IIIS Discussion Paper

No.396/ March 2012

A Food Demand System Estimation for Uganda

Ole Boysen, IIIS Research Associate, Trinity College Dublin

IIIS Discussion Paper No. 396

A Food Demand System Estimation for Uganda

Ole Boysen, IIIS Research Associate, Trinity College Dublin

A Food Demand System Estimation for Uganda*

Ole Boysen[†]

Abstract

This article estimates a household demand system for Uganda from cross-sectional household survey data. More specifically, a 13 item two-stage demand system model is estimated for rural and urban households separately where the main, second-stage is represented by a Quadratic Almost Ideal Demand System which accounts for socio-demographic household characteristics and censoring and focuses on food items. Elasticities are calculated for three household expenditure groups as well as for the aggregate. We find that food expenditures tend to be more elastic for poorer households than for richer ones. All foods are generally price inelastic and price elasticities tend to decrease with rising expenditure level. A number of substitutional and complementary relationships between food items are identified.

1 Introduction

Acknowledging the continued seriousness of the global poverty problem, the international community has formalized their intent to reduce poverty and hunger, and thereby their intent to act, with the proclamation of the Millennium Development Goals through the UN. But to work towards these goals efficiently requires to evaluate the impacts of policy intervention alternatives on individuals' real incomes, i.e., on both nominal incomes and expenditures. Corresponding models, whether on economy or household level, generally require parameters which describe how households adapt their expenditure basket when faced with income or price changes.[1]

In 2005, 1.4 billion people in developing countries were living in extreme poverty, i.e., on less than 1.25 USD per day, and Sub-Saharan Africa was with 51% the region with the highest proportion of people living in extreme poverty (World Bank, 2010). Nevertheless, little research on demand analysis of developing countries and of Sub-Saharan Africa, in particular, has been published which would provide the elasticity

[†]Ole Boysen, e-mail: boyseno@tcd.ie, Institute for International Integration Studies and Department of Economics, Trinity College Dublin, Ireland.

*The author would like to acknowledge financial support received under the "New Issues in Agricultural, Food and Bio-energy Trade (AGFOODTRADE)" (Small and Medium-scale Focused Research Project, Grant Agreement no. 212036) research project funded by the European Commission. The author is grateful to the International Food Policy Research Institute (IFPRI) for facilitating access to the household survey data during an extended research stay. The views expressed in this paper are the sole responsibility of the author and do not necessarily reflect those of the European Commission.

[1]See Sadoulet and de Janvry (1995).

parameters required (see, e.g., Teklu, 1996; Abdulai and Aubert, 2004; Nzuma and Sarker, 2010).

This study adds to this literature by estimating a 13 item household demand system for Uganda with a focus on food demand. Based on a 2005/06 household survey, we estimate a two-stage demand system. In the first stage, households allocate their consumption budget to food and non-food. Then, in the second-stage, households allocate the food budget to 12 different food item groups. The first stage is represented by a Working-Leser type Engel curve equation and the second stage by a Quadratic Almost Ideal Demand System (QUAIDS). The demand system is quadratic in expenditures to allow demand curves to be non-linear in the logarithm of expenditures.[2] In particular, it allows a good to be a luxury at one end of the income distribution but a necessity at the other (Banks et al., 1997). It is augmented to capture influences of socio-demographic household characteristics on demand. Furthermore, due to the high prevalence of households which report zero consumption for one or several food item groups, the demand system implements an approach to deal with censoring introduced by Shonkwiler and Yen (1999).

The remainder of this paper is organized as follows. Section 2 introduces the household survey data and describes the correction of the price data. Section 3 formulates the demand system model and introduces the estimation procedure. Section 4 presents the results and Section 5 concludes.

2 Data

The demand system models households' allocation of their total expenditure budget to the available expenditure items as a function of prices, income, and possibly socio-demographic household characteristics. Here, the demand system is estimated using the 2005/06 Ugandan National Household Survey (UNHS), a representative survey of 7426 households.[3]

The survey used a two-stage design where at stage one 600 Enumeration Areas (EAs) were allocated to regions based on population size of the region. 153 additional EAs were allocated to the insecure Northern region, on basis of foreseeable attrition, to capture the Internally Displaced People (IDP) camps in the north, and to increase sample size for some districts. Ten households in each EA were selected by simple random sampling. Each household was visited twice, once between May and October 2005 and another time between November 2005 and April 2006 in

[2]For studies which discuss the advantages of rank 3, such as the QUAIDS, over rank 2 demand systems, see, for example, Decoster and Vermeulen (1998) and Cranfield et al. (2003).

[3]Five households have been deleted in this study due to missing expenditure data.

order to capture seasonalities with the agricultural production module. However, the socio-economic module was only administered once for each household, i.e., for five random households during each visit (see Uganda Bureau of Statistics, 2006). The UNHS contains a detailed expenditure section, which surveys consumption of 61 different food, beverage, and tobacco commodities during the past seven days. For each commodity it lists the unit of measurement and the quantities and values for five different types of consumption, namely household consumption out of purchases, away from home consumption out of purchases, consumption out of home produce, and out of items received in-kind together with their market and farm-gate prices. Additionally, we take various socio-demographic variables from the household survey, which might help to explain differences in household demand behavior (see Tables 2 and 3).

The two main explanatory variables for household demand are income and prices. Household income is commonly proxied by expenditure because household-reported income is regarded as particularly unreliable. Moreover, expenditure is seen as more constant since households are able to smooth temporary income fluctuations by (dis-)saving. "Prices" as given in the survey are generally unit values, which are derived by dividing value by quantity. But the quantity and value reported for an item might include different varieties and the composition of these might vary across households. Therefore, differences in these unit values might reflect differences in quality choice rather than differences in the price level for a homogenous good.

To correct prices for quality differences and measurement error, we follow the approach in Deaton (1997).[4] The basis for this approach is that households within a cluster are usually surveyed all within a period of a few days and thus these households should face essentially the same price without any time variations. Under this assumption, differences in unit values can be interpreted as resulting from quality and measurement error. We define a cluster as consisting of those households of an EA which have been surveyed together on the socio-economic module during one of the two visits. This results in a total of 1484 clusters.

The quality and measurement error corrected prices are estimated by an OLS regression according to the following equation:

$$\begin{aligned}\ln p_i = \alpha_i + \beta_i \ln y + \sum_{l\in L} \kappa_{il} Z_l + \sum_{c\in C} \phi_{ic} D_c + \sum_{s\in S} \gamma_{is} U_{is} + \sum_{m\in M} \theta_{im} V_{im} \\ + \sum_{s\in S} \sum_{m\in M} \delta_{ism} U_{is} V_{im} + \epsilon_i\end{aligned} \tag{1}$$

[4]The market survey questionnaire of the UNHS probes for prices and unit conversion factors. Nevertheless, we opt for the approach presented to facilitate correction for quality bias.

where p_i: unit value (=value / quantity) of item i, y: value of household assets, Z: vector of household characteristics, D_c: dummy for cluster c, U_{is}: dummy for unit s, and V_{im}: dummy for variety m and L, C, S, and M: sets of household characteristics, cluster, unit, and variety indices, respectively.

Quality differences are assumed to be correlated with the value of household assets per capita and household characteristics variables[5]. The unit dummies represent conversion factors between different measurement units. The UNHS uses a multitude of units for each item of which many are not directly convertible to kilograms or liters. Conversion factors are estimated inspired by the approach in Capéau and Dercon (2006). The variety dummies convert different derivatives of a product, such as grain and flour from the same cereal, into a base product where a constant extraction relationship can be assumed. Unit and variety dummy variables are interacted since the same unit has different meanings for different varieties. For example, a liter of maize cobs has a different conversion factor to kilograms than a liter of maize flour.

The measurement error and quality bias-corrected unit values are then obtained by removing the coefficients for the household characteristics and total expenditure from the prediction equation. Furthermore, unit of quantity and code of variety are removed, because only the price for a base unit and variety is needed for the later estimation of the demand system. The price prediction equation is given below.

$$\ln p_{ic} = \hat{\alpha}_i + \hat{\phi}_{ic} D_c \qquad \forall i \in I, c \in C \tag{2}$$

Not all clusters have incidence of consumption for every item. Thus, where missing, the price has been approximated using the average of $\hat{\phi}_{ic}$ coefficients over the clusters of the district, or, if also missing, of the region.

The valuation of autoconsumption items at farm-gate prices poses a conceptual problem for the demand system estimation. On the one hand, the farm household can exchange these goods for money only at the farm-gate price. On the other hand, consuming these goods out of own consumption does not make the household worse off than a household which buys these same goods on the market. Assuming consumption and production decisions are completely separable and market prices are the true opportunity costs of consumption out of home production, the quantity of home produce should be revalued at market prices. When revaluing home consumption at prices consistent with market prices, we also introduce a quality part into the home consumption budget assuming that the household would produce food items of a quality similar to what it buys. Quantities have to be converted to the reference

[5]These include household size, urban residency, residency in an IDP camp, and shares of members of male gender, age below 5, between 5 and 15, and above 60.

unit of each particular item during revaluation. The following equations are used for revaluation:

$$Q' = Q_{uv} e^{\hat{\gamma}_u + \hat{\theta}_v + \hat{\delta}_{uv}} \tag{3}$$

$$P' = P_{uv} e^{-(\hat{\gamma}_u + \hat{\theta}_v + \hat{\delta}_{uv})} \tag{4}$$

$$V' = P'Q' \tag{5}$$

where P' and Q': price and quantity measured in reference unit and variety, u and v: unit and variety indices, respectively. The coefficients are taken from the estimation of Eq. (1).

2.1 Construction of food group aggregates

In order to depict food demand behavior as precise as possible, it is desirable to have an individual demand function for each food item. But to get sufficient sample sizes for estimation[6] and to get a number of equations which is computable in a single holistic demand model given the technological limits, some aggregation into food groups is necessary. However, no theoretically-founded approach is available to identify the ideal aggregation (see Abdulai and Aubert, 2004) and hence we chose to keep those food items separate which are most important for the poor population.

The aggregation is shown in Table 1. Items, which are close derivatives of each other, such as corn grain and flour or fresh and dry cassava, have been aggregated in the previous step. Furthermore, we have aggregated all entries of column "consumption out of purchases, away from home" to one value and created the new food group "food consumed away from home" for these. We suspect that this variable is dominated by a quality and service component and thus is only loosely related to the basic item. Note that total consumption and budget shares include auto-consumption items revalued at market prices. For the sake of clarity, we consider only three household groups for each of rural and urban areas. These are, in terms of total expenditures, the poorest 30% (quantile group $q_{<.3}$), the people with expenditures higher than the poorest 30% but lower than the richest 30% ($q_{.3\text{-}.7}$), and the richest 30% ($q_{>.7}$). Quantiles are defined separately on rural and urban subpopulations.

In line with Engel's Law, the budget share spent on food decreases with increasing income (here measured by total consumption expenditure). The poorest (richest) 30% of the rural population spend 64% (52%) of their income on food while the corresponding figures for the urban population amount to 54% (34%). The most

[6] Not every household consumes every item during the short seven-day recall period.

Table 1: Percentage budget shares by expenditure quantile

	Quantile						
	Rural			Urban			
	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	Food group
Out of total consumption:							
Food	64.3	62.3	51.8	54.2	44.2	33.6	
Non-food	35.7	37.7	48.2	45.8	55.8	66.4	
Out of food consumption:							
Matooke	6.7	13.1	16.5	4.5	10.9	12.8	Matooke
Sweet potatoes	11.4	11.4	7.9	7.1	5.1	2.3	Sweet potatoes
Cassava	13.2	10.0	6.7	8.7	3.9	1.4	Cassava
Irish potatoes	0.7	1.3	1.2	0.5	1.0	1.3	Fruits & vegetables
Rice	0.8	1.6	2.3	4.8	4.0	4.9	Other foods
Maize	14.0	10.9	7.8	13.8	7.9	3.9	Maize
Bread	0.1	0.4	1.3	0.7	2.6	3.3	Other foods
Millet	2.4	2.2	1.7	0.7	0.7	0.4	Other foods
Sorghum	2.8	0.8	0.4	1.6	0.2	0.1	Other foods
Beef	1.7	3.9	5.6	4.0	6.0	8.0	Livestock products
Pork	0.4	0.6	0.7	0.1	0.2	0.6	Livestock products
Goat meat	0.5	0.9	1.1	0.4	0.4	0.7	Livestock products
Other meat	0.1	0.1	0.3	0.2	0.2	0.1	Livestock products
Chicken	0.6	1.3	1.6	0.6	0.7	1.5	Livestock products
Fish	3.8	3.5	3.5	5.1	4.7	3.5	Fish
Eggs	0.1	0.3	0.5	0.2	0.6	1.0	Livestock products
Fresh milk	1.3	2.7	4.8	1.4	4.3	5.3	Livestock products
Other foods	1.2	1.0	1.1	0.9	1.0	1.0	Other foods
Cooking oil	3.2	1.9	1.6	3.9	2.7	1.9	Fats & oils
Ghee	0.1	0.1	0.4	0.0	0.1	0.2	Fats & oils
Margarine, butter, etc.	0.0	0.1	0.2	0.0	0.2	0.4	Fats & oils
Passion fruits	0.1	0.3	0.8	0.2	0.8	1.2	Fruits & vegetables
Sweet bananas	0.2	0.3	0.6	0.2	0.6	0.7	Fruits & vegetables
Mangoes	0.8	0.8	0.6	0.6	0.4	0.3	Fruits & vegetables
Oranges	0.2	0.2	0.2	0.1	0.2	0.4	Fruits & vegetables
Other fruits	0.6	1.2	1.6	0.5	0.7	1.3	Fruits & vegetables
Onions	0.9	0.7	0.7	1.2	1.1	0.9	Fruits & vegetables
Tomatoes	1.6	1.8	1.6	2.4	2.4	2.0	Fruits & vegetables
Cabbages	0.4	0.4	0.4	0.9	0.7	0.6	Fruits & vegetables
Dodo	1.9	1.3	0.7	0.9	0.6	0.4	Fruits & vegetables
Other vegetables	3.4	1.0	0.6	2.2	0.7	0.4	Fruits & vegetables
Beans	10.5	8.6	6.4	9.4	5.9	3.7	Beans
Groundnuts	2.0	2.4	2.4	2.4	2.5	2.0	Other foods
Peas	2.0	0.5	0.3	1.1	0.3	0.3	Fruits & vegetables
Sim sim	1.4	0.5	0.2	1.1	0.4	0.1	Other foods
Sugar	2.9	4.9	5.2	6.4	7.2	6.1	Sugar
Coffee	0.1	0.0	0.1	0.1	0.0	0.1	Other foods
Tea	0.4	0.5	0.5	0.5	0.5	0.5	Other foods
Salt	1.3	0.8	0.7	0.9	0.4	0.3	Other foods
Soda	0.1	0.3	0.7	0.3	1.3	1.8	Other foods
Beer	0.0	0.2	0.7	0.2	1.1	2.7	Alcohol & tobacco
Other alcoholic drinks	1.9	1.6	0.8	2.1	0.9	0.6	Alcohol & tobacco
Other drinks	0.5	0.7	0.8	0.6	0.3	0.1	Other foods
Cigarettes	0.4	0.5	0.6	1.0	0.8	0.7	Alcohol & tobacco
Other tobacco	0.5	0.3	0.1	0.2	0.0	0.0	Alcohol & tobacco
Expenditure in restaurants on food	0.2	0.6	1.4	1.2	5.1	6.3	Other foods
Expenditure in restaurants on soda	0.0	0.0	0.2	0.0	0.3	0.4	Other foods
Expenditure in restaurants on beer	0.0	0.0	0.1	0.0	0.0	0.2	Alcohol & tobacco
Other juice	0.0	0.1	0.1	0.1	0.4	0.4	Other foods
Food consumed away from home	0.8	1.3	3.7	3.9	7.0	11.0	Other foods

Source: own computation based on processed UNHS data.

important food item for the poorest group in rural (urban) areas is maize with a food budget share of 14% (14%), followed by sweet potatoes, cassava, beans with shares of 11 to 13% (7 to 9%). Further important items in their diets are matooke for rural and rice, fish, and sugar for urban poor households with 7% and 5 to 6%, respectively. These basic foods amount to 56% (55%) of all expenditures on food. The shares of the main staples sweet potatoes, cassava, maize, and beans, as well as that of fish, decrease with rising income. By contrast, the shares of matooke, livestock products, and processed foods in general increase. Particularly noteworthy is matooke which becomes the most important food item for the richest household group with 17% (13%).

Prices are aggregated using the weighted geometric mean (Stone price index) over prices which have been normalized to one:

$$\ln p_{sc} = \sum_{i \in I_s} \bar{w}_i \ln \left(\frac{p_{ic}}{\bar{p}_i} \right) \qquad \forall s \in S, c \in C \tag{6}$$

where I_s: set of items included in aggregate item group s, p: price, $c \in C$: set of clusters or regions, $\bar{w}_i$: average of the budget shares for item i over all clusters, and $\bar{p}_i$: median of prices p_{ic} over all clusters.

Summary statistics of socio-demographic variables, total expenditure, expenditure shares, and corrected prices which are used in the regressions are presented in Tables 2 and 3. In contrast to the other tables in this paper, here the statistics are unweighted. Note that the means for dummy variables in Table 2 correspond to the share of ones in the sample, e.g., the share of rural households with a male head is 50%. The standard deviations for item prices in Table 3 indicate wide price dispersion which is a necessary condition for estimating demand systems from cross-sectional household data. The rural and urban samples comprise 5,723 and 1,698 households representing 84.6% and 15.4% of the population, respectively.

3 Demand system model

We estimate a two-stage demand system where the first-stage is motivated by the non-availability of price data for non-food items and the second stage focuses on food consumption. The separation into two stages requires the assumption of weak separability between consumption decisions. Households first decide how much of the budget to spend on food versus non-food and then in the second stage allocate the food budget to different food items.

Table 2: Summary statistics of socio-economic and demographic variables used in the regressions

	Rural		Urban	
	Mean	S.d.	Mean	S.d.
Total expenditure	706,125	9,944,955	1,332,007	3,934,365
Food share	0.60	0.17	0.47	0.18
Household assets per capita	352,360	2,201,944	1,418,813	5,254,511
Household size	5.34	2.94	4.71	2.92
Share male	0.50	0.24	0.50	0.28
Share aged below 5	0.17	0.17	0.14	0.17
Share aged 5 to 15	0.27	0.22	0.22	0.22
Share aged above 60	0.07	0.20	0.04	0.14
Age head	43.18	16.02	38.73	13.90
Male head	0.25	0.43	0.30	0.46
Subsistence farming	0.84	0.37	0.34	0.47
IDP camp	0.05	0.22	–	–
Region Eastern	0.26	0.44	0.24	0.43
Region Northern	0.22	0.42	0.20	0.40
Region Western	0.23	0.42	0.25	0.43
Education head primary	0.23	0.42	0.29	0.45
Education head secondary	0.08	0.28	0.17	0.38
Education head tertiary	0.03	0.17	0.12	0.33
Season Jul.–Sep.05	0.27	0.44	0.28	0.45
Season Oct.–Dec.05	0.25	0.44	0.23	0.42
Season Jan.–Mar.06	0.28	0.45	0.27	0.44
Season Apr.–Jun.06	0.06	0.24	0.05	0.23

Statistics are unweighted. Base levels for dummy variables: subsistence farming - none, region - central, education head - none, season - Apr–Jun05, water - unprotected well/spring. Source: own computation based on processed UNHS data.

3.1 First-stage demand model

The first-stage of this demand system is represented by a Working-Leser formulation extended with a quadratic term as shown in Eq. (7), similar to the formulation used in Ecker (2009).

$$w_F = \alpha'_F + \sum_{k \in K} \delta_k z_k + \gamma_F \ln p_F + \beta_F \ln M + \lambda_F (\ln M)^2 \tag{7}$$

where w_F: share of food expenditure in total household expenditure, z: vector of household characteristics, p_F: aggregate food price, and M total per capita household expenditure. We implement the demographic translation approach introduced by Pollak and Wales (1981) to account for household characteristic-related heterogeneity. This is included in Eq. (7) where the ordinary intercept α_F has been substituted by $\alpha_F = \alpha'_F + \sum_{k \in K} \delta_k z_k$. z_k is a vector of household-specific socio-demographic variables. Thus, this approach assumes that household differences in

Table 3: Summary statistics of food group budget shares and prices used in regressions

	Rural					Urban				
	Exp. share			Price		Exp. share			Price	
	Mean	S.d.	Zeros	Mean	S.d.	Mean	S.d.	Zeros	Mean	S.d.
Matooke	0.11	0.17	0.56	0.99	0.43	0.09	0.13	0.50	1.26	0.57
Sweet potatoes	0.10	0.15	0.46	1.01	0.89	0.04	0.08	0.53	1.13	0.74
Cassava	0.10	0.15	0.43	1.06	1.43	0.05	0.10	0.57	1.07	0.42
Fruits & vegetables	0.11	0.10	0.07	1.03	0.61	0.10	0.09	0.10	1.27	0.45
Other foods	0.17	0.20	0.01	1.00	0.29	0.29	0.26	0.00	1.11	0.23
Maize	0.11	0.15	0.33	1.05	2.62	0.08	0.11	0.31	1.12	0.75
Livestock products	0.09	0.12	0.45	1.03	1.04	0.12	0.13	0.36	1.12	0.16
Fish	0.04	0.07	0.61	1.13	2.14	0.04	0.06	0.52	1.21	0.53
Fats & oils	0.02	0.04	0.39	1.01	1.91	0.03	0.04	0.26	1.02	0.35
Beans	0.08	0.10	0.26	1.05	2.70	0.06	0.08	0.28	1.11	0.45
Sugar	0.04	0.06	0.42	1.19	3.69	0.06	0.05	0.23	1.03	0.52
Alcohol & tobacco	0.03	0.07	0.70	1.01	0.38	0.04	0.10	0.75	1.18	0.52

Statistics are unweighted. The zeros column shows the share of households which reported zero expenditures on the particular food group. Source: own computation based on processed UNHS data.

these variables influence the food budget share only through shifts in the intercept. We include variables for household size, share of household members aged below 5, between 5 and 15, and above 60, as well as the share of male members, geographical regions, seasons (quarters), and age, gender, and education of the household head. We also include indicators for whether a household resides in an IDP camp or not and for subsistence farming. The latter takes a value of one if the household has any consumption out of own produce and zero otherwise.

The equations for the expenditure η_F (8) and Marshallian (uncompensated) price ε_F (9) elasticities of food demand are derived from Eq. (7). Using these elasticities, the Hicksian (compensated) price elasticity ε_F^H (10) is derived on basis of the Slutsky equation.[7]

$$\eta_F = 1 + \frac{\beta_F}{w_F} + \frac{2\lambda_F \ln M}{w_F} \tag{8}$$

$$\varepsilon_F = -1 + \frac{\gamma_F}{w_F} \tag{9}$$

$$\varepsilon_F^H = \varepsilon_F + \eta_F w_F \tag{10}$$

[7]Assuming budget shares add up to one, the expenditure elasticity for non-food (NF) demand could be calculated as $\eta_{NF} = \frac{1-w_F \cdot \eta_F}{1-w_F}$.

3.2 Second-stage demand system

The second-stage demand system develops a more detailed picture of food demand and is based on an aggregation of food items to 12 food groups as shown in Table 1. The aggregation keeps the items separate which are most important for the poor.

The functional form chosen for the demand system estimation is the Quadratic Almost Ideal Demand System (QUAIDS) introduced by Banks et al. (1997). It extends the Almost Ideal Demand System (AIDS) of Deaton and Muellbauer (1980) to allow more flexible fitting of Engel curves. The AIDS restricts budget shares to be linear in the natural logarithm of total expenditure while the QUAIDS adds the flexibility of a quadratic term in total expenditure. In consequence, the QUAIDS allows a good to be a luxury at one end of the income distribution but a necessity at the other. The QUAIDS in its budget share form is formally defined as follows.

$$w_i = \alpha_i + \sum_{k \in I} \gamma_{ik} \ln p_k + \beta_i \ln \left(\frac{m}{a(p)} \right) + \frac{\lambda_i}{b(p)} \left(\ln \left(\frac{m}{a(p)} \right) \right)^2 \tag{11}$$

where $a(p)$ is the translog price index

$$\ln a(p) = \alpha_0 + \sum_{k \in I} \alpha_k \ln p_k + \frac{1}{2} \sum_{k \in I} \sum_{l \in I} \gamma_{kl} \ln p_k \ln p_l \tag{12}$$

and $b(p)$ the Cobb-Douglas price aggregator

$$b(p) = \prod_{k \in I} p_k^{\beta_k} \tag{13}$$

and w_i, p_i, and m are budget share and price of food item group i, and total food expenditure per capita, respectively. I is the set of food item groups. The AIDS arises as a special case when all $\lambda_i = 0$.

Additionally, the demand system should satisfy the following constraints in order to comply with demand system theory, namely additivity of budget shares so that $\sum_{i \in K} w_i = 1$:

$$\sum_{i \in I} \alpha_i = 1, \qquad \sum_{i \in I} \beta_i = 0, \qquad \sum_{i \in I} \lambda_i = 0, \qquad \sum_{i \in I} \gamma_{ij} = 0 \quad \forall j \in I, \tag{14}$$

homogeneity of degree zero in p:

$$\sum_{j \in I} \gamma_{ij} = 0 \quad \forall i \in I, \tag{15}$$

and Slutsky symmetry:

$$\gamma_{ij} = \gamma_{ji} \quad \forall i, j \in I. \tag{16}$$

To introduce socio-demographic variables, again the demographic translation approach is implemented by substituting

$$\alpha_i = \alpha_i' + \sum_{k \in K} \delta_{ik} z_k \tag{17}$$

in Eqs. (11) and (12). This requires one additional constraint to the system of equations which requires the effect of each demand shifter to cancel out across items:

$$\sum_{i \in I} \delta_{ik} = 0 \quad \forall k \in K \tag{18}$$

The set of socio-demographic variables included is identical to the one included in the first-step demand model.

3.3 Censoring

Per item expenditure data in household surveys frequently includes reported expenditures of zero. Households might report zero expenditure on certain item groups during the recall period of the survey for a variety of reasons, such as non-preference, non-affordability, infrequent purchases or sufficient inventory, or non-availability. The incidence of such censoring of the food groups is documented in Table 3.

Including all such expenditures as zero in the demand system estimation regressions biases the estimates. Several approaches to solve this problem have been developed. The most popular was the one by Heien and Wessells (1990) until Shonkwiler and Yen (1999) (henceforth SY) showed the inconsistency of that estimator and proposed a new one. Although Tauchmann (2005) shows that the SY estimator is inefficient and alternatives have been suggested, e.g. in Dong et al. (2004), it remains popular in current applications due to the simplicity of its estimation and is also applied in this study.

SY assume that households decide on consumption in a two-step process according to the following model.

$$d_{ih}^* = z_{ih}'\alpha_i + \upsilon_{ih} \tag{19}$$

$$w_{ih}^* = x_{ih}'\beta_i + \varepsilon_{ih} \tag{20}$$

$$d_{ih} = \begin{cases} 1 & \text{if } d_{ih}^* > 0 \text{ and} \\ 0 & \text{if } d_{ih}^* \leq 0 \end{cases} \tag{21}$$

$$w_{ih} = d_{ih} w_{ih}^* \tag{22}$$

where i: commodity index, h: household index, x and z: vectors of exogenous variables, d_{ih} and w_{ih}: observed dependent variables for the consumption versus non-consumption decision and budget shares respectively, and d_{ih}^* and w_{ih}^* their unobserved, latent counterparts.

Households first decide on consumption versus non-consumption and then decide on the share of the budget to spend on each item in the second step conditional on a positive consumption decision. The first step is estimated using a probit model and the estimates of the cumulative distribution ($\hat{\Phi}$) and probability density functions ($\hat{\phi}$) are used in the second step to augment the QUAIDS estimation. More specifically, the econometric QUAIDS model from Eq. (11) is modified as follows.

$$w_i^* = \hat{\Phi}_i w_i + \hat{\phi}_i \tag{23}$$

The probit model includes the same variables as the QUAIDS model but additionally a set of dummies for the type of water source of the household to facilitate the identification of the model. The rational for using the type of water source is that the presence of different water sources or distribution systems indicate the level of infrastructural development of a location and/or that the location has access and is accessible to certain machinery. Certain foods might be unavailable in some areas due to poor infrastructure and market access.

3.4 Elasticities

The elasticity formulas for the non-linear QUAIDS are derived directly from Eqs. (11), (12), and (13) augmented by the demographic translation from Eq. (17) and censoring (23) modifications.
Expenditure elasticities:

$$\eta_i = \frac{\partial q_i}{\partial m}\frac{m}{q_i} = 1 + \frac{\Phi_i}{w_i}\left[\beta_i + \frac{2\lambda_i}{b(p)}\ln\left(\frac{m}{a(p)}\right)\right] \tag{24}$$

Uncompensated price elasticities:

$$\varepsilon_{ij} = \frac{\partial q_i}{\partial p_j}\frac{p_j}{q_i} = -\delta_{ij} + \frac{\Phi_i}{w_i}\left[\gamma_{ij} - \left(\beta_i + \frac{2\lambda_i}{b(p)}\ln\left(\frac{m}{a(p)}\right)\right)\left(\alpha_j + \sum_{k\in I}\gamma_{jk}\ln p_k\right) - \frac{\lambda_i\beta_j}{b(p)}\left(\ln\left(\frac{m}{a(p)}\right)\right)^2\right] \tag{25}$$

with Kronecker delta defined as $\delta_{ij} = \begin{cases} 1 & \text{if } i = j \text{ and} \\ 0 & \text{otherwise.} \end{cases}$

Compensated price elasticities:

$$\varepsilon_{ij}^H = \varepsilon_{ij} + \left(\frac{\beta_i}{w_i} + 1\right) w_j \tag{26}$$

The second-stage elasticities are conditional on the first-stage elasticities. The equations to calculate unconditional food group demand elasticities from the results of the two demand system estimations are taken from Carpentier and Guyomard (2001).

Unconditional expenditure elasticities:

$$\eta_i^{\bar{c}} = \eta_{i|F}\eta_F \tag{27}$$

Unconditional uncompensated price elasticities:

$$\varepsilon_{ij}^{\bar{c}} = \varepsilon_{ij} + w_{j|F}\left(\frac{1}{\eta_{j|F}} + \varepsilon_F\right) \times \eta_{i|F}\eta_{j|F} + w_F w_{j|F}\eta_F\eta_{i|F} \times (\eta_{j|F} - 1) \tag{28}$$

Unconditional compensated price elasticities:

$$\varepsilon_{ij}^{H,\bar{c}} = \varepsilon_{ij}^H + w_{j|F}\varepsilon_F^H\eta_{i|F}\eta_{j|F} \tag{29}$$

where F: denotes statistics from the first-stage estimation on total food demand, $\bar{c}$: denotes unconditional elasticities, $i|F$: denotes statistics from the second-stage estimation which are conditional on the first-stage statistics.

3.5 Estimation

We estimate separate demand systems for rural and urban populations. The first-stage Working-Leser model is estimated by an OLS regression. The second-stage QUAIDS model is estimated with one budget share equation per food item group. The estimation of the non-censored QUAIDS is usually based on a system with one equation omitted (in order to avoid singularity of the matrix) which is then calculated from the others using the additivity assumption of demand system theory. However, due to augmentation with the added probability term, Shonkwiler and Yen (1999, footnote 2) note that the additivity property in a share equation system is not invariant to the equation dropped any more. Yen et al. (2002) recommend that a SY-based demand system should be estimated on the full set of share equations thereby not enforcing the additivity property on the system. Following this recommendation, the system is estimated only with homogeneity (15) and symmetry (16) properties as well as canceling out of each shifter term restrictions (18) enforced. Furthermore, only equations of food groups with at least 5% of censored observations are augmented with the probability terms in the described way. This primarily affects the "other foods" equation but possibly could, with low probability, affect "fruits & vegetables" when subsamples are selected for bootstrapping.

The censored QUAIDS has been estimated using the Iterative Linear Least Squares Estimator suggested by Blundell and Robin (1999).[8] The basic mechanism is as follows. Initially the QUAIDS is estimated by Seemingly Unrelated Regression[9] with $a(p)$ approximated by the Stone price index and $b(p)$ by setting all β_k to one. Using the resulting coefficients, $a(p)$ and $b(p)$ are re-calculated and the QUAIDS is re-estimated. This procedure is repeated until the iteration-to-iteration change of the coefficients is very small and the process has thus converged.

As α_0 is difficult to estimate (see Deaton and Muellbauer, 1980, p. 316), we chose an arbitrary, low value of 12.[10]

The standard errors of the coefficients of two-step censored estimation procedures are biased as the second-stage estimation depends on regressors, which have been estimated with error. Murphy and Topel (1985) develop an analytical method to correct for this bias. In this study, however, we utilize the non-parametric bootstrap procedure to derive the standard errors of the QUAIDS coefficients as well as the standard errors of the conditional and unconditional second-stage elasticities. The standard errors of the unconditional second-stage elasticities also depend on the error introduced through the estimation of the food elasticities in the first stage.

[8] All computations were carried out using R (R Development Core Team, 2010). The procedure is implemented loosely building on and extending code of the `micEconAids` package (Henningsen, 2010). We checked the coefficients of this QUAIDS procedure without censoring and socio-demographic variables against those estimated with the STATA procedure suggested in Poi (2008) to validate the procedure. The estimated coefficients turned out to be very close to each other.

[9] This utilizes the R package `systemfit` (Henningsen and Hamann, 2007).

[10] α_0 values of 9, 10, and 11 did not change the resulting elasticities substantially but caused the procedure to require many more iterations to converge. E.g., the conditional expenditure elasticities for urban households had a mean absolute deviation from those calculated with $\alpha_0 = 12$ of 0.007 and standard deviation of 0.008. For the uncompensated own-price elasticities the corresponding figures were 0.014 and 0.017.

The statistical significance of these coefficients and elasticities is established using basic bootstrap confidence intervals (compare Davison and Hinkley, 1997) with 1600 replications for α-levels of 0.1, 0.05, and 0.01 utilizing the `boot` package (Canty and Ripley, 2010).

We estimate two separate demand systems, one for rural and one for urban households.

4 Results

As a consequence of the squared expenditure terms, the QUAIDS elasticties are explicitly dependent on the expenditure level. To examine the change of elasticities in response to increasing expenditure levels, tables present elasticities for the expenditure quantile household groups introduced earlier. Note that these quantile household groups are determined separately from the rural and urban subsamples, respectively. Moreover, the rural and urban demand systems are estimated independently but the results are presented side by side in common tables.

The estimated coefficients from the first-stage Working-Leser model regression are shown in Table A.1. With regard to the socio-demographic variables, larger households allocate less expenditure share to food, higher shares of males, children aged below 5, and between 5 and 15 in the household increase food's share. The other regions spend higher shares on food than the central region. Higher education levels decrease the share, subsistence farming increases it, and residency in an IDP camp decreases it again. Seasons seem not to influence the allocation pattern towards food versus non-food substantially.

Table 4 shows mean expenditure per capita $\bar{M}$ and food shares $\bar{w}_F$ as computed from the samples, and expenditure (η_F), uncompensated (ε_F) and compensated price (ε_F^H) elasticities computed from the Working-Leser regression coefficients and evaluated at the means of the three household groups and the total sample for rural and urban households, respectively.

In the total expenditure row $\bar{M}$ we can observe the strong income differences between rural and urban areas which has to be taken into account when comparing statistics between rural and urban household groups. The share of expenditure spent on food ($\bar{w}_F$) in the sample decreases with rising expenditure but this curve seems to be much steeper in urban areas. Expenditure elasticities of food demand are positive and significant for all household groups and decrease with rising expenditure level. Price elasticities are all negative and significant as expected. Rural and urban households' expenditures are inelastic to food price changes but urban households have substantially larger price elasticities. In general, urban households seem to be

Table 4: Food demand elasticities calculated from the Working-Leser regression

	Rural				Urban			
Quantile	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	Mean	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	Mean
$\bar{M}$	156,495	319,996	2,621,221	961,184	282,292	708,810	2,910,275	1,244,602
$\bar{w}_F$	0.65	0.63	0.52	0.60	0.54	0.44	0.34	0.44
η_F	0.89$^{\blacktriangledown}$	0.88$^{\blacktriangledown}$	0.85$^{\blacktriangledown}$	0.87$^{\blacktriangledown}$	0.80$^{\blacktriangledown}$	0.78$^{\blacktriangledown}$	0.77$^{\blacktriangledown}$	0.80$^{\blacktriangledown}$
	(0.02)	(0.01)	(0.03)	(0.01)	(0.02)	(0.02)	(0.07)	(0.03)
ε_F	-0.80$^{\blacktriangledown}$	-0.80$^{\blacktriangledown}$	-0.75$^{\blacktriangledown}$	-0.79$^{\blacktriangledown}$	-0.94$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$	-0.91$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$
	(0.03)	(0.03)	(0.04)	(0.04)	(0.08)	(0.10)	(0.13)	(0.10)
ε_F^H	-0.23$^{\blacktriangledown}$	-0.24$^{\blacktriangledown}$	-0.31$^{\blacktriangledown}$	-0.26$^{\blacktriangledown}$	-0.51$^{\blacktriangledown}$	-0.59$^{\blacktriangledown}$	-0.65$^{\blacktriangledown}$	-0.58$^{\blacktriangledown}$
	(0.03)	(0.03)	(0.05)	(0.04)	(0.08)	(0.10)	(0.13)	(0.10)

Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Standard errors are given in parenthesis. Source: own computation.

somewhat more willing to adjust food consumption when incomes or prices change. The lower responsiveness of rural households to income and price changes likely also reflects that larger parts of rural households' consumption consist of own produce whose production they cannot change in the short-term. Moreover, price changes have no direct impact on the production for own consumption.

The coefficients from the second-stage QUAIDS estimations are shown in Tables A.2 and A.3. The λ_i coefficients of 5 (2) commodities for rural (urban) households turn out to be statistically significant at the 5% level, thus indicating that the quadratic term of the QUAIDS model is relevant to explain household demand for sweet potato, fruits & vegetables, livestock products, and fish in the rural and livestock products and fish in the urban demand system, respectively. The ϕ_i coefficient for the censoring term is significant at the 5% level for all food groups except for sugar and alcohol & tobacco in rural areas and except maize and alcohol & tobacco in urban areas suggesting that accounting for censoring is of explanatory relevance. Table 5 shows the mean absolute deviation of non-censored from censored QUAIDS elasticities. The influence of the censoring modifications is sizable.

The socio-demographic variables in the QUAIDS model are found to have statistically significant impacts on the intercepts of many foods. Some noteworthy ones are listed below. The share of male household members in rural households increases the expenditure share of alcohol & tobacco. The share of children aged below five increases the share of livestock products which includes dairy. Residents of IDP camps consume higher shares of maize, which is the main staple distributed as aid by the UN World Food Programme (WFP; see Benson et al., 2008), but also of fruits & vegetables and fats & oils, and less of other staples. Rural subsistence-farming households show increased expenditure shares of matooke, sweet potatoes, cassava, fruits & vegetables, livestock products, and beans. The higher the level of education of the household head the smaller the share spend on cassava and the larger the shares on livestock products, fats & oils, sugar, and alcohol & tobacco which might be attributable to the choice of higher qualities of those products. Households with older heads spend larger shares on matooke. Furthermore, the coefficients indicate strong regional differences, in particular, in consumption shares of matooke, cassava, and beans. The consumption shares of most foods vary somewhat over the seasons but those of fish and fats & oils are relatively constant.

The expenditure shares used to compute the unconditional QUAIDS elasticities for each household group are shown in Table 6 and the elasticities themselves are shown in Table 7. These elasticities are unconditional, i.e., the first-stage elasticities have been incorporated according to Eqs. (27)–(29). The elasticities have been evaluated at each household group's as well as the total sample's weighted means of the regressor variables.

All expenditure elasticities η_i are positive and most are significant at the 5% level as well. Expenditure elasticities for most food groups decrease with rising income, reflecting the typical Engel relationship, except for fruits & vegetables and alcohol & tobacco of all households and other foods, fats & oils, and sugar of rural households whose expenditure elasticities increase. For the poorest household group, matooke, livestock products, and fish in rural and livestock products in urban areas are luxuries ($\eta_i > 1$), i.e. they will increase consumption of these goods more than proportionally with rising income, but all of these elasticities decrease with rising income level so that these products become necessities for the richest household group. By contrast, the expenditure elasticities for alcohol & tobacco of all households and for other foods of rural households increase with rising expenditure level and become luxuries for the richest household group.

All own-price elasticities ε_i are negative and most are statistically significant. Only livestock products of all households and fish in rural areas are price elastic, demands for the other items are inelastic. Other foods and alcohol & tobacco of all households together with sugar of rural households are the only food groups

Table 5: Mean absolute deviation of non-censored from censored QUAIDS elasticities

	η	ε	ε^H
Rural	0.10	0.10	0.10
Urban	0.12	0.16	0.16

Each value represents the mean over the absolute differences of the 12 food item group elasticities. Source: own computation.

whose price elasticities increase with rising income. The ε_i decreases with rising expenditure level of the household group for the majority of foods.

To identify whether foods are substitutes or complements, we turn to the compensated cross-price elasticities detailed in Tables B.3 and B.4 which single out the pure price effect. Restricting the discussion to the poorest household group, the tables indicate a symmetric and significant complementary relationship between matooke and livestock products, matooke and beans, cassava and fish, other foods and livestock products, maize and fats & oils, and maize and beans in rural and matooke and cassava and fats & oils and beans in urban areas. Furthermore, the tables reveal numerous symmetric and significant substitutional relationships.[11]

[11]For rural households, these are matooke and sweet potatoes, matooke and fruits & vegetables, matooke and other foods, matooke and maize, matooke and alcohol & tobacco, sweet potatoes and other foods, sweet potatoes and maize, sweet potatoes and beans, cassava and fruits & vegetables, cassava and maize, cassava and livestock products, cassava and beans, fruits & vegetables and fish, fruits & vegetables and fats & oils, other foods and maize, other foods and fats & oils, other foods and beans, maize and fish, livestock products and fish, livestock products and fats & oils, livestock products and beans, fish and fats & oils, fish and beans, fats & oils and beans, and beans and sugar. For urban households, these are matooke and sweet potatoes, matooke and fruits & vegetables, matooke and maize, matooke and alcohol & tobacco, sweet potatoes and cassava, sweet potatoes and other foods, fruits & vegetables and sugar, maize and sugar, and livestock products and fats & oils.

Table 6: Weighted mean budget shares

	Rural				Urban			
Quantile	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	Mean	$q_{<.3}$	$q_{.3\text{-}.7}$	$q_{>.7}$	Mean
$\bar{M}$	156,495	319,996	2,621,221	961,184	282,292	708,810	2,910,275	1,244,602
$\bar{w}_F$	0.65	0.63	0.52	0.60	0.54	0.44	0.34	0.44
$\bar{w}_{1\|F}$	0.07	0.13	0.17	0.13	0.04	0.11	0.13	0.10
$\bar{w}_{2\|F}$	0.11	0.12	0.08	0.10	0.07	0.05	0.02	0.05
$\bar{w}_{3\|F}$	0.13	0.10	0.07	0.10	0.09	0.04	0.01	0.05
$\bar{w}_{4\|F}$	0.13	0.10	0.09	0.10	0.11	0.09	0.10	0.10
$\bar{w}_{5\|F}$	0.14	0.13	0.17	0.15	0.20	0.27	0.33	0.26
$\bar{w}_{6\|F}$	0.14	0.11	0.08	0.11	0.14	0.08	0.04	0.08
$\bar{w}_{7\|F}$	0.05	0.10	0.15	0.10	0.07	0.12	0.17	0.12
$\bar{w}_{8\|F}$	0.04	0.03	0.04	0.04	0.05	0.05	0.04	0.04
$\bar{w}_{9\|F}$	0.03	0.02	0.02	0.02	0.04	0.03	0.02	0.03
$\bar{w}_{10\|F}$	0.10	0.09	0.06	0.08	0.09	0.06	0.04	0.06
$\bar{w}_{11\|F}$	0.03	0.05	0.05	0.04	0.06	0.07	0.06	0.07
$\bar{w}_{12\|F}$	0.03	0.03	0.02	0.03	0.04	0.03	0.04	0.03

$\bar{w}_F$ denotes the share of food expenditure in total expenditure. $\bar{w}_{i|F}$ denotes the share of item i expenditure in food expenditure. Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Source: own computation based on processed UNHS data.

Table 7: Unconditional demand elasticities for food items calculated from the QUAIDS regression

Quantile	Rural								Urban							
	$q_{<.3}$		$q_{.3\text{-}.7}$		$q_{>.7}$		Mean		$q_{<.3}$		$q_{.3\text{-}.7}$		$q_{>.7}$		Mean	
	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)
η_1	1.10▼	(0.08)	0.96▼	(0.02)	0.84▼	(0.06)	0.90▼	(0.05)	0.84▼	(0.13)	0.75▼	(0.04)	0.65▼	(0.05)	0.70▼	(0.05)
η_2	0.74▼	(0.05)	0.69▼	(0.03)	0.29	(0.20)	0.53▼	(0.09)	0.53▼	(0.07)	0.46▼	(0.09)	0.26	(0.25)	0.50▼	(0.09)
η_3	0.69▼	(0.05)	0.66▼	(0.04)	0.76	(0.38)	0.74▼	(0.17)	0.68▼	(0.05)	0.53▼	(0.09)	0.12	(0.31)	0.59▼	(0.07)
η_4	0.70▼	(0.03)	0.70▼	(0.03)	0.89▼	(0.09)	0.82▼	(0.05)	0.61▼	(0.08)	0.63▼	(0.04)	0.76•	(0.26)	0.71▼	(0.13)
η_5	0.90▼	(0.05)	0.97▼	(0.03)	1.15▼	(0.10)	1.12▼	(0.07)	0.97▼	(0.08)	0.90▼	(0.04)	0.84▼	(0.07)	0.91▼	(0.04)
η_6	0.62▼	(0.06)	0.58▼	(0.04)	0.69•	(0.26)	0.68▼	(0.11)	0.45▼	(0.05)	0.26▼	(0.07)	0.06	(0.24)	0.37▼	(0.07)
η_7	2.49▼	(0.17)	1.51▼	(0.04)	0.84▼	(0.12)	1.14▼	(0.15)	1.88▼	(0.15)	1.26▼	(0.05)	0.94▼	(0.08)	1.19▼	(0.07)
η_8	1.18▼	(0.08)	1.08▼	(0.06)	0.50▼	(0.20)	0.75▼	(0.14)	0.93▼	(0.07)	0.83▼	(0.05)	0.56▼	(0.11)	0.75▼	(0.06)
η_9	0.87▼	(0.08)	0.87▼	(0.11)	0.91▼	(0.22)	0.90▼	(0.14)	0.67▼	(0.06)	0.60▼	(0.05)	0.50▼	(0.07)	0.60▼	(0.04)
η_{10}	0.67▼	(0.04)	0.61▼	(0.03)	0.49▼	(0.16)	0.60▼	(0.07)	0.52▼	(0.04)	0.43▼	(0.08)	0.53•	(0.24)	0.54▼	(0.10)
η_{11}	0.61▼	(0.17)	0.74▼	(0.05)	0.82•	(0.27)	0.79▼	(0.19)	0.75▼	(0.07)	0.68▼	(0.03)	0.51▼	(0.08)	0.63▼	(0.04)
η_{12}	0.72▼	(0.13)	0.81▼	(0.09)	1.19▼	(0.16)	1.02▼	(0.09)	0.98▼	(0.13)	1.12▼	(0.11)	1.20▼	(0.20)	1.19▼	(0.13)
ε_1	-0.94▼	(0.04)	-0.95▼	(0.02)	-0.93▼	(0.03)	-0.94▼	(0.03)	-0.93▼	(0.11)	-0.96▼	(0.05)	-0.94▼	(0.04)	-0.94▼	(0.05)
ε_2	-0.79▼	(0.04)	-0.79▼	(0.04)	-0.69▼	(0.06)	-0.76▼	(0.04)	-0.95▼	(0.09)	-0.94▼	(0.13)	-0.89▼	(0.30)	-0.94▼	(0.14)
ε_3	-0.75▼	(0.04)	-0.69▼	(0.05)	-0.56▼	(0.08)	-0.70▼	(0.05)	-0.74▼	(0.08)	-0.44•	(0.19)	0.55	(0.54)	-0.52▼	(0.15)
ε_4	-0.51▼	(0.06)	-0.38▼	(0.08)	-0.36▼	(0.09)	-0.43▼	(0.07)	-0.66▼	(0.08)	-0.63▼	(0.09)	-0.66▼	(0.09)	-0.66▼	(0.09)
ε_5	-0.75▼	(0.11)	-0.75▼	(0.12)	-0.84▼	(0.09)	-0.80▼	(0.10)	-0.86▼	(0.18)	-0.89▼	(0.14)	-0.90▼	(0.12)	-0.89▼	(0.14)
ε_6	-0.93▼	(0.06)	-0.93▼	(0.07)	-0.91▼	(0.11)	-0.93▼	(0.07)	-0.80▼	(0.07)	-0.69▼	(0.13)	-0.41	(0.27)	-0.71▼	(0.12)
ε_7	-1.49▼	(0.18)	-1.22▼	(0.09)	-1.00▼	(0.09)	-1.14▼	(0.11)	-1.48▼	(0.23)	-1.26▼	(0.13)	-1.11▼	(0.11)	-1.22▼	(0.14)
ε_8	-1.01▼	(0.05)	-1.01▼	(0.05)	-0.99▼	(0.05)	-1.00▼	(0.05)	-0.88▼	(0.07)	-0.86▼	(0.07)	-0.79▼	(0.10)	-0.84▼	(0.08)
ε_9	-0.89▼	(0.05)	-0.83▼	(0.08)	-0.84▼	(0.07)	-0.86▼	(0.06)	-0.82▼	(0.07)	-0.77▼	(0.09)	-0.72▼	(0.11)	-0.78▼	(0.09)
ε_{10}	-0.82▼	(0.03)	-0.79▼	(0.04)	-0.72▼	(0.05)	-0.79▼	(0.04)	-0.73▼	(0.10)	-0.60▼	(0.16)	-0.37	(0.26)	-0.62▼	(0.15)
ε_{11}	-0.93▼	(0.07)	-0.96▼	(0.04)	-0.96▼	(0.04)	-0.96▼	(0.05)	-0.99▼	(0.08)	-0.98▼	(0.07)	-0.96▼	(0.09)	-0.98▼	(0.08)
ε_{12}	-0.96▼	(0.09)	-0.97▼	(0.09)	-0.98▼	(0.10)	-0.97▼	(0.09)	-0.82▼	(0.10)	-0.80▼	(0.13)	-0.91▼	(0.09)	-0.85▼	(0.10)
ε_1^H	-0.89▼	(0.04)	-0.87▼	(0.02)	-0.85▼	(0.02)	-0.87▼	(0.02)	-0.91▼	(0.11)	-0.92▼	(0.05)	-0.91▼	(0.04)	-0.91▼	(0.05)
ε_2^H	-0.74▼	(0.04)	-0.74▼	(0.04)	-0.68▼	(0.06)	-0.72▼	(0.04)	-0.93▼	(0.09)	-0.93▼	(0.13)	-0.89▼	(0.30)	-0.93▼	(0.14)
ε_3^H	-0.69▼	(0.04)	-0.65▼	(0.05)	-0.53▼	(0.08)	-0.65▼	(0.05)	-0.70▼	(0.08)	-0.43•	(0.19)	0.55	(0.54)	-0.51▼	(0.15)
ε_4^H	-0.45▼	(0.06)	-0.34▼	(0.08)	-0.31▼	(0.09)	-0.38▼	(0.07)	-0.63▼	(0.08)	-0.60▼	(0.09)	-0.64▼	(0.09)	-0.62▼	(0.09)
ε_5^H	-0.67▼	(0.11)	-0.67▼	(0.12)	-0.74▼	(0.09)	-0.70▼	(0.10)	-0.75▼	(0.18)	-0.79▼	(0.13)	-0.80▼	(0.12)	-0.78▼	(0.14)
ε_6^H	-0.87▼	(0.06)	-0.89▼	(0.07)	-0.88▼	(0.11)	-0.88▼	(0.07)	-0.77▼	(0.07)	-0.68▼	(0.13)	-0.41	(0.27)	-0.70▼	(0.12)
ε_7^H	-1.41▼	(0.18)	-1.12▼	(0.09)	-0.94▼	(0.08)	-1.07▼	(0.10)	-1.41▼	(0.23)	-1.19▼	(0.13)	-1.05▼	(0.11)	-1.16▼	(0.13)
ε_8^H	-0.98▼	(0.05)	-0.99▼	(0.05)	-0.98▼	(0.05)	-0.99▼	(0.05)	-0.85▼	(0.07)	-0.84▼	(0.07)	-0.78▼	(0.10)	-0.83▼	(0.08)
ε_9^H	-0.87▼	(0.05)	-0.82▼	(0.08)	-0.83▼	(0.07)	-0.84▼	(0.06)	-0.81▼	(0.07)	-0.76▼	(0.09)	-0.72▼	(0.11)	-0.77▼	(0.09)
ε_{10}^H	-0.78▼	(0.03)	-0.76▼	(0.04)	-0.70▼	(0.05)	-0.76▼	(0.04)	-0.70▼	(0.10)	-0.59▼	(0.16)	-0.37	(0.26)	-0.61▼	(0.15)
ε_{11}^H	-0.92▼	(0.07)	-0.93▼	(0.04)	-0.94▼	(0.04)	-0.94▼	(0.05)	-0.96▼	(0.08)	-0.96▼	(0.07)	-0.95▼	(0.09)	-0.96▼	(0.08)
ε_{12}^H	-0.95▼	(0.08)	-0.95▼	(0.09)	-0.97▼	(0.10)	-0.96▼	(0.09)	-0.80▼	(0.10)	-0.79▼	(0.13)	-0.90▼	(0.09)	-0.83▼	(0.10)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript °, •, and ▼ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

5 Summary and conclusion

This study contributes to the limited literature on Sub-Saharan Africa food demand research and, to the best of our knowledge, represents the first complete set of food demand system estimates for Uganda. The availability of demand system estimates and elasticities are particularly important for policy evaluation and simulation studies which otherwise have to rely on elasticities taken from other countries.

We estimate a complete two-stage demand system model, which consists of a quadratic term-augmented Working-Leser type Engel function to estimate food versus non-food budget shares in the first stage and a Quadratic Almost Ideal Demand System (QUAIDS) to allocate the budget shares to 12 different food item groups in the second stage. The estimated QUAIDS accounts for censoring which is present in a substantial proportion of the consumption data of most groups. Both the censoring and the added functional flexibility of the quadratic expenditure term of the QUAIDS model compared to the AIDS model have been found statistically significant for many food groups. Furthermore, the model accounts for socio-demographic effects. It is estimated separately for rural and urban households.

Elasticities are computed for three different expenditure groups for rural and urban households, respectively. On average, food consumption tends to be more expenditure-responsive for rural than for urban households. For the poorest household groups, livestock products in general and matooke and fish in rural areas are luxuries. Alcohol & tobacco is a luxury for the richest. The largest expenditure elasticities appear for livestock products.

In particular, consumption of livestock products is price elastic. The price elasticities of other foods and alcohol & tobacco for all households and of sugar for rural households increase with rising income level while those of other food groups decrease. We also find a number of symmetric and significant substitutional and complementary relationships between food groups based on their compensated cross-price elasticities.

The most important limitation of this study, in our opinion, is the assumption of separability of consumption and production decisions. We have revalued consumption out of own production with market prices. If a subsistence household indeed decides to sell some produce instead of self-consuming it, the expenditure share of this item will be overestimated and those of the other items underestimated resulting in higher coefficients for subsistence-farmed items and lower coefficients for other items. Furthermore, subsistence farming households cannot change their consumption bundles quickly given the long cycles in agricultural production. Consequently, reactions to expenditure and price changes are likely smaller in the short run than if all households would source those items from markets. But also larger reactions are conceivable in the long run, for example, if households switch between crops due to a price change.

Another factor limiting households' reactions to expenditure and price changes is food received in-kind. For example, residents of IDP camps receive food aid, in particular maize, through the WFP. Price effects as well as options to adjust the composition of the food basket are likely to be rather limited for IDP camp residents.

A Appendix

Table A.1: Estimated coefficients from Working-Leser regression on food demand shares

	Rural		Urban	
	Estimate	S.e.	Estimate	S.e.
Intercept	$1.24^{\blacktriangledown}$	(0.28)	$3.00^{\blacktriangledown}$	(0.51)
$\ln \bar{p}_F$	$0.13^{\blacktriangledown}$	(0.01)	0.03	(0.04)
$\ln M$	-0.04	(0.04)	$-0.28^{\blacktriangledown}$	(0.07)
$(\ln M)^2$	-0.00	(0.00)	$0.01^{\bullet}$	(0.00)
log(hhsize)	$-0.05^{\blacktriangledown}$	(0.01)	$-0.08^{\blacktriangledown}$	(0.01)
Share male	$0.03^{\blacktriangledown}$	(0.01)	$0.05^{\blacktriangledown}$	(0.01)
Share aged below 5	$0.04^{\bullet}$	(0.02)	$0.08^{\blacktriangledown}$	(0.03)
Share aged 5 to 15	$0.05^{\blacktriangledown}$	(0.01)	0.01	(0.02)
Share aged above 60	-0.01	(0.01)	-0.01	(0.03)
Region Eastern	$0.05^{\blacktriangledown}$	(0.01)	$0.03^{\bullet}$	(0.01)
Region Northern	$0.06^{\blacktriangledown}$	(0.01)	0.01	(0.02)
Region Western	$0.05^{\blacktriangledown}$	(0.01)	$0.03^{\bullet}$	(0.01)
ln(age head)	$0.03^{\blacktriangledown}$	(0.01)	0.02	(0.01)
Male head	$0.01^{\bullet}$	(0.01)	-0.00	(0.01)
Education head primary	$-0.03^{\blacktriangledown}$	(0.01)	-0.02°	(0.01)
Education head secondary	$-0.07^{\blacktriangledown}$	(0.01)	$-0.05^{\blacktriangledown}$	(0.01)
Education head tertiary	$-0.14^{\blacktriangledown}$	(0.01)	$-0.09^{\blacktriangledown}$	(0.01)
Season Jul.–Sep.05	-0.01	(0.01)	-0.00	(0.01)
Season Oct.–Dec.05	-0.00	(0.01)	-0.01	(0.01)
Season Jan.–Mar.06	0.00	(0.01)	0.00	(0.01)
Season Apr.–Jun.06	0.00	(0.01)	$0.06^{\blacktriangledown}$	(0.02)
Subsistence farming	$0.05^{\blacktriangledown}$	(0.01)	$0.03^{\blacktriangledown}$	(0.01)
IDP camp	$-0.08^{\blacktriangledown}$	(0.01)	-0.01	(0.05)
N	5,723		1,698	
RMSE	0.15		0.15	
R^2	0.22		0.32	
Adjusted R^2	0.21		0.31	

Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

In Tables A.2 and A.3, Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. γ indices represent item 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. δ indices represent shifter variable 1: ln(household size), 2: Share male, 3: Share aged below 5, 4: Share aged 5 to 15, 5: Share aged above 60, 6: ln(age head), 7: Male head, 8: Subsistence farming, 9: IDP camp, 10: Region Eastern, 11: Region Northern, 12: Region Western, 13: Education head primary, 14: Education head secondary, 15: Education head tertiary, 16: Season Jul.–Sep.05, 17: Season Oct.–Dec.05, 18: Season Jan.–Mar.06, and 19: Season Apr.–Jun.06, respectively. Source for both tables: own computation.

Table A.2: Rural households: estimated coefficients from food group demand QUAIDS regression

	Matooke		Sweet potatoes		Cassava		Fruits & vegetables		Other foods		Maize		Livestock products		Fish		Fats & oils		Beans		Sugar		Alcohol & tobacco	
	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)
α	-0.017	(0.036)	0.065°	(0.041)	0.031	(0.037)	0.076▼	(0.024)	0.349▼	(0.036)	0.063	(0.041)	-0.040	(0.041)	0.066°	(0.033)	0.060▼	(0.011)	0.039	(0.028)	0.100▼	(0.016)	0.104•	(0.049)
β	0.032▼	(0.009)	-0.042▼	(0.009)	-0.047▼	(0.008)	-0.025▼	(0.004)	0.008	(0.005)	-0.060▼	(0.009)	0.144▼	(0.010)	0.026▼	(0.006)	-0.001	(0.004)	-0.035▼	(0.005)	-0.015•	(0.006)	-0.011	(0.011)
γ_1	0.010	(0.006)	0.011•	(0.006)	-0.017▼	(0.005)	0.007°	(0.004)	0.033▼	(0.005)	0.004	(0.006)	-0.021▼	(0.006)	-0.004	(0.004)	-0.006▼	(0.002)	-0.026▼	(0.004)	-0.004	(0.003)	0.013▼	(0.004)
γ_2	0.011•	(0.006)	0.034▼	(0.008)	-0.021▼	(0.006)	-0.015▼	(0.004)	0.001	(0.006)	-0.001	(0.006)	0.001	(0.007)	-0.007	(0.006)	-0.006•	(0.002)	0.001	(0.004)	-0.003	(0.003)	0.005	(0.005)
γ_3	-0.017▼	(0.005)	-0.021▼	(0.006)	0.046▼	(0.009)	-0.005	(0.005)	-0.011	(0.007)	0.056▼	(0.008)	0.011°	(0.007)	-0.033▼	(0.005)	-0.006°	(0.003)	-0.006	(0.005)	-0.002	(0.004)	-0.014•	(0.006)
γ_4	0.007°	(0.004)	-0.015▼	(0.004)	-0.005	(0.005)	0.061▼	(0.008)	-0.023▼	(0.009)	-0.025▼	(0.005)	0.009	(0.006)	0.005	(0.003)	0.006°	(0.003)	-0.005	(0.004)	-0.012▼	(0.004)	-0.003	(0.004)
γ_5	0.033▼	(0.005)	0.001	(0.006)	-0.011	(0.007)	-0.023▼	(0.009)	0.031•	(0.015)	0.011	(0.007)	-0.050▼	(0.010)	-0.008°	(0.005)	0.006°	(0.004)	0.008	(0.005)	0.004	(0.005)	-0.002	(0.006)
γ_6	0.004	(0.006)	-0.001	(0.006)	0.056▼	(0.008)	-0.025▼	(0.005)	0.011	(0.007)	0.003	(0.012)	0.007	(0.009)	0.012•	(0.005)	-0.018▼	(0.002)	-0.030▼	(0.005)	-0.004	(0.003)	-0.016▼	(0.005)
γ_7	-0.021▼	(0.006)	0.001	(0.007)	0.011°	(0.007)	0.009	(0.006)	-0.050▼	(0.010)	0.007	(0.009)	-0.037•	(0.016)	0.018▼	(0.004)	0.014▼	(0.003)	0.021▼	(0.006)	0.014▼	(0.004)	0.013°	(0.007)
γ_8	-0.004	(0.004)	-0.007	(0.006)	-0.033▼	(0.005)	0.005	(0.003)	-0.008°	(0.005)	0.012•	(0.005)	0.018▼	(0.004)	-0.002	(0.005)	0.002	(0.002)	0.013▼	(0.004)	0.001	(0.002)	0.004	(0.004)
γ_9	-0.006▼	(0.002)	-0.006•	(0.002)	-0.006°	(0.003)	0.006°	(0.003)	0.006°	(0.004)	-0.018▼	(0.002)	0.014▼	(0.003)	0.002	(0.002)	0.006°	(0.003)	0.002	(0.002)	-0.001	(0.002)	-0.000	(0.003)
γ_{10}	-0.026▼	(0.004)	0.001	(0.004)	-0.006	(0.005)	-0.005	(0.004)	0.008	(0.005)	-0.030▼	(0.005)	0.021▼	(0.006)	0.013▼	(0.004)	0.002	(0.002)	0.021▼	(0.004)	0.004	(0.002)	-0.004	(0.004)
γ_{11}	-0.004	(0.003)	-0.003	(0.003)	-0.002	(0.004)	-0.012▼	(0.004)	0.004	(0.005)	-0.004	(0.003)	0.014▼	(0.004)	0.001	(0.002)	-0.001	(0.002)	0.004	(0.002)	0.002	(0.004)	0.002	(0.003)
γ_{12}	0.013▼	(0.004)	0.005	(0.005)	-0.014•	(0.006)	-0.003	(0.004)	-0.002	(0.006)	-0.016▼	(0.005)	0.013°	(0.007)	0.004	(0.004)	-0.000	(0.003)	-0.004	(0.004)	0.002	(0.003)	0.002	(0.008)
δ_1	-0.008	(0.006)	-0.002	(0.007)	-0.003	(0.007)	-0.011•	(0.004)	-0.039▼	(0.005)	0.010°	(0.006)	0.058▼	(0.006)	0.008	(0.005)	-0.000	(0.003)	0.002	(0.005)	-0.007•	(0.003)	-0.008	(0.006)
δ_2	-0.036▼	(0.010)	0.033▼	(0.012)	0.001	(0.009)	-0.033▼	(0.007)	0.086▼	(0.011)	-0.003	(0.010)	-0.030▼	(0.011)	0.004	(0.010)	-0.008•	(0.004)	-0.025▼	(0.008)	-0.013▼	(0.005)	0.023•	(0.011)
δ_3	0.025	(0.018)	-0.024	(0.020)	-0.037•	(0.020)	0.018	(0.013)	-0.049•	(0.018)	-0.005	(0.022)	0.061▼	(0.022)	0.048•	(0.019)	0.004	(0.007)	-0.003	(0.015)	-0.004	(0.008)	-0.034•	(0.019)
δ_4	0.054▼	(0.015)	0.040•	(0.016)	-0.007	(0.015)	0.012	(0.010)	-0.028•	(0.013)	-0.006	(0.017)	-0.014	(0.018)	-0.009	(0.014)	0.004	(0.006)	-0.006	(0.011)	-0.010°	(0.006)	-0.031•	(0.014)
δ_5	-0.031	(0.019)	0.027	(0.022)	-0.003	(0.017)	0.001	(0.013)	0.013	(0.018)	-0.016	(0.021)	0.011	(0.023)	-0.013	(0.022)	0.004	(0.009)	0.012	(0.016)	0.007	(0.009)	-0.011	(0.018)
δ_6	0.033▼	(0.009)	-0.003	(0.009)	0.015	(0.009)	0.012•	(0.006)	-0.022•	(0.009)	0.014	(0.009)	-0.017°	(0.010)	-0.019•	(0.009)	-0.012▼	(0.003)	-0.001	(0.007)	0.002	(0.004)	-0.003	(0.008)
δ_7	-0.003	(0.006)	-0.001	(0.007)	-0.003	(0.006)	-0.006	(0.004)	0.013•	(0.006)	0.004	(0.007)	-0.006	(0.007)	-0.006	(0.006)	0.000	(0.002)	-0.002	(0.005)	-0.001	(0.003)	0.011°	(0.006)
δ_8	0.069▼	(0.008)	0.036▼	(0.010)	0.035▼	(0.009)	0.036▼	(0.006)	-0.120▼	(0.009)	-0.020•	(0.008)	0.027▼	(0.009)	-0.021▼	(0.007)	-0.005°	(0.003)	0.039▼	(0.007)	-0.006°	(0.003)	-0.070▼	(0.009)
δ_9	0.018	(0.041)	-0.050▼	(0.018)	-0.110▼	(0.029)	0.095▼	(0.010)	-0.046▼	(0.014)	0.168▼	(0.023)	0.067°	(0.035)	-0.061▼	(0.014)	0.063▼	(0.006)	-0.060▼	(0.013)	0.008	(0.008)	-0.092▼	(0.023)
δ_{10}	-0.073▼	(0.008)	0.037▼	(0.008)	0.037▼	(0.007)	0.018▼	(0.004)	0.042▼	(0.007)	0.035▼	(0.007)	-0.001	(0.007)	-0.013•	(0.006)	0.002	(0.002)	-0.073▼	(0.007)	-0.006•	(0.003)	-0.004	(0.008)
δ_{11}	-0.186▼	(0.013)	-0.041▼	(0.012)	0.144▼	(0.010)	-0.002	(0.006)	0.065▼	(0.009)	-0.023•	(0.012)	-0.020	(0.014)	0.010	(0.009)	0.010▼	(0.003)	0.053▼	(0.007)	-0.012•	(0.005)	0.002	(0.012)
δ_{12}	0.065▼	(0.008)	-0.017•	(0.007)	0.000	(0.007)	-0.005	(0.005)	-0.000	(0.006)	-0.027▼	(0.007)	-0.024▼	(0.007)	-0.012°	(0.008)	-0.011▼	(0.004)	0.067▼	(0.006)	-0.030▼	(0.004)	-0.005	(0.007)
δ_{13}	0.009°	(0.005)	-0.004	(0.006)	-0.025▼	(0.005)	-0.004	(0.003)	-0.001	(0.005)	-0.008	(0.005)	0.007	(0.006)	0.006	(0.005)	0.003	(0.002)	-0.000	(0.004)	0.007▼	(0.002)	0.010•	(0.005)
δ_{14}	0.025▼	(0.007)	-0.017•	(0.008)	-0.050▼	(0.008)	0.000	(0.004)	-0.007	(0.008)	-0.010	(0.008)	0.017•	(0.009)	0.005	(0.007)	0.007▼	(0.002)	0.013•	(0.006)	0.009▼	(0.003)	0.009	(0.009)
δ_{15}	-0.000	(0.011)	-0.026•	(0.013)	-0.081▼	(0.010)	0.020▼	(0.007)	0.004	(0.012)	-0.038▼	(0.011)	0.058▼	(0.012)	0.008	(0.010)	0.010▼	(0.003)	-0.002	(0.009)	0.009°	(0.005)	0.038•	(0.016)
δ_{16}	0.005	(0.007)	0.017°	(0.009)	-0.023▼	(0.008)	-0.042▼	(0.006)	0.006	(0.007)	0.013	(0.008)	0.007	(0.008)	0.004	(0.007)	0.003°	(0.002)	-0.026▼	(0.006)	0.001	(0.004)	0.035▼	(0.007)
δ_{17}	0.001	(0.008)	0.079▼	(0.011)	-0.021▼	(0.008)	-0.051▼	(0.006)	0.002	(0.008)	-0.050▼	(0.009)	0.022▼	(0.008)	0.009	(0.008)	0.002	(0.002)	-0.019▼	(0.006)	-0.007°	(0.003)	0.031▼	(0.009)
δ_{18}	0.015•	(0.008)	0.046▼	(0.009)	-0.016°	(0.008)	-0.043▼	(0.006)	0.016°	(0.008)	-0.032▼	(0.009)	-0.009	(0.008)	0.013°	(0.007)	0.002	(0.002)	-0.023▼	(0.006)	-0.009•	(0.004)	0.039▼	(0.007)
δ_{19}	-0.014	(0.010)	0.003	(0.014)	-0.012	(0.011)	-0.019•	(0.007)	-0.016	(0.011)	0.004	(0.013)	0.033▼	(0.012)	0.007	(0.013)	0.010°	(0.005)	-0.053▼	(0.010)	-0.001	(0.005)	0.057▼	(0.011)
λ	-0.007	(0.006)	-0.011•	(0.007)	0.007	(0.009)	0.006•	(0.002)	0.010•	(0.004)	0.007	(0.007)	-0.028▼	(0.005)	-0.012▼	(0.004)	0.001	(0.002)	-0.000	(0.004)	0.002	(0.006)	0.008	(0.006)
ϕ	0.116▼	(0.010)	0.084▼	(0.018)	0.103▼	(0.018)	0.159▼	(0.022)	–	(–)	0.156▼	(0.025)	0.185▼	(0.013)	0.102▼	(0.012)	0.032▼	(0.008)	0.186▼	(0.016)	0.012	(0.008)	0.038°	(0.022)

Table A.3: Urban households: Estimated coefficients from food group demand QUAIDS regression

	Matooke		Sweet potatoes		Cassava		Fruits & vegetables		Other foods		Maize		Livestock products		Fish		Fats & oils		Beans		Sugar		Alcohol & tobacco	
	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)
α	0.043	(0.061)	-0.066	(0.067)	-0.181▼	(0.066)	0.115▼	(0.032)	0.593▼	(0.079)	0.112•	(0.053)	0.022	(0.063)	0.025	(0.050)	0.068▼	(0.018)	0.083°	(0.045)	0.020	(0.024)	0.193•	(0.088)
β	0.003	(0.013)	-0.050▼	(0.013)	-0.029•	(0.013)	-0.026▼	(0.009)	0.043•	(0.016)	-0.086▼	(0.012)	0.143▼	(0.015)	0.016•	(0.008)	-0.008°	(0.004)	-0.044▼	(0.007)	-0.006	(0.005)	0.035•	(0.021)
γ_1	0.006	(0.010)	0.016°	(0.008)	-0.042▼	(0.009)	0.013•	(0.005)	0.006	(0.012)	0.008	(0.008)	-0.015	(0.012)	-0.013•	(0.005)	0.003	(0.002)	-0.003	(0.006)	0.002	(0.003)	0.019•	(0.008)
γ_2	0.016°	(0.008)	0.003	(0.014)	0.022°	(0.012)	-0.020▼	(0.006)	0.021°	(0.013)	-0.000	(0.008)	-0.003	(0.012)	0.004	(0.006)	-0.006°	(0.003)	-0.011•	(0.005)	-0.011▼	(0.004)	-0.015°	(0.009)
γ_3	-0.042▼	(0.009)	0.022°	(0.012)	0.049▼	(0.016)	-0.006	(0.008)	-0.001	(0.016)	0.001	(0.012)	0.010	(0.013)	-0.013•	(0.007)	-0.004	(0.004)	-0.009	(0.008)	0.001	(0.005)	-0.010	(0.010)
γ_4	0.013•	(0.005)	-0.020▼	(0.006)	-0.006	(0.008)	0.036▼	(0.010)	0.004	(0.013)	-0.024▼	(0.008)	0.003	(0.011)	-0.001	(0.005)	0.005	(0.004)	-0.003	(0.007)	0.007	(0.005)	-0.011°	(0.007)
γ_5	0.006	(0.012)	0.021°	(0.013)	-0.001	(0.016)	0.004	(0.013)	0.040	(0.035)	-0.001	(0.018)	-0.035	(0.021)	-0.008	(0.011)	-0.012°	(0.007)	-0.000	(0.015)	-0.002	(0.010)	-0.012	(0.014)
γ_6	0.008	(0.008)	-0.000	(0.008)	0.001	(0.012)	-0.024▼	(0.008)	-0.001	(0.018)	0.023°	(0.014)	0.000	(0.014)	-0.008	(0.006)	-0.005	(0.004)	-0.003	(0.008)	0.007	(0.006)	0.002	(0.009)
γ_7	-0.015	(0.012)	-0.003	(0.012)	0.010	(0.013)	0.003	(0.011)	-0.035	(0.021)	0.000	(0.014)	-0.034	(0.024)	0.015	(0.010)	0.026▼	(0.006)	0.020°	(0.011)	-0.004	(0.009)	0.019	(0.012)
γ_8	-0.013•	(0.005)	0.004	(0.006)	-0.013•	(0.007)	-0.001	(0.005)	-0.008	(0.011)	-0.008	(0.006)	0.015	(0.010)	0.014°	(0.007)	0.001	(0.002)	0.008	(0.006)	-0.002	(0.003)	0.004	(0.007)
γ_9	0.003	(0.002)	-0.006°	(0.003)	-0.004	(0.004)	0.005	(0.004)	-0.012°	(0.007)	-0.005	(0.004)	0.026▼	(0.006)	0.001	(0.002)	0.009•	(0.004)	-0.012▼	(0.003)	0.001	(0.003)	-0.005°	(0.003)
γ_{10}	-0.003	(0.006)	-0.011•	(0.005)	-0.009	(0.008)	-0.003	(0.007)	-0.000	(0.015)	-0.003	(0.008)	0.020°	(0.011)	0.008	(0.006)	-0.012▼	(0.003)	0.029•	(0.013)	0.002	(0.005)	-0.018•	(0.007)
γ_{11}	0.002	(0.003)	-0.011▼	(0.004)	0.001	(0.005)	0.007	(0.005)	-0.002	(0.010)	0.007	(0.006)	-0.004	(0.009)	-0.002	(0.003)	0.001	(0.003)	0.002	(0.005)	-0.000	(0.007)	-0.001	(0.004)
γ_{12}	0.019•	(0.008)	-0.015°	(0.009)	-0.010	(0.010)	-0.011°	(0.007)	-0.012	(0.014)	0.002	(0.009)	0.019	(0.012)	0.004	(0.007)	-0.005°	(0.003)	-0.018•	(0.007)	-0.001	(0.004)	0.028•	(0.014)
δ_1	-0.002	(0.009)	0.010	(0.010)	0.008	(0.010)	0.004	(0.007)	-0.047▼	(0.012)	-0.002	(0.009)	0.049▼	(0.010)	0.010	(0.007)	-0.001	(0.004)	0.000	(0.007)	-0.006	(0.004)	-0.022•	(0.012)
δ_2	-0.049•	(0.017)	0.003	(0.015)	0.024°	(0.016)	-0.060▼	(0.010)	0.180▼	(0.024)	0.036▼	(0.014)	-0.107▼	(0.018)	-0.001	(0.011)	-0.023▼	(0.007)	0.013	(0.011)	-0.025▼	(0.007)	0.009	(0.019)
δ_3	0.019	(0.028)	-0.006	(0.031)	-0.019	(0.030)	0.026°	(0.016)	-0.201▼	(0.038)	-0.088▼	(0.031)	0.165▼	(0.032)	0.038°	(0.022)	0.005	(0.008)	0.006	(0.024)	0.031▼	(0.011)	0.024	(0.037)
δ_4	0.043•	(0.022)	-0.011	(0.023)	-0.010	(0.027)	-0.002	(0.013)	-0.115▼	(0.031)	-0.005	(0.028)	0.057•	(0.027)	0.011	(0.017)	-0.000	(0.007)	-0.005	(0.014)	0.025▼	(0.009)	0.012	(0.029)
δ_5	-0.016	(0.043)	-0.050	(0.044)	0.018	(0.034)	0.042°	(0.022)	0.011	(0.055)	0.024	(0.033)	0.009	(0.046)	-0.002	(0.036)	0.001	(0.016)	0.011	(0.029)	-0.022	(0.016)	-0.025	(0.059)
δ_6	0.033•	(0.015)	0.018	(0.016)	0.062▼	(0.016)	0.001	(0.008)	-0.088▼	(0.021)	0.009	(0.012)	-0.018	(0.017)	-0.004	(0.013)	-0.006	(0.004)	0.000	(0.011)	0.017▼	(0.006)	-0.024	(0.018)
δ_7	-0.008	(0.009)	0.005	(0.012)	0.007	(0.009)	0.001	(0.006)	0.033•	(0.014)	0.007	(0.007)	-0.023•	(0.012)	0.005	(0.007)	-0.002	(0.003)	-0.003	(0.007)	-0.007•	(0.003)	-0.016	(0.012)
δ_8	0.024▼	(0.008)	0.039▼	(0.010)	0.026▼	(0.009)	0.005	(0.005)	-0.043▼	(0.012)	-0.004	(0.008)	0.002	(0.010)	0.004	(0.007)	-0.008▼	(0.002)	-0.003	(0.006)	-0.002	(0.003)	-0.042▼	(0.011)
δ_9	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)	–	(–)
δ_{10}	-0.069▼	(0.011)	-0.000	(0.012)	0.039▼	(0.011)	0.011°	(0.006)	-0.002	(0.016)	0.035▼	(0.010)	0.017	(0.012)	-0.003	(0.009)	0.006•	(0.003)	-0.017•	(0.007)	0.009•	(0.004)	-0.025°	(0.013)
δ_{11}	-0.117▼	(0.018)	-0.026°	(0.015)	0.131▼	(0.016)	0.008	(0.009)	-0.018	(0.020)	0.020	(0.014)	-0.020	(0.018)	0.002	(0.011)	0.017▼	(0.004)	0.023•	(0.010)	0.008	(0.006)	-0.027	(0.018)
δ_{12}	0.042▼	(0.011)	0.012	(0.012)	0.009	(0.012)	0.001	(0.007)	-0.007	(0.018)	-0.017	(0.010)	-0.013	(0.012)	-0.044▼	(0.016)	-0.005	(0.005)	0.044▼	(0.007)	-0.027▼	(0.005)	0.004	(0.017)
δ_{13}	0.019•	(0.009)	-0.013	(0.009)	-0.030▼	(0.009)	-0.002	(0.005)	-0.003	(0.013)	0.008	(0.008)	0.007	(0.011)	0.002	(0.007)	0.003	(0.003)	-0.012•	(0.006)	0.003	(0.004)	0.016	(0.010)
δ_{14}	0.008	(0.009)	-0.007	(0.011)	-0.049▼	(0.010)	0.010°	(0.006)	-0.033•	(0.015)	-0.015°	(0.010)	0.057▼	(0.012)	0.004	(0.008)	0.008•	(0.003)	-0.023▼	(0.006)	0.010•	(0.004)	0.031•	(0.012)
δ_{15}	0.007	(0.011)	-0.034▼	(0.011)	-0.040▼	(0.011)	0.017•	(0.007)	-0.064▼	(0.017)	-0.015°	(0.009)	0.073▼	(0.013)	0.014	(0.009)	0.009•	(0.004)	-0.012°	(0.008)	0.015▼	(0.005)	0.031•	(0.014)
δ_{16}	-0.045▼	(0.011)	0.033▼	(0.014)	-0.005	(0.011)	-0.016•	(0.007)	0.034•	(0.016)	-0.007	(0.011)	0.014	(0.012)	-0.009	(0.008)	-0.004	(0.003)	-0.010	(0.008)	0.006	(0.004)	0.010	(0.013)
δ_{17}	-0.031▼	(0.012)	0.074▼	(0.017)	-0.026°	(0.012)	-0.008	(0.007)	0.056▼	(0.016)	-0.031•	(0.012)	0.002	(0.013)	-0.012	(0.009)	-0.002	(0.003)	-0.025▼	(0.008)	0.001	(0.005)	0.002	(0.018)
δ_{18}	-0.041▼	(0.012)	0.029•	(0.015)	-0.020°	(0.012)	-0.015•	(0.007)	0.073▼	(0.017)	-0.007	(0.013)	-0.008	(0.014)	-0.014	(0.010)	-0.007°	(0.004)	-0.009	(0.010)	0.004	(0.005)	0.016	(0.015)
δ_{19}	-0.021	(0.018)	0.001	(0.022)	0.048•	(0.021)	-0.004	(0.012)	0.037	(0.029)	-0.000	(0.019)	-0.035	(0.021)	0.006	(0.020)	-0.007	(0.005)	-0.003	(0.013)	-0.022•	(0.008)	-0.000	(0.024)
λ	-0.012	(0.005)	0.005	(0.005)	0.001	(0.006)	0.007	(0.009)	-0.003	(0.008)	0.010	(0.006)	-0.023▼	(0.009)	-0.010▼	(0.003)	-0.001	(0.001)	0.008	(0.005)	-0.006	(0.003)	0.016	(0.016)
ϕ	0.090▼	(0.018)	0.082▼	(0.027)	0.050•	(0.020)	0.108▼	(0.023)	–	(–)	0.024	(0.041)	0.161▼	(0.021)	0.082▼	(0.019)	0.035▼	(0.013)	0.048•	(0.022)	0.044▼	(0.014)	0.032	(0.037)

B Supplemental tables

Table B.1: Rural households: Unconditional, uncompensated price elasticities $\varepsilon_{ij}^{\bar{c}}$ of food item demand calculated from the QUAIDS regression

		Item											
Quantile	Item	1	2	3	4	5	6	7	8	9	10	11	12
$q_{<.3}$	1	-0.94$^{\blacktriangledown}$	0.07$^{\bullet}$	-0.10$^{\bullet}$	0.06$^{\bullet}$	0.22$^{\blacktriangledown}$	0.05	-0.16$^{\blacktriangledown}$	-0.02	-0.04$^{\blacktriangledown}$	-0.15$^{\blacktriangledown}$	-0.03	0.08$^{\blacktriangledown}$
		(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)
	2	0.07$^{\blacktriangledown}$	-0.79$^{\blacktriangledown}$	-0.05°	-0.03	0.05	0.04	0.00	-0.03	-0.02	0.04°	0.01	0.04
		(0.03)	(0.04)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)	(0.03)
	3	-0.05°	-0.04°	-0.75$^{\blacktriangledown}$	0.03	0.01	0.30$^{\blacktriangledown}$	0.05	-0.14$^{\blacktriangledown}$	-0.01	0.01	0.01	-0.05°
		(0.02)	(0.03)	(0.04)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)
	4	0.07$^{\bullet}$	-0.06°	0.02	-0.51$^{\blacktriangledown}$	-0.12°	-0.13$^{\blacktriangledown}$	0.06	0.04°	0.05$^{\bullet}$	-0.00	-0.07$^{\bullet}$	-0.01
		(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.04)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
	5	0.25$^{\blacktriangledown}$	0.03	-0.05	-0.14$^{\bullet}$	-0.75$^{\blacktriangledown}$	0.12°	-0.37$^{\blacktriangledown}$	-0.06	0.05$^{\bullet}$	0.09$^{\bullet}$	0.03	-0.01
		(0.04)	(0.04)	(0.05)	(0.06)	(0.11)	(0.05)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	6	0.05$^{\bullet}$	0.05°	0.33$^{\blacktriangledown}$	-0.06$^{\bullet}$	0.12$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$	0.04	0.06$^{\blacktriangledown}$	-0.07$^{\blacktriangledown}$	-0.11$^{\blacktriangledown}$	0.01	-0.06$^{\bullet}$
		(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.06)	(0.04)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)
	7	-0.35$^{\blacktriangledown}$	-0.14$^{\bullet}$	-0.00	-0.01	-0.75$^{\blacktriangledown}$	-0.00	-1.49$^{\blacktriangledown}$	0.21$^{\blacktriangledown}$	0.12$^{\blacktriangledown}$	0.23$^{\blacktriangledown}$	0.05	0.10
		(0.07)	(0.08)	(0.08)	(0.07)	(0.12)	(0.10)	(0.18)	(0.06)	(0.04)	(0.07)	(0.05)	(0.08)
	8	-0.05	-0.08	-0.32$^{\blacktriangledown}$	0.05	-0.10$^{\bullet}$	0.13$^{\blacktriangledown}$	0.16$^{\blacktriangledown}$	-1.01$^{\blacktriangledown}$	0.02	0.15$^{\blacktriangledown}$	-0.01	0.04
		(0.04)	(0.06)	(0.05)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.02)	(0.04)	(0.02)	(0.04)
	9	-0.10$^{\blacktriangledown}$	-0.08°	-0.07	0.14$^{\bullet}$	0.15$^{\bullet}$	-0.29$^{\blacktriangledown}$	0.25$^{\blacktriangledown}$	0.04	-0.89$^{\blacktriangledown}$	0.07$^{\bullet}$	-0.00	0.00
		(0.03)	(0.05)	(0.06)	(0.06)	(0.07)	(0.05)	(0.06)	(0.03)	(0.05)	(0.03)	(0.03)	(0.05)
	10	-0.16$^{\blacktriangledown}$	0.06$^{\bullet}$	0.01	0.02	0.12$^{\blacktriangledown}$	-0.16$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.03$^{\bullet}$	-0.82$^{\blacktriangledown}$	0.05$^{\blacktriangledown}$	-0.01
		(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)
	11	-0.04	0.01	0.02	-0.18$^{\bullet}$	0.14	-0.02	0.27$^{\blacktriangledown}$	0.02	0.00	0.10$^{\bullet}$	-0.93$^{\blacktriangledown}$	0.05
		(0.05)	(0.05)	(0.07)	(0.08)	(0.10)	(0.07)	(0.09)	(0.04)	(0.03)	(0.05)	(0.07)	(0.06)
	12	0.16$^{\blacktriangledown}$	0.10°	-0.10	0.01	0.02	-0.12°	0.14°	0.05	0.01	-0.01	0.04	-0.96$^{\blacktriangledown}$
		(0.05)	(0.06)	(0.06)	(0.05)	(0.07)	(0.06)	(0.07)	(0.05)	(0.03)	(0.05)	(0.03)	(0.09)
$q_{.3\text{-}.7}$	1	-0.95$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	-0.04°	0.04$^{\blacktriangledown}$	0.12$^{\blacktriangledown}$	0.04$^{\bullet}$	-0.07$^{\blacktriangledown}$	-0.01	-0.02$^{\blacktriangledown}$	-0.07$^{\blacktriangledown}$	-0.01	0.04$^{\blacktriangledown}$
		(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	2	0.10$^{\blacktriangledown}$	-0.79$^{\blacktriangledown}$	-0.05$^{\bullet}$	-0.03	0.05°	0.04	0.01	-0.03	-0.02	0.03°	0.01	0.04
		(0.03)	(0.04)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)	(0.03)
	3	-0.04	-0.06°	-0.69$^{\blacktriangledown}$	0.02	-0.01	0.37$^{\blacktriangledown}$	0.07°	-0.19$^{\blacktriangledown}$	-0.02	-0.00	0.01	-0.06°
		(0.03)	(0.03)	(0.05)	(0.03)	(0.04)	(0.05)	(0.04)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
	4	0.11$^{\blacktriangledown}$	-0.09$^{\bullet}$	-0.00	-0.38$^{\blacktriangledown}$	-0.18$^{\bullet}$	-0.19$^{\blacktriangledown}$	0.09	0.05	0.06$^{\bullet}$	-0.02	-0.09$^{\bullet}$	-0.01
		(0.04)	(0.04)	(0.04)	(0.08)	(0.08)	(0.05)	(0.06)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	5	0.27$^{\blacktriangledown}$	0.02	-0.06	-0.16$^{\blacktriangledown}$	-0.75$^{\blacktriangledown}$	0.11°	-0.38$^{\blacktriangledown}$	-0.06	0.05°	0.09$^{\bullet}$	0.03	-0.02
		(0.04)	(0.05)	(0.05)	(0.07)	(0.12)	(0.06)	(0.07)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)
	6	0.09$^{\blacktriangledown}$	0.06	0.40$^{\blacktriangledown}$	-0.10$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$	0.06	0.08$^{\bullet}$	-0.10$^{\blacktriangledown}$	-0.16$^{\blacktriangledown}$	0.00	-0.08$^{\bullet}$
		(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.07)	(0.06)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
	7	-0.18$^{\blacktriangledown}$	-0.04	0.03	0.02	-0.33$^{\blacktriangledown}$	0.03	-1.22$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.07$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	0.05°	0.05
		(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.09)	(0.03)	(0.02)	(0.04)	(0.02)	(0.04)
	8	-0.04	-0.08	-0.37$^{\blacktriangledown}$	0.06°	-0.10°	0.16$^{\blacktriangledown}$	0.20$^{\blacktriangledown}$	-1.01$^{\blacktriangledown}$	0.02	0.16$^{\blacktriangledown}$	0.01	0.05
		(0.04)	(0.07)	(0.06)	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)	(0.02)	(0.04)	(0.03)	(0.05)
	9	-0.15$^{\blacktriangledown}$	-0.14°	-0.13	0.19$^{\bullet}$	0.21$^{\bullet}$	-0.50$^{\blacktriangledown}$	0.42$^{\blacktriangledown}$	0.06	-0.83$^{\blacktriangledown}$	0.10$^{\bullet}$	-0.00	0.00
		(0.05)	(0.08)	(0.09)	(0.09)	(0.11)	(0.07)	(0.10)	(0.04)	(0.08)	(0.05)	(0.05)	(0.08)
	10	-0.17$^{\blacktriangledown}$	0.07$^{\bullet}$	0.00	0.01	0.13$^{\blacktriangledown}$	-0.21$^{\blacktriangledown}$	0.20$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.03$^{\bullet}$	-0.79$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	-0.02
		(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.01)	(0.04)	(0.02)	(0.04)
	11	-0.00	0.02	0.01	-0.11$^{\bullet}$	0.09	-0.01	0.17$^{\blacktriangledown}$	0.01	-0.00	0.07$^{\bullet}$	-0.96$^{\blacktriangledown}$	0.03
		(0.03)	(0.03)	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
	12	0.18$^{\blacktriangledown}$	0.09	-0.13°	-0.00	0.01	-0.15$^{\bullet}$	0.16	0.05	0.00	-0.02	0.03	-0.97$^{\blacktriangledown}$
		(0.05)	(0.06)	(0.07)	(0.05)	(0.07)	(0.06)	(0.08)	(0.05)	(0.03)	(0.05)	(0.03)	(0.09)
$q_{>.7}$	1	-0.93$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	-0.03	0.04$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.03	-0.00	0.01	-0.01$^{\bullet}$	-0.05$^{\blacktriangledown}$	0.00	0.03$^{\blacktriangledown}$
		(0.03)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
	2	0.21$^{\blacktriangledown}$	-0.69$^{\blacktriangledown}$	-0.10$^{\bullet}$	-0.04	0.11$^{\bullet}$	0.03	0.10°	-0.04	-0.03	0.03	0.02	0.06°
		(0.06)	(0.06)	(0.04)	(0.03)	(0.05)	(0.05)	(0.07)	(0.04)	(0.02)	(0.03)	(0.02)	(0.04)
	3	-0.10	-0.12$^{\bullet}$	-0.56$^{\blacktriangledown}$	-0.00	-0.06	0.54$^{\blacktriangledown}$	0.07	-0.29$^{\blacktriangledown}$	-0.04	-0.01	0.01	-0.11°
		(0.09)	(0.05)	(0.08)	(0.04)	(0.08)	(0.07)	(0.11)	(0.05)	(0.03)	(0.05)	(0.03)	(0.06)
	4	0.10$^{\bullet}$	-0.10$^{\bullet}$	-0.01	-0.36$^{\blacktriangledown}$	-0.22$^{\blacktriangledown}$	-0.21$^{\blacktriangledown}$	0.07	0.05°	0.06°	-0.01	-0.10$^{\bullet}$	-0.02
		(0.04)	(0.05)	(0.05)	(0.09)	(0.09)	(0.05)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	5	0.18$^{\blacktriangledown}$	0.02	-0.05	-0.13$^{\blacktriangledown}$	-0.84$^{\blacktriangledown}$	0.09°	-0.30$^{\blacktriangledown}$	-0.04	0.04$^{\bullet}$	0.08$^{\bullet}$	0.02	-0.02
		(0.03)	(0.04)	(0.04)	(0.05)	(0.09)	(0.04)	(0.06)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
	6	0.09	0.06	0.55$^{\blacktriangledown}$	-0.17$^{\blacktriangledown}$	0.14	-0.91$^{\blacktriangledown}$	0.03	0.11$^{\bullet}$	-0.15$^{\blacktriangledown}$	-0.22$^{\blacktriangledown}$	-0.01	-0.12$^{\bullet}$
		(0.07)	(0.06)	(0.07)	(0.05)	(0.08)	(0.11)	(0.10)	(0.04)	(0.02)	(0.04)	(0.03)	(0.05)
	7	-0.01	0.01	0.03	0.04	-0.16$^{\blacktriangledown}$	0.01	-1.00$^{\blacktriangledown}$	0.10$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	0.08$^{\blacktriangledown}$	0.05$^{\blacktriangledown}$	0.05
		(0.04)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.09)	(0.02)	(0.01)	(0.03)	(0.02)	(0.03)
	8	0.08	-0.04	-0.36$^{\blacktriangledown}$	0.08$^{\bullet}$	-0.01	0.13$^{\bullet}$	0.35$^{\blacktriangledown}$	-0.99$^{\blacktriangledown}$	0.03°	0.14$^{\blacktriangledown}$	0.03	0.06
		(0.06)	(0.07)	(0.05)	(0.04)	(0.06)	(0.06)	(0.09)	(0.05)	(0.02)	(0.04)	(0.03)	(0.05)
	9	-0.14$^{\bullet}$	-0.14°	-0.14	0.18$^{\bullet}$	0.19°	-0.48$^{\blacktriangledown}$	0.42$^{\blacktriangledown}$	0.07	-0.84$^{\blacktriangledown}$	0.09$^{\bullet}$	-0.00	-0.00
		(0.06)	(0.08)	(0.09)	(0.09)	(0.12)	(0.07)	(0.10)	(0.04)	(0.07)	(0.05)	(0.05)	(0.08)
	10	-0.22$^{\blacktriangledown}$	0.09°	-0.02	-0.00	0.17$^{\bullet}$	-0.31$^{\blacktriangledown}$	0.28$^{\blacktriangledown}$	0.16$^{\blacktriangledown}$	0.04°	-0.72$^{\blacktriangledown}$	0.08$^{\blacktriangledown}$	-0.02
		(0.05)	(0.05)	(0.06)	(0.05)	(0.07)	(0.06)	(0.09)	(0.04)	(0.02)	(0.05)	(0.03)	(0.05)
	11	-0.00	0.02	0.00	-0.11$^{\bullet}$	0.07	-0.01	0.16$^{\bullet}$	0.01	-0.00	0.07$^{\bullet}$	-0.96$^{\blacktriangledown}$	0.02
		(0.06)	(0.03)	(0.04)	(0.05)	(0.07)	(0.04)	(0.08)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
	12	0.13°	0.09	-0.15°	-0.03	-0.06	-0.16$^{\bullet}$	0.11	0.06	0.00	-0.01	0.02	-0.98$^{\blacktriangledown}$
		(0.07)	(0.07)	(0.08)	(0.06)	(0.08)	(0.07)	(0.10)	(0.05)	(0.04)	(0.05)	(0.04)	(0.10)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

Table B.2: Urban households: unconditional, uncompensated price elasticities $\varepsilon_{ij}^{\bar{c}}$ of food item demand calculated from the QUAIDS regression

		Item											
Quantile	Item	1	2	3	4	5	6	7	8	9	10	11	12
$q_{<.3}$	1	-0.93▼	0.19•	-0.46▼	0.16•	0.05	0.12	-0.22	-0.15•	0.04	-0.01	0.02	0.21•
		(0.11)	(0.09)	(0.11)	(0.06)	(0.14)	(0.09)	(0.14)	(0.06)	(0.03)	(0.07)	(0.04)	(0.10)
	2	0.13•	-0.95▼	0.19•	-0.08•	0.20•	0.07	-0.04	0.03	-0.02	-0.03	-0.05°	-0.08
		(0.05)	(0.09)	(0.08)	(0.04)	(0.09)	(0.06)	(0.08)	(0.04)	(0.02)	(0.03)	(0.03)	(0.06)
	3	-0.19▼	0.13•	-0.74▼	0.00	0.01	0.06	0.02	-0.06°	-0.01	-0.01	0.02	-0.04
		(0.05)	(0.06)	(0.08)	(0.04)	(0.08)	(0.06)	(0.06)	(0.03)	(0.02)	(0.04)	(0.03)	(0.05)
	4	0.13▼	-0.14▼	-0.02	-0.66▼	0.07	-0.14•	-0.00	-0.00	0.05	0.01	0.08°	-0.08
		(0.04)	(0.05)	(0.07)	(0.08)	(0.11)	(0.07)	(0.09)	(0.04)	(0.04)	(0.06)	(0.04)	(0.06)
	5	0.02	0.12°	-0.02	0.02	-0.86▼	0.01	-0.24°	-0.05	-0.06°	0.01	-0.02	-0.08
		(0.06)	(0.07)	(0.08)	(0.07)	(0.18)	(0.09)	(0.11)	(0.06)	(0.03)	(0.08)	(0.05)	(0.07)
	6	0.08•	0.03	0.06	-0.06°	0.08	-0.80▼	-0.00	-0.03	-0.01	0.03	0.07•	0.03
		(0.04)	(0.04)	(0.06)	(0.04)	(0.09)	(0.07)	(0.07)	(0.03)	(0.02)	(0.04)	(0.03)	(0.04)
	7	-0.26•	-0.06	-0.02	-0.08	-0.62•	-0.09	-1.48▼	0.09	0.20▼	0.11	-0.13	0.08
		(0.12)	(0.11)	(0.12)	(0.10)	(0.22)	(0.13)	(0.23)	(0.09)	(0.06)	(0.11)	(0.09)	(0.11)
	8	-0.14•	0.05	-0.13•	-0.01	-0.12	-0.05	0.08	-0.88▼	0.01	0.09	-0.03	0.02
		(0.05)	(0.05)	(0.07)	(0.04)	(0.11)	(0.06)	(0.09)	(0.07)	(0.02)	(0.05)	(0.03)	(0.06)
	9	0.07	-0.09	-0.04	0.12	-0.21	-0.04	0.45▼	0.02	-0.82▼	-0.19▼	0.03	-0.09
		(0.05)	(0.06)	(0.07)	(0.08)	(0.13)	(0.07)	(0.12)	(0.04)	(0.07)	(0.06)	(0.06)	(0.06)
	10	0.01	-0.05	-0.02	0.02	0.06	0.05	0.14	0.07	-0.07▼	-0.73▼	0.05	-0.12•
		(0.05)	(0.04)	(0.06)	(0.05)	(0.11)	(0.06)	(0.09)	(0.04)	(0.03)	(0.10)	(0.04)	(0.06)
	11	0.03	-0.12▼	0.03	0.10	-0.02	0.13°	-0.09	-0.02	0.02	0.05	-0.99▼	-0.01
		(0.04)	(0.05)	(0.06)	(0.06)	(0.12)	(0.07)	(0.11)	(0.04)	(0.04)	(0.06)	(0.08)	(0.05)
	12	0.12°	-0.10	-0.08	-0.08	-0.14	0.03	0.07	0.02	-0.04	-0.12•	-0.02	-0.82▼
		(0.06)	(0.06)	(0.08)	(0.05)	(0.11)	(0.07)	(0.09)	(0.05)	(0.02)	(0.06)	(0.03)	(0.10)
$q_{.3\text{-}.7}$	1	-0.96▼	0.09•	-0.18▼	0.08▼	0.03	0.08•	-0.10°	-0.06•	0.02°	0.01	0.02	0.08•
		(0.05)	(0.04)	(0.04)	(0.02)	(0.06)	(0.03)	(0.06)	(0.02)	(0.01)	(0.03)	(0.02)	(0.04)
	2	0.20•	-0.94▼	0.23°	-0.13•	0.29•	0.07	-0.03	0.04	-0.04	-0.06	-0.07°	-0.10
		(0.07)	(0.13)	(0.11)	(0.06)	(0.13)	(0.08)	(0.11)	(0.05)	(0.03)	(0.05)	(0.04)	(0.08)
	3	-0.41▼	0.27•	-0.44•	-0.02	0.06	0.08	0.10	-0.13°	-0.03	-0.06	0.05	-0.09
		(0.10)	(0.13)	(0.19)	(0.09)	(0.19)	(0.13)	(0.14)	(0.08)	(0.04)	(0.09)	(0.06)	(0.12)
	4	0.16▼	-0.17▼	-0.04	-0.63▼	0.08	-0.18•	0.00	-0.01	0.05	-0.00	0.08°	-0.10
		(0.05)	(0.05)	(0.07)	(0.09)	(0.12)	(0.08)	(0.10)	(0.04)	(0.04)	(0.07)	(0.05)	(0.07)
	5	0.02	0.09•	-0.00	0.02	-0.89▼	0.02	-0.18°	-0.03	-0.04	0.01	-0.01	-0.06
		(0.05)	(0.05)	(0.06)	(0.05)	(0.14)	(0.07)	(0.09)	(0.04)	(0.03)	(0.05)	(0.04)	(0.05)
	6	0.15•	0.04	0.05	-0.14•	0.15	-0.69▼	0.02	-0.05	-0.02	0.03	0.11•	0.07
		(0.07)	(0.07)	(0.10)	(0.07)	(0.16)	(0.13)	(0.13)	(0.06)	(0.03)	(0.07)	(0.05)	(0.08)
	7	-0.14•	-0.02	0.03	-0.02	-0.34•	-0.02	-1.26▼	0.06	0.12▼	0.09	-0.05	0.04
		(0.07)	(0.06)	(0.07)	(0.06)	(0.13)	(0.07)	(0.13)	(0.05)	(0.03)	(0.06)	(0.05)	(0.06)
	8	-0.13•	0.05	-0.13°	-0.00	-0.11	-0.05	0.11	-0.86▼	0.01	0.10	-0.02	0.03
		(0.05)	(0.06)	(0.07)	(0.05)	(0.12)	(0.06)	(0.10)	(0.07)	(0.02)	(0.06)	(0.04)	(0.07)
	9	0.10°	-0.12	-0.07	0.15	-0.25	-0.07	0.61▼	0.03	-0.77▼	-0.26▼	0.04	-0.11
		(0.06)	(0.08)	(0.09)	(0.10)	(0.17)	(0.09)	(0.16)	(0.05)	(0.09)	(0.09)	(0.08)	(0.08)
	10	0.02	-0.10	-0.08	0.02	0.10	0.04	0.24	0.11	-0.13▼	-0.60▼	0.07	-0.18•
		(0.07)	(0.07)	(0.09)	(0.09)	(0.18)	(0.09)	(0.14)	(0.07)	(0.04)	(0.16)	(0.06)	(0.09)
	11	0.04	-0.10▼	0.03	0.10°	0.01	0.12°	-0.07	-0.02	0.02	0.05	-0.98▼	-0.00
		(0.04)	(0.04)	(0.06)	(0.06)	(0.11)	(0.06)	(0.10)	(0.04)	(0.04)	(0.05)	(0.07)	(0.04)
	12	0.13	-0.13	-0.09	-0.12	-0.22	0.01	0.08	0.02	-0.05	-0.16°	-0.03	-0.80▼
		(0.08)	(0.08)	(0.10)	(0.07)	(0.14)	(0.08)	(0.12)	(0.06)	(0.03)	(0.07)	(0.04)	(0.13)
$q_{>.7}$	1	-0.94▼	0.07•	-0.15▼	0.07▼	0.08	0.06•	-0.04	-0.04°	0.02•	0.00	0.03•	0.08°
		(0.04)	(0.03)	(0.04)	(0.02)	(0.07)	(0.03)	(0.06)	(0.02)	(0.01)	(0.02)	(0.01)	(0.04)
	2	0.42•	-0.89▼	0.50°	-0.33•	0.59•	0.12	-0.09	0.09	-0.09	-0.16	-0.18•	-0.26
		(0.15)	(0.30)	(0.25)	(0.12)	(0.29)	(0.18)	(0.27)	(0.12)	(0.07)	(0.11)	(0.09)	(0.18)
	3	-1.17▼	0.74°	0.55	-0.10	0.18	0.16	0.34	-0.38°	-0.08	-0.22	0.11	-0.23
		(0.31)	(0.40)	(0.54)	(0.25)	(0.54)	(0.37)	(0.41)	(0.22)	(0.12)	(0.24)	(0.17)	(0.35)
	4	0.14▼	-0.16▼	-0.04	-0.66▼	0.03	-0.18•	-0.02	-0.00	0.05	-0.01	0.08	-0.12
		(0.05)	(0.05)	(0.07)	(0.09)	(0.15)	(0.07)	(0.11)	(0.04)	(0.04)	(0.06)	(0.05)	(0.07)
	5	0.03	0.07•	0.00	0.01	-0.90▼	0.01	-0.12	-0.02	-0.03	0.00	0.01	-0.06
		(0.04)	(0.04)	(0.05)	(0.05)	(0.12)	(0.05)	(0.08)	(0.04)	(0.02)	(0.04)	(0.03)	(0.04)
	6	0.26°	0.06	0.07	-0.32•	0.20	-0.41	-0.04	-0.13	-0.06	0.02	0.20°	0.10
		(0.15)	(0.15)	(0.22)	(0.15)	(0.33)	(0.27)	(0.27)	(0.11)	(0.07)	(0.14)	(0.11)	(0.17)
	7	-0.06	-0.02	0.03	-0.01	-0.17	-0.02	-1.11▼	0.07°	0.10▼	0.06	-0.01	0.04
		(0.06)	(0.05)	(0.05)	(0.05)	(0.11)	(0.06)	(0.11)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)
	8	-0.13	0.05	-0.17°	0.01	-0.02	-0.09	0.27°	-0.79▼	0.02	0.12	0.00	0.09
		(0.07)	(0.08)	(0.10)	(0.07)	(0.17)	(0.09)	(0.14)	(0.10)	(0.03)	(0.08)	(0.05)	(0.10)
	9	0.14•	-0.16°	-0.09	0.18	-0.27	-0.10	0.78▼	0.04	-0.72▼	-0.33▼	0.06	-0.12
		(0.07)	(0.09)	(0.11)	(0.12)	(0.20)	(0.11)	(0.20)	(0.07)	(0.11)	(0.10)	(0.10)	(0.09)
	10	-0.00	-0.17	-0.14	-0.01	0.06	0.03	0.32	0.16	-0.22▼	-0.37	0.09	-0.35•
		(0.12)	(0.10)	(0.15)	(0.14)	(0.28)	(0.15)	(0.24)	(0.11)	(0.07)	(0.26)	(0.10)	(0.16)
	11	0.08	-0.13▼	0.03	0.12°	0.08	0.13°	-0.01	-0.01	0.02	0.05	-0.96▼	0.02
		(0.05)	(0.05)	(0.07)	(0.07)	(0.13)	(0.08)	(0.12)	(0.04)	(0.04)	(0.06)	(0.09)	(0.06)
	12	0.08	-0.08	-0.06	-0.11°	-0.22	0.01	0.03	0.02	-0.03	-0.11°	-0.02	-0.91▼
		(0.07)	(0.06)	(0.07)	(0.06)	(0.13)	(0.06)	(0.10)	(0.05)	(0.02)	(0.05)	(0.03)	(0.09)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript °, •, and ▼ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

Table B.3: Rural households: unconditional, compensated price elasticities $\varepsilon_{ij}^{H,\bar{c}}$ of food item demand calculated from the QUAIDS regression

		Item											
Quantile	Item	1	2	3	4	5	6	7	8	9	10	11	12
$q_{<.3}$	1	-0.89$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	-0.01	0.15$^{\blacktriangledown}$	0.32$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	-0.13$^{\blacktriangledown}$	0.01	-0.02	-0.08$^{\bullet}$	-0.01	0.10$^{\blacktriangledown}$
		(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)
	2	0.10$^{\blacktriangledown}$	-0.74$^{\blacktriangledown}$	0.01	0.03	0.12$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.02	-0.01	-0.00	0.09$^{\blacktriangledown}$	0.02	0.05°
		(0.03)	(0.04)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)	(0.03)
	3	-0.02	0.01	-0.69$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.07$^{\bullet}$	0.36$^{\blacktriangledown}$	0.07$^{\bullet}$	-0.12$^{\blacktriangledown}$	0.00	0.05$^{\bullet}$	0.03	-0.03
		(0.02)	(0.03)	(0.04)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)
	4	0.10$^{\blacktriangledown}$	-0.01	0.08$^{\bullet}$	-0.45$^{\blacktriangledown}$	-0.05	-0.07°	0.08°	0.06$^{\bullet}$	0.07$^{\blacktriangledown}$	0.04	-0.05°	0.01
		(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.04)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
	5	0.29$^{\blacktriangledown}$	0.10$^{\bullet}$	0.03	-0.06	-0.67$^{\blacktriangledown}$	0.20$^{\blacktriangledown}$	-0.34$^{\blacktriangledown}$	-0.03	0.07$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	0.05	0.01
		(0.04)	(0.04)	(0.05)	(0.06)	(0.11)	(0.05)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	6	0.08$^{\blacktriangledown}$	0.10$^{\blacktriangledown}$	0.38$^{\blacktriangledown}$	-0.01	0.17$^{\blacktriangledown}$	-0.87$^{\blacktriangledown}$	0.05	0.08$^{\blacktriangledown}$	-0.06$^{\blacktriangledown}$	-0.07$^{\blacktriangledown}$	0.02	-0.05°
		(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.06)	(0.04)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)
	7	-0.24$^{\blacktriangledown}$	0.04	0.21$^{\bullet}$	0.19$^{\blacktriangledown}$	-0.52$^{\blacktriangledown}$	0.22$^{\bullet}$	-1.41$^{\blacktriangledown}$	0.27$^{\blacktriangledown}$	0.17$^{\blacktriangledown}$	0.40$^{\blacktriangledown}$	0.10°	0.15
		(0.07)	(0.07)	(0.08)	(0.07)	(0.11)	(0.10)	(0.18)	(0.06)	(0.04)	(0.08)	(0.05)	(0.08)
	8	0.00	0.01	-0.22$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	0.01	0.24$^{\blacktriangledown}$	0.19$^{\blacktriangledown}$	-0.98$^{\blacktriangledown}$	0.04$^{\blacktriangledown}$	0.23$^{\blacktriangledown}$	0.02	0.06
		(0.04)	(0.06)	(0.05)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.02)	(0.04)	(0.02)	(0.04)
	9	-0.06°	-0.02	0.01	0.21$^{\blacktriangledown}$	0.23$^{\blacktriangledown}$	-0.21$^{\blacktriangledown}$	0.28$^{\blacktriangledown}$	0.06$^{\bullet}$	-0.87$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	0.02	0.02
		(0.03)	(0.05)	(0.06)	(0.06)	(0.07)	(0.04)	(0.06)	(0.03)	(0.05)	(0.03)	(0.03)	(0.05)
	10	-0.13$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.07$^{\bullet}$	0.07$^{\bullet}$	0.18$^{\blacktriangledown}$	-0.10$^{\blacktriangledown}$	0.17$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.04$^{\blacktriangledown}$	-0.78$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	-0.00
		(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.01)	(0.03)	(0.02)	(0.03)
	11	-0.02	0.05	0.07	-0.13	0.19$^{\bullet}$	0.03	0.28$^{\blacktriangledown}$	0.03	0.02	0.14$^{\blacktriangledown}$	-0.92$^{\blacktriangledown}$	0.06
		(0.05)	(0.05)	(0.07)	(0.08)	(0.10)	(0.06)	(0.09)	(0.04)	(0.03)	(0.05)	(0.07)	(0.06)
	12	0.19$^{\blacktriangledown}$	0.15$^{\blacktriangledown}$	-0.04	0.07	0.09	-0.06	0.16°	0.07	0.03	0.04	0.05	-0.95$^{\blacktriangledown}$
		(0.05)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.07)	(0.05)	(0.03)	(0.05)	(0.03)	(0.08)
$q_{.3\text{-}.7}$	1	-0.87$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	0.02	0.10$^{\blacktriangledown}$	0.20$^{\blacktriangledown}$	0.10$^{\blacktriangledown}$	-0.01	0.01	-0.00	-0.01	0.02$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$
		(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	2	0.16$^{\blacktriangledown}$	-0.74$^{\blacktriangledown}$	-0.01	0.02	0.11$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.06°	-0.02	-0.01	0.07$^{\blacktriangledown}$	0.03$^{\blacktriangledown}$	0.05$^{\bullet}$
		(0.03)	(0.04)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.01)	(0.02)	(0.01)	(0.03)
	3	0.01	-0.01	-0.65$^{\blacktriangledown}$	0.06$^{\bullet}$	0.04	0.41$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	-0.17$^{\blacktriangledown}$	-0.02	0.03	0.03°	-0.05
		(0.03)	(0.03)	(0.05)	(0.03)	(0.04)	(0.05)	(0.04)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
	4	0.17$^{\blacktriangledown}$	-0.03	0.04	-0.34$^{\blacktriangledown}$	-0.12	-0.14$^{\bullet}$	0.13$^{\bullet}$	0.06$^{\bullet}$	0.07$^{\bullet}$	0.02	-0.07°	-0.00
		(0.04)	(0.04)	(0.04)	(0.08)	(0.08)	(0.05)	(0.06)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	5	0.35$^{\blacktriangledown}$	0.10$^{\bullet}$	-0.00	-0.10	-0.67$^{\blacktriangledown}$	0.18$^{\blacktriangledown}$	-0.32$^{\blacktriangledown}$	-0.04	0.07$^{\bullet}$	0.14$^{\blacktriangledown}$	0.06°	0.00
		(0.04)	(0.05)	(0.05)	(0.07)	(0.12)	(0.06)	(0.07)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)
	6	0.14$^{\blacktriangledown}$	0.10$^{\blacktriangledown}$	0.44$^{\blacktriangledown}$	-0.07$^{\bullet}$	0.17$^{\blacktriangledown}$	-0.89$^{\blacktriangledown}$	0.09°	0.09$^{\blacktriangledown}$	-0.10$^{\blacktriangledown}$	-0.13$^{\blacktriangledown}$	0.02	-0.07$^{\bullet}$
		(0.03)	(0.04)	(0.05)	(0.03)	(0.04)	(0.07)	(0.06)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
	7	-0.05	0.07°	0.13$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	-0.20$^{\blacktriangledown}$	0.13$^{\bullet}$	-1.12$^{\blacktriangledown}$	0.14$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.21$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.08°
		(0.03)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.09)	(0.03)	(0.02)	(0.04)	(0.02)	(0.04)
	8	0.05	-0.00	-0.30$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	-0.01	0.23$^{\blacktriangledown}$	0.27$^{\blacktriangledown}$	-0.99$^{\blacktriangledown}$	0.04$^{\bullet}$	0.22$^{\blacktriangledown}$	0.04	0.07
		(0.04)	(0.07)	(0.05)	(0.04)	(0.05)	(0.06)	(0.05)	(0.05)	(0.02)	(0.04)	(0.03)	(0.05)
	9	-0.08	-0.08	-0.08	0.24$^{\bullet}$	0.28$^{\blacktriangledown}$	-0.44$^{\blacktriangledown}$	0.47$^{\blacktriangledown}$	0.08°	-0.82$^{\blacktriangledown}$	0.14$^{\blacktriangledown}$	0.02	0.02
		(0.05)	(0.07)	(0.09)	(0.09)	(0.11)	(0.07)	(0.10)	(0.05)	(0.08)	(0.05)	(0.05)	(0.08)
	10	-0.12$^{\blacktriangledown}$	0.12$^{\blacktriangledown}$	0.04	0.04	0.18$^{\blacktriangledown}$	-0.17$^{\blacktriangledown}$	0.23$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	0.04$^{\bullet}$	-0.76$^{\blacktriangledown}$	0.08$^{\blacktriangledown}$	-0.01
		(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.06)	(0.03)	(0.01)	(0.04)	(0.02)	(0.04)
	11	0.06°	0.07$^{\bullet}$	0.06	-0.06	0.15$^{\bullet}$	0.04	0.22$^{\blacktriangledown}$	0.03	0.01	0.11$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$	0.04
		(0.03)	(0.03)	(0.04)	(0.05)	(0.06)	(0.04)	(0.05)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
	12	0.24$^{\blacktriangledown}$	0.15$^{\bullet}$	-0.07	0.05	0.07	-0.09	0.21$^{\bullet}$	0.07	0.01	0.02	0.06°	-0.95$^{\blacktriangledown}$
		(0.05)	(0.06)	(0.07)	(0.05)	(0.07)	(0.06)	(0.08)	(0.05)	(0.03)	(0.05)	(0.03)	(0.09)
$q_{>.7}$	1	-0.85$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	-0.00	0.08$^{\blacktriangledown}$	0.18$^{\blacktriangledown}$	0.06$^{\blacktriangledown}$	0.06$^{\bullet}$	0.02$^{\bullet}$	-0.00	-0.02°	0.02$^{\blacktriangledown}$	0.04$^{\blacktriangledown}$
		(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
	2	0.24$^{\blacktriangledown}$	-0.68$^{\blacktriangledown}$	-0.09$^{\bullet}$	-0.03	0.14$^{\blacktriangledown}$	0.04	0.12$^{\bullet}$	-0.03	-0.03	0.04	0.03°	0.07°
		(0.05)	(0.06)	(0.04)	(0.03)	(0.04)	(0.05)	(0.06)	(0.04)	(0.02)	(0.03)	(0.02)	(0.04)
	3	-0.03	-0.09°	-0.53$^{\blacktriangledown}$	0.03	0.01	0.57$^{\blacktriangledown}$	0.13$^{\bullet}$	-0.27$^{\blacktriangledown}$	-0.03	0.02	0.03	-0.10°
		(0.06)	(0.05)	(0.08)	(0.04)	(0.07)	(0.08)	(0.08)	(0.05)	(0.03)	(0.05)	(0.03)	(0.05)
	4	0.18$^{\blacktriangledown}$	-0.06	0.02	-0.31$^{\blacktriangledown}$	-0.14°	-0.17$^{\blacktriangledown}$	0.13$^{\bullet}$	0.07$^{\bullet}$	0.07$^{\bullet}$	0.02	-0.08°	-0.01
		(0.04)	(0.05)	(0.05)	(0.09)	(0.09)	(0.05)	(0.07)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	5	0.28$^{\blacktriangledown}$	0.07$^{\bullet}$	-0.01	-0.07	-0.74$^{\blacktriangledown}$	0.13$^{\blacktriangledown}$	-0.21$^{\blacktriangledown}$	-0.02	0.05$^{\bullet}$	0.11$^{\blacktriangledown}$	0.05°	-0.01
		(0.03)	(0.04)	(0.04)	(0.05)	(0.09)	(0.04)	(0.06)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)
	6	0.15$^{\bullet}$	0.09	0.57$^{\blacktriangledown}$	-0.14$^{\blacktriangledown}$	0.20$^{\blacktriangledown}$	-0.88$^{\blacktriangledown}$	0.09	0.12$^{\blacktriangledown}$	-0.14$^{\blacktriangledown}$	-0.20$^{\blacktriangledown}$	0.01	-0.11$^{\bullet}$
		(0.06)	(0.05)	(0.07)	(0.05)	(0.07)	(0.11)	(0.09)	(0.04)	(0.02)	(0.05)	(0.03)	(0.05)
	7	0.06°	0.05$^{\bullet}$	0.06$^{\bullet}$	0.08$^{\blacktriangledown}$	-0.08$^{\bullet}$	0.04	-0.94$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.07$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.08$^{\blacktriangledown}$	0.06°
		(0.04)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.08)	(0.02)	(0.01)	(0.03)	(0.02)	(0.03)
	8	0.13$^{\bullet}$	-0.02	-0.34$^{\blacktriangledown}$	0.10$^{\blacktriangledown}$	0.03	0.15$^{\bullet}$	0.39$^{\blacktriangledown}$	-0.98$^{\blacktriangledown}$	0.03$^{\bullet}$	0.16$^{\blacktriangledown}$	0.04°	0.07
		(0.05)	(0.07)	(0.06)	(0.04)	(0.05)	(0.06)	(0.08)	(0.05)	(0.02)	(0.04)	(0.03)	(0.05)
	9	-0.06	-0.10	-0.11	0.22$^{\blacktriangledown}$	0.28$^{\blacktriangledown}$	-0.45$^{\blacktriangledown}$	0.49$^{\blacktriangledown}$	0.09°	-0.83$^{\blacktriangledown}$	0.12$^{\bullet}$	0.02	0.01
		(0.05)	(0.07)	(0.09)	(0.09)	(0.11)	(0.07)	(0.10)	(0.04)	(0.07)	(0.05)	(0.05)	(0.08)
	10	-0.17$^{\blacktriangledown}$	0.11$^{\bullet}$	-0.00	0.02	0.22$^{\blacktriangledown}$	-0.29$^{\blacktriangledown}$	0.32$^{\blacktriangledown}$	0.17$^{\blacktriangledown}$	0.04$^{\bullet}$	-0.70$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	-0.02
		(0.05)	(0.05)	(0.06)	(0.05)	(0.06)	(0.06)	(0.08)	(0.04)	(0.02)	(0.05)	(0.03)	(0.05)
	11	0.07°	0.05	0.03	-0.07	0.14$^{\bullet}$	0.02	0.23$^{\blacktriangledown}$	0.03	0.01	0.10$^{\blacktriangledown}$	-0.94$^{\blacktriangledown}$	0.04
		(0.04)	(0.03)	(0.04)	(0.05)	(0.06)	(0.04)	(0.07)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)
	12	0.24$^{\blacktriangledown}$	0.14$^{\bullet}$	-0.11	0.03	0.05	-0.12	0.20°	0.08	0.01	0.03	0.05	-0.97$^{\blacktriangledown}$
		(0.06)	(0.07)	(0.07)	(0.06)	(0.08)	(0.07)	(0.10)	(0.05)	(0.04)	(0.05)	(0.04)	(0.10)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

Table B.4: Urban households: unconditional, compensated price elasticities $\varepsilon_{ij}^{H,\bar{c}}$ of food item demand calculated from the QUAIDS regression

		Item											
Quantile	Item	1	2	3	4	5	6	7	8	9	10	11	12
$q_{<.3}$	1	-0.91$^{\blacktriangledown}$	0.23$^{\bullet}$	-0.42$^{\blacktriangledown}$	0.21$^{\blacktriangledown}$	0.14	0.18$^{\bullet}$	-0.19	-0.13°	0.05$^{\bullet}$	0.03	0.05	0.22$^{\bullet}$
		(0.11)	(0.09)	(0.11)	(0.06)	(0.14)	(0.09)	(0.14)	(0.06)	(0.03)	(0.07)	(0.04)	(0.10)
	2	0.15$^{\blacktriangledown}$	-0.93$^{\blacktriangledown}$	0.21$^{\bullet}$	-0.05	0.25$^{\blacktriangledown}$	0.11$^{\bullet}$	-0.02	0.05	-0.01	0.00	-0.03	-0.07
		(0.05)	(0.09)	(0.08)	(0.04)	(0.09)	(0.06)	(0.08)	(0.04)	(0.02)	(0.03)	(0.03)	(0.06)
	3	-0.17$^{\blacktriangledown}$	0.16$^{\bullet}$	-0.70$^{\blacktriangledown}$	0.04	0.09	0.11	0.04	-0.04	0.01	0.02	0.05	-0.03
		(0.04)	(0.06)	(0.08)	(0.04)	(0.08)	(0.06)	(0.06)	(0.03)	(0.02)	(0.04)	(0.03)	(0.05)
	4	0.15$^{\blacktriangledown}$	-0.12$^{\blacktriangledown}$	0.01	-0.63$^{\blacktriangledown}$	0.14	-0.10°	0.02	0.01	0.06°	0.04	0.10$^{\bullet}$	-0.07
		(0.04)	(0.05)	(0.07)	(0.08)	(0.11)	(0.07)	(0.09)	(0.04)	(0.03)	(0.06)	(0.04)	(0.06)
	5	0.04	0.15$^{\bullet}$	0.03	0.08	-0.75$^{\blacktriangledown}$	0.08	-0.20	-0.02	-0.04	0.06	0.02	-0.06
		(0.06)	(0.07)	(0.08)	(0.06)	(0.18)	(0.09)	(0.11)	(0.06)	(0.03)	(0.08)	(0.05)	(0.07)
	6	0.09$^{\bullet}$	0.05	0.08	-0.04	0.13	-0.77$^{\blacktriangledown}$	0.01	-0.01	0.00	0.06	0.09$^{\blacktriangledown}$	0.04
		(0.04)	(0.04)	(0.06)	(0.04)	(0.09)	(0.07)	(0.07)	(0.03)	(0.02)	(0.04)	(0.03)	(0.04)
	7	-0.21°	0.01	0.07	0.03	-0.42°	0.04	-1.41$^{\blacktriangledown}$	0.14	0.24$^{\blacktriangledown}$	0.21$^{\bullet}$	-0.06	0.12
		(0.12)	(0.11)	(0.12)	(0.10)	(0.22)	(0.13)	(0.23)	(0.09)	(0.06)	(0.11)	(0.09)	(0.11)
	8	-0.12$^{\bullet}$	0.08	-0.08	0.05	-0.02	0.02	0.11	-0.85$^{\blacktriangledown}$	0.03	0.13$^{\bullet}$	0.01	0.04
		(0.05)	(0.05)	(0.07)	(0.04)	(0.11)	(0.06)	(0.09)	(0.07)	(0.02)	(0.05)	(0.03)	(0.06)
	9	0.08°	-0.06	-0.01	0.16°	-0.14	0.01	0.48$^{\blacktriangledown}$	0.04	-0.81$^{\blacktriangledown}$	-0.16$^{\bullet}$	0.06	-0.07
		(0.05)	(0.06)	(0.07)	(0.08)	(0.13)	(0.07)	(0.12)	(0.04)	(0.07)	(0.06)	(0.06)	(0.06)
	10	0.02	-0.03	0.00	0.05	0.12	0.09	0.16°	0.09°	-0.06$^{\bullet}$	-0.70$^{\blacktriangledown}$	0.07°	-0.11°
		(0.05)	(0.04)	(0.06)	(0.05)	(0.11)	(0.06)	(0.09)	(0.04)	(0.03)	(0.10)	(0.04)	(0.06)
	11	0.04	-0.09°	0.07	0.15$^{\bullet}$	0.06	0.19$^{\bullet}$	-0.06	-0.00	0.03	0.09°	-0.96$^{\blacktriangledown}$	0.00
		(0.04)	(0.05)	(0.06)	(0.06)	(0.12)	(0.07)	(0.11)	(0.04)	(0.04)	(0.06)	(0.08)	(0.05)
	12	0.14$^{\bullet}$	-0.06	-0.03	-0.03	-0.04	0.10	0.10	0.04	-0.02	-0.07	0.02	-0.80$^{\blacktriangledown}$
		(0.06)	(0.06)	(0.08)	(0.05)	(0.10)	(0.06)	(0.09)	(0.05)	(0.02)	(0.06)	(0.03)	(0.10)
$q_{.3\text{-}.7}$	1	-0.92$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	-0.16$^{\blacktriangledown}$	0.11$^{\blacktriangledown}$	0.12$^{\bullet}$	0.10$^{\blacktriangledown}$	-0.06	-0.04°	0.03$^{\blacktriangledown}$	0.03	0.04$^{\bullet}$	0.09$^{\bullet}$
		(0.05)	(0.04)	(0.04)	(0.02)	(0.06)	(0.03)	(0.06)	(0.02)	(0.01)	(0.03)	(0.02)	(0.04)
	2	0.22$^{\bullet}$	-0.93$^{\blacktriangledown}$	0.24$^{\bullet}$	-0.11$^{\bullet}$	0.34$^{\blacktriangledown}$	0.09	-0.01	0.05	-0.03	-0.04	-0.05	-0.10
		(0.07)	(0.13)	(0.11)	(0.06)	(0.13)	(0.08)	(0.11)	(0.05)	(0.03)	(0.05)	(0.04)	(0.08)
	3	-0.39$^{\blacktriangledown}$	0.29$^{\bullet}$	-0.43$^{\bullet}$	-0.00	0.12	0.10	0.13	-0.12°	-0.02	-0.05	0.06	-0.08
		(0.10)	(0.13)	(0.19)	(0.09)	(0.19)	(0.13)	(0.14)	(0.08)	(0.04)	(0.09)	(0.06)	(0.12)
	4	0.19$^{\blacktriangledown}$	-0.15$^{\blacktriangledown}$	-0.03	-0.60$^{\blacktriangledown}$	0.15	-0.15$^{\bullet}$	0.04	0.01	0.06	0.02	0.10$^{\bullet}$	-0.09
		(0.05)	(0.05)	(0.07)	(0.09)	(0.12)	(0.08)	(0.10)	(0.04)	(0.04)	(0.07)	(0.05)	(0.07)
	5	0.06	0.11$^{\bullet}$	0.01	0.06	-0.79$^{\blacktriangledown}$	0.05	-0.13	-0.01	-0.03	0.03	0.02	-0.05
		(0.05)	(0.05)	(0.06)	(0.05)	(0.13)	(0.07)	(0.09)	(0.04)	(0.03)	(0.06)	(0.04)	(0.05)
	6	0.17$^{\bullet}$	0.04	0.06	-0.13$^{\bullet}$	0.18	-0.68$^{\blacktriangledown}$	0.03	-0.05	-0.02	0.03	0.12$^{\bullet}$	0.07
		(0.07)	(0.07)	(0.10)	(0.07)	(0.16)	(0.13)	(0.13)	(0.06)	(0.03)	(0.07)	(0.05)	(0.08)
	7	-0.08	0.00	0.06	0.03	-0.19	0.02	-1.19$^{\blacktriangledown}$	0.09°	0.14$^{\blacktriangledown}$	0.12°	-0.01	0.05
		(0.07)	(0.06)	(0.07)	(0.06)	(0.13)	(0.07)	(0.13)	(0.05)	(0.03)	(0.06)	(0.05)	(0.06)
	8	-0.09	0.07	-0.11°	0.03	-0.01	-0.02	0.16	-0.84$^{\blacktriangledown}$	0.03	0.12$^{\bullet}$	0.01	0.04
		(0.05)	(0.06)	(0.07)	(0.05)	(0.12)	(0.06)	(0.10)	(0.07)	(0.02)	(0.06)	(0.04)	(0.07)
	9	0.13$^{\bullet}$	-0.11	-0.06	0.17	-0.18	-0.05	0.64$^{\blacktriangledown}$	0.04	-0.76$^{\blacktriangledown}$	-0.24$^{\blacktriangledown}$	0.06	-0.10
		(0.06)	(0.08)	(0.09)	(0.10)	(0.17)	(0.09)	(0.16)	(0.05)	(0.09)	(0.09)	(0.08)	(0.08)
	10	0.04	-0.09	-0.07	0.03	0.15	0.05	0.26°	0.12	-0.12$^{\blacktriangledown}$	-0.59$^{\blacktriangledown}$	0.08	-0.18$^{\bullet}$
		(0.08)	(0.07)	(0.09)	(0.09)	(0.18)	(0.09)	(0.14)	(0.07)	(0.04)	(0.16)	(0.06)	(0.09)
	11	0.07°	-0.09$^{\bullet}$	0.04	0.13$^{\bullet}$	0.09	0.15$^{\bullet}$	-0.03	-0.00	0.03	0.07	-0.96$^{\blacktriangledown}$	0.00
		(0.04)	(0.04)	(0.06)	(0.06)	(0.11)	(0.06)	(0.10)	(0.04)	(0.04)	(0.05)	(0.07)	(0.04)
	12	0.18$^{\bullet}$	-0.10	-0.07	-0.07	-0.09	0.05	0.14	0.05	-0.03	-0.13	0.01	-0.79$^{\blacktriangledown}$
		(0.08)	(0.08)	(0.10)	(0.07)	(0.13)	(0.08)	(0.12)	(0.06)	(0.03)	(0.07)	(0.04)	(0.13)
$q_{>.7}$	1	-0.91$^{\blacktriangledown}$	0.08$^{\bullet}$	-0.14$^{\blacktriangledown}$	0.09$^{\blacktriangledown}$	0.15$^{\bullet}$	0.07$^{\bullet}$	-0.00	-0.03	0.03$^{\blacktriangledown}$	0.01	0.05$^{\blacktriangledown}$	0.09$^{\bullet}$
		(0.04)	(0.03)	(0.04)	(0.02)	(0.07)	(0.03)	(0.06)	(0.02)	(0.01)	(0.02)	(0.01)	(0.04)
	2	0.43$^{\blacktriangledown}$	-0.89$^{\blacktriangledown}$	0.50°	-0.32$^{\bullet}$	0.62$^{\bullet}$	0.12	-0.08	0.09	-0.09	-0.16	-0.17°	-0.25
		(0.15)	(0.30)	(0.25)	(0.12)	(0.28)	(0.18)	(0.26)	(0.12)	(0.07)	(0.11)	(0.09)	(0.18)
	3	-1.17$^{\blacktriangledown}$	0.74°	0.55	-0.09	0.19	0.16	0.35	-0.38°	-0.08	-0.21	0.11	-0.23
		(0.31)	(0.40)	(0.54)	(0.25)	(0.53)	(0.37)	(0.41)	(0.22)	(0.12)	(0.24)	(0.17)	(0.35)
	4	0.18$^{\blacktriangledown}$	-0.16$^{\blacktriangledown}$	-0.04	-0.64$^{\blacktriangledown}$	0.12	-0.17$^{\bullet}$	0.03	0.00	0.06	0.00	0.10°	-0.11
		(0.05)	(0.05)	(0.07)	(0.09)	(0.14)	(0.08)	(0.11)	(0.04)	(0.04)	(0.06)	(0.05)	(0.07)
	5	0.07°	0.08$^{\bullet}$	0.00	0.04	-0.80$^{\blacktriangledown}$	0.02	-0.07	-0.01	-0.03	0.01	0.03	-0.05
		(0.04)	(0.04)	(0.05)	(0.05)	(0.12)	(0.05)	(0.08)	(0.04)	(0.02)	(0.04)	(0.03)	(0.04)
	6	0.26°	0.06	0.07	-0.32$^{\bullet}$	0.21	-0.41	-0.04	-0.13	-0.06	0.02	0.20°	0.10
		(0.15)	(0.15)	(0.22)	(0.15)	(0.33)	(0.27)	(0.27)	(0.11)	(0.07)	(0.14)	(0.11)	(0.17)
	7	-0.01	-0.01	0.04	0.02	-0.07	-0.01	-1.05$^{\blacktriangledown}$	0.08$^{\bullet}$	0.10$^{\blacktriangledown}$	0.07	0.01	0.06
		(0.05)	(0.05)	(0.05)	(0.05)	(0.11)	(0.06)	(0.11)	(0.04)	(0.02)	(0.04)	(0.04)	(0.05)
	8	-0.11	0.05	-0.17°	0.03	0.04	-0.08	0.30$^{\bullet}$	-0.78$^{\blacktriangledown}$	0.03	0.12	0.01	0.09
		(0.07)	(0.08)	(0.10)	(0.07)	(0.17)	(0.09)	(0.14)	(0.10)	(0.03)	(0.08)	(0.05)	(0.10)
	9	0.17$^{\bullet}$	-0.15°	-0.09	0.19	-0.21	-0.09	0.81$^{\blacktriangledown}$	0.05	-0.72$^{\blacktriangledown}$	-0.32$^{\blacktriangledown}$	0.07	-0.11
		(0.07)	(0.09)	(0.11)	(0.12)	(0.20)	(0.11)	(0.20)	(0.07)	(0.11)	(0.10)	(0.10)	(0.09)
	10	0.02	-0.16	-0.14	0.01	0.12	0.04	0.35	0.17	-0.21$^{\blacktriangledown}$	-0.37	0.10	-0.34$^{\bullet}$
		(0.12)	(0.10)	(0.15)	(0.14)	(0.28)	(0.15)	(0.24)	(0.11)	(0.07)	(0.26)	(0.10)	(0.16)
	11	0.10$^{\bullet}$	-0.13$^{\blacktriangledown}$	0.03	0.14$^{\bullet}$	0.14	0.14°	0.02	-0.00	0.03	0.05	-0.95$^{\blacktriangledown}$	0.03
		(0.05)	(0.05)	(0.07)	(0.07)	(0.13)	(0.08)	(0.12)	(0.04)	(0.04)	(0.06)	(0.09)	(0.06)
	12	0.13°	-0.07	-0.05	-0.07	-0.09	0.02	0.10	0.03	-0.02	-0.10°	0.01	-0.90$^{\blacktriangledown}$
		(0.06)	(0.06)	(0.07)	(0.05)	(0.12)	(0.06)	(0.09)	(0.04)	(0.02)	(0.05)	(0.03)	(0.09)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript $^{\circ}$, $^{\bullet}$, and $^{\blacktriangledown}$ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

Table B.5: Conditional demand elasticities for food items calculated from the QUAIDS regression

Quantile	Rural								Urban							
	$q_{<.3}$		$q_{.3\text{-}.7}$		$q_{>.7}$		Mean		$q_{<.3}$		$q_{.3\text{-}.7}$		$q_{>.7}$		Mean	
	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)	Est.	(S.e.)
$\eta_{1\|F}$	1.25▼	(0.09)	1.10▼	(0.02)	0.99▼	(0.07)	1.04▼	(0.06)	1.05▼	(0.15)	0.96▼	(0.04)	0.85▼	(0.07)	0.89▼	(0.07)
$\eta_{2\|F}$	0.83▼	(0.06)	0.78▼	(0.04)	0.34	(0.24)	0.61▼	(0.11)	0.67▼	(0.09)	0.59▼	(0.11)	0.35	(0.32)	0.62▼	(0.11)
$\eta_{3\|F}$	0.78▼	(0.05)	0.75▼	(0.04)	0.90	(0.42)	0.86▼	(0.18)	0.86▼	(0.07)	0.68▼	(0.12)	0.15	(0.41)	0.74▼	(0.08)
$\eta_{4\|F}$	0.79▼	(0.04)	0.79▼	(0.04)	1.06▼	(0.09)	0.94▼	(0.06)	0.77▼	(0.09)	0.81▼	(0.05)	1.00▼	(0.27)	0.90▼	(0.15)
$\eta_{5\|F}$	1.01▼	(0.05)	1.10▼	(0.04)	1.36▼	(0.10)	1.28▼	(0.08)	1.22▼	(0.10)	1.15▼	(0.05)	1.10▼	(0.06)	1.14▼	(0.05)
$\eta_{6\|F}$	0.69▼	(0.06)	0.66▼	(0.05)	0.82•	(0.29)	0.78▼	(0.12)	0.56▼	(0.06)	0.33▼	(0.09)	0.08	(0.31)	0.46▼	(0.08)
$\eta_{7\|F}$	2.80▼	(0.18)	1.71▼	(0.05)	0.99▼	(0.16)	1.31▼	(0.18)	2.35▼	(0.18)	1.62▼	(0.06)	1.23▼	(0.12)	1.50▼	(0.11)
$\eta_{8\|F}$	1.33▼	(0.08)	1.22▼	(0.06)	0.60•	(0.24)	0.87▼	(0.16)	1.17▼	(0.08)	1.07▼	(0.06)	0.73▼	(0.16)	0.95▼	(0.08)
$\eta_{9\|F}$	0.98▼	(0.09)	0.99▼	(0.13)	1.08▼	(0.26)	1.04▼	(0.16)	0.85▼	(0.07)	0.78▼	(0.07)	0.66▼	(0.08)	0.76▼	(0.05)
$\eta_{10\|F}$	0.75▼	(0.04)	0.70▼	(0.04)	0.58▼	(0.18)	0.69▼	(0.08)	0.65▼	(0.05)	0.55▼	(0.10)	0.69•	(0.30)	0.68▼	(0.12)
$\eta_{11\|F}$	0.68▼	(0.19)	0.84▼	(0.05)	0.97•	(0.31)	0.90▼	(0.21)	0.94▼	(0.07)	0.88▼	(0.04)	0.67▼	(0.09)	0.79▼	(0.05)
$\eta_{12\|F}$	0.82▼	(0.15)	0.92▼	(0.11)	1.41▼	(0.19)	1.18▼	(0.11)	1.23▼	(0.17)	1.44▼	(0.14)	1.57▼	(0.21)	1.50▼	(0.15)
$\varepsilon_{1\|F}$	-0.95▼	(0.04)	-0.98▼	(0.02)	-0.97▼	(0.02)	-0.97▼	(0.02)	-0.94▼	(0.11)	-0.97▼	(0.05)	-0.96▼	(0.04)	-0.96▼	(0.05)
$\varepsilon_{2\|F}$	-0.81▼	(0.04)	-0.81▼	(0.04)	-0.70▼	(0.06)	-0.78▼	(0.04)	-0.96▼	(0.09)	-0.95▼	(0.13)	-0.89▼	(0.30)	-0.95▼	(0.14)
$\varepsilon_{3\|F}$	-0.77▼	(0.04)	-0.71▼	(0.05)	-0.58▼	(0.08)	-0.72▼	(0.05)	-0.75▼	(0.08)	-0.44•	(0.19)	0.55	(0.54)	-0.53▼	(0.15)
$\varepsilon_{4\|F}$	-0.53▼	(0.06)	-0.40▼	(0.08)	-0.38▼	(0.09)	-0.45▼	(0.07)	-0.68▼	(0.08)	-0.64▼	(0.09)	-0.67▼	(0.09)	-0.67▼	(0.08)
$\varepsilon_{5\|F}$	-0.78▼	(0.11)	-0.77▼	(0.12)	-0.88▼	(0.09)	-0.83▼	(0.10)	-0.84▼	(0.18)	-0.89▼	(0.13)	-0.90▼	(0.11)	-0.88▼	(0.13)
$\varepsilon_{6\|F}$	-0.95▼	(0.06)	-0.95▼	(0.07)	-0.93▼	(0.11)	-0.95▼	(0.07)	-0.82▼	(0.07)	-0.71▼	(0.13)	-0.41	(0.27)	-0.73▼	(0.12)
$\varepsilon_{7\|F}$	-1.46▼	(0.18)	-1.22▼	(0.09)	-1.04▼	(0.09)	-1.16▼	(0.10)	-1.37▼	(0.23)	-1.20▼	(0.13)	-1.10▼	(0.10)	-1.18▼	(0.13)
$\varepsilon_{8\|F}$	-1.02▼	(0.04)	-1.02▼	(0.05)	-1.00▼	(0.05)	-1.01▼	(0.05)	-0.87▼	(0.07)	-0.86▼	(0.07)	-0.79▼	(0.10)	-0.84▼	(0.08)
$\varepsilon_{9\|F}$	-0.90▼	(0.05)	-0.84▼	(0.08)	-0.84▼	(0.07)	-0.86▼	(0.06)	-0.83▼	(0.07)	-0.78▼	(0.09)	-0.73▼	(0.11)	-0.78▼	(0.09)
$\varepsilon_{10\|F}$	-0.84▼	(0.03)	-0.81▼	(0.04)	-0.73▼	(0.05)	-0.80▼	(0.04)	-0.74▼	(0.10)	-0.61▼	(0.16)	-0.38	(0.26)	-0.63▼	(0.15)
$\varepsilon_{11\|F}$	-0.94▼	(0.07)	-0.97▼	(0.04)	-0.97▼	(0.04)	-0.97▼	(0.05)	-1.00▼	(0.08)	-0.99▼	(0.07)	-0.98▼	(0.09)	-0.99▼	(0.08)
$\varepsilon_{12\|F}$	-0.97▼	(0.09)	-0.97▼	(0.09)	-0.99▼	(0.10)	-0.98▼	(0.09)	-0.81▼	(0.10)	-0.79▼	(0.13)	-0.89▼	(0.09)	-0.84▼	(0.10)
$\varepsilon^H_{1\|F}$	-0.87▼	(0.04)	-0.83▼	(0.02)	-0.80▼	(0.02)	-0.84▼	(0.02)	-0.89▼	(0.11)	-0.86▼	(0.05)	-0.85▼	(0.04)	-0.87▼	(0.05)
$\varepsilon^H_{2\|F}$	-0.72▼	(0.04)	-0.72▼	(0.04)	-0.67▼	(0.06)	-0.71▼	(0.04)	-0.92▼	(0.09)	-0.92▼	(0.13)	-0.88▼	(0.30)	-0.92▼	(0.14)
$\varepsilon^H_{3\|F}$	-0.67▼	(0.04)	-0.64▼	(0.05)	-0.52▼	(0.09)	-0.63▼	(0.05)	-0.67▼	(0.08)	-0.42•	(0.19)	0.55	(0.54)	-0.49▼	(0.15)
$\varepsilon^H_{4\|F}$	-0.43▼	(0.06)	-0.33▼	(0.08)	-0.28▼	(0.09)	-0.35▼	(0.07)	-0.60▼	(0.08)	-0.57▼	(0.09)	-0.57▼	(0.09)	-0.58▼	(0.09)
$\varepsilon^H_{5\|F}$	-0.64▼	(0.11)	-0.63▼	(0.12)	-0.64▼	(0.09)	-0.64▼	(0.11)	-0.60▼	(0.18)	-0.58▼	(0.13)	-0.54▼	(0.11)	-0.58▼	(0.13)
$\varepsilon^H_{6\|F}$	-0.85▼	(0.06)	-0.88▼	(0.07)	-0.87▼	(0.11)	-0.87▼	(0.08)	-0.74▼	(0.07)	-0.68▼	(0.13)	-0.41	(0.27)	-0.69▼	(0.12)
$\varepsilon^H_{7\|F}$	-1.32▼	(0.18)	-1.05▼	(0.09)	-0.89▼	(0.07)	-1.03▼	(0.09)	-1.21▼	(0.23)	-1.00▼	(0.13)	-0.89▼	(0.09)	-1.00▼	(0.13)
$\varepsilon^H_{8\|F}$	-0.97▼	(0.04)	-0.98▼	(0.05)	-0.98▼	(0.05)	-0.98▼	(0.05)	-0.81▼	(0.07)	-0.81▼	(0.07)	-0.77▼	(0.10)	-0.80▼	(0.08)
$\varepsilon^H_{9\|F}$	-0.86▼	(0.05)	-0.81▼	(0.08)	-0.82▼	(0.07)	-0.84▼	(0.07)	-0.79▼	(0.07)	-0.75▼	(0.09)	-0.71▼	(0.11)	-0.76▼	(0.09)
$\varepsilon^H_{10\|F}$	-0.76▼	(0.03)	-0.75▼	(0.04)	-0.70▼	(0.05)	-0.75▼	(0.04)	-0.68▼	(0.10)	-0.57▼	(0.16)	-0.35	(0.26)	-0.59▼	(0.14)
$\varepsilon^H_{11\|F}$	-0.92▼	(0.07)	-0.93▼	(0.04)	-0.92▼	(0.04)	-0.93▼	(0.05)	-0.94▼	(0.08)	-0.93▼	(0.07)	-0.94▼	(0.09)	-0.93▼	(0.08)
$\varepsilon^H_{12\|F}$	-0.95▼	(0.08)	-0.95▼	(0.09)	-0.95▼	(0.10)	-0.95▼	(0.09)	-0.77▼	(0.10)	-0.75▼	(0.13)	-0.83▼	(0.09)	-0.79▼	(0.10)

Item indices denote 1: Matooke, 2: Sweet potatoes, 3: Cassava, 4: Fruits & vegetables, 5: Other foods, 6: Maize, 7: Livestock products, 8: Fish, 9: Fats & oils, 10: Beans, 11: Sugar, and 12: Alcohol & tobacco, respectively. Superscript °, •, and ▼ indicate coefficients significantly different from zero at level 0.1, 0.05, and 0.01, respectively. Source: own computation.

References

Abdulai, A. and Aubert, D. (2004). A cross-section analysis of household demand for food and nutrients in Tanzania, *Agricultural Economics* **31**(1): 67–79.

Banks, J., Blundell, R. and Lewbel, A. (1997). Quadratic Engel curves and consumer demand, *The Review of Economics and Statistics* **79**(4): 527–539.

Benson, T., Mugarura, S. and Wanda, K. (2008). Impacts in Uganda of rising global food prices: The role of diversified staples and limited price transmission, *Agricultural Economics* **39**(s1): 513–524.

Blundell, R. and Robin, J. M. (1999). Estimation in large and disaggregated demand systems: An estimator for conditionally linear systems, *Journal of Applied Econometrics* **14**(3): 209–32.

Canty, A. and Ripley, B. D. (2010). *boot: Bootstrap R (S-Plus) Functions*. R package version 1.2-43.

Capéau, B. and Dercon, S. (2006). Prices, unit values and local measurement units in rural surveys: an econometric approach with an application to poverty measurement in Ethiopia, *Journal of African Economies* **15**(2): 181–211.

Carpentier, A. and Guyomard, H. (2001). Unconditional elasticities in two-stage demand systems: An approximate solution, *American Journal of Agricultural Economics* **83**(1): 222–29.

Cranfield, J. A. L., Eales, J. S., Hertel, T. W. and Preckel, P. V. (2003). Model selection when estimating and predicting consumer demands using international, cross section data, *Empirical Economics* **28**(2): 353–364.

Davison, A. C. and Hinkley, D. V. (1997). *Bootstrap Methods and their Applications*, Cambridge University Press, Cambridge, UK.

Deaton, A. (1997). *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*, John Hopkins University Press for the World Bank, Washington D.C., Baltimore and London.

Deaton, A. S. and Muellbauer, J. (1980). An almost ideal demand system, *American Economic Review* **70**(3): 312–26.

Decoster, A. and Vermeulen, F. (1998). Evaluation of the empirical performance of two-stage budgeting AIDS, QUAIDS and Rotterdam models based on weak separability, *Public Economics Working Paper Series ces9807*, Center for Economic Studies, Katholieke Universiteit Leuven.

Dong, D., Gould, B. W. and Kaiser, H. M. (2004). Food Demand in Mexico: An Application of the Amemiya-Tobin Approach to the Estimation of a Censored Food System, *American Journal of Agricultural Economics* **86**(4): 1094–1107.

Ecker, O. (2009). *Economics of Micronutrient Malnutrition: The Demand for Nutrients in Sub-Saharan Africa*, PhD thesis, University of Hohenheim.

Heien, D. and Wessells, C. R. (1990). Demand systems estimation with microdata: A censored regression approach, *Journal of Business & Economic Statistics* **8**(3): 365–71.

Henningsen, A. (2010). *micEconAids: Demand Analysis with the Almost Ideal Demand System (AIDS)*. R package version 0.6-4.

Henningsen, A. and Hamann, J. D. (2007). systemfit: A package for estimating systems of simultaneous equations in r, *Journal of Statistical Software* **23**(4): 1–40.

Murphy, K. M. and Topel, R. H. (1985). Estimation and inference in two-step econometric models, *Journal of Business & Economic Statistics* **3**(4): 370–79.

Nzuma, J. M. and Sarker, R. (2010). An error corrected almost ideal demand system for major cereals in kenya, *Agricultural Economics* **41**(1): 43–50.

Poi, B. P. (2008). Demand-system estimation: Update, *Stata Journal* **8**(4): 554–556.

Pollak, R. A. and Wales, T. J. (1981). Demographic variables in demand analysis, *Econometrica* **49**(6): 1533–1551.

R Development Core Team (2010). *R: A Language and Environment for Statistical Computing*, R Foundation for Statistical Computing, Vienna, Austria.

Sadoulet, E. and de Janvry, A. (1995). *Quantitative Development Policy Analysis*, The Johns Hopkins University Press, Baltimore, MD.

Shonkwiler, J. S. and Yen, S. T. (1999). Two-step estimation of a censored system of equations, *American Journal of Agricultural Economics* **81**(4): 972–982.

Tauchmann, H. (2005). Efficiency of two-step estimators for censored systems of equations: Shonkwiler and Yen reconsidered, *Applied Economics* **37**(4): 367–374.

Teklu, T. (1996). Food demand studies in sub-saharan africa: a survey of empirical evidence, *Food Policy* **21**(6): 479 – 496.

Uganda Bureau of Statistics (2006). *Uganda National Household Survey 2005/06 - Report on the Socio-Economic Module*, Uganda Bureau of Statistics, Entebbe, Uganda.

World Bank (2010). *Global Monitoring Report 2010: The MDGs after the Crisis*, The World Bank, Washington D.C.

Yen, S. T., Kan, K. and Su, S.-J. (2002). Household demand for fats and oils: Two-step estimation of a censored demand system, *Applied Economics* **34**(14): 1799–1806.

Institute for International Integration Studies
The Sutherland Centre, Trinity College Dublin, Dublin 2, Ireland