing agricultural productivity, well-integrated markets and expanded purchasing power of vulnerable groups combine to eradicate hunger, malnutrition and poverty.

Governance Models Linking Nutrition and Agriculture: Comparisons with other Countries

Several models for nutrition's institutional position within government are seen around the world, which include:

- Ministry of Health
- Ministry of Agriculture
- A cross-sectoral location such as Ministry of Finance and/or Economic Planning, the Office of the Prime Minister or the Office of the President

Consensus among policy specialists is that the institutional “home” for nutrition does not exert a large influence on the development, implementation or success of action for broad nutrition security. Rather, effective leadership is the key element. Therefore, the sector that can most reliably provide capable leadership in the nutritionalisation of agriculture (i.e., can champion food and nutrition issues effectively into action), is the appropriate institutional home.

Similarities and differences between national food security and nutrition policy and experiences in Kenya and Nigeria are considered by the meeting participants as noted below.

Kenya

Similar to Uganda, the vast majority of Kenya's population lives in rural areas (79 percent) and works in agriculture (80 percent), making up roughly one quarter of the GDP (UNDP, 2007; IFAD, 2009). A sizeable proportion of the poor are women who reside in rural areas and rely on subsistence agriculture.

Kenya has reasonably rich nutritional surveillance data available for the Demographic and Health Surveys and other assessments (KDHS, 2009; KNBS, 2010a). The government of Kenya works closely with international agencies such as UNICEF to monitor and collate nutrition indicators from all over the country. The general statistical picture that emerges from a review of these data shows many similarities in the nutrition situation to that in Uganda. Among Kenya's population of almost 40 million people, more than one quarter (10 million) suffer from chronic food insecurity and poor nutrition, and 2 to 4 million people require emergency food assistance at any given time (KNBS, 2010b; Kenya MOA, 2009). Nearly 30 percent of Kenya's children (1.8 million) are classified as chronically under-nourished. In her presentation, Professor Judith Kimiywe from Kenyatta University in Nairobi says a large proportion of both women and children suffer from micronutrient deficiencies. Specifically, it is estimated from 2008 data that deficiencies in vitamin A and iron affect 84 percent and 73 percent of children, respectively and 39 percent and 60 percent of women, respectively. Zinc deficiency affects 51 percent of children, and 16 percent of adult males suffer from iron deficiency anaemia (Olielo and Rombo, 2009).

The national food security and nutrition policy framework adopted by Kenya includes the four dimensions of food security: availability, accessibility, stability, and meeting nutritional requirements (Republic of Kenya, 2008). Kenya's approach to food security combines longer-term action to enhance productive potential and incomes, with programmes and policies that respond to the immediate needs of the poor and food insecure.

Like Uganda, Kenya exhibits a long history of previous, integrated efforts to address malnutrition and food and nutrition security. A large amount of documentation of previous efforts to address food security and related issues is available for policy review and analysis. A Kenya National Food Security and Nutrition Policy was established in 1981 in a Sessional Paper, and changes were made in 1986 and 1994. Government initiatives in national nutrition policy and action have also incorporated frameworks and priorities in line with international commitments and declarations to end hunger and extreme poverty, including the Maputo Declaration and CAADP. Nutrition is a focus in a number of related policy documents, including: Kenya's Poverty Reduction Strategy Paper (PRSP) of 2001; Economic Recovery Strategy (ERS) for Wealth and Employment Creation, 2003-2007; Strategy for Revitalising Agriculture (SRA) 2004-2014; the Vision 2030; and Njaa Marufuku Kenya (Eliminating Hunger in Kenya). A number of Kenyan institutions are now involved in coordinating food security and nutrition, including:

- Kenya Food Security Meeting (KFSM): established and housed in the Office of the President, is responsible for food security monitoring and for advising on emergency response;
- Inter-ministerial Coordinating Committee on Food and Nutrition (ICCFN): housed in the Ministry of Planning and National Development, is responsible mainly for nutrition issues in development planning;
- The Agricultural Sector Coordinating Unit (ASCU): responsible for coordination of reforms among agricultural sector ministries as provided for by The Strategy for Revitalising Agriculture (SRA); and
- National Food Safety Coordinating Committee (NFSCC): responsible for increasing awareness and advising on food safety and quality related issues.

A coordinating structure for the implementation of the Food Security and Nutrition Policy (FSNP) has been proposed, a strategic framework for national FSNP implementation has been developed, and a large number of food security and nutrition programmes have been identified.

Although Kenya has made progress, the country still faces challenges to meeting the MDGs that include a very low investment in agriculture. Despite the relative importance of the sector, Professor Kimiywe notes that agriculture receives on average less than 5 percent of public investment. This is one constraint on the level of support available for farmers. In addition, farmers generally lack a sustaining environment, networked organisations such as production and training cooperatives, and the requisite infrastructure such as irrigation facilities, roads, railway networks, and storage facilities.

Nigeria

In comparison to Uganda, Nigeria is a huge country with a five-fold larger population of over 152 million people (CIA, 2010). It depends heavily on the oil industry for its budgetary revenues although agriculture remains a major component of the economy, accounting for 32 percent of GDP (CIA, 2009). Inequality is also high in Nigeria with the wealthiest quintile of the population accounting for more than half of all consumption. As in Uganda, Nigeria can draw on the experiences, documentation and lessons learnt from a long history of national agricultural projects and programs stretching back to at least 1935. Professor Adu of the Nigerian Academy of Sciences reports in his statements that

several projects increased food production, but they did not impact national food security. Adu goes on to explain that programs in Nigeria often possess at least one (and often multiple) major weakness that affects implementation and/or impact. These weaknesses can include:

- lack of continuity;
- administrative dislocations;
- policy inconsistency;
- poor funding;
- poor political support;
- high input technology beyond the capacity of small holder systems;
- political interference;
- poor management;
- poor commitment;
- low use of foundation seed;
- displaced Private Sector participation in food production;
- lack of local support and ineffective programme coordination;
- gross under-utilisation of infra-structure (e.g., silos); and
- lack of institutional arrangements for implementation.

When looked at collectively, experience from these programs in Nigeria highlights the fact that agricultural changes have occurred against a background of temporal shifts—in population, demography, and other structural conditions. Such shifts warrant more detailed analyses to tease apart the reasons for an apparently weak effect of agricultural growth on nutrition in Nigeria.

It appears that Nigeria has no specific policy or strategy ratified for nutrition mainstreaming or nutritionalisation of agriculture. Several capacity gaps were identified in Nigeria that are similar to those identified for Uganda. These include a need to:

- advocate so nutrition is accepted as a National Development Priority and to better ensure that agricultural projects, policies and systems include nutrition outcomes as indicators of success;
- create a coherent cross-sectoral/ministerial policy strategy;
- evolve more innovative structures that guide food and nutrition security;
- design agricultural strategies (e.g., biofortification) that can increase the production of micronutrient rich foods; and
- incorporate effective models that assess nutrition impact of agricultural interventions.

The Ugandan Situation in Comparative Context

Although oversimplification must be avoided, indications are that the profile of nutrition in Uganda is relatively lower compared to Kenya as measured by the ratification of the Kenyan National Food Security and Nutrition Policy. Nevertheless, the challenges currently experienced within Kenya in coordinating and implementing their FSNP provide evidence that nutritionalisation of agriculture at the national level can be challenging. Similarly, the challenges experienced in Nigeria, a much larger country in terms of population, are like those facing Uganda whereby both countries have a mix of opportunities and barriers. They both appear to lack policy and implementation strategies and structures although

Nigeria seems somewhat less progressive compared to Uganda. On these analyses Kenya has more policy implementation strategies and structures than Nigeria or Uganda but without ratification and implementation, these strategies are all but useless. For Kenya, it may be that enacting constitutional change could prove a special catalyst for improving the profile of nutrition in the country while in Uganda the route may be to take advantage of special opportunities through the work of national champions as well as the National Development Plan.

All three countries are characterised by relatively low investment in agriculture, as is the case in most African Union (AU) countries. Indications are that real investment falls short of the 10 percent budgetary targets agreed to by AU Heads of State under CAADP and the Maputo Declaration (Somma, 2008).

National Frameworks for Coordination

National frameworks for coordinating policy development and implementation began in Uganda in the 1980s. In 1997, the Poverty Eradication Action Plan (PEAP) became the national planning framework and in 2001, the Plan for Modernisation of Agriculture (PMA) was launched in an effort to address the pillar of PEAP focused on improving household incomes and reducing poverty. The aim of PMA was to redirect subsistence farmers away from household production for consumption toward producing more for the market. It was expected to increase poor farmers' incomes and quality of life, as well as improve food security through adoption of modern farming methods and specialised farming for target markets. PEAP was revised in 2000 and 2004 and underwent a third round of revisions in 2008 to produce the five-year National Development Plan (2010-2015). The Development Strategy and Investment Plan (DSIP) for agriculture was developed in line with the National Development Plan as the successor to PMA. Using these frameworks and other available resources in Uganda's health and agriculture sectors helps form the basis for ideas on nutritionalising agriculture and other sectors in Uganda. This chapter is a semi-comprehensive review of organisations, programs, policies, plans, frameworks and systems in Uganda that could be leveraged for the nutritionalisation of agriculture in the country.

National Policy

Uganda has a well-articulated national plan for development that demands attention to hunger and nutrition both in terms of the targets adopted and the underlying requirement to boost nutrition to achieve key objectives of the plan. Requirements for achieving the objectives of this plan are identified as including, at a minimum, adequate care for children and resources to allow everyone in the population to attain their full potential in terms of productivity, health, and educability. Specifically, the goal to reduce poverty from 38 to 30 percent is recognised through three main driving strategies:

- increased agricultural productivity and value added;
- improved health and survival; and
- human capacity development.

National Development Plan

The current National Development Plan (NDP) is for the period 2010/2011 to 2014/2015. It is the country's medium term strategic planning framework that stipulates the current development status, challenges, opportunities, development priorities and implementation strategies. In the Plan, nutrition falls under the thematic areas of both health and agriculture development. Nutrition is clearly identified in the NDP as a cross-cutting issue and therefore a responsibility of non-governmental (NGOS) and community-based organizations (CBOs); the private sector; and government ministries departments and agencies (MDAs) including the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Health (MOH), Ministry of Education and Sports, and Ministry of Gender, Labour and Social Development, among others. MAAIF and the MOH are the lead ministries in food security and nutrition issues and are mandated by the constitution to set minimum standards, assure quality and develop relevant policies.

Agriculture in the NDP

A clear objective of the agriculture sector set out in the NDP period is to increase production and productivity. Among the proposed strategies is enhancing technology development and ensuring effective delivery of advisory services and technology to the farmers. One focus of technology development could be to improve nutritional values of the various crops at the farm level. However, more research is needed on fortification of crops considered food staples as well as bio-fortification that targets crops while they are growing. Such strategies call for a law to regulate the industry but the bill (The Biosafety Bill) remains under debate in Parliament. Without this regulatory pathway for commercialisation of genetically modified (GM) products, Uganda lacks a definition as to how the commercialised GM crops would be approved to be grown in the country.

The value chain approach is another NDP strategy that is being adopted by the agriculture sector. The strategy aims to enhance nutrition throughout the value chain (i.e., at all steps during production, processing, marketing and consumption). Crops would have to be produced with necessary nutrients while taking into account the energy requirements and the tastes that consumers prefer.

Nutrition in the NDP

Nutrition in the NDP is objective 3 of the health and nutrition thematic area (sub-sector) and it focuses on improving the nutritional status of the Ugandan population. The following strategies have been identified:

- Support maternal and child initiatives to promote child survival growth and development by: encouraging and supporting antenatal care services through health and nutrition education; promoting diet diversification, growth monitoring, and counseling; supporting infant and young child feeding in the context of HIV; and promoting and supporting exclusive breastfeeding for six months as well as timely introduction of adequate complementary feedings and continued breastfeeding to at least 24 months of age.
- Strengthen mechanisms for control and prevention of micronutrient deficiencies by: promoting supplementation with micronutrients (vitamin A, iron, and zinc) to target groups; establishing and implementing a comprehensive policy framework for micronutrient deficiency control; managing iodine deficiency disorders; deworming young children, school children and pregnant women; and promoting diet diversification and food fortification with essential micronutrients.
- Build community and institutional capacity for management of malnutrition by: promoting nutrition in patients with HIV/AIDS, tuberculosis and non-communicable diseases; identifying, referring and managing cases of acute malnutrition; managing and supporting the nutritional care of sick children following Integrated Management of Childhood Illness (IMCI) protocols; supporting institutional feeding; promoting local production of therapeutic feeds; procuring necessary equipment for managing malnutrition; and providing nutrition education and sensitisation for communities.

Uganda's Agriculture Sector

The following show policy and organisational capacity in the agricultural sector of Uganda for nutritionalisation:

- The Development Strategy and Investment Plan
- Ministry of Agriculture, Animal Industry and Fisheries
- The National Agricultural Research Organisation
- Program for Biosafety Systems
- Uganda National Council for Science and Technology

The Development Strategy and Investment Plan (DSIP)

The DSIP for agriculture was developed through MAAIF and in line with the National Development Plan spanning the same timeframe and is the successor to Uganda's Plan for Modernisation of Agriculture. DSIP was guided by the principles and targets of the Comprehensive Africa Agriculture Development Program (CAADP) and its completion was the basis for Uganda's signature of the CAADP compact on March 31, 2010, immediately following approval by Cabinet. It provides a road map for agricultural sector development. Since agricultural development programs must comply with DSIP guidelines this an opportunity for nutrition linked agriculture programming in Uganda. However, the DSIP provides only broad guidelines and experience shows there is a challenge of moving from district level to real action on the ground.

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)

MAAIF has a pivotal role in promoting and coordinating sector players—namely, central government MDAs, local governments, CBOs, NGOs, private sector and the civil society—in ensuring food and nutrition security for the Ugandan population. The National Development Plan sets out strategies and intervention areas through which this can be achieved and MAAIF is regarded as a key facilitator of the operationalisation of the Plan.

Current thinking is that MAAIF could be designated the lead in promoting messages designed to educate the public on nutritional values of the various types of food available in Uganda and food preparation methods that minimize nutrient loss. This could be done through radio programmes, extension services, and household visits where necessary.

The National Agricultural Research Organisation

The National Agricultural Research Organisation (NARO) is “the apex body for guidance and coordination of all agricultural research activities in the national agricultural research system in Uganda.” Its vision is a farmer responsive research system that generates and disseminates problem-solving, profitable and environmentally sound technologies, knowledge and information on a sustainable basis (NARO, 2010). NARO coordinates a family of applied National Agricultural Research Institutes, Laboratories and Units each devoted to research on development of specific crop, forest, fish, livestock, arid lands or type of agricultural resource or science. NARO also works with the National Agricultural Research System (NARS) and the National Agricultural Advisory Services (NAADS) program and its related extension service providers.

Several current projects of NARO aim to incorporate essential nutrients in staple foods through strategic breeding and value-addition processes. Target research areas include: (i) developing production based solutions that address deficiencies of several micronutrients (vitamin A, iron and iodine), and macronutrients (proteins and fats); (ii) research on biofortification through breeding using both conventional and molecular procedures; (iii) a cross-cutting focus on three strategies to ensure food security (increased yields, disease resistance and post-harvest loss); (iv) research on new value-addition processes to boost profits and improve food diversity in the market; and (v) food safety to guarantee health of customers.

Examples of completed or on-going research include:

- *nutrient enhancement research*: conventional breeding for incorporation of vitamin A in sweet potatoes; enhancement of protein (lysine and tryptophan) content in Longe 5 maize; and improvement of aroma and yield through efficient use of nitrogen in rice; and molecular incorporation of vitamin A, iron and zinc in bananas.
- *nutrient value-addition processes research*: fortification of wheat and vegetable oils with vitamin A; and extrusion and fortification with vitamin A, zinc and iron of cassava/sweet potato to produce ready-to-eat food products for children under five years and for other vulnerable groups.
- *food safety related activities research*: analysis of agro-chemical residues in crops and animal products; antibiotic and acaricides in animal products (dairy and meats including poultry); and polycyclic aromatic hydrocarbons in smoked products.

In summary, the work of NARO represents an established model for cross-sector approaches integrating nutrition research within agricultural research and extension.

Program for Biosafety Systems

Funded by USAID and implemented by the International Food Policy Research Institute (IFPRI), the Program for Biosafety Systems (PBS) was designed to foster Biosafety decisions based on scientific facts and sustainable development strategies that support responsible development and safe use of agricultural biotechnology in accordance with national or regional policies and legal frameworks. PBS works through a variety of partner-driven activities and initiatives including training workshops, a competitive grants program, biosafety policy analysis and policy development, and consultative guidance on biotechnology product development (IFPRI, 2007). A major focus of PBS is on research looking at agricultural applications of modern biotechnology, including nutritionally enhanced crops and genetic modification of plant varieties for greater resistance to insects, herbicides, and diseases, and for increased tolerance to drought and to soils contaminated with high concentrations of salt or heavy metals.

Uganda National Council for Science and Technology

The Uganda National Council for Science and Technology (UNCST) was established in 1990 by an Act of Parliament as a semi-autonomous government agency to advise, develop, and implement policies and strategies for integrating Science, Technology and Research development in Uganda (UNCST, online). Its line ministry is the Ministry of Finance, Planning and Economic Development. UNCST is supported by an Executive Committee who interfaces regularly with the Council and their Specialised Committees. These Specialised Committees include among others, one on agricultural sciences and another on health sciences who each advise the Council on policy matters related to science and technology in their respective sectors. In addition, there are other standing committees such as the HIV/AIDS Research Committee and the National Biosafety Committee that are set up by the Council to undertake focused work.

Uganda's Health Sector

According to the Uganda Food and Nutrition Policy of 2003, “food security promotes good nutrition and good nutrition is key to good health and the socio-economic well being of a population.” Signed by the Minister of Health and the Minister of Agriculture, this document underscores the importance of considering nutrition as a fundamental component of good health. The following are a list of organisations, policies, plans, and guidelines within the health sector that can be engaged for the nutritionalisation of agriculture:

- Ministry of Health
- Uganda Food and Nutrition Council
- Food and Nutrition Policy
- Policy Guidelines on Infant and Young Child Feeding
- National Health Plan and Health Sector Strategic Plan
- Uganda Action for Nutrition
- The Uganda Policy Guidelines on Infant and Young Child Feeding (MOH, 2009b)

The Ministry of Health

The specific mandate of the Ministry of Health (MOH) is to improve the quality of health services and to ensure equity in accessing essential health services with the overall goal of reducing morbidity and mortality. Through the MOH, the Government of Uganda has developed an operational framework for nutrition in a National Child Survival Strategy that focuses on interventions in nutrition in the context of HIV/AIDS and maternal infant and young child feeding.

There is a Nutrition Division within the Ministry whose primary goal is “to improve the Nutrition status of the Population with emphasis on vulnerable groups of Children and Mothers” (Ministry of Health, online). There is also a Nutrition Sub-Committee under the Maternal Child Health Cluster of the Ministry of Health that is supported by Technical Working Groups encompassing a variety of nutrition components. These include:

- Infant and Young child feeding Technical Working Group
- Micro-nutrients Technical Working Group
- Integrated Management of Acute Malnutrition Technical Working Group
- Nutrition and HIV/AIDS Technical Working Group
- Nutrition information systems Technical Working Group
- Population Nutrition Technical Working Group
- Nutrition in emergencies Technical Working Group

To coordinate the nutrition intervention in the country, bi-annual Stakeholders’ meetings are held at the National level involving the Ministry of Health, Regional and Hospital nutritionists, District Health Officers, nutrition implementing agencies/organisations and development partners (MOH Administrator, 2010).

Uganda Food and Nutrition Council

The Uganda Food and Nutrition Council was established by the Food and Nutrition Act and institutionalised in 1987. It is a multi-sector body housed in the secretariat for the Plan for Modernisation of Agriculture in the Ministry of Finance, Planning, and Economic Development (Benson, 2008). Although the track records of such multi-sectoral nutrition councils in shifting government resource allocations to address under-nutrition are quite poor (Benson, 2008), the Council is never-the-less positioned to take the key advocacy role within government for linking the Agriculture and Health sectors. UFNC has potential under the National Development Plan to provide a forum where scientists, policymakers and practitioners can collaborate, promote, design and operationalise projects that focus on the nutritionalisation of agriculture. In fact, UFNC might be the best positioned group to move the draft Food and Nutrition Security Act forward.

Food and Nutrition Policy

In recognition of the vicious cycle between poverty and malnutrition, a multi-sectoral effort was undertaken to provide a framework for addressing food and nutrition issues in the country. The result was the Uganda Food and Nutrition Policy (GOU, 2003) developed within the context of the overall national development policy objective of eradicating poverty as spelt out in the PEAP. As such, the Policy focused on food security, improved

nutrition and increased incomes. The bill to operationalise the Food and Nutrition Policy is (and has been) pending in Cabinet but if passed, could activate the Food and Nutrition Council.

Policy Guidelines on Infant and Young Child Feeding

The Ministry of Health in conjunction with local and international partners developed Policy Guidelines on the Feeding of Infants and Young Children that was most recently updated in 2009. The Guidelines provide a framework for enhancing nutrition, health, growth and development of infants and young children, as well as strengthening the care and support services to their parents and caretakers. They are intended for use by planners, managers and implementers who are involved in the provision of maternal and child health, reproductive health and HIV/AIDS treatment, care and support (MOH, 2009a).

National Health Plan and Health Sector Strategic Plan

Uganda's first National Health Plan (NHP I) guided the Health sector between 1999 and 2009. It was accompanied by the first (HSSP I) then second Health Sector Strategic Plan (HSSP II) that directed the investments of the sector during the 10 year period. In 2010, it became necessary to develop a third HSSP (HSSP III) in line with the NDP that provides an overall framework for the sector investments from July 2010 to June 2015 (GOU, MOH, 2010).

Uganda Action for Nutrition

A key nutrition organisation outside government is the Uganda Action for Nutrition (UGAN). UGAN is a highly active, broad-based, civil society organisation that is emerging as a potentially central advocate for nutrition in Uganda. Adoption of this role in a results-oriented, planned manner would increase the capacity of UGAN to influence the processes of policy development in mainstreaming nutrition issues and actions within the agricultural and other sectors.

Coordination within Government

According to Joel Nuwamanya—the former Director of Coordination and Monitoring at the Office of the Prime Minister—in government, there are many institutions involved in coordination at several levels. These include institutions within local governments (such as districts, sub-counties, lower councils, private sector, civil society organisations) and committees and institutions within central government (such as the Presidency, Cabinet, Parliament, Prime Minister's Office, and cross-institutional bodies). Those involved in *nutrition coordination* at the central level are MAAIF (currently responsible for Food Security), MOH (currently responsible for Nutrition Security), the National Food and Nutrition Council, the Food and Nutrition Security Committee as well as others such as ministries, departments and agencies (MDAs), the private sector, and certain civil society organisations. Although there are many players, ultimately, it is the Prime Minister's Office that leads government business and coordinates all government policies, programmes and projects. Mr. Nuwamanya's presentation suggests possible coordinating mechanisms for nutritionalisation of agriculture within certain frameworks.

Cross-sectoral Coordination

As important as it is, inherent problems with government administration and funding frameworks have and continue to limit success toward cross-sectoral coordination and action in Uganda. The long time period required for drafting the Uganda Food and Nutrition Policy (from 1990 to 2003) exemplifies some of these challenges particularly with trying to coordinate policy development and implementation within the existing framework. These challenges are in the areas of ownership, representation, information exchange and consultation. In addition, the criteria Government sectors use to assess success also becomes a challenge. It appears that coordinated activities do not factor high on government's analysis and thus do not receive the attention needed to promote work that crosses sectoral divides. Also, relationships between ministries and agencies can sometimes be characterized as competitive rather than coordinated particularly when they are competing for funding.

Despite these challenges, government has put in place strong guidelines and frameworks to achieving coordination within Government. By using the mechanisms already in place, it may be possible to promote linkages between the health and agriculture sectors that emphasise nutritionalisation of agriculture. Such work might usefully include: accurate identification of and consensus around food security and nutritional problems; systematic and comprehensive gap analysis of national and regional nutrition programming; broad consultation, impact assessment and careful programming to ensure proper sequencing of efforts across sectors; and action to assist sectors in obtaining adequate resources for their nutrition-related activities.

Institutional Framework for Coordination

In response to studies of the monitor and evaluation arrangements and developments in Uganda that identified weaknesses and gaps in their system, the Government of Uganda approved a coordination framework that would push all government programs to work together in a rational and synchronised manner. This coordination framework represents an integration of all efforts aimed at data collection and information gathering and dissemination with respect to the delivery of the government's intended goals and policy objectives, as laid out in the PEAP and other national policy frameworks (OECD and The World Bank, 2006). Seen in Figure 5.1, the framework is made up of a four-tier coordination mechanism that includes:

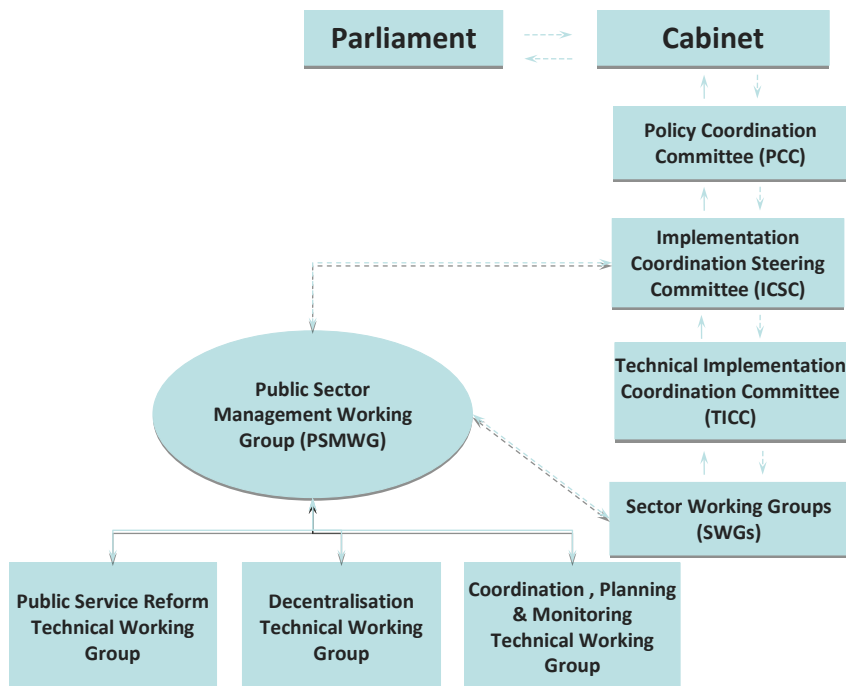
- Policy Coordination Committee (PCC)
- Implementation Coordination Steering Committee (ICSC)
- Technical Implementation Coordination Committee (TICC)
- Sector Working Groups (SWG's)

The PCC—under the chairmanship of the Prime Minister—brings together all the Ministers of central coordinating ministries such as Finance, Office of the President, Local Government, and National Planning Authority. They meet and report to Cabinet twice a year on issues of performance, results, and cross cutting matters requiring coordination. ICSC is composed of all the Permanent Secretaries who meet three times a year to look at what has come from the TICC whose mandate is to bring together all the Technical officers in the Government including NGOs, donors, and even academia. TICC plans,

budgets and assesses performance and results through the harmonisation of cross cutting issues, and reports to the Committee of the Permanent Secretaries. Separate from the committees are the sector working groups. The Sector Working Groups (SWG's) bring together all institutions of the sector to jointly plan, budget and monitor activities. There are 16 sectors in the Government for budgetary purposes.

This Committee system facilitates Institutions to work together through dialogue, consultation, and discussion. Such networking and communication enables better planning, budgeting, harmonisation of issues and decision-making at all levels.

Figure 5.1. Institutional coordination framework



Used with permission from the Office of the Prime Minister, Uganda.

Source: Nuwamanya J.K. (2010).

Coordinating Nutritionalisation of Agriculture within the Frameworks

To successfully utilise the frameworks for reducing malnutrition through agriculture, each sector would likely need to demonstrate how its work could reduce under-nutrition and specify the action as well as output and outcome indicators for achieving targets in reducing under-nutrition. Identifying champions to promote nutrition and build strong linkages with other sectors would enhance synergies with relevant sectors within MDAs as would formation of an Inter-Sectoral Working Group. In this way, the Working Groups could jointly facilitate planning, budgeting, monitoring and implementation of activities that promote nutrition within agriculture. And the sectors could regularly monitor whether progress is being made by measuring well chosen indicators for achieving good nutrition. The Inter-Sector Working Group would then feed their results and challenges into the

National Institutional Coordination Framework through the Technical Implementation Coordination Committee (TICC) (i.e., technical people from ministries, NGOs, donors which are under the Office Prime Minister) for overall policy coordination and decision-making. It may also be necessary to have a wider forum of all stakeholders engaged in interventions aimed at improving nutrition for women and children to share experiences and practices throughout the year.

Outcomes and Ideas

The Workshop brought together a well-informed group of presenters who offered varying opinions, interpretations and perspectives. Many presentations focused on successes and challenges of previous and ongoing programs, policies and governance structures aimed at linking maternal, infant and child nutrition to different kinds of support and interventions in Agriculture in Uganda and beyond. Workshop participants reflected the diversity of the presenters. Drawing from policy, implementation, academia, government and media organisations, the audience represented a motivated group of change agents from multiple sectors. Despite the diversity, there was remarkable agreement on the major issues and the way forward. This chapter is a compilation of those ideas discussed at the workshop for improving nutrition security through the nutritionalisation of agriculture, and pulls together general concepts, needs, opportunities and challenges as described by the workshop participants.

Core Concepts

Several presentations and subsequent discussions alluded to a set of well-established or newly emerging beliefs in the Science of Agriculture and Nutrition that are relevant to the workshop goals noted in Chapter 1 of this report. Many of the ideas mentioned can be organised under ten core concepts. These concepts are widely accepted in the Nutrition/Health community and are amenable to translation into the Agricultural sector. As such, the opportunities, challenges and needs presented in this section reflect thinking formed by the core concepts outlined in Table 6.1.

Table 6.1. Ten core concepts for linking agriculture with nutrition outcomes

10 Core Concepts	
1	Achieving nutrition security is a cornerstone of development
2	Improved nutrition is a sound social and economic investment
3	The challenge of malnutrition cuts across sectors
4	Agricultural production and nutrition security have a “bi-directional” relationship
5	Agriculture can play an important role in eliminating malnutrition
6	Successful nutritionalisation of agriculture must address a set of specific inequities
7	Malnutrition can be measured in several useful ways
8	There is a nutritional “window of opportunity” at the beginning of life
9	The nutritional status of women of reproductive age directly influences the nutritional status of other family members
10	Maternal under-nutrition has trans-generational effects

Requirements for Nutritionalisation in Uganda

A number of “needs” were identified by the workshop participants, for successful integration of nutrition into all sectors of government (see Box 6.1). Although the agricultural sector was of particular interest, the audience was keen to “nutritionalise” beyond the single sector.

BOX 6.1

Requirements for Effective Nutritionalisation in Uganda

Workshop participants oriented toward six key messages indicating there is a need for:

- the right mix of policies and interventions that can lead to nutrition security for all individuals within a region;
- multi-sectoral approaches and coordination in addressing mother and child malnutrition;
- nutrition education and sensitisation at all levels and in all sectors;
- inclusion of men in gender and health-related issues for improving nutrition outcomes of women and children;
- empowering and more directly involving the community in crafting nutrition interventions;
- greater sustainability and adoption of nutrition programmes within agriculture and all other sectors (“mainstreaming nutrition”); and
- advocates and champions at all levels and in multiple sectors to promote nutrition agendas.

Need for Advocacy

For any of the core concepts to be translated into action, advocates are needed to promote nutrition particularly for women, infants and children. Given the long history of malnutrition in Uganda, it appears that the interests of the malnourished have not been well-served through routine operations of government. Advocacy could speed the incorporation of nutrition as a performance indicator for all sectors; but for it to be effective, advocacy engagements must be well planned and leadership is needed to goad policymakers, gently or forcefully, to take on the issue of malnutrition. Without external pressure, nutrition is unlikely to become a priority in any sector despite an intellectual understanding of the importance of doing so.

Value of Advocacy

Advocates can work toward a number of goals that build capacity for nutritionalisation of agriculture starting by educating policymakers and the public about the importance of good nutrition for human and economic development. This can lead to a demand for improved nutrition and closer analysis of nutrition outcomes in programs, policies and systems. The data from country comparisons show that without changes at all levels of governance and civil society, integrating nutrition outcomes into agricultural policies is not a concern. Advocacy can move national policy into local action. District and local governments are very important within any advocacy process. Making local policy makers aware of the importance of proper nutrition for individual, household, regional and aggregate national development creates a demand for more trained staff at local levels who

are knowledgeable in nutrition. The awareness also leads to greater financial resources for incorporating nutrition measures into local agricultural action plans and strategies.

Holding sectoral partners accountable for their contributions to nutrition security and ensuring that human and financial resources are provided for nutrition/agriculture activities will be an important part of the advocates' work. In this way, advocates can promote cross-sectoral communication and joint responsibility for improving nutrition in the population.

Housing the Nutrition Policy

Despite the clear framework expressed in the NDP, currently there is no specific home for the Uganda Food and Nutrition Policy within government raising general concerns about lack of ownership and specific concerns about a lack of linkage to agriculture. Several participants at the workshop suggested nutrition had become orphaned within government and with the dissolution of the Department of Home Economics, nutrition was demoted to a mere unit with very few staff within the Ministry of Agriculture, Animal Industry and Fisheries. On the other hand, some viewed this "lack of home" as an opportunity for cross-sectoral programming.

To build leadership in nutrition policy and programming within government some at the workshop suggested strengthening and restructuring the Uganda Food and Nutrition Council to ensure that it performs its functions as outlined in the Food and Nutrition Policy of July 2003. These functions include being an apex body for guidance and coordination of all food and nutrition activities in the country; and guiding the Government in all matters pertaining to food and nutrition. Another suggestion was to revise and align the Food and Nutrition Policy with the NDP.

Opportunities

A rich landscape of inter-sectoral opportunities exists in Uganda. By overcoming challenges to linking sectors and maximising these opportunities, Uganda can be an example to other countries. The following are resources within Uganda that could be leveraged and made into opportunities for nutritionalisation of agriculture and thus improve nutrition security.

In Uganda there is/are:

- varied communication channels for dissemination of nutrition information to the public (e.g., radio, print, television, extension services, academia, health professionals, National Agricultural Advisory Services, community and faith-based organisations);
- international donor willingness to partner with the Government of Uganda to improve nutrition security through agricultural programs and systems (e.g., U.S. Government's Global Hunger and Food Security Initiative; UN World Food Program's Agriculture and Market Support and Purchase for Progress);
- private donor interest to fund nutrition and cross-sectoral programs in Uganda;
- active civil society organisations that can facilitate information exchange and cross-sectoral dialogue (e.g., Uganda Action for Nutrition and Uganda National Academy of Sciences);
- governmental and non-governmental advocates for improving the diets and the nutritional status of all members of the household (e.g., the UNAS

Workshop Planning Committee);

- the cross-sectoral governmental organisations that are currently in place and could be empowered or revitalised (e.g., Uganda Food and Nutritional Council, Food and Nutrition Security Committee, Home Economics Department within MAAIF);
- the recent National Development Plan that can promote cross-sectoral cooperation and balanced resource allocation among the sectors;
- within the MAAIF, agricultural programs and systems that address food quality and value chains that could incorporate nutrition inputs and outcomes;
- the MOH—with their access to technical experts in health (e.g., Nutrition Sub-Committee Working Groups and the Nutrition Division of MOH)—could provide nutrition-related information to other sectors through National Stakeholders Meetings;
- African interest in supporting agricultural development (e.g., CAADP, NEPAD, Maputo Declaration); and
- existing capacity within the agricultural sector of Uganda for research and product development (e.g., NARO and DSIP).

Challenges

A major challenge to integrating nutrition into agricultural policies, programs and systems are sectoral administration and funding frameworks within government. Overcoming this challenge would likely entail strengthening the coordination framework in Uganda to force and facilitate government programs to work together in a rational and synchronised manner. However, without a better understanding of the values and language of each other's sectors, integration becomes increasingly difficult. Enhancing linkages through cross-sectoral education may be one way of overcoming this obstacle but it would require a substantial funding commitment to facilitate curriculum development and follow-through. Other challenges to cross-sectoral collaboration and enhancing nutrition security in Uganda include:

- lack of human and financial resources for research and product development;
- limited funding for cross-sectoral projects and programs;
- poor understanding and acceptance of bio-modified products;
- difficulties in reaching vulnerable groups with technologies and information that could improve their nutritional status;
- weak nutrition education within extension services;
- climate change that alters crop production and quality;
- shifting mindsets from the commercialisation of agriculture for profits to meeting the nutritional and health needs of all household members;
- maintaining the health of the current and future workforce through good sanitation, clean water and age-appropriate nutritious diets; and
- educating young women to prevent teenage pregnancies that perpetuate a cycle of poverty and malnutrition.

The Way Forward

Participants suggested a number of ways the information presented at this meeting could be operationalised to improve nutrition outcomes of vulnerable populations in Uganda. It starts by creating an awareness of the importance of nutrition through education and advocacy. Educating the public as well as all sectors and levels of government generates a demand for action. Advocates and champions can then take key messages forward to ensure funding streams are adequate and appropriately allocated in ways that benefit those in greatest need of assistance. Advocates could also push to include nutrition inputs and outcomes in agricultural programs, policies and systems to better ensure accountability.

Harnessing Existing Government Capacity

The Uganda Food and Nutrition Policy was developed jointly by the Ministry of Agriculture, Animal Industries and Fisheries and the Ministry of Health and was approved by Cabinet in 2003. Following its approval, a Food and Nutrition Bill was drafted in order to operationalise the UFNP; however, the bill is still awaiting approval by Cabinet.

This Bill, if presented to Parliament and passed into law, would provide for the formation of a Food and Nutrition Council to promote food security in the country. The Council would constitute the formal public sector coordination body, taking on a key advocacy role from within government. This Council could be the place where scientists, policymakers and practitioners collaborate, promote, design and operationalise projects that focus on the nutritionalisation of agriculture; concretising the National Development Plan elements; and move forward the draft Food and Nutrition Security Act. Unfortunately, the Nutrition Council cannot be operationalised without the Food and Nutrition Bill.

In the absence of a Food and Nutrition Bill, The National Planning Authority has taken on a key role for improving nutrition security in Uganda as the implementers and evaluators of the NDP. This new five year strategic framework received input from multiple sectors and includes nutritional strategies, interventions and indicators. These and other markers can be used to monitor improved health and nutrition for economic development. At a cost of 54 trillion shillings, the ambitious plan will need to avoid waste and financial leakages in order to maximise the impact of the Plan.

Other frameworks that may be useful for joint interventions include The Uganda Policy Guidelines on Infant and Young Child Feeding (MOH, 2009b); the National Health Policy (2010); and the Health Sector Strategic Plan (HSSP III). However, it is important that nutritionalisation efforts also be embedded in District Plans since it is at the district level where critical implementation arrangements are made. By building capacity and collaborating more effectively at this level, the importance of developing and finalising implementation proposals in consultation with district officers becomes apparent.

Improving Food Value Chain Systems

Sustainable scale-up of successful pilot innovations in post-harvest storage, processing and production methods depends heavily on national leadership and coordination for developing and promoting appropriate post-harvest infrastructure and marketplace demand. MAAIF is positioned at the centre of agricultural activity. As such, MAAIF has

the potential for leadership and coordination of specific nutrition-related interventions as part of its ongoing focus on agricultural value chains development. Some of these interventions might include:

- sealing cracks in the “leaky food pipeline” to reduce gross on- and off-farm storage and transport losses of crops;
- diminishing post-harvest losses to pests and spoilage;
- minimising micronutrient loss through proper storage;
- limiting food contamination by toxins and disease pathogens;
- facilitating food distribution through markets;
- enhancing food value through food fortification or bio-fortification;
- improving nutrient bioavailability to increase the uptake of key nutrients; and
- increasing dietary diversity.

Women, Agriculture and Health

Incorporating gender issues into aspects of the food supply chain can optimise women’s nutritional status and enhance prenatal and infant nutrition and health. This can be accomplished through a variety of interventions that acknowledge and promote the importance of food crops that are normally grown by women. By widening the focus of agricultural research and extension beyond male-dominated cash crops, and by acknowledging and promoting the importance of food crops that are normally grown by women, gender-specific strategies can be employed to increase the food base and supplement staple foods. Such strategies might include food crop diversification, cultivation of crops, rearing of small livestock, development of backyard fish ponds, and agro-forestry.

Often, women in Africa are responsible for caring for the children and producing food consumed by their families while also contributing to cash crop agriculture. This is very time-consuming and without adequate assistance, not only is her nutrition compromised but so are her children’s as she adapts time-saving feeding methods that minimise interactions with her child. Because of a poor nutritional status and without access to safe water and good sanitation, women and their children suffer greatly from the vicious cycle of malnutrition and infections. Bouts of respiratory infections and diarrhoea further exacerbate calorie, iron and other nutrient deficiencies and add to a mother’s already compromised ability to work. Empowering men to assist women in ways that lighten their work load can have an impact on improving the nutrition of women and their children by allowing women more time to feed themselves and their children. Time-saving innovations such as ready-to-eat food products for children and agricultural labor-saving technologies, and food based guidelines to help low income families diversify and optimise their diets may also improve the nutritional status of women and their children.

Conclusion

Malnutrition in the form of under-nutrition (with and without ample food supply) or over-nutrition is noted in all regions of Uganda particularly affecting women and children. The double-burden of malnutrition where overweight and obese mothers present to health clinics with stunted children creates a unique challenge. Part of this can be addressed through educational campaigns that provide farming households knowledge on good

nutritional care. However, good nutrition will also need to be addressed through training of public servants and others in the agriculture sector who do not understand how their work impacts on nutrition. This includes increasing the knowledge of policy leaders in all sectors on the importance of improving nutrition in vulnerable populations; as well as building skills and capacity of public agriculturalists in nutrition through in-service training; and educating agriculture professors and teachers at universities and professional colleges about nutrition.

Although knowledge is critical to improving and balancing good nutrition for all in Uganda, this will be taking place in the midst of strong efforts to make agriculture more commercialised, specialised, and profitable. Currently the focus of agriculture is to promote economic enterprise in which productivity and profitability are central. This is linked to the relatively recent restructuring of the public agriculture sector and decentralisation so for example, the National Agricultural Advisory Services (NAADS) has no focus on nutrition. Similarly, the Plan for the Modernisation of Agriculture (and its successor, the Agricultural Sector Development Strategy and Investment Plan, (DSIP) orients toward agriculture as an economic activity rather than subsistence production and the well-being of smallholder farming households. The result is that nutrition falls out of the priorities within the public agricultural sector. Many question whether the commercialisation of agriculture approach to development should instead focus on agriculture for assuring food security that includes looking into how farmers use their increased income.

One way to better assure that agriculture links to improved nutritional outcomes may be to mainstream nutrition into annual work plans and budgets at the local government level. Nutrition indicators could be used in performance assessment of local government agencies using relatively simple measures of nutrition. Local governments and others could incorporate such measures as basic anthropometry and household dietary diversity into their monitoring and evaluation systems.

In summary, it appears that to be effective in reducing malnutrition, agricultural changes must address regional, seasonal and gender disparities in vulnerability to malnutrition and should prioritise the nutrition security of women and children. In all parts of the country a majority of households have poor dietary variety and quantity. Food insecurity is a major determinant of poor maternal diet quality and diversity during pregnancy and lactation even in areas of relative political stability and high food production. There is need to boost production and add value in the agriculture-food chain in sustainable ways that will reduce food insecurity and malnutrition among the vulnerable households living in these communities. Technologies such as staple crop bio-fortification, post-harvest preservation and food fortification have the potential of increasing profits for small holders and increasing access to affordable, micronutrient-rich diets for all. Using the value chain approach, nutritionalisation at all levels—from planning, through harvesting to post-harvest processing and storage—will go a long way towards improving nutrition security for even the most vulnerable populations in Uganda.

References

- African Union. 2003. The Maputo Declaration. <http://www.nepad.org/system/files/Maputo%20Declaration.pdf> [Accessed 14 December 2010].
- Anderson K, Basalirwa RJ, Mwesigwa H, Okorio J, and Sserunkuma D. 2006. Uganda Food Security Initiative, Phase 2: Final Evaluation Report. Africare, Uganda. http://pdf.usaid.gov/pdf_docs/PDACG740.pdf [Accessed 22 February 2011].
- Benson T. 2008. Improving Nutrition as a Development Priority: Addressing Undernutrition in National Policy Processes in Sub-Saharan Africa. International Food Policy Research Institute, Washington, D.C.
- Benson T. 2010. Planning Meeting for the Workshop on The “Nutritionalisation” of Agriculture-based Economic Projects in Uganda. 29 January 2010. Speke Resort, Munyonyo, Uganda.
- Berti, PR, Krasevec J, and FitzGerald S. 2004. A Review of the Effectiveness of Agriculture Interventions in Improving Nutrition Outcomes. *Public Health Nutrition*: 7(5), 599–609.
- Blackden, M, Canagarajah S, Klasen S, and Lawson D. 2007. Gender and Growth in Sub-Saharan Africa: Evidence and Issues. In Mavrotas, G. and A. Shorrocks (Eds.) *Advancing Development*. London: Palgrave, pp. 349-370.
- Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, et al. 2008. Maternal and Child Undernutrition 1: Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet* 371(9608):243-260.
- Bosworth J. 2003. Integrating Land Issues into the Broader Development Agenda: Uganda. United Kingdom Department for International Development. <http://www.fao.org/docrep/006/y5026e/y5026e0f.htm#bm15> [Accessed 14 January 2011].
- CIA (Central Intelligence Agency). 2009. The World Fact Book. <https://www.cia.gov/library/publications/the-world-factbook/fields/2012.html> [Accessed 14 January 2011].
- CIA. 2010. The World Fact Book. <https://www.cia.gov/library/publications/the-world-factbook/fields/2052.html> [Accessed 3 January 2011].
- CAADP (The Comprehensive Africa Agriculture Development Programme). Online. <http://www.nepad-caadp.net/about-caadp.php> [Accessed 17 December 2010].
- FANTA-2 (Food and Nutrition Technical Assistance II). 2010. The Analysis of the Nutrition Situation in Uganda. AED, Washington, D.C.
- FAO (Food and Agriculture Organisation). 1996. World Food Summit. 13-17 November 1996 Rome Italy. FAO, Rome. http://www.fao.org/wfs/index_en.htm [Accessed 4 February 2011].
- FAO. 2010. The State of Food Insecurity in the World 2010: Undernourishment Around the World in 2010. www.fao.org/docrep/013/i1683e/i1683e02.pdf [Accessed 4 January 2010].

- FAO. 2011. Hunger. FAO, Rome. <http://www.fao.org/hunger/en/> [Accessed 4 February 2011].
- FAOSTAT (FAO Statistics Division). 2011. Concepts and Definitions. FAO, Rome. <http://faostat.fao.org/site/375/default.aspx> [Accessed 7 February 2011].
- G8. 2009. "L'Aquila" Joint Statement on Global Food Security. L'Aquila Food Security Initiative (AFSI). [http://www.g8italia2009.it/static/G8_Allegato/LAquila_Joint_Statement_on_Global_Food_Security\[1\],0.pdf](http://www.g8italia2009.it/static/G8_Allegato/LAquila_Joint_Statement_on_Global_Food_Security[1],0.pdf) [Accessed 2 January 2011].
- GOU (Government of Uganda). 2003. Uganda Food and Nutrition Policy. http://www.fao.org/righttofood/inaction/countrylist/Uganda/Uganda_foodandnutritionpolicy.pdf [Accessed on 4 February 2011].
- GOU, MOH (Ministry of Health). 2010. Health Sector Strategic Plan III, 2010/11-2014/15. http://www.health.go.ug/docs/HSSP_III_2010.pdf [Accessed 23 February 2011].
- Harshbarger R. Sunday Vision, 7th June, 2009. Nutrition- Obesity rising in rural areas. New Vision, Uganda. <http://newvision.co.ug/D/9/34/683905/harshbarger> [Accessed 23 February 2011].
- IFAD (International Fund for Agricultural Development). 2009. Kenya Statistics. <http://www.ruralpovertyportal.org/web/guest/country/statistics/tags/kenya> [Accessed 16 January 2011].
- IFPRI (International Food Policy Research Institute). 2007. Program for Biosafety Systems. IFPRI, Washington, D.C.
- KDHS. 2009. Kenya: Standard DHS, 2008-09. http://www.measuredhs.com/aboutsurveys/search/metadata.cfm?surv_id=300&ctry_id=20&SrvyTp [Accessed 4 February 2011].
- KNBS (Kenya National Bureau of Statistics). 2010a. <http://www.knbs.or.ke/> [Accessed 16 January 2011].
- KNBS. 2010b. Kenya: 2009 Population and housing census highlights. Kenya National Bureau of Statistics. <http://www.knbs.or.ke/Census%20Results/KNBS%20Brochure.pdf> [Accessed 16 January 2011].
- Kikafunda J and Bambona A. 2005. Food Security does not automatically guarantee Nutrition Security: A Case Study of Bushenyi District, Western Uganda. African Crop Science Conference Proceedings 7: 687-689.
- Klasen S. 2002. Low Schooling for Girls, Slower Growth for All? World Bank Economic Review 16: 345-73.
- Klasen S and Lamanna F. 2009. The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries, Feminist Economics 15(3): 91-132.
- Lal R, Stewart RE, Hansen DO, and Uphoff N (Eds.). 2005. Climate Change and Global Food Security. CRC Press: Taylor & Francis Group, Boca Raton, Florida.

- Martorell R, Yarbrough C, Yarbrough S, and Klein RE. 1980. The Impact of Ordinary Illnesses on the Dietary Intakes of Malnourished Children. *American Journal Clinical Nutrition* 33: 345-350.
- Maxwell DG. 1994. Chapter 3 Uganda: The Household Logic of Urban Farming in Kampala. In: *Cities Feeding People: An Examination of Urban Agriculture in East Africa*. Axumite G. Egziabher et al, eds. International Development Research Centre. IDRC: Ottawa, Canada. <http://www.idrc.ca/openbooks/706-x/> [Accessed 14 January 2011].
- McKinney P. 2009. *Comprehensive Food Security and Vulnerability Assessment: Uganda*. VAM Food Security Analysis. United Nations World Food Programme, Rome.
- Mwadime R. 2010. Workshop on Nutritionalisation of Agriculture in Uganda: The Role of Agriculture in Improving the Nutritional Status of Women and Children. 11-12 August 2010. Commonwealth Resort, Munyonyo. Kampala, Uganda.
- Kenya MOA (Ministry of Agriculture). 2009. Strategic Plan 2008 – 2012. Nairobi. Kenya Ministry of Agriculture. http://www.kilimo.go.ke/kilimo_docs/pdf/moa_strategic_plan.pdf [Accessed 4 February 2011].
- MOH (Ministry of Health, Uganda). 2009a. The Operational Framework For Nutrition In The National Child Survival Strategy. http://www.health.go.ug/nutrition/docs/infant/Operational_Framework.pdf [Accessed 14 January 2011].
- MOH. 2009b. Policy Guidelines on Infant and Young Child Feeding. http://www.health.go.ug/nutrition/docs/IYCF_Guidelines.pdf [Accessed 2 January, 2011].
- MOH Administrator, Uganda. 2010. Ministry of Health. http://www.health.go.ug/nutrition/index.php?option=com_content&view=article&id=59&Itemid=61 [Accessed 2 January, 2011].
- Ministry of Health, Uganda. Online. Welcome to Nutrition Division of the Ministry of Health. <http://www.health.go.ug/nutrition/> [Accessed 2 January, 2010].
- NARO (The National Agricultural Research Organisation). 2010. <http://www.naro.go.ug/> [Accessed 14 January 2011].
- NPA (National Planning Authority). 2010. The National Development Plan 2010/11 to 2014/15. http://www.finance.go.ug/docs/NDP_April_2010-Prot.pdf [Accessed 14 December, 2010].
- NEPAD (New Partnership for Africa's Development). 2011. Planning and Coordinating Agency: History. <http://www.nepad.org/history> [Accessed 4 February 2011].
- Nuwamanya J. 2010. Workshop on Nutritionalisation of Agriculture in Uganda: The Role of Agriculture in Improving the Nutritional Status of Women and Children. 11-12 August 2010. Commonwealth Resort, Munyonyo. Kampala, Uganda.
- OECD and The World Bank. 2006. *Managing for Development Results Principles in Action: Sourcebook on Emerging Good Practice, First Edition*. <http://www.mfdr.org/sourcebook/5-6Uganda-Evolution.pdf> [Accessed 4 February 2011].

- Olielo TKO and Rombo GO. 2009. The Availability of Processed Fruit Products and their Contents of Vitamins A and C in Nairobi, Kenya. *African Journal of Food Agriculture Nutrition and Development* 9(1):565-579.
- Republic of Kenya. 2008. Food Security and Nutrition Strategy. http://www.fao.org/righttofood/inaction/countrylist/Kenya/Kenya_FSNS_finaldraft.pdf [Accessed 4 February 2011].
- Republic of Uganda. 2011. Uganda Nutrition Action Plan 2010-2015: Scaling-up Multi-Sectoral Efforts to Establish the Nutritional Foundation for Uganda's Development. Final Draft.
- Somma A. 2008. The 10 percent that could change Africa. October IFPRI Forum. International Food Policy Research Institute, Washington, D.C.
- Sserunjogi L and Harvey P. 2005. Building a multi-sectoral vitamin A program in Uganda: Establishing sustainable roles for effective implementation. *Sight and Life Newsletter* 2:26–29.
- UNICEF (United Nations Children's Fund). 1990. Strategy for Improved Nutrition of Children and Women in Developing Countries. A UNICEF policy review. New York: UNICEF.
- UNICEF (The United Nations Children's Fund). 2000. Domestic Violence against Women and Girls. *Innocenti Digest*. No. 6. <http://www.unicef-irc.org/publications/pdf/digest6e.pdf> [Accessed 15 January 2011].
- UNICEF. 2009. The State of the World Children's Report 2010(Special Edition). New York.
- U.S. Government. May, 2010. Feed the Future Guide. The US Government. Washington, D.C.
- The World Bank. 2005. Uganda: From Periphery to Centre A Strategic Country Gender Assessment. World Bank, Washington, D.C.
- Uganda Action for Nutrition (UGAN). December, 2010. Malnutrition: Uganda is paying too high a price (An Advocacy Package). UGAN. Kampala, Uganda.
- The World Bank. 2007. From Agriculture to Nutrition: Pathways, Synergies, and Outcomes Agriculture and Rural Development Department. World Bank, Washington, D.C.
- The World Bank. 2008. World Development Report: Agriculture for Development. The International Bank for Reconstruction and Development / World Bank, Washington, D.C.
- Udry C. 1994. "Gender, Agricultural Productivity and the Theory of the Household." *Timbergen Institute Discussion Paper* TI94-118.
- UBOS (Uganda Bureau of Statistics) and ORC Macro. 1996. Uganda Demographic and Health Survey 1995. Statistics Department and Macro International Inc., Calverton, Maryland, USA.
- UBOS and ORC Macro. 2001. Uganda Demographic and Health Survey 2000-2001. UBOS and ORC Macro, Calverton, Maryland, USA.
- UBOS and ORC Macro. 2006. Uganda Demographic Health Survey 2006. UBOS and ORC Macro, Calverton, Maryland, USA.

UGAN (Uganda Action for Nutrition Society), USAID, WFP, FANTA-2, and AED. 2010. Brief 4. Economy and Nutrition. UGAN, Uganda.

UNCST (Uganda National Council for Science and Technology). Online. UNCST. http://www.uncst.go.ug/site/index.php?option=com_frontpage&Itemid=1 [Accessed 15 January 2011].

United Nations. 2000. Resolution adopted by the General Assembly: United Nations Millennium Declaration A/RES/55/2. <http://www.un.org/millenniumgoals/bkgd.shtml> [Accessed 15 January 2011].

UNDP (UN Development Programme). 2007. The 2006 Revision and World Urbanization Prospects: The 2007 Revision. <http://esa.un.org/unup> [Accessed 18 January 2011].

UNDP and UNDP/Uganda. 2007. Millennium Development Goals: Uganda's Progress Report 2007. Geneva: UNDP. <http://www.undp.or.ug/mdgs/25> [Accessed 23 January 2009].

Glossary of Terms

Term or concept	Definition
Body Mass Index (BMI)	A measure of body fat based on height and weight. It is calculated using weight in kilograms divided by height in meters squared (kg/m ²)
Food security	According to FAO, Food security is defined as the situation “when all people, at all times, have physical and economical access to sufficient, safe and nutritious food for a healthy and active life.”
Hunger	Food intake that is continuously insufficient to meet dietary energy requirements
Malnutrition	A poor state of nutrition referring to both under- and over-nutrition
Millennium Development Goals (MDGs)	Include eight international development goals that were endorsed by governments at the United Nations in September 2000. MDG-1 is to eradicate extreme poverty and hunger by 2015. One of its 3 targets is to “reduce by half the proportion of people who suffer from hunger.”
Nutrition security	Encompasses food security; defined at the Science Academies Summit in Madras, India (1996) as ensuring “every individual has the physical, economic and environmental access to balanced diet that includes the necessary macro and micro nutrients and safe drinking water, sanitation, environmental hygiene, primary health care and education so as to lead a healthy and productive life.”
Overweight	BMI of 25–29.9
Obesity	BMI of 30 or greater
Stunting	An indicator of chronic under-nutrition and short stature, it is a height-for-age z-score of less than 2 standard deviations (-2 SD) of the WHO Child Growth Standards
Undernourishment	According to FAO, undernourishment refers to the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement for maintaining a healthy life and carrying out a light physical activity
Underweight	In adults, it is a BMI <18.5; in children it is a weight-for-age z-score of less than 2 standard deviations (-2 SD) of the WHO Child Growth Standards
Wasting	An indicator of acute under-nutrition (thin), it is children whose weight-for-height z-scores of less than two standard deviations (-2 SD) of the WHO Child Growth Standards

APPENDICES

APPENDIX A

List of Participants

Academic / Academy

Uganda National Academy of Sciences	Patrick Rubaihayo
	Franklin Muyonjo
	Zaam Ssali
	Prof. P.E. Mugambi
	Francis Buwembo
	Paul Nampala
	William B. Banage
	Noah Nyende
	Ochapet Patrick
	Harriet Nanfuma
Nigerian Academy of Sciences	Justin Epelu-Opio
	Israel Folorunso Adu
Tanzania Academy of Sciences	Adedamola Badejo
	Sylvester L.B. Kajuna
US National Academies	Patricia Cuff
	Christian Acemah
Kenyatta University	Judith Kimiywe
Kyambogo University	Grace Muhoozi
Kyambogo University / Uganda Action for Nutrition	Peter Milton Rukundo

Makerere University	Abdel-Rahman Lubowa
	Matovu Hassan A.
	Kyomugisha Elizabeth
	Nyakuni Geoffrey
	Joyce Kikafunda
	Rhona Baingana
	John Muyonga
	Nakibuuka Alizik
Makerere University – Dept. Of Women and Gender Studies	Consolata Kabonesa
Makerere University /Uganda National Academy of Sciences	Prof. Edward K. Kirumira
Makerere University College of Health Sciences	Prof. John T. Kakitahi
Makerere University College of Health Sciences	Celestino Obua
Makerere University School of Public Health HIV/AIDS Fellowship Programme	Florence Tushemerirwe
Mbarara University of Science and Technology	Prof. Frederick Kayanja

Governmental

Office of the Prime Minister	JK Nuwamanya
Parliament of Uganda	Hon. Olive Woneka
	Richard Ssendege M.
Minister of Gender Labour and Social Development	Bwire Bernard
Minister of Gender Labour and Social Development (Representing Rt. Hon. Prime Minister)	Hon. Opio Gabriel
Ministry of Agriculture Animal Industry and Fisheries	Alex Bambona
	Daisy Eresu
	Catherine Semakula
	Kasoma Charles
	Sunday Mutabazi
Ministry of Education and Sports	Susan Oketcho
Ministry of Health	Dr. Elizabeth Madraa
	Namukose Samalie B.
	Nakitende Louise
	Dramadri Juliet
Ministry of Health – Gulu Referral Hospital	Albert Lule
Ministry of Health – Jinja Referral Hospital	Asiimwe Charles
Ministry of Justice and Constitution Affairs	Luwano Dan
National Planning Authority	Wilberforce Kisamba Mugerwa
National Agricultural Research Organisation	Margaret Masette
	Arinaitwe Geoffrey
	Andrew Kiggundu
Kampala City Council	Semwanga Margaret Azuba
US Embassy	Vanessa Harper
	Ambassador Lanier

USAID	Megan Rhodes
	Juan Carlos Rodriguez
	Gaudensia Kenyangi
	Theresa Tuano
	Brian Conklin
	Dr. Janex Kabarangira

Civil society

A2Z Project	Dr. Alfred Boyo
AED – Washington Office	Michele McNabb
Community Based Initiative for Nutrition	Lillian Busingye
Global Alliance for International Nutrition	Louise Sserunjogi
Grameen Foundation	Jill Shemin
HarvestPlus	Anna Marie Ball
HarvestPlus, Kampala	Sylvia R. Magezi
Heifer International	Patrick Nalere
IFPRI	Todd Benson
LOG'EL Project Ltd.	Zirabamuzale Abubaker
Plan for Modernisation of Agriculture	Tom Mugisa
Regional Centre for Quality of Health Care /FANTA.2 Project	Talwana Alexie
	Diana Kyokusiima
RUFORUM	Moses Osiru
SCIFODE	Peter Wamboga Mugirya
Uganda Action for Nutrition	Opedun Peter Mark
Uganda Health Communication Alliance	Ooko Akumu Vincent
	Kwizeera Andrew
	Baguma T. Richard
Uganda National Farmers' Federation	Augustine Mwendya
USAID/FANTA.2	Robert Mwadime
Volunteer Efforts for Development Concerns (VEDCO)	Agnes Kirabo

International Agencies and Foundations

UN-Food and Agriculture Organisation	Juliet Aphane
	Beatrice Okello
	Percy W. Misika
UN-World Food Programme	Nancy Adero
	Peace Nganwa
	Purna C. Wasti
	Julia Tagwireyi
	Geoffrey Ebong
	Melissa Antal
	Stanlake Samkange

Bill and Melinda Gates Foundation	Shelly Sundberg
-----------------------------------	-----------------

Media

Daily Monitor	Eve Mashoo
KFM Radio	Wanyana Diana
NBS TV	Namuwaya Evaline
NTV	Lea Bwanika
	Frank Walusimbi
The Monitor	Flavia Nalubega
The New Vision	Ninsiima Racheal
	John R. Kasozi
UBC TV	Robert Bwaitu
Vision Voice Radio / Radio West	Violet Nabatanzi
Transcriber	Nandawula Stella

APPENDIX B

Workshop Agenda

Nutritionalisation of Agriculture in Uganda: The Role of Agriculture in Improving the Nutritional Status of Women and Children A Workshop

Commonwealth Resort – Munyonyo, Albert Hall
Kampala, Uganda

Workshop Objective:

The overall objective of the workshop is to promote linkages between Agriculture and Nutrition in a way that works towards improving the nutritional status of women and children in Uganda. The specific objectives of the workshop are:

- To bring together multi-sectoral stakeholders to discuss national and international efforts to assess how agriculture's past interventions have incorporated nutrition outcome measures.
- To review the performance of nutrition and agriculture coordination bodies and the implementation of policies and interventions put in place in an effort to improve nutritional outcomes.
- To discuss how the information presented at this meeting can be operationalised in a way that improves nutritional outcomes for vulnerable populations in Uganda.

DAY ONE

7:30–9:00 **Arrival and Registration**

OPENING SESSION

Chair: Prof. J.T. Kakitahi
Deputy Principal
College of Health Sciences
Makerere University

9:00-9:05	Setting the Stage: Introduction to Workshop Objectives and the Purpose of the Workshop Prof. J.T. Kakitahi
9:05-9:10	<i>Welcome</i> Prof. Paul E. Mugambi President, Uganda National Academy of Sciences
9:10-9:25	<i>Guest of Honor:</i> Rt. Hon. Prof. Apolo R. Nsibambi Prime Minister and Leader of Government Business

9:25-9:40	Guest Speaker: His Excellency, Ambassador Jerry P. Lanier Ambassador of the United States of America to Uganda
9:40-10:05	Keynote Address: <i>An Analysis of the Role of Agriculture in Improving the Nutritional Status of Women and Children</i> Ms. Juliet Aphane Nutrition Officer, Nutrition and Consumer Protection Division UN Food and Agriculture Organisation

10:05-10:30—BREAK

Session I: Background – Defining the Problem
10:30-11:45am

Purpose: To critically review the causes and the impact of malnutrition on women and children

Moderator: Dr. Louise Sserunjogi
Country Advisor
GAIN Country Office, Uganda

10:30-10:45	<i>A Profile of Malnutrition in Uganda: Demographics and Consequences</i> Dr. Elizabeth Madraa Head of Nutrition, Ministry of Health
10:45-11:00	<i>Highlighting the Agriculture Implications from the Uganda Nutrition Profiles study</i> Mr. Alex Bambona Head Nutrition and Home Economics, Ministry of Agriculture, Animal Industry and Fisheries
11:00-11:15	<i>Determinants of Malnutrition in Uganda</i> Dr. Robert Mwadime Senior Regional Nutrition Advisor Food and Nutrition Technical Assistance II (FANTA2) Project, and Regional Centre for Quality of Health Care, Makerere University School of Public Health
11:15-11:45	30 minute panel discussion with speakers

Session II: Agriculture Interventions and Nutrition Outcomes: Lessons Learnt
11:45am-12:45pm

Purpose: To explore past and present agricultural interventions and their impacts (or lack of impacts) on the nutritional status of women and children, review how they were measured, as well as possible explanations for the findings

Moderator: Hon. Olive Wonekha
Member, Committee on Agriculture, Animal Industry and Fisheries
Parliament of Uganda

11:45-11:55	<i>Previous Efforts to Improve Nutrition in Uganda: Challenges and Lessons Learnt</i> Prof. Joyce Kikafunda Department of Food Science and Technology Makerere University
11:55-12:05	<i>Integrating Nutrition in Agricultural Research: A Case Study of the National Agricultural Research Organisation</i> Dr. Emily Twinamasiko Director, Research Coordination, National Agricultural Research Organisation
12:05-12:15	<i>Post-Harvest and Food Processing Systems in Uganda</i> Prof. John Muyonga Head, Department of Food Science and Technology Makerere University
12:15-12:45	30 minute panel discussion with speakers

Session III: National policies and governmental coordination agencies
12:45-1:45pm

Purpose: To discuss government policies that address nutrition (within the context of the national development plan) as well as attempts by government to engage in cross-sectoral dialogue, coordination, and funding

Moderator: Prof. John Muyonga
Head, Department of Food Science and Technology
Makerere University

12:45-12:55	<i>Operationalisation of Nutrition in the National Development Plan within the Agricultural Sector</i> Dr. Wilberforce Kisamba-Mugerwa Chairperson, National Planning Authority
12:55-1:05	<i>The Economics and Politics of Nutrition in Uganda</i> Dr. Todd Benson Uganda Agricultural Strategy Support Programme International Food Policy Research Institute
1:05-1:15	<i>Government Models of Coordination: Challenges, Experiences and Lessons Learnt</i> Mr. Tom Mugisa Programme Officer – Technical Services Plan for Modernisation of Agriculture Secretariat
1:15-1:30	15 minute panel discussion with speakers

1:30-2:30—LUNCH

Session IV: Engaging in cross-sectoral dialogue
2:30-3:30pm

Purpose: To highlight cross cutting issues that impede policy implementation for effective contribution of agriculture to improved nutrition outcomes

Roundtable Discussion

5 minutes of presentation for each, followed by 30 minutes of plenary discussion

Facilitator: Prof. Edward K. Kirumira – Dean, Faculty of Social Sciences, Makerere University

Roundtable Discussants:

- Mr. Peter Rukundo – Lecturer, Department of Human Nutrition and Home Economics, Kyambogo University and Secretary General, Uganda Action for Nutrition
- Prof. Patrick Rubaihayo – Prof. Emeritus, Makerere University and Fellow of UNAS
- Prof. Consolata Kabonesa – Head, Department of Women & Gender Studies, Makerere University
- Mr. Augustine Mwendya – Vice Chairperson, Uganda National Farmers’ Federation
- Ms. Agnes Kirabo – Vice Chairperson, Uganda Land Alliance

3:30-4:00—BREAK

Session V: Examining Models Linking Agriculture and Nutrition
4:00-5:00pm

Purpose: Examine models linking nutrition and agriculture in other countries in the Africa region and describe how they were or are being implemented and the lessons learnt

Moderator: Ms. Julia Tagwireyi
 Senior Nutrition Advisor, Uganda Country Office
 UN-World Food Programme

4:00-4:10	<i>Nigeria</i> Prof. Israel Folorunso Adu National Open University, Victoria Island, Lagos Co-Chair Planning Committee (Agriculture-Nutrition Linkage Project, Nigeria)
4:10-4:20	<i>Kenya</i> Prof. Judith Kimiywe Chairperson, Department of Food, Nutrition and Dietetics Kenyatta University, Nairobi
4:20-5:00	40 minute panel discussion with speakers

5:00-7:00pm RECEPTION

DAY TWO

7.30-9.00 **Arrival and Registration**

Chair: Prof. J.T. Kakitahi
Deputy Principal
College of Health Sciences
Makerere University

9:00-9:10	<i>Recap of Day One</i> Prof. J.T. Kakitahi
9:10-9:40	Keynote Address Michele McNabb Director, Food Security Initiative AED, Washington D.C. Dr. Anna-Marie Ball Team Leader and Behavioural Change Expert HarvestPlus, Orange Fleshed Sweet potato Project
9:40-9:50	<i>Preparation for break-out groups – elaboration and clarification on tasks for the groups</i> Prof J.T. Kakitahi (supported by Secretariat Staff)

Session VI: Small break-out group discussions **9:50-11:30am**

Purpose: To delve more deeply into how researchers, members of parliament, academicians, academics, NGOs, public and private foundations and others could respond to the needs identified and what the groups could do to improve the nutritional status of women and children in Uganda through agricultural interventions.

Questions for break-out sessions:

- 1) How can policy makers and program designers be empowered to operationalise and monitor nutrition in the National Development Plan and other interventions?
Chair: Mr. Charles Asimwe, Senior Nutritionist, Jinja Referral Hospital
- 2) What are the opportunities and challenges for the agriculture sector to embrace nutrition outcomes and how can synergies among sectors be strengthened?
Chair: Prof. Israel Folorunso Adu, Agriculture-Nutrition Linkage Project, Nigeria
- 3) How can the information presented at this meeting be operationalised in a way that improves nutrition outcomes of vulnerable populations in Uganda?
Chair: Dr. Elizabeth Madraa, Head of Nutrition, Ministry of Health
- 4) How can resources be appropriately allocated to respond to the variable needs of the different regions within Uganda, e.g. under-nutrition with and without ample food supply, over-nutrition, micro-nutrient deficiency, and areas with unbalanced diets?
Chair: Geoffrey Ebong, Programme Advisor, World Food Programme, Uganda Country Office

11:30-12:00—BREAK

12:00-12:45	Continue small group discussions in order to organize presentations to plenary
12:45-1:45	<p><i>Panel discussion - chairpersons of the breakout groups with the audience</i></p> <p>Moderator: Dr. Robert Mwadime, FANTA-2 Project</p> <ul style="list-style-type: none"> • Mr. Charles Asiimwe • Prof. Israel Folorunso Adu • Dr. Elizabeth Madraa • Mr. Geoffrey Ebong

1:45-2:30—LUNCH

Session VII: Improving the present, looking to the future
2:30-5:00pm

Moderator: Dr. Robert Mwadime
Senior Regional Nutrition Advisor
Food and Nutrition Technical Assistance II (FANTA2) Project, and
Regional Centre for Quality of Health Care, Makerere University School of Public
Health

Purpose: To explore opportunities for improving the policies, implementation, leveraging resources and developing meaningful collaborations among the various sectors and stakeholders.

2:30-2:45 *Ensuring Coordination of Government Sectors and MDAs for Effective Contribution to Improvement of Nutrition for Women and Children*
Mr. J.K. Nuwamanya
Director, Monitoring, Evaluation and Policy Coordination
Office of the Prime Minister

2:45-3:00 *Defining Strategies for Collaboration for Nutritionalisation of Agriculture*
Mr. Stanlake Samkange
UN-World Food Programme Representative and Country Director, Uganda

3:00-3:25 *Leveraging Resources for Nutritionalisation of Agriculture*
Team Leaders for Uganda, Feed the Future Initiative of the US Government

3:25-3:45 Open discussion

3:45-4:05 *Summary and Way Forward*

4:05-4:30 *Closing Speech*
Hon. Hope Mwesigye
Minister of Agriculture, Animal Industry and Fisheries

END

APPENDIX C

Speaker Biographies

ISRAEL FOLORUNSO ADU was born in 1947 and holds a BSc degree in Agriculture (second class, Upper division), 1972, and a Ph.D in Animal Science (1975), all from the University of Ibadan, in Nigeria. He started his teaching and research career as a Research Fellow and Lecturer at the Ahmadu Bello University (ABU) in Zaria, Nigeria, in 1976 and eventually rose through the ranks to become a Professor in 1986. In 1988, he was awarded the Von-Humboldt Foundation Fellowship for his sabbatical leave year at the Institute for Tierzucht und Hausetiergenetik, University of Giessen in Germany before being transferred to the University of Agriculture, Abeokuta, Nigeria, in 1990 as Head of the Department of Animal Production and Health. He later became Dean of Student Affairs (1991-1996), and then Deputy Vice-Chancellor (1996-2006). Prof Adu's research focus is on improving the production and productivity of indigenous sheep and goats and he has 103 publications (94 articles, 6 monographs and 3 chapters in books). He also supervises postgraduate research (Masters and PhD). Finally, Prof Adu is a Fellow of the Nigerian Society for Animal Production, a Fellow of the Nigerian Academy of Sciences and has served on numerous occasions as a consultant. He is married and blessed with children and grandchildren.

JULIET APHANE is a Nutrition Officer working with the Food Security and Policy Group, Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations (FAO). She has a Masters degree in Nutrition from Tufts University, Boston, Massachusetts, USA. Ms Aphane has worked for FAO for over 15 years. She has assisted member countries in technical areas such as identification and formulation of policies, strategies, programmes and projects for improving nutrition within the food and nutrition sector; promoting production and consumption of local and indigenous foods to alleviate micronutrient deficiencies and sustain biodiversity; incorporation of nutrition objectives in development policies and programmes in agriculture, food security, and rural development; institutional capacity development and multi-sectoral coordination. She served as Chief Technical Advisor for the regional project "Protecting and Improving Food and Nutrition Security of Orphans and HIV/AIDS Affected Children, in Lesotho and Malawi" from 2004 to 2008 where she diligently promoted food based strategies to alleviate hunger, micronutrient deficiencies and improve livelihoods of vulnerable communities. From 2006 to 2008 she served as FAO Representative in Lesotho. Before joining FAO she worked vastly in the area of nutrition and rural development, specifically in household food security and infant and young child nutrition. Her working experience has an ample geographical coverage within the SADC region.

ANNA-MARIE BALL is the Uganda delivery manager and behavior change expert for HarvestPlus, a global alliance that seeks to reduce micronutrient malnutrition in developing countries by bio-fortifying staple food crops. She is based in Uganda where she has worked on a project to disseminate the bio-fortified orange sweet-potato in Uganda and Mozambique. Currently the HarvestPlus team is delivering orange sweet potato and high iron beans to areas in the west and southwest of the country. Prior to joining HarvestPlus Anna-Marie worked in the water sector in Zambia as a Health Expert/Sociologist. In Botswana she conducted research in the area of youth reproductive health, behaviour change and HIV/AIDS. Raised in southern Africa, Anna-Marie, a Canadian citizen, received her BSc. (Honours) in Biology from Queen's University (Canada), a Masters in International Development Planning (University of Guelph) and PhD in Community Health Sciences (University of Manitoba).

ALEX BAMBONA is the head of the Nutrition and Home Economics Unit in the Ministry of Agriculture Animal Industry and Fisheries, Uganda. He holds a M.Sc. Agricultural Economics, Graduate Diploma in Management, Graduate Diploma in Food and Nutrition Security, and B.Sc. Food Science and Technology. Previously, he has served as a lecturer for courses of Food Economics and marketing; and Food Security & Community Nutrition at Makerere University. He has also coordinated an advocacy project that promotes nutrition friendly actions in development policies and programs. These nutrition friendly actions include promotion of environmentally sustainable farming practices and nutrition dense varieties. He is a member of The Uganda Apiculture Development Organization, Uganda Action for Nutrition (UGAN) and an Executive Member of East Africa Energy Technology Development Network - Uganda Chapter.

TODD BENSON is a Senior Research Fellow in the Development Strategy and Governance Division of the International Food Policy Research Institute. He is based in Kampala, where he heads IFPRI's Uganda Agricultural Strategy Support Programme. Dr. Benson, a geographer by training, has extensive experience in Africa in agricultural, nutrition, and poverty-related policy research and strategy formulation. He has worked for IFPRI since 1999 based in Malawi, US, and Uganda.

BRIAN CONKLIN is the Agriculture and Food Security Team Leader at USAID/Uganda. He is responsible for an approximately \$100 million agriculture and food security portfolio covering food security programs, agriculture livelihoods and agriculture research. He is also responsible for agriculture programming within the U.S. Government's "Feed the Future" initiative in Uganda, addressing poverty, agriculture, and nutrition to help meet MDG 1. Mr. Conklin serves on the Agriculture Sector Donor Working Group which is a coordinating body for the Ministry of Agriculture, private sector and development partners in Uganda. He has been in Uganda since 2008 and worked with USAID since 2000 and has worked in southern Africa, the middle east, eastern Europe, southeast Asia and South America. He holds an undergraduate degree from Southern California College and an MBA in Economic Development from Eastern College in St. David's, Pennsylvania.

CONSOLATA KABONESA has over 10 years of specialised experience in gender programming, gender training and research at both the local and international level. She has worked in a broad international context including projects with the UK Government Agency for Development (DFID), NORAD, HIVOS (Dutch NGO), International Organization for Migration (IOM), the US Government (USIA), Sida/SAREC, Uganda Red Cross, several National Women’s Groups as well as several Foundations, including: the Rockefeller Foundation, The Carnegie Corporation, and the Ford Foundation. Dr. Kabonesa holds a PhD in Human and Community Development and currently works in the Department of Women and Gender Studies at Makerere University, Uganda.

JOHN TUHE KAKITAH is a Professor of Public Health at the College of Health Sciences, Makerere University, Kampala, Uganda. He holds Bachelor of Medicine and Bachelor of Surgery of Makerere University. Also holds a Diploma in Public Health and a Master’s Degree in Nutrition from the University of Cambridge UK. Has more than 30 years of professional experience in a Public Health and nutrition. Has been a lecturer in the Institute of Public Health teaching human nutrition to both undergraduate and post graduate students and director of Mwanamugimu nutrition unit of Mulago hospital. He has been a nutrition advisor for various multilateral bodies and has carried out various studies on nutrition problems in and outside Uganda. Was WHO consultant on decision making based on nutrition surveillance data in Iringa, Tanzania; Midterm review of the joint UNICEF/WHO nutrition support programme; FAO consultant for the Development of procedures for District Based Plans of Action for Nutrition in Uganda; FAO consultant and Team Leader for field testing “Assessment Tool” for improvement of Nutrition programmes-a multinational collaborative study. He has also carried out various Feasibility study, baseline, M&E coordination, and supervision of students, Impact assessment studies and surveys. He has also published widely in the area of human nutrition.

JOYCE KAKURAMATSI KIKAFUNDA is a Professor of Food Science and Nutrition at the Department of Food Science and Technology, Faculty of Agriculture, Makerere University, Kampala, Uganda. She holds a First Class Honours degree in Agriculture from Makerere University; an MSc in Food Science and Technology from the University of Saskatchewan, Saskatoon, Canada and; a PhD in Human Nutrition from the University of Reading, UK. Professor Kikafunda is the pioneer founder of the Department of Food Science and Technology, a department she nurtured and headed for 10 years. She was among the founder members of Uganda Action for Nutrition (UGAN) and the current Chairperson of the Association. She is a member of the British Nutrition Society and the World Public Health Nutrition Association. Professor Kikafunda’s research interests lie in the areas of Community Nutrition, Under-five and School Child Nutrition and micronutrient nutrition. She has supervised over 20 postgraduate students and published over 30 scientific papers in refereed journals. She has been the National Coordinator of several Nutrition Intervention programmes in Uganda. She was an External Examiner at Kenyatta University, Kenya. She spear-headed the establishment of the MSc in Applied Human Nutrition at Makerere University, a programme that is generating much needed human resource in the nutrition field. Professor Kikafunda is Africa’s only representative on the Board of Trustees of the International Rice Research Institute (IRRI) in the Philippines.

JUDITH KIMIYWE is an Associate Professor and Chairperson of the Department of Food Nutrition and Dietetics at the School of Applied Human Sciences, Kenyatta University, Kenya. She holds a B.ED Home economics, MSc. Community Nutrition and Health and a PhD in Food and Nutrition. She is also a Certified Nutrition Specialist. Prof. Kimiywe's research has centered on use of local available resources to enhance food and nutrition security of individuals and communities to mitigate hunger, malnutrition and poverty in Kenya and beyond. Prof. Kimiywe is a member of several professional organizations such as The Kenya Coalition for Action in Nutrition and FARA among others. She is a Patron and a founder of the Kenyatta University Nutrition Club, which has grown into an Interuniversity Association in Kenya. She is an awardee of the CGIAR Award to dietary diversity Kenya Team, Nominated Custodian of Dietary Diversity 22nd May 2010 and Vice Chancellor's Award in recognition of attracting high number research grants 2006-2009. She was recently appointed as an Expert Consultant – Joint FA/Biodiversity International Expert Consultation on Nutrition Indicators for Biodiversity – 2 Food Consumption Washington DC, 8 – 9 June 2009. Prof. Kimiywe has supervised and mentored 8 PhD and 35 Msc students from 2002. She has authored several articles with colleagues and students in both local and international journals and conference proceedings. She has established linkages and collaboration with other Universities locally and abroad for enhancing capacity building for faculty and students in the department. Prof. Kimiywe has contributed to the development of training manuals and user friendly materials on food, nutrition and health for health care providers, extension officers and for communities. Prof. Kimiywe has been involved in regional projects covering Eastern African countries, Senegal, Benin, and South Africa. She has been involved in the development of Food and Nutrition Security Policy, Health Sector strategic plan and Infants and Young Child Feeding Policy and Guidelines for Kenya. She has also contributed to the older people Policy on health and nutrition issues, and the School Feeding Programme. Prof. Kimiywe has also contributed to the development of the Micronutrient Guidelines for Control of micronutrient deficiencies and contributed to the enhancement of the Nutrition curriculum through RUFORUM in Institutions of higher learning towards meeting the MDGS.

AGNES KIRABO is a female Activist working with Volunteer Efforts for Development Concerns (VEDCO). Kirabo's activist career has been developed for the last six years. She is known for issues concerning agriculture in Uganda as a tool and an opportunity to end income poverty and poverty of the mind. She has mobilized farmers to influence policy and practice at all levels and has undertaken policy analysis to ensure that policies do not compromise agriculture and the livelihoods of the biggest population of the poor in the country. Kirabo is Board Chair of Participatory Ecological Land Use – Uganda (PELUM-U) and the Board Vice-Chair of Uganda Land Alliance. She has worked with farmers for the last nine years and she is an Adult Educator by profession.

AMBASSADOR JERRY P. LANIER is a career diplomat with 26 years of service in the Department of State. Prior his appointment as the U.S. Ambassador to the Republic of Uganda, he served as the Foreign Policy Advisor for U.S. Africa Command headquartered in Stuttgart, Germany. Previously, he was the Director of the Office of Regional and

Security Affairs in the Africa Bureau at the State Department. Mr. Lanier has also served in the Philippines, Kenya, Thailand, Bosnia-Herzegovina, and Ghana. At the State Department, he has served as the Special Assistant to the Assistant Secretary for African Affairs, country officer for the Republic of Korea, Legislative Management Officer for Africa, Deputy Director for the Office of West African Affairs, and Deputy Director for the Office Pakistan, Afghanistan, and Bangladesh Affairs. He received his B.A. at Pembroke State University, his M.A. at the University of North Carolina at Chapel Hill, and served three years as lecturer in the history department of the University of North Carolina at Charlotte.

ELIZABETH MADRAA is a medical doctor who has specialized in international public health. For ten years, she practiced medicine at Mulago National Referral Hospital, Kampala, mostly in the Child Health Nutrition Unit. Prior to working at Mulago, she was the Director for Aid and NGO Coordination in the Office of the Prime Minister for two years. Her previous experience also includes being Manager for the National HIV/AIDS Programme for 15 years, Head of the Nutrition Section (Ministry of Health) for 2 years, and she's currently the Programme Manager for Food Fortification, Ministry of Health, Uganda. She is a Hubert Humphrey Fellow.

MARGARET MASETTE is the Head of Food Bioscience Research Centre (FBRC), a unit under National Agricultural Research Laboratories (NARL) under the National Agricultural Research Organization (NARO). She currently serves as a principal investigator of a World Bank funded project focusing on enhancement of market opportunities for priority commodities (selected crops, fish and milk). She also co-ordinates two other projects: a short-term FAO funded project designed to increase supply of mukene (*Rastrineobola argentea*) for human consumption and development and promotion of groundnut cookies funded by USAID. She conducted a nationwide study to document use of indigenous knowledge (IK) in food processing and preservation. She was also involved in the establishment of the nutritional status in rural households and impact of HIV/AIDS in selected districts of Uganda. Margaret lectures both undergraduate and post-graduate students in post-harvest fisheries, marketing and transportation courses in the Department of Zoology at Makerere University. Over the years, Margaret has specialized in fish quality assurance aspects, sanitation and hygiene, nutrition among fisher communities, risk assessment and assessment of post-harvest losses with their causative agents. In this respect, she has been involved in the advisory role of setting up and auditing of quality management systems (GMP, HACCP, TQM, ISO 9002 etc) in all fish factories in the country as a national inspector and auditor. Since 2003 she has also been a member of Lake Victoria Fisheries Organization working group on fish inspection and quality assurance (FIQA-RWG) as their executive secretary. In 2009, she was nominated as a regional co-coordinator for African Network of fish Technology and Safety (ANFTS) for East, Central and Southern Africa. Margaret is completing her PhD programme at Makerere University and has attended short-courses studies, professional workshops and seminars in UK, Malaysia, Thailand, Iceland, Morocco, Israel, Senegal, Cameroon, Tanzania and Kenya. (*Margaret presented on behalf of Dr. Twinamatsiko, Director of Research Coordination of the National Agricultural Research Organisation (NARO)*).

MICHELE MCNABB is the Director for Food Security Initiative at AED, Washington, DC, USA. She is a food security expert with 25 years of experience in international development, focusing on early warning, disaster risk reduction and strategic communications. She has worked widely throughout East and Southern Africa, including nine years based in Kenya and five years based in Mozambique. She directed a USAID-funded disaster preparedness project in Mozambique and was Regional Representative for the Greater Horn of Africa for the Famine Early Warning System Project (FEWS) based in Kenya. She was the lead author for the 2009 *World Disasters Report* on early warning/early action and other technical publications. She is a graduate of the Fletcher School of Law and Diplomacy.

WILBERFORCE KISAMBA-MUGERWA is a PhD holder in Agricultural Economics from Makerere University. He is currently the Executive Chairperson of the National Planning Authority in Uganda and also a Research Associate with Makerere Institute of Social Research. He was the 2009 spring semester; Visiting Professor for International studies in Rural Development at Williams College, Massachusetts USA. Before joining the National Planning Authority in Uganda, he served as a Division Director of International Service of National Agricultural Research (ISNAR) with the International Food Policy Research Institute (IFPRI) based in Addis Ababa, Ethiopia. Before that Kisamba Mugerwa had held various Cabinet Ministerial positions in the Government of Uganda including the Ministry of Agriculture, Animal Industry and Fisheries. He was also elected Member of Parliament for 24 years until 2004 and was the first Chairman of Luweero District Council in Uganda. He has a strong background in research with particular interests in rural finance, land tenure and natural resources management; agricultural research for development, food security and rural development and governance in general. He has written and presented several professional papers in international conferences and some of them published. He is a successful small-scale farmer in Kokanda, Bamunaanika County, and Luweero District in Uganda.

TOM MUGISA is an Agribusiness Economist, works as a Programme Officer responsible for Technical Services at the Plan for Modernisation of Agriculture (PMA) Secretariat, Ministry of Agriculture, Animal Industry and Fisheries. He has over 25 years experience in the agriculture sector from working as a front line Extension Officer, National Expert and International Consultant. Mr Mugisa, has among others, coordinated the formulation of Uganda's Food and Nutrition Policy, 2003; National Food and Nutrition Strategy, 2005; Toolkit for Monitoring the Right to adequate food, 2007; and National Food and Nutrition Legal Framework, 2009. He has also coordinated various local and international workshops/seminars on food and nutrition security as well made presentations on the subject to various audiences in and outside the country. He studied in Makerere University, Eastern and Southern African Management Institute (ESAMI) and Maastricht Management Institute, The Netherlands.

JOHN H. MUYONGA is Associate Professor and Head of the Department of Food Science and Technology, Faculty of Agriculture at Makerere University. Dr. Muyonga holds a PhD in Food Science from the University of Pretoria, a MS from Cornell University and a B.Sc. from Makerere University. His expertise is in Protein functionality in food systems, nutritional effects of food processing, post harvest technology of fish, commercialization of scientific and technological innovations and education and food based nutritional interventions. In addition to his teaching, Dr. Muyonga offers consultancy services in aspects of nutritional interventions and food processing. His research interests include post harvest biochemistry of meat, fish and poultry, fish waste utilisation, protein functionality, enhancing nutritional properties of food through processing, University-private sector partnerships, nutritional and nutraceutical properties of traditional Ugandan foods and improving the nutritional status through information and education. His current research projects include among others: Potential of grain amaranth for improvement of nutrition among children; Extent and nutritional implications of the hard to cook defect in Uganda's common bean varieties; Banana tissue culture and nutrient enhancement for food security and income generation among PLWHA in the lake Victoria basin; Improving nutrition and healthcare of children, mothers and other vulnerable groups in northern Uganda through nutrition and healthcare education. He is also in charge of the Food Technology and Business Incubation Programme.

ROBERT MWADIME is the Senior Regional Nutrition Advisor for FANTA II Project based in Uganda. He has more than 18 years of experience in the design, implementation and evaluation of child health and HIV/AIDS projects with particular emphasis on nutrition. His recent work with the Regional Center for Quality of Health Care (RCQHC) supported development of nutrition guidelines, training, and IEC materials and the design and implementation of short courses related to quality of care of health services, integrated management of childhood illness, and nutrition. Dr. Mwadime received his Ph.D. in Economic Development and Health from Wageningen University, the Netherlands, and his MPH from Johns Hopkins University. He speaks Swahili and Luganda.

AUGUSTINE MWENDYA is the Vice Chairperson of the Uganda National Farmers Federation, a member organisation which brings together farmers in Uganda.

APOLO ROBIN NSIBAMBI is a Ugandan academic and politician. He is the current Prime Minister of Uganda, a post he has held since April 5, 1999. He is also an *ex officio* member of the Ugandan Parliament. Previously, Professor Nsibambi served as the Dean, Faculty of Social Science at Makerere University from 1978 until 1983 and from 1985 until 1987. He was appointed Head, Department of Political Science at Makerere University in 1987, a position he held until 1990. He became the Director, *Makerere Institute of Social Research (MISR)* in 1994, serving in that capacity until 1996. Between 1996 and 1998, he served as Minister of Public Service in the Uganda Cabinet. In 1998 he was appointed Minister of Education and Sports, serving in that capacity until 1999 when he was appointed Prime Minister and Leader of Government Business. He holds a Bachelor of Science (BSc) degree with Honors in Economics from the University of London. He

also holds a Masters of Arts (MA) degree in Political Science from the University of Chicago in the United States of America. His Doctor of Philosophy (PhD) degree was obtained from the University of Nairobi. (*The Prime Minister was represented by Dr. Gabriel Opio, Minister for Gender Labour and Social Development*)

J.K. NUWAMANYA is the out-going Director of Monitoring, Evaluation and Policy Coordination at the Office of the Prime Minister of Uganda. Before that, he served as the Commissioner for Coordination and Monitoring in the Office of the Prime Minister for over 10 years. He holds a Bachelors Degree in Agriculture and Msc. Agricultural Economics from Makerere University, Kampala, Uganda.

MEGAN RHODES is the Health Team Leader at USAID/Uganda. She is responsible for an approximately \$65 million health portfolio covering family planning/reproductive health, maternal and child health, malaria, tuberculosis, nutrition, neglected tropical diseases, emerging pandemic threats, and health systems strengthening. She is also responsible for nutrition programming within the U.S. Government's "Feed the Future" initiative in Uganda, addressing poverty, agriculture, and nutrition to help meet MDG 1. Ms. Rhodes also serves as chair of the Uganda Health Development Partners, the coordinating body for donors in Uganda. She has been with USAID/Uganda since December 2009. Megan came to Uganda after 5 years at USAID/Washington working on HIV/AIDS programs. She has over 12 years of experience in public health programming, with a specific focus on social and behavioral health issues, working in over a dozen countries in Africa, Asia, and the Caribbean, as well as domestic public health work in her native United States.

PATRICK RUBAIHAYO is a Professor Emeritus at Makerere University, Uganda. He has expertise in Plant Breeding, Genetics, Plant Tissue and Cell Culture, Biosafety/Biopolicy and Genomics. Prof. Rubaihayo has widely travelled and worked with a number of crops including: grain legumes, bananas, tomatoes, potatoes, maize, sorghum etc. He moved through the ranks from Lecturer to Associate Professor in the Department of Crop Science, Makerere University between 1971 and 1976 and was appointed Professor in 1995. Between 1981-85, he was Member of Ugandan Parliament and Minister of State for Agriculture and Forestry where he was in charge of the Coffee Rehabilitation Programme (CRP), the Agriculture Rehabilitation Project (ARP) and Agricultural Research among other duties. In late 1985, he rejoined the University as a Professor and was Coordinating National Banana-Based Cropping Systems Research Programme until 1994. He has also Coordinated National Pigeon pea Improvement Programme and Tomato Improvement Programme. By the time he retired in 2006 his research involved banana production systems in Uganda, tissue and cell culture and molecular diversity in bananas, Molecular diversity studies in sweet potatoes, indigenous and exotic palms in Uganda, variability in potato and cowpeas viruses in East Africa and genes controlling cassava starch branching enzymes. He is credited with a book publication and over a hundred journal papers. He has been awarded several meritorious awards and belongs to several scientific societies and Uganda National Academy of Sciences.

PETER RUKUNDO is the Organizing Secretary of the Uganda Action for Nutrition (UGAN) and a lecturer in Human Nutrition and Dietetics, Dept. of Human Nutrition and Home Economics, Kyambogo University, Uganda. He is also a founding member of the Uganda Dietetics Association (UDA) and a research associate with the African Journal on Ethics and Human Rights. He is also an advocate for the Human Right to Adequate Food with the Foodfirst Information and Action Network. Peter holds a Masters Degree in Public Health Nutrition, major in Nutrition and Human Rights and a prospective PhD candidate in the same. His research interests include Public Health Nutrition Policy and Planning using a rights based approach.

STANLAKE SAMKANGE is a lawyer by profession and was educated at Harvard, Oxford and Stanford University. He practiced Law at Covington & Burling, Washington D.C. (1988-1993) and clerked for the Supreme Court of Zimbabwe (1987) before joining the UN Secretariat where he served in the Office of the Secretary-General (1993-1996), and in the Department of Political Affairs (1996-1998). He worked as Special Advisor on African Affairs at G8 Summit (2001-2002), Director of Research and Rapporteur of the International Commission on Intervention and State Sovereignty (2000 2001), Rapporteur and Member of the UN Panel of Experts on Angola (UNITA) Sanctions established by the UN Security Council (1998-1999). He is currently the Representative and Country Director of the United Nations World Food Programme in Uganda since. Prior to his appointment to the Uganda Country Office in June 2008, he headed the Policy, Strategy & Programme Support Division of WFP in Rome (2003 to mid 2008), including work on the WFP Strategic Plan 2008-2013 that places a stronger emphasis on WFP's contribution to sustainable solutions to hunger and malnutrition.





Sciences for Prosperity

Uganda National Academy of Sciences
A4 Lincoln Flats Makerere University
P.O. Box 23911 Kampala, Uganda.

Tel: +256-414-533 044 **Fax:** + 256-414-533 044

Website: www.ugandanationalacademy.org **E-mail:** info@unas.or.ug / unas@infocom.co.ug