NUTRITION COUNTRY PROFILE
THE REPUBLIC OF UGANDA
2010

Source: UNCS.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Food Insecurity and Vulnerability Information and Mapping Systems

Acknowledgments

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Summary

The Republic of Uganda is a landlocked country of East-central Africa endowed with large fresh-water resources and a high agricultural potential. The population, young and predominantly rural, is mostly engaged in subsistence rain-fed farming. A high population growth rate exerts pressure on the country's resources. Although poverty is decreasing, it remains widespread, especially in the northern regions. Northern and north-eastern regions of Uganda have experienced severe civil insecurity which resulted in mass displacement of people to Internally Displaced Persons camps. Since 2006, the security situation in northern Uganda has progressively improved; but the situation remains tense in the north-east (Karamoja).

The high incidence of infectious diseases, compounded by very limited access to improved sanitation, together with a low immunization coverage and limited access to essential health care contribute to a high rate of young child mortality. The maternal mortality ratio also remains very high. Nevertheless, both young child and maternal mortality rates are decreasing.

Although the contribution of the agricultural sector to the economy is declining, this sector continues to play a pivotal role in Uganda's development. As for staple food crops, a steady increase in production has been observed and although cereal imports have been increasing, dependence on imports for staples is limited.

The Ugandan diet is mainly composed of plantain, starchy roots (cassava, sweet potatoes) and cereals (maize, millet, sorghum). Pulses, nuts and green leafy vegetables complement the diet. In urban areas, which are undergoing a nutrition transition, food consumption patterns are changing and rice is gaining importance. Overall, the diet remains poor in micronutrient-rich foods. Food insecurity persists in some parts of the country, mainly due to poverty, adverse climatic conditions, low agricultural productivity and prolonged civil insecurity in some regions. These factors combine in Karamoja where food insecurity remains widespread. The dietary energy supply meets the population energy requirements, but the share of lipids and that of protein are at the lower limits of recommendations. Undernourishment affects 15% of the population, a proportion which has decreased over the last decade.

Although early initiation of breastfeeding is progressing it is still not widely practised. A majority of infants are exclusively breastfed until six months of age, but currently the practice is not increasing. Complementary feeding is insufficiently diversified. These inappropriate practices, along with high morbidity, poverty and food insecurity, are major determinants of malnutrition among young children. The prevalence of chronic malnutrition (stunting) among children under 5 years of age (38% in 2006) places the country at a high level of malnutrition. Stunting is particularly widespread in the Southwest region. Nonetheless, overall prevalence is decreasing. Among adult women, undernutrition persists, particularly in the northern and eastern parts of the country. Meanwhile, the country is undergoing a nutrition transition, still strictly limited to urban areas, where more than one third of women are overweight or obese.

Thanks to the universal salt iodization strategy developed in 1994, iodine deficiency disorders have regressed considerably. The 2005 nation-wide survey highlighted excessive iodine intake among children, calling for a reinforcement of the surveillance system. On the basis of sub-clinical data, vitamin A deficiency is considered a severe public health problem among children. Vitamin A supplementation coverage remains limited among both children and women. Anemia affects almost three quarters of underfives and half of women of childbearing age. Iron supplementation coverage of pregnant women should be expanded. Long-term measures to combat vitamin A and iron deficiencies, such as promotion of production and intake of vitamin A and iron-rich foods and food fortification need to be strengthened considerably.

Although the situation remains critical in certain regions, a gradual return to stability in the northern part of the country and a current favourable agricultural context at national level are opportunities to further develop long-term food-based strategies and improve the nutritional quality of the diet.

Summary Table				
Basic Indicators				**Year**
Population				
Total population		27.357	million	2006
Rural population		87	%	2005
Population under 15 years of age		50	%	2005
Annual population growth rate		3.2	%	2000-2005
Life expectancy at birth		48	years	2000-2005
Agriculture				
Agricultural area		65	%	2007
Arable and permanent cropland per agricultural inhabitant		0.3	Ha	2007
Human development and poverty				
Human development index		0.514	[0-1]	2007
Proportion of population living with less than 1$ a day (PPP)	***MDG1***	52	%	2005
Proportion of the population living below the national poverty line	***MDG1***	31	%	2005-2006
Education				
Net primary enrolment ratio	***MDG2***	89	%	2004
Youth literacy rate (15-24 years)	***MDG2***	77	%	2000-2004
Ratio of girls to boys in primary education	***MDG3***	0.98	girl per 1 boy	2002-2003
Health				
Infant mortality rate	***MDG4***	76	‰	2001-2005
Under-five mortality rate	***MDG4***	137	‰	2001-2005
Maternal mortality ratio (adjusted)	***MDG5***	550	per 100 000 live births	2005
Percentage of deaths among under-fives attributable to malaria		22	%	2008
Percentage of children aged 12-23 months immunized against measles	***MDG4***	68	%	2006
Environment				
Sustainable access to an improved water source in rural areas	***MDG7***	64	% of population	2006
Food and nutrition situation				**Year**
Energy requirements				
Population energy requirements		2021	kcal per capita/day	2005
Food Supply				
Dietary Energy Supply (DES)		2384	kcal per capita/day	2003-2005
Prevalence of undernourishment	***MDG1***	15	%	2003-2005
Share of protein in DES		10	%	2003-2005
Share of lipids in DES		16	%	2003-2005
Food diversification index		57	%	2003-2005
Food consumption				
Average energy intake (per capita or per adult)		n.a.		
Percent of energy from protein		n.a.		
Percent of energy from lipids		n.a.		
Infant and young child feeding	**Age**			
Exclusive breastfeeding rate	< 6 months	60	%	2006
Timely complementary feeding rate	6-9 months	80	%	2006
Bottle-feeding rate	0-11 months	18	%	2006
Continued breastfeeding rate at 2 years of age		54	%	2006
Nutritional anthropometry				
Prevalence of stunting in children under 5 years*		38	%	2006
Prevalence of wasting in children under 5 years*		6	%	2006
Prevalence of underweight in children under 5 years*	***MDG1***	16	%	2006
Proportion of women with BMI<18.5 kg/m²		12	%	2006
Micronutrient deficiencies				
Prevalence of goitre in school-age children		n.a.		
Percentage of households consuming adequately iodized salt		96	%	2006
Prevalence of sub-clinical vitamin A deficiency in preschool children		20	%	2006
Vitamin A supplementation coverage in children		36	%	2006
Vitamin A supplementation coverage in mothers		33	%	2006
Prevalence of anemia in women		49	%	2006
Iron supplementation coverage in mothers		58	%	2006

MDG: Millennium Development Goal; n.a.: not available. * WHO 2006 growth standards.

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Acronyms	
BMI	Body Mass Index
CED	Chronic Energy Deficiency
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CPRC	Chronic Poverty Research Center
CRS	Catholic Relief Services
DES	Dietary Energy Supply
DPT3	Diphtheria, Pertussis (whooping cough) and Tetanus vaccine – three doses
EC	European Commission
FAD	Fisheries and Aquaculture Department
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical Databases
FEWS NET	Famine Early Warning System Network
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
GDP	Gross domestic product
GIEWS	Global Information and Early Warning System
GNP	Gross national product
GoU	Government of Uganda
HIV/AIDS	Human immunodeficiency virus / Acquired immunodeficiency syndrome
HSSP	Health Sector Strategic Plan
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorders
IDP	Internally Displaced Persons
IFAD	International Fund for Agricultural Development
ILO	International Labour Office
IPT	Intermittent Preventive Treatment
ITN	Insecticide-treated nets
IUGR	Intra-uterine growth retardation
LBW	Low birth weight
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MFPED	Ministry of Finance, Planning and Economic Development
MoA	Ministry of Agriculture
MoES	Ministry of Education and Sports
MoH	Ministry of Health
MOST	USAID Micronutrient Programme
MoLWE	Ministry of Lands, Water and Environment
NDP	National Development Plan
NARO	National Agricultural Research Organisation
NCHS/CDC	National Center for Health Statistics/Centers for Disease Control and Prevention
NEPAD	New Partnership for Africa's Development
NEWS	National Early Warning System
NSEID	Network for Sustained Elimination of Iodine Deficiency
OFDA	Office of United States Foreign Disaster Assistance
OFSP	Orange fleshed sweet potatoes
ORT	Oral rehydration therapy
PEAP	Poverty Eradication Action Plan
PMA	Plan for Modernization of Agriculture
PPP	Purchase Power Parity
RBP	Retinol Binding Protein
RoU	Republic of Uganda
SD/MFED	Statistics Department/Ministry of Finance and Economic Planning
SP	Sulfodoxine-pyrimethamine
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
UFNSIP	Uganda Food and Nutrition Strategy and Investment Plan
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNCS	United Nations Cartographic Section

UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFNP	Uganda National Food and Nutrition Policy
UNHCR	United Nations High Commissioner for Refugees
UNHS	Uganda National Household Survey
UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
UNSTAT	United Nations Statistics Division
UPE	Universal Primary Education
USAID	United States Agency for International Development
USI	Universal Salt Iodization
VAD	Vitamin A Deficiency
VAM	Vulnerability, Analysis and Mapping branch
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

Part I: Basic indicators

I.1 Geographic information

The Republic of Uganda, located in East-central Africa, is bounded on the north by Sudan, on the east by Kenya, on the south by the United Republic of Tanzania and Rwanda, and on the west by the Democratic Republic of the Congo. Uganda is a landlocked country occupying 241 551 km^2, 18% of which consists of open inland waters and permanent wetlands (UNDP, 2007a).

The main water bodies are Lake Victoria, Lake Albert, Lake Kyoga, Lakes Edward and George. The main rivers include the Victoria Nile and the Albert Nile (Ibale, 1998). The Nile (Victoria Nile) divides the country in two parts, flowing from Lake Victoria at Jinja through Lake Kyoga to the northern tip of Lake Albert, and then north to the Sudan (Albert Nile). A significant proportion of the southern part of Uganda is occupied by swamps (FAO, Forestry Division).

The country consists of a plateau, generally between 1 200 and 1 500 m of elevation. Many streams flow through it. In the west, this plateau is interrupted by a depression forming Lakes Edward and Albert, with the upthrust of the Ruwenzori Mountains (5 110 m) in the centre, between the lakes. In the extreme north the plateau extends across the Nile into the district of West Nile. The south-west is very hilly and higher than the rest of the country. In the east, along the border with Kenya, three high mountains, Elgon (4 321 m), Kadam (3 068 m) and Moroto (3 083 m), dominate the landscape (FAO, Forestry Division).

The climate is tropical but mild because of the generally high altitude. The temperature ranges from about 16° to 29°C, with 1 000 mm or more rainfall over most of the country. In the extreme north-east, in Karamoja, there is a small zone with less than 500 mm of rainfall (FAO, Forestry Division). Rainfall is bi-modal in the central and western regions falling between March and May and between September and December and mono-modal in the northern and eastern regions falling between May and October. In the central and western regions, the months of December to mid-February and June to mid-August are usually dry periods.

Soil fertility varies according to the level of rainfall. The land is generally fertile in the central and western regions and becomes less fertile as one moves to the east and the north. Due to these combinations of climatic conditions, the vegetation of Uganda varies between tropical rain forest vegetation in the south and savannah woodlands and semi-desert vegetation in the north (UBOS and Macro International Inc., 2007). The rainfall patterns are becoming more unpredictable, probably as a consequence of global warming (MoLWE, 2007).

The major ethnic groups in Uganda are Bantus, Nilotics, Hamites and Nilohamites, Bantus being the largest ethnic group followed by Nilotics (UBOS, 2002; UBOS, 2005).

I.2 Population

Population indicators

The population, estimated at 27.4 million in 2006, is young as half of the people are below 15 years of age (UBOS, 2006; UNPD). The estimated average annual population growth rate of 3.2% (reference period 2000-2005) is one of the highest in the world, largely due to the country's high fertility rate (6.7 children per woman in 2006), declining infant and child mortality rates and the high influx of refugees (UNPD; UBOS and Macro International Inc., 2007; UNDP, 2007a). Uganda's population growth rate continues to erode economic gains, deepen poverty, and counter other achievements in the social sectors (USAID, 2005). About 87% of the population lives in rural areas (UNPD). However, the urban population is growing quickly at a rate of 5% per year (UBOS, 2002).

Uganda has an average population density of 120 inhabitants/km^2 (UNPD). The figures range from 65 inhabitants/km^2 in the least densely populated Northern region to 229 inhabitants/km^2 in the Eastern region (UN, 2004). In terms of mobility of the population, there is increased rural to urban migration (UN, 2004).

Over the past few decades, the damaging effects of recurrent natural disasters, internal civil conflict and political instability in neighbouring countries have created massive population movements and disruption of the socio-economic situation.

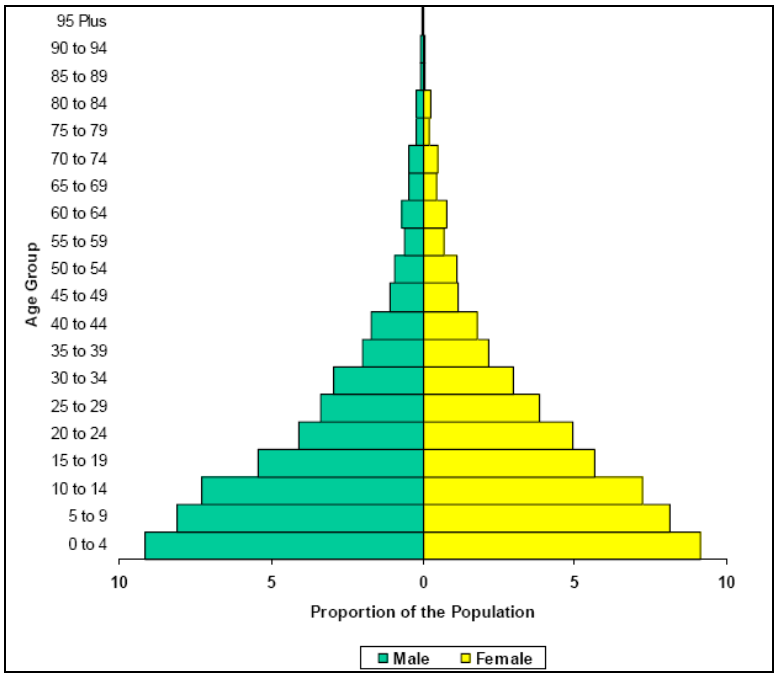
Increasingly frequent droughts and ongoing violence in the Karamoja sub-region of north-eastern Uganda have rendered many of its inhabitants unable to provide for their immediate needs (WFP, 2008). In northern Uganda, since 1986, protracted conflict between the Lord's Resistance Army and the Government of Uganda has created a complex emergency, marked by violent attacks against civilians and extensive displacement (USAID/DCHA and OFDA, 2008). Internal conflict, particularly in the Northern and Eastern regions, resulted in the mass displacement of more than 1.6 million people into Internally Displaced Persons (IDPs) camps (UN, 2004). Since the 2006 peace process, the security situation in northern Uganda has improved and many IDPs have returned to their home in Gulu, Amuru, Pader and Kitgum districts of the Acholi sub-region (an area close to Uganda's border with Sudan). However, many households remain displaced. There are also concerns that, because of the lack of facilities in return areas, levels of preventable diseases and malnutrition will increase. On the other hand, as people have returned to their former homes, conflict over land has emerged as a major challenge (USAID, 2009; WFP, 2009). In the north-east, the situation remains tenuous; further displacements take place due to banditry in the Karamoja area, often reinforced by the occurrence of droughts (WFP, 2009).

Instability in Sudan and in the Democratic Republic of the Congo has led many refugees to seek asylum in the West Nile and southwest sub-regions of western Uganda (WFP, 2008). Since the signing of the Sudan Comprehensive Peace Accord in 2005, many Sudanese refugees have returned home (UN News Centre). In January 2010, the total number of refugees in Uganda was estimated at about 130 000, primarily coming from the Democratic Republic of the Congo (70 000 refugees in early 2010) and from Sudan (30 000 refugees) (UNHCR, 2010).

Table 1: Population indicators

Indicator	Estimate	Unit	Reference period	Source
Total population	27.357	million	2006	UBOS
Annual population growth rate	3.2	%	2000-2005	UNPD
Crude birth rate	47	‰	2005	UNPD
Population distribution by age			2005	UNPD
0-4 years	20	%		
5-14 years	30	%		
15-24 years	20	%		
25-59 years	26	%		
60 and over	4	%		
Rural population	87	%	2005	UNPD
Agricultural population	66	%	2000	FAOSTAT
Population density	120	inhabitants per km^2	2005	UNPD
Median age	15	years	2005	UNPD
Life expectancy at birth	48	years	2000-2005	UNPD
Population sex ratio	100	males per 100 female	2005	UNPD
Net migration rate	0	%	2000-2005	UNPD
Total dependency rate	108	%	2005	UNPD

Population pyramid



Source: UBOS 2002.

The population pyramid of Uganda has a wide base, which reflects the high level of fertility and the high level of mortality in the country.

I.3 Agriculture

The agricultural sector is and has always been the backbone of the economy of Uganda. However, the contribution of agriculture to total GDP has been declining consistently, from about 50% in the early 1990s to 25-30% in the 2000s and 23% in 2008 (WB). This trend is attributable to a decline in prices of agricultural products, slower growth in agriculture, and insecurity in the northern and eastern regions (UBOS, 2005/06). It also reflects the process of industrialization, which has been enhanced by the current political and macroeconomic stability, with a concurrent reduction in reliance on agriculture. Nevertheless, agriculture continues to play a pivotal role in the development of Uganda both economically and socially: nearly 90% of the population lives in rural areas where agriculture provides approximately 80% of employment. Agriculture is not only the main source of livelihood to the rural population but also the main source of export earnings in Uganda (90% of export earnings are derived from the agricultural sector - RoU, 2004). This suggests that price shocks and accessibility to markets directly affect the performance of the economy (Ssewanyana and Bategeka, 2007).

In the agricultural sector food-crop production is predominant, accounting for about two thirds of agricultural GDP for the period 2001-2002 while cash crops accounts for less than 10% (IFAD, 2004). Agricultural production comes exclusively from about 4.5 million small-scale farmer households, 80% of whom own an average landholding of less that 2 Ha. The bulk of the producers are scattered subsistence farmers who engage in non market-oriented production and predominantly use rudimentary technologies (RoU, 2004).

The major food crops are bananas (*matooke*), cereals (maize, rice, sorghum, finger millet), starchy roots (sweet potatoes and cassava), pulses (beans) and oilcrops (groundnuts and soybean). The traditional cash crops are mainly coffee, cotton, tea and tobacco, and the dominant fruit and vegetables are pineapples, passion fruits, tomatoes, onions and cabbages (NEPAD and FAO, 2004; FAO, AQUASTAT, 2006). Coffee remains Uganda‘s leading export earner. However, its contribution to total export earnings has fallen from 60% in 1999 to 19% in 2003 (RoU, 2004).

Uganda is often described as having some of the most fertile land in the region (WFP/VAM and EC, 2006). However, the country’s agriculture is characterized by low–input/low–output technologies with very low usage rates of purchased inputs such as improved seeds, fertilizers and pesticides. Crop yields are therefore low and have not kept pace with rapid population growth. Natural soil erosion is compounded by man-made

factors, such as human and livestock population pressure on land and inappropriate farming techniques (e.g. soil disturbance and compaction through tillage, cultivating vertically up and down the slope, grassed bunds, etc.) (NEPAD and FAO, 2004). Over-dependence on rainfed agriculture, lack of irrigation facilities and lack of access to credit are further constraints to agricultural development (FAO and MoA, 2000).

Being landlocked, Uganda faces many challenges of access to international markets. For good access to regional and international markets, rail and air transport, as well as waterways, are particularly important for Uganda. The inadequate transhipment infrastructure exerts a restraining effect on both agricultural production and marketing, especially of agricultural products, which are marketed in bulk (UNDP, 2007a). Moreover, poor internal road linkages hinder domestic marketing. Rural roads remain in a poor state and during the rainy season, most of them are impassable, resulting into loss of income from agricultural produce (Ssewanyana and Bategeka, 2007). Market infrastructures are not well developed and there are still inadequate storage facilities, especially in rural areas (Mwesigye, 2006).

Table 2: Land use and irrigation

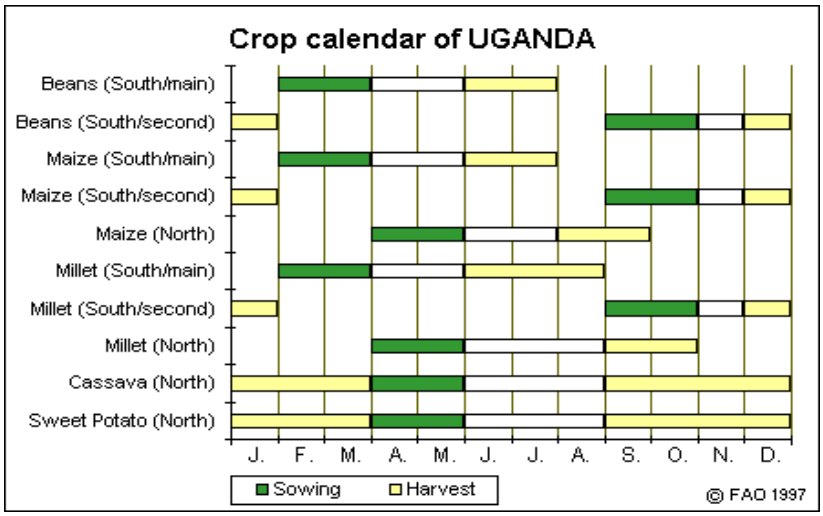
Type of area	Estimate	Unit	Reference period	Source
Total land area	19 710	1000 Ha	2007	FAOSTAT
Agricultural area	65	%	2007	FAOSTAT
Arable lands & permanent crops	39	%	2007	FAOSTAT
Permanent crops	11	%	2007	FAOSTAT
Permanent pasture	26	%	2007	FAOSTAT
Forested land areas	18	%	2005	WB
Irrigated agricultural land	0.03	%	1998	AQUASTAT
Arable & permanent cropland in Ha per agricultural inhabitant	0.3	Ha	2007	FAOSTAT

N.B. Percentages are calculated on the total land area

Main crops, agricultural calendar, seasonal food shortage

According to FAO estimates, the major food and agricultural commodities produced in Uganda in 2005 in terms of quantities were plantain, cassava, sweet potatoes, maize, cow milk and millet (FAO, Statistics Division). All of these commodities are mainly used for local human consumption (FAO, Faostat).

Plantain (green cooking bananas locally known as *matooke*) and sweet potatoes are grown mostly in the western and central regions while cassava is grown mostly in the northern and eastern regions. Maize is grown all over the country but the main producing areas are in the west and in the far north and east of Uganda (Robbins and Ferris, 1999). Milk is mainly produced in the south-west part of the country. The other region that contributes significantly to milk production is the north-east, where nomadic cattle herders produce relatively large quantities of milk (Staal and Kaguongo, 2003).



Source: FAO/GIEWS.

The hungry season stretches from June to August, and is worsened by lack of food storage capacity at community and household level.

Livestock production and fisheries

The livestock sub-sector plays an important role in Uganda. Both pure pastoralism and mixed farming are practiced. Smallholders and pastoralists raise over 90% of the livestock in mixed farming and range systems. However, civil instability in the northern and eastern rangelands has been an impediment to unfold the full potential of the sub-sector (King, 2002).

Uganda is richly endowed with natural water bodies. Therefore fisheries play a very important role as a basis for subsistence and commercial livelihoods (FAO/FAD, [no date]). Fish are also a major export commodity for Uganda. Though aquaculture production remains insignificant in economic terms, investment in aquaculture is increasing (FAO/FAD, [no date]).

Table 3: Livestock and fishery statistics

Livestock production and fishery	Estimate	Unit	Reference period	Source
Cattle	6 100 000	number of heads	2005	FAOSTAT
Sheep and goats	8 850 000	number of heads	2005	FAOSTAT
Poultry birds	22 849	thousands	2005	FAOSTAT
Fish catch and aquaculture	427 575	tonnes	2005	FAOSTAT

I.4 Economy

In the 1970s through the early 1980s, Uganda faced a period of civil and military unrest, which severely affected the economic and social infrastructure of the country (UBOS and Macro International Inc., 2007). After 1986, an important reform programme was launched, and subsequently the country achieved an average GDP growth rate of over 7% per year through the 1990s (USAID, 2005; EC, [no date]). This high rate of growth was the result of the re-establishment of law and order and macroeconomic stability, the rehabilitation of major infrastructure, market liberalization, including opening up to external trade, liberalization of input markets, and liberalization of export markets for coffee, cotton, and tea (USAID, 2005). Annual GDP growth rate has shown impressive performance in recent years (10% in 2008) (WB).

The economic success of Uganda is reflected in the fast transformation of the structure of its economy over the last two decades. This structural shift is fuelled by an expansion in the transformation industry (processing and export of commodities such as coffee, fish and cut flowers) as well as in tourism and services. Consequently the structure of the labour force is also changing gradually (WFP/VAM and EC, 2006).

The impact of the significant economic growth is limited by high population growth, among other factors, and Uganda remains among the poorest countries in the world, with a per capita GDP estimated at 1,059 PPP US$ in 2007, considerably lower than the average for sub-Saharan countries (2,031 PPP US$ in 2007) (UNDP, 2009).

Table 4: Basic economic indicators

Indicator	Estimate	Unit	Reference period	Source
Gross Domestic Product per capita	1,059	PPP US $	2007	UNDP
GDP annual growth	10	%	2008	WB
Gross National Income per capita	420	$	2008	WB
Industry as % of GDP	26	%	2008	WB
Agriculture as % of GDP	23	%	2008	WB
Services as % of GDP	52	%	2008	WB
Paved roads as % of total roads	23	%	2003	WB
Internet users	17	per 1000 people	2005	WB
Total debt service as % of GDP	2	%	2007	WB
Military public expenditure	2	% of GDP	2003	UNDP

Uganda's major non-food exports include cotton and tobacco while imports include petroleum products, road vehicles, medical and pharmaceutical products, plastics, iron and steel, telecommunication and electronic equipment (UBOS, 2005/06).

I.5 Social indicators

Health indicators

In Uganda, both infant mortality and under-five mortality rates remain high. According to the 2006 Uganda Demographic and Health Survey (UDHS), for the period 2001-2005, infant mortality rate was estimated at 76‰ and under-five mortality rate was estimated at 137‰ (UBOS and Macro International Inc., 2007).

Trends can be assessed by comparing these data with those from the 2000-2001 UDHS. For purposes of comparability, data from the districts of Bundibugyo, Gulu, Kasese, Kitgum, and Pader are excluded for all the surveys. Overall there was a downward trend in mortality rates but of limited magnitude: infant mortality rate declined from 89‰ in the period 1994/95-1999/2000 to 75‰ in the period 2000-2005 while under-five mortality rate declined from 158‰ to 137‰ over the same period (UBOS and Macro International Inc., 2007).

Indicators related to maternal mortality such as antenatal care coverage, delivery in health facilities, and medical assistance at delivery have progressed only marginally over the last ten years (UBOS and Macro International Inc., 2007). Yet, adjusted maternal mortality ratio decreased significantly between 2000 and 2005, from 880 to 550 per 100,000 live births respectively (UNICEF, 2009).

The major causes of maternal mortality are severe bleeding, eclampsia, unsafe abortions, obstructed labour, malaria and HIV/AIDS (UNDP, 2007b). The main contributing factors include high fertility rates, low access to facilities and quality services - especially for reproductive health –, low percentage (42%) of births attended by skilled health personnel and short intervals between pregnancies (UNDP, 2007b; UBOS and Macro International Inc., 2007).

Malaria, diarrhoea and acute respiratory infections are the most common health problems in Uganda. Malaria is highly endemic with 63% of the population exposed to high transmission risk. It is the leading cause of morbidity in all age groups (UBOS and Macro International Inc., 2007; UN, 2004). Among other factors, the high burden of malaria may be attributed to low use of preventive measures, including low use of insecticide-treated bed nets (UBOS and Macro International Inc., 2007). Access to treatment also remains insufficient.

According to the UDHS 2006, only 46% of children aged 12-23 months were fully vaccinated (BCG, measles, and three doses of both DPT and polio vaccines, excluding polio vaccine given at birth). Although still largely insufficient, vaccination coverage has however progressed, as the percentage of fully vaccinated children aged 12-23 months increased from 37% in 2000-2001 to 44% in 2006 (the 2006 data exclude districts not covered in the earlier survey) (UBOS and Macro International Inc., 2007).

As a result of its twenty-year-long fight against HIV/AIDS, Uganda has seen the prevalence of HIV infection fall from an average prevalence of 18% in 1992 to 6% in 2002 among adults aged 15-49 years (UN, 2004). Nevertheless progress seems to be slowing down as the most recent estimates (prevalence of 5% in 2007) reveal that the prevalence declined by only 1 percentage point between 2002 and 2007 (UN, 2004; UNAIDS, 2008). In 2004-2005, for the age category of 15-49 years, women were found to be slightly more infected than men (7.3% versus 5.2%). Prevalence in children less than five years was found to be less than 1% the same year (MoH, 2005).

Access to health services remains a nation-wide problem, the establishment of various programmes within the National Health Policy and the decentralization process notwithstanding. The Government removed cost-sharing fees from public health institutions in 2001, thus improving to some extent access to health services for the poor. However, inadequate and low-skilled human resources, poor infrastructure, equipment and utilities still hinder access to quality health care (UN, 2004).

Table 5: Health indicators

Indicator	Estimate	Unit	Reference period	Source
Mortality				
Infant mortality rate	76	‰	2001-2005	UDHS
Under-five mortality rate	137	‰	2001-2005	UDHS
Maternal mortality ratio :				
reported	435	per 100 000 live births	1996-2006	UDHS
adjusted	550	per 100 000 live births	2005	UNICEF
Morbidity				
Percentage of deaths among under-fives attributable to malaria	22	%	2008	WHO
Percentage of under-fives sleeping under an insecticide-treated bednet	10	%	2006	UDHS
Percentage of under-fives with diarrhoea in the last 2 weeks	26	%	2006	UDHS
Percentage of under-fives with diarrhoea in the last 2 weeks who receive oral rehydration therapy (ORT)*	54	%	2006	UDHS
Percentage of under-fives with acute respiratory infections in the last 2 weeks	15	%	2006	UDHS
Tuberculosis prevalence	646	per 100 000 people	2004	UNSTAT
HIV/AIDS				
Prevalence in adults (15-49 years)	5	%	2007	UNAIDS
Percentage of women (15-24) who know that a person can protect herself from HIV infection by consistent condom use	68	%	2000	UNSTAT
Immunization				
Percent of children aged 12-23 months immunized against tuberculosis	91	%	2006	UDHS
Percent of children aged 12-23 months with DPT3 immunization	64	%	2006	UDHS
Percent of children age 12-23 months immunized against measles	68	%	2006	UDHS
Percent of pregnant women immunized against tetanus	51	%	2006	UDHS

* ORT includes solution prepared from oral rehydration salts (ORS), pre-packaged ORS packet, recommended home fluids or increased fluids.

Water and sanitation

Over the past decade, significant progress has been made towards increasing sustainable access to safe drinking water in the country (UNDP, 2007a). In 2006, in rural areas, 64% of the population had access to an improved water source (versus 89% in urban areas) (UBOS and Macro International Inc., 2007). Improvements in the rural sector have been in line with the PEAP (Poverty Eradication Action Plan) target of 65% coverage by 2005 (MFPED, 2003).

Access to improved sanitation remains extremely low, especially in rural areas where only 9% of the population had access to improved sanitation in 2006 (21% of the population in urban areas) (UBOS and Macro International Inc., 2007). Poor sanitation coupled with unsafe water sources increases the risk of water-borne diseases and illnesses due to poor hygiene.

Table 6: Access to safe water and sanitation

Indicator	Estimate	Unit	Reference period	Source
Sustainable access to an improved water source				
Urban	89	% of population	2006	UDHS
Rural	64	% of population	2006	UDHS
Access to improved sanitation				
Combined urban/rural	11	% of population	2006	UDHS

Access to health services

In 2006, half of the population (51%) had neither physical nor economic access to health care facilities (UBOS, 2006). Overall, 86% of women encounter some problems in accessing health care and these are mainly high cost of treatment and long distances to the health facility (UBOS and Macro International Inc., 2007). Although the Government removed cost-sharing fees in public facilities, medicines are not always available in the health centers and hospitals and people have to buy them themselves from pharmacies.

Table 7: Access to health services

Indicator	Estimate	Unit	Reference period	Source
Health personnel: number of physicians	5	per 100 000 people	1990-2004	UNDP
Percentage of children under-five with fever (in the last two weeks) receiving anti-malarial drugs	61	%	2006	UDHS
Percent of births attended by skilled health personnel	42	%	2006	UDHS
Public expenditure on health	2.2	% of GDP	2003	UNDP

Education

Since the inception of Universal Primary Education (UPE) in 1997, primary school enrolment rose from 5.2 million children in 1997 to 7.4 million in 2004 (MoES, 2003/04; UBOS, 2006). In 2004, among the 7.4 million pupils 49% were female. Thus the gender disparity in primary schools enrolment is now levelling out (MoES, 2003/04; UBOS, 2006).

The substantial increase in enrolment rate after the introduction of UPE has not been matched by an equivalent increase in teachers, classrooms and textbooks. This has had a negative impact on the quality of education all over the country (UNDP, 2007b). In 2004, the pupil-teacher ratio was 50:1 and classroom-pupil ratio was 79:1 (MoES, 2003/04; UBOS, 2006). Moreover, the dropout and repetition rates in primary schools are still high and attainment of the MDG target of getting all children to complete a course of primary schooling is not foreseen in the near future. The primary school completion rate has actually decreased from 60% in 2004 to 48% in 2006. The completion rate of boys (55%) was still higher than that of girls (42%) in 2006 (UNDP, 2007b). The key reasons for the high dropout rate include, among others, the cost of education (other than what is covered by the UPE programme), indifference/lack of interest to attend, and sickness such as HIV/AIDS of children and/or parents (UNDP, 2007a).

The National Adult Literacy Strategic Investment Plan (NALSIP), implemented in 2002, was designed to increase access to adult literacy education and to redress the gender imbalance in adult literacy rate (Okech, 2005). The adult literacy rate has improved slightly from 62% in 1997 to 67% in 2000-2004 although there are persistent gender differentials (male rate of 77%, female rate of 58% in 2000-2004) (UN, 2004; UNESCO, 2006).

The Government of Uganda has a School Health Policy with school feeding guidelines. Some schools provide lunch to their pupils who pay in advance for this service. Schools do have canteens where pupils purchase snacks. In some parts of the country, mainly the food insecure areas and refugee hosting areas of the north and north-east, the UN and some NGOs provide school feeding programmes in partnership with Government. As part of the ongoing Government/WFP partnership on school feeding, support to primary education is implemented in the Karamoja region which has the lowest primary education indicators and the lowest human development indicators in the country. The WFP Country Programme 2006-2010 has a focus

on the special incentive for girls' education, in addition to supporting all children attending primary schools in the region. WFP provides a morning micronutrient-fortified corn-soya blend porridge and a hot lunch consisting of maize meal, beans, vitamin A-fortified vegetable oil and iodized salt (WFP, 2005).

Table 8: Education

Indicator	Estimate	Unit	Reference period	Source
Adult literacy rate (age 15 and over)	67	%	2000-2004	UNESCO
Adult literacy rate : females as % of males	75	%	2000-2004	UNESCO
Youth literacy rate (15-24 years)	77	%	2000-2004	UNESCO
Net primary enrolment ratio	89	%	2004	MoES
Grade 5 completion rate	64	%	2001	UNESCO
Ratio of girls to boys in primary education	0.98	number of girls per 1 boy	2002-2003	UNESCO
Public expenditure on education	5.3	% of GNP	2004	UNESCO

Level of development, poverty

Despite its current economic growth, Uganda remains one of the poorest countries in the world and is classified as a least developed country. Social and economic progress is challenged by protracted civil insecurity in some regions, high population growth rate, poverty and large disparities in income distribution (WFP, 2006).

Nevertheless, Uganda has made tremendous progress in poverty reduction. The percentage of Ugandans living below the national poverty line has declined from 56% in 1992-93 to 38% in 2002-2003 and 31% in 2005-2006 (UBOS, 2005/06). Over the last period, poverty reduction was particularly marked in rural areas where the incidence of poverty declined from 43% in 2002-2003 to 34% in 2005-2006; in urban areas, the incidence of poverty remained at the level of 13-14% over the period (UBOS, 2005/06). The recent overall reduction in poverty seems to have been partly due to a better performance of the agricultural sector. In particular, one of the factors underlying the improvements could have been the significant increase in coffee prices between 2002-2003 and 2005-2006 (UBOS, 2005/06).

However, progress in poverty reduction across geographical locations still remains a challenge. Incidence of poverty in the northern region is still very high, estimated at 61% in 2005-2006, and this region has registered only a slight and insignificant fall in the incidence of poverty since 2002-2003 (63%), while the situation has improved significantly in other regions (UBOS, 2005/06). The high incidence of poverty in the northern region is largely attributable to the long-lasting conflict in the region, coupled with a cattle rustling problem that has traditionally plagued Karamoja and the surrounding sub-region (UNDP, 2007b).

The Poverty Eradication Action Plan (PEAP) of 1997 and the Plan for Modernization of Agriculture (PMA) of August 2000 have provided comprehensive development frameworks and have guided the formulation of government policies and programmes since their inception (MFPED, 2003; PMASC, 2002).

Table 9: Human development and poverty

Indicator	Estimate	Unit	Reference period	Source
Human development index (HDI)	0.514	value between 0-1	2007	UNDP
Proportion of population living with less than 1$ a day (PPP)	52[1]	%	2005	UNSTAT
Population living below the national poverty line	31	%	2005-2006	UNHS-III
Human poverty index (HPI-1)	29	%	2007	UNDP

[1] Estimated from Uganda National Household Survey III 2005.

Other social indicators

Although the rate of female employment has greatly increased over the years, it is still lower than that of men (86% for women compared to 95% for men in 2006) (UBOS and Macro International Inc., 2007). Further findings from UDHS 2006 showed that the proportion of women employed in the agricultural sector is higher than that of men (75% of women and 68% of men). However, a higher proportion of married women than men are not paid for their work (30% of women compared to 13% of men) (UBOS and Macro International Inc., 2007).

Child labour still exists in Uganda. The Uganda National Household Survey 2005-2006 indicated that 32% of children aged 5-17 years were economically active, with only slight disparities between male (34%) and female (31%) children (UBOS, 2005/06).

According to UNICEF estimates, there were more than 2 million orphaned children (age 0-17 years) in Uganda in 2005, largely as a result of the HIV/AIDS epidemic (UNICEF, 2007).

Table 10: Other social indicators

Indicator	Estimate	Unit	Reference period	Source
Gender related development index (GDI)	0.502	value between 0-1	2005	UNDP
Women's wage employment in non-agricultural sector as % of total non agricultural employees	36	%	1990	UNSTAT
Ratification of ILO Convention 182 on The Worst Forms of Child Labour	Ratified		2001	ILO

II.1 Qualitative aspects of the diet and food security

Food consumption patterns

Starchy roots (cassava and sweet potatoes), plantain (green cooking bananas locally known as *matooke*) and cereals (maize, millet and sorghum) are the main staple foods in the Ugandan diet.

Food availability and accessibility, climatic conditions, socio-economic status and traditions in different parts of the country are responsible for variations in food consumption patterns. The most important staple foods in the central and western regions are *matooke*, sweet potatoes, maize and rice while those in the northern and eastern regions are cassava, maize, millet and sorghum (MOST and MoH, 2004). Different dishes are prepared from these staples; for example *matooke* is steamed and mashed, sweet potatoes and cassava are boiled, the cereals and sometimes cassava are ground into flour which is mixed with hot water to form stiff pastes locally known as *unga* for maize or *kalo* for millet and cassava.

The staples are almost always accompanied with a sauce/relish. Dry beans (*Phaseolus vulgaris*), groundnuts, field peas, cowpeas and green leafy vegetables (mostly *Amaranthus spp*.) are the preferred ingredients of sauces/relishes. Foods of animal origin (fresh water fish, red and white meats, milk and eggs) are also consumed, but in small amounts or infrequently because of their high cost. This low consumption of animal foods limits micronutrient intake in the population.

Cereals are also used to make non-alcoholic and alcoholic beverages.

Rural communities rely mostly on cereals, *matooke*, starchy roots, pulses and leafy vegetables, while urban households have better access to a wider variety of foods. In addition, they have better access to various meats, fish, and imported cereals (rice, wheat flour and oats) because of their higher purchasing power compared to rural communities.

In rural areas meals are generally monotonous (one staple and one sauce/relish) and depend on what is being grown or can be accessed in the local markets. Most families in rural areas consume two meals a day (lunch and dinner) with no breakfast and no snacks in between, while in urban areas, in general, three meals are consumed (breakfast, lunch and dinner), sometimes with mid-morning and evening snacks. During periods of food shortage, a number of families may have only one meal a day. This is common in rural areas and among the urban poor living in slums.

Overall, the Uganda National Household Survey of 2005-2006 revealed that 8% of households took only one meal a day[2] (UBOS, 2005/06). Slightly more households in rural areas (9%) had only one meal a day compared to their urban counterparts (6%). Regional variations showed that the northern region registered the highest proportion of households (18%) who had only one meal a day compared to other regions. Moreover, the same survey revealed that 10% of the households did not give any breakfast to their children aged less than 5 years (UBOS, 2005/06).

Vulnerable groups such as children, pregnant and breastfeeding mothers usually follow the same diet as the rest of the family, irrespective of their physiological status which would require a better diet in terms of quality and quantity. Food prioritisation among household members is practiced during times of food stress and in some communities differences exist in allocation of food between male and female adults in favour of men. Low consumption of food of animal origin among pregnant women was found to be widespread in most parts of the country due to their high cost and a lack of knowledge of their importance during pregnancy (UBOS and Macro International Inc., 2007).

[2] Data collection: first round between May and October 2005 (partly during the period of food shortage which generally extends from June to August), second round between November 2005 and April 2006.

Food security situation[3]

Although many parts of Uganda enjoy adequate food security throughout the year due to favourable weather conditions, some parts of the country experience food insecurity situations. Many factors contribute to food insecurity in these areas, varying between regions and livelihood systems. These include unreliable climatic conditions (particularly recurring droughts and floods), low productivity, crop and animal pests and diseases, and declining soil fertility (WFP/VAM and EC, 2006). Food insecurity is also the result of man-made factors, such as prolonged conflicts and civil insecurity, particularly in the northern region. Chronic food insecurity affects many households in rural areas and is more marked before the start of the harvest season. The food insecurity problems are compounded by poverty, rapid population growth and the HIV/AIDS pandemic (UBOS and ORC Macro, 2001).

Over the last decade, there has been a steady increase in production of staple food crops (starchy roots, maize, rice, sorghum, beans; production of plantain has only slightly increased) (FAO, Faostat). However, despite the general increase in production, with the rapid population growth Uganda will not be able to avoid food problems in years to come unless efforts are urgently made to modernize agriculture (FAO/GIEWS, 2006).

Low purchasing power limits access to food for a large number of people (FAO/GIEWS, 2006). In rural Uganda, although own production represents the main source of food, more than a third of consumed food is purchased. Thus, people are vulnerable to fluctuating food prices. Moreover, access to market for both purchase and selling of goods is limited and lack of information leads to poor terms of trade at the farm level (WFP/VAM and EC, 2006). Hence, economic and physical access to food remain the major problems for most vulnerable groups – displaced people, rural minorities, female-headed households, pastoral communities (particularly the Karamajong), urban poor and the landless. This is primarily due low purchasing power or lack of employment opportunities.

An analysis carried out in June 2008 in Uganda suggests that the country has remained relatively insulated from the global food price crisis although staple prices are showing a gradual upward trend (Benson 2008; Wodon and Zaman, 2008). A diversified staple diet, with a large share of staples derived from local products (*matooke*, tubers and potatoes), i.e. limited integration with world markets is a key factor explaining the moderate trend in local food prices (Wodon and Zaman, 2008).

In 2008, WFP conducted a Comprehensive Food Security and Vulnerability Analysis (CFSVA) which covered the entire country divided into 25 strata. A representative sample of households was selected for each stratum, using two-stage random sampling. Data collection took place in October-November 2008, a period which corresponds to the end of the harvesting period and is typically a period of plenty (WFP, 2009).

In this survey, food consumption data were collected at the household level (data obtained from 7 271 household questionnaires) and used to obtain a "snap-shot" of household's access to food over the week preceding the survey. Households were categorized as those with poor (food insecure), borderline (moderately food insecure) or acceptable (food secure) food consumption[4] (WFP, 2009).

Households with a "poor" diet consumed essentially staples (about 6 times a week) and rarely pulses (0.6 times a week), vegetables (1.7 times) or fruit (0.3 times). Sugar was consumed 1.2 times per week and oil 1.1 times. Meat and milk were very rare in the diet (0.1 time for meat, 0.0 time for milk). The transition from the "poor" to the "borderline" consumption profile showed a distinct increase in the frequency of consumption of pulses, vegetables, sugar and oil, as well as staples. The transition from "borderline" to "adequate" was clearly marked by an increase in the frequency of consumption of pulses, fruit and sugar, but the most notable change was the appearance of meat and milk in the diet (WFP, 2009).

[3] Food security is defined as "A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FIVIMS). Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity may be chronic, seasonal or transitory.

[4] Food consumption data were collected with a standard WFP seven-day recall tool. The 23 food items in the questionnaire list were aggregated into eight food groups. Consumption frequencies of food items within a food group were summed, and capped at 7 were needed. Food Consumption Scores (FCS) were then calculated based on frequency of consumption of the eight food groups weighted for their nutritional contribution. Based on values of the FCS, three levels of consumption were defined: an FCS of 0-21 indicated a "poor" diet, an FCS of 21.5-35 a "borderline" diet and values greater than 35 an "adequate" diet. FCS is a useful proxy for food security (WFP, 2009).

The CFSVA results indicate that, at the end of 2008, 6.3% of households were food insecure ("poor" diet), 21.3% were moderately food insecure ("borderline" diet) and at risk of becoming food insecure if conditions were to deteriorate. The remaining 72.4% of the households were classified as food secure ("adequate" diet) (WFP, 2009).

The highest prevalence of food insecurity was observed in the region of Karamoja (especially in the southern part of the region) where 20% of the households were food insecure and a further 38% were moderately food insecure. Food insecurity was also a significant problem in Busoga (East Central region) where 15% of households were food insecure. Food insecurity in Busoga appeared to be a chronic problem, related to problems in accessing markets due to high food prices and/or reduced income, and chronic illness coupled with a lack of health services. Few households (2%) appeared to be food insecure in refugee/IDP hosting areas of Acholi (in northern Uganda), an area where food insecurity has traditionally been a problem. In part, this can be explained by the large contribution of WFP food assistance to this region. Nevertheless, in Acholi area, more than one-third (36%) of households were moderately food insecure. By livelihood, the prevalence of food insecurity was higher among the "natural resource dependant" (12% of food insecure households) and "fisherfolk" (11%)[5] households (WFP, 2009).

Economic access to markets was a significant problem across the country, being one of the main explanations behind the high levels of food insecurity in some regions. Reduced availability of food in the market, which might be related to the decreased "effective demand" in some areas caused by decreased household purchasing power, was another cause of food insecurity. In Karamoja, general poverty, asset poverty and personal insecurity were major determinants of food insecurity (WFP, 2009).

Due to differences in methodology and periods of data collection, results outlined in the 2008 CFSVA are not directly comparable to those of 2005 (WFP/VAM and EC, 2006).

In the CFSVA 2008, eleven coping strategies were investigated for frequency of use in the previous seven days. The most frequently reported strategy was to rely less on preferred or expensive food (38% of households). About a third (30%) of households reported reducing meal size and a similar percentage reduced the number of meals. A quarter of households reported borrowing food from neighbours/friends and purchasing food on credit. About 17% reported gathering wild foods, hunting or harvesting immature crops (WFP, 2009).

Emergency situations

Currently only the population in Karamoja may continue requiring emergency food assistance. In this region, although general food aid distributions ceased in December 2009, the World Food Programme continues to provide food assistance to children under the age of two, pregnant mothers, and pupils through school meals as well as those suffering from malnutrition. The Government of Uganda, together with development partners, has devised a five-year Karamoja Action Plan for Food Security (KAPFS 2010-2014) to foster sustainable food security and increased household incomes. This plan will be implemented at the community level and seeks to diversify livelihoods and improve food production to enable households to produce adequate food for own consumption and a marketable surplus (FEWS NET, 2010a; FEWS NET, 2010b).

Surveys of dietary diversity and variety

The CFSVA conducted in October-November 2008 provides information on the diversity of the diet. Households were asked to report the number of days they had consumed specific food items in the 7 days preceding the survey and eight food groups were defined[6] (WFP, 2009).

Results show that, at national level, over the week preceding the survey, households had consumed staples[7] 6.7 days and pulses 4.9 days on average. Among staple food groups, cassava was the most frequently consumed food item (2.9 days a week), followed by maize, potatoes and *matooke*. In the pulses food group, groundnuts/*sim sim* were more frequently consumed than beans, etc. Oil was consumed on average 3.2 days a week and sugar 3.5 days. Vegetables and fruit were less frequently consumed (2.9 and 1.1 days a

[5] "Natural resource dependants" are households who source 75% of their income from activities such as firewood gathering, charcoal burning, etc. A small but important part of their income activity is from agriculture (11%). For "fisherfolk", 77% of the toal income is gained from fishing activities. However, even within this group, 15% of the total income comes from agriculture

[6] Food groups are: staples, pulses, oil, sugar, vegetables, fruit, milk, and meat.

[7] In this assessment, staples include: maize, rice, sorghum, millet, wheat, cassava, potatoes, yams, bread (etc.), matooke and beer residue.

week, respectively); milk was consumed on average 1.5 days a week. Consumption of other animal products was very infrequent: on average, households consumed fish 0.9 day over the week, meat 0.7 day and eggs 0.3 day (WFP, 2009).

By region, results show clear differences in food patterns. Cassava was more frequently consumed in Teso, West Nile and Western regions, while maize was more frequent in the diet in Acholi and Karamoja. Consumption of *matooke* was very frequent in the Southwest region. Consumption of meat and milk was not frequent in the northern part of the country (Teso, Lango and Acholi) and in refugees' camps. Milk and meat were consumed more frequently in the southern regions (particularly in Central 1 and Central 2 regions) as opposed the northern regions, probably in relation with animal ownership and wealth, which are greater in the southern regions. In Acholi and refugees camps, as well as in Karamoja and Eastern region, frequency of consumption of fruit was very low (WFP, 2009).

In conclusion, overall dietary diversity is low, especially in the northern part of the country which also suffers from widespread food insecurity. Consumption of micronutrient-rich foods - fruit and vegetables (with the exception of *matooke*) and food of animal origin – is not frequent; this is one of the main causes of the high prevalence of micronutrient deficiencies observed in Uganda.

II.2 National food supply data

Supply of major food groups

Table 11: Trends in per capita supply of major food groups (in g/day)

Major food groups	Supply for human consumption in g/day								
	1963-65	1968-70	1973-75	1978-80	1983-85	1988-90	1993-95	1998-00	2003-05
Fruit/vegetables*	449	475	450	535	586	597	619	605	530
Starchy roots	494	446	561	501	676	611	488	502	525
Cereals (excl. beer)	192	208	173	166	128	148	151	163	171
Pulses/nuts/oilcrops	92	102	101	83	80	90	87	90	109
Milk and milk products	78	71	77	79	67	63	59	55	67
Meat and offals	37	36	37	38	35	32	34	33	32
Fish/shellfish	25	36	45	42	35	36	25	22	28
Sweeteners	35	39	15	6	5	8	15	20	24
Vegetable oils	5	6	5	3	2	5	12	11	17
Eggs	2	2	2	2	2	2	2	2	2
Animal fats	1	1	1	1	1	2	3	2	1
Other**	530	597	672	502	396	414	392	380	345

Source: FAOSTAT
** Mainly plantain*
*** Largely composed of alcoholic beverages*

In 2003-2005, the major food groups in terms of supply for human consumption were fruit/vegetables and starchy roots (FAO, Faostat).

Supply of the fruit/vegetable group is principally composed of starchy green cooking bananas (plantain), locally produced and known as *matooke*, which is one of Uganda's main staple foods. The per capita supply of this food group increased until 1983-85 and then remained relatively stable. A slight decrease is observed in the last period (FAO, Faostat).

Starchy roots are important staple foods in addition to plantain. This food group is mainly comprised of locally produced cassava and white fleshed sweet potatoes. The per capita supply of this food group has fluctuated slightly over the total period but changes should be interpreted with great caution since the production of cassava is notoriously difficult to measure.
The per capita supply of cereals declined between the 1960s and 1980s. This decrease seems to have been partially compensated by a parallel increase in the per capita supply of starchy roots during the same period. The per capita supply of cereals started showing an upward trend in the late 1980s. The supply of this food group is composed primarily of maize and millet (principally locally produced) and to a lesser extent of

sorghum, rice and wheat. In the earlier years, millet dominated the supply of cereals but more recently, maize, which was originally regarded as a food for workers, surpassed millet and is now consumed in many rural and urban settings. The supply of rice tends to increase as it becomes more common in the Ugandan diet, especially in urban areas. Rice is both locally produced and imported (FAO, Faostat). From the nutritional point of view, cereals (in general) provide much more energy, protein and lipids than plantain, cassava or white fleshed sweet potatoes and they are a better source of micronutrients (especially iron, zinc and niacin) (USDA; FAO, 1997).

The per capita supply of pulses/nuts/oilcrops, principally composed of beans, is relatively high (FAO, Faostat).

The per capita supply of foods of animal origin, which are good sources of high quality protein and of micronutrients, has been low and irregular over the years. The supply of milk/dairy products, already initially low, has dropped slightly since the late-1970s. The supply of meat/offals has not changed over the period, and remains low overall. The supply of fish/shellfish showed an increase from the 1960s until the 1970s but then started a downward trend to the current low supply of 28 g/day per capita (FAO, Faostat).

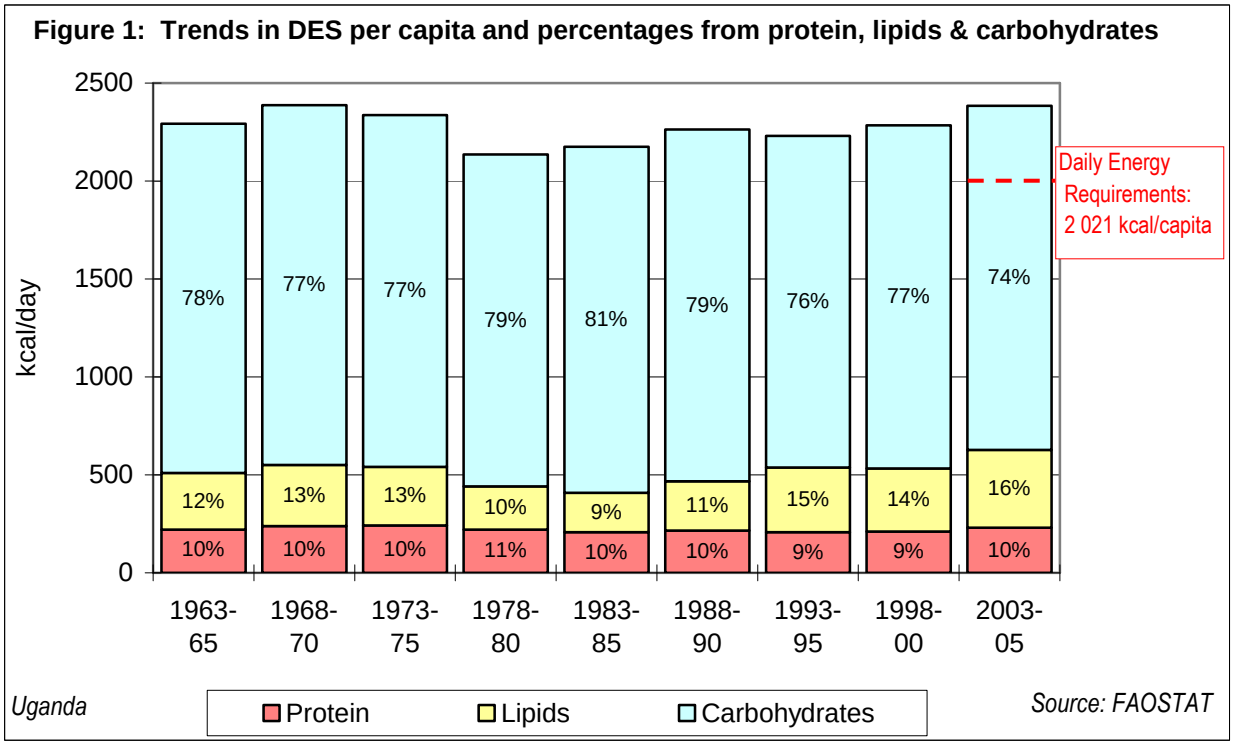
These trends in the supply of milk/dairy products and meat/offals are due to structural problems in the cattle livestock sector such as removal of subsidies and tax deductions in the context of globalization, as well as to overgrazing, diseases and low productivity in the face of rapid population growth (Opio et al., 1998; NARO, 2001b).

The per capita supply of sweeteners showed a sharp decrease between 1963-65 and 1983-85. Since the early 1990s, the supply has increased. The per capita supply of vegetable oils - imported palm oil and also locally produced sunflowerseed oil - has increased in the early 1990s but remains relatively low (FAO, Faostat).

The supply of the food group “other”, which is very high, is principally composed of alcoholic beverages. Traditional alcoholic beverages include *tonto*, a brew produced from juice obtained from special varieties of bananas and mostly consumed in central and western Uganda, and *ajon*, an alcoholic beverage produced from finger millet and widely consumed in eastern and northern Uganda where millet is the most common staple food (WHO, 2004). According to the World Health Organization Global Status Report on Alcohol (2004), Ugandans hold an unenviable first position in the world of highest recorded per capita alcohol consumption in litres of pure alcohol (WHO, 2004). A Ministry of Finance Report from the 2002 Uganda Participatory Poverty Assessment Project also highlighted excessive alcohol consumption as one of the key drivers of poverty especially in the countryside (MFPED, 2002; CPRC, 2007). Excessive alcohol consumption has a negative impact on the achievement of key human development outcomes. Alcohol consumption may be a coping response to stress. The IDPs camps of northern and north-eastern Uganda are among the many places where high level of alcohol consumption is common. In response to this situation, the Ministry of Health is developing a position paper on alcohol and substance abuse (CPRC, 2007).

Dietary energy supply, distribution by macronutrient and diversity of the food supply

- Figure 1: Dietary energy supply (DES), trends and distribution by macronutrient



After a significant decline in the late 1970s-1980s due to social and political turbulence, the dietary energy supply (DES) has increased slightly. In 2003-2005, DES was 2384 kcal per capita/day, sufficient to meet the population energy requirements estimated at 2021 kcal per capita/day[8] in 2005 (FAO, Faostat; FAO, 2004).

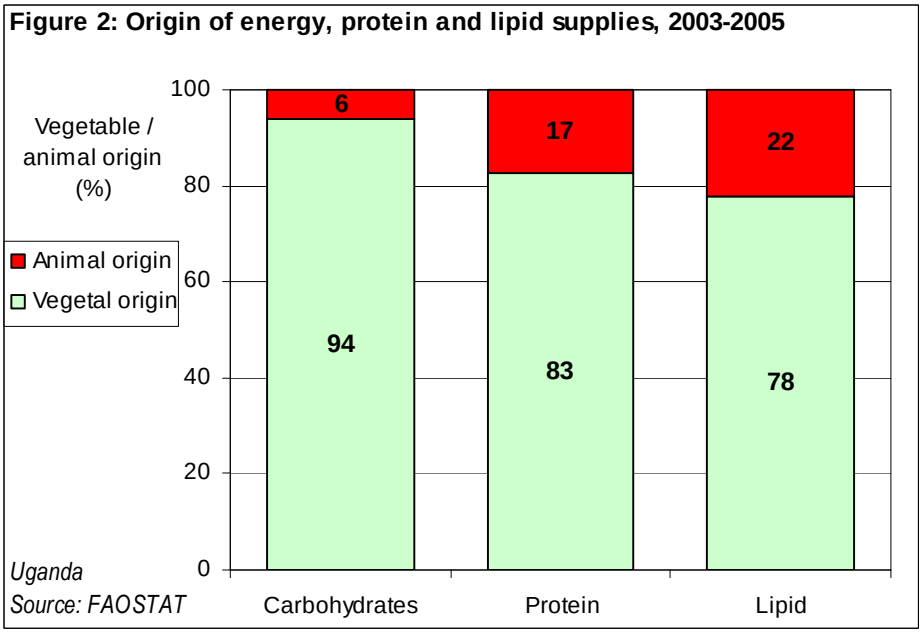
According to "*The State of Food Insecurity in the World*" (2008), the prevalence of undernourishment was estimated at 15% in 2003-2005. After a slight increase in the early 1990s from 19% in 1990-92 to 23% in 1995-97, the prevalence of undernourishment has decreased 8 percentage points since the mid-1990s (FAO, 2008).

Carbohydrates still provide about three-quarters of the DES. Since 1983-85, the share of carbohydrates in the DES has decreased to the advantage of that of lipids, which has increased substantially; despite this increase, the share of lipids in the DES was still at the lower limit of recommendations (15-30% of energy from lipids) in 2003-2005. This low level may interfere with the metabolism of fat soluble vitamins (vitamin A for example). The contribution of protein to DES has remained constant but at a low level over the 40-year period considered. During the last period, the share of protein in the DES, estimated at 10%, was still at the lower limit of recommendations (10-15%) (FAO, Faostat; WHO/FAO, 2003).

[8] Energy requirements are for a healthy and active lifestyle. Software default values attribute to 90 % of the urban adult population a light Physical Activity Level (PAL=1.55) and greater than light activity to the remaining 10% (PAL=1.85), and to 50% of the rural adult population a light activity (PAL=1.65) and greater than light physical activity (PAL=1.95) to the other 50% (FAO, 2004).

Vegetable/animal origin of macronutrients

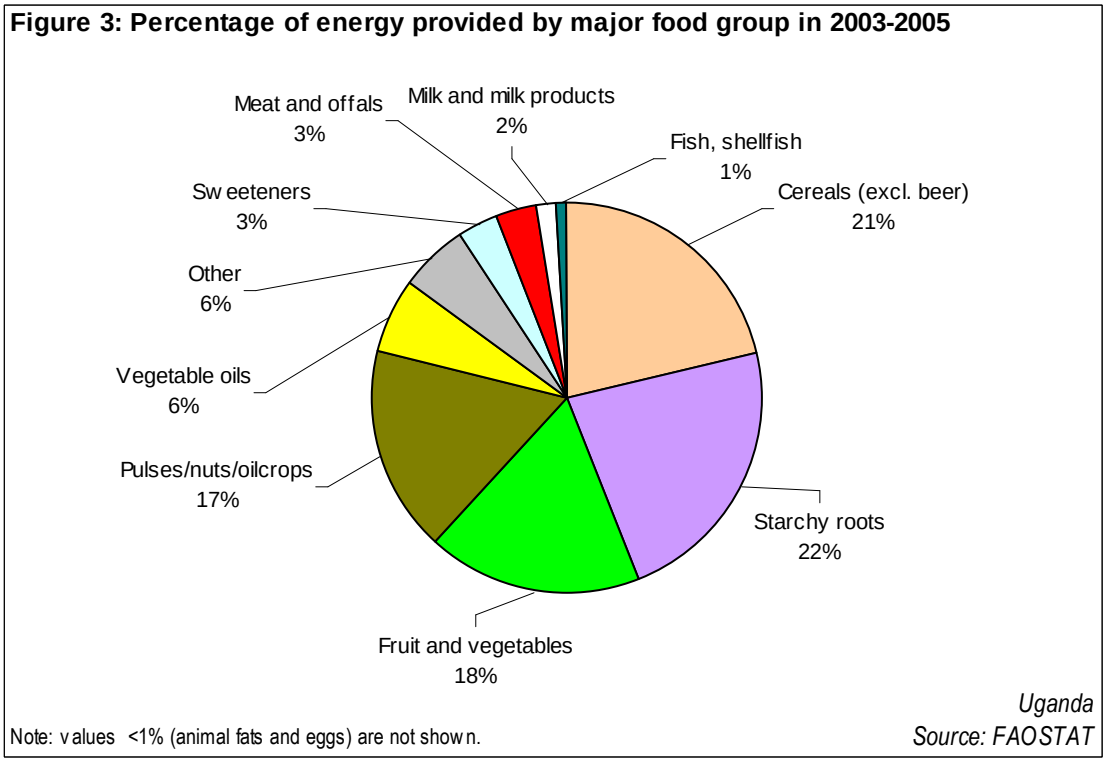
- Figure 2: Vegetable/animal origin of energy, protein and lipid supplies



As a consequence of the high per capita supply of plantain, starchy roots and, to a lesser extent, cereals, the share of macronutrients of vegetable origin is very important. Limited supplies of foods of animal origin imply low intake and low bioavailability of micronutrients in the diet, especially vitamin A, iron, zinc and calcium.

Dietary energy supply by food group

- Figure 3: Dietary energy supply by food group



Starchy roots contribute about one-quarter of the DES, followed by cereals and fruit and vegetables (mostly plantain). The contribution of pulses/nuts/oilcrops to the DES is also relatively important. Foods of animal origin (milk/milk products, meat/offal, fish/shellfish) together contribute only 6% of DES (FAO, Faostat). The low contribution of these food groups in the diet may entail multiple micronutrient deficiencies and insufficient intake of high quality animal protein.

Table 12: Share of the main food groups in the Dietary Energy Supply (DES), trends

Food groups	% of DES								
	1963-65	1968-70	1973-75	1978-80	1983-85	1988-90	1993-95	1998-00	2003-05
Starchy roots	22	19	24	24	32	28	22	22	22
Cereals (excl. beer)	24	25	22	23	17	19	20	21	21
Fruit and vegetables*	15	15	15	20	21	21	22	21	18
Pulses/nuts/oilcrops	16	18	18	15	14	15	15	15	17
Vegetable oils	2	2	2	1	1	2	5	4	6
Other**	9	10	12	9	7	7	7	7	6
Sweeteners	5	6	2	1	1	1	2	3	3
Meat and offals	3	3	3	3	3	3	3	3	3
Milk and milk products	2	2	2	2	2	2	2	2	2
Fish, shellfish	1	1	1	1	1	1	1	1	1
Animal fats	0	0	0	0	0	1	1	1	0
Eggs	0	0	0	0	0	0	0	0	0

Source: FAOSTAT
** Mainly plantain*
*** Largely composed of alcoholic beverages*

Starchy roots, cereals and fruit and vegetables (plantain) are the main contributors to the DES. After an increase between 1963-65 and 1983-85, the contribution of starchy roots to the DES has decreased during the last decade. However, in 2003-2005, this food group still provided almost one-quarter of the DES. The trend in the share of cereals in the DES is opposite to that of starchy roots. The share of fruit and vegetables in the DES has increased since the 1960s (FAO, Faostat).

The contribution of pulses/nuts/oilcrops to the DES has been slightly fluctuating but has generally not increased since the 1960s. The contribution of meat/offals, milk/milk products, and fish/shellfish has not increased at all over the period considered. On the other hand, the contribution of vegetable oils tripled between 1963-65 and 2003-2005 (FAO, Faostat).

The FAO dietary diversification index, i.e. the contribution of foods other than cereals and starchy roots to DES, is estimated at 57% in 2003-2005, a level indicating a high dietary diversity. However, this high level is mainly due to the contribution of plantain which is a food with a low content of vitamins compared to other foods of the fruit and vegetable group. Therefore, it can be concluded that the Ugandan diet is insufficiently diversified.

Food imports and exports

In 2003-2005, the major food groups imported (in terms of quantity) were cereals (mainly wheat and, to a lesser extent, rice, maize and sorghum) and vegetable oils (palm oil). Imports of cereals have increased since the early 1990s, notably because of the internal conflict.

The import dependency ratio[9] (IDR) for cereals increased from about 2% in the 1980s to 17% in 2003-2005. IDR for vegetable oils has also increased considerably since the 1980s, to reach 50% in 2003-2005. On the other hand the IDR for sweeteners has decreased slightly since the early 1990s (IDR of 20% in 2003-2005). This trend can be attributed to an increase in local production of refined sugar. For other food groups (except animal fats), Uganda is not dependant on imports (FAO, Faostat).

In 2003-2005, the major food exports, in terms of quantity, were beverage crops (mainly coffee), cereals (maize) and, to a lesser extent, fish and shellfish (FAO, Faostat).

[9] Import dependency ratio is defined as: IDR = (quantity imported / (quantity produced + quantity imported – quantity exported)) *100. It represents the share of domestic supply which comes from imports. IDR takes into account supply of food groups (quantity) whatever its utilization and not only what is destined to human consumption.

Food aid

In 2008 Uganda received a total food aid of 190 886 t, of which 159 457 t were cereals (mainly maize) and 31 429 t were non-cereal (mainly beans). This food aid was mainly delivered as emergency food aid[10] (WFP, FAIS). Food aid targeted IDPs, refugees, infants, pregnant and breastfeeding women, HIV/AIDS-affected people, drought-affected people, orphans and street children. WFP also supports vulnerable populations in Karamoja (WFP, 2009a). In 2003-2005, cereal food aid[11] (grain equivalent) represented approximately 12% of the national cereal supply for human consumption. In 1993-95, this proportion was only 4% (FAO, Faostat; WFP, FAIS).

Since 2003, food aid deliveries have increased tremendously as the humanitarian situation in northern Uganda deteriorated dramatically during 2003 and early 2004 (WFP, 2007b; USAID/DCHA and OFDA, 2004). The WFP Emergency Operation has been extended to March 2010 to provide food rations to extremely vulnerable individuals, estimated at 20% of the population, through community-based supplementary feeding programs (FEWS NET, 2010a).

II.3 Food consumption

In 2008, a food consumption study was conducted among children and women of childbearing age in order to provide data for the National Food Fortification Program (Harvey et al., 2008). This was a cross-sectional study covering three out of the four regions of Uganda that included the Central region (Kampala City) representing urban areas and the Western (Bushenyi and Hoima districts) and Northern (Kitgum and Lira districts) regions representing rural areas. Data collection took place between May and September 2008 in Kampala and the Western region and in August/September in the North. Households were eligible for inclusion in the study if there was at least one woman of reproductive age (15-49 years) and a child aged 6-59 months. Overall, 957 women of childbearing age, 510 children aged 24-59 months and 438 children aged 6-23 months were included in the survey. Quantitative dietary intake data was collected using the Gibson and Ferguson (2008) multi-pass 24-hour recall method.

The findings revealed that the diet is predominantly based on foods of vegetable origin. Plantain, roots/tubers and cereals are the main contributors to energy intake, representing approximately 50% of women's energy intake; only 11-13% of their energy intake came from foods of animal origin.

Women's intake of plantain varied from about 150 g/day in the North to more than 450 g/day in the West. Their intake of roots/tubers was also high while that of cereals (maize, rice, millet, sorghum and wheat products) was much lower than expected (75-125 g/day). Intake of pulses and nuts, which are good sources of protein and micronutrients, was relatively large (100-180 g/day), especially in the two rural regions. Intake of fruit was higher in the Western region (about 175 g/day versus 100 g/day in Kampala and in the Northern region). Consumption of sugar, oil/fat, and vegetables was modest (20-60 g/day). As is typical in developing countries, intake of meat, fish, poultry and eggs was low (25-60 g/day), with this being most pronounced in the North. Consumption of milk was very low in all the three regions surveyed (Harvey et al., 2008).

Among children aged 24-59 months, it is likely that energy intake is sufficient to meet energy requirement in Kampala and the West, but probably not in the North. As for women, energy intake appears acceptable (between 1800 and 2800 kcal/day), except for individuals in the lowest quintiles of intake, and mainly in the North where food price and climatic shocks have disrupted access to food. Protein intake appears sufficient in all regions for both women and children (Harvey et al., 2008).

The dietary patterns of both women and children aged 24-59 months were found to be highly inadequate for vitamins A and B-12, iron, zinc, and calcium resulting from a diet which featured low levels of consumption of animal products. The North showed the highest prevalence of inadequate intake for vitamins A and B12

[10] *Emergency* food aid is destined to victims of natural or man-made disasters; *Project* food aid aims at supporting specific poverty-alleviation and disaster-prevention activities; *Programme* food aid is usually supplied as a resource transfer for balance of payments or budgetary support activities. Unlike most of the food aid provided for project or emergency purposes, it is not targeted to specific beneficiary groups. It is sold on the open market, and provided either as a grant, or as a loan.

[11] Cereal food aid may include cereal-soy blend.

while inadequate intake of iron, zinc, and calcium were generally most prevalent in Kampala (Harvey et al., 2008).

The authors recommended massive fortification of staples and condiments with vitamins and minerals to reduce micronutrient deficiencies in the population (Harvey et al., 2008). Nevertheless, cereals which are the most common vehicle for food fortification, are not consumed in large amounts; wheat and maize flour in particular are consumed mostly in Kampala but not in the rural regions. Likewise oil is mostly consumed in Kampala, while in the rural regions half of the women did not consume it. The same is true for sugar which is not consumed by half of the children and women in the rural regions. Therefore the potential impact of fortification of wheat, oil or sugar for reducing micronutrient deficiencies might be limited in the rural parts of Uganda. Alternative food-based strategies need to be developed in the rural sector of the country, based on crop diversification, homesteads gardens, small livestock production.

II.4 Infant and young child feeding practices

Over the last 15 years, three nationally representative surveys have been conducted in Uganda to assess infant and young child feeding practices: the 2006 Uganda Demographic and Health Survey (UDHS), the 2000-2001 UDHS and the 1995 UDHS[12] (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001; SD/MFED and Macro International Inc., 1996).

According to the 2006 UDHS, breastfeeding is a universal practice in Uganda, as 98% of children born in the five years preceding the survey have been breastfed. Differences by background characteristics of gender, residence, region or mother's education were small (UBOS and Macro International Inc., 2007).

Among last-born children everbreastfed, only 42% were breastfed within one hour of birth (early initiation of breastfeeding); 86% were breastfed within 24 hours of birth. Children living in urban areas were more likely to benefit from early initiation than their rural counterparts. Disparities across regions were marked, ranging from 35% of children with early initiation in Southwest region to 54% in Kampala. In Karamoja sub-region, 57% of children were put to the breast within one hour of birth. Overall, early initiation of breastfeeding was slightly more common among children of mothers with at least some primary education (UBOS and Macro International Inc., 2007).

There has been improvement in the practice of early initiation of breastfeeding since the early 2000s: in 2000-2001, 32% of children born in the five years preceding the survey were put to the breast within 24 hours of birth versus 42% in 2006 (last children born in the five years preceding the survey)[13] (UBOS and ORC Macro, 2001; UBOS and Macro International Inc., 2007). However, promotion of early initiation of breastfeeding should be reinforced. Mother and child benefit from this practice. From the child's perspective, colostrum is important because it is highly nutritious and rich in antibodies that protect the newborn from diseases and reduce the subsequent risk of mortality.

Moreover, in Uganda, it is rather common to give prelacteal liquids to infants. Children receive plain water, sugar or glucose water and milk other than breastmilk as the most common types of prelacteal liquids (UBOS and Macro International Inc., 2007). Such practices can have negative health consequences for infants, make them more susceptible to infectious diseases and diarrhoea, and impact their nutritional status.

According to the 2006 UDHS (STATcompiler data), the median duration of breastfeeding among children under three years was 21.6 months, a duration comparable to that observed in the 2000-2001 UDHS (UBOS and Macro International Inc., 2007; ORC Macro, 2008).

[12] The 2006 UDHS was the first UDHS to include the entire country in the sample. In previous UDHS, some districts were excluded because of security problems. In the 2000-2001 UDHS, areas making up the current districts of Amuru, Bundibugyo, Gulu, Kasese, Kitgum, and Pader were excluded from the sample: these areas comprises around 7% of the population of Uganda. The 1995 UDHS excluded Kitgum and Pader. Whenever possible, comparable data (adjusted 2006 data covering the geographic areas surveyed in the 2000-2001 UDHS) are used to evaluate trends. However, comparable data are not provided for each indicator and most of trend analysis included in this profile are based on unadjusted data and therefore should be interpreted with caution.

[13] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Table 13: Initiation and duration of breastfeeding

Survey name/date (Reference)	Background characteristics	Sample size (all children under five years)*	Percentage of children under five years everbreastfed	Number of last-born children under five years ever-breastfed	Among last-born children ever-breastfed, percentage breastfed within one hour of birth	Among last-born children ever-breastfed, percentage breastfed within 24 hours of birth[1]	Number of children under three years**	Median duration of breastfeeding in children under three years (in months)
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	8423	98.2	4969	42.2	86.1	4204	21.6
	Sex							
	M	4180	97.8	2486	41.4	85.5	2105	21.5
	F	4243	98.6	2484	43.0	86.6	2100	21.6
	Residence							
	Urban	953	98.3	661	47.7	85.9	516	19.7
	Rural	7470	98.2	4309	41.4	86.1	3688	21.7
	Region							
	Central 1	814	97.1	484	37.1	82.3	401	20.4
	Central 2	710	98.4	424	40.1	84.3	348	19.2
	Kampala	417	98.6	295	53.6	88.5	224	19.0
	East Central	905	98.5	503	45.4	94.6	442	20.6
	Eastern	1317	99.0	751	36.1	88.7	647	21.6
	North	1474	97.7	857	42.2	79.5	737	23.9
	West Nile	462	98.6	285	48.9	79.0	249	24.0
	Western	1309	98.4	767	49.4	90.3	661	21.6
	Southwest	1013	97.8	604	35.1	86.0	496	22.6
	North sub-regions							
	IDP	614	98.1	351	43.6	77.5	n.a.	n.a.
	Karamoja	324	97.4	184	56.6	80.4	n.a.	n.a.
	Mother's education							
	No education	1910	97.4	1070	40.1	83.7	885	22.5
	Primary	5358	98.5	3114	42.4	86.6	2704	21.4
	Secondary or higher	1155	98.2	786	44.3	87.2	615	19.6

[1] Includes children who started breastfeefing within one hour of birth.

*: based on births in the five years preceding the survey regardless of whether the children are living or dead at the time of interview.

**: data on median duration of breastfeeding taken from STATcompiler (ORC Macro, 2008).

n.a.: not available.

Data from UDHS 2006 (Table 14) indicated that 60% of children under 6 months of age were exclusively breastfed. Exclusive breastfeeding rate declined sharply with age, from 84% among children aged 0-1 month to 35% among children aged 4-5 months. The median duration of exclusive breastfeeding was found to be 3.1 months (UBOS and Macro International Inc., 2007).

WHO recommends the introduction of complementary foods around the age of 6 months because by that age breastmilk alone is no longer sufficient to support optimal growth. In Uganda, about 80% of children aged 6-9 months were given complementary food (timely complementary feeding). More than 90% of children continued to be breastfed at 1 year of age and 54% were still breastfed at 2 years of age (UBOS and Macro International Inc., 2007).

Bottle-feeding is not a recommended practice because of the higher risk of morbidity due to unsafe water and preparation facilities. However, this practice is common in Uganda: in 2006, bottle-feeding rate among children aged 0-11 months was 18% (UBOS and Macro International Inc., 2007). Moreover, the rate has increased sharply since 2000-2001 (5%) (UBOS and ORC Macro, 2001). This increase is likely to be due to limited sensitisation of mothers/caretakers on the dangers involved such as diarrhoea and also due to the increase in the numbers of working mothers. It could also be due to the HIV/AIDS epidemic as infected women are advised, where possible, to stop breastfeeding to prevent passing it on to their children.

Comparison with previous UDHS[14] reveals that exclusive breastfeeding rate for the first six months increased from 57% in 1995 to 63% in 2000-2001 but slightly declined in 2006 (60%).

Timely complementary feeding rate (at 6-9 months of age) fluctuated but no improvement has been observed since 1995 (80% in 1995, 75% in 2000-2001 and 80% in 2006). Continued breastfeeding rate at 1 year of age has remained almost steady since 1995 while continued breastfeeding rate at 2 years of age declined from 60% in 1995 to 54% in 2006 (SD/MFED and Macro International Inc., 1996; UBOS and ORC Macro, 2001; UBOS and Macro International Inc., 2007).

Table 14: Type of infant and young child feeding

Survey name/date (Reference)	Type of feeding in the 24 hours preceding the survey		
	Indicator by age	Sample size	Percentage of children
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Exclusive breastfeeding rate**		
	0-1 month	224	84.2
	2-3 months	295	64.8
	4-5 months	269	34.8
	<6 months	789	60.1
	Timely complementary feeding rate		
	6-9 months	523	79.7
	Bottle-feeding rate		
	0-11 months	1589	18.0
	Continued breastfeeding rate		
	12-15 months (1 year)	546	91.1
	20-23 months (2 years)	460	54.4

According to UDHS 2006, among breastfed children aged 6-11 months, only 32% were given milk other than breastmilk/dairy products and 22% were given meat/fish/eggs in the 24 hours preceding the survey. Only one-third of children aged 6-11 months were given fruit and vegetables rich in vitamin A. Half the children of this age-group were given food made from pulses and nuts (UBOS and Macro International Inc., 2007).

Among older children, consumption of food made from pulses and nuts, food made with oil/fat/butter, meat/fish/eggs and fruit and vegetables rich in vitamin A was more common. However, even among children aged 24-35 months, less than one-third were given meat/fish/eggs and about a half were given fruit and vegetables rich in vitamin A. Moreover, the proportion of children receiving other milk/dairy products was slightly lower among children aged 24-35 months when compared to younger children (UBOS and Macro International Inc., 2007).

Use of infant formula is not a common practice in Uganda (UBOS and Macro International Inc., 2007). The gap between the infrequent use of infant formula and the rate of bottle-feeding can be explained by the fact that mothers use diluted cow's milk to bottle feed their children instead of infant formula.

In conclusion, complementary feeding remains insufficiently diversified; in particular, consumption of animal foods, which are rich in essential micronutrients (especially vitamin A, iron and calcium) and protein, and consumption of fruit and vegetables rich in vitamin A are not widespread even in the older age group.

Table 15: Consumption of complementary foods by breastfeeding status and age

Survey name/date (Reference)	Age (months)	Breastfeeding status*	Number of children	Foods consumed by children in the 24 hours preceding the survey					
				Percent of children having consumed the following foods					
				Infant formula	Other milk/ dairy products	Food made from pulses and nuts	Meat/ fish/ eggs	Foods with oil/ fat/butter	Fruit and vegetables rich in vit. A
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**6-11**	**BF**	750	0.5	31.7	49.5	22.0	21.3	31.8
	12-23	**BF**	1112	0.2	32.4	65.8	31.5	31.5	47.3
	24-35	**BF+ NBF**	883	0.2	28.5	69.5	30.2	34.2	51.4

* Breastfed children (BF) or non breastfed (NBF) children or breastfed and non breastfed taken together

[14] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Hence, several inappropriate infant feeding practices persist and are proximal causes of the high prevalence of malnutrition among young Ugandan children and of the high infant mortality rate. Efforts are still necessary to improve these practices.

The Baby Friendly Hospital Initiative (BFHI) is implemented in Uganda. Hospitals are awarded baby-friendly status when standard procedures in maternity wards are brought into line with WHO guidelines for successful breastfeeding. Twenty hospitals in Uganda were targeted out of which 11 have been given the BFHI status (UNICEF, 2002).

The International Code of Marketing of Breast Milk Substitutes is also being implemented. However, enforcement and monitoring of its implementation still needs to be improved (Waterston and Tumwine, 2003).

II.5 Nutritional anthropometry

Low birth weight
(Less than 2 500 g)

According to UDHS 2006, among children born in the five years preceding the survey and whose birth weight was recorded, the prevalence of low birth weight was 11%. However, only 35% of neonates were weighed at birth. In Uganda, many women (59% in 2006) do not deliver at a health facility, and hence neonates are not weighed at birth. Children with a recorded birth weight are predominantly those born in a more privileged environment (in urban areas and/or of mothers with higher education, etc.) (UBOS and Macro International Inc., 2007). Due to the low proportion of newborns weighed at birth and the lack of representativity of recorded birth weights, the prevalence of low birth weight must be interpreted with caution and could be underestimated.

According to mother's own assessment on their baby's size at birth, 6% of neonates were considered "very small" and 15% were considered "smaller than average" (UBOS and Macro International Inc., 2007).

Trends in the prevalence of low birth weight cannot be assessed, as data from previous surveys (UDHS) are not comparable with those from UDHS 2006.

Low birth weight (LBW) results from preterm birth and/or intra-uterine growth retardation (IUGR), the major attributable causes of IUGR including mother's low weight gain during pregnancy, low body mass index, short stature and malaria. LBW is closely associated with neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life (UNICEF and WHO, 2004; WHO, 2002a).

Anthropometry of preschool children

Since the early 1990s, three nationally representative surveys have been conducted in Uganda in order to assess the nutritional status of preschool children: the 2006 Uganda Demographic and Health Survey (UDHS), the 2000-2001 UDHS and the 1995 UDHS (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001; SD/MFED and Macro International Inc., 1996).

In 2006, the prevalence of stunting among children under five years was 38%, that of wasting was 6% and that of underweight was 16% (based on WHO Child Growth Standards 2006 - UBOS and Macro International Inc., 2007). Based on the prevalence of stunting, the severity of malnutrition in Uganda is defined as "high" according to WHO criteria (WHO, 1995).

At national level in 2006, 38% of preschool children were stunted (chronic malnutrition) and 15% were severely stunted. Boys were slightly more likely to be stunted than girls (Table 16). Among the under 6 months, 17% were stunted, probably as a consequence of intrauterine growth retardation and/or prematurity. The prevalence of stunting increased during the first years of life to reach 48% among children aged 24-35 months. After 3 years of age, prevalence remained high (UBOS and Macro International Inc., 2007). Inappropriate complementary feeding practices, combined with cumulative effects of illnesses and lack of access to health care, are among the main factors contributing to the deterioration of the nutritional status after the age of 6 months.

The prevalence of stunting was significantly higher among children living in rural areas (40%) when compared to those living in urban areas (26%). By region, differences in prevalence were also marked, ranging from 22% in Kampala to 50% in the Southwest region (UBOS and Macro International Inc., 2007). Although the Southwest region is considered the "food basket" of the nation, the diet remains insufficiently diversified, mainly based on *matooke,* a food product poor in protein (WFP, 2009; FAO, 1997). Moreover, the prevalence of preventable diseases in children is particularly high and rural poverty is widespread (Anderson et al., 2006). All these factors may explain the high prevalence of chronic malnutrition observed in this region. To help communities build their capacity to deal with malnutrition in the Southwest region, the Uganda Food Security Initiative project phase 2 was implemented in 2002 for a 4-year period. This project included the development of communal and household backyard vegetable gardens and the promotion of cultivation and consumption of orange-fleshed sweet potatoes, dark green leafy vegetables, fruit and other vitamin-A rich foods. The impact of the project was relatively large (Anderson et al., 2006).

Mothers' level of education was strongly inversely associated with stunting: prevalence among children of mothers with no education or with only primary education was much higher than among children of mothers with secondary or higher education (UBOS and Macro International Inc., 2007). This observation should not automatically be interpreted as a direct effect of mother's education but more as the correlation between economic status of the family and the prevalence of stunting.

Acute malnutrition (wasting) reflects the nutritional situation at the time of the survey and hence can be strongly influenced by the season during which data collection took place. Data collection for UDHS 2006 took place between May and October, during the period of food shortage, which generally extends from June to August.

At national level, in 2006 the prevalence of wasting was 6% and that of severe wasting 2%. There was no significant difference in the prevalence by gender. Prevalence peaked at 17% among children aged 6-11 months, probably due to inadequate complementary feeding practices and high morbidity. After this age, the prevalence of wasting decreased and among children aged 48-59 months, it was 1%, a statistically insignificant percentage. In contrast with the prevalence of stunting which was much higher in rural areas than in urban areas, the prevalence of wasting did not vary by place of residence. There were large regional differences in the prevalence of wasting, ranging from 3% in Central 2 and Eastern regions to 10% in East Central region. The prevalence of wasting did not vary with educational attainment of the mother (UBOS and Macro International Inc., 2007).

At national level, the prevalence of underweight among underfives was 16% and that of severe underweight was 4% in 2006 (UBOS and Macro International Inc., 2007).

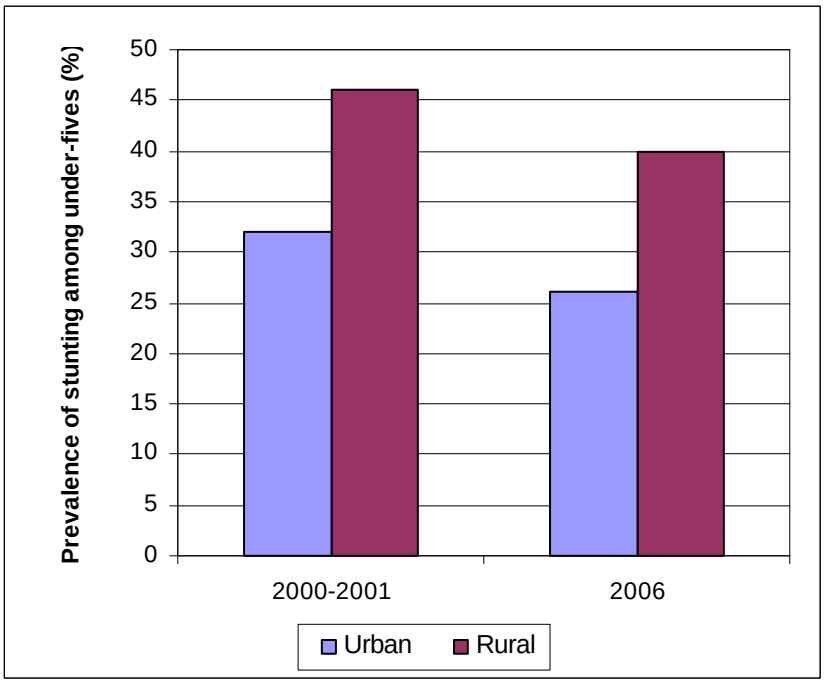
Trends in child nutritional status can be assessed by comparing data collected in the 2006 UDHS with data from the 2000-2001 UDHS (WHO Child Growth Standards), both surveys including children under five years of age[15] (children under four years of age in the 1995 UDHS). Comparison shows that the prevalence of stunting decreased from 45% in 2000-2001 to 38% in 2006. The decrease in prevalence was identical in both urban and rural areas (6 percentage points). Data from 2006 UDHS were collected during the period of food shortage while data from 2000-2001 were collected outside this period; thus, comparison of the prevalence of wasting is not valid. The prevalence of underweight has slightly decreased since the early 2000s (19% in 2000-2001 and 16% in 2006). According to the WHO Global database on child growth and malnutrition, the prevalence of overweight has remained steady between 2000-2001 and 2006 (5%) (WHO, Global database on child growth and malnutrition; UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

Although the prevalence of stunting has decreased since 2000-2001, chronic malnutrition among preschool children remains a major public health problem. Many factors have a negative impact on the nutritional status of young children, among which inadequate infant and young child feeding practices, high morbidity coupled with limited access to health care, food insecurity, poverty but also civil insecurity in certain regions.

The Mwanamugimu National Child Malnutrition Rehabilitation centre at Mulago Hospital in Kampala and a few other regional nutrition rehabilitation centres, handle the treatment and care of acute malnutrition, including educating the mothers. Diagnosis of acute malnutrition is complicated by HIV/AIDS as a recent study found that one third of the children admitted for acute malnutrition were HIV positive (Bachou et al., 2006).

[15] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

- Figure 4: Trends in prevalence of stunting among children under five years



Source: WHO, Global database on child growth and malnutrition; UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001.

Table 16: Anthropometry of preschool children

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Uganda Demographic and Health Survey 2006 (May-Oct. 2006) (UBOS and Macro International Inc., 2007)	**Total**	0-4.99	M/F	2687	15.0	38.1	2.0	6.1	4.1	15.9	n.a.
	Sex										
		0-4.99	M	1357	16.8	40.5	2.2	7.4	4.2	17.3	n.a.
		0-4.99	F	1330	13.1	35.6	1.8	4.9	4.1	14.4	n.a.
	Age										
		0-0.49	M/F	242	5.4	16.9	2.3	8.4	2.4	10.7	n.a.
		0.5-0.99	M/F	288	9.4	20.9	6.4	16.7	7.9	22.5	n.a.
		1-1.99	M/F	578	14.2	41.1	4.0	10.6	6.1	20.0	n.a.
		2-2.99	M/F	535	21.7	47.6	0.8	3.9	3.6	16.5	n.a.
		3-3.99	M/F	521	15.3	41.8	0.3	1.5	2.7	11.9	n.a.
		4-4.99	M/F	521	16.1	40.5	0.3	1.3	2.7	13.5	n.a.
	Residence										
	Urban	0-4.99	M/F	273	8.3	25.5	3.0	6.8	2.5	10.6	n.a.
	Rural	0-4.99	M/F	2414	15.7	39.5	1.9	6.1	4.3	16.5	n.a.
	Region										
	Central 1	0-4.99	M/F	273	15.2	39.2	2.5	4.5	4.2	13.0	n.a.
	Central 2	0-4.99	M/F	249	8.0	29.8	0.6	3.1	1.9	8.4	n.a.
	Kampala	0-4.99	M/F	130	8.1	22.2	3.7	7.4	2.6	10.3	n.a.
	East Central	0-4.99	M/F	309	11.1	38.3	4.5	9.9	5.7	22.9	n.a.
	Eastern	0-4.99	M/F	411	12.5	36.2	1.0	3.4	2.2	11.2	n.a.
	North	0-4.99	M/F	397	17.3	40.0	1.9	6.5	6.8	21.8	n.a.
	West Nile	0-4.99	M/F	156	15.3	37.7	2.3	8.3	4.5	16.6	n.a.
	Western	0-4.99	M/F	422	17.6	37.6	0.3	5.0	3.2	14.6	n.a.
	Southwest	0-4.99	M/F	342	22.7	49.6	3.4	9.0	5.2	19.3	n.a.
	North sub-regions										
	IDP	0-4.99	M/F	172	13.9	37.4	1.7	6.3	5.0	20.2	n.a.
	Karamoja	0-4.99	M/F	(84)	(25)	(54)	(4)	(11)	(14)	(36)	n.a.
	Mother's education										
	No education	0-4.99	M/F	551	15.8	41.4	2.4	6.6	5.9	20.6	n.a.
	Primary	0-4.99	M/F	1580	15.5	39.4	2.2	6.2	3.9	15.6	n.a.
	Secondary or higher	0-4.99	M/F	339	7.1	22.7	1.7	6.8	2.6	8.4	n.a.

* Category <-2 Z-scores includes <-3 Z-scores. Data based on WHO Child Growth Standards (WHO, 2006)
n.a.: not available
Results in brackets are based on small samples and therefore must be interpreted with caution.

Table 16: Anthropometry of preschool children (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Uganda Demographic and Health Survey 2000-2001 (Sept. 2000- March 2001) (WHO, Global database on child growth and malnutrition - UBOS and ORC Macro, 2001)	**Total**	0-5.00	M/F	6433	20.1	44.8	1.5	5.0	5.8	19.0	4.9
	Sex										
		0-5.00	M	3213	22.7	47.5	1.6	6.2	6.9	21.0	5.3
		0-5.00	F	3220	17.4	42.1	1.5	3.7	4.7	17.0	4.5
	Age										
		0-0.49	M/F	640	6.7	17.6	2.6	7.9	4.8	12.5	9.6
		0.5-0.99	M/F	700	9.5	31.4	4.2	12.3	8.9	26.3	4.8
		1-1.99	M/F	1420	23.6	50.2	1.6	7.4	7.0	22.3	4.2
		2-2.99	M/F	1212	26.4	53.3	1.3	2.4	5.6	18.7	4.9
		3-3.99	M/F	1313	22.4	50.7	0.6	2.1	5.1	16.5	5.0
		4-5.00	M/F	1150	20.2	45.8	0.6	2.0	4.1	17.3	3.3
	Residence										
	Urban	0-5.00	M/F	611	10.5	32.0	0.8	2.9	2.4	10.0	4.0
	Rural	0-5.00	M/F	5823	21.1	46.1	1.6	5.2	6.2	20.0	5.0
	Region										
	Central	0-5.00	M/F	1732	18.1	41.4	1.7	4.3	5.5	17.3	4.2
	Eastern	0-5.00	M/F	1952	16.6	41.3	1.2	5.6	5.3	19.3	3.5
	Northern	0-5.00	M/F	1098	19.6	43.3	1.4	5.1	6.9	21.0	3.7
	Western	0-5.00	M/F	1651	26.5	53.7	1.9	4.8	6.0	19.2	8.2
	Mother's education										
	No education	0-5.00	M/F	1370	n.a.	51.2	n.a.	6.4	n.a.	25.3	n.a.
	Primary	0-5.00	M/F	3608	n.a.	43.8	n.a.	5.0	n.a.	18.9	n.a.
	Secondary or higher	0-5.00	M/F	626	n.a.	35.1	n.a.	3.7	n.a.	13.3	n.a.

* Category <-2 Z-scores includes <-3 Z-scores. Data based on WHO Child Growth Standards (WHO, 2006)

n.a.: not available

Note: For mother's education, data comes from the UDHS report (NCHS estimates) and has been converted into estimates based on the WHO child growth standards by using the algorithm developed by Yang and de Onis (Yang and de Onis, 2008).

Table 16: Anthropometry of preschool children (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Uganda Demographic and Health Survey 1995 (Mar.- Aug. 1995) (WHO, Global database on child growth and malnutrition - SD/MFED and Macro International Inc., 1996)	**Total**	0-3.99	M/F	5012	19.3	45.0	2.4	7.0	7.4	21.5	5.1
	Sex										
		0-3.99	M	2434	21.8	48.5	2.9	7.9	8.3	23.8	5.6
		0-3.99	F	2578	17.0	41.6	2.0	6.0	6.5	19.4	4.6
	Age										
		0-0.49	M/F	723	5.1	18.2	3.8	9.3	4.9	13.7	8.7
		0.5-0.99	M/F	802	10.0	33.1	4.1	12.6	11.1	26.4	3.4
		1-1.99	M/F	1484	22.1	50.4	2.3	7.6	8.1	25.1	3.6
		2-2.99	M/F	1045	26.8	55.8	1.6	3.9	7.1	21.8	4.4
		3-3.99	M/F	958	25.6	55.2	1.2	2.7	5.3	17.5	6.9
	Residence										
	Urban	0-3.99	M/F	558	10.7	28.1	2.4	6.6	4.2	12.6	3.8
	Rural	0-3.99	M/F	4453	20.4	47.1	2.4	7.0	7.8	22.7	5.3
	Region										
	Central	0-3.99	M/F	1266	15.0	39.4	1.6	4.7	5.1	16.6	4.2
	Eastern	0-3.99	M/F	1325	19.5	43.9	2.7	8.4	7.7	24.4	3.4
	Northern	0-3.99	M/F	998	20.4	46.1	3.4	8.5	9.3	26.4	3.8
	Western	0-3.99	M/F	1423	22.4	50.3	2.3	6.5	7.7	19.8	8.3
	Mother's education										
	No education	0-3.99	M/F	1484	n.a.	49.0	n.a.	8.7	n.a.	26.4	n.a.
	Primary	0-3.99	M/F	2764	n.a.	44.3	n.a.	6.1	n.a.	22.1	n.a.
	Secondary or higher	0-3.99	M/F	527	n.a.	31.7	n.a.	3.2	n.a.	14.5	n.a.

* Category <-2 Z-scores includes <-3 Z-scores. Data based on WHO Child Growth Standards (WHO, 2006)

n.a.: not available

Note: For mother's education, data comes from the UDHS report (NCHS estimates) and has been converted into estimates based on the WHO child growth standards by using the algorithm developed by Yang and de Onis (Yang and de Onis, 2008).

Anthropometry of school-age children

There is no national anthropometric data on school-age children in Uganda.

Results of the May 2006 anthropometric study conducted by Kikafunda et al., 2006 (unpublished) in two primary schools in central Uganda in a semi-urban area (6 km from Kampala City) are reported here (Table 17). Data were collected among 360 children aged 6-9.99 years. Standard anthropometric methods were used to assess the nutritional status of children (Kikafunda et al., 2006 unpublished).

Among these children, the prevalence of stunting was 20.1% and that of underweight was 13.9%. The prevalence of wasting was 2.3%, a prevalence similar to what is observed in the reference population, suggesting that wasting was not a public health problem among school-age children living in this area (Kikafunda et al., 2006, unpublished). Data collection for this survey took place in May (2006), outside the period of food shortage.

This survey reveals that chronic malnutrition is highly prevalent among school-age children living in this area. This survey was conducted among children attending school in a semi-urban area located near the national capital Kampala. It is likely that the prevalence of chronic malnutrition among school-age children living in rural areas and/or not attending school would be higher. A nationally representative survey should be conducted in order to assess the nutritional status of school-age children.

Table 17: Anthropometry of school-age children

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores[1]	< -3 Z-scores	< -2 Z-scores[1]	< -3 Z-scores	< -2 Z-scores[1]	> +2 Z-scores
Nutritional status of school children aged 6-10 years in Wakiso District, Central Uganda (May 2006) (Kikafunda et al., 2006 unpublished data)[2]	**Total**	6-9.99	M/F	360	1.1	20.1	0.3	2.3	0.3	13.9	n.a.
	Sex										
		6-9.99	M	178	1.2	21.7	0.5	2.4	0.2	13.0	n.a.
		6-9.99	F	182	1.0	18.5	0.1	2.2	0.4	14.8	n.a.
	Age										
		6-6.99	M/F	(90)	(0)	(17)	(0)	(1)	(0)	(12)	n.a.
		7-7.99	M/F	(94)	(1)	(19)	(0)	(2)	(0)	(13)	n.a.
		8-8.99	M/F	(96)	(1)	(21)	(0)	(3)	(0)	(15)	n.a.
		9-9.99	M/F	(80)	(1)	(24)	(0)	(3)	(1)	(17)	n.a.

[1] Category <-2 Z-scores includes <-3 Z-scores.

[2] The study was conducted in the Central region of Uganda, in Wakiso District. The two semi-urban government primary schools were Kazo mixed and Kazo Church of Uganda found in Nabweru sub-county (6km northwest of Kampala).

Data based on NCHS/CDC/WHO Child Growth reference (WHO, 1983)

n.a.: not available

Results in brackets are based on small samples and therefore must be interpreted with caution.

Anthropometry of adolescents

There is currently no data available on anthropometry of adolescents in Uganda.

Anthropometry of adult women

Over the last 15-year period, three national surveys have been conducted to assess anthropometry of women of childbearing age in Uganda: the 2006 UDHS, the 2000-2001 UDHS and the 1995 UDHS (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001; SD/MFED and Macro International Inc., 1996).

In 2006, only 2% of women of childbearing age measured less than 145 cm, a cutoff below which risk of difficult delivery and of giving birth to a low birth weight baby is higher due to intrauterine growth retardation. Mean body mass index (BMI) was 22 kg/m^2, with substantial disparities according to background characteristics (Table 18) (UBOS and Macro International Inc., 2007).

The prevalence of chronic energy deficiency (CED) (BMI<18.5 kg/m^2) among women of childbearing age was 12%. The prevalence of CED was slightly higher among young women aged 15-19 years than among older women. In rural areas, prevalence was more than twice that of urban areas. The prevalence of CED was higher in the northern and eastern parts of the country, in Eastern, North, West Nile and East Central regions. The prevalence of CED decreased significantly with increasing educational level (UBOS and Macro International Inc., 2007).

These data reveal that CED, which constitutes a risk in terms of pregnancy outcome and maternal mortality, persists among women of childbearing age. It is also a contributing factor to malnutrition among young children.

At national level in 2006, 17% of women of childbearing age were overweight or obese. The prevalence of overweight and obesity increased with age and with increasing educational level. In urban areas, about one-third of women were overweight or obese compared to 13% in rural areas. In Kampala the prevalence of overweight and obesity reached 34% (UBOS and Macro International Inc., 2007).

In the 1995 UDHS, only women who had given birth in the four years preceding the survey were measured while in the 2000-2001 and 2006 UDHS, the data refer to all women age 15-49 years, difference which may introduce a bias in trends. Hence, only data from the 2000-2001 and 2006 UDHS are compared. Comparison of these two UDHS[16] shows that the prevalence of CED remained almost stable (10% in 2000-2001 and 12% in 2006) and that of overweight and obesity increased slightly from 14% in 2000-2001 to 17% in 2006. During this period, the prevalence of overweight and obesity increased by 4 percentage points in urban areas and by only 2 points in rural areas (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In urban areas, in 2006 the prevalence of overweight and obesity among women of childbearing age (34%) was significantly higher than the prevalence of CED (6%), indicating that Uganda is undergoing a nutrition transition, which currently remains limited to urban areas. In rural areas, in 2006 the prevalence of overweight and obesity among women (13%) was similar to that of CED (14%) (UBOS and Macro International Inc., 2007).

[16] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Table 18: Anthropometry of adult women

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Anthropometry of adult women								
			Height			Body Mass Index[1] (kg/m²) (BMI)					
								Percentage of women with BMI			
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	<18.5 (chronic energy deficiency)	18.5-24.9 (normal)	25.0-29.9 (overweight)	≥30.0 (obesity)
Uganda Demographic and Health Survey 2006 (May-Oct. 2006) (UBOS and Macro International Inc., 2007)	**Total**	15-49	2872	n.a.	1.9	2434	22.2	12.1	71.3	12.4	4.1
	Age										
		15-19	640	n.a.	4.0	578	21.3	16.1	74.4	8.0	1.5
		20-29	1062	n.a.	1.8	815	22.2	9.0	75.4	12.3	3.3
		30-39	741	n.a.	1.1	631	22.5	12.2	67.4	15.0	5.4
		40-49	429	n.a.	0.5	409	22.7	12.6	65.0	15.0	7.3
	Residence										
	Urban	15-49	475	n.a.	1.7	428	24.3	5.9	60.4	21.5	12.2
	Rural	15-49	2397	n.a.	2.0	2006	21.7	13.5	73.7	10.5	2.4
	Region										
	Central 1	15-49	309	n.a.	2.1	263	23.1	7.1	70.0	18.6	4.3
	Central 2	15-49	257	n.a.	4.1	218	22.7	7.4	70.6	17.4	4.6
	Kampala	15-49	238	n.a.	1.3	221	24.6	4.8	60.8	19.1	15.3
	East Central	15-49	281	n.a.	1.7	234	21.8	13.4	75.5	10.1	1.0
	Eastern	15-49	395	n.a.	1.6	320	20.9	18.7	76.4	2.8	2.2
	North	15-49	430	n.a.	0.2	369	20.6	20.8	73.1	5.1	1.0
	West Nile	15-49	163	n.a.	0.5	136	20.6	19.9	73.5	5.7	0.9
	Western	15-49	429	n.a.	3.9	346	22.3	9.6	73.7	13.5	3.2
	Southwest	15-49	369	n.a.	1.4	327	23.3	6.6	66.7	20.9	5.8
	North sub-regions										
	IDP	15-49	158	n.a.	0.5	135	20.7	19.6	75.5	4.3	0.5
	Karamoja	15-49	(94)	n.a.	(0)	(78)	(19.7)	(32)	(60)	(7)	(1)
	Education's level										
	No education	15-49	553	n.a.	1.2	466	21.3	17.7	71.3	8.2	2.8
	Primary	15-49	1695	n.a.	2.3	1408	21.9	13.0	72.0	11.8	3.3
	Secondary or higher	15-49	624	n.a.	1.6	559	23.4	5.4	69.6	17.7	7.2

[1] excludes pregnant women and women with a birth in the 2 months preceding the survey.
Note: the sample includes all women age 15-49.
Results in brackets are based on small samples and therefore must be interpreted with caution.
n.a. : not available.

Table 18: Anthropometry of adult women (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Anthropometry of adult women							
			Height			Body Mass Index[1] (kg/m²) (BMI)				
								Percentage of women with BMI		
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	<18.5 (chronic energy deficiency)	18.5-24.9 (normal)	≥25.0 (overweight or obese)
Uganda Demographic and Health Survey 2000-2001 (Sept. 2000- Mar. 2001) (UBOS and ORC Macro, 2001)	**Total**	15-49	6668	158.1	2.2	5601	21.9	10.4	75.8	13.8
	Age									
		15-19	1444	156.3	3.8	1274	21.4	12.9	77.4	9.7
		20-24	1392	157.8	1.8	1053	21.9	7.0	80.9	12.1
		25-29	1245	158.4	2.3	980	22.0	8.0	78.4	13.6
		30-34	921	159.3	0.7	756	22.2	10.7	71.8	17.5
		35-39	746	158.9	0.7	652	22.0	13.3	70.7	16.0
		40-44	531	159.3	1.6	502	22.3	10.5	73.7	15.8
		45-49	388	158.4	4.9	383	22.2	11.4	70.4	18.2
	Residence									
	Urban	15-49	1021	158.0	2.0	914	23.6	4.7	65.1	30.2
	Rural	15-49	5647	158.1	2.2	4687	21.6	11.5	77.9	10.6
	Region									
	Central	15-49	2029	156.7	2.3	1768	22.8	5.8	72.7	21.5
	Eastern	15-49	1833	159.3	1.5	1480	21.2	13.9	77.1	9.0
	Northern	15-49	1102	160.7	0.5	936	20.7	17.7	77.2	5.1
	Western	15-49	1704	156.7	4.0	1416	22.3	7.5	77.7	14.8
	Education's level									
	No education	15-49	1489	158.3	2.9	1247	21.4	12.4	78.8	8.8
	Primary	15-49	3996	157.7	2.3	3298	21.7	11.1	76.9	12.0
	Secondary or higher	15-49	1182	159.0	0.9	1055	23.2	5.7	69.3	25.0

[1] excludes pregnant women and women with a birth in the 2 months preceding the survey.
Note: the sample includes all women age 15-49.

Table 18: Anthropometry of adult women (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Anthropometry of adult women						
			Height			Body Mass Index[1] (kg/m²) (BMI)			
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	Percentage of women with BMI	
								<18.5 (chronic energy deficiency)	≥25.0 (overweight or obese)
Uganda Demographic and Health Survey 1995 (Mar. – Aug. 1995) (SD/MFED and Macro International Inc., 1996)	**Total**	15-49	4091	158.3	1.6	3207	21.5	9.9	n.a.
	Age								
		15-19	522	156.7	2.7	409	21.2	10.6	n.a.
		20-24	1216	158.0	1.5	954	21.2	9.6	n.a.
		25-29	949	158.7	1.3	714	21.5	9.0	n.a.
		30-34	713	159.1	1.0	547	21.7	10.2	n.a.
		35-49	690	158.5	1.9	583	21.7	10.8	n.a.
	Residence								
	Urban	15-49	476	158.8	0.8	396	22.8	5.2	n.a.
	Rural	15-49	3615	158.2	1.7	2811	21.3	10.6	n.a.
	Region								
	Central	15-49	1067	157.2	1.8	830	22.2	5.4	n.a.
	Eastern	15-49	1078	159.0	0.6	792	20.7	14.1	n.a.
	Northern	15-49	830	160.9	0.2	674	20.6	14.0	n.a.
	Western	15-49	1116	156.6	3.4	911	22.1	7.3	n.a.
	Education's level								
	No education	15-49	1274	158.3	1.4	997	21.2	10.4	n.a.
	Primary	15-49	2380	158.1	1.8	1863	21.4	10.1	n.a.
	Secondary or higher	15-49	438	159.1	0.9	347	22.3	7.4	n.a.

[1] excludes pregnant women and women with a birth in the 3 months preceding the survey.
Note: the sample includes women who had a birth in the four years preceding the survey.
n.a.: not available.

Anthropometry of adult men

There is currently no data available on anthropometry of adult men in Uganda.

II.6 Micronutrient deficiencies

Iodine deficiency disorders (IDD)

Prevalence of goitre and urinary iodine level

There is currently no data available on prevalence of goitre at national level. Only sub-national estimates are available. The prevalence of low urinary iodine among school-age children was assessed at national level in 2005 (Olico-Okui, 2005).

The nation-wide survey conducted in 2005 measured urinary iodine concentration among children aged 6-12 years. The survey was a two-stage cluster sampling survey stratified by geographical regions (North, East, Central and West). The sample was comprised of 3260 children (boys and girls) selected from 119 schools (Olico-Okui, 2005).

According to this survey, median urinary iodine concentration among school-age children was 464 µg/L, a level well above the threshold defined by WHO (300 µg/L) to indicate excessive iodine intake, with risks of adverse health consequences (iodine-induced hyperthyroidism, autoimmune thyroid diseases). Only 4% of children had an urinary iodine concentration below 100 µg/L (Table 19) (Olico-Okui, 2005; WHO, Database on iodine deficiency disorders; WHO, 2001a).

These results, representative at national level, confirm earlier sub-national estimates indicative of a probable risk of excessive iodine intake in the population.

In 1999, a survey was conducted in six districts from different parts of the country: Apac (lowland, Northern), Hoima (lowland, Midwestern), Luwero (lowland, Central), Kisoro (highland, Southwestern), Kabale (highland, Western) and Kapchorwa (highland, Eastern) (Bimenya et al., 2002). Children aged 6–12 years attending both public and private schools (72 primary schools) were randomly selected for the study. A total of 2 870 children were included for assessing the prevalence of goitre and 293 children were included for urinary iodine measurements (Bimenya et al., 2002).

Results of the 1999 sub-national survey revealed that the prevalence of total goitre among school-age children was 60%, ranging from 43% in Luwero to 76% in Kapchorwa, and the prevalence of visible goitre was as high as 31% (Bimenya et al., 2002; WHO, Database on iodine deficiency disorders). Hence, in all the sampled districts, the prevalence of total goitre was above above the WHO cut-off (30%) to consider IDD as a public health problem of severe importance in these areas (WHO, 2001a). In the highland districts of Kabale, Kapchorwa and Kisoro the prevalence of total goitre was higher than in the lowland districts of Apac, Luwero and Hoima, though the prevalence in Hoima approaches those in highland districts. At the same time, the overall median urinary iodine concentration was 310 µg/L and only 5% of children had urinary iodine concentration below 50 µg/L. In all districts, except Kabale and Kisoro, median levels of urinary iodine was above 300 µg/L, indicative of excessive iodine intake according to WHO criteria (Bimenya et al., 2002; WHO, 2001a). In Kisoro, 20% of children had urinary iodine concentration below 50 µg/L (Bimenya et al., 2002).

Results from a 1991 survey conducted in four endemic districts (Kisoro, Bundibugyo, Hoima and Kapchorwa) had indicated a prevalence of goitre of 75%, estimated based on a sample of 1 523 children aged 10 years and above (maximum age not reported) attending school. During the same year (1991), in Masindi district, the prevalence of goitre among 2 032 school children aged 11-13 years had been estimated at 44% (MoH, 1993; WHO, Database on iodine deficiency disorders; NSEID, 2007).

High levels of IDD in Uganda might be related to low consumption of iodine-rich foods such as fish and poor availability of iodine in the soil. Uganda is a mountainous country and high levels of IDD might be related to this ecological characteristic which influences the availability of iodine in the soil and hence iodine levels of the crops grown in these areas.

In Uganda, the *Universal Salt Iodization* (USI) strategy, which established that all salt entering the country must be iodized, was developed in 1994. When the sub-national survey of 1999 revealed a high prevalence of goitre in some districts, the implementation of USI was still recent and prevalence of goitre remained high because it takes a long time for goitre to disappear following the introduction of iodized salt. Biological indicators (urinary iodine) are more sensitive to recent changes in iodine intake and therefore more useful for short-term evaluation of programme impact (FAO, 2005). Median urinary iodine concentration (assessed among school-age children at national level in 2005 and at sub-national level in 1999) indicated excessive iodine intake. This problem needs to be tackled urgently.

Table 19: Prevalence of goitre and level of urinary iodine in school-age children

Survey name/date (Reference)	Background characteristics	Sex	Age (years)	Prevalence of goitre		Level of urinary iodine		
				Sample size	Percentage with goitre [Total goitre]	Sample size	Median (µg/L)	Percentage with urinary iodine <100µg/L
Assessment of the success of Uganda's USI in the control of IDD after 10 years 2005 (WHO Database on iodine deficiency - Olico-Okui, 2005)	**Total**	M/F	6-12.99	n.a.	n.a.	3260	463.8	3.9
	Sex							
		M	6-12.99	n.a.	n.a.	1640	483.5	n.a.
		F	6-12.99	n.a.	n.a.	1620	448.8	n.a.
	Residence							
	Urban	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Rural	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Region							
	Central	M/F	6-12.99	n.a.	n.a.	854	437.3	3.9
	Eastern	M/F	6-12.99	n.a.	n.a.	820	467.6	2.9
	Northern	M/F	6-12.99	n.a.	n.a.	780	564.2	1.2
	Western	M/F	6-12.99	n.a.	n.a.	806	388.3	7.7

n.a. : not available

Iodization of salt at household level

Most of Uganda's salt is imported. At border main entry points, the Uganda National Bureau of Standards tests imported salt samples for evidence of iodine using the standard rapid field test kits (NSEID, No date).

Two nationally representative surveys document iodization of salt at household level: the 2006 UDHS and the 2000-2001 UDHS (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In Uganda, consumption of adequately iodized salt (≥15 ppm) is nearly universal: in 2006, 96% of households for which salt testing was carried out had adequately iodized salt, a level comparable to that reported in 2000-2001 (95%)[17] (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

Urban households were slightly more likely to use adequately iodized salt than their rural counterparts (Table 20). By region, the percentage of households using adequately iodized salt ranged from 90% in Western region to 100% in Kampala (UBOS and Macro International Inc., 2007).

In view of results from the 2005 national survey conducted among school-age children revealing excessive iodine intake, iodine level of salt at household level needs to be evaluated and the iodized salt programme needs to be carefully monitored.

[17] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Table 20: Iodization of salt at household level

Survey name/date (Reference)	Background characteristics	Total number of households	Percentage of households tested	Iodine level of household salt		
				None (0 ppm)	Inadequate (<15 ppm)	Adequate (≥15 ppm)
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	8870	88.8	1.5	2.8	95.8
	Residence					
	Urban	1389	85.3	0.1	1.2	98.7
	Rural	7481	89.4	1.7	3.0	95.3
	Region					
	Central 1	1029	88.3	0.0	1.1	98.9
	Central 2	920	89.3	0.2	1.4	98.4
	Kampala	663	85.1	0.0	0.4	99.6
	East Central	863	88.1	0.1	2.0	97.9
	Eastern	1168	89.1	0.0	2.2	97.8
	North	1385	85.3	0.1	2.7	97.2
	West Nile	473	93.8	0.1	8.3	91.6
	Western	1289	90.1	7.2	2.9	89.9
	Southwest	1081	92.0	2.8	5.4	91.8
	North sub-regions					
	IDP	595	87.3	0.0	3.1	96.9
	Karamoja	328	67.0	0.0	0.6	99.4

Note: ppm = parts per million

Vitamin A deficiency (VAD)

Prevalence of sub-clinical and clinical vitamin A deficiency

The 2006 UDHS and the 2000-2001 UDHS provide nationally representative data on sub-clinical vitamin A deficiency (VAD) among preschool children while no data are available on the clinical signs of the deficiency in this age group (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001). However, it is important to note that biochemical methods differ between the two surveys. In the 2000-2001 UDHS, vitamin A status was determined by measuring serum retinol concentrations using high-performance liquid chromatography (HPLC), the gold standard, while the 2006 UDHS employed the retinol binding protein enzyme assay (RBP-EIA). The cut-off used to indicate VAD in children is a concentration of 0.70 µmol/L of retinol. The current international consensus is that a concentration of 0.70 µmol/L of retinol is equivalent to a concentration of 0.825 µmol/L of RBP which is the cut-off used in the 2006 UDHS (UBOS and Macro International Inc., 2007).

In 2006, 20% of children aged 6-59 months had RBP levels below the cut-off point of 0.825 µmol/L (UBOS and Macro International Inc., 2007). Therefore, according to WHO criteria, VAD is a problem of severe public health significance (WHO, 2009).

Boys were more likely to have sub-clinical VAD than girls as were children living in rural areas when compared to those living in urban areas (Table 21). Regional disparities in the prevalence of low level of RBP were substantial, ranging from 12% in Kampala to 32% in East Central region (UBOS and Macro International Inc., 2007).

In East Central region, vitamin A supplementation coverage of children (6-59 months, see Table 23) and percentage of young children (6-35 months) consuming foods rich in vitamin A[18] were higher than respective national averages in 2006 (UBOS and Macro International Inc., 2007). Although vitamin-A rich foods may be consumed only in small amounts by children, some other factors may explain the high prevalence of sub-clinical VAD in this region. These factors include poor child feeding practices such as low rates of exclusive breastfeeding, high prevalence of sub-clinical VAD among women of childbearing age (see Table 22) and subsequently low breastmilk retinol content, and high rates of infectious diseases among children, especially measles, which may contribute to VAD in this region which registered the lowest percentage of children immunized against measles in 2006 (UBOS and Macro International Inc., 2007).

[18] In the 24 hours preceding the survey; foods rich in vitamin A include meat (and organ meat), fish, poultry, eggs, pumpkin, carrots, orange-fleshed sweet potatoes, dark green leafy vegetables, mango and papaya.

In 2000-2001, 28% of children aged 6-59 months had serum retinol level below 0.70 µmol/L (UBOS and ORC Macro, 2001). Differences in prevalence between the two surveys are hence small and could be due to the differing methodologies (UBOS and Macro International Inc., 2007).

Among children, VAD remains a severe public health problem and efforts to address this problem need to be maintained and upscaled. In the short term, intensive national supplementation campaigns were recommended by the Ministry of Health in 2004 and are currently implemented (MoH, 2004).

Table 21: Prevalence of sub-clinical and clinical vitamin A deficiency in children under 5 years

Survey name/date (Reference)	Background characteristics	Age (months)	Sex	Prevalence of low level of RBP*		Clinical signs of xerophthalmia		
				Sample size	Percentage with RBP <0.825 µmol/L	Sample size	Type of sign	Percentage
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	6-59	M/F	2460	20.4	n.a.	n.a.	n.a.
	Sex							
		6-59	M	1218	22.4	n.a.	n.a.	n.a.
		6-59	F	1242	18.5	n.a.	n.a.	n.a.
	Residence							
	Urban	6-59	M/F	241	14.9	n.a.	n.a.	n.a.
	Rural	6-59	M/F	2219	21.1	n.a.	n.a.	n.a.
	Region							
	Central 1	6-59	M/F	251	22.6	n.a.	n.a.	n.a.
	Central 2	6-59	M/F	228	24.2	n.a.	n.a.	n.a.
	Kampala	6-59	M/F	118	12.3	n.a.	n.a.	n.a.
	East Central	6-59	M/F	285	32.3	n.a.	n.a.	n.a.
	Eastern	6-59	M/F	375	22.1	n.a.	n.a	n.a.
	North	6-59	M/F	365	19.8	n.a.	n.a.	n.a.
	West Nile	6-59	M/F	134	19.6	n.a.	n.a.	n.a.
	Western	6-59	M/F	381	14.7	n.a.	n.a.	n.a.
	Southwest	6-59	M/F	322	14.7	n.a.	n.a.	n.a.
	North sub-regions							
	IDP	6-59	M/F	156	9.3	n.a.	n.a.	n.a.
	Karamoja	6-59	M/F	(82)	(6)	n.a.	n.a.	n.a.

*: Retinol binding protein
n.a.: not available.
Results in brackets are based on small samples and therefore must be interpreted with caution.

Among school-age children, no nationally representative data on VAD are currently available. Only fragmented data on sub-clinical VAD are available.

The nutritional status of school children study carried out in central Uganda in 2006 assessed the vitamin A status of children aged 6-9.99 years (Kikafunda et al., 2006, unpublished). The study was conducted in the Central region, in Wakiso District. Two semi-urban government primary schools were selected for the survey. The sample was comprised of 526 children aged 6-9.99 years. Serum retinol was measured using HPLC. According to this survey, 24.9% of the school-age children had a serum retinol concentration below the cut-off point of 0.70 µmol/L. Less than one percent of the children (0.8%) had serum retinol concentration below 0.35 µmol/L (Kikafunda et al., 2006, unpublished).

This survey, conducted in two semi-urban primary schools, revealed that the prevalence of sub-clinical VAD among school-age children was high in the study area. However, since the sample is not representative, prevalence cannot be inferred to the national level.

Two nationally representative surveys document sub-clinical and clinical VAD in women: the 2006 UDHS and the 2000-2001 UDHS (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

To evaluate sub-clinical VAD in women, the 2006 UDHS used the same methodology as for children, based on the concentration of RBP. The cut-off used for women was 1.24 µmol/L of RBP[19] (UBOS and Macro

[19] In these analyses, 0.7 µmol/L of retinol is assumed to be equivalent to 0.825 µmol/L of RBP.

International Inc., 2007). Nineteen percent of the women had a low RBP concentration. Prevalence was slightly higher in rural areas than in urban areas (Table 22). Regional differences in prevalence were marked, ranging from 13% in Western region to 31% in East Central region (UBOS and Macro International Inc., 2007).

In 2001, 52% of women had serum retinol concentration below 1.05 µmol/L (UBOS and ORC Macro, 2001). The difference in prevalence between these two surveys is large; nevertheless it is difficult to interpret it because of the differing methods used.

The 2006 UDHS documented clinical signs of VAD (night blindness) among mothers during their last pregnancy (in the five years preceding the survey). Prevalence of night blindness adjusted for daytime blindness was 1%, which is lower than the WHO cutoff (5%) for defining a problem of public health significance (UBOS and Macro International Inc., 2007; WHO, 2009). These results are similar to those reported in the 2000-2001 UDHS[20] (UBOS and ORC Macro, 2001).

Table 22: Prevalence of clinical vitamin A deficiency in mothers during their last pregnancy and prevalence of sub-clinical vitamin A deficiency among women

Survey name/date (Reference)	Background characteristics	Age (years)	Prevalence of night blindness during pregnancy[1]			Prevalence of low level of RBP among women	
			Number of mothers	Percentage non adjusted	Percentage adjusted for daytime blindness	Number of women	Percentage of women with RBP <1.24 µmol/L
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	15-49	5035	8.0	1.3	2834	19.4
	Residence						
	Urban	15-49	668	4.0	1.5	460	17.4
	Rural	15-49	4367	8.6	1.3	2374	19.8
	Region						
	Central 1	15-49	497	2.8	0.1	303	14.4
	Central 2	15-49	428	3.4	0.7	253	20.7
	Kampala	15-49	298	1.8	0.2	230	13.5
	East Central	15-49	510	14.4	0.2	280	31.2
	Eastern	15-49	755	6.9	1.3	391	24.0
	North	15-49	872	7.9	1.5	419	20.8
	West Nile	15-49	289	11.1	1.5	165	21.3
	Western	15-49	772	13.1	2.4	427	12.7
	Southwest	15-49	615	6.9	2.2	366	18.1
	North sub-regions						
	IDP	15-49	356	9.1	0.4	155	11.8
	Karamoja	15-49	188	6.9	3.8	(91)	(7)

[1] During the last pregnancy of women with a live birth in the 5 years preceding the survey.
Results in brackets are based on small samples (<100) and therefore must be interpreted with caution.
Note : RBP = retinol binding protein

In conclusion, sub-clinical data indicate that VAD is common among both young children and women.

The main causes of VAD in Uganda are very low availability and intake of foods of animal origin (meat and offals, eggs, dairy products) which contain high amounts of preformed retinol, and low intake of tubers, fruit, and vegetables rich in carotenoids. The per capita supply of milk/dairy products, already initially low, has declined slightly in the last two decades and that of meat has remained very limited (FAO, Faostat). Consumption of foods of animal origin, which are expensive, is very low and overall only 4% of households consume meat daily (MOST and MoH, 2004). Low intake of fruit and vegetables rich in vitamin A (dark green leaves - such as those of amaranth and spinach -, mangoes, papayas, etc.) is also a contributor to VAD.

The Ugandan diet is mainly based on plantain (*matooke*), starchy roots (cassava and white fleshed sweet potatoes) and cereals (maize, millet, sorghum). Plantain contains very little beta-carotene and most starchy roots contain only negligible amounts of beta-carotene with the exception of orange-flesh varieties of sweet potato and yam (FAO, 1990). Beta-carotene is generally less well absorbed than retinol, but these sources of vitamin A are generally more affordable than animal products. Moreover, the share of lipids in the DES is

[20] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

relatively low (16% in 2003-2005, at the lower limit of recommendations - see Figure 1), and effective utilization of vitamin A requires an adequate share of lipids in the diet (FAO, 1997).

The 2006 UDHS estimated the consumption of vitamin A-rich foods (meat, fish, poultry, eggs, pumpkin, carrots, orange-fleshed sweet potatoes, dark green leafy vegetables, mango and papaya) by children aged 6-35 months and mothers aged 15-49 years with a child under three years of age. The samples included 3 133 children and 3 922 mothers. Results showed that 62% of children and 69% of mothers had consumed vitamin A-rich foods in the 24 hours preceding the survey (UBOS and Macro International Inc., 2007). However, it is likely that the amounts of vitamin A-rich foods consumed are low, especially regarding animal products. As revealed by the 2008 Food Consumption Survey conducted in three regions of Uganda, the prevalence of insufficient intake of vitamin A was very high among both young children and women (Harvey et al., 2008).

In addition to vitamin A obtained through the diet, vitamin A supplements may be given to children as part of primary prevention programmes. Mothers may get vitamin A supplements during the post-partum period to assist both the women and their breastfeeding children.

Vitamin A supplementation

For the immediate prevention and control of VAD, the government of Uganda gave highest priority to vitamin A supplementation. The micronutrient supplementation strategy was aimed at high risk groups, mostly children between 6 and 59 months of age and post-partum women (MoH, 1999).

In 1999, an analysis of the nutrition situation was carried out in order to identify priority nutrition actions for the health sector and indirect data suggested strongly that VAD was a problem of public health significance. Therefore, the Health Sector Strategic Plan called for improving vitamin A status through increasing coverage of supplementation for preschool children, enhancing breastfeeding, and increasing consumption of vitamin-A rich foods through agriculture and fortification. At that time, vitamin A supplements were being delivered to children together with routine EPI measles vaccination at 9 months of age and National Immunisation Days (NIDs) for polio. In strengthening the on-going supplementation interventions, the Ministry of Health supported one district to pilot test all the processes needed to implement a successful supplementation programme at district and community levels. The national vitamin A supplementation programme was then launched in May 2002, with various delivery mechanisms for providing vitamin A to children, making it difficult to monitor coverage. In April 2004, the Ministry of Health launched a new strategy to promote twice-annual Child Days during which an integrated package of child health interventions is delivered, including vitamin A to all children aged 6-59 months as well as deworming (for children from 1 to 14 years), immunization, growth monitoring, etc. (Sserunjogi and Harvey, 2005).

The 2006 UDHS and 2000-2001 UDHS provide nationally representative data on vitamin A supplementation of children and mothers (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In 2006, only 36% of children aged 6-59 months had received vitamin A supplementation in the 6 months preceding the survey. Children living in rural areas were slightly more likely to be provided vitamin A supplements than those living in urban areas (Table 23). Disparities across regions were substantial, coverage ranging from 23% in Central 1 region to almost 50% in North and Western regions. Supplementation coverage was relatively high in both IDP camps (51%) and Karamoja sub-region (47%) (UBOS and Macro International Inc., 2007).

Vitamin A supplementation coverage of children needs to be substantially extended. Despite the implementation of a new strategy for twice-annual vitamin A supplementation in 2004, the percentage of children aged 6-59 months who received vitamin A supplements in the 6 months preceding the survey remained almost unchanged between 2000-2001 (38%) and 2006 (36%)[21] (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001). Low vitamin A supplementation coverage of children can be attributed to the high workload of the mothers who still find it a challenge to take their children to a health facility unless they are sick.

In 2006, among mothers with a birth in the five years preceding the survey, only one-third had been provided vitamin A supplements within 2 months postpartum. Coverage of mothers was significantly higher in urban areas than in rural areas (Table 23). Women living in the Southwest region were less likely to have received vitamin A supplements (UBOS and Macro International Inc., 2007).

[21] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Vitamin A supplementation coverage of mothers also needs to be extended. Nevertheless, progress has been achieved: the percentage of mothers who received vitamin A supplements within 2 months postpartum increased from only 11% in 2000-2001 to 33% in 2006[22]. The percentage of mothers who had been provided vitamin A supplements almost doubled in urban areas and tripled in rural areas during this 5-year period (UBOS and ORC Macro, 2001; UBOS and Macro International Inc., 2007). This increase could be the result of the efforts of the Health Sector Strategic Plan (HSSP) of the Ministry of Health which sensitises mothers, through traditional birth attendants, to request supplements if they delivered at home.

Table 23: Vitamin A supplementation of children and mothers

Survey name/date (Reference)	Background characteristics	Children				Mothers		
		Age (months)	Sex	Number of children	Percent of children who received vit. A supplements in the 6 months preceding the survey	Age (years)	Number of mothers[1]	Percent of mothers who received vit. A supplements within 2 months postpartum
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	6-59	M/F	6863	36.4	15-49	5035	32.7
	Sex							
		6-59	M	3355	36.6			
		6-59	F	3508	36.3			
	Residence							
	Urban	6-59	M/F	769	33.8	15-49	668	44.1
	Rural	6-59	M/F	6094	36.8	15-49	4367	30.9
	Region							
	Central 1	6-59	M/F	654	23.2	15-49	497	26.5
	Central 2	6-59	M/F	584	28.8	15-49	428	40.4
	Kampala	6-59	M/F	343	30.3	15-49	298	46.9
	East Central	6-59	M/F	753	40.8	15-49	510	42.2
	Eastern	6-59	M/F	1105	29.4	15-49	755	32.3
	North	6-59	M/F	1165	48.1	15-49	872	29.3
	West Nile	6-59	M/F	363	30.6	15-49	289	43.0
	Western	6-59	M/F	1066	49.4	15-49	772	29.0
	Southwest	6-59	M/F	830	29.9	15-49	615	22.7
	North sub-regions							
	IDP	6-59	M/F	470	51.0	15-49	356	32.3
	Karamoja	6-59	M/F	259	46.8	15-49	188	36.8

[1] Women with a birth in the 5 years preceding the survey. For women with two or more births during that period, data refer to the most recent birth

Besides supplementation, food-based interventions to provide a long-term sustainable approach to eliminating VAD in Uganda include information, education and communication (IEC) activities to promote behaviour change and increase the production and intake of vitamin A-rich foods (Lwamafa, 1995).

Bio-fortification is a food-based strategy that is based on the breeding of micronutrient-rich varieties of foods. Bio-fortification through promotion of orange-fleshed sweet potatoes (OFSP) which are rich in beta carotene is already in practice in Uganda. However, adoption and production of the beta-carotene rich OFSP has been constrained by a lack of planting material, low use of inputs, pests and diseases, erratic rainfall and post harvest and marketing issues (Potts and Nagujja, 2007). OFSP vines for planting can now be obtained from Namulonge Agricultural Research Institute or from some farmers.
Fortification of processed foods with micronutrients is another food-based strategy that can target a large population. However, the success of the strategy may be limited as the majority of the people in Uganda consume unprocessed foods (UBOS and ORC Macro, 2001; Bukusuba, 2005). The Uganda Food Fortification Programme was launched in 2004 and already, maize flour fortified with vitamin A, iron and B vitamins, and vegetable cooking oil fortified with vitamin A, are being sold (Bukusuba, 2005).

[22] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

Iron deficiency anemia (IDA)

Prevalence of IDA

Two nationally representative surveys, the 2006 UDHS and the 2000-2001 UDHS, document the prevalence of anemia among preschool children, women of childbearing age and men (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In 2006, almost three-quarters of children aged 6-59 months were anemic (hemoglobin <11.0g/dL) and 7% were severely anemic (hemoglobin <7.0g/dL) (UBOS and Macro International Inc., 2007). Prevalence of anemia was above the 40% threshold defined by WHO as representing a severe public health problem in the country (WHO, 2001b).

Prevalence of anemia (any anemia) was higher among boys than among girls (Table 24). Prevalence decreased with age, particularly after the second year of life (UBOS and Macro International Inc., 2007). Iron requirements rise markedly after age 4-6 months and during the remaining part of the first year these requirements are very high (WHO/FAO, 2004). Coupled with poor maternal iron status and insufficient iron intake, this may explain the extremely high prevalence of anemia among the younger children. Prevalence of anemia was significantly higher in rural areas (74%) than in urban areas (57%). By region, there were substantial disparities, ranging from a prevalence of 52% in Kampala to 80% in Central 1, East Central, Eastern and North regions (UBOS and Macro International Inc., 2007).

In order to compare 2006 UDHS data on anemia with 2000-2001 UDHS data, several adjustments were made: the 2000-2001 and 2006 data have been adjusted for altitude and the 2006 data excludes districts not covered in the 2000-2001 UDHS (UBOS and Macro International Inc., 2007).

After adjustments, the comparison of the two UDHS surveys shows that the prevalence of anemia in preschool children remained about the same over this time span: the prevalence of any anemia was 71% in 2000-2001 and 73% in 2006; the prevalence of severe anemia was 8% in 2000-2001 and 7% in 2006 (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In a study by Kikafunda et al. (2008) conducted in a rural district in South Western Uganda to assess the prevalence of anemia and the associated factors among under-fives (6-59 months) and their mothers, slightly over one quarter (26%) of the children studied were found to be anemic (any anemia, defined as hemoglobin <11.0g/dL). There was a significant correlation between the anemia status of the child and that of his/her mother. Being male, not being born in a health facility, low maternal formal education, poor maternal knowledge of child nutrition issues and, starting complementary foods before 6 months of age, were factors that were significantly associated with high prevalence of anemia among the study children (Kikafunda et al., 2008).

Table 24: Prevalence of anemia in preschool children

Survey name/date (Reference)	Background characteristics	Age (months)	Sex	Sample size	Percentage of children with	
					Any anemia (Hb<11.0 g/dL)	Severe anemia (Hb<7.0 g/dL)
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	6-59	M/F	2466	72.6	6.8
	Sex					
		6-59	M	1225	74.9	6.4
		6-59	F	1241	70.3	7.2
	Age					
		6-8	M/F	130	92.9	19.3
		9-11	M/F	139	90.9	16.4
		12-17	M/F	294	87.9	15.2
		18-23	M/F	286	82.3	9.5
		24-35	M/F	536	71.0	5.3
		36-47	M/F	537	69.1	2.6
		48-59	M/F	544	54.8	1.0
	Residence					
	Urban	6-59	M/F	239	56.6	2.0
	Rural	6-59	M/F	2227	74.3	7.3
	Region					
	Central 1	6-59	M/F	253	80.3	6.0
	Central 2	6-59	M/F	229	72.3	7.2
	Kampala	6-59	M/F	116	52.2	1.8
	East Central	6-59	M/F	285	79.5	9.5
	Eastern	6-59	M/F	376	80.0	7.8
	North	6-59	M/F	366	80.2	5.4
	West Nile	6-59	M/F	135	69.2	5.1
	Western	6-59	M/F	383	64.4	6.9
	Southwest	6-59	M/F	324	62.2	7.4
	North sub-regions					
	IDP	6-59	M/F	156	77.8	2.3
	Karamoja	6-59	M/F	(82)	(82)	(8)

Hb: Hemoglobin
Prevalence of anemia is adjusted for altitude using formulas in CDC, 1998.
Results in brackets are based on small samples and therefore must be interpreted with caution.

There is currently no nationally representative data available on the prevalence of anemia in school-age children.

Results of the study on the nutritional status of school children conducted in 2006 in two primary schools of Wakiso District, Central Uganda (sample size: 262) found that the prevalence of anemia[23] among children aged 6-9.99 years was 35.1%. The prevalence of severe anemia was 0.4%, that of moderate anemia was 1.9% and that of mild anemia was 32.8% (Kikafunda et al., 2006, unpublished). In the same study, serum ferritin concentration for 474 children was determined using the ELISA method and the results showed that 3% of the children had a serum ferritin level below 10 µg/L (Kikafunda et al., 2006, unpublished). Since serum ferritin can be increased due to infection (including subclinical infection), this result does not rule out iron deficiency. This survey was conducted among school children living in a semi-urban area. Since the sample is not representative, prevalence cannot be inferred to the national level.

Among women of childbearing age, according to the UDHS survey conducted in 2006 at national level, the prevalence of anemia was 49% and severe anemia affected 1% of women (Table 25) (UBOS and Macro International Inc., 2007).

Young women aged 15-19 years were less likely to be anemic than women aged 20-49. The prevalence of anemia among pregnant women and among breastfeeding women was significantly higher than in non-

[23] Anemia (any anemia) is defined as hemoglobin <12.0 g/dL; mild anemia is defined as hemoglobin between 10.0-11.9 g/dL; moderate anemia is defined as hemoglobin between 7.0-9.9 g/dL; severe anemia is defined as hemoglobin <7.0 g/dL.

pregnant/non breastfeeding women (UBOS and Macro International Inc., 2007). During pregnancy, iron deficiency is associated with multiple adverse outcomes for both mother and infant, including an increased risk of haemorrhage, maternal mortality, perinatal mortality and low birth weight (WHO, 2001b).

The prevalence of anemia was significantly higher in rural areas (52%) than in urban areas (35%). By region, prevalence ranged from 33% in Kampala to 64% in North region. About two-thirds of women living in IDP camps were anemic (UBOS and Macro International Inc., 2007).

Table 25: Prevalence of anemia in women of childbearing age

Survey name/date (Reference)	Background characteristics	Age (years)	Sample size	Percentage of women with	
				Any anemia (pregnant women Hb<11.0 g/dL; non pregnant women Hb<12.0 g/dL)	Severe anemia (all women Hb<7.0 g/dL)
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	15-49	2834	49.0	0.8
	Age				
		15-19	627	43.4	0.3
		20-29	1049	50.0	1.0
		30-39	733	51.8	0.9
		40-49	426	50.0	0.9
	Pregnancy/Breastfeeding status				
	Pregnant	15-49	349	64.4	2.6
	Breastfeeding	15-49	945	53.1	0.6
	Non-pregnant/Non-breastfeeding	15-49	1540	43.1	0.5
	Residence				
	Urban	15-49	460	34.9	0.1
	Rural	15-49	2374	51.8	0.9
	Region				
	Central 1	15-49	305	57.5	1.4
	Central 2	15-49	251	42.9	0.4
	Kampala	15-49	228	32.7	0.3
	East Central	15-49	280	48.2	0.3
	Eastern	15-49	393	48.9	0.4
	North	15-49	421	64.0	0.9
	West Nile	15-49	165	37.1	0.0
	Western	15-49	427	45.1	1.4
	Southwest	15-49	365	49.7	1.2
	North sub-regions				
	IDP	15-49	155	64.6	0.5
	Karamoja	15-49	(92)	(54)	(2)

Hb: Hemoglobin
Prevalence of anemia is adjusted for altitude and for smoking status, if known, using formulas in CDC, 1998.
Results in brackets are based on small samples and therefore must be interpreted with caution.

In order to have comparable data (UDHS data) on the prevalence of anemia in women, the 2000-2001 UDHS data were adjusted for altitude; adjustment for smoking status was removed from the 2006 UDHS data (information not available for the previous survey) and districts not surveyed in 2000-2001 were excluded from the 2006 data (UBOS and Macro International Inc., 2007).

After adjustments, the comparison of the consecutive UDHS surveys shows that prevalence of anemia increased from 37% in 2000-2001 to 41% in 2006 and prevalence of severe anemia remained the same (UBOS and Macro International Inc., 2007).

The above mentioned study by Kikafunda et al. (2008) in South Western Uganda also explored the prevalence of anemia and the associated factors among mothers (15-49 years; sample size: 52). It was found that almost one fifth (18%) of the mothers had anemia (any anemia, defined as hemoglobin <11.0 g/dL). Health problems such as respiratory infections, malaria and worms, low maternal education, and physiological status of the mother especially breastfeeding, were some of the factors that were significantly associated with high prevalence of anemia among mothers (Kikafunda et al., 2008).

According to the 2006 UDHS, 28% of men aged 15-49 were anemic (hemoglobin <13.0 g/dL). In rural areas, prevalence of anemia was almost twice that of urban areas (Table 26) (UBOS and Macro International Inc., 2007).

Comparison with data collected in the 2000-2001 UDHS (data adjusted) shows an increase in the prevalence of anemia among men: 23% of men age 15-54 were anemic in 2000-2001 compared with 29% in 2006 (men age 15-54, data not shown) (UBOS and Macro International Inc., 2007).

Table 26: Prevalence of anemia in adult men

Survey name/date (Reference)	Background characteristics	Age (years)	Sample size	Percentage of men with	
				Any anemia (Hb <13.0 g/dL)	Severe anemia (Hb <9.0 g/dL)
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	15-49	2236	27.8	n.a.
	Residence				
	Urban	15-49	352	16.0	n.a.
	Rural	15-49	1885	30.1	n.a.
	Region				
	Central 1	15-49	250	33.4	n.a.
	Central 2	15-49	223	34.3	n.a.
	Kampala	15-49	191	14.9	n.a.
	East Central	15-49	194	22.0	n.a.
	Eastern	15-49	306	36.4	n.a.
	North	15-49	301	23.9	n.a.
	West Nile	15-49	120	15.7	n.a.
	Western	15-49	364	23.1	n.a.
	Southwest	15-49	288	36.5	n.a.
	North sub-regions				
	IDP	15-49	129	23.3	n.a.
	Karamoja	15-49	(55)	(28)	n.a.

Hb: Hemoglobin
n.a.: not available
Prevalence of anemia is adjusted for altitude and for smoking status, if known, using formulas in CDC, 1998.
Results in brackets are based on small samples and therefore must be interpreted with caution.

Anemia can result from both diet-related causes and from infectious and parasitic diseases.

In Uganda, the high prevalence of anemia may be primarily related to the low dietary intake of iron-rich foods. The Ugandan diet is based on starchy foods (roots/tubers, cereals and plantain). Most people in the country have limited access to foods of animal origin, rich in heme iron, and mainly obtain iron from foods of vegetable origin. Bioavailability of heme iron found in foods of animal origin is high, while the bioavailability of non-heme iron from foods of vegetable origin is low.

According to UDHS 2006, at national level, only 30% of children aged 6-35 months (sample size: 3133) and 31% of women aged 15-49 with a child under three years (sample size: 3922) had consumed iron-rich foods (including meat, fish, poultry and eggs) in the 24 hours preceding the survey. The percentage of children and mothers having consumed iron-rich foods was much lower in rural areas than in urban areas; in IDP camps and Karamoja, this percentage was particularly low and this is consistent with the high prevalence of anemia observed in these areas. In addition, in the North region, where the prevalence of anemia among women was the highest, only 14% of mothers had consumed iron-rich foods in the 24 hours preceding the survey (UBOS and Macro International Inc., 2007). The findings from the 2008 Food Consumption Survey conducted in three regions of Uganda revealed that the prevalence of inadequate intake of iron was very high among both young children and women (Harvey et al., 2008).

Other factors responsible for anemia are malaria, which is endemic in Uganda, parasites such as hookworm, and also infections and chronic diseases including HIV/AIDS, which worsen the situation.

Interventions to combat IDA

The micronutrient supplementation strategy developed in 1999, coordinated through the Health Sector Strategic Plan (HSSP) of the Ministry of Health and implemented systematically since 2002, targets specific at-risk groups. To combat IDA, pregnant women are supplemented with iron and folic acid (MoH, 1999).

The 2006 and the 2000-2001 UDHS document iron supplementation of women during pregnancy, at national level (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001).

In 2006, 58% of women who gave birth during the five-years preceding the survey reported that they had taken iron tablets/syrups during the pregnancy preceding their last live birth. By region, large disparities in supplementation were observed, coverage ranging from only 32% in Southwest region to 73% in West Nile region. In the north sub-regions (IDP camps and Karamoja), it was relatively large when compared to national coverage (UBOS and Macro International Inc., 2007).

Overall, iron supplementation coverage in pregnant women needs to be expanded. Moreover, compliance is very low: less than 1% of women reported taking iron supplements for at least 90 days during pregnancy, as is recommended (UBOS and Macro International Inc., 2007).

Although still insufficient, iron supplementation coverage in pregnant women has improved. In 2000-2001, 50% of pregnant women took iron supplements; in 2006, this percentage increased to 58%[24] (UBOS and Macro International Inc., 2007; UBOS and ORC Macro, 2001). The low coverage of iron supplementation is mainly related to insufficient access to ante-natal health care, to lack of knowledge of the need for iron during pregnancy and to the bad taste of iron tablets.

Table 27: Iron supplementation: percentage of mothers who took iron tablets/syrups during pregnancy

Survey name/date (Reference)	Background characteristics	Number of mothers with a birth in the 5 years preceding the survey	Percent who took iron tablets/syrups during pregnancy*
Uganda Demographic and Health Survey 2006 (UBOS and Macro International Inc., 2007)	**Total**	5035	58.0
	Residence		
	Urban	668	60.1
	Rural	4367	57.7
	Region		
	Central 1	497	64.9
	Central 2	428	64.9
	Kampala	298	60.2
	East Central	510	65.1
	Eastern	755	67.8
	North	872	59.3
	West Nile	289	72.6
	Western	772	48.1
	Southwest	615	31.8
	North sub-regions		
	IDP	356	65.2
	Karamoja	188	74.1

*During the pregnancy preceding the last live birth.

In addition to supplementation interventions, food-based strategies to combat IDA including nutrition education to promote iron-rich foods farming and consumption, bio-fortification and food fortification, are being developed in Uganda. Food fortification of maize and wheat flour with iron and zinc is already taking place in some selected processing plants in Uganda. For bio-fortification, commonly consumed foods such as beans, cassava, maize and wheat are targeted for iron and zinc enrichment (Potts and Nagujja, 2007). Bio-fortification of beans, cassava, maize and wheat with iron and zinc is not yet implemented in Uganda but is planned and experiments are being conducted in this regard at Agricultural Research Institutes. There is also experimentation on bio-fortification of sweet bananas with beta carotene, iron and zinc, at Kawanda Agricultural Research Institute in Uganda.

Recently, efforts have been made to address other major causes of anemia such as malaria and intestinal worms as well as iron deficiency as part of an integrated antenatal care approach. National antenatal policies

[24] Trends analysis should be interpreted with caution as the 2006 data have not been adjusted for districts excluded from the previous UDHS.

are implemented more vigorously than postnatal policies as observed by Sserunjogi et al. who found that most health units in the Eastern region do not carry out postnatal care for the mothers (Sserunjogi et al., 2003).

The strategy for reducing malaria in pregnancy, an essential part of the malaria control program, includes Intermittent Preventive Treatment (IPT), insecticide-treated nets (ITNs), and prompt treatment of clinical malaria episodes. During pregnancy, the malaria control guidelines in Uganda recommend the use of at least two doses of SP (sulfodoxine-pyrimethamine)/Fansidar during the second and third trimester of pregnancy (at antenatal care visits). The IPT programme was introduced in Uganda in 2002 (UBOS and Macro International Inc., 2007). According to UDHS 2006, among women with a birth in the two years preceding the survey, only 18% received two or more doses of SP/Fansidar to prevent malaria during pregnancy. Concerning the use of ITNs during pregnancy, in 2006 only 10% of pregnant women age 15-49 slept under an ITN and pregnant women were not more likely to sleep under an ITN than other women (UBOS and Macro International Inc., 2007).

The above interventions are also complemented by others such as deworming. Deworming for intestinal parasites is commonly done for helminths and schistosomiasis (UBOS and Macro International Inc., 2007). According to 2006 UDHS, among 6 863 children aged 6-59 months, 42% were given deworming medication in the past 6 months. Among 5 035 women with a child born in the five years preceding the survey, only 27% took deworming medication during pregnancy of last birth (UBOS and Macro International Inc., 2007).

A study by Mwadime et al. (2004) describing the process used to develop a comprehensive programme to control anemia in pregnant women in four districts of Uganda underlined the challenges encountered, which were mostly translating policies into consistent practice. They noted that major impediments to the success of the programmes were: insufficient supplies of iron/folic acid supplements, antihelminthics and antimalarials, that led health providers to offer clients supplies that were insufficient to last until the next visit; late and infrequent use of antenatal services by pregnant women; lack of understanding among women of the importance of taking iron/folic acid, antihelminthics and antimalarials during pregnancy; and health workers not being aware of the anemia guidelines, in terms of the recommended preventive dosages of iron/folic acid (Mwadime et al., 2004)

Other micronutrient deficiencies

The prevalence of zinc deficiency in Uganda is still unknown although findings indicate low levels of zinc in complementary foods, leading to sub-optimal intakes among young children (Kikafunda et al., 1996; Kikafunda et al., 1998).

The nutritional status study of school children by Kikafunda et al., 2006 (unpublished) also assessed the zinc status of children aged 6-9.99 years (sample size 400). The study was conducted in the Central region of Uganda, in Wakiso District in two semi-urban government primary schools. Serum zinc was analyzed using Atomic Absorption Spectrometry. Zinc deficiency was classified as severe (serum zinc concentration <70 µg/dL) and moderate (serum zinc concentration 70-80 µg/dL). According to this study, the prevalence of zinc deficiency among school children was 29% (Kikafunda et al., 2006). The prevalence of zinc deficiency was thus high in this population group.

In Uganda, due to the predominantly plant-based diet and limited access to zinc-rich foods (animal products, oysters and shellfish), zinc deficiency is likely to be widespread. Moreover, due to the abundance of zinc inhibitors such as phytates, common in plant-based diets, the bioavailability of zinc in the diet is probably low. Prevalence of zinc deficiency should be assessed at national level. Many young Ugandan children may suffer from zinc deficiency, which could be an important cause of stunting and impaired immunocompetence.

II.7 Policies and programmes aiming to improve nutrition and food security

For a long time, all efforts to address malnutrition of children in Uganda were aimed at rehabilitating the sick at nutrition rehabilitation centres such as Mwanamugimu at Mulago Hospital, in Kampala. Efforts were concentrated on the management of clinical malnutrition (kwashiorkor and marasmus) in these centres with little or no attention being directed at the community, where the root causes of the problems lie. In the last two decades, through the introduction of Demographic and Health Surveys, it has become apparent that chronic malnutrition is more prevalent than originally thought.

In 2003, the Uganda National Food and Nutrition Policy (UNFNP), developed by a team coordinated jointly by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) and the Ministry of Health (MoH), was officially approved. The UNFNP aims to improve the nutritional status of all the people of Uganda through multi-sectorial interventions that focus on food security, improved nutrition and increased incomes (MAAIF and MoH, 2003). The Uganda Food and Nutrition Strategy and Investment Plan (UFNSIP), enacted in 2005, was formulated to guide the implementation of the Uganda Food and Nutrition Policy (UFNP). The principal objective of the UFNSIP is to improve and ensure nutrition security for all Ugandans, particularly through nutrition-related interventions (GoU, 2005; Potts and Nagujja, 2007).

A number of national policies, programmes and strategies can directly or indirectly impact on nutrition improvement of the people. These include the Poverty Eradication Action Plan (PEAP), the Plan for Modernisation of Agriculture (PMA), the Health Sector Strategic Plan (HSSP) and others. PEAP is the nation's most important Development Framework for Uganda and provides an over-arching framework to guide public action to formulate policies that target poverty eradication (MFPED, 2004). PEAP addresses issues of nutrition indirectly, since the poverty indicator encompasses the food basket and nutrition issues at household level. The Plan for Modernization of Agriculture (PMA) was developed within the framework of PEAP and one of its major objectives is to increase incomes and improve the quality of life of poor subsistence farmers and improve household food security. Under PMA, issues of nutrition are assumed to be addressed within the concept of food security. However, food security per se does not guarantee nutrition security unless issues of health, sanitation and care are also addressed. PMA, however, recognizes that poor health and high incidence of disease and poverty are fundamentally connected, and poor health is a major determinant of farmers' livelihoods since it affects their capacity to work (DANIDA, 2005). The PMA emphasizes the critical importance of education in promoting the behavioural changes necessary to improve the performance of the agricultural sector (MoES, 2003).

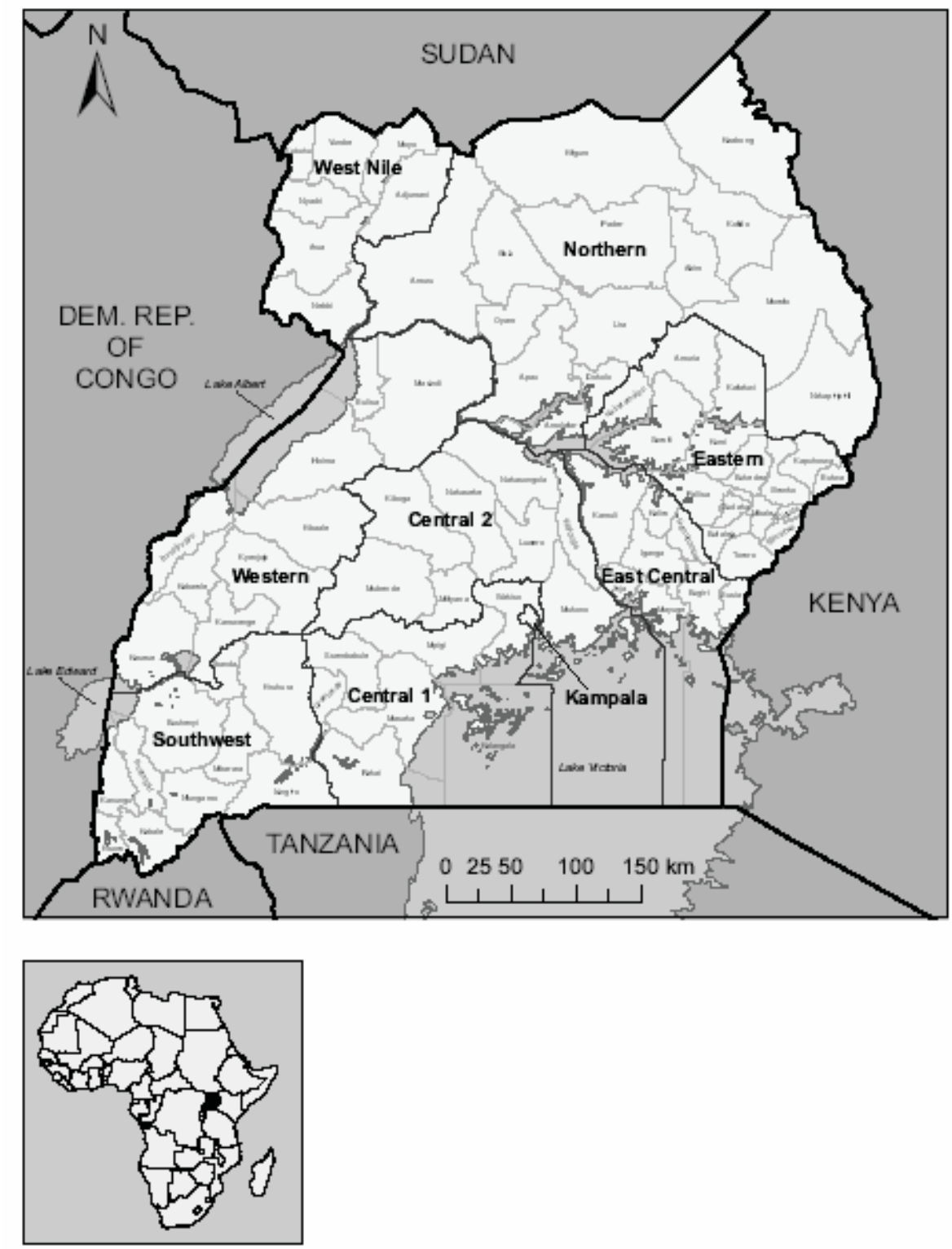
The recently launched Uganda National Development Plan (NDP) 2010, the successor of PEAP, affirms that human nutrition is one of the key factors in human development and economic productivity. The NDP, with a vision to transform Uganda's society into a modern and prosperous nation, put in place objectives, strategies and interventions to improve the nutritional status of Ugandans (RoU, 2010).

The collapse of the Nutrition Surveillance System in the mid-1990s was recognized in the National Health Policy of 1998 (MoH, 1999) and nutrition surveillance was included in the HSSP beginning in 2000 (MoH, 2000). Nutrition surveillance systems also exist within MAAIF and the Government set up a surveillance system to coordinate organizations dealing with food and nutrition. However, as of 2004, the systems were not yet well coordinated (MoH, 2004).

The Ministry of Agriculture, Animal Industry and Fisheries hosts a National Early Warning System (NEWS) responsible for monitoring agricultural production through conducting pre- and post-harvest crop assessments. Because of limited funding, this fieldwork has consisted of interviews with key informants. In addition the Nutrition Division of MAAIF collects and analyses data on child anthropometry and body mass index of mothers for NEWS (Suresh and Ergeneman, 2005). Also cooperating with government is the Famine Early Warning System Network (FEWS NET) which, together with the WFP, conducts surveys to assess the status of specific vulnerable groups, and conducts food needs assessments that help optimize the outreach of food assistance programmes (FEWS NET, 2005; FEWS NET, 2006).

Under the Uganda Food and Nutrition Policy, the government seeks to develop a monitoring system to provide timely information that can be used to stabilize the food and nutrition situation in the country. Some of the strategies to achieve this include: establishing sentinel sites for the collection of data on food and nutrition; training relevant personnel in data management; publishing and disseminating timely, regular reports on the food and nutrition situations at all levels; and establishing a coordinated national food and nutrition information network (MoH, 2004).

Annex: Map of Uganda



Source: UBOS and Macro International Inc., 2007.

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