A Food Composition Table for Central and Eastern Uganda

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Acknowledgments

Abbreviations Used

AOAC Association of Official Analytical Chemists
DFE   Dietary Folate Equivalents
FAO   Food and Agriculture Organization
FCT   Food Composition Table
IU   International Units
RAE   Retinol Activity Equivalents
RE   Retinol Equivalents
USDA United States Department of Agriculture
WHO   World Health Organization

Table of Contents

I | Introduction

In the context of evaluating an intervention to introduce provitamin A-rich orange sweet potato in rural Ugandan communities, HarvestPlus and its collaborators conducted surveys of dietary intakes using an interactive, 24-hour recall method (Gibson and Ferguson 2008). After meeting with local partners, it was clear that a comprehensive, up-to-date food composition table (FCT) appropriate for Ugandan diets was not available. Regionally focused FCTs were also limited when this work commenced in 2006. Hence, HarvestPlus undertook to develop an FCT for use in Central and Eastern Uganda. Given the large effort required to compile an FCT and the growing interest in quantitative food and nutrient intake assessment to support food-based interventions in the region, HarvestPlus chose to make this resource available to others through this publication. We expect this may be useful for others conducting nutrition-related research or designing nutrition interventions in the region.

In addition to a documented FCT, we also present information and tables on two related datasets. The first is a table of gram-weight conversion factors to aid in the quantification of portion sizes of foods consumed from dietary data collected by recall. The second is a set of standard recipes for commonly consumed composite dishes in the region. Electronic versions of all tables in database format are available through HarvestPlus. They are formatted for use with CSDietary, a software program developed by Serpro, Inc. (Santiago, Chile) in collaboration with HarvestPlus that is used to process dietary intake data and calculate nutrient intakes.

II | Food Composition Table

This FCT represents a compilation of existing and imputed food composition data for foods commonly consumed in Central and Eastern Uganda. With the exception of orange sweet potato, it does not contain data from the primary analysis of food samples collected in the region. This method assumes some obvious limitations, some of which are discussed below. However, the FCT compiled in this manner serves as a practical resource.

The food items included in the FCT were derived from two dietary intake surveys conducted in 84 selected communities from 3 districts in the Central and Eastern regions of Uganda among women and children 6 months to 7 years of age. Thus, the foods represent 100 percent of the energy and nutrient intakes of the individuals surveyed and are broadly representative of the foods consumed in these regions. It is possible, however, that some seasonal food items were not available during the timeframe of data collection and are missing from the FCT.

The food composition data included here represent the edible portion of the food items as indicated. Weight of refuse (e.g., skin, pits, bones) were generally removed when calculating the gram-weight amount of the food consumed. With few exceptions, this FCT does not contain entries for composite dishes. The method of data collection and processing used facilitated the breakdown of composite dishes consumed into the amounts of ingredients consumed. This allows for the correct categorization of food items and nutrients into food groups, which is important when quantifying the specific sources of nutrients. Composite dishes combining foods from different food groups can be difficult to assign to a specific food group and result in inaccuracies. Complete recipe data are provided in a separate table (see section IV).

A list of the nutrients and reference variables used in the FCT and a brief description of them are given in Table 1. The nutrients selected for use in this FCT are those most often considered in addressing food and nutrient intake inadequacies and in food-based interventions to improve nutrient intake adequacy in

TABLE 1

Variables and Descriptions Used in the Food Composition Table

Variable Name	Variable Description
food_code	Food code (country specific)
food_description	Food description, general
food_state	Food state (raw and cooked states)
food_state_code	Food state code
fct_source	Source of original food composition data
fct_source_code	Food composition table original source code
fct_source_descr	Description of source of imputed food composition data
water_source_descr	Description of the source of water content data for adjusted food items
retention_source	Source of nutrient retention data applied
retention_source_code	Source code for nutrient retention data applied
retention_source_descr	Description of source of nutrient retention data
food_group	Food group name
food_group_code	Food group code
dry_matter_g	Dry matter content (grams)
water_g	Water content (grams)
energy_kcal	Energy (kilocalories)
protein_g	Protein (grams)
lipid_total_g	Total lipid/fat (grams)
carbohydrate_g	Carbohydrate (grams)
fiber_g	Fiber (grams)
calcium_mg	Calcium (milligrams)
iron_mg	Iron (milligrams)
zinc_mg	Zinc (milligrams)
vit_c_mg	Vitamin C (milligrams)
thiamin_mg	Thiamin (milligrams)
riboflavin_mg	Riboflavin (milligrams)
niacin_mg	Niacin (milligrams)
vit_b6_mg	Vitamin B6 (milligrams)
folate_total_mcg	Total folate (micrograms)
folic_acid_mcg	Folic acid, from fortificant (micrograms)
folate_food_mcg	Folate from natural food source (micrograms)
folate_dfe_mcg	Dietary Folate Equivalents (micrograms)
vit_b12_mcg	Vitamin B12 (micrograms)
vit_a_iu	Vitamin A International Units (IU)
vit_a_rae_mcg	Vitamin A Retinol Activity Equivalents (micrograms)
retinol_mcg	Retinol (micrograms)
alpha_carot_mcg	Alpha carotene (micrograms)
beta_carot_mcg	Beta carotene (micrograms)
beta_crypt_mcg	Beta cryptoxanthin (micrograms)

developing country regions (i.e., energy, macronutrients, selected vitamins and minerals). Additional nutrients emerging to be of concern in these regions (e.g., vitamin E, long-chain fatty acids and other lipid fractions) could be added in later editions.

Sources of Food Composition Data

Primary source

Although drawn from several sources of existing FCTs (Table 2), the primary source of food composition data for this table was the United States Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 21 (USDA 2008). The rational for this selection was:

• It is a source that is updated at regular intervals. Secondary FCTs built from this source can thus also be easily updated by matching to original food codes.

• There are relatively few missing data for its core set of nutrients.

• It is reliable in terms of quality. Food data admitted to this FCT are obtained using up-to-date analytical methods by the USDA or contracted partners.

• Nutrient data for both raw and one or more cooked forms of the same food are often available.

Some disadvantages are that the nutrient content of food items included in the USDA may differ from those grown in the geographical regions for which dietary intakes will be assessed, due to differences in varieties cultivated and growing conditions. In many cases, the magnitude of error cannot be known given the lack of sufficient, reliable food composition data for most areas. Some adjustments for this limitation can be made for key foods and nutrients in the FCT. In general, the benefits of reliability, completeness, and convenience of using the USDA National Nutrient Database as a primary source were considered to outweigh the limitations. Care was taken not to select fortified foods, as there are as yet few fortified foods available in rural Ugandan markets. Ugandan foods that were fortified were treated separately, as described below.

Secondary sources

When matching food items or when close substitutes could not be found in the primary source, secondary sources of food composition data were consulted. Secondary food composition data sources used and codes assigned to them for use in the FCT documentation table are given in Table 2.

TABLE 2
Sources of Food Composition Data Used and Assigned Codes

FCT Source, Reference[1]	FCT Source (abbreviated)[2]
USDA National Nutrient Database for Standard Reference, Release 21 (USDA 2008)	USDA-21
The Composition of South African Foods, 1st edition (Kruger et al. 1998)	SA
ASEAN Food Composition Tables, 1st edition (Puwastien et al. 2000)	ASEAN
The Philippine Food Composition Tables (Portugal et al. 1997)	Phil
WorldFood Dietary Assessment System, version 2.0 (Bunch and Murphy 1997) (Contains FCTs for Egypt, India, Indonesia, Kenya, Mexico, and Senegal)	WFDA
The Composition of Foods Commonly Eaten in East Africa (West et al. 1988)	West 88
USDA National Nutrient Database for Standard Reference, Release 19 (USDA 2006)	USDA-19

1 References for each source are provided in the References section. Additional sources of FCT data for completing missing nutrient values, moisture content levels, or nutrient retention factors for specific nutrients are also given in the References section.
2 The abbreviated name of the FCT source of data, as appears in the electronic FCT database (*fct_source*).

Tertiary sources

Tertiary sources of food composition data and imputations of data were required in particular cases. In the case of vitamin A-fortified fats and oils, information on the vitamin A content was derived directly from product labels. Nutrient information for fortified flour mixtures provided by a local food security program was derived from available product information.

Local food items for which nutrient composition data were not identified were imputed directly from foods of a similar description derived from the primary or secondary nutrient composition sources. In some cases, food items were identified in primary or secondary sources, but the source contained missing data for some nutrients. In these cases, missing nutrient data were imputed directly from foods of a similar description.

Examples of other types of imputations made to the nutrient composition of specific food items include:

• For obscure, green leafy vegetables, generic food composition data were calculated as the mean of several common green leafy vegetable types.

• The project for which dietary assessment was implemented was the large-scale introduction of orange sweet potato for improved vitamin A status. Sweet potato entries were adjusted to reflect the determined dry matter content and beta-carotene/vitamin A content of specific, local sweet potato varieties.

• Due to the generally high content of vitamin A in ripe forms of mango and papaya, adjustments to the vitamin A content for semi-ripe and unripe forms of mango and papaya were imputed.

Specific sources of tertiary FCT data for completing missing nutrient values or adjusting particular nutrient contents of foods are noted in the electronic FCT database (*fct_source_descr*) and are given in the References section. For food items that had all food composition data imputed from another source, the *fct_source* is coded as "HarvestPlus Uganda." If tertiary sources were only used to complete missing nutrients

from the primary FCT source, *fct_source* is coded for the primary source, and the tertiary source of specific nutrients is noted in the column *fct_source_description*.

Determination of cooked food values

For some foods, nutrient composition data was not available for all common, local cooking methods. It was not considered appropriate to use data from one database source for a raw food and derive data for a cooked form of the same food item from a different database source. In this case, it was necessary to impute cooked food nutrient values from the raw food based on changes in moisture content and nutrient losses due to cooking.

Cooking generally changes the water content of foods—sometimes substantially and sometimes very little. Dry cooking (e.g., baking, frying, roasting) or dehydration for preservation results in reduced water content and thus an increase in nutrient content per 100 grams cooked food. Wet cooking methods (e.g., boiling, steaming) generally have the opposite effect, but the magnitude of increase in water content can also depend on the water content and water holding capacity of the raw food item. Steaming can have an ambiguous effect, and limited water content data are available for steamed foods together with their comparable raw food item.

Nutrients are often lost from foods as a result of cooking. The magnitude of loss is affected by the food matrix, nutrient, cooking temperature, cooking duration, and use of excess cooking water. Losses are generally higher for vitamins than for most minerals.

When imputing the nutrient content of cooked food from a raw food item, adjustments for change in moisture content were imputed in one of two ways:

i) The water content was imputed using the relative difference (%) in water content for a similar food item for which both raw and appropriate cooked forms were available. This required identifying data for another starchy staple, root/tuber, green leafy vegetable, etc. The same relative (%) change in water content was then applied to the raw food item, resulting in a

proportional adjustment to energy and all nutrient contents.

ii) The water content was imputed directly from a similar food item prepared by the desired cooking method. This would only be used if the relative change in water content from the raw form could not be calculated.

Most water content data used for these imputations were derived from the USDA FCT. All sources of water content data used are noted in the electronic FCT (*water_source_descr*) and are listed in the References section.

Following any water content adjustment, factors for nutrient retention were then applied. The primary source of nutrient retention data by cooking source was the USDA Table of Nutrient Retention Factors, Release 6 (2007). These factors are generic in nature, applying to broad categories of foods (e.g., '"legumes") and a selection of common cooking methods. Retention factors, expressed as the percentage of nutrients retained after cooking, that best fit the description of the food item to be adjusted, as well as the cooking method, were selected and applied.

For orange and yellow sweet potato, the retention factors for provitamin A carotenoids were derived from published literature for Uganda-specific varieties, and the retention of vitamin A in fortified vegetable oil and fats was derived from unpublished research results for these products. Otherwise, all nutrient retention data were derived from the USDA source (2007). The specific sources of these retention factors are noted in the electronic FCT (*retention_source_code* and *retention_source_description*) and are given in the References section.

Development of "Hybrid" Food Items for Use as Ingredients in Recipes

As noted above, food intake data were calculated for all individual food items and for ingredients of composite cooked dishes. When recipe data were collected, the weight of the raw ingredients was recorded. However, if raw food items were selected from an FCT using the raw weight amount, nutrient losses from that ingredient due to cooking would not be accounted for. If a cooked version of the food item was selected, the raw weight of the ingredient and the cooked weight of the food would not correspond.

Although this issue can be dealt with in different ways, we chose to prepare FCT entries for a series of ingredients based on their weight as added before cooking but for which the nutrient contents were adjusted for losses by a particular cooking method. Most often these ingredients were in raw form, but they also included pre-cooked items added to dishes for a second phase of cooking. These "hybrid" food items or ingredients are included in the electronic version of the tables only. Because they mirror existing raw or precooked food items, they use the food code derived from the raw ingredient but prefaced by a "7" for ingredients in recipes prepared by frying and by an "8" for ingredients in recipes prepared by boiling to form a new 6-digit food code. To avoid confusion during data entry, the food name was also prefaced and ended with an asterisk (*), followed by the cooking method of the recipe (i.e., fried or boiled).

It is worth emphasizing that the system of using these food items adjusted for nutrient losses from cooking as ingredients is not a conventional approach for FCTs but was found to be convenient for our approach to calculating recipes. Other methods using standard entries for raw ingredients found in this FCT can be applied, such as those described by Charrondiere and Burlingame (2011) and Greenfield and Southgate (2003).

Food Name Descriptions

Food names were designed to be complete in their descriptions, providing sufficient information to fully identify the food relative to its nutrient composition. The following descriptions were considered and applied as relevant:

- Specific food item

- Specific part of food item (e.g., chicken wing, with skin)

- Fresh or dried state (e.g., pumpkin leaves, dried)

- Processing state (e.g., refined vs. whole grain, smoked)

- Color (as relevant for nutrient content or identification)

- Stage of maturity or ripeness

- Raw or cooked; if cooked, the cooking method used (e.g., boiled, steamed, roasted, fried)

In most cases, food items that used local names also had their common names given. In a few exceptions, the species could not be precisely identified, and food composition data from an item of similar description were selected or imputed, and only a local name is given.

Food Numbering

The FCT uses a food code system with four to six digits, whereby codes are arranged by food group and subgroup. This system allows flexibility for the addition of new foods to the FCT so that foods of the same group will be ordered together. The numeric ranges of food codes used for each food group are given in Table 3.

TABLE 3			
FOOD GROUP NAMES AND CODES			
Food Group Code	**Food Group Name**	**Food Group Description**	**Food Code (range)**
1	Biofortified crop[1]	--as assigned--	
2	Grains and grain products	Whole and refined grains and products, bakery products or pastries based on grain flour	1000-1999
3	Roots and tubers	Starchy roots and tubers	2000-5999
4	Beans, nuts, and seeds	Beans, lentils, peas, nuts, seeds	6000-8999
5	Milk and dairy	Milk, milk powder, sour milk, cheese, cream, yogurt	9000-9999
6	Meats, poultry, and insects	Red meat, white meat, poultry, game, rodents, processed meats, organ meats (kidney, liver, mixed offals, intestines), blood, animal skin/ears/feet/head, insects	11000-13999 16000-16999
7	Fish and seafoods	Whole fish, fish meat, eel, reptiles, shell fish	14000-15999
8	Eggs	Whole or separated eggs	17000-17999
9	Fruits and fresh/pure fruit juices	Fresh fruits, dried fruits, undiluted pure fruit juices, starchy fruits (banana/plantain)	30000-39999
10	Vegetables	Fresh vegetables, dried vegetables	18000-18999 29000-29999
11	Fats and oils	Vegetable oils, margarine, butter, ghee, animal fats including lard, shortening, drippings	25000-25999
12	Sugars and sweets	Sugar, honey, syrup, candies, sweets, chocolates, sweet cookies	26000-26999
13	Beverages	Tea, coffee, soda, powdered drink mixes, artificial, diluted or sweetened juices and infusions, non-dairy fermented beverages, beer and other alcoholic beverages	27000-27999
14	Miscellaneous	Condiments, spices, soup stocks/broths, baking powder/soda, ash	40000-49999

1 This food group designation was intended to facilitate isolation of food items that may be the target of a food-based intervention, such as biofortified foods (e.g., orange sweet potato). It may also be used for food items targeted for fortification or agricultural production.

General Notes for Nutrients and Other Food Composition Data

All FCT data are expressed per 100 grams of food in the state indicated by the food description. Food composition data are complete for all nutrients with the exception of fiber and values for water content of four food items for which appropriate data were not found. Zero values given in the FCT are thus true zeros and not missing values.

Energy proximates and nutrient content were calculated as described in USDA (2008), unless referenced data indicates otherwise. Briefly, protein was calculated from the amount of total nitrogen in food, total lipid by gravimetric methods, and carbohydrate by the difference of 100 – the sum of the percent of water, protein, total lipid, ash, and alcohol. Energy was calculated from proximates using the Atwater system of caloric factors. Nutrient contents were determined using Association of Official Analytical Chemists (AOAC) methods. Significant figures for nutrient values were given as per USDA (2008), with the exception of iron, which was rounded to one digit.

Dry matter

Dry matter was calculated as:
(100 – water content grams) ÷ 100 grams food.

Folate

Following the USDA methods, folate values are given as available for total folate, food folate, folic acid, and Dietary Folate Equivalents (DFE). These forms are distinguished because folic acid, the fortificant form of folate, has a higher biological equivalent than natural food folate by a factor of 1.7. DFE is a unit that takes these different biological values into account and is the final form used in the calculation of nutrient intakes; only this folate variable was ensured complete for all food entries. The definitions for the various sources of folate are summarized in Table 4.

Niacin

Niacin values are for preformed niacin only and do not include the contribution of tryptophan, which is a precursor to niacin (i.e., 60 mg of tryptophan = 1 mg of niacin). Dietary requirements are generally expressed as Niacin Equivalents required per day, which assume a contribution from tryptophan. It should thus be recognized that the adequacy of dietary niacin intakes calculated from this FCT may be underestimated.

Vitamin A

Several forms of vitamin A are included in the FCT. The Retinol Activity Equivalents (RAE) adopted by the U.S. Food and Nutrition Board/Institute of Medicine (2001) were used. These differ from Retinol Equivalents (RE),

TABLE 4	
FOLATE SOURCES AND THEIR DESCRIPTION AS USED IN THE FCT	
Folate Source	**Description**
Food folate	Natural, endogenous folate in food
Folic acid	Exogenous form of folate added as a fortificant
Total folate	Direct sum of food folate and folic acid
Dietary Folate Equivalents (DFE)	Calculated as: food folate + (folic acid x 1.7)

which are still used by the World Health Organization (WHO)/Food and Agriculture Organization (FAO) (2004), in that compared to RE, the RAE assume that twice as many µg of provitamin A are required to produce one µg of retinol in the body. The derivation of the RAE units, as applied to all food items regardless of source, is summarized in Table 5.

Although vitamin A International Units (IU) are no longer used to express dietary vitamin A intakes, and data are not complete in the FCT, these units are still occasionally the only form of vitamin A content available for some foods. The vitamin A IU column in this FCT is thus considered as a "working column" to be used only if necessary. If only IU data were available for vitamin A content, the following conversions to RAE were used:

For plant-source vitamin A derived from provitamin A carotenoids:

$$\text{Vitamin A RAE} = \text{Vitamin A IU} \div 20;$$

For animal source (retinol) or fortificant forms of vitamin A:

$$\text{Vitamin A RAE} = \text{Vitamin A IU} \div 3.33.$$

Food Groups

All food items were assigned to one appropriate food group. The food group names, descriptions, and codes used are summarized in Table 3.

Food State Codes

Although the state of each food item with regard to cooking method is indicated within the food name, a separate code to indicate cooking state was included. The food states and codes are given in Table 6.

TABLE 5	
Source of Vitamin A and Conversion to Retinol Activity Equivalents[1]	
Vitamin A Form	**Retinol Activity Equivalents (RAE)**
Retinol	µg retinol ÷ 1
Alpha-carotene	µg alpha-carotene ÷ 24
Beta-carotene	µg beta-carotene ÷ 12
Beta-cryptoxanthin	µg beta-cryptoxanthin ÷ 24

[1] Retinol Equivalents (RE) used by WHO/FAO (2004) use a factor of 6 for beta-carotene and 12 for alpha-carotene and beta-cryptoxanthin.

TABLE 6	
Food States and Codes	
Food State Description	**Food State Code**
Raw	1
Boiled	2
Steamed	3
Fried	4
Roasted	5

III | Gram-Weight Conversion Factors

In addition to the nutrient content of specific food items, dietary assessment using the 24-hour recall method also requires other detailed information on foods and recipes. For example, food intakes ultimately need to be presented on a gram-weight basis. However, the portion sizes of foods and composite dishes consumed and ingredient amounts used in home-prepared recipes are typically not described and recorded in gram weights during the 24-hour recall interview. Rather, food amounts are often recorded in units such as measured volumes, household measures (e.g., a cup, teaspoon), food item sizes (e.g., small, medium, large), or standard units for uniformly sized food items (e.g., eggs, bread slices). Each method requires a set of gram-weight conversion factors. Unfortunately, this type of information is scarcely available in published documents.

Some of the conversion factors presented in the database (see section V) are specific to the survey methods used to estimate portion sizes, but others are more general and many may be useful for future surveys in Uganda and the region. The variable names, variable descriptions, and variable codes used in the conversion factor file are summarized in Table 7. Every food item in the FCT has one or more conversion factor associated with it. In addition, every recipe has a volume-to-weight conversion factor, as the intake amount of composite dishes was estimated as a volume.

Conversion Methods

Several methods were used in the dietary survey to estimate portion sizes, the selection of which depended on the food type. Direct weight was used when common cooked foods were weighed directly on a scale (and hence have a conversion factor of "1") and recorded as grams. Volumes of liquids, semi-liquid foods, and composite dishes were demonstrated in a bowl or cup but measured in volumetric flasks and recorded in milliliters. For some foods of relatively uniform diameter but varying length, gram-weight conversions based on measured length were used (e.g., some fish). Standard volumetric measures for small amounts of liquids were used. These included a set of teaspoons and "kendos," which are small metal scoops used to sell vegetable oil in the market. Standard sizes were represented by life-size photos of small, medium, and large food items or a single (standard) unit for food items that vary little in size.

TABLE 7

Variable Names, Descriptions, and Codes Used for Gram-Weight Conversion Factors

Variable Name	Variable Description	Codes and Descriptions
conv_codetype	Conversion type code to indicate individual food items or recipes	1 – Conversion for individual food items 2 – Volume-to-weight conversion for recipes
conv_foodcode	Food code (as appears in FCT)	
conv_food_descr	Food description (as appears in FCT)	
conv_method conv_method_descr	Conversion method code Conversion method description	1 – Direct weight (grams) 2 – Volume (milliliters) 3 – Length (centimeters) 4 – Standard volume 5 – Standard size 7 – Model weight (play-dough)
conv_stdvol conv_stdvol_descr	Standard volume code Standard volume description	11 – Spoon 1 12 – Spoon 2 13 – Spoon 3 31 – Small kendo 32 – Medium kendo 33 – Large kendo
conv_size conv_size_descr	Standard size code Standard size description	1 – Small 2 – Medium 3 – Large 4 – Standard size
conv_factor	Mathematical conversion factor (all methods)	
conv_unit conv_unit_descr	Conversion unit code Conversion unit description	1 – Actual weight of food in grams (g) 2 – Grams of food per gram of play-dough (g/g) 3 – Grams of food per ml of food (g/ml) 4 – Grams of food for indicated measuring spoon size (g) 5 – Grams of food for the indicated size of food (g) 6 – Grams of food per unit length of food (g/cm)

TABLE 8

Variable Names, Descriptions, and Codes Used for Standard Recipes

Variable Name	Variable Description	Codes and Descriptions
recipe_code	Recipe code	
recipe_descr	Recipe description (includes names of all ingredients)	
recipe_type	Recipe type (indicates if recipe was derived directly from collected data or modified through imputations)	1 – Standard 2 – Standard modified 4 – Household average
recipe_type_descr	Recipe type description	
ingr_code	Ingredient code (as given in FCT for ingredients)	
ingr_descr	Ingredient description (as given in FCT for ingredients)	
ingr_fraction	Ingredient fraction (as a proportion of the cooked recipe weight)	
ingr_fraction_type ingr_fraction_type_descr	Ingredient fraction type Ingredient fraction type description	1 – Milliliter fraction 2 – Grams fraction

IV | Standard Recipes

Recipes for composite dishes tend to be locally specific. Collection of reliable household-level data by recall can be challenging and time consuming. As a way of simplifying data collection procedures without severely compromising the accuracy of information, standard recipe data for several common dishes were collected and applied. Standard recipes were compiled by organizing several community members to prepare specified dishes using usual proportions of ingredients. Ingredient weights and the final weight of the cooked recipe were recorded and averaged. Recipe data collection methods are described in further detail in Gibson and Ferguson (2008).

While recipes are defined by their major ingredients, they can vary in their content of minor ingredients. Also, recipes could have similar major ingredients, such as bean dishes where the recipe would not change whether red beans or yellow beans were used. We, therefore, modified standard recipes by removing minor ingredients, such as onions and tomatoes, and recalculating the ingredient proportions or substituting similar major ingredient types.

Finally, recipe data that were collected in households based on recall of ingredient amounts and final cooked volumes during the dietary survey were compiled and averaged for common recipes not collected as standard recipes. Standard recipes collected and modified are given in Appendix 1 and in database format (see section V) with the proportion of ingredients by weight. The water content of the final cooked recipe is not given but can be calculated as: 1 – sum of proportion of ingredients by weight. Variable names, descriptions, and codes used are summarized in Table 8. Household average recipes are maintained in the electronic file.

V | Electronic Files

Electronic files containing the FCT and related data in Excel format are available through the HarvestPlus website. These are:

- HarvestPlus Uganda FCT.xls

- HarvestPlus Uganda Recipes.xls

- HarvestPlus Uganda Conversions.xls

Additional files that are formatted specifically for use with the CSDietary program are available by request (harvestplus@cgiar.org).

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Appendix 1: Recipes

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
90300	**MATOOKE, MASHED, BOILED**		Standard Modified
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	1.000	
90301	**MATOOKE, MASHED, STEAMED**		Standard Modified
805003	* BANANA,MATOOKE,GREEN,FRESH,RAW *STEAMED*	1.000	
90400	**ATAP, CASSAVA FLOUR**		Standard
802020	* CASSAVA FLOUR,RAW *BOILED*	0.448	
90401	**ATAP, CASSAVA & MILLET FLOUR**		Standard
802020	* CASSAVA FLOUR,RAW *BOILED*	0.340	
801104	* MILLET FLOUR,RAW *BOILED*	0.077	
90402	**ATAP, CASSAVA & SORGHUM FLOUR**		Standard
802020	* CASSAVA FLOUR,RAW *BOILED*	0.340	
801106	* SORGHUM FLOUR,RAW *BOILED*	0.077	
90403	**ATAP, CASSAVA, MILLET & SORGHUM FLOUR**		Standard
802020	* CASSAVA FLOUR,RAW *BOILED*	0.340	
801104	* MILLET FLOUR,RAW *BOILED*	0.040	
801106	* SORGHUM FLOUR,RAW *BOILED*	0.040	
90500	**POSHO (MAIZE ATAP), WHITE, REFINED FLOUR**		Standard
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.340	
90501	**POSHO (MAIZE ATAP), WHITE, UNREFINED FLOUR**		Standard
801042	* MAIZE FLOUR,WHITE VARIETY,UNREFINED,RAW *BOILED*	0.329	
90502	**POSHO (MAIZE ATAP), YELLOW, REFINED FLOUR**		Standard
801043	* MAIZE FLOUR,YELLOW VARIETY,REFINED,RAW *BOILED*	0.340	
90503	**POSHO (MAIZE ATAP), YELLOW, UNREFINED FLOUR**		Standard
801044	* MAIZE FLOUR,YELLOW VARIETY,UNREFINED,RAW *BOILED*	0.329	
90504	**POSHO (MAIZE ATAP), MAIZE-SOY FLOUR - TASO**		Standard
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.340	
90601	**RICE, WHITE (POLISHED), W/WO TOMOTOES &/OR ONIONS**		Standard
801201	* RICE,WHITE,POLISHED,RAW *BOILED*	0.310	
90602	**RICE, WHITE (POLISHED), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL**		Standard Modified
801201	* RICE,WHITE,POLISHED,RAW *BOILED*	0.313	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.015	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
90611	**RICE, BROWN (UNPOLISHED), W/WO TOMATOES &/OR ONIONS**		**Standard Modified**
801204	* RICE,BROWN,UNPOLISHED,RAW *BOILED*	0.310	
90611	**RICE, BROWN (UNPOLISHED), W/WO TOMATOES &/OR ONIONS**		**Standard Modified**
801204	* RICE,BROWN,UNPOLISHED,RAW *BOILED*	0.310	
90612	**RICE, BROWN (UNPOLISHED), W/WO TOMOTOES &/OR ONIONS, VEGETABLE OIL**		**Standard Modified**
801204	* RICE,BROWN,UNPOLISHED,RAW *BOILED*	0.313	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.015	
91000	**RAW TOMATO SOUP W/WO ONIONS**		**Standard**
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	1.000	
91001	**BOILED TOMATO SOUP, W/WO ONIONS**		**Standard**
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.810	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.096	
91002	**BOILED TOMATO SOUP,W/WO ONION, VEGETABLE OIL**		**Standard**
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.780	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.135	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.085	
91011	**SOUP/STOCK, BEEF/GOAT/PORK,W/WO TOMATOES &/OR ONIONS,VEGETABLE OIL**		**Standard Modified**
41010	SOUP,STOCK,BEEF,HOME-PREPARED	0.907	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.093	
92001	**CHICKEN SOUP/STOCK, W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL**		**Standard**
42000	SOUP,STOCK,CHICK,HOME-PREPARED	0.871	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.129	
93001	**FISH (ALL TYPES) SOUP/STOCK, W/WO TOMATOES &/OR ONIONS,VEGETABLE OIL**		**Standard**
43000	SOUP,STOCK,FISH,HOME-PREPARED	0.942	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.058	
93002	**FISH (ALL TYPES) SOUP/STOCK, W/WO TOMATOES &/OR ONIONS,GROUNDNUTS (POWDER/PASTE)**		**Standard Modified**
43000	SOUP,STOCK,FISH,HOME-PREPARED	0.797	
808007	* GROUNDNUTS,POWDER,RAW *BOILED*	0.179	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.024	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.000	
93003	**FISH (ALL TYPES) SOUP/STOCK, W/WO TOMATOES &/OR ONIONS,SOUR MILK**		**Standard Modified**

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
809205	* SOURMILK,FRESH,RAW *BOILED*	0.277	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.048	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.014	
814027	* FISH,NILE PERCH (TYPE 3),SMOKED/DRIED,BOILED *BOILED*	0.011	
814006	* FISH,TILAPIA (TYPE 2),SMOKED/DRIED,RAW *BOILED*	0.007	
814046	* FISH,LUNGFISH (TYPE 4),SMOKED/DRIED,RAW *BOILED*	0.003	
94000	BEAN SAUCE (K20/PINTO, DRIED), W/WO TOMATOES &/OR ONIONS		Standard
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.450	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.100	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.091	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.011	
94001	BEAN SAUCE (K20/PINTO, DRIED),W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.289	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.066	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.025	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.013	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.002	
725015	* VEGETABLE OIL,SOYBEAN SEED,RAW *COOKED*	0.001	
94080	BEAN SAUCE (CRANBERRY/KANYEBWA, FRESH), W/WO TOMATOES &/OR ONIONS		Standard
806101	* BEANS,CRANBERRY(KANYEBWA),FRESH,RAW *BOILED*	0.532	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.092	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.022	
94081	BEAN SAUCE (CRANBERRY/KANYEBWA, FRESH), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806101	* BEANS,CRANBERRY(KANYEBWA),FRESH,RAW *BOILED*	0.517	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.089	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.028	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.021	
94100	BEAN SAUCE (GREEN GRAM/MUNG, DRIED) W/WO TOMATOES &/OR ONIONS		Standard
806089	* BEANS,MUNG,DRIED,RAW *BOILED*	0.290	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.040	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.010	
94101	BEAN SAUCE (GREEN GRAM/MUNG, DRIED) W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard Modified
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.150	
806089	* BEANS,MUNG,DRIED,RAW *BOILED*	0.133	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.043	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.027	
725008	* VEGETABLE OIL,TASO(PALMLOLEIN),RAW *COOKED*	0.016	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.005	
94103	BEAN SAUCE (BLACK BEANS, DRIED), W/WO TOMATOES &/OR ONIONS		Standard
806030	* BEANS,BLACK,DRIED,BOILED *BOILED*	0.450	
806029	* BEANS,BLACK,DRIED,RAW *BOILED*	0.100	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.091	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.011	
94104	BEAN SAUCE (BLACK BEANS, DRIED), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806029	* BEANS,BLACK,DRIED,RAW *BOILED*	0.289	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.066	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.025	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.013	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.002	
725015	* VEGETABLE OIL,SOYBEAN SEED,RAW *COOKED*	0.001	
94106	BEAN SAUCE (WHITE/NAVY BEANS, DRIED), W/WO TOMATOES &/OR ONIONS		Standard
806070	* BEANS,WHITE(NAVY),DRIED,BOILED *BOILED*	0.450	
806069	* BEAN,WHITE(NAVY),DRIED,RAW *BOILED*	0.100	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.091	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.011	
94107	BEAN SAUCE (WHITE/NAVY, DRIED), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806069	* BEANS,WHITE(NAVY),DRIED,RAW *BOILED*	0.289	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.066	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.025	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.013	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.002	
725015	* VEGETABLE OIL,SOYBEAN SEED,RAW *COOKED*	0.001	
94109	BEAN SAUCE (CRANBERRY/KANYEBWA, DRIED), W/WO TOMATOES &/OR ONIONS		Standard
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.450	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.100	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.091	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.011	
94110	BEAN SAUCE (CRANBERRY/KANYEBWA, DRIED), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.289	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.066	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.025	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.013	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.002	
725015	* VEGETABLE OIL,SOYBEAN SEED,RAW *COOKED*	0.001	
94115	BEAN SAUCE (OTHER KIDNEY BEAN TYPES, DRIED), W/WO TOMATOES &/OR ONIONS		Standard
806130	* BEANS,KIDNEY(OTHER),DRIED,BOILED *BOILED*	0.450	
806129	* BEANS,KIDNEY(OTHER),DRIED,RAW *BOILED*	0.100	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.091	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.011	
94116	BEAN SAUCE (OTHER KIDNEY BEAN TYPES, DRIED), W/WO TOMATOES &/OR ONIONS, VEGETABLE OIL		Standard
806129	* BEANS,KIDNEY(OTHER),DRIED,RAW *BOILED*	0.292	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.060	
829001	* CABBAGE,GREEN,FRESH,RAW *BOILED*	0.023	
25011	VEGETABLE OIL,SUNFLOWER SEED,RAW	0.020	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.014	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.006	
725015	* VEGETABLE OIL,SOYBEAN SEED,RAW *COOKED*	0.001	
25053	ANIMAL FAT,LARD,RAW	0.001	
94302	COWPEA SEED SAUCE (EMAGIRA), W/WO TOMATOES &/OR ONIONS		Standard
806215	* COWPEAS,DRIED,RAW *BOILED*	0.446	
94400	SOY BEAN SAUCE, W/WO TOMATOES &/OR ONIONS		Standard Modified
807030	* SOYBEAN FLOUR,RAW *BOILED*	0.153	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.139	
94600	GROUNDNUT SAUCE, W/WO TOMATOES &/OR ONIONS		Standard
808007	* GROUNDNUTS,POWDER,RAW *BOILED*	0.200	
808010	* GROUNDNUTS,PASTE,RAW *BOILED*	0.050	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.050	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.010	
94700	SESAME SEED SAUCE, W/WO TOMATOES &/OR ONIONS		Standard
808053	* SESAME SEED,PASTE,RAW *BOILED*	0.350	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.190	
95200	PORRIDGE, MILLET FLOUR		Standard
801104	* MILLET FLOUR,RAW *BOILED*	0.141	
830092	* LEMON,FRESH,RAW *BOILED*	0.035	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
830022	* MANGO,GREEN,WO/SKIN,FRESH,RAW *BOILED*	0.019	
830102	* TAMARIND,FRESH,RAW *BOILED*	0.003	
95202	**PORRIDGE, MILLET FLOUR, W/COW MILK**		**Standard**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.124	
801104	* MILLET FLOUR,RAW *BOILED*	0.074	
95300	**PORRIDGE, MAIZE FLOUR, WHITE, REFINED**		**Standard Modified**
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.122	
95301	**PORRIDGE, MAIZE FLOUR, WHITE, UNREFINED**		**Standard**
801042	* MAIZE FLOUR,WHITE VARIETY,UNREFINED,RAW *BOILED*	0.110	
95305	**PORRIDGE, MAIZE FLOUR, WHITE, UNREFINED, W/COW MILK**		**Standard**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.139	
801042	* MAIZE FLOUR,WHITE VARIETY,UNREFINED,RAW *BOILED*	0.110	
95312	**PORRIDGE, MAIZE FLOUR, YELLOW, REFINED**		**Standard Modified**
801043	* MAIZE FLOUR,YELLOW VARIETY,REFINED,RAW *BOILED*	0.122	
95313	**PORRIDGE, MAIZE FLOUR, YELLOW, UNREFINED**		**Standard**
801044	* MAIZE FLOUR,YELLOW VARIETY,UNREFINED,RAW *BOILED*	0.110	
95314	**PORRIDGE, MAIZE FLOUR, YELLOW, REFINED, W/SUGAR**		**Standard Modified**
801043	* MAIZE FLOUR,YELLOW VARIETY,REFINED,RAW *BOILED*	0.113	
26002	SUGAR,CANE,ALL GRADE,RAW	0.060	
95315	**PORRIDGE, MAIZE FLOUR, YELLOW, UNREFINED, W/SUGAR**		**Standard Modified**
801044	* MAIZE FLOUR,YELLOW VARIETY,UNREFINED,RAW *BOILED*	0.093	
26002	SUGAR,CANE,ALL GRADE,RAW	0.047	
95316	**PORRIDGE, MAIZE FLOUR, YELLOW, REFINED, W/COW MILK**		**Standard Modified**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.093	
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.052	
801043	* MAIZE FLOUR,YELLOW VARIETY,REFINED,RAW *BOILED*	0.040	
26002	SUGAR,CANE,ALL GRADE,RAW	0.039	
95317	**PORRIDGE, MAIZE FLOUR, YELLOW, UNREFINED, W/COW MILK**		**Standard Modified**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.139	
801044	* MAIZE FLOUR,YELLOW VARIETY,UNREFINED,RAW *BOILED*	0.110	
95380	**PORRIDGE, MAIZE-SOY FLOUR (TASO)**		**Standard Modified**
801045	* CORN-SOY BLEND,(USAID/TASO),RAW *BOILED*	0.120	
95381	**PORRIDGE, MAIZE-SOY FLOUR (TASO), W/SUGAR**		**Standard Modified**

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
801045	*** CORN-SOY BLEND,(USAID/TASO),RAW *BOILED***	**0.120**	
26002	SUGAR,CANE,ALL GRADE,RAW	0.060	
95382	**PORRIDGE, MAIZE-SOY FLOUR (TASO), W/COW MILK**		**Standard Modified**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.139	
801045	* CORN-SOY BLEND,(USAID/TASO),RAW *BOILED*	0.110	
95390	**PORRIDGE, MAIZE-SOY FLOUR**		**Standard**
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.060	
807030	* SOYBEAN FLOUR,RAW *BOILED*	0.060	
95400	**TEA, BLACK, BREWED, W/SUGAR**		**Standard**
26002	SUGAR,CANE,ALL GRADE,RAW	0.091	
95401	**TEA, COW MILK ADDED**		**Standard**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.586	
95403	**TEA, W/COW MILK & SUGAR**		**Standard**
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.686	
26002	SUGAR,CANE,ALL GRADE,RAW	0.050	
95701	**PORRIDGE, SOY FLOUR**		**Standard**
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.060	
807030	* SOYBEAN FLOUR,RAW *BOILED*	0.060	
95703	**PORRIDGE, SOY FLOUR, W/COW MILK**		**Standard**
801041	* MAIZE FLOUR,WHITE VARIETY,REFINED,RAW *BOILED*	0.060	
807030	* SOYBEAN FLOUR,RAW *BOILED*	0.060	
809001	* MILK,COW,WHOLE,FRESH,RAW *BOILED*	0.054	
96000	**GREEN LEAF SAUCE, COWPEA LEAVES,FRESH, W/WO TOMATOES &/OR ONIONS**		**Standard**
818071	* COWPEA LEAVES,FRESH,RAW *BOILED*	0.334	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.240	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.010	
96002	**GREEN LEAF SAUCE,COWPEA LEAVES,FRESH, W/WO TOMATOES &/OR ONIONS, G.NUTS (POWDER/PASTE)**		**Standard**
808010	* GROUNDNUTS,PASTE,RAW *BOILED*	0.236	
818071	* COWPEA LEAVES,FRESH,RAW *BOILED*	0.178	
96050	**GREEN LEAF SAUCE, AMARANTH LEAVES, W/WO TOMATOES &/OR ONIONS**		**Standard Modified**
818033	* AMARANTH LEAVES,FRESH,FRIED *BOILED*	0.394	
818032	* AMARANTH LEAVES,FRESH,BOILED *BOILED*	0.197	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.084	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
818031	* AMARANTH LEAVES,FRESH,RAW *BOILED*	0.032	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.014	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.012	
96130	GREEN LEAF SAUCE,BEAN LEAVES, W/WO TOMATOES &/OR ONIONS		Standard
818071	* COWPEA LEAVES,FRESH,RAW *BOILED*	0.334	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.240	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.010	
96150	GREEN LEAF SAUCE, SPIDER PLANT LEAVES, FRESH,W/WO TOMATOES &/OR ONIONS		Standard Modified
818061	* SPIDER PLANT LEAVES,FRESH,RAW *BOILED*	0.300	
818091	* COCOYAM LEAVES,FRESH,RAW *BOILED*	0.150	
829052	* ONION,LARGE BULB,FRESH,RAW *BOILED*	0.002	
96200	GREEN LEAF SAUCE,OKRA LEAVES,FRESH, W/WO TOMATOES &/OR ONIONS		Standard
818081	* OKRA LEAVES,FRESH,RAW *BOILED*	0.990	
96350	GREEN LEAF SAUCE,NAKATI LEAVES,FRESH, W/WO TOMATOES &/OR ONIONS		Standard Modified
818014	* SCARLET EGGPLANT (NAKATI) LEAVES,FRESH,FRIED *BOILED*	0.596	
818011	* SCARLET EGGPLANT (NAKATI) LEAVES,FRESH,RAW *BOILED*	0.173	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.171	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.060	
96400	GREEN LEAF SAUCE, PUMPKIN LEAVES, FRESH, W/WO TOMATOES &/OR ONIONS		Standard Modified
818052	* PUMPKIN LEAVES,FRESH,BOILED *BOILED*	0.468	
818058	* PUMPKIN LEAVES,FRESH,FRIED *BOILED*	0.258	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.058	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.004	
97171	MUGOYO, SWEET POTATO (WHITE), FRESH ROOT		Standard Modified
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	1.000	
97172	MUGOYO, SWEET POTATO (YELLOW), FRESH ROOT		Standard Modified
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	1.000	
97173	MUGOYO, SWEET POTATO (ORANGE), FRESH ROOT		Standard Modified
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	1.000	
97180	MUGOYO, SWEET POTATO (WHITE & YELLOW), FRESH ROOT		Standard
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.500	
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.500	
97182	MUGOYO, SWEET POTATO (YELLOW & ORANGE), FRESH ROOT		Standard Modified

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.500	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.500	
97184	**MUGOYO, SWEET POTATO (WHITE,YELLOW & ORANGE), FRESH ROOT**		**Standard Modified**
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.333	
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.333	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.333	
97186	**MUGOYO, SWEET POTATO (WHITE & ORANGE), FRESH ROOT**		**Standard Modified**
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.500	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.500	
97200	**MUGOYO, SWEET POTATO (WHITE), FRESH ROOT, W/BEANS, DRIED**		**Standard**
803008	* SWEETPOTATO,WHITE,W/SKIN,FRESH,RAW *BOILED*	0.450	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.130	
97202	**MUGOYO, SWEET POTATO (YELLOW), FRESH ROOT, W/BEANS, DRIED**		**Standard**
804008	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,RAW *BOILED*	0.450	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.130	
97204	**MUGOYO, SWEET POTATO, (ORANGE), FRESH, W/BEANS, DRIED**		**Standard Modified**
804103	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,RAW *BOILED*	0.450	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.130	
97206	**MUGOYO, SWEET POTATO (WHITE & YELLOW), FRESH ROOT, W/BEANS, DRIED**		**Standard**
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
803008	* SWEETPOTATO,WHITE,W/SKIN,FRESH,RAW *BOILED*	0.225	
804008	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,RAW *BOILED*	0.225	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.065	
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.065	
97208	**MUGOYO, SWEET POTATO, (YELLOW & ORANGE), FRESH, W/BEANS, DRIED**		**Standard Modified**
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
804008	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,RAW *BOILED*	0.225	
804103	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,RAW *BOILED*	0.225	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.065	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.065	
97210	**MUGOYO, SWEET POTATO, (WHITE,YELLOW & ORANGE), FRESH, W/BEANS, DRIED**		**Standard Modified**
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
803008	* SWEETPOTATO,WHITE,W/SKIN,FRESH,RAW *BOILED*	0.150	
804008	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,RAW *BOILED*	0.150	
804103	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,RAW *BOILED*	0.150	
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.043	
804006	* SWEETPOTATO,YELLOW,W/SKIN,FRESH,BOILED *BOILED*	0.043	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.043	
97212	**MUGOYO, SWEET POTATO, (WHITE & ORANGE), FRESH, W/BEANS, DRIED**		**Standard Modified**
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.230	
803008	* SWEETPOTATO,WHITE,W/SKIN,FRESH,RAW *BOILED*	0.225	
804103	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,RAW *BOILED*	0.225	
806110	* BEANS,CRANBERRY(KANYEBWA),DRIED,BOILED *BOILED*	0.180	
803006	* SWEETPOTATO,WHITE,W/SKIN,FRESH,BOILED *BOILED*	0.065	
804106	* SWEETPOTATO,ORANGE,W/SKIN,FRESH,BOILED *BOILED*	0.065	
97398	**KATOGO, MATOOKE, W/WO TOMATOES AND/OR ONIONS**		**Standard**
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.730	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.134	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.020	
97399	**KATOGO, MATOOKE, W/WO TOMATOES AND/OR ONIONS, VEGETABLE OIL**		**Standard**
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.709	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.130	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.029	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.020	
97400	**KATOGO, MATOOKE, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS**		**Standard**
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.473	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.120	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.070	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.060	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.030	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
97401	**KATOGO, MATOOKE, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS, VEGETABLE OIL**		**Standard**
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.464	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.121	

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806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.065	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.060	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.028	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.020	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.013	
97402	KATOGO, MATOOKE, G.NUT, PASTE/POWDER, W/WO TOMATOES AND/OR ONIONS		Standard
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.651	
808007	* GROUNDNUTS,POWDER,RAW *BOILED*	0.083	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.050	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
97403	KATOGO, MATOOKE, G.NUT, PASTE/POWDER, W/WO TOMATOES AND/OR ONIONS, VEGETABLE OIL		Standard
805001	* BANANA,MATOOKE,GREEN,FRESH,RAW *BOILED*	0.651	
808007	* GROUNDNUTS,POWDER,RAW *BOILED*	0.083	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.050	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
97450	KATOGO, YAM, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS		Standard
802241	* YAM,(NDAGGU,BALUGGU,OTHERS),FRESH,RAW *BOILED*	0.473	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.120	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.070	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.060	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.030	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
97451	KATOGO, YAM, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS, VEGETABLE OIL		Standard
802241	* YAM,(NDAGGU,BALUGGU,OTHERS),FRESH,RAW *BOILED*	0.464	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.121	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.065	
806010	* BEANS,PINTO(K20/NAMBALE),DRIED,BOILED *BOILED*	0.060	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.028	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.020	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.013	
97498	KATOGO, CASSAVA, W/WO TOMATOES AND/OR ONIONS		Standard Modified
802001	* CASSAVA,FRESH,RAW *BOILED*	0.295	
802002	* CASSAVA,FRESH,BOILED *BOILED*	0.209	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.088	
829051	* ONION,SMALL BULB,FRESH,RAW *BOILED*	0.007	
97500	KATOGO, CASSAVA, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS		Standard

Recipe/ Ingredient Code	Recipe / Ingredient Name	Ingredient Proportion	Recipe Type
802001	* CASSAVA,FRESH,RAW *BOILED*	0.444	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.110	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.100	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.010	
97501	KATOGO, CASSAVA, BEANS, DRIED, W/WO TOMATOES AND/OR ONIONS, VEGETABLE OIL		Standard
802001	* CASSAVA,FRESH,RAW *BOILED*	0.436	
806009	* BEANS,PINTO(K20/NAMBALE),DRIED,RAW *BOILED*	0.110	
806109	* BEANS,CRANBERRY(KANYEBWA),DRIED,RAW *BOILED*	0.095	
725004	* VEGETABLE OIL,MUKWANO,FORTIFIED,RAW *COOKED*	0.016	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.014	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.010	
97502	KATOGO, CASSAVA, G.NUT, PASTE/POWDER, W/WO TOMATOES AND/OR ONIONS		Standard
802001	* CASSAVA,FRESH,RAW *BOILED*	0.660	
808007	* GROUNDNUTS,POWDER,RAW *BOILED*	0.060	
729052	* ONION,LARGE BULB,FRESH,RAW *FRIED*	0.000	
729063	* TOMATO,RIPE,FRESH,RAW *FRIED*	0.000	
99004	CABBAGE, GREEN LEAVES, W/WO TOMATOES &/OR ONIONS		Standard Modified
829001	* CABBAGE,GREEN,FRESH,RAW *BOILED*	0.570	
99100	ENTULA SAUCE, W/WO TOMATOES &/OR ONIONS		Standard Modified
829091	* ENTULA (SOLANUM GILO),FRESH,RAW *BOILED*	0.325	
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.046	
99201	MUSHROOM SAUCE, W/WO TOMATOES, W/WO ONION, VEGETABLE OIL		Standard
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.182	
829205	* MUSHROOMS,DRIED, RAW, *BOILED	0.132	
829052	* ONION, LARGE BULB, FRESH, RAW *BOILED*	0.050	
725001	* VEGETABLE OIL,UNSPECIFIED BRAND,RAW *COOKED*	0.016	
99202	MUSHROOM SAUCE, W/WO TOMATOES, W/WO ONION		Standard
829063	* TOMATO,RIPE,FRESH,RAW *BOILED*	0.185	
829205	* MUSHROOMS,DRIED, RAW, *BOILED	0.134	
829052	* ONION, LARGE BULB, FRESH, RAW *BOILED*	0.051	