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# Measuring Access to Food in Tanzania: A Food Basket Approach

Nancy Cochrane and Anna D'Souza





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# Measuring Access to Food in Tanzania: A Food Basket Approach

Nancy Cochrane and Anna D'Souza

## Abstract

Household access to food over time in Tanzania is measured by comparing the cost of representative food baskets to household income. Consumption patterns, estimated using household data from the 2010/11 National Panel Survey conducted by Tanzania's National Bureau of Statistics (NBS), show considerable diversity across the country. Maize (corn) dominates the diets in the surplus-maize-producing regions. Households in the maize-deficit regions in the north favor other sources of starch such as cassava and banana. The food baskets include 15 food groups that make up approximately 67 to 88 percent of average calorie intake. From 2008/09 to 2010/11, food basket costs rose rapidly in nominal terms but were stable in real terms. Combining food basket cost data and income data suggests that households in the bottom two income quintiles have significant difficulties with access to food.

**Keywords:** household access to food, Tanzania, maize, cassava, National Panel Survey, food consumption, food security, dietary diversity.

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## What Is the Issue?

Tanzania, a country rich in agricultural resources and a net exporter of its primary staple, maize, is subject to chronic food insecurity and suffers from periodic droughts that reduce harvests. Policies to address food insecurity have been hindered by lack of accurate estimates of production and existing food needs. This study uses data from the 2010/11 Tanzanian National Panel Survey (TZNPS) to construct a set of representative food baskets for mainland Tanzania, Dar es Salaam, and two geographical zones. Using current retail food prices, ERS calculated the monthly cost of the food baskets over a 3-year period (January 2010 to February 2013). Tanzania is one of 19 focus countries under the U.S. Government's Feed the Future initiative and is a recipient of U.S. foreign assistance. Comparing monthly food-basket costs with per capita income provides a more precise identification of the segments of the Tanzanian population who most need food aid than is possible using existing methods.

## What Did the Study Find?

Using data from TZNPS, the authors estimated calorie and expenditure shares for 15 foods and food groups for 7 geographic zones of mainland Tanzania plus the business capital Dar es Salaam. The authors used the calorie shares to construct representative food baskets for Dar es Salaam plus two of the zones: the surplus-maize-producing Southern Highlands and the maize-deficit Lake Zone in the northwest surrounding Lake Victoria. The two zones were chosen to illustrate the wide divergence in diets across the regions of Tanzania. In particular:

- Diets vary considerably among Tanzania's geographical regions. Maize dominates the diets in the surplus-maize-producing regions of the Southern Highlands. In contrast, while maize is still an important component of household diets in the maize-deficit regions in the north, it makes up a smaller share of calories. Households in these regions favor other sources of starch such as cassava and banana.

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- The food basket cost is lowest in the Southern Highlands because of the ready availability of low-priced maize. The cost is highest in Dar es Salaam, the business capital and largest city, and the cost is also high in the Lake Zone.
- From January 2010 to February 2013, food basket costs rose rapidly in nominal terms but rose more moderately in real terms.
- Households in the bottom two income quintiles face potential problems with access to food. The cost of a minimal food basket is close to 100 percent of the average income of the bottom quintile; the figure is 80-90 percent for the second quintile. Households in the Lake Zone potentially face greater difficulties than those in the Southern Highlands because of higher food costs and lower average income.
- Fewer households in Dar es Salaam face difficulties with food access. Average income in Dar es Salaam is nearly twice that of the Southern Highlands and Lake Zone, but the food basket cost, while high, is not twice the cost of that in these two zones. Further TZNPS data suggest that a greater share of households in Dar es Salaam belong to the country's upper income quintiles.

## How Was the Study Conducted?

The TZNPS on households provides estimates of the calorie shares of specific food items in household consumption. Using those data, ERS created monthly representative food baskets for each of 7 geographic zones that provided a daily per capita average of 2,137 calories (the average daily per capita intake reported in the Tanzanian Food Balance Sheet produced by the United Nations Food and Agriculture Organization). The study presents food baskets for mainland Tanzania, Dar es Salaam, and two geographical zones—one in the southern grain-growing area, the other in a grain-deficit zone bordering on Lake Victoria. The baskets included 15 food groups, which accounted for 67 to 88 percent of daily calorie intake. The food groups included maize (corn), rice, beans, cooking bananas, millet and sorghum, potatoes, sweet potatoes, wheat and other grains, cassava, poultry, beef and goat, fish, cooking oil, ripe bananas, and mangoes and other fruit. ERS used retail prices reported by Tanzania's National Bureau of Statistics to calculate the monthly cost of the food baskets. Comparing the monthly food basket cost with an estimate of monthly per capita income by quintile provided a measure of household access to food.

# Measuring Access to Food in Tanzania: A Food Basket Approach

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## Introduction

Tanzania is located in East Africa, just below the equator, and covers an area of 947,340 square miles. It has a population of approximately 48 million people, with about 70 percent living in rural areas. Tanzania is among the world's poorest countries; according to the World Bank, per capita gross domestic product (GDP) in purchasing power parity (PPP) was \$1,700 in 2012 (World Bank, 2012), and malnutrition is high.<sup>1</sup>

Agriculture accounts for 27 percent of gross domestic product (GDP) and employs 80 percent of the labor force. Major food crops include maize, sorghum, millet (bulrush and finger), rice, wheat, beans and other pulses, cassava, potatoes, sweet potatoes, and cooking bananas (unripe bananas consumed as a source of starch). A wide variety of vegetables and tropical fruits are grown as well. Major cash crops—key sources of export earnings—include coffee, tea, sisal, cashew nuts, cloves, and other spices. Tanzania is a surplus producer of maize (in most years), net importer of rice, and largely self-sufficient producer of other food crops. Most of the rural population comprises small-scale farmers, cultivating less than one hectare of land.

Although Tanzania is rich in agricultural resources and a net exporter of maize, the country suffers from periodic droughts that reduce harvests and is subject to chronic food insecurity. Much of the population is engaged in small-scale agriculture, which generates both income and a substantial portion of their food. USDA's Economic Research Service (ERS) estimates that 5 million people, out of a total population of 48 million, were food insecure in 2014, and this number is projected to grow to 14 million by 2024 (Rosen et al., 2014). The World Food Programme (WFP) estimates that as much as 40 percent of the population is affected by malnutrition (WFP, 2010). According to UNICEF, the United Nations Children's Fund, approximately 42 percent of Tanzanian children are stunted (United Nations, 2013).

The principal tool currently used by Tanzania to address food insecurity is the distribution of food aid to vulnerable households; recently, the Government of Tanzania (GOT) introduced a system of cash transfers on a pilot basis. A key challenge faced by the Governments of Tanzania and other

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<sup>1</sup> Purchasing power parity is a concept in which a given amount of U.S. dollars will purchase the same bundle of goods in all economies. GDP in purchasing power parity takes into account differences in what a dollar can buy in different countries by adjusting exchange rates in the calculations.



countries coping with food insecurity is to identify the households most in need of assistance. GOT relies on estimates of food availability to identify regions potentially in need of assistance. For each administrative region, Tanzania’s Ministry of Agriculture forecasts production of 12 basic food crops (maize, rice, wheat, sorghum, finger millet, bulrush millet, beans, other pulses, cassava, cooking bananas, sweet potatoes, and “Irish” (white) potatoes). Production of the 12 crops is converted to a “grain equivalent,” and the Ministry calculates whether this is sufficient to meet the consumption needs of the population.<sup>2</sup>

The current method focusing on availability tends to target regions experiencing production shortfalls. However, availability is just one of four pillars of food security, as defined by the United Nations Food and Agriculture Organization (FAO): the other three are access, utilization, and stability (UN FAO, 2006). Availability refers to the physical existence of food, which relates to production, stocks, and trade. Access refers to a household’s ability to obtain food, which depends on income, prices, and distance to local food markets. Utilization refers to an individual’s ability to process nutrients and energy from food, which depends on many factors, including dietary diversity and nutrient absorption, intra-household allocation of food, and hygienic preparation. The “stability” pillar refers to the stability of the other three pillars over time (UN FAO, 2006).

In this report, we measure household access to food over time, using representative food baskets to compare food costs to household income. We use data from the 2010/11 Tanzanian National Panel Survey (TZNPS): a nationally representative household survey carried out by Tanzania’s National Bureau of Statistics (NBS)) to obtain consumption patterns—specifically, calorie shares of different foods consumed by households—for various groups of Tanzanian households.<sup>3</sup> We then create food baskets based on the calorie shares that achieve the per capita daily calorie intake estimated for Tanzania by FAO.

We use time series price data to calculate the monthly cost of these food baskets. The monthly food baskets consist of a set of foods that are typically consumed by households in the zone and make up 67 to 88 percent of total calories consumed by the average household. The ratio of the monthly per capita food basket cost and monthly per capita income provides a practical measure of food access. Any decline in the cost of food or increase in income is expected to improve the food security of a household. Monitoring food costs relative to consumer purchasing power can provide timely feedback on the effectiveness of food security policies and the investment required to address problems of food security.

We present the food baskets for mainland Tanzania (which excludes Zanzibar), for the business capital, Dar es Salaam, and for two geographical zones—the Southern Highlands and the Lake Zone (bordering on Lake Victoria).<sup>4</sup> Mainland Tanzania is divided into 21 administrative regions, which we grouped into 7 geographical administrative zones.<sup>5</sup> Using data from the TZNPS, we estimated calorie and expenditure shares for 15 foods and groups for each of the 7 zones. We then used the calorie shares to construct food baskets for Dar es Salaam and two zones: the Southern Highlands,

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<sup>2</sup> What GOT calls “grain equivalent” is the dry matter equivalent of the crops being monitored. This is generally similar to a maize equivalent. GOT prefers to use the term “grain equivalent” to downplay the emphasis on maize.

<sup>3</sup> The World Bank’s Living Standards Measurement Study-Integrated Surveys on Agriculture team provided assistance to NBS.

<sup>4</sup> Tanzania is a union of Tanganyika (referred to here as mainland Tanzania) and the island of Zanzibar. We have confined our analysis to mainland Tanzania.

<sup>5</sup>The seven zones are Eastern, Northern, Lake, Central, Western, Southern, and Southern Highlands.

which includes the regions of Mbeya, Iringa, and Rukwa, and the northwest Lake Zone, which includes the regions of Mara, Mwanza, and Kagera (all of which border on Lake Victoria).

Considerable geographical variation exists in agricultural production. The major maize-growing region is the Southern Highlands (see figs. 1 and 2). This area is typically a surplus-producing region, with maize from this region shipped to other regions, as well as neighboring countries. The regions in the Lake Zone and other regions in the north (e.g., Arusha and Kilimanjaro) grow less maize and more bananas and cassava, as well as some millet and sorghum (see figs. 3 and 4). The regions of Mbeya and Iringa (in the Southern Highlands zone) and Morogoro (in the Eastern zone) are the biggest rice producers, although Tanzania is a net importer of rice.

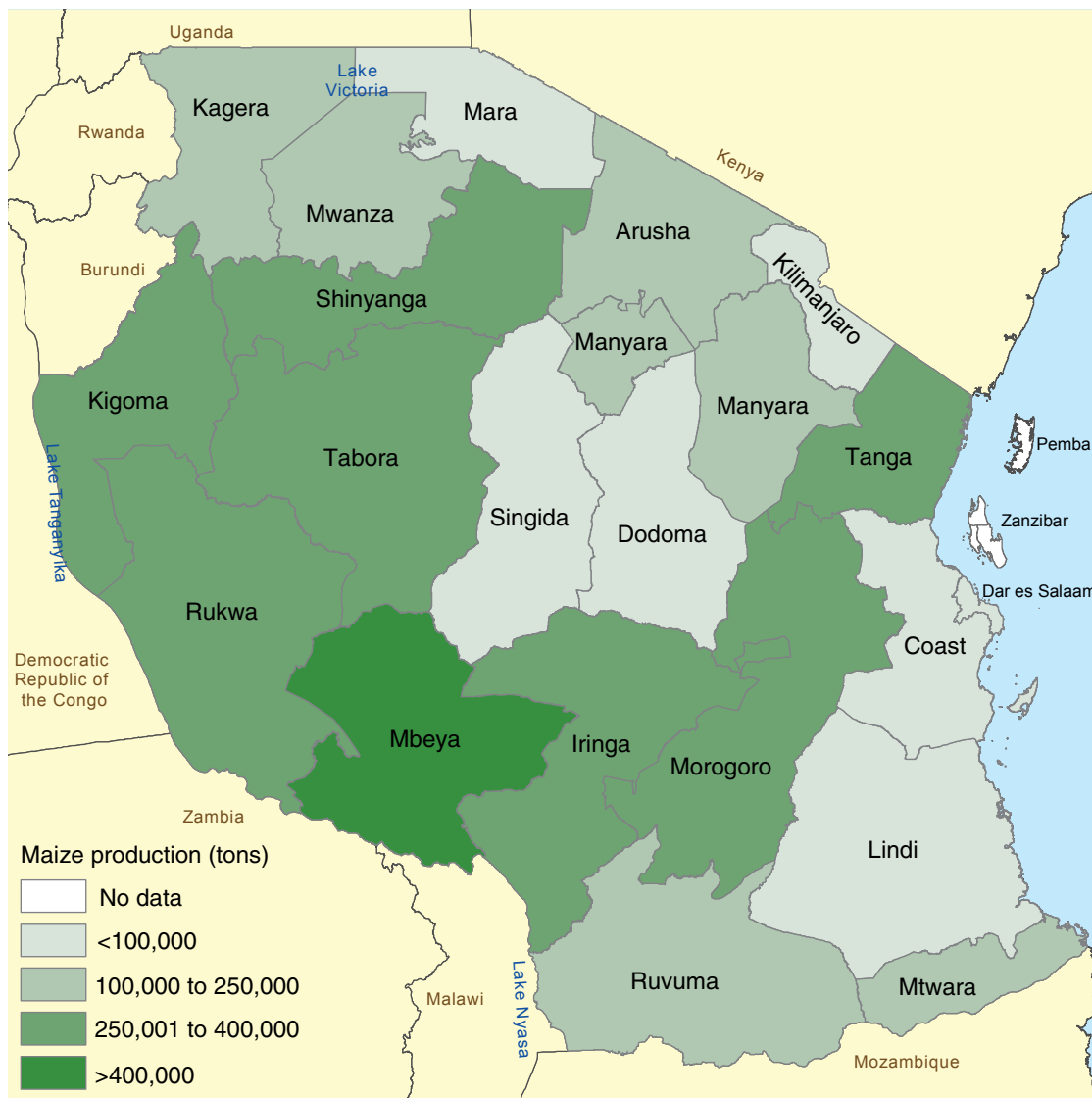
Figure 1  
**Political map of Tanzania**



Source: USDA, Economic Research Service.

Figure 2

**Mbeya in the Southern Highlands is the largest maize producer**



Source: USDA, Economic Research Service using data from the Tanzanian Ministry of Agriculture, Food Security, and Cooperatives.

TZNPS results show wide geographical diversity in dietary preferences that parallel agricultural production patterns. The two geographical zones presented in this study were chosen to illustrate the geographical diversity of the country, with respect to dietary preferences, as well as the structure of agricultural production.<sup>6</sup> The Southern Highlands is a surplus-maize-producing region; the Lake Zone, in the northwest along Lake Victoria, produces less maize and more roots and tubers. Survey results show significant differences in the typical diets of these two regions: households in the Southern Highlands derive 50 percent of their calories from maize, while those in the Lake Zone derive just 32 percent of their calories from maize and larger shares from cassava and banana (19

<sup>6</sup> Followup visits were made to these two zones, and interviews with local officials and nutrition experts generally confirmed the dietary patterns revealed by the survey results.

Figure 3

**The Lake Zone grows more cassava and less maize than the Southern Highlands**



Source: USDA, Economic Research Service using data from Tanzania’s Ministry of Agriculture, Food Security, and Cooperatives.

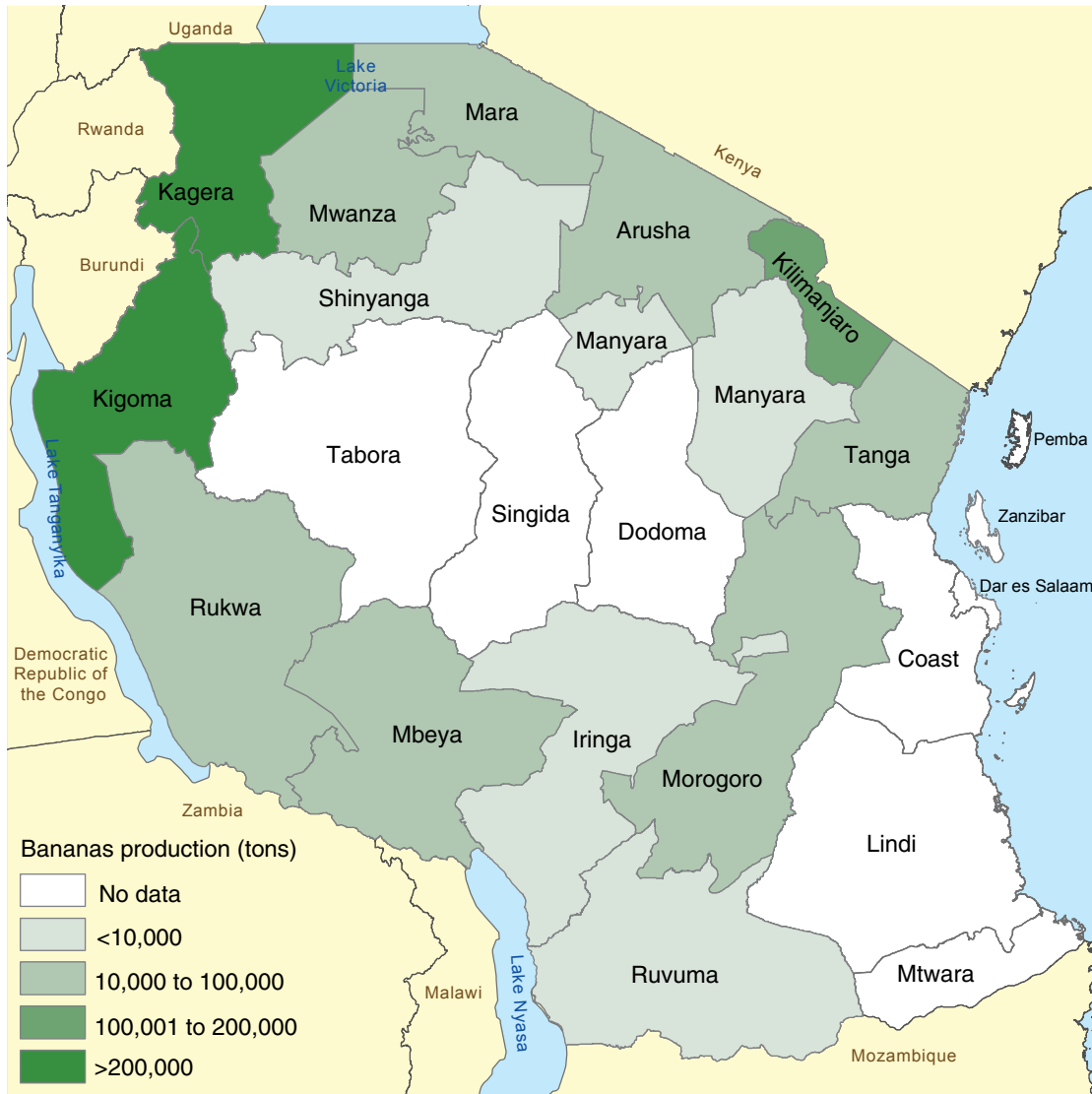
and 5 percent, respectively). As might be expected given their relative wealth, households in Dar es Salaam consume a much more diverse diet, deriving just 23 percent of their calories from maize.

**Food Basket Approach Adds Depth to Other Measures of Food Security**

Two alternative approaches are commonly used to measure food security. One, which is used by ERS in its Global Food Security Assessments, is a national-level approach based on a food balance, calculated according to the methodology used by FAO. Availability of staple foods is calculated as the sum of production plus imports minus exports, waste and losses, and change in stocks. Availability of each food is converted to a grain equivalent and then summed to give a single measure of food availability in the country. This measure is useful for presenting a picture of overall

Figure 4

**The Lake Zone includes the largest banana-growing region**



Source: USDA, Economic Research Service using data from Tanzania's Ministry of Agriculture, Food Security, and Cooperatives.

food availability and making comparisons across countries. But it only measures availability; it does not provide a measure of access or utilization.

Using the second common approach to measuring food security, WFP calculates a proxy for access using data from its *Comprehensive Food Security and Vulnerability Assessments*, which it carries out every 3 to 5 years in a number of developing countries, including Tanzania (WFP, 2010). WFP carries out a survey based on 7-day recall; the questionnaire asks for frequency of consumption of different food groups rather than quantities consumed. Based on survey results, WFP calculates *Food Consumption Scores (FCS)*, “which combine: i) dietary diversity (the number of individual foods consumed over the past week is collected); ii) food frequency (the number of days in the past week that a specific food item has been consumed is collected); and iii) the nutritional importance of the food groups (which are weighted to reflect this)” (WFP, 2010). Based on research, WFP argues

that FCS serves as a good proxy for access. However, FCS does not provide any information on quantities of food consumed, nor does it link access to market prices.

Both of these approaches provide a good picture of a country's food security situation at the national level. The food basket approach used in this study can enhance this understanding by providing details on subnational differences in diets and linking to markets and prices. This level of detail is especially useful for countries seeking to introduce cash transfers as an alternative to food aid. This approach can help identify regions where overall food supplies may be adequate but where a number of households still experience problems with access. It also provides better information on the demand for key commodities such as maize that is used to make national decisions about commodity imports and exports.

The method also allows policymakers to track access across time and, along with other information, can provide an early warning of an impending food emergency. The method relies on readily available secondary data sources (food price and GDP income data from NBS), not requiring expensive data collection.

This approach also has its limitations. Consumption levels are held constant across time, so it is not possible to account for substitution in response to price or income changes. Because of data limitations, it is not possible to account for seasonal variations in monthly income or consumption. Available price data are also limited, and some of the price data used to calculate the food basket costs may be less than reliable. Additionally, because the food baskets are based on estimated household calorie shares, they represent actual consumption but do not necessarily provide the full range of nutrients required for a healthy diet. See the "Caveats to the Analysis" chapter for a more detailed discussion of these limitations.

## Methodology and Data Sources

The food basket methodology draws on multiple data sources. Here, we briefly list the sources and their role in the methodology. We provide more detail later on, presenting summary statistics, constructing the food baskets, and measuring household access to food in Tanzania.

We used food consumption data from Wave 2 of the TZNPS household survey to obtain estimates of shares of calories derived from various food groups. To convert calorie shares to quantities of specific food items, we started with data on calories per kilogram of food provided by NBS (Tanzania's NBS and Ministry of Finance, 2012). The nutritional data were combined with edible-portion conversion factors from USDA to get estimates of per capita consumption (USDA, 2011). Representative food baskets (in grams) were then constructed using the estimated calorie shares and the estimated per capita calorie consumption (2,137) from the FAO Food Balance Sheet for Tanzania. We used the FAO estimate to be consistent with other food security assessments and analyses in developing countries (FAO, 2012).<sup>7</sup> To calculate the costs of the food baskets we used market survey data provided by NBS; using current price data will allow continuous monitoring of changes in the cost of these food baskets. To measure access to food, GDP per capita data from the Tanzanian National Accounts (provided by NBS) were used. These data too are readily available and frequently updated and thus can be used to continuously monitor changes in food access.

TZNPS was administered between October 2010 and December 2011 and covered 3,924 households (3,168 households are from the first round; the remainder are split-off households).<sup>8,9</sup> The survey was stratified geographically to reflect the country's overall composition (i.e., using appropriate population weights, the estimates are nationally representative). The survey also provides statistically reliable estimates for Tanzania's eight administrative zones (North, Central, Eastern, South, Southern Highlands, West, Lake, and Zanzibar), as well as for Dar es Salaam, other mainland urban areas, and mainland rural areas. The final sample for our analysis of mainland Tanzania consists of 3,313 households. Table 1 displays the number of sample households by region and zone. The field-work was spread out over the 14 months to take into account the seasonal variation in consumption patterns, which are important in a country like Tanzania where agriculture is a primary source of income for most households.<sup>10</sup> For details on sample design, see Sandefur (2009).

The household questionnaire includes detailed questions on food consumption inside and outside the household, as well as key demographic information. The food consumption section asks female

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<sup>7</sup> The 2009 data are the most recent available for Tanzania. The per capita calorie estimate is derived from the total food available for human consumption divided by the total population. To calculate the total food available for human consumption, FAO begins with the total food available in the country (production, imports, and aid) and then accounts for food exported, fed to livestock, used for seed, and lost during storage and transportation.

<sup>8</sup> Split-off households occur when one or more individuals move from one household to another (either forming a new household or joining an existing household).

<sup>9</sup> The survey's first wave was administered between October 2008 and October 2009 and covered 3,265 households in all 26 regions of Tanzania (21 in Mainland and 5 in Zanzibar). The first wave of the panel used a multistage cluster design and was constructed using the National Master Sample Frame (list of all populated enumeration areas in the country) that was developed for the 2002 Population and Housing Census. The survey team was able to track 97 percent of first-round households (i.e., at least one household member from Round 1 lived in the Round 2-tracked household). Attrition rates were similar across strata. Approximately 18 percent of Round 1 households split before Round 2, largely because of marriage and migration. For more details, see Tanzania's NBS and Ministry of Finance (2012).

<sup>10</sup> We average the data over the sample period using survey weights to obtain representative estimates.

Table 1

**Tanzanian National Panel Survey sample sizes by zone and region**

Zone, sample size	Region, sample size
Eastern, 846	Dar es Salaam, 626 Morogoro, 135 Pwani, 85
Northern, 443	Arusha, 122 Kilimanjaro, 114 Manyara, 83 Tanga, 124
Lake, 396	Kagera, 157 Mara, 64 Mwanza, 175
Central, 195	Dodoma, 109 Singida, 66
Western, 468	Kigoma, 180 Shinyanga, 194 Tabara, 144
Southern, 575	Lindi, 180 Mtwara, 237 Ruvuma, 158
Southern Highlands, 410	Iringa, 137 Mbeya, 173 Rukwa, 100

Source: Government of Tanzania, 2010-11 Tanzanian National Panel Survey.

respondents (who are the primary caregivers and are typically in charge of the preparation and distribution of food) about food consumed within the household by any member over the past week.<sup>11</sup> In particular, the survey asks for the amount of food consumed (in kilograms or liters) for 59 food items from purchases, own-production, or gifts and other sources. Expenditure data, in Tanzanian shillings (TSH), are collected for purchased items (1 U.S. dollar = 1,666 Tanzanian shillings (2014)). A separate section asks respondents about individual expenditure on meals and food eaten away from home over the previous week. In this analysis, we focus exclusively on in-home food to calculate calorie availability by food group, since food away from home cannot be disaggregated by food group.

<sup>11</sup> The survey does not solicit information on the intra-household allocation of food, and therefore, we cannot examine differences in food consumption within the household.

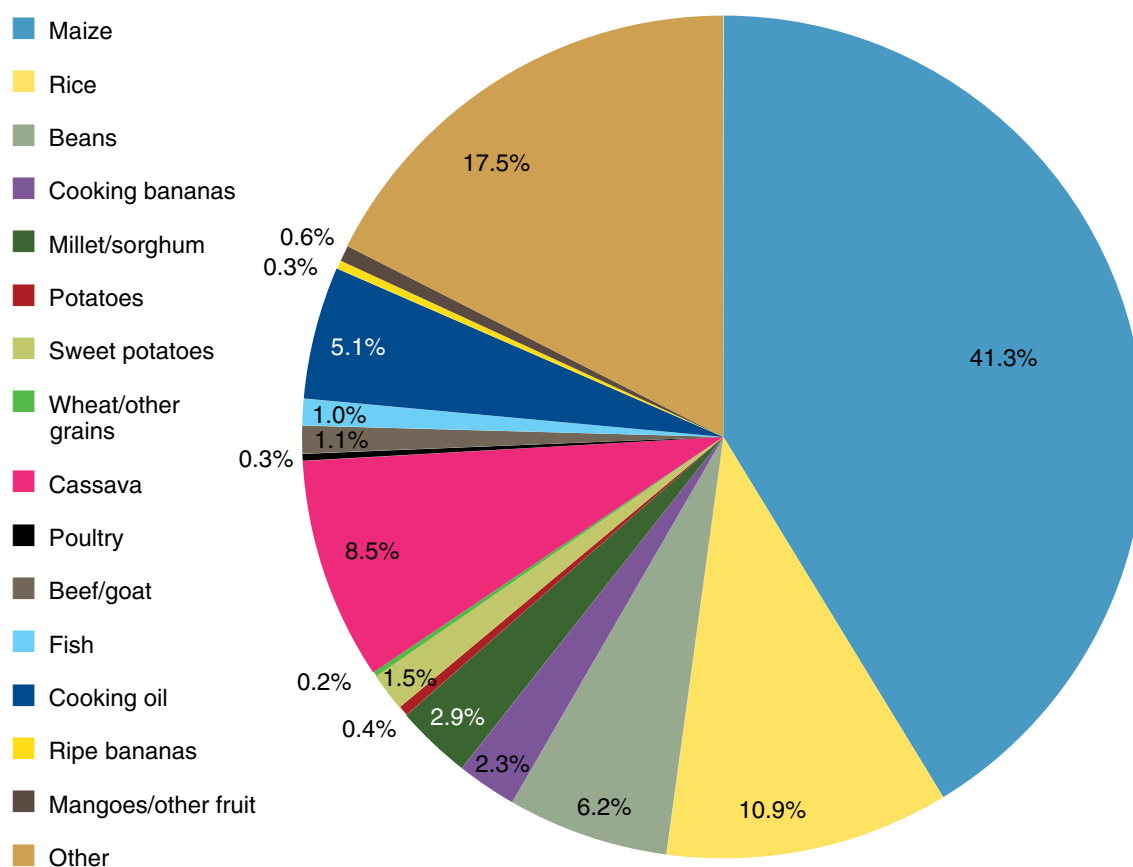


## Dietary Patterns Vary Across Zones

To examine the diversity of dietary patterns across Tanzania, we estimated shares of calories devoted to various food groups. From the 59 food items in the TZNPS, we chose 15 foods groups because of their important role in the Tanzanian diet and the availability of retail prices; the foods make up over 80 percent of average daily calories, except in Dar es Salaam, where they make up just 67 percent of calorie intake.

Figures 5 through 8 display calorie shares by food group for mainland Tanzania, Dar es Salaam, the Southern Highlands, and the Lake Zone, respectively. The Tanzanian diet relies heavily on starchy staples. Maize is a major staple food throughout mainland Tanzania, providing over 40 percent of household calories. However, there is considerable geographical variation. Maize accounts for 51 percent of total calories in the Southern Highlands, and even in the Lake Zone, where it accounts for 32 percent of calories, it makes up a larger share of calories than any other food category. For households in the Lake Zone, cassava is the other key staple, providing about

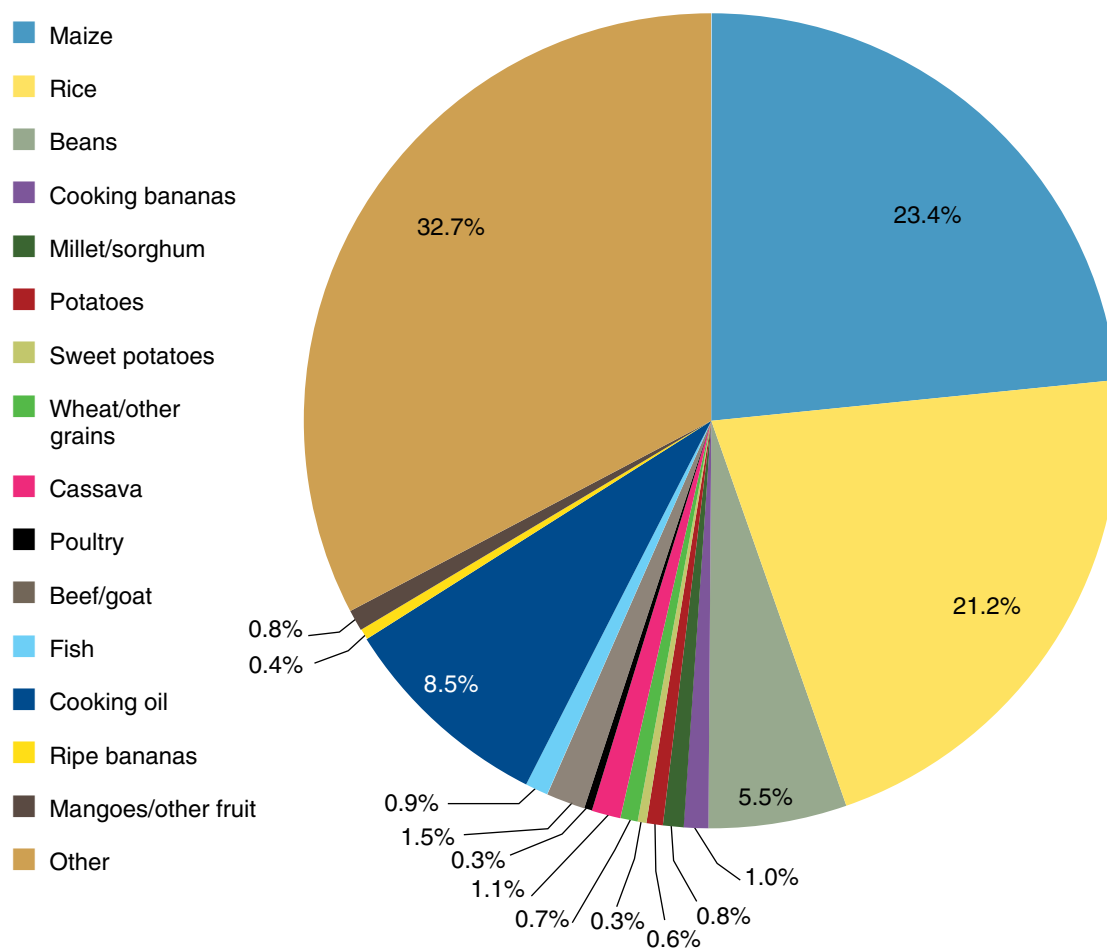
Figure 5  
**Mainland Tanzania—41 percent of calories derive from maize**



Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

Figure 6

**Dar es Salaam—households consume a more diverse diet than in the two zones**



Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

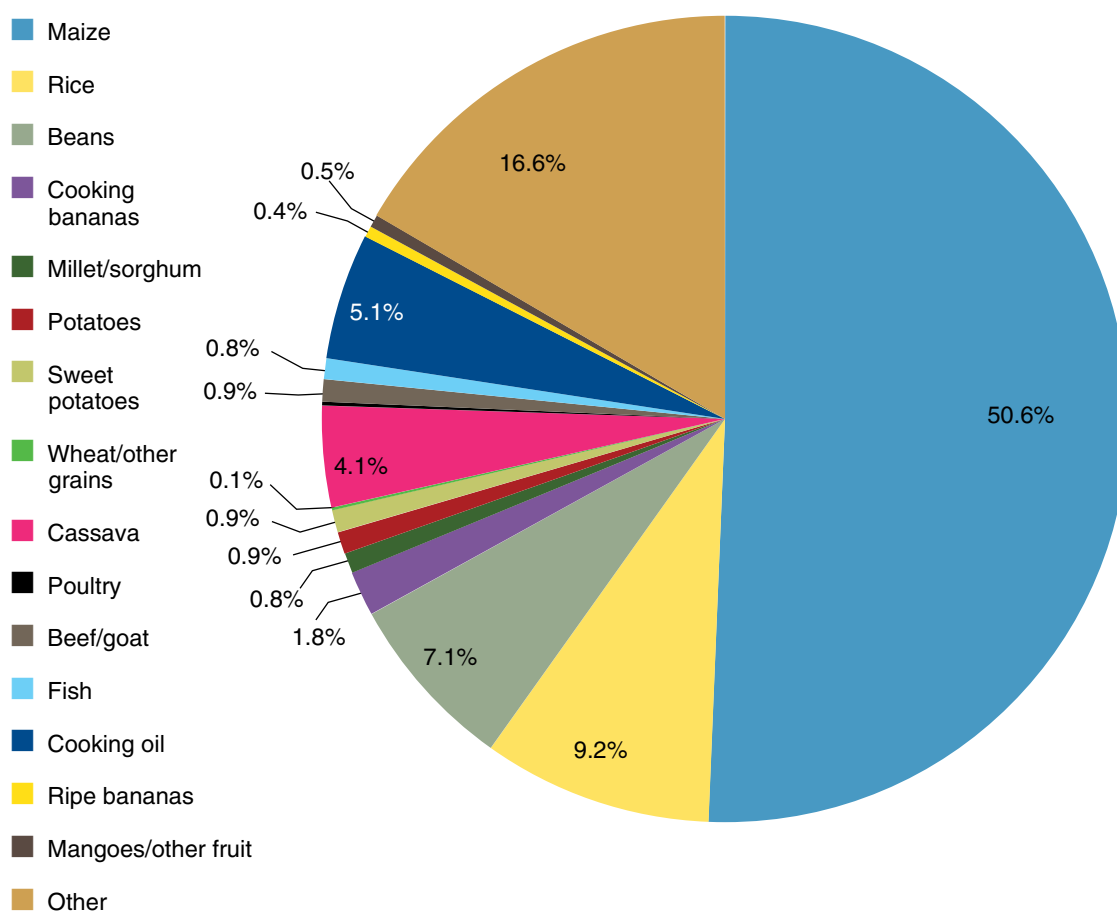
19 percent of total calories; cassava consumption is much lower in the Southern Highlands (4 percent).<sup>12</sup> Rice, beans, and cooking bananas are important to the diets in both zones, although banana consumption is higher in the Lake Zone. Irish potato consumption is low throughout the country. Consumption of sweet potatoes is somewhat higher, especially in the Lake Zone. In most areas, beans are the main source of protein.

Consumption of animal products is low throughout the country, but is lowest in the Southern Highlands. Fish is an important source of protein in the Lake Zone, followed by beef and goat and then poultry. Fish is also eaten in the Southern Highlands but makes up a smaller share of total calories. Dairy products were not included in the food basket because their calorie shares were negligible. Vegetables (apart from the starchy vegetables) were also not included—the total calorie share for all vegetables was just 1 percent, even in Dar es Salaam.

<sup>12</sup> Cassava is consumed both in its fresh form and in the form of flour. In the Lake Zone, it is consumed mainly as flour; in other regions it is more commonly consumed fresh during the cassava season.

Figure 7

**Southern Highlands—50 percent of calories derive from maize**



Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

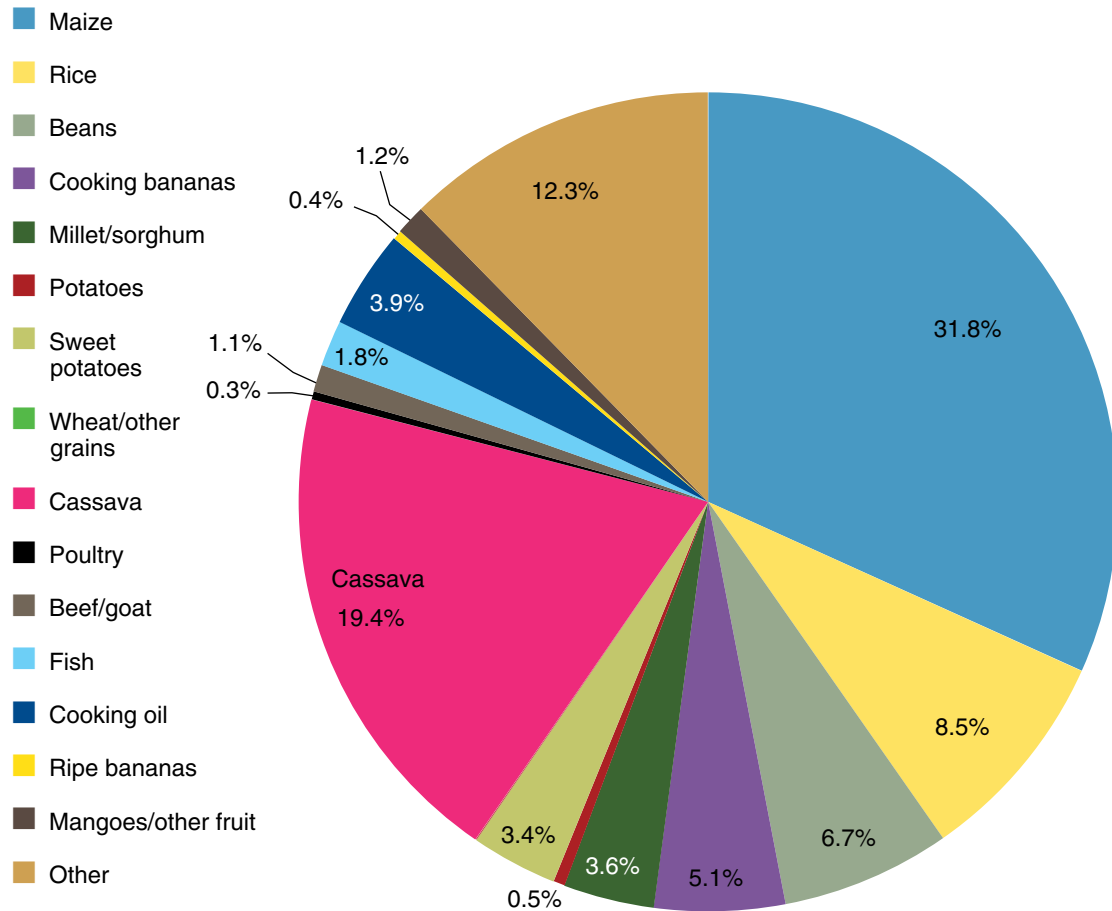
In Dar es Salaam, maize makes up 23 percent of calories; rice is the other major staple, providing about 21 percent of calories. Diets in the city are generally more diverse, perhaps because of higher average incomes and/or greater access to markets. (Foods from the 15 tracked food groups make up only 67 percent of total calories consumed, compared with 83-88 percent for other areas.)

The survey data also suggest that a lot of heterogeneity in consumption exists within zones, partly because of intra-zone variations in climatic and growing conditions and partly because of transportation costs. For example, the three regions that make up the Lake Zone (Mara, Mwanza, and Kagera) display quite different dietary patterns. Because Kagera is a major banana-growing region, households there derive a large portion of their calories (20 percent) from bananas. In contrast, households in Mara rely more heavily on cassava and millet and derive a negligible portion of their calories from bananas (0.4 percent). Because the sample sizes in these regions were small (64 in Mara and 157 in Kagera), these calorie shares are suggestive rather than statistically conclusive.

Maize dominates the diets in all three regions of the Southern Highlands (Mbeya, Iringa, Rukwa), though households in Mbeya have a slightly smaller calorie share for maize and a larger share for rice than those in the other two regions. In interviews conducted by ERS staff during field visits in

Figure 8

**Lake Zone diets contain higher shares of bananas and cassava than do diets of Dar es Salaam and the Southern Highlands**



Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

March 2013, respondents pointed out some notable differences in dietary preferences among districts (subcomponents of regions). Rice is favored in the district of Kyela, near the Malawi border, while bananas are favored in the Rungwe district. Respondents also pointed out that many households that had not traditionally consumed much maize are switching to a more maize-based diet, in part because public food assistance is in the form of maize. In addition, they said that in all three regions of the Southern Highlands, maize has become more of a cash crop in recent years and is displacing more traditional crops such as millet and sorghum.

## Constructing the Food Baskets

To construct the food baskets, calorie shares from the TZNPS data were estimated, after accounting for the inedible portion of the foods (husks, peels, seeds, pits, etc.), using edible-portion conversion factors from USDA (USDA, 2011).<sup>13</sup> Using these calorie shares, we imposed a target of a daily per capita intake of 2,137 calories, which is the average daily per capita calorie intake calculated by FAO in its 2009 Food Balance Sheet for Tanzania (FAO, 2012).<sup>14</sup> The daily quantities (grams) of food were derived using estimates of calories per kilogram provided by NBS (Tanzania's NBS and Ministry of Finance, 2012). The typical food baskets for mainland Tanzania, Dar es Salaam, the Southern Highlands, and the Lake Zones are shown in tables 2 through 5, respectively.

Table 2  
**Food basket calculations for mainland Tanzania**

(1) Food group/item	(2) Calorie shares	(3) Calories per kg	(4) Calories per day assuming a diet of 2,137 calories	(5) Grams/day	(6) Kilograms/month
Maize	0.413	3,680	882	240	7.19
Rice	0.109	3,640	233	64	1.92
Beans	0.062	3,330	132	40	1.19
Cooking bananas	0.023	1,350	49	36	1.09
Millet/sorghum	0.029	3,450	62	18	0.54
Potatoes	0.004	790	8	10	0.31
Sweet potatoes	0.015	1,050	31	30	0.89
Wheat/other grains	0.002	3,400	4	1	0.04
Cassava	0.085	1,492	182	122	3.66
Poultry	0.003	1,390	6	4	0.12
Beef/goat	0.011	1,550	23	15	0.45
Fish	0.010	820	22	26	0.79
Cooking oil	0.051	8,840	109	12	0.37
Ripe bananas	0.003	920	7	7	0.22
Mangoes/other fruit	0.006	850	13	15	0.46
Total calorie share	0.825				

Notes: Column 4 displays the calories for each food based on daily total calories of 2,137; column 4 equals column 2 multiplied by 2,137 calories. Column 5 equals column 4 divided by column 3 (which yields kilograms per day) multiplied by 1,000. Column 6 equals column 5 multiplied by 30 (days in month) and divided by 1,000 (to convert grams to kilograms). kg = kilogram.

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

<sup>13</sup> The edible portion of a Tanzanian product could differ somewhat from the USDA estimates because of differences in variety or techniques used to remove the inedible portion. However, the USDA database is the only comprehensive source of these conversion factors. Most of these factors were derived from the basic biological properties of the food item (thickness of the peel, weight of the seeds, etc.), so we assumed the differences will be minimal.

<sup>14</sup> The 2009 data are the most recently available for Tanzania. The per capita calorie estimate was derived from the total food available for human consumption divided by the total population. The FAO calculations began with the total food available in the country (production, imports, and aid) and then accounted for food exported, fed to livestock, used for seed, and lost during storage and transportation, in order to get the total food available for human consumption.

Table 3

**Food basket calculations for Dar es Salaam**

(1) Food group/item	(2) Calorie shares	(3) Calories per kg	(4) Calories per day assuming a diet of 2,137 calories	(5) Grams/day	(6) Kilograms/month
Maize	0.234	3,680	500	136	4.08
Rice	0.212	3,640	454	125	3.74
Beans	0.055	3,330	117	35	1.05
Cooking bananas	0.010	1,350	21	15	0.46
Millet/sorghum	0.008	3,450	18	5	0.15
Potatoes	0.006	790	14	18	0.53
Sweet potatoes	0.003	1,050	7	7	0.21
Wheat/other grains	0.007	3,400	15	4	0.13
Cassava	0.011	1,492	25	16	0.49
Poultry	0.003	1,390	7	5	0.14
Beef/goat	0.015	1,550	33	21	0.64
Fish	0.009	820	19	24	0.71
Cooking oil	0.085	8,840	182	21	0.62
Ripe bananas	0.004	920	9	10	0.30
Mangoes/other fruit	0.008	850	18	21	0.63
Total calorie share	0.673				

Notes: Column 4 displays the calories for each food based on daily total calories of 2,137; column 4 equals column 2 multiplied by 2,137 calories. Column 5 equals column 4 divided by column 3 (which yields kilograms per day) multiplied by 1,000. Column 6 equals column 5 multiplied by 30 (days in month) and divided by 1,000 (to convert grams to kilograms). kg = kilogram.

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

Note that these food baskets are *representative*: they reflect the typical diet patterns for each zone, but do not necessarily comprise a nutritionally optimal diet. Preliminary analysis suggests that the Southern Highlands diets are sufficient in protein, according to average USDA daily requirements, because of the dominance of maize, but are deficient in many vitamins and minerals. The Lake Zone diet is deficient in protein, as well as most micronutrients. More nutritious food baskets would include more beans, animal products, groundnuts, and leafy green vegetables. (Groundnuts and leafy green vegetables are grown in Tanzania, but not frequently consumed.)<sup>15</sup>

To calculate the total cost of these food baskets, we used retail market prices reported by the NBS Department of Labor and Price Statistics. For Dar es Salaam, prices were used from retail sources throughout the city; for the Southern Highlands Zone, prices were used from the main market in Mbeya (the retail center of the maize growing region); and for the Lake Zone, average prices were

<sup>15</sup> These preliminary calculations were based on recommended daily requirements taken from the Food and Nutrition Board, Institute of Medicine, National Academy of Sciences (2004). Nutrient content of selected foods was taken from the Tanzania Food Composition Tables (2008), compiled by Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam; the Tanzania Food and Nutrition Centre (TFNC), Dar es Salaam; and the Harvard School of Public Health (HSPH), Boston, MA, November 2008.

Table 4

**Food basket calculations for Southern Highlands Zone**

(1) Food group/item	(2) Calorie shares	(3) Calories per kg	(4) Calories per day assuming a diet of 2,137 calories	(5) Grams/day	(6) Kilograms/month
Maize	0.506	3,680	1,082	294	8.82
Rice	0.092	3,640	197	54	1.62
Beans	0.071	3,330	152	46	1.37
Cooking bananas	0.018	1,350	38	28	0.85
Millet/sorghum	0.008	3,450	17	5	0.15
Potatoes	0.009	790	19	24	0.71
Sweet potatoes	0.009	1,050	19	18	0.55
Wheat/other grains	0.001	3,400	2	1	0.02
Cassava	0.041	1,492	87	58	1.75
Poultry	0.001	1,390	3	2	0.07
Beef/goat	0.009	1,550	19	12	0.37
Fish	0.008	820	18	22	0.65
Cooking oil	0.051	8,840	108	12	0.37
Ripe bananas	0.004	920	10	10	0.31
Mangoes/other fruit	0.005	850	11	13	0.38
Total calorie share	0.834				

Notes: Column 4 displays the calories for each food based on daily total calories of 2,137; column 4 equals column 2 multiplied by 2,137 calories. Column 5 equals column 4 divided by column 3 (which yields kilograms per day) multiplied by 1,000. Column 6 equals column 5 multiplied by 30 (days in month) and divided by 1,000 (to convert grams to kilograms). kg = kilogram.

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

used from the three markets in the regional capitals—Mwanza, Bukoba, and Musoma—weighted by the population of each region given the wide variations in prices within the zone.<sup>16</sup>

TZNPS results indicate that, on average, mainland households derive 25 percent of their food consumption from their own production. This share is 32 percent among rural households. To derive the total food basket cost, we valued this portion of food consumption at local market prices.

The baskets of foods in tables 2-5 represent 67 to 88 percent of the total calories typically consumed by one person in a month. To give policymakers an accurate picture of the food security situation, we estimated the cost of a total food basket by including the cost of *other foods* that households consume, including dairy products, vegetables, nuts and spices, sugar and sweets, and beverages (alcoholic and nonalcoholic). These food groups include small quantities of a wide array of products that are often difficult to measure and to value.

To estimate the value of these other foods, estimated shares of food expenditure were used. In particular, we calculated the share of total food expenditures devoted to the 15 food groups, as well

<sup>16</sup> Ideally, the prices would have been weighted by the volume of goods traded on each market, but those data were not available.

Table 5

**Food basket calculations for Lake Zone**

(1) Food group/item	(2) Calorie shares	(3) Calories per kg	(4) Calories per day assuming a diet of 2,137 calories	(5) Grams/day	(6) Kilograms/month
Maize	0.318	3,680	679	184	5.53
Rice	0.085	3,640	182	50	1.50
Beans	0.067	3,330	143	43	1.29
Cooking bananas	0.051	1,350	110	82	2.45
Millet/sorghum	0.036	3,450	76	22	0.67
Potatoes	0.005	790	10	12	0.37
Sweet potatoes	0.034	1,050	73	69	2.08
Wheat/other grains	0.000	3,400	1	0	0.01
Cassava	0.194	1,490	415	279	8.36
Poultry	0.003	1,390	7	5	0.15
Beef/goat	0.011	1,550	23	15	0.44
Fish	0.018	820	39	47	1.42
Cooking oil	0.039	8,840	83	9	0.28
Ripe bananas	0.004	920	8	8	0.25
Mangoes/other fruit	0.012	850	25	30	0.89
Total calorie share	0.877				

Notes: Column 4 displays the calories for each food based on daily total calories of 2,137; column 4 equals column 2 multiplied by 2,137 calories. Column 5 equals column 4 divided by column 3 (which yields kilograms per day) multiplied by 1,000. Column 6 equals column 5 multiplied by 30 (days in month) and divided by 1,000 (to convert grams to kilograms). kg = kilogram.

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

as to the “other foods” category. For in-home consumption of purchased food, we used the value of expenditure reported by households. For in-home consumption of own-production and gifts, expenditure was estimated using the quantities reported by households and median unit-value prices from purchases of the same food items.<sup>17</sup> For away-from-home consumption, we aggregated the value of expenditure reported for individuals to the household level.

The expenditure shares, shown in table 6, denote the share of total food expenditures for each of the foods in the baskets. Expenditures on the basket of 15 food groups made up 57 percent of total food expenditures in Dar es Salaam, 69 percent in the Southern Highlands, and 80 percent in the Lake Zone. We used these expenditure shares to estimate the value of other foods and add that value to the value of the 15 food groups in the baskets. These estimates were included in the total food basket costs shown in figures 6 and 9 and in table 7. (Note that the expenditure shares of foods such as maize, rice, beans and cassava are typically lower than the calorie shares, since these are relatively

<sup>17</sup> Unit-value prices for purchased foods were calculated by dividing expenditures by quantities for each food item. Assigned unit-value prices were taken from nearest geographical area given a minimum of three unit price observations. The minimum of three unit price observations helped to ensure that the price represented the area and to guard against potential outliers. Ideally, shadow prices would be used to calculate the value of food produced at home. Because the survey instrument did not provide enough information to create shadow prices, we used market prices, as is common in the literature.



Table 6

**Three Tanzanian regions' calorie and expenditure shares**

Food item	Dar es Salaam		Southern Highlands		Lake Zone	
	Calorie	Expenditure	Calorie	Expenditure	Calorie	Expenditure
<i>Shares (percent)</i>						
Maize	23.4	9.9	50.6	28.0	31.8	17.5
Rice	21.2	13.5	9.2	6.8	8.5	6.2
Beans	5.5	4.8	7.1	7.5	6.7	6.7
Cooking bananas	1.0	1.3	1.8	2.6	5.1	5.5
Millet/sorghum	0.8	0.6	0.8	0.6	3.6	2.1
Potatoes	0.6	1.4	0.9	2.1	0.5	0.8
Sweet potatoes	0.3	0.5	0.9	1.2	3.4	4.2
Wheat/other grains	0.7	0.5	0.1	1.2	0.0	4.2
Cassava	1.1	0.3	4.1	0.1	19.4	0.0
Poultry	0.3	1.1	0.1	1.9	0.3	9.6
Beef/goat	1.5	2.6	0.9	1.5	1.1	3.4
Fish	0.9	9.3	0.8	5.3	1.8	6.2
Cooking oil	8.5	5.7	5.1	4.4	3.9	9.2
Ripe bananas	0.4	4.9	0.4	4.7	0.4	3.0
Mangoes/other fruit	0.8	1.2	0.5	1.2	1.2	0.9
Total	66.9	57.4	82.5	69.3	84.3	79.5

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

cheap foods, in terms of calories per TSH. Conversely, expenditure shares of more expensive foods, like beef and poultry, are higher than their calorie shares because they are more expensive, in terms of calories per TSH.)

Table 7 displays food basket costs by zone for December 2012—a month chosen simply as an illustration. The cost was lowest in the Southern Highlands, driven by relatively low maize prices and a relatively high-calorie share devoted to maize, as well as low consumption of high-priced items such as meat and fish. The food basket in Dar es Salaam was the most expensive, driven by generally higher food prices and greater consumption of higher priced foods such as rice, meat, and fish. The food basket for the Lake Zone was also relatively costly. Maize prices were high, and the calorie share of maize, while lower than in the Southern Highlands, was still fairly high. Also, consumption of poultry, beef, and fish (relatively expensive items) was higher in the Lake Zone. The primary driver of the high cost, however, was the large calorie share devoted to cassava, which was relatively expensive. The “Caveats to the Analysis” chapter raises the possibility that the cassava prices were measured with error and thus that the cost of the Lake Zone food basket may have been exaggerated.

Figure 9 displays the nominal monthly cost of each region's food basket from January 2010 to February 2013. The sharp rise in the nominal costs of the food baskets that began in mid-2011 can be attributed largely to a surge in maize and rice prices in Tanzania (shown in figures 10 and 11).

From January 2010 to February 2013, food inflation was higher than non-food inflation. Price increases were the most pronounced for maize and rice, which make up substantial shares of the

Table 7  
Monthly food-basket cost, December 2012

Product	Dar es Salaam	Southern Highlands	Lake Zone
<i>Tanzanian shillings</i>			
Maize	3,606	5,865	4,399
Rice	7,308	3,241	2,690
Beans	1,753	2,193	1,895
Cooking bananas	421	353	944
Millet/sorghum	197	226	1,254
Potatoes	451	313	342
Sweet potatoes	294	329	912
Wheat/other grains	157	28	12
Cassava	287	947	5,471
Poultry	862	653	1,032
Beef/goat	3,457	1,851	2,055
Fish	5,113	3,894	7,133
Cooking oil	1,664	1,296	1,130
Ripe bananas	338	228	290
Mangoes/other fruit	421	335	634
Other	17,887	9,145	8,917
<b>Total</b>	<b>44,217</b>	<b>30,896</b>	<b>39,108</b>

Source: USDA, Economic Research Service using data from Government of Tanzania, 2010-11 National Panel Survey.

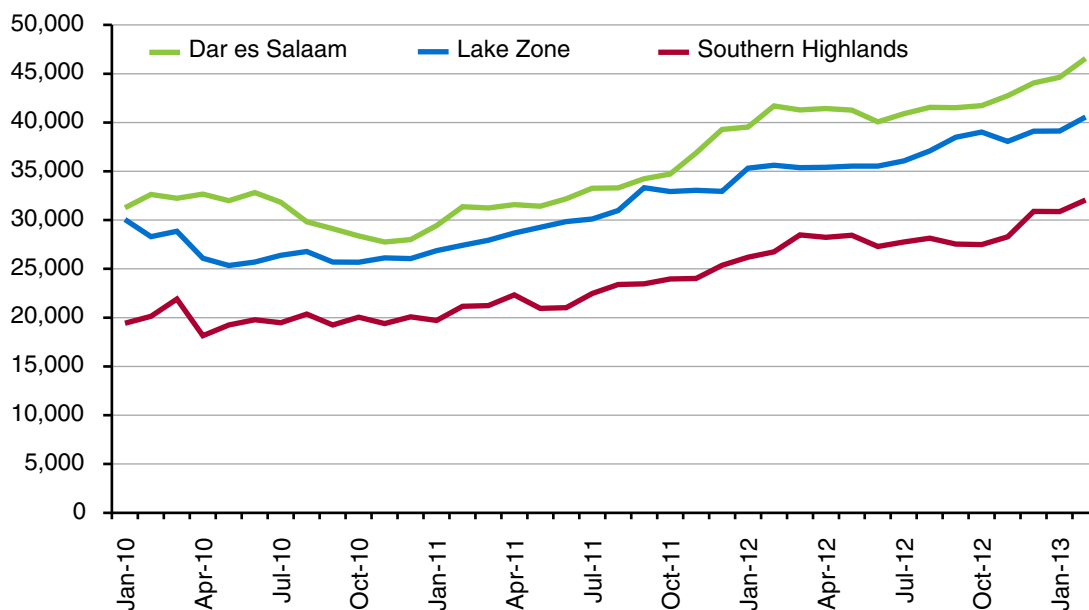
food baskets in both zones. We calculated changes in the real cost of food by deflating the cost of the food basket using the consumer price index (CPI) from NBS. The rise in the real costs of the food baskets was more moderate than the rise in the nominal costs (fig. 12).<sup>18</sup>

<sup>18</sup> According to NBS, food and nonalcoholic beverages make up 47.8 percent of the basket of goods used to compute the consumer price index.

Figure 9

**Nominal per month, per household food basket costs rose sharply from 2011 to 2013**

Tanzanian shillings



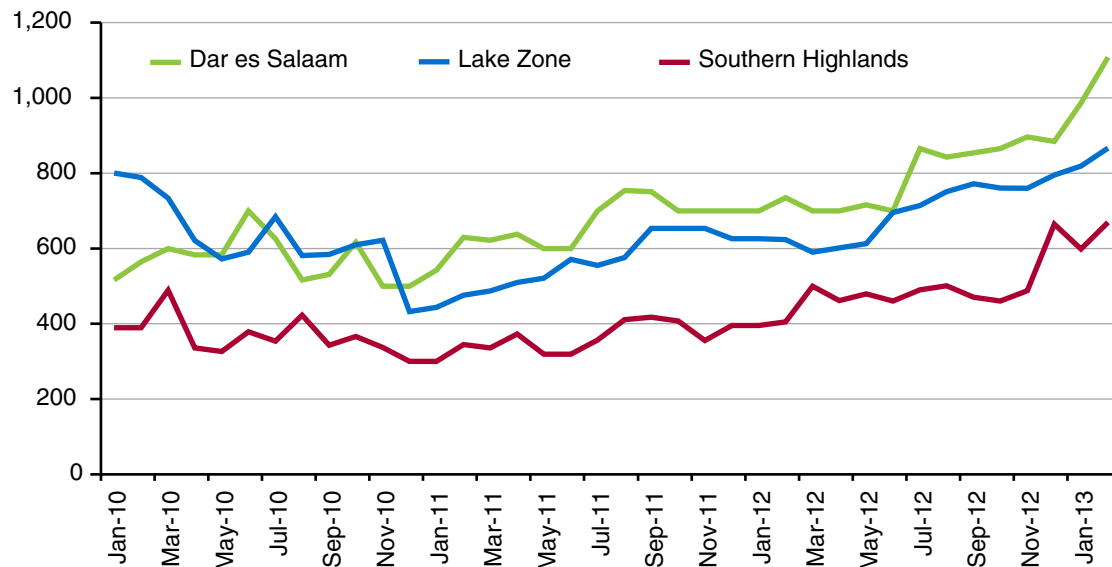
Note: 1 U.S. dollar = 1,666 Tanzanian shillings.

Source: USDA, Economic Research Service using data from Government of Tanzania, National Bureau of Statistics, Department of Labor and Price Statistics, and the 2010-11 Tanzanian National Panel Survey.

Figure 10

**Maize prices, paralleling nominal food basket costs, rose sharply from 2011 to 2013**

Tanzanian shillings per kg



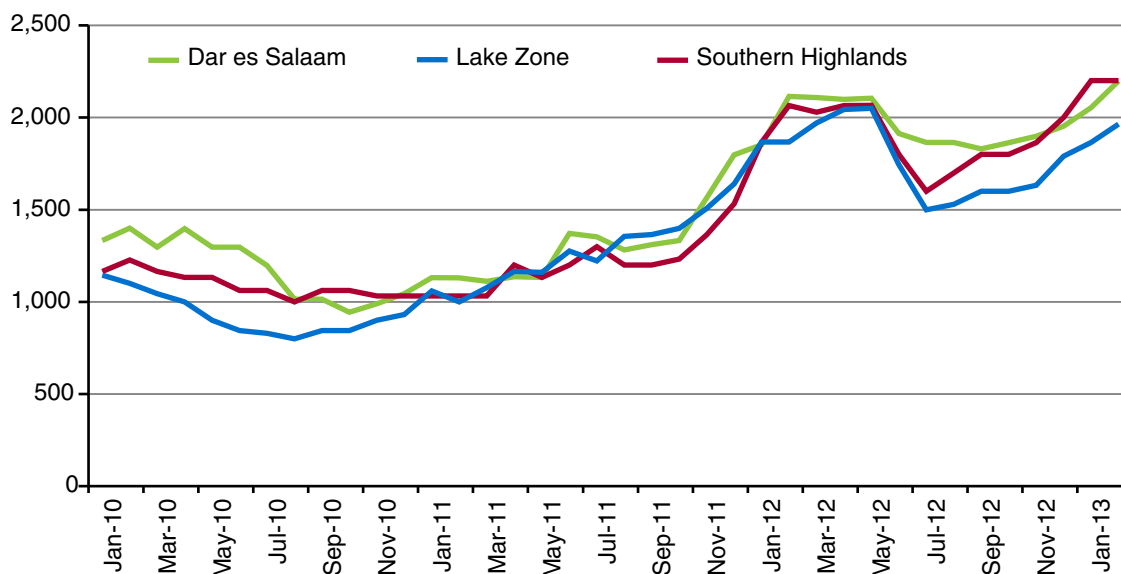
Note: 1 U.S. dollar = 1,666 Tanzanian shillings. Prices for the Southern Highlands were collected from the main open-air market in the city of Mbeya. Prices for the Lake Zone are an average of prices collected from three main markets: Bukoba, Mwanza, and Musoma. kg = kilogram.

Source: Government of Tanzania, National Bureau of Statistics, Department of Labor and Price Statistics.

Figure 11

**Rice prices, mirroring nominal food basket costs and maize prices, rose sharply**

Tanzanian shillings per kg



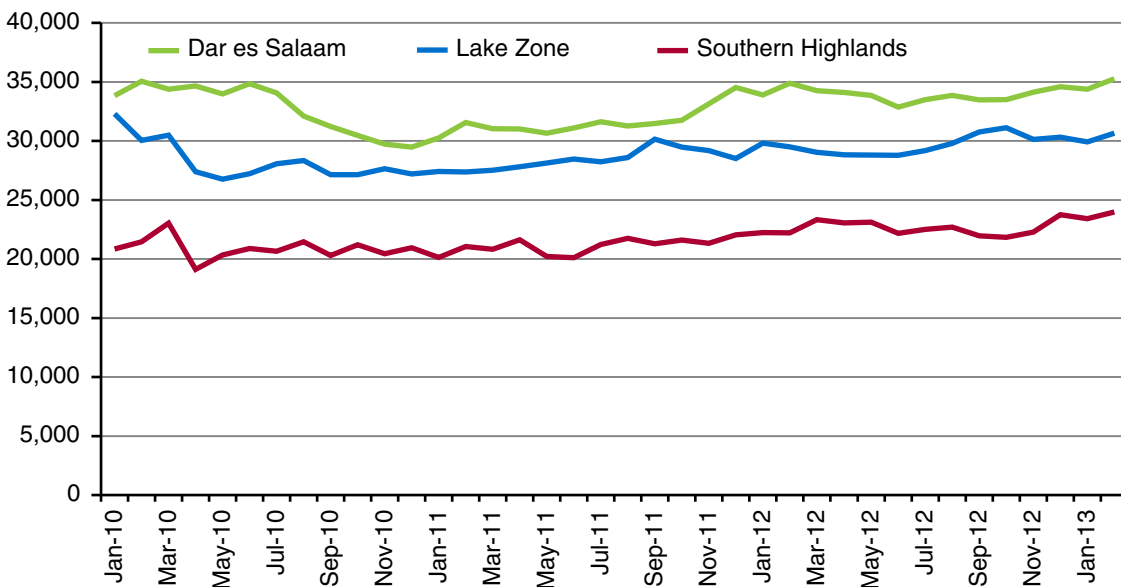
Note: 1 U.S. dollar = 1,666 Tanzanian shillings. Prices for the Southern Highlands were collected from the main open-air market in the city of Mbeya. Prices for the Lake Zone are an average of prices collected from three main markets: Bukoba, Mwanza, and Musoma. kg = kilogram.

Source: Government of Tanzania, National Bureau of Statistics, Department of Labor and Price Statistics.

Figure 12

**Real per month, per household food basket costs rose moderately**

Tanzanian shillings, Sept. 2010=100



Note: 1 U.S. dollar = 1,666 Tanzanian shillings.

Source: USDA, Economic Research Service, using data from Government of Tanzania, National Bureau of Statistics, Department of Labor and Price Statistics, and the 2010-11 Tanzanian National Panel Survey.

## Measuring Access

Food is just one of the expenditures for Tanzanian households; households also spend money on housing, clothing, school fees, and other essential goods and services. As in many developing countries, poor households in Tanzania spend the majority (on average, 75 percent) of their income on food.

To measure access to food, we calculated the ratio of the monthly food basket cost to monthly per capita income. If the ratio was greater than 0.50 (that is, if the cost of the food basket is over 50 percent of total household income), we defined the household as potentially food insecure. Decreases or increases in the ratio indicated improvements or declines, respectively, in access to food.

Because data on Tanzanian GDP by region were only available annually, we divided by 12 to obtain monthly per capita income for each region. While the assumption of constant monthly income is a strong one (for a country in which many households engage in the agricultural sector), we were limited by data availability.<sup>19</sup>

Access appears to be a potential problem only in the Lake Zone. In December 2012, for example, the average nominal cost of the Lake Zone food basket was 39,108 TSH. Average monthly per capita nominal GDP was 71,906 TSH, giving a ratio of 54 percent. The ratio for the Southern Highlands is 31 percent. The ratio for Dar es Salaam, where average monthly per capita GDP was 144,570 TSH, was also 31 percent (table 8).

However, the aggregate numbers mask significant variation across households within these zones. Income inequality in Tanzania is pronounced, and those in the lower income quintiles have more difficulty accessing food and buffering price increases than those in the upper quintiles.

Table 8

### Food-basket cost as share of income by quintile, December 2012

Income group	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Share of GDP held by quintile	6.8	11.1	15.6	21.7	44.8
Total GDP held by quintile (million TSH)	3,040,801	4,963,661	6,975,955	9,703,733	20,033,513
Per capita GDP (TSH)	348,513	568,896	799,530	1,112,167	2,296,086
Average monthly per capita GDP (TSH)	29,043	47,408	66,627	92,681	191,341
Monthly food-basket cost as percent of income, December 2012					
Dar es Salaam	152	93	66	48	23
Southern Highlands	106	65	46	33	16
Lake Zone	135	82	59	42	20

Note: GDP = gross domestic product.

TSH = Tanzanian shillings (1 U.S. dollar = 1,666 TSH).

Source: USDA, Economic Research Service using data from the World Bank and the Tanzanian National Bureau of Statistics.

<sup>19</sup> Per capita GDP from the National Accounts is an imperfect proxy for household income. An alternative approach would be to use total consumption derived from TZNPS as a proxy for income. The principal motivation for developing the food-basket measure, however, was to be able to monitor changes in access to food. GDP data are updated regularly and are available with only a short lag, which allows users to follow monthly changes in access to food; whereas data from TZNPS are only available every few years.

Combining the GDP data with income quintile share data from the World Bank, we created the national average per capita GDP by quintile (see table 8). Based on these estimates, households in the bottom quintiles appeared vulnerable to food insecurity, with the food basket costs greatly exceeding average incomes. However, these aggregate estimates could be misleading given the considerable variation in income across areas—for example, average per capita income in Dar es Salaam was twice that in the Lake Zone and close to twice the average income in the Southern Highlands. Therefore, it is likely that more households in the country’s top quintiles lived in Dar es Salaam and fewer of them lived in other areas; similarly, households in the bottom quintiles (with difficulty accessing food) were more likely to live outside of Dar es Salaam.

The TZNPS survey data appear to support these hypotheses. For example, less than 2 percent of households in Dar es Salaam were in the bottom income quintile of Tanzania, while as many as 76 percent of Dar es Salaam households were in the country’s top income quintile; and in the Lake Zone, a larger portion of households were in Tanzania’s bottom quintile and a smaller portion were in its top quintile. Therefore, access was likely a bigger problem in the Lake Zone and in the Southern Highlands than in Dar es Salaam. Further note that these ratios do not necessarily mean that the bottom quintile verged on starvation. The food basket calculations were based on average consumption patterns for all households in the areas (not on quintile-specific consumption patterns). While households at the bottom likely consumed fewer calories, they also likely consumed a cheaper (in calories per TSH), less diverse, and less nutritious diet—consisting of less meat, less fruit, less rice, and more maize and other starches. Unfortunately, the survey design does not allow us to calculate food baskets by quintile within zone.

## Caveats to the Analysis

Limitations of the methodology and data must be kept in mind when interpreting the results of this study. Limitations include:

**Combining data from multiple sources.** The current methodology combined data from several sources (e.g., household surveys, national accounts, and FAO food balances). We took this approach to allow continuous monitoring of changes in food access using the most recent GDP and price data; using price and/or income data estimated from household surveys would have provided outdated food-access information. (It was necessary to use the household data to estimate calorie shares since such data are not available from other sources.) However, this approach has limitations. GDP per capita data from national accounts provide only a rough proxy for household income and thus may not reflect actual or disposable income for measuring food access of households. Similarly, the price data may not reflect accurately the true prices that households paid for their food. Finally, the FAO estimates of daily calories per capita do not take into account wastage that may have occurred at the household level; they also do not account for varying levels of activity—assuming only a “light work” level of activity. Thus, the constructed food baskets may not have reflected accurately the combination of food necessary to achieve the calorie threshold for certain Tanzanian households.

**Scope of the analysis.** Our analysis was limited to examining access to food—one pillar of food security. While food availability and utilization are important, our food basket methodology did not take them into account. Nevertheless, our analysis complements current food availability measures. With timely price reports, it is possible to track changes in the cost of the food basket. This analysis, combined with reports from the districts on crop conditions, can provide early warning of an impending food security problem.

**Survey limitations.** Another set of caveats concerns the nature of the survey. The food consumption data came from a 7-day recall method. As in other household surveys, there was the potential of measurement error associated with recall and waste. Recall bias stems from respondents’ memory lapses about food consumed over long periods of time, causing them to underreport or overreport the quantities of food consumed. This may occur systematically across foods or it may occur when recalling certain foods; in the latter case, the calorie shares across food groups would suffer from measurement error bias. Furthermore, household consumption data do not typically account for food waste (food prepared or purchased but not eaten), and thus estimates of food intake may be larger than actual values. Again, bias in the calorie share estimates occurs if there is more waste in certain food groups than others.

**Food away from home.** The food baskets calculated in this report accounted only for food consumed inside the home because we could not disaggregate food away from home by food group. The share of food expenditures outside the home was quite large, especially in Dar es Salaam, where food outside the home accounted for almost a third of all food expenditures. Thus we may not have captured the full food access experience of households in Dar es Salaam.

**Income assumptions.** Annual GDP was divided by 12 to obtain average monthly income; however, in an agriculture-dominated economy, monthly income may vary considerably by season. Therefore, our measures of access may have better reflected the true access to food in certain months during the years.

**Retail price data.** Serious limitations existed to the available retail price data in Tanzania. Prices used were provided by the NBS Department of Labor and Price Statistics, which is responsible for calculating the CPI. Market reporters in each region are responsible for sending the prices to NBS. District and regional governments determine which offices will be responsible for reporting prices, and there is little oversight. The methods used to collect and report prices are not consistent across regions, in terms of quality standards or units of measure. For example, maize and rice prices are reported on a per kilogram basis, but other food items, such as bananas, potatoes, cassava, and most fruit, are reported by the piece, bunch, or pile. NBS converts these measurements into kilogram equivalents, but because no standard definition exists for a pile or bunch, such prices likely suffer from measurement error.

Market prices reported for cassava are particularly problematic. Cassava is consumed mainly in the form of cassava flour, and in interviews conducted by ERS, households indicated that they preferred to buy cassava flour in the market because great care must be taken when processing raw cassava into flour, given its toxic nature. Since retail prices of cassava flour are not available, we converted quantities of flour to their raw cassava equivalent and then used the market price for raw cassava. There is little consistency across regions in reporting cassava prices; some regions report prices by the kilogram and others by piece (which can vary considerably in size). Cassava makes up a large share of the food basket in the Lake Zone and so its food basket costs and, thus, vulnerability to food security (driven by poor access) may be exaggerated.



## Conclusion

Considerable variation in diets exists among the geographical regions of Tanzania. Maize dominates the diets in the surplus-maize-producing regions of the Southern Highlands. However, in the maize-deficit regions in the north, maize, while still important, makes up a smaller share of food intake; households in these regions supplement maize with other starchy staples such as cassava and banana. The food basket cost is lowest in the Southern Highlands, because of the ready availability of low-priced maize. The cost is highest in Dar es Salaam but also quite high in the Lake Zone. Food basket costs have risen rapidly in nominal terms but remained stable in real terms.

The bottom two income quintiles of Tanzania's population, for which the cost of a minimal monthly food basket is over 50 percent of the average monthly income, face potential problems with access. Households in the Lake Zone could potentially face greater difficulties than those in the Southern Highlands because of higher food costs and lower average income. Fewer households in Dar es Salaam face difficulties with access. Average income in Dar es Salaam is nearly twice that of the two zones, and the cost of the food basket, while high, is not twice the cost. Further TZNPS data suggest that a greater share of households in Dar es Salaam than in the two zones is in the country's upper income quintiles.

Results of this analysis can help better pinpoint Tanzanian regions that may be more vulnerable to food insecurity. In the Lake Zone, the cost of the food basket is higher, because of generally higher food prices, and the average income is lower than the respective counterparts in the Southern Highlands.

Furthermore, knowing the monthly costs for a representative food basket across the country can help identify vulnerable households and calculate the appropriate resources for poverty alleviation programs, such as a recently launched pilot program of conditional cash transfers to vulnerable households (conditions include enrollment of children in school, regular health checkups, participation in nutrition workshops, among others), combined with "labor-intensive public works."

Finally, while this analysis has described representative food baskets, future work can focus on creating affordable food baskets that provide a better balanced diet using foods that are readily available and acceptable given current cultural tastes and preferences. For example, the baskets could include a greater variety of leafy green vegetables, which are widely grown in Tanzania, and could constitute a good source of vitamin A, and millet could be an alternative to maize, offering more minerals such as calcium and phosphorus than maize does.

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