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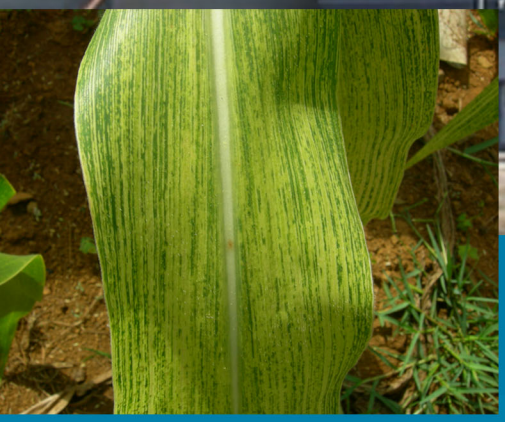
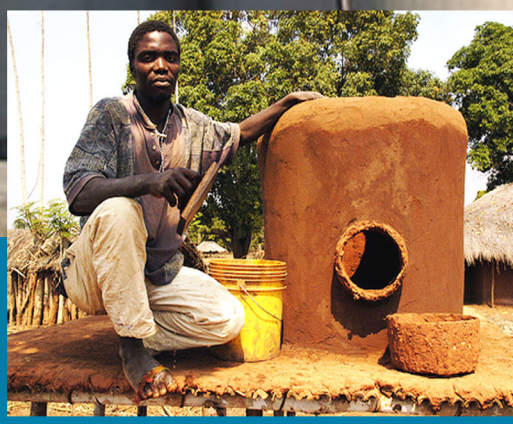
FOOD INSECURITY IN UGANDA:
A DILEMMA TO ACHIEVING THE HUNGER MILLENNIUM DEVELOPMENT GOAL





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FOOD INSECURITY IN UGANDA: A DILEMMA TO ACHIEVING THE HUNGER MILLENNIUM DEVELOPMENT GOAL

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ABSTRACT

The status of food security in Uganda is worrying. The share of Ugandans suffering from food insecurity measured in terms of caloric intake is alarmingly high with low rates of income poverty. Based on the 2005/06 Uganda National Household Survey data, the study provides insights into access to food at household level. More importantly, the study shows that average caloric intake stood at 1,970 calories per person per day, which is below the minimum caloric requirement of 2,200 calories. As such, a population of 17.5 million Ugandans in 3.1 million households were unable to meet the minimum caloric requirement in 2006. This raises questions on whether Uganda will be able to achieve the Millennium Development Goal (MDG) 1: halving extreme poverty and hunger by 2015. While Uganda is on track to halve extreme poverty, it is less likely to halve extreme hunger by 2015. Yet the results suggest that food insecurity and income poverty are closely linked. Similarly, food insecurity at household level is closely linked to child nutrition status. In other words, anti-poverty interventions and interventions to address food insecurity and child nutrition status have to be closely linked. The results further suggest that income growth, land under cultivation, changes in food prices and education attainment of household head significantly impact on caloric intake.

There are significant seasonal fluctuations in dietary intakes – calories and protein. Improving post harvest storage technologies and preservation methods; creating remunerative employment especially for the urban population; and strengthening the food distribution mechanisms would go a long way in addressing these seasonal fluctuations. Food insecurity is also marked with significant spatial variations that need to be taken into account in designing anti-food insecurity interventions.

The famine that hit some districts during 2009 demonstrates that adverse effects on the agricultural sector directly increase vulnerability to food insecurity. At the same time, increasing land under cultivation improves food security at household level. This suggests that improving agricultural productivity is a key to long-term food security.

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1.0 INTRODUCTION

Despite substantial resources targeted towards combating hunger and malnutrition, there has been limited progress towards the attainment of this particular Millennium Development Goal (MDG) in most developing countries—especially in sub-Saharan Africa (SSA). The 2009 UNICEF report on "Tracking progress on child and maternal nutrition" shows that between 1990 and 2008, the prevalence of malnutrition in the developing world reduced from 40 percent to 29 percent. However, SSA made the least progress—reducing the prevalence of malnutrition from 38 to 34 percent during the same period (UNICEF, 2009). Consequently, the MDG goal of reducing malnutrition and hunger by half between 1990 and 2015 is unlikely to be met in SSA. The main causes of under nourishment in SSA include drought, declining soil fertility, low incomes and, to some extent, persistent civil conflict. According to FAO, the high prevalence of hunger and malnutrition in SSA is likely to restrict progress towards the attainment of other MDGs since nutrition intake impacts on child and maternal mortality as well as school attendance. The recent global surge in food and commodity prices has also renewed concerns about the vulnerability of household caloric intakes to food prices. Related, there are concerns that the 2008 global financial crisis could deepen the food crisis in the developing world (FAO, 2008b). Consequently, there is renewed interest to understand the programmes and policies that may drive the reduction in malnutrition.

During May-July 2009, Uganda experienced a major food crisis—with famine and acute food shortage on a scale much wider than what was observed during the food price hikes of 2006/07 and the financial crisis of 2008. According to the Office of the Prime Minister (OPM), at least 17 districts—mainly in the sub-regions of North East and West Nile, faced famine while a further 31 districts faced acute food shortages.[1] Indeed, the heightened media focus on the affected districts prompted the Government of Uganda (GoU) to explain the causes of food shortages and the steps taken to mitigate the effects of the food shortage. This shortage was the outcome of delayed rains experienced during the beginning of 2009. In terms of policy response, the government provided Ushs 20 billion (about US$9.5 million) to procure food for the affected districts. In addition, apart from intensifying the distribution of free seedlings and farm equipment, the government also sought to make it mandatory for households to store food.

> "I have requested the Minister of Local Government to use Section 95 of the Local Government Act to direct districts to make ordinances (bye-laws) which will compel homesteads to maintain granaries for food storage" _The Prime Minster of Uganda addressing the Parliament in July 2009.

The fact that a delay in the on-set of the rainy season forced a large population of Ugandans to go hungry without food calls for a comprehensive analysis of food security status in the country. For instance, first, it is important to know which areas of the country are most vulnerable to weather shocks and hence food insecurity. Second, it is important to understand whether the 2009 famine was a one-off shock or symptoms of long standing

[1] Uganda: Food Shortage Hits 52 Districts—(The New Vision Newspaper July 15, 2009). The districts facing famine were: Abim, Amuria; Adjumani, Arua, Bukedea, Bukwa, Kaabong, Kaberamaido, Kapchorwa, Katakwi, Koboko, Kumi, Moroto, Moyo, Nakapiriti, and Yumbe. These districts account for 15 percent of the estimated 30.6 million Ugandans (MoFPED, 2009/10).

food challenges faced by the particular districts. Such information is critical if Uganda is to devise appropriate interventions—e.g. whether to pursue the provision of food assistance or other handouts or to target increasing agricultural productivity in the worst affected districts.

The importance of understanding food security in Uganda's policy process

There are a number of reasons why issues of food insecurity are of critical policy importance in Uganda. First, the country has maintained persistently high level of under nourishment despite reduction in income poverty and sustained macroeconomic growth. Indeed, the recently launched five-year National Development Plan (2010-2015), a successor to the Poverty Eradication Action Plan (PEAP), notes that since 1992, Uganda's average caloric intake per person has remained below the World Health Organisation (WHO)'s minimum requirement of 2,300 calories per person per day despite the country registered impressive reduction income poverty (GoU 2010). Over the 1992/93-2005/06 period, the trends show that Uganda has only managed to register marginal improvements in household food security status as measured in caloric terms. According to an earlier study by Ssewanyana *et al*. (2006)—examining the rural food situation in Uganda during 1992/93—2002/03, the proportion of the Ugandan population food insecure (as measured by the inability to meet the minimum daily caloric intake) reduced only from 83 percent in 1992/93 to 59 percent by 1999/2000 before rising again to 63 percent by 2002/03. This rate remained more or less the same in 2005/06 as will be discussed later. The above trends contrast poorly with indicators of income poverty—which reduced from 56 percent in 1992/93 to 31 percent by 2005/06 (Ssewanyana and Okidi 2007).

Second, even other indicators of nutritional status have performed dismally during the era of sustained positive macroeconomic growth in Uganda. For example, the proportion of infants classified as chronically malnourished has held steady since the mid-1990s. According to the regular Uganda Demographic and Health Surveys (UDHS), the prevalence of stunting among children aged 5 years and below declined from 45 percent in 1988/89 to 38 percent by 1995 and the rate has held steady for over 10 years (UBoS and ORC Macro, 2006).[2] As such, regardless of the indicator of food inadequacy, the overall nutritional status of a large population of Ugandans remains dire and this dent in Uganda's impressive growth record has attracted the attention of policy makers (GoU, 2010).

Third, is the twin challenge of Uganda's rapidly expanding population however, with stagnating growth in the agricultural sector—the principal source of livelihood for most of Ugandans. With the Ugandan population growing at 3.2 percent per annum, this implies that the country adds about 1 million "new mouths" to feed each year. On the other hand, growth in the agricultural sector has stalled in the past 10 years. For example, over the 2000/01-2009/10 period, growth in the agricultural sector averaged about 2 percent compared to about 8 and 11 percent for industry and services respectively (MoFPED, 2010). As such, the already poor status of food security is being compounded by a fast expanding population—forced to share the non-expanding basket of food. There are also hardly any new opportunities for employment outside the agricultural sector.

[2] Nutritional status on children represents long term measures of health and is not only caused by caloric availability but also factors such as access to health services such as vaccinations and child care (Behrman and Deolalikar, 1988).

Finally, the recent changes in the regional geo-political environment have ensured that issues of food security remain at the forefront of Uganda's policy agenda. Even prior to the 2009 food crisis/famine, the food situation across the country was erratic. There was a surge in food prices during 2007/08—driven by a host of factors including: the increased regional demand for local foods (from southern Sudan); the rising global food prices alluded to earlier; and the spates of droughts and floods across the country (MoFPED 2008). Apart from increases in food prices, the return of formerly internally displaced persons (IDP) to their homes starting in 2007 could also increase the vulnerabilities of households who for some time depended on food assistance. In 2005/06, at least 1.8 million Ugandans were resident in IDP camps in North and Eastern Uganda and by February 2009, the IDP population was only 700,000 (Office of the Prime Minister 2009). The large population of returning IDPs faces unique challenges—they are less integrated into the market and young generation do not have access to land due to long periods of displacement (WFP 2009).

Study Objectives

The broad objective of this study is to examine the food insecurity situation using the most recent Uganda National Household Survey of 2005/06 (UNHS III). Specifically, the study seeks to understand the food consumption patterns and how they vary spatially. It examines the extent of food insecurity in terms of calories and protein intakes and whether there is a seasonality dimension. The UNHS III data was also combined with 2009 information on districts facing famine to shed light on whether the famine was a one-off shock or an exhibit of long term underlying food insecurity problems. In addition, the study examines how child nutritional status varies with food security status at household level. This particular objective is addressed by linking UNHS III and UDHS of 2005/06 datasets. Despite the richness of the sub-sample common to these dataset, this remains a study of one cross section—at one point in time. Finally, the correlates of household food security status as measured by caloric intake in Uganda are examined.

The rest of the study is organised as follows: A critical review of the previous studies on food security issues in Uganda is examined in the next section. Section three describes the data and methods used to achieve the study objectives. The discussion of the results is the subject of section four. Section five concludes with implications for policy.

2.0 REVIEW OF FOOD SECURITY STUDIES ON UGANDA

There have been attempts in the past to examine the nature, extent, and impacts of food insecurity in Uganda. Examples of empirical studies in the recent past include: Simler (2010), WFP (2009), Pouw (2009), Benson *et al*. (2008), Alderman (2007), Ssewanyana *et al*. (2006), Ssewanyana (2003) and Bahiigwa (1999). The study by Benson et al. (2008), based on nationally representative surveys, focused on the potential impacts of rising global prices on the food security situation in Uganda. The authors find that although the majority of households are net food buyers, they nevertheless consume a variety of staples—majority of which are traded only locally. As such, because Uganda is not a net importer of food commodities, it is unlikely to be affected by the global rise in food prices. Nonetheless, Benson *et al.* conclude that households dependent on particular commodities for their diet notably maize—with a substantial regional demand (from Southern Sudan and Kenya), are likely to be affected by frequent price changes.

A recent study by Simler (2010) examines the short term impacts of the global food price hikes of 2008 on the welfare of households in Uganda. Based on simulations of the impact of the increase in prices of five commodities, namely, maize, matooke, cassava, sweet potatoes, and rice, the study finds that the incidence and depth of poverty increases by a modest 2.6 and 2.2 percentage points respectively. However, Northern Uganda suffers a worse fate with an increase in poverty of 5.9 percentage points. Despite the study novel simulation methods, it nevertheless has some limitations. As highlighted by the author, the simulations capture short-run impacts and do not consider the case where households substitute food products consumed in response to price changes. Second, the study only considers five food products. Although the five products considered are among the most traded food items in Uganda, their importance has a spatial dimension. For example, rice only features significantly in the food budgets of urban households. Finally, Simler does not consider issues of seasonality in food consumption. For example, some households are net sellers in periods immediately after the harvest and become net food buyers later in the agricultural reason. This present study instead considers the consumption of all food items regardless of importance in the food budget. It also examines seasonality in consumption of calories and proteins.

The 2009 comprehensive food security and vulnerability analysis for Uganda by WFP (2009) shows that in 2009, more than half of all households in Uganda depended on the market in order to meet their food needs. In addition, May-August is the period of the year where most households report facing the worst food challenges whereas households in Karamoja are chronically food insecure for most parts of the year. However, WFP reports a surprising finding that only about 6 percent of households in Uganda are faced with food insecurity.[3] This is very low figure linked to indicator of food security used—i.e. a household's food consumption score based on the nutritional density of 8 major food groups of: staples, pulses, vegetables, fruits, meats, diary products, sugar, and oil. Given that the indicator used does not capture food quantities, at best it is a measure of food diversity rather than food availability or utilisation.

[3] The World Food Programme assessment shows that 6.3 percent of households have a poor diet; 21.3 percent have a borderline diet while 72.4 percent have an acceptable diet.

Food production and consumption is heavily concentrated in Uganda. Furthermore, although most food is produced for own consumption, some food products are critical sources of household income. Despite a variety of staples, food production and consumption is dominated by a few staple notably matooke, sweet potatoes, cassava, maize and beans. The above crops account for 44 percent of the cultivated area in Uganda (Kasirye and Hisali 2008). At the same time, their importance in the diets of Ugandans is also large; the 5 staples account for 41 percent of the food budgets of Ugandan households. On the other hand, two staples—namely maize and matooke are also important sources of household incomes—the two products account for 36 percent of the total household earnings from crop sales.

Apart from the recent interest in food insecurity issues—due to the 2009 food famine, there are other important reasons for undertaking an assessment of the food security situation in Uganda. First, in Uganda like other developing countries, nutritional adequacy has long lasting impacts especially on children's cognitive outcomes. For example, evidence from a randomised experiment in Northern Uganda shows that school feeding programmes significantly boost children's learning achievements (Adelman *et al*. 2008). Apart from cognitive growth, evidence from other developing countries shows that nutritional intake also impacts on the labour productivity of poor households (Behrman 1993).

Second, previous studies were unable to link information on household incomes and caloric intakes to other indicators of nutrition status such as stunting, wasting, and underweight status. Such a link is important to understand why nutritional indicators have stagnated while income poverty has declined. This gap in the literature is mainly due to the paucity of data. Most of the indicators of children's nutritional status are from the regular DHS surveys—which however do not capture household food utilisation. On the other hand, the regular household surveys—which are the main source of caloric information, rarely capture anthropometric information. It is only the UNHS 1999/2000 that captured both indicators of child nutritional status and income poverty. Apart from this particular survey, the 2005/06 is the other survey that can be linked to nationally representative anthropometric information from the demographic survey. Consequently, in the present study, the most recent demographic survey data is linked to the regular food utilisation indicators with the child nutritional indicators.

3.0 DATA SOURCES AND METHODS

3.1 Data Sources

This study employs two datasets—the UNHS III and the 2006 UDHS. Both surveys were conducted by the Uganda Bureau of Statistics (UBoS). The UNHS III survey covered 7,421 households with 42,111 individuals from May 2005 to April 2006. The survey was based on a two stage stratified random sampling design. In the first stage, Enumeration Areas (EAs) were selected from the four geographical regions. In the second stage, 10 households were randomly selected from each of the EA. The household questionnaire gathered information on food acquisition by source. The survey also had a community module capturing information on community infrastructure among others; and a community market price survey. Of the 7,421 households, about 258 households (3.5 percent of the total sample) are not used in the analysis due to consuming food mainly from restaurants. A further 466 households (6.2 percent of the UNHS sample) are dropped because their caloric intakes that are outliers—caloric intakes are considered outliers if the there are less than one third or more than three times the median caloric intake of all households. As such, the sample used in the analysis is 6,722 households or 90.5 percent of the total UNHS sample.

The second dataset—the 2006 UDHS, was also based on a two stage stratified random sampling design, nationally representative covering 9,864 households with 8,531 eligible women (aged 15-49 years). The UDHS survey was conducted between May and September 2006. In the first stage, clusters were the principal sampling unit and at the second stage, 25-30 households were randomly selected from each cluster. The survey captured information relating to child nutritional status as well as other background household information. The UDHS and UNHS were designed to be linked—so as to generate a sub-sample of households with both health and poverty indicators. There are about 3,050 households (about 41 percent of the UNHS sample) common in both surveys. This particular sub-sample of households is used to examine how child nutritional status varies with the incidence food insecurity at household level.

3.2 Methods

Most recent studies on Uganda have used various measures of food diversity as the indicator for household food security status. For example, Pouw (2009) examines how household rank different food items and how this is linked to their poverty status for 298 households in three districts of Uganda—Kabarole, Kapchorwa, and Mpigi. As earlier noted, a recent assessment by the WFP (2009) also uses dietary diversity as some measure of food security. In this particular study, a household is food secure if it consumes a variety of foods in a 14 day recall period. Despite the importance of dietary diversity, the neglect of actual quantities consumed seriously limits the utility of this particular indicator of household food security status. As such, food consumption diversity scores need to be complemented with other measures of food insecurity. Earlier studies on Uganda, for example, Bahiigwa (1999) consider a household's own perception of "having something to eat, at all times, and basically having enough to feed the household" as the measure of food secure status in an analysis of food adequacy in 16 districts in Uganda. Indeed, qualitative measures are more subjective than quantitative measures based on actual food utilisation. Nonetheless, such qualitative measures can be adequate in cases where actual household data on food consumption is not available.

Caloric intake is the standard by which under nutrition in developing countries is commonly assessed by FAO (FAO, 2003). Indeed, previous assessments of food insecurity in rural Uganda by Ssewanyana *et al*. (2006) and Ssewanyana (2003) have used this approach. This present study adopts a similar approach but compliments it with other measures reported in food security literature such as diversity in food consumption. As earlier noted, the study examines the link between caloric intakes and the nutritional status of children in Uganda. A description of how nutrition intakes are captured in the household surveys and how they are used in the analysis of food security status in the present study is presented below.

The household food consumption section of the UNHS survey captures information relating to the actual food consumption using a 7-day recall period. This particular section captures the 48 most commonly consumed food items in Uganda and is a basis for most of the analysis in the study. In particular, the food consumption module provides information on food quantity and value of all foods consumed from purchases, own production and gifts/free. Although the survey captures quantities in both metric and non-metric units, some food items have sufficiently large proportion of quantities consumed in non-metric units. For such food items, the information collected in the community price survey is used to establish the metric equivalents for most units of consumption, to convert them to their metric equivalents[4]. Conversion of quantities of food consumed to their calories equivalents was based on food nutrient tables of East African by West (1987). Further details of how the caloric intakes were derived can be found in Ssewanyana *et al*. (2006). A household is considered to be food insecure if the actual caloric (protein) intake is less than the minimum caloric (protein) requirement. Different thresholds of the minimum dietary requirements (75 and 60 percent; translating into 1,669 and 1,335 Kcal per person per day respectively) are employed to examine household's vulnerability to food insecurity. Finally, the study utilises Geographical Information System (GIS) mapping techniques to display the incidence of food insecurity in Uganda.

In addition to the quantitative approaches to measuring food insecurity, a food diversity score (FDS) is computed. Dietary diversity is defined as the number of different foods or food groups consumed over a given period. This study follows closely the methodology proposed by Guthrie and Scheer (1981). Using this approach, food categories consumed in the household are summed and weighted (based on nutritional density) to derive the FDS. In order to analyze the dietary diversity better terciles were constructed to categorize the FDS into: low (FDS < 8), medium (FDS 8-14), and high (FDS 15-19).

The study employs ordinary least squares (OLS) regression to examine the seasonality in dietary intakes among the Ugandan households. The daily dietary intake (calories and protein) is regressed on household conditions such as location and regional indicators and seasonal dummies. The month of interview in each survey serves as a seasonal dummy with January the default category in each case. In addition, the regressions are estimated separately for urban, rural and the regions in order to capture geographical variation in food dietary intakes.

[4] The UNHS market survey collects information on units of quantity and price for 29 food items at the community level. Fish, millet, sorghum, milk and simsim are among the major food items not captured in the market survey.

In addition to the above analysis, the study examines determinants of calorie intake by running reduced form regressions expressed as in eq. (1):

(1) $$\log C_i = \beta X_i + \varepsilon_i$$

where C_i is caloric intake, β is a vector of coefficients, and X_i is a vector of all of the variables measuring household income, access to land, and other household head characteristics; community characteristics including access to community infrastructure, and prices of major food staples; and location factors. In this case, a regression coefficient is a conditional correlation, i.e. the correlation of the regressor (say, of an indicator for size of land cultivated) after controlling for the other regressors (e.g., household head's education and family size). The above model is estimated at national and sub-regional levels.[5]

Other estimation and data issues considered include the use of sample weights; and accounting for: heteroskedasticity, clustering and multicollinearity. Specifically, the appropriate univariate and econometrics results are reported, which are adjusted for sample weights and robust heteroskedasticity and clustering. In the subsequent section, a description of the model variables is discussed.

Description of the variables used in the analysis

Anthropometric indicators: For anthropometrics, the 3 standard definitions of child nutrition are used i.e. (1) stunting—a child's weight for height being less than 2 standard deviation of the reference population; (2) wasting—a child's height for age being less than 2 standard deviation from the reference population; and (3) underweight—a child's weight for age scores being less than 2 standard deviations of the reference population for children below 60 months. The sub-sample common to both 2006 UDHS and UNHS III had about 2,895 households of which 403 households had children aged below 60 months. Overall, the child nutrition and household food security status linkage is based on 643 children.

Weekly food consumption: The survey captured information on the source of food consumed at household level i.e. whether through: purchases, own production, gifts/free, or consumption away from home. This information was captured for all the 48 listed items in the food consumption module of the survey. With the exception of information on alcohol consumption as well as consumption of food in restaurants, the rest of food consumption information are used to compute the share of households consuming particular food items; daily caloric and protein intakes as discussed above; as well as budget shares for the various food items. Nonetheless, most of the analysis is based on caloric intakes as it is the most widely used indicator of food intake.

Household consumption expenditure employed as a proxy for permanent income to be consistent with the previous poverty works on Uganda. A household is said to be poor if its consumption expenditure is below the minimum income required to meet the basic needs (for details see, Ssewanyana and Okidi 2007).

[5] Using OLS, it is possible that including household income in a regression for caloric intakes may be subject to endogenity concerns. Given that there are no suitable instrumental variables based on the data available, this is a possibility that the study cannot rule out and the results should be interpreted with this limitation in mind.

*Household typologies***:** Evidence on whether female based households are vulnerable to food insecurity remains inconclusive. This result is partly explained by data availability - failure to define these households based on the available household survey data. To shed light on this issue, the study constructs gender-based typology of households according to living arrangement. It classifies households in three ways: according to the sex of the 'head' to include female headed and male headed; by the sex composition of adults (adult person considered to be 18 years and older) to include a household with more adult females than males (Female majority, hereafter); with more adult males than females (Male majority, hereafter); and with same number of adult females and males (Equal dominated, hereafter); and based on presence of working adult members to include male breadwinner without female earner (Male breadwinner, hereafter), female breadwinner without male earner (Female breadwinner, hereafter) and having both female and male earners (Dual earners, hereafter) and no adult breadwinner.

Other characteristics: The other household level characteristics used include education attainment and age of the household head, the household size as well as the demographic composition of the household and land under cultivation. The model includes community characteristics such as community infrastructure, among others.

Location variables: The sub-region dummies[6] are those as classified in the 2006 UDHS, which are based on grouping districts by ethnicity. The only exception is Kampala due to its peculiar characteristics. Other location variables considered include whether a household is located in urban or rural areas; whether a household is located in IDP camp; and whether the district is among those officially facing famine in July 2009[7].

[6] Sub-regions: **Central 1:** Kalangala, Masaka, Mpigi, Rakai, Lyantonde, Sembabule and Wakiso; **Central 2**: Kayunga, Kiboga, Luwero, Nakaseke, Mubende (Mityana), Mukono, and Nakasongola; Kampala; **East Central**: Bugiri, Busia, Iganga, Namutamba, Jinja, Kamuli, Kaliro and Mayuge; **Eastern**: Kaberamaido, Kapchorwa, Bukwa, Katakwi (Amuria), Kumi, Bukedea, Mbale, Bududa, Manafwa, Pallisa, Budaka, Sironko, Soroti, Tororo, and Butaleja; **North:** Apac, Oyam, Gulu (Amuru), Kitgum, Lira (Dokolo), Amolatar, , Pader, Kotido (Kaabong), Abim, , Moroto, and Nakapiripirit; **West Nile:** Adjumani, Arua (Koboko), Nyadri, Nebbi and Yumbe; **Western:** Bundibugyo, Hoima, Kabarole, Kamwenge, Kasese, Kibaale, Kyenjonjo, Masindi, and Buliisa; **Southwest:** Bushenyi (Ibanda), Kabale, Kanungu, Kisoro, Mbarara, Isingiro, Kiruhura, Ntungamo and Rukungiri.

[7] The "famine districts" are in the following sub-regions: Acholi (Abim); Bugisu (Bukedea and Bukwa); Karamoja (Kaabong, Moroto, Nakapiripit); Teso (Amuria, Kapchorwa, Katakiwi, and Kumi); and West Nile (Adjumani, Arua, Moyo, Koboko, and Yumbe).

4.0 RESULTS

This section provides the main results of the study. First, a profile of the major types of foods consumed and the sources of food consumed is presented. This is followed by an analysis of actual food intakes—focusing mainly on caloric intakes. Next, the extent of food insecurity in Uganda is examined using a number of criteria. This is followed by linking food insecurity with child nutritional status. In addition, the diversity of the diet of Ugandan households is examined as well as how food intakes are affected by seasonality. Lastly, is the presentation and discussion of the in-depth results based on econometric analysis.

4.1 Major food items consumed

Table 1 presents the basic consumption patterns of 14 key food items during the last seven days prior to interview. These food items account for 62 percent of the weekly consumption expenditures on food. It is evident that matooke accounts for the largest expenditure share (of about 12 percent) as well as the largest median quantity consumed (of about 25kgs per week). The other major food items based on budget shares are: sweet potatoes (7.3 percent); maize flour (6.8 percent); dry beans (5.4 percent); beef (5.4 percent); and cassava fresh (4.3 percent). Furthermore, the comparison of the quantity consumed and expenditures by households shows which foods are cheap to acquire (column D). At about Ushs 161 per kg, matooke is again the cheapest food item to acquire followed by sweet potatoes (Ushs 181) and cassava fresh (Ushs 208). Overall, Table 1 shows that food consumption by Ugandan households is dominated by cereals and starch foods—and this may be partly explained by relatively cheap price of the key food items.

Table 1: Weekly household consumption of major food items

Food Item	Expenditure share (%)	Median, weekly			% of households reporting consumption
		Quantity (kg)	Expenditure (Ushs)	Price per kg/ltr (Ushs)	
	A	B	C	D	E
Matooke	11.6	24.80	4,000	161	48.6
Sweet Potatoes	7.3	11.00	2,000	182	53.5
Cassava Fresh	4.3	7.20	1,500	208	41.6
Cassava Flour	3.2	6.00	2,500	417	21.2
Rice	2.5	1.50	1,600	1,067	24.9
Maize Grain	1.6	3.00	1,000	333	17.3
Maize Flour	6.8	3.00	1,600	533	59.3
Bread	1.4	1.00	1,200	1,200	19.3
Millet	1.5	2.00	1,200	600	18.8
Sorghum	0.6	3.00	1,000	333	10.4
Beef	5.4	1.00	2,700	2,700	32.2
Milk (litres)	3.9	3.50	1,750	500	33.8
Oils (litres)	2.3	0.30	700	2,333	63.3
Dry beans	5.4	2.00	1,400	700	64.6
Sugar	5.1	1.00	1,500	1,500	62.2
Average	62.9				

Source: Author's calculations based on UNHS III.

Table 1 also shows the proportion of households consuming particular food item (column E) and majority of households report consuming dry beans (65 percent), maize flour (59 percent) and sweet potatoes (53 percent). Nonetheless, the consumption patterns are driven by both regional tastes and price as shown in Table A 1. The only exception is maize flour, which is consumed by majority of households. For instance, matooke is predominantly consumed in Central and in the Western parts of the country. Cassava is predominantly consumed in the North and to a less extent, in Eastern Uganda. Similarly, sweet potatoes are consumed more in Eastern Uganda than any other region. A possible explanation for this pattern is that consumption of staple partly reflects different agro-ecological food production zones. For instance, cassava and sweet potatoes are produced and consumed mainly in the arid and semi-arid Northern and Eastern Uganda due to their better drought resistance and minimal processing requirements for preservation.

For the "famine districts", Table A1 shows that at least 67 percent and 76 percent of households in these affected districts report consuming cassava flour and dry beans respectively. This result also shows the extent of vulnerability of households in these districts. For instance, for cassava, the proportion of households in "famine districts" consuming this food item is more than twice the proportion estimated for either Northern or Eastern Uganda. This latter fact suggests that the failure of the cassava crop in 2009 may have precipitated the observed famine in the aforementioned districts.

Further evidence that consumption depends on regional tastes is also shown by the estimated quantities consumed. Specifically, in Western region, the median quantity of matooke consumed (43kgs) far outweighs that of any other food item. Similarly both cassava products—fresh and flour, are mainly consumed in Northern region. On the other hand, Table A1 shows that there are large regional price differences for various food items. For example, the median price of matooke in the Western region (Ushs 93) is less than half the second cheapest price—in the Northern region (Ush 188) while households in regions of Central and Eastern pay a price for matooke that is about 133 percent and 117 percent respectively higher than the median price paid by households in the Western region. The above patterns may be explained by the fact that foods are cheaper in regions where they are locally produced and matooke being produced predominantly in Western Uganda, one would expected that it is cheaper in that region. However, the above explanation is not consistent for all areas of Uganda. For example, cassava fresh item is 55 percent cheaper in Northern than Eastern Uganda—the next least median price per kg. Furthermore, "famine districts" appear to pay more to acquire cassava flour (Ushs 458) than either Northern or Eastern Uganda.

Table A 1 also shows that the diet for most Ugandan households is concentrated in only a few food items. For example, matooke and sweet potatoes accounts for 19 percent of the food budget in the Central region. In Eastern region, sweet potatoes and maize flour account for 21 percent of the food budget. On the other hand, in the Northern region, it is mainly cassava flour and dry beans that account for 19 percent of the budget. Nonetheless, it is in the Western region and among districts affected by famine in 2009 that overall dietary diversity is least. In particular, in Western Uganda one food item—matooke accounts for nearly 20 percent of the food budget. On the other hand, cassava flour accounts for about 18 percent of the budget share in the "famine" districts. Such heavy concentration of diets can affect long-term nutritional growth. The estimates from the 2006 UDHS shows

malnutrition is highest in Western Uganda—about 50 percent of the children below 5 years are stunted (UBoS and Macro International 2007) and this is partly attributed to the heavy concentration of the regional diet in matooke.

4.2 Sources of food consumed

Table 2 shows the distribution of sources of food consumed from three (3) main sources—consumption away from home is excluded as only a small proportion of households indicate acquiring food from this specific source. Furthermore, the items consumed are grouped by major category of food groups i.e. cereals, matooke, roots and tubers, meats and related products, vegetables, legumes and pulses, and other foods. Table 2 reveals that most cereals, and roots and tubers are acquired through own production. Nationally, for households consuming sweet potatoes, cassava fresh, and maize grain, at least 67 percent, 66 percent, and 62 percent respectively acquired the food through own production.

The food consumption patterns also highlight the importance of certain crops as a source of income. Maize is the most important cash crop—with more than two thirds of households consuming the crop indicating that they depend on the market for its acquisition. The relative importance of maize as a cash crop can also be partly attributed to the emerging food trade in the Nile Basin countries—especially in Kenya and Southern Sudan as earlier mentioned. This has provided additional markets for the crop in the recent past. Indeed, foreign earnings from maize increased from US$ 5.3 m in 1998 to US$ 23.1 m in 2007 (MoFPED 2008/09). In addition, local purchases of the crop for relief purposes to the war ravaged north and drought stricken northeast have been on the increase since the late 1990s. All the above factors have significantly contributed to the increased importance of maize as a source of income especially for the poor. The other important cash crop is matooke—though consumed predominantly in Western and Central regions, it is purchased mainly in the latter.

A different picture emerges when sources of food consumption are considered based on sub-regions. In this case, most of the unprocessed staples are acquired mainly through purchases. For example, 41 percent of the households consuming matooke in Central 1 sub-region acquire the item through purchases compared to 37 percent nationally. Also, 73 percent of the households consuming cassava flour in Central 1 sub-region acquire it through purchases compared to 57 percent, 25 percent, and 39 percent for the sub-regions of Central 2, East Central, and Eastern respectively. Also, about half of the households consuming cassava flour in the "famine districts" acquire it through the market. Although desirable, not all households can be able to grow their own food crops. Factors such as terrain and weather coupled with availability of land may constrain households from being self- sufficient in food consumption. The table further reveals that households residing in Kampala are net buyers of food, suggesting that price fluctuations will directly impact on the food security status.

Table 2: Source of food consumed by sub-regions, 2005/06 (%)

Food category	National			Sub-region																																
				Central 1			Central 2			Kampala			East Central			Eastern			North			West Nile			Western			South-Western			IDP Camps			Famine Districts		
	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift	Purchases	Own	Gift
Matooke	37	57	6	41	54	5	36	57	7	95	1	4	41	54	5	28	67	5	71	19	10	31	59	10	29	65	7	21	73	6	100	0	0	35	58	7
Roots and tubers																																				
Sweet potatoes	26	67	6	29	66	6	21	74	5	93	4	2	12	80	8	20	73	7	32	59	9	44	49	8	22	72	7	18	76	6	34	54	11	38	57	5
Cassava-Fresh	28	66	6	26	69	5	25	70	5	86	6	6	14	80	6	24	62	14	41	51	7	56	40	3	19	76	5	18	79	4	65	29	6	39	50	11
Cassava-Flour	43	54	4	73	23	5	57	42	1	81	0	19	25	68	6	39	58	4	63	34	3	47	49	4	41	57	2	45	55	0	80	10	10	47	49	4
Irish potatoes	56	40	4	74	22	4	60	32	8	98	1	1	98	2	0	91	9	0	100	0	0	100	0	0	28	62	10	25	72	4	-	-	-	92	8	0
Cereals																																				
Rice	90	5	5	94	0	6	94	2	4	99	1	0	83	10	7	85	9	6	86	7	6	80	14	6	93	5	3	85	10	5	60	20	20	84	11	5
Maize-Grain	24	62	13	35	55	10	19	71	10	100	0	0	17	73	10	13	75	11	34	32	34	47	41	10	15	69	13	25	71	3	20	2	78	39	49	11
Maize-Flour	64	26	10	81	16	3	76	21	3	98	1	2	40	53	7	54	42	4	37	17	46	73	22	5	54	41	5	81	17	2	12	4	84	70	24	6
Bread	96	1	3	94	0	5	95	1	4	99	0	1	93	3	3	97	0	3	96	0	0	100	0	0	97	2	1	95	1	2	100	0	0	100	0	0
Millet	33	60	7	77	18	4	65	30	5	82	4	14	21	69	11	21	71	8	32	57	11	38	60	3	45	51	4	26	69	5	57	30	13	37	61	2
Sorghum	36	51	12	100	0	0	36	52	12	100	0	0	12	82	6	36	60	4	41	27	31	53	46	1	21	76	3	30	65	6	35	10	54	48	46	6
Meat, diary and related foods																																				
Beef	96	1	3	95	0	5	95	1	4	98	0	2	96	1	4	95	2	2	97	1	3	94	0	6	98	1	1	98	0	2	100	0	0	91	2	5
Pork	92	1	2	94	3	2	93	0	3	100	0	0	95	1	0	100	0	0	91	4	3	90	0	10	86	0	2	83	2	2	67	33	0	97	0	3
Goat meat	89	6	4	78	9	8	88	4	8	100	0	0	95	3	2	90	2	8	83	10	6	80	4	16	93	5	2	88	11	1	100	0	0	74	12	12
Other meat	84	5	11	95	0	6	86	2	12	100	0	0	89	12	0	90	0	10	88	0	12	27	23	50	42	17	42	82	13	6	0	0	100	85	0	15
Chicken	33	63	5	42	51	7	36	56	7	87	0	13	24	72	5	16	82	2	27	72	1	30	53	17	38	59	2	26	74	0	100	0	0	20	72	8
Fish	94	2	4	93	2	5	92	3	4	100	0	0	96	2	3	90	2	7	93	2	5	95	0	5	95	1	3	94	3	2	98	1	1	92	2	6
Eggs	63	33	3	79	19	1	56	40	3	95	0	4	62	36	1	44	51	3	66	26	0	65	26	8	48	48	4	40	56	2	80	0	0	43	48	9
Fresh milk	72	22	6	73	19	7	73	21	5	98	1	2	75	19	6	50	39	10	65	28	6	70	12	18	77	18	3	63	30	7	100	0	0	45	41	13
Infant formula	85	0	15	87	0	14	50	0	50	100	0	0	100	0	0	100	0	0	13	0	88	-	-	-	-	-	-	100	0	0	-	-	-	-	-	-
Oil/fats	92	2	6	95	2	3	98	1	1	99	0	1	98	1	1	97	2	1	73	1	27	97	0	3	96	3	2	92	6	2	41	0	59	96	1	3
Fruits																																				
Passion fruits	65	29	6	69	27	4	53	41	5	96	0	4	62	29	6	67	28	5	57	25	18	72	7	21	56	41	1	43	48	10	100	0	0	51	33	16
Sweet banana	49	44	5	40	58	2	45	47	8	92	0	5	58	33	8	53	37	8	86	12	0	59	33	8	47	44	7	39	53	5	100	0	0	58	32	9
Mangoes	22	43	32	21	71	8	23	53	23	95	0	0	11	58	25	15	33	49	25	23	52	20	16	63	20	43	35	26	50	24	64	9	27	19	21	58
Oranges	56	26	17	78	21	1	60	23	17	95	0	5	21	48	29	77	12	10	52	16	29	38	40	23	44	46	10	48	23	29	50	25	25	60	23	14
Other fruits	28	58	13	26	66	8	19	66	15	92	3	5	13	66	20	27	54	18	46	36	18	64	24	13	36	50	13	34	54	12				50	32	16
Vegetables																																				
Onions	93	5	2	90	7	2	90	8	2	100	0	0	96	1	2	91	5	4	97	2	1	90	7	3	87	9	4	90	8	3	96	2	2	92	6	3
Tomatoes	92	6	3	90	7	3	89	8	3	99	0	0	92	4	4	94	4	2	89	7	4	90	9	2	90	8	2	92	5	3	89	5	7	92	6	3
Cabbages	91	6	4	87	10	4	89	7	4	100	0	0	90	5	4	92	3	5	93	5	2	96	4	0	85	11	4	87	6	6	100	0	0	93	5	3
Dodo	19	64	17	17	75	8	9	80	11	86	10	4	11	78	11	22	65	13	45	28	27	52	39	9	12	64	24	5	65	30	51	24	25	42	40	18
Other vegetables	41	46	13	38	59	3	40	53	7	98	0	3	31	57	12	39	45	17	42	38	21	46	46	8	15	75	11	24	65	10	52	30	18	35	45	20
Legumes and pulses																																				
Fresh beans	24	68	8	27	62	11	22	70	9	84	6	10	17	70	12	24	70	6	15	70	15	37	63	0	28	64	8	11	85	5	18	64	18	41	58	2
Dry beans	49	46	6	46	51	3	44	53	4	99	1	1	46	43	11	49	49	3	50	33	17	73	25	2	38	59	3	32	65	3	49	15	37	75	21	4
Groundnuts	70	26	4	83	13	4	80	17	3	99	1	0	62	33	5	62	32	5	63	28	9	61	36	3	57	39	5	58	38	5	80	13	8	51	44	5
Peas	39	28	33	97	3	0	87	13	0	100	0	0	52	20	29	50	45	6	28	20	52	47	50	3	23	76	1	38	57	5	17	7	77	53	43	4
Others																																				
Simsim	68	27	5	100	0	0	66	26	9	86	0	14	24	50	26	50	38	13	65	30	6	85	15	0	60	37	3	100	0	0	82	9	8	87	12	1
Sugar	96	1	3	93	0	6	96	0	4	99	0	0	97	0	3	96	2	3	96	2	2	98	0	2	98	0	2	97	0	3	98	2	0	95	1	3
Coffee	89	8	2	82	15	3	87	11	2	100	0	0	89	0	7	77	10	6	94	6	0	97	1	2	91	10	0	100	0	0	100	0	0	91	3	4
Tea	98	1	2	98	0	1	98	0	2	99	1	0	97	0	3	96	2	2	98	1	1	100	0	0	97	0	3	97	1	2	100	0	0	98	1	1
Salt	98	0	1	99	0	1	99	0	1	99	1	0	97	0	3	98	1	1	98	1	2	99	0	1	99	0	0	99	0	1	98	1	1	98	1	2

Source: Author's calculations from the UNHS 2005/06 Food Consumption Module

The North sub-region is also an exception in as far as consuming food from gifts/free is concerned. The sub-region stands out as having the largest proportion of households acquiring food through food handouts at the time of the survey. For example, while less than 10 percent of households from other sub-regions acquire maize flour from gifts, the corresponding rate in Northern Uganda is 46 percent. Likewise at least 34 percent and 31 percent of households consuming maize grain and sorghum respectively in the North sub-region acquire it through gifts. This unique situation is partly explained by the conditions of civil war that have existed in this part of the country since the mid 1980s. As a result of the war, some households were displaced into camps and these relied heavily on relief aid for food consumption. Nonetheless, since 2006 when the government and rebels initiated peace negotiations, some displaced households have managed to return to their former homesteads. As former IDPs return to their homesteads, it is expected that more households in the sub-region should be in position to cultivate most of the food required for consumption.

Finally, the last 3 columns of Table 2 show the source of food acquisition in the districts facing famine in July 2009. For the main staples consumed in these areas i.e. cassava, households mainly acquire the food from own production (50 percent) as well as purchases (39 percent). However, households in these districts are more likely to acquire dry beans from purchases compared to the whole country (75 percent against 49 percent).

4.3 Dietary intakes

On average, Ugandans consume 1,953 Kcal, which is below the minimum requirement of 2,226 Kcal. The results reveal that 68.5 percent of Ugandans are food insecure as measured in terms of caloric intakes. This translates into 17.5 million caloric insecure Ugandans living in 3.1 million households in 2005/06. The Northern region contributes disproportionately to total food insecure persons compared to its population share in the country. The reverse is observed for Western Uganda. Comparing the proportion of poor and caloric deficient persons, there are striking differences worth noting. In particular, the percentage of Ugandans unable to the meet the minimum recommended dietary intake is much higher than those unable to meet the minimum income.

Table 3 also shows the level of caloric intakes by various household characteristics. It is evident that caloric intakes are about 15 percent higher in rural than urban areas. Also as expected, on average, households in the Northern sub-region had the least caloric intake—of about 1,470 Kcal per person per day compared to other regions such as Eastern (1,830 Kcal) and South Western Uganda (2,599 Kcal). Caloric intakes are also highly dependent on the household's status in the income distribution. Based on the household poverty status, Table 3 shows that the caloric intakes of poor households are about 36 percent lower than those of non-poor households. Food insecurity and income poverty are closely linked. However, worth noting is that not all the income poor are caloric deficient and not all the caloric deficient are income poor. More disaggregated analysis reveals that nearly 6.9 million persons were both caloric deficient and income poor.

Table 3: Indicators of food sufficient by selected household characteristics, 2005/6

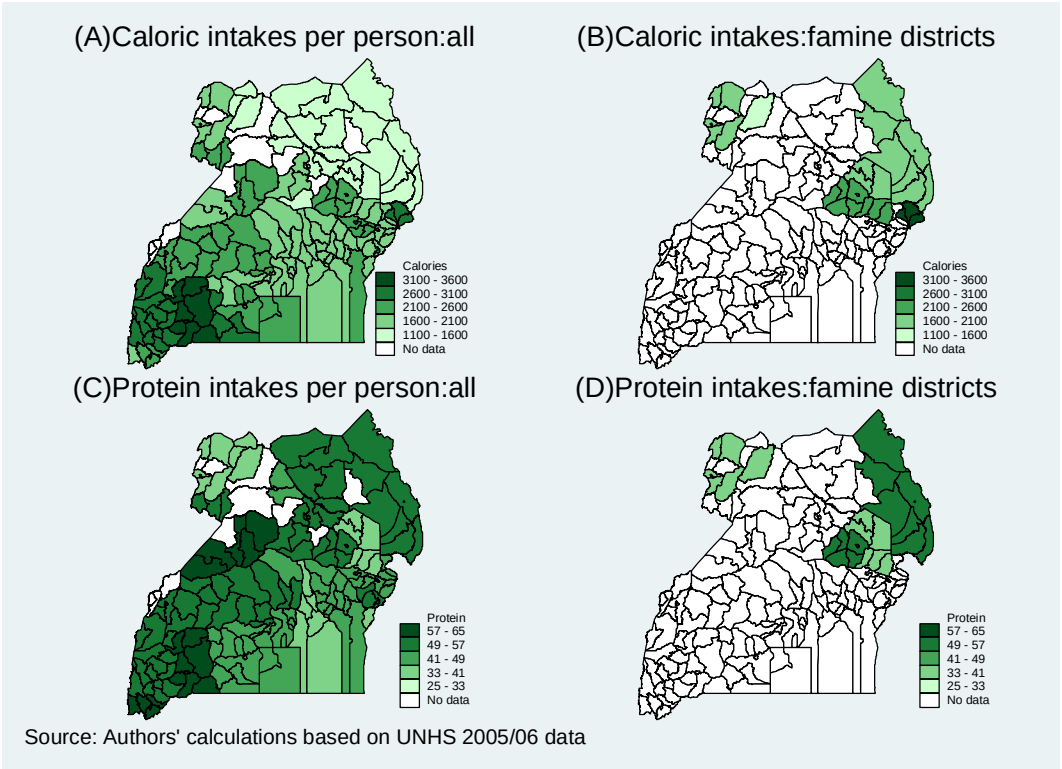
Indicator	Daily intake of			% unable to meet fewer than (Kcal)			No. of persons food insecure, millions (based on criteria C)
	Protein	Caloric		2,226	1,669	1,335	
	[A]	[B]		[C]	[D]	[E]	
All Households	37.7	1,970		68.5	44.1	28.6	17.5
By Location							
- Rural	37.8	1,995		62.9	41.8	27	14.4
- Urban	37.2	1,716		77.6	55.3	36.6	3.1
Sub-regions*							
Central Uganda	36.0	1,871		70.5	47.1	30	5.5
- Central 1	36.1	1,998		64.8	39.8	25.5	2.2
- Central 2	35.9	1,850		69.8	48.6	30.4	1.5
- Kampala	36.1	1,645		82.6	57.8	37.4	0.9
Eastern Uganda	34.8	1,830		68.8	46.5	28.9	4.8
- East Central	33.7	1,756		70	47.9	31.5	0.8
- Eastern	36.1	1,880		67.4	44.8	26.1	2.5
Northern Uganda	35.6	1,554		79.7	61.9	45.8	4.1
- North	38.2	1,470		82	65.5	49.2	0.3
- West Nile	28.7	1,778		73.7	52.7	37.1	0.8
Western Uganda	44.2	2,466		44.4	24	13.1	3.2
- Western	41.9	2,261		52.6	31.6	19.7	1.1
- South-western	45.6	2,599		39.3	19.1	8.9	1.1
IDP Camps	36.9	1,377		81.5	67.4	52.3	1.2
Poverty Status							
- Non Poor	41.8	2,179		56.6	33.7	19.4	10.9
- Poor	27.9	1,354		90.8	74.1	55.5	6.6
Per adult equivalent quintiles							
- Quintile 1	26.6	1,299		93.6	79.8	61.8	4.6
- Quintile 2	32.1	1,705		79.3	53.4	32.6	4.2
- Quintile 3	37.2	1,971		63.8	39.8	22.6	3.5
- Quintile 4	43.4	2,324		51	29	16.9	2.7
- Quintile 5	49.8	2,459		48	27.6	16.6	2.5
Household earning type							
- Dual earners	36.9	1,966		67.1	44.8	27.7	11.6
- Female breadwinner	38.8	1,936		61.5	40.5	26.1	3.3
- Male breadwinner	38.5	1,793		71.8	52.2	37.6	1.9
- No adult breadwinner	43.6	2,159		52.8	35	25.7	0.7
Household gender dominated							
- Female majority	38.1	1,959		60.9	40.5	26.2	5.2
- Male majority	40.3	2,066		66.4	46	33.3	3.2
- Equally dominated	36.7	1,991		67.6	45.4	28.4	9.1
Gender of household head							
- Female	38.9	1,947		61.8	39.4	25.4	3.9
- Male	37.7	1,954		67.4	44.6	27.2	13.6
Average number of meals a day							
- One	38.5	1,734		82.7	67.4	53.5	1.5
- Two or more	48.5	2,542		63.7	41.9	26.3	15.9

Source: Author's calculation from the 2005/06 UNHS.

Considering dietary intakes by household typologies, it is evident that female based households are more likely to be caloric secure relative to their male counterparts. This finding holds true for protein intakes. These findings are consistent with the notion that women are more likely to spend on food than their male counterparts. Relating dietary intakes with number of meals eaten per day, it is evident from Table 3 that households reporting a single meal per day during the past 7 days prior to the survey, on average, consumed about 1,340 Kcal. On the other hand, households with at least 2 meals a day consumed, on average, 2,020 Kcal daily.

Food dietary intakes also vary spatially (Figure 1). It is evident that Kapchorwa has both the highest caloric and protein intakes. The other districts with high caloric intakes are in the Southwest sub-region—notably Mbarara, Ibanda, and Bushenyi districts. The least amount of caloric intakes is found in the sub-regions of Karamoja and Acholi. On the other hand, districts in Northern region show relatively higher rates of protein intakes than for example Central region. This may be partly explained by the fact that more households in the Northern region keep livestock—a key source of protein. Also, it may be explained by availability of beans in the Northern region—another key source of proteins—however, provided mainly by relief agencies such as the WFP. These findings are consistent with the results in Table 2.

Figure 1: Mean caloric and protein intakes in 2005/06



Source: Authors' calculations based on UNHS 2005/06 data

4.4 Extent of food Insecurity

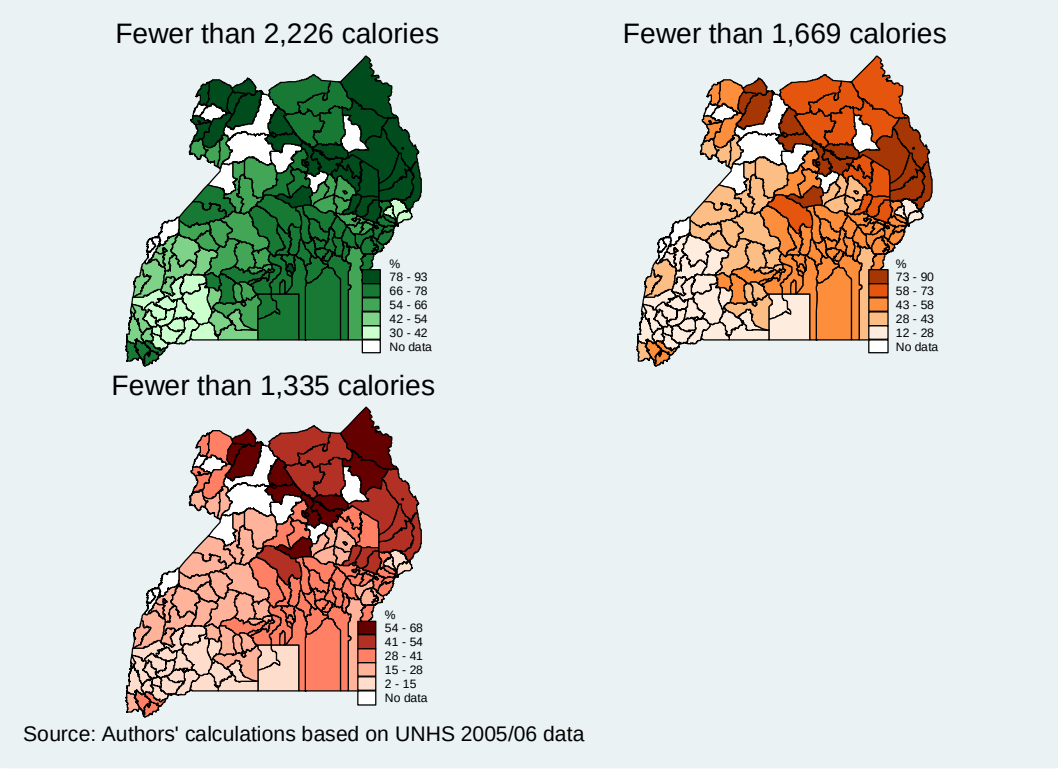
Using different thresholds of the recommended dietary intake, the study investigates the severity or vulnerability to food insecurity. As expected, due to limited own production, low income and differences in consumption preferences, a higher proportion of households consumed less than 2,226Kcal per day in urban (78 percent) compared to rural areas (63

percent). At the regional level, Western Uganda has the least prevalence of food insecurity—46 percent. Based on per adult equivalent quintiles, food insecurity significantly reduces as one moves up the distribution of household income—from 94 percent for the bottom quintile to 48 percent for the top quintile. Nonetheless, the fact that about half of individuals in the top quintile are classified as food insecure shows that achieving the hunger MDG is going to be an uphill task for Uganda.

The last three columns of Table 3 show that the food security situation dramatically changes as one adjusts the threshold of the recommended intake – fewer than 1,669 and 1,335 Kcal. Nearly 44.1 percent of the households (with 11.7 million persons) consumed fewer than 1,669Kcal per day per person; and 28.6 percent of the households (with 7.2 million persons) consumed fewer than 1,335 Kcal per day per person. However, the prevalence of food insecurity remains high for certain groups regardless of the change in the criterion. The situation in northern Uganda and in particular in IDPs is worrying with nearly half of the households unable to meet 1,335 Kcal. Notable among these are households resident in IDP camps where reducing the threshold of the recommended intake results in a drop of food insecurity prevalence from 81 percent to only 52 percent (a change equivalent to a reduction of about 35 percentage points). This change compares unfavourably with the national average where similar change in the food security criteria results in a reduction of about 56 percentage points (from 65 percent to 29 percent). Overall, regardless of the definition of food insecurity, a substantial population in Uganda does not meet the recommended dietary intake.

Figure 2 presents a graphical illustration of the severity of food insecurity in Uganda - a movement from moderate to extreme food insecurity. In the maps, districts without data are left blank while the rates of food insecurity increase with increasing intensity of the colour e.g. in the first map (fewer than 2,226 calories), districts with highest rates of insecurity are shaded dark green. Starting with first map as expected, the highest proportion of households unable to meet their recommended caloric intakes are in Karamoja sub-region. However, the same figures shows other pockets of high proportions of food insecure households—notably in West Nile, Teso, and Nakasongola.

Figure 2: Prevalence of food insecurity in Uganda by districts



Source: Authors' calculations based on UNHS 2005/06 data

The second map shows that most households unable to meet at least 1,669 calories are again in Karamoja. These particular households are followed closely by households in Northern Uganda and West Nile. Surprisingly, there are also small pockets of highly food insecurity observed in Kabale district. The final map confirms that extreme food insecurity is concentrated in Karamoja and to a limited extent in Acholi and Teso sub-regions. Most of the other areas have low proportion of households unable to meet 1,335 calories (rates below 30 percent). These relatively well fed districts are mainly in Southwest sub-region.

The transition from one criterion of food insecurity to another shows marked differences in the food situation in Uganda. First, although the sub-region of Karamoja shows high rates of overall food insecurity (by all the three criteria), particular districts notably Kabong and Kotido show much higher rates of extreme food insecurity (inability to meet at least 1,335 calories) than Moroto and Nakapipirt, for example. Second, a similar situation is observed in Acholi sub-region where Gulu district has higher rates of insecurity (regardless of criteria) than Kitgum and Pader. Other districts with higher levels of extreme food insecurity include Amolatar, Dokolo, and Lira. Third, in West Nile, Moyo consistently performs worse in terms of caloric intake than Adjumani. Finally, it is also worth noting that in Central Uganda, Nakasongola district has the highest proportion of extreme food insecurity—with a range of 41-54 percent.

These particular maps in some way retrospectively explain the food security status faced by households facing famine in 2009. Specifically, many of the "famine" districts had large populations facing extreme food insecurity i.e. households consuming fewer than 1,335

calories. Depending more on own production to acquire staples such as cassava, many of the households in these particular districts may have been forced into the market for food due to the poor rains in early 2009. In summary, the maps suggest that the districts facing famine in 2009 were already chronically food insecure—based on extent of extreme food insecurity in 2005/06.

4.5 Food insecurity-child nutrition outcomes nexus

Food insecurity results in under nutrition, which has an effect on the children nutrition outcomes. As earlier mentioned, child nutrition status is important—both for overall health as well as future cognitive development. This section relates child nutrition indicators with various household characteristics focusing on only children from households surveyed in both the 2006 UDHS and UNHS III. Table 4 shows that about one in three children in Uganda are stunted. On the other hand, only 17 percent are wasted while the corresponding rate for underweight is 6 percent. At the sub-regional level, the highest rates of stunting are in Southwest sub-region—43 percent followed by the sub-regions of North and Western—at about 34 percent. This is surprising given that the Southwest sub-region has relatively higher levels of food consumption than either the sub-regions of North or West Nile (Table 3). Considering the living arrangements, it is evident that children residing in male based households are likely to have better height-for-age scores relative to their counterparts in female based households. This might be explained by the higher protein intake exhibited by male based households.

Indeed, when one considers the nutritional status by food security status, there are no significant differences in the stunting rates. For children resident in districts faced with famine in 2009, their anthropometric indicators are not significantly different from the rest of the country—with the exception for the rates for underweight—24 against 20 percent respectively. This apparent discrepancy—where food security status appears to have no impact on child nutritional status may be partly explained by the fact that only some children captured by the UDHS are observed. Second, child nutritional status is a long term measure of food intake as opposed to food insecurity—which is a relatively short term measure of food intake. Unlike caloric food security status, where the child nutritional status is relatively similar, for food security status based on protein intakes, the differences are quite large. This suggests that protein intakes are more important to child nutrition than caloric intakes.

Table 4: Indicators of child nutritional status by selected characteristics

Indicator	Height for age	Weight for height	Weight for age
All households	31.4	5.5	20.2
By Location			
Rural	31.6	5.5	17.9
Urban	23.4	6.9	9.5
Famine Districts (2009)	29.3	4.3	24.1
Sub-regions			
Central 1	29.8	4.2	14.5
Central 2	21.4	2.2	13.2
Kampala	19.1	7.5	12.6
East Central	31.7	9.7	28.9
Eastern	28.1	2.3	16.2
North	34.2	5.6	27.9
West Nile	32.2	4.8	22.1
Western	33.3	3.9	16.8
South-western	42.7	9.8	23.1
Poverty Status			
Non-poor	28.5	5.8	14.4
Poor	37.6	5.4	25.1
Expenditure Quintiles			
Bottom quintile	36.6	4.1	21.6
Richest quintile	29.2	6.9	10.3
Food insecurity:			
Consume fewer than 2,226Kcal	29.1	5.4	17.0
Consume fewer than 40.4g	18.7	6.8	20.4
Household earning type			
Dual earners	32.9	4.7	17.9
Female breadwinner	28.8	8.1	21.0
Male breadwinner	26.6	12.0	16.0
No adult breadwinner	-	-	-
Household adult sex composition			
Female majority	34.7	4.6	19.4
Male majority	30.2	5.1	15.9
Equally dominated	30.5	6.1	17.5

Source: Author's calculations based on UNHS III and 2006 UDHS.
Notes: Analysis limited to 2,895 households covered in both UNHS III and 2006 UDHS.
Estimates weighted using the 2006 UDHS sample weights

4.6 Composition of food intakes by major groups

In order to better understand the cause of the large variation in food insecurity, Table 5 shows the contribution of the major food groups to dietary intake. A few observations can be made regarding the overall composition of the Ugandan diet in 2005/06. First, roots and tubers are the most important source of calories in the Ugandan diet contributing about 29 percent of the caloric intake. Other important sources of calories include cereals and matooke, which supply about 28 percent and 20 percent calories respectively. Second, the significance of roots as a source of calories is most important among rural households (31 percent). Third, roots and tubers are most important in the sub-regions of West Nile and East Central—contributing 61 percent and 43 percent of the caloric intakes respectively. Fourth, cereals are most important in urban areas while matooke's contribution to caloric intakes is highest in the sub-regions of Southwest (49 percent) and Central 1 (31 percent). This sub-regional variation in caloric contribution is consistent with national food production where roots are mainly produced and consumed in the sub-regions of West Nile and in the East Central whereas matooke is predominantly produced and consumed in South-western Uganda. Furthermore, the large matooke contribution to caloric intakes in Southwest sub-region may partly explain the high stunting rates observed in the sub-region (Table 4). Indeed, it is plausible that children from the sub-region are malnourished due to over reliance on matooke—a food item with relatively low nutrition content.

Also, caloric contribution varies widely with income level. Indeed, Table 5 reveals a very high dependency by the poor on roots and cereals as a source of calories. The main staple—matooke contributes the largest share of calories among households from the top quintile. These findings are in line with other developing countries which show that a restricted diet for the poor- i.e. very rich in starchy staples but little animal products, fresh fruits and vegetables (Ruel 2002). However, such a high dependency by households in the bottom quintile on a few food groups for caloric intake has implications for changes in food prices. Given their low incomes, any increase in price of roots or cereals is likely to lead to reduced consumption and hence nutritional intake.

Table 5 also reveals that legumes are the most important source of proteins contributing nearly 37 percent of the overall protein intake. However, again there are wide geographical variations in legume contribution to protein intakes—with the contribution highest in West Nile (52 percent) and Western (48 percent) sub-regions, while in East Central and Kampala the contributions to protein intakes are much lower, about 20 percent and 31 percent respectively. An explanation for this can be that the production of legumes especially beans is highest in the sub-regions of West Nile and Western. It is also evident that legumes contribution to protein intakes declines with increasing income levels. At higher expenditure quintiles, meat and its related products replaces legumes as the most important source of proteins which may suggest that legumes are considered inferior foods[8].

[8] An inferior good is a good that decreases in demand when consumer incomes rise.

Table 5: Contributions of major food groups to dietary intakes, %

Food type		Location		Sub-region									Famine Districts 2009	Quintiles				
	All	Rural	Urban	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South Western		Q1	Q2	Q3	Q4	Q5
Caloric																		
Cereals	27.6	26.9	31.1	24.6	23.9	29.9	32.1	35.3	45.4	15.0	16.0	17.7	26.9	37.9	27.8	26.9	23.3	24.3
Roots	28.7	30.8	18.2	20.1	30.3	13.7	43.0	32.4	28.5	60.6	30.1	14.6	49.0	34.5	36.3	31.4	27.2	17.7
Legumes	13.6	13.7	13.1	10.7	12.5	12.2	7.9	10.2	20.2	18.6	18.3	13.1	15.7	15.9	15.2	13.8	13.1	10.9
Meat	3.9	3.1	7.5	4.6	5.2	9.4	3.8	2.4	1.9	1.3	4.1	3.5	2.3	1.3	1.7	2.8	4.3	8.0
Matooke	20.4	20.8	18.3	31.4	19.7	20.3	5.8	14.5	0.3	1.8	27.6	49.1	3.2	8.4	15.1	20.0	26.0	28.5
Oils	0.4	0.4	0.9	0.5	0.5	0.9	0.6	0.4	0.6	0.3	0.3	0.1	0.3	0.3	0.4	0.4	0.5	0.6
Sugar	5.4	4.3	10.8	8.1	7.9	13.5	6.7	4.7	3.2	2.3	3.5	1.9	2.6	1.8	3.6	4.7	5.5	10.0
Total	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Protein																		
Cereals	30.7	30.1	33.6	30.5	27.3	33.1	36.2	42.8	40.6	15.9	17.4	23.7	29.4	37.5	30.3	30.2	27.5	29.2
Roots	18.6	20.1	10.9	16.6	22.3	8.9	31.8	18.8	13.3	27.3	18.3	12.8	23.2	21.2	22.6	20.8	18.1	12.3
Legumes	36.9	37.7	32.7	33.9	33.8	31.1	20.2	28.9	42.1	52.0	48.5	45.6	41.2	37.1	40.1	38.3	38.5	31.6
Meat	11.7	9.8	21.2	15.7	14.9	25.3	11.2	7.9	4.0	4.7	12.9	12.6	5.9	3.0	5.3	8.7	13.3	24.3
Matooke	2.1	2.2	1.6	3.4	1.8	1.7	0.6	1.5	0.0	0.1	2.9	5.3	0.3	1.3	1.8	2.0	2.6	2.6
Total	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

Source: Author's calculations based on UNHS III.
Notes: Meat includes meat and related products.

4.7 Dietary Diversity

Another possible explanation for the food insecurity situation could be the variety of foods consumed—dietary diversity. The diversity score is important for two reasons. First, it is a good predictor of nutritional adequacy or intake (Hatloy et al. 1998). Second, its close association with household socio-economic status such as per capita consumption and energy availability make it another suitable indicator of household food security (Hoddinott and Yohannes 2002). The dietary diversity score computed following the approach by Guthrie and Scheer (1981), is on average 13.5 with a median of 15. As expected, poorer households consume relatively few food categories relative to their better off counterparts as reflected by the mean FDS scores of 11.8 against 14.1 (Table 6).

Table 6 further shows that majority of Ugandan households are in the top tercile. At a sub-regional level, the majority of households in North and West Nile are in the middle tercile—63 percent and 54 percent respectively. An even larger proportion of IDP camps are in the middle tercile (70 percent). Related, the majority of poor households (66 percent) are in the middle tercile. Also worth noting is the fact that urban households show a large diversity in diet despite higher level of food insecurity—based on average daily caloric intakes (Table 3). This suggests that food diversity may not translate into nutritional quality. With these findings it is very difficult to conclude whether FDS is a good predictor of food security. Previous cross-country studies find results to the contrary that dietary diversity is good predictor of household food security (Hoddinott and Yohannes 2002; Ruel 2002). However, the above results should be interpreted with caution since not all the food categories included in the FDS contribute to caloric intake. Indeed, food categories such as vegetables and fruits (which are rich in iron and vitamins) do not contribute significantly to caloric intake but feature prominently in the FDS.[9]

[9] The Food diversity score includes both food items used in the derivation of dietary intakes as well as those excluded from the calculation of dietary intakes.

Table 6: Food dietary diversity score, 2005/06

Food Score	All	Location		Sub-regions*								IDP Camp	Famine Districts 2009	Poverty Status	
		Rural	Urban	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South-Western			Poor	Non Poor
Food dietary diversity score																
Mean	13.5	13.4	13.9	14.1	14.1	13.9	13.7	13.6	12.1	12.9	13.8	13.7	11.4	12.7	11.8	14.1
Median score	15.0	14.0	16.0	16.0	15.0	16.0	15.0	15.0	12.0	14.0	15.0	15.0	11.0	14.0	12.0	15.0
	Aggregated into Tercile, % households with a given score															
Tercile I	3.4	3.8	1.0	2.6	2.0	1.0	3.6	2.2	6.3	4.3	3.9	2.7	8.2	5.2	7.7	1.6
Tercile II	42.1	45.2	26.7	30.3	34.5	19.9	40.0	45.0	63.3	53.9	41.0	43.2	69.9	56.5	66.1	33.3
Tercile III	54.6	51.1	72.3	67.1	63.6	79.2	56.5	52.8	30.5	41.9	55.1	54.1	21.9	38.0	26.2	65.1
Total	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Source: Author's calculations based on UNHS III.

Note: - The food categories are weighted based on nutritional density as follows; Matooke=2, Cereals=2, Roots and Tubers=2, Legumes and Pulses =3, Meat and related products=4, Oils and Fats=1, Fruits=1, Vegetables=1, Condiments=1, Restaurant, foods=1 and unclassified " other foods"=1. Also the calculation excludes households with caloric intakes classified as outliers.

- Tercile 1 (Low score 2-7); Tercile II (Medium score 8-14) and Tercile III (High score 15-19).

4.8 Seasonality of dietary intakes

Studies analyzing household food consumption patterns in developing countries usually find a consistent seasonal pattern in food consumption—in particular, caloric intakes are highest during the harvest season and consistently decline until the next harvest (Handa and Mlay 2006; Chaudhuri and Paxson 2001; Alderman 1996; Sahn 1989). In developing countries, seasonal variation in food intake arises because of the heavy dependency on rainfed agriculture for food production coupled with poor storage and preservation capacity at the household level. Specific to Uganda, as earlier noted, the official explanation for famine witnessed in the sub-regions of West Nile, Karamoja and Teso in 2009 was the poor rains registered during the first half of 2009. Vulnerabilities due to dependency on rainfed agriculture are further exacerbated by the low incomes for most households, which limits their access to through food markets. Thus, reduction in food intake becomes a natural coping strategy for most households during the post harvest period

Significant seasonal variations in caloric and protein intakes are noted in Table 7 and Table 8 respectively. For caloric intakes, five out of the eleven months in the regression display significant seasonality at the 5 percent level at the national level. The interpretation is as follows--relative to the month of January, caloric intakes are significantly lower in April, June, July, November, and December. Turning to protein intakes, six out of eleven months are significant—suggesting more seasonal variation in protein than caloric intake. Furthermore, the seasonal caloric fluctuations are more pronounced in the sub-regions of West Nile and Western compared to any other sub-regions. Specifically, caloric intake in West Nile sub-region significantly declines during July to August as well as November to December. On the contrary, caloric intakes for the Western sub-region are lower during April, June, and October to December.

Also, caloric intakes in rural areas are significantly higher in February and March compared to January. This may be partly explained by the dependence of urban households on the market for most food acquisition (characterised by unstable prices) compared to rural households that predominantly rely on own production. Above all, the seasonal variation in food intake is consistent with the agricultural production cycle. As previously mentioned, the main agricultural season runs from March to May and this is followed by the first harvest in July. The second season runs from August to October followed by the harvest in December and January. Thus as would be expected, caloric and protein intakes are highest in January and July- the harvest periods and lower during the planting period of March-June and August -October.

Considering the districts faced with famine in 2009, a different picture emerges. Specifically, caloric intakes in these districts are significantly higher at the start of the year (February, March, and May) than at any other period[10]. Although this pattern is also observed for rural households in general, the magnitudes of the coefficients for famine districts, is more than twice that of rural areas as whole. However, the pattern for protein intakes mirrors that for the rest of the country. The above results suggest that staples in these areas—which contribute the largest proportion of calories, operate on different weather pattern. In particular, these districts register their highest caloric intakes at the beginning of year and any food shock during this period is bound to be disastrous.

[10] Caloric intakes are also higher in September than January for these districts.

Table 7: Test for seasonality in caloric intakes

Month	National[1]	Location			Sub-region									Districts 2009
		Urban	Rural		Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South-Western	
Month (*ref. Jan*):														
February	0.030	-0.073	0.067*		-0.313*	-0.023	-0.637	-0.058	0.011	0.065	0.130	0.006	0.030	0.143*
March	-0.008	-0.083	0.066*		-0.003	-0.034	-0.890*	-0.134	-0.031	0.208**	-0.108	-0.145	0.147**	0.273***
April	-0.091**	-0.091	-0.114**		-0.109	-0.066	-0.739	-0.153*	-0.199*	0.098	0.05	-0.291*		-
May	-0.044	-0.004	-0.032		-0.029	0		-0.168	-0.184*	-0.032	-0.029	0.032	-0.016	0.134*
June	-0.110***	-0.173**	-0.042		0	-0.081		-0.215**	-0.120	-0.216**	0.015	-0.211*	-0.079	0.141
July	-0.049*	-0.126*	-0.019		0.080	-0.144		-0.057	-0.276**	0.064	-0.201*	-0.187	0	-0.081
August	-0.014	0.043	0.001		-0.093	0.038		-0.063	-0.034	0.030	-0.174*	-0.134	0.117	-0.044
September	-0.012	-0.039	0.002		0.015	-0.034	-0.6	-0.039	-0.111	0.030	-0.147	-0.159	0.035	0.193*
October	-0.004	-0.106	-0.032		0.003	0.026	-0.571	-0.047	-0.154	0.055	-0.132	-0.256*	0.190*	0.082
November	-0.072**	0.026	-0.086**		-0.06	-0.034		-0.066	-0.125	-0.027	-0.330***	-0.216*	-0.076	0.055
December	-0.126***	-0.317***	-0.063		0	-0.091		-0.237*	-0.135	-0.142*	-0.368**	-0.265*	-0.011	-0.045
Sub-region (ref. Central 1)														
Central 2	-0.043*													
Kampala	-0.081*													
East Central	-0.088***													
Eastern	-0.017													
North	-0.270***													
West Nile	-0.044													
Western	0.115***													
South-Western	0.260***													
Urban dummy	-0.081***													
IDP dummy	-0.046													
Famine districts 2009	-0.091***													
Constant	7.586***	7.505***	7.540***		7.574***	7.524***	8.071***	7.539***	7.594***	7.233***	7.520***	7.781***	7.766***	7.306***
## households	6,731	1,470	5,261		779	839	270	930	849	993	458	643	970	679

Source: Author's calculations based on UNHS III.

Table 8: Test for seasonality in protein intakes

Month	National[1]	Location		Sub-region									Famine districts 2009
		Urban	Rural	Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South-Western	
Month (ref. Jan):													
February	0	-0.79	0.04	-0.13	0.04		-0.12	-0.01	0.05	0.12	0.14	-0.01	0.107
March	-0.06*	-1.60	-0.05	-0.13	-0.14	-0.13	-0.14	-0.01	0.15	-0.26**	0.11	-0.01	-0.115
April	-0.07*	-2.82	-0.10**	-0.05	-0.09		-0.20*	-0.08	0.15	-0.06	0.12	-	-
May	-0.11***	-1.02	-0.14***	-0.17*			-0.17	-0.11	-0.04	-0.14	-0.02	-0.06	-0.12
June	-0.09**	-4.83	-0.06		-0.05		-0.14	-0.08	-0.23**	-0.09	0.05	-0.02	-0.013
July	-0.08*	-3.24	-0.06	-0.05	0.01		-0.09	-0.20*	-0.08	-0.26*	0.01	-0.02	**-0.221****
August	-0.01	1.83	-0.01	-0.12	0.07	0.96	-0.08	0.09	-0.09	-0.14	0.1	0.01	**-0.141***
September	0.01	0.66	0.01	-0.05	-0.02	0.13	-0.03	0.02	-0.02	-0.31**	0.23*	0.04	-0.09
October	0.04	-1.07	0.02	0.05		0.11	-0.09	0.01	0.04	-0.11	0.16	0.26**	-0.149
November	-0.07*	0.54	-0.09**	-0.04	-0.15		-0.12	-0.01	-0.08	-0.28**	-0.13	-0.09	**-0.132***
December	-0.09**	-8.17**	-0.02		0.04		-0.11	-0.08	-0.22**	-0.37*	0.13	-0.09	-0.081
Sub-region(ref: Central 1)													
Central 2	0.04												
Kampala	-0.01												
East Central	-0.03												
Eastern	0.01												
North	0.04												
West Nile	-0.16***												
Western	0.13***												
South-Western	0.18***												
Urban dummy	0.03*												
IDP dummy	-0.05												
Famine Districts 2009	-0.03												
Constant	3.56***	42.04***	3.59***	3.59***	3.58***	3.53***	3.61***	3.56***	3.60***	3.49***	3.58***	3.72***	3.528***
Number of households	*6,501*	*1,420*	*5,081*	*747*	*782*	*263*	*903*	*809*	*1,001*	*436*	*606*	*954*	*648*

Source: Author's calculations based on UNHS III.

4.9 Econometric results

The previous analysis has shown that many household characteristics are correlated with levels of caloric intakes. Unfortunately, these correlations may well be spurious, in the sense that some third variable affects both the observed average household caloric intakes and the characteristic in question. The econometric results are presented in Table 9 – both at national level; disaggregated at sub-region level; and for "famine" districts. The discussion in the subsequent sections is limited to the most important variables.

Contrary to the strand of literature showing a weak caloric-income linkages (see for example, Behrman and Deolalikar, 1987; Boius and Haddad, 1992), the study findings suggest a positive and significant relationship between caloric intake and income. In other words, increases in household income will lead to substantial increases in caloric intake. At the national level, a 10 percent increase in income will result into 4.6 percent increase caloric intakes. Caloric intake in households residing in West Nile is likely to be more responsive to changes in income than caloric intake in households residing in other sub-regions. These findings suggest that interventions to increase household income would to a great extent increase caloric intake.

The results further show that food prices have significant effect on caloric intake after controlling for income effect. However, the magnitude and direction differ spatially. With regard to changes in prices paid for the key food items, the results in Table 9 are in some cases positive while in others they are negative. For a normal good, the expected relationship is negative i.e. an increase in price is associated with reduced quantity consumed and consequently caloric intakes. On the other hand, the positive relationship shows how some of the items are major staple foods especially for poor households. In this case, an increase in the price of staples would result in poor households consuming more of the product as they are unable to substitute to more nutritious foods due to a limited income. Indeed, this phenomena—of rising caloric intakes with increasing price of staples has been documented in other countries e.g. China with regard to rice and wheat (Jensen and Miller 2008). However, for most of the food items, Table 9 shows that the response to price changes are sub-region specific—depending on wealth status and the extent to which a food item is a staple in the particular sub-region. For example, a unit increase in the price of matooke is associated with a 1 percent reduction in caloric intakes nationally. However, the reduction in some sub-regions is very large. For example, a unit increase in the price of matooke is associated with a 27 percent and 22 percent reduction in caloric intakes in Central 1 and South Western Uganda respectively.

Other sub-region results also show the vulnerability to food price changes due to dependency on the market to acquire food. For instance, in the capital Kampala—where the majority of households acquire food through the markets, a 10 percent increase in the price of maize leads to a 7.2 percent reduction in caloric intakes, all other factors held constant. Finally, the last column of Table 9 shows how households in the 2009 "famine" districts are sensitive to major food prices. It is worth noting that with the exception of beans, most of the other food prices have no significant effect on caloric intakes in the famine districts. This suggests that most of the households in the "famine" districts depend on own production and as such are insulated from most price changes. Overall, caloric intakes are more responsive to changes in income than changes in food prices.

Broadly speaking, land under cultivation contributes positively and significantly to caloric intake. A one acre increase in cultivated land raises caloric intakes by 5 percent nationally. However, with Uganda's high population growth farming land expansion strategies might be limited in the short-medium term. The long-term strategy would call for increasing agricultural productivity.

The results further reveal that education attainment of the household head matters. For example, higher education attainment of the household head is associated with reducing levels of caloric intakes. In this case, the education indicator not only captures knowledge, but also preferences—i.e. higher education attainment may be associated with increased consumption of food less rich in calories. Clearly at national level, caloric intake does not seem to differ between households with female head and those with male head. However, households with female heads and resident in East Central sub-region are significantly less likely to be caloric deficient than their male counterparts. The reverse is observed for households resident in North sub-region with female headed households consuming on average about 9 percent more calories than male headed households. The results further reveal that household size and demographic composition significantly affect caloric intakes. For instance, the presence of young children (aged 5 years and below) significantly reduces averages caloric intakes and the effect of infants is most pronounced in West Nile. In particular, a 10 percent increase in the share of infants reduces caloric intakes by 5.7 percent in West Nile; 5.1 percent in Eastern sub region and 3.6 percent in the North. The above results suggest that the status of food security in some sub-regions in Uganda is driven by a high population dependency problem.

Table 9: Reduced form OLS estimates of caloric intakes, 2005/06

Dependent variable: Log of daily caloric intake				Combined	Sub-regions									Famine Districts
					Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South-Western	
Log of household consumption per adult equivalent	0.458***	0.387***	0.464***	0.330***	0.478***	0.450***	0.518***		0.668***	0.578***		0.483***	0.598***	
Log of cultivated land (acres)	0.049***	0.041	0.059***	0.075*	0.025	0.094***	0.075***		0.039	-0.008		0.011	0.045	
Education attainment of the household head (cf: No education)														
Some primary	-0.011	-0.054	-0.032	0.069	0.021	-0.089	-0.024		0.003	-0.023		0.006	0.007	
Completed primary	-0.036	0	-0.11	0.074	-0.04	-0.068	0.013		0.072	-0.073		-0.061	0.073	
Some secondary	-0.077***	-0.128	-0.102	0.131	-0.03	-0.08	-0.021		-0.01	-0.109		-0.179	0.019	
Completed secondary	-0.196***	-0.133	-0.226**	-0.031	-0.192*	-0.161*	-0.209*		-0.290**	-0.286***		-0.172**	-0.08	
Demographics														
Age of the household Head	4.148*	-22.674	4.447	28.232	6.294	-5.513	14.545		-9.101	-7.913		0.928	-9.114	
Age of the head squared	-1.971	11.138	-2.115	-13.636	-3.005	2.704	-7.108		4.416	3.916		-0.401	4.495	
Female headed household	-0.013	-0.052	-0.019	-0.012	-0.102*	0.014	0.099*		-0.003	0.006		-0.043	0.045	
Household size	-0.010***	-0.01	-0.012*	-0.015	-0.015***	-0.007	-0.011		0.009	-0.001		-0.015	-0.001	
Household Composition														
Share of female adults	0.089	0.088	0.069	0.352	0.16	-0.016	0.156		-0.031	-0.001		0.006	-0.039	
Share of female teenagers	0.033	0.284*	0.099	0.212	0.274	-0.173	-0.021		-0.39	-0.109		0.039	-0.151	
Share of male teenagers	0.177***	0.348	0.281	-0.001	0.135	0.046	0.219		0.079	0.21		-0.057	0.029	
Share of children aged 0-5 years	-0.109*	0.14	0.01	0.285	0.014	-0.509***	-0.356**		-0.569*	-0.306		-0.266*	-0.335*	
Food price per kg														
Matooke	-0.010*	-0.276***	0.013	-0.022	-0.006	-0.005	-0.009		-0.009	-0.062**		-0.227**	0.004	
Sweet potatoes	-0.032***	-0.032	-0.067	-0.250**	-0.065	-0.02	-0.024		-0.025	-0.093		0.006	0.003	
Cassava-Fresh	-0.003	0.022	-0.164**	-0.045**	-0.062	-0.007	-0.015		-0.031**	-0.028		0.028*	-0.007	
Cassava-flour	0.001	0.009	-0.005	0.024*	0.013	-0.002	-0.007		0.037	-0.009		-0.002	0	
Maize grain	0.010***	0.011	-0.002	0.023	0.018*	0.011	0.008		0.015	0.002		0.007	0.018*	
Maize flour	-0.016*	-0.002	-0.088	-0.716**	-0.270*	0.011	-0.137		-0.003	-0.184		-0.039	0.003	
Fresh beans	-0.004*	-0.002	0.001	-0.01	0.003	-0.002	-0.008		0.024*	-0.014		-0.001	0.013	
Dry beans	0.008	0.024	-0.012	0.375	0.016	-0.107	-0.124		-0.183	0.023		-0.138	-0.309**	
Location														
Urban dummy	-0.185***	-0.106	-0.205***	0	-0.164*	-0.242***	-0.177**		-0.208**	-0.185**		-0.200**	-0.262***	
Sub-region dummies (cf: Kampala)														
Central1	0.181***													
Central 2	0.108**													
East Central	0.161***													
Eastern	0.288***													
North	0.077*													

Dependent variable: Log of daily caloric intake				Combined	Sub-regions								Famine Districts
					Central 1	Central 2	Kampala	East Central	Eastern	North	West Nile	Western	South-Western
West Nile	0.231***												
Western	0.376***												
South Western	0.518***												
Household resident in IDP camp dummy	0.015												
District faced with famine in July 2006	-0.044												
Community characteristics													
Presence at community level:													
Factory employing at least 10 people	-0.103***	-0.059	-0.200***	0.049	-0.103	-0.198		-0.095	0	-0.054	-0.099	0	
Truck/Pick up to transport inputs/produce	0.002	0.063	-0.027	-0.073	-0.026	-0.031		-0.009	-0.04	0.006	-0.037	0.009	
Constant	1.928***	6.718***	3.487***	3.07	3.476*	4.284**		2.263	3.151	4.312*	4.480**	4.029*	
Observations	7,057	814	873	275	970	890		1,026	509	664	1,036	676	
R-squared	0.38	0.28	0.32	0.33	0.3	0.33		0.34	0.45	0.38	0.36	0.42	

Source: Authors' calculations from the UNHS 2005/06

Notes: Absolute value of t statistics in brackets * significant at10 percent; ** significant at 5 percent; and *** significant at 1 percent.

In each of the regressions, we use sampling weights that are the product of the standard sampling weight that captures the household's probability of selection and the household size. We also take into account the sampling design when

5.0 CONCLUSIONS

Using a nationally representative household survey conducted in 2005/06, the study findings indicate that Uganda is faced with a very high rate of food insecurity measured in terms of caloric intake. This suggests that the country is less likely to meet the hunger MDG by 2015. While it is difficult to rule out underreporting of quantities of food consumed by the sampled households, Uganda's level of food insecurity is well above international averages. Nearly 68.5 percent of the Uganda population is caloric deficient – translating into about 17.5 million food insecure persons in 2005/06 unable to consume 2,226 Kcal. The nature and extent of food insecurity has a significant spatial dimension. Karamoja, as expected, comes out as one of the food insecure sub-region regardless of food insecurity measure used.

The food insecurity and income poverty are closely linked. Similarly, food insecurity at household level is closely linked to child nutrition status. The anti-poverty interventions, and interventions to address food insecurity and under nutrition among children have to been closely linked. It is also evident that the linkage has a significant spatial dimension. For instance, caloric intake is more response to changes in income in West Nile relative to other sub-regions.

Across sub-regions, the diet of Ugandan households is very restricted. While the results for food diversity scores show that most Ugandan households consume a variety of food items, the actual caloric and protein contributions are concentrated in a few food items. In particular, matooke contributes about 50 percent of the caloric intakes in Southwest sub-region. Consequently, it is not surprising that the same sub-region has the highest rates of child malnutrition despite its relatively higher food intakes. The particular case illustrates the fact that own production alone or self sufficiency is unlikely to lead to adequate nutrition intake. Indeed, without participation in food markets, households are bound to compromise their overall health status.

It is evident that dietary intakes (both caloric and protein intakes) heavily depend on the agricultural cropping season and this has implications for both health and nutritional status. Seasonal fluctuations in food intake often lead to malnutrition especially during the months when that food availability is reduced. Counter measures for the seasonal food intake can include: first, for households that rely on own production for food acquisition--improved storage and preservation of food would help smoothen food fluctuations during the post harvest period. Second, for urban households, which exhibit the greatest seasonal fluctuations, creating remunerative employment could help in smoothing consumption. Third, mechanisms should be put in place to ensure distribution of food from surplus to deficit areas.

Changes in food prices matter. The results also show that most households in the country mainly consume staples—that are acquired cheaply and any change in prices of staples have adverse effects since the same households cannot substitute to other food products. In a liberalised environment—without price controls, the best way to stabilise staple food prices is through strategies that increase output and through better infrastructure—to link food surplus areas to deficit areas.

There is no doubt that protein intakes are most critical for child nutritional status. In particular, children from households with relatively higher protein intakes than caloric intakes have the lowest stunting rates. Indeed, children from sub-regions with the highest caloric intakes (e.g.

South Western Uganda) have some of the highest stunting rates. Also, evidence from previous national programmes—such as the Nutrition and Early Child Hood Development Project (1998-2005) showed that providing children with foods such as: legumes, meats, milk, and porridge significantly lowered stunting rates among children aged one year or less (Alderman, 2007). Consequently, scaling up such worthy interventions to all districts of Uganda could help improve the overall nutritional status of children in Uganda.

Finally, the results suggest that Karamoja deserves special attention in any programmes targeting food insecurity in Uganda. Because households in this part of Uganda face severe environmental conditions—notably irregular rainfall, the results suggest that this part of the country will continue to rely on food assistance in order to meet nutritional needs. In the medium term, a livelihood strategy—based on breeding and sale of livestock could be used to help households in Karamoja to meet food needs through the market.

References

Adelman, S., H. Alderman, D.O. Grilligan., and J. Konde-Lule (2008), "The Education and nutritional impact of alternative food for education programme in Northern Uganda", study presented at the 2008 Social Protection for the poorest conference, Entebbe, Uganda.

Alderman, H. (2007), "Improving nutrition through community growth promotion: Longitudinal study of nutrition and early child development programme in Uganda", *World Development* Vol. 35. No.8: 1376-89.

Alderman, H. (1996), "Savings and economic shocks" *Journal of Development Economics* 51 (2), 343-365.

Appleton, S (2003), "Regional or national poverty lines? The Case of Uganda in the 1990s" *Journal of African Economies*, 12(4): 598-624.

Bahiigwa, G (1999), "Household food security in Uganda" EPRC Working Study No. 9.

Behrman, J. R (1993) "The economic rationale for investing in nutrition in developing countries" *World Development,* 21(11): 1749-1771.

Behrman, J. R. and A. B. Deolalikar (1988), "Health and Nutrition" in Chenery. H and Srinivasan. T. N (eds), *Handbook of Development Economics* Vol. 1: North Holland: Elsevier pp 631-711.

Behrman, J.R. and A. B. Deolalikar (1987), "Will Developing Country Nutrition Improve with Income? A Case Study of Rural India", *Journal of Political Economy,* 95, 492-507.

Benson, T., S. Mugarura and K. Wanda (2008) "Impacts in Uganda of rising global food prices: the role of diversified staples and limited price transmission", *Agricultural Economics* Vol 39 (November): 513-524.

Bouis, H.E. and L.J. Haddad (1992), "Are Estimates of Calorie-Income Elasticities Too High? A Recalibration of the Plausible Range", *Journal of Development Economics,* 39, 333-364.

Chaudhuri and C. Paxson (2001) "Consumption smoothing and income seasonality in Rural India", Discussion Study No. 173. Research Programme in Development Studies, Princeton University.

FAO (2008a) *The State of Food Insecurity in the World 2008*. Rome FAO

_____, (2008b) Crop Prospects and Food Situation. Rome FAO

_____, (2003) *Measurement and Assessment of Food Deprivation and Undernutrition*, Proceedings of an International Scientific Symposium Convened by the Agriculture and Economic Development Analysis Division, Rome

Gersony, R. (1997), "The Anguish of Northern Uganda: Results of a Field-Based Assessment of the Civil Conflicts in Northern Uganda", USAID Mission, Kampala.

Government of Uganda (2010), *National Development Plan (2010/11-2014/15,* Kampala, Republic of Uganda.

Guthrie, H and J. Scheer (1981), "Validity of a dietary score for assessing nutrient adequacy", *Journal of the American Dietetic Association* 78: 240-245.

Handa, S. and G. Mlay (2006), "Food consumption patterns, seasonality and market access in Mozambique", *Development Southern Africa,* 23(4): 541-560.

Hatloy, A., L.E.Torheim, and A. Oshaug (1998), "Food variety- A good indicator of nutritional adequacy of the diet? A case study from an urban area in Mali, West Africa", *European Journal of Clinical Nutrition,* 52 (12): 891-898.

Hoddinott, J. and Y. Yohannes (2002), Dietary diversity as a food security indicator, International Food Policy Research Institute FCN Discussion Study 136: Washington, D.C.

Jensen, R and N. Miller (2008), "Giffen behaviour and subsistence consumption", *American Economic Review*, 97(4): 1553–1577.

Kasirye, I and E. Hisali (2008), "Review of Agricultural Sector Investments and Institutional Performance in Uganda", a report submitted to the Budget Monitoring and Accountability Unit, MFPED.

Ministry of Finance, Planning and Economic Development (2008), *Background to the budget 2008/2009 Fiscal Year*: *Achieving Prosperity for All through Infrastructure Development, Enhancing Employment and Economic Growth*. Kampala, Ministry of Finance Planning and Economic Development.

Pouw, N.R.M. (2009), "Food priorities and poverty: The case of smallholder farmers in rural Uganda", *Journal of African Economies,* 18(1): 113-152.

Ruel, T. M (2002), "Is dietary diversity an indicator of food security or dietary quality? A review of measurement issues and research needs", IFPRI FCND Discussion Study No. 140.

Sahn, D (ed.), (1989), Seasonal Variation in Third World Agriculture: The consequences for food security, Baltimore, Md., John Hopkins University Press for the International Food Policy Research Institute.

Simler, K. R (2010), "The Short-Term Impact of Higher Food Prices on Poverty in Uganda", World Bank Policy Research Working Study No. 5210.

Ssewanyana, S. N (2003), "Food security and child nutrition status among urban poor households in Uganda", African Economic Research Consortium, Research Study No. 130.

Ssewanyana, S., M. Obwona, and I. Kasirye (2006), Understanding food insecurity in Uganda: A Special Study, Report prepared for USAID Uganda Country Office.

Ssewanyana, S. and J. Okidi (2007), Poverty estimates from the Uganda National Household Survey III, 2005/06, EPRC Occasional Study No. 34.

UBoS (2007) *Uganda National Household Survey 2005-2006: Social Economic Report*. Kampala.

UBoS and Macro International Inc (2007), *Uganda Demographic and Health Survey 2006* Calverton, Maryland: UBOS and Macro International Inc.

UNICEF (2009), *Tracking Progress on Child and Maternal Nutrition: A survival and development priority*. New York, UNICEF.

West, C. (1987), "Food composition table", mimeo, Department of Human Nutrition, Wageningen Agricultural University: De Drejien.

World Food Programme (2009), "Comprehensive food security and vulnerability analysis (CFSVA) Uganda, Mimeo.

Table A 1: Household consumption, median quantities, expenditures and expenditures shares of major food items, by region, 2005/06

Food Item	% of households reporting Consumption					Weekly quantity (median) (kg)					Weekly expenditure (median) (Ushs)				Expenditure share (%)					Median price per kg (Ushs)				
	Central	Eastern	Northern	Western	Famine Districts1	Central	Eastern	Northern	Western	Famine Districts	Central	Eastern	Northern	Western	Central	Eastern	Northern	Western	Famine Districts	Central	Eastern	Northern	Western	Famine Districts
Matooke	61.9	33.8	4.2	80.4	12.6	18.3	14.8	8.0	42.8	27.7	4,000	3,000	1,500	4,000	12.4	6.9	0.7	19.8	2.8	219	203	188	144	256
Sweet Potatoes	55.5	60.8	43.0	52.3	37.9	9.0	16.9	6.0	15.1	12.7	2,000	2,450	1,200	2,000	6.7	11.9	5.2	7.0	4.4	222	145	200	157	227
Cassava Fresh	45.4	33.5	39.8	45.6	22	5.6	5.8	10.8	4.8	9.3	2,000	1,000	1,200	1,500	4.0	3.2	5.8	4.9	1.6	357	172	111	161	185
Cassava Flour	6.8	32.3	27.6	24.3	**67.5**	2.0	8.0	9.4	3.0	11.7	1,200	2,500	4,000	1,200	0.5	5.1	9.4	3.0	17.6	600	313	426	103	**458**
Rice	36.5	31.6	7.3	17.7	9.1	1.5	2.0	1.0	1.5	2.0	1,500	1,800	1,300	1,400	3.2	3.3	0.9	1.5	1.2	1,000	900	1,300	700	250
Maize Grain	12.0	25.2	19.2	15.2	21.7	2.0	2.0	4.8	3.0	6.2	1,400	1,000	1,000	1,000	1.2	2.3	2.3	1.2	2.8	700	500	208	161	550
Maize Flour	65.3	62.4	49.1	57.5	31.9	2.5	4.0	3.9	2.9	5.8	1,600	2,000	1,420	1,400	6.2	8.9	7.9	5.4	4.7	640	500	364	241	500
Bread	34.4	13.5	2.5	18.7	5.6	1.0	1.0	0.7	1.0	1.4	1,200	1,000	1,000	1,200	2.3	0.9	0.2	1.1	0.6	1,200	1,000	1,429	857	1,429
Millet	7.2	21.7	14.7	34.1	7.8	1.0	1.0	2.4	2.0	5.7	800	1,200	800	1,200	0.3	2.0	1.4	3.1	0.9	800	1,200	333	211	333
Sorghum	0.7	16.6	22.5	7.4	45.6	1.0	3.0	3.5	3.0	4.6	800	600	1,200	1,200	0.1	0.7	2.7	0.5	3.7	800	200	343	261	343
Beef	37.0	34.1	14.4	38.5	23.2	1.5	1.0	1.0	1.0	1.4	3,000	2,500	2,500	3,000	5.6	5.3	3.7	5.9	4.6	2,000	2,500	2,500	2,143	2,500
Milk (litres)	44.7	37.8	7.8	36.9	20.9	3.5	3.0	3.5	3.5	6.4	2,000	1,400	1,800	1,600	4.7	3.8	1.6	3.9	3.4	571	467	514	250	514
Oils (litres)	68.3	70.6	73.0	42.8	53.4	0.4	0.4	0.3	0.3	0.3	600	700	700	600	1.9	2.5	4.5	1.5	1.8	1,714	2,000	2,333	2,000	2,333
Dry beans	55.7	50.3	79.3	77.4	75.9	2.0	2.0	2.4	3.0	2.2	1,400	1,000	1,200	1,600	3.6	3.4	9.9	7.6	7.1	700	500	500	727	500
Sugar	76.3	74.1	44.0	47.7	45.6	1.0	1	0.8	0.5	1.2	1,600	1,500	1,200	1,125	6.0	6.4	4.8	3.0	4.3	1,600	1,500	1,600	938	600
												sub total			***58.7***	***66.6***	***61.0***	***69.4***	**61.5**					

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