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Assessing Food Security in Tanzania in the Next Decade

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ARD ECONOMIST Beghin and USDA ERS have been collaborating to advance USDA ERS' annual International Food Security Assessment. The Assessment provides a 10-year outlook of the state of food insecurity in 76 low- and middle-income countries with a strong focus on the interface between income distribution within the population and food insecurity.

This collaboration with CARD brings a more systematic approach into the Assessment by introducing price information, price and income responses in consumption, which vary by level of poverty, food quality heterogeneity across income deciles, and consistent aggregation of the demand by deciles into a market demand. The new approach relies on a food demand system consisting of four categories (major grain, other grains, roots and tuber, and an aggregate all other food) in grain equivalent.

For each food category, the new approach developed for the Assessment explicitly incorporates a measure of the decile income distribution and its impact on food demand by decile and at the aggregate level. Further, the approach incorporates variable food quality, with quality increasing with increasing income across deciles.

Various qualities of a given food category are aggregated into an average-quality equivalent that leaves country-level consumption unchanged, but reflects consumer choices over quality. Prices faced by different



Tanzanian food market Photo by Roxanne Clemens

consumer deciles vary accordingly with quality, with lower-income deciles consuming cheaper calories than higher-income deciles. Quality scaling in the approach uses a reference consumption level based on national food survey data that FAO publishes annually in *State of Food Insecurity* (SOFI). This reference consumption level focuses on the bottom decile and represents a credible level of consumption in grain equivalent for the poorest segment of the population in the country under consideration.

The new methodology introduces an explicit link between domestic and international markets and the imperfect connection between the two because

of sizable trade and transaction costs. Interior markets of these countries are somewhat insulated from what is happening at the border or capital cities where trade takes place. High transportation costs and other sizeable frictions impede prices from equalizing geographically. The methodology uses international price projections from USDA's international agricultural outlook. These projected world prices and exchange rates movements are then used to project future domestic prices faced by consumers in these countries, while accounting for the imperfect transmission between markets, various taxes, and transportation costs.

Using these projected prices, population, and income and exchange rates projections from international agencies, food consumption is projected for 10 deciles for a decade (2013-2023). Food security is assessed by comparing projected food consumption for low-income deciles with a target caloric level corresponding to food security. Deciles with an average food consumption falling below these foodsecure levels are deemed food-insecure. The new approach also provides a more direct estimate of projected food insecurity based on national survey statistics collected in SOFI and characterizing food distribution in these countries.

This article reports estimated food consumption and food insecurity in Tanzania for 2013–2023 based on ᅉ actual food market information of 2012. This article presents food projections and key determinants of food consumption growth for the key staple grain in Tanzania and the projected state of food insecurity in Tanzania.

Based on the SOFI information and other FAO data on food availability, the per capita food availability for the first decile of Tanzanian population in 2012 is estimated at 138 kg of grain equivalent (rounded) per year (about 1,239 calories per day). This minimum reflects the quality adjustment incorporated in the new method, such that the calibrated food demand is set to 138 kg in the base year for the lowest decile. Over time, this minimum consumption is projected to grow slowly, following the projected distribution of food availability in the country, again based on the SOFI parameters and projected income growth, decreases in prices, and appreciation of the Tanzanian currency making food cheaper over time. Figure 1 shows the projected consumption for decile 1 (and other deciles) in kg of grain equivalent per year.

As income per capita is projected to increase over time in Tanzania, consumption is also projected to

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Figure 1. Projected total food consumption in grain equivalent by income-based population decile in Tanzania

increase despite the prevailing income inequality, which is maintained unchanged in the projection. Food consumption per decile is shown in Figure 1. The four bottom deciles are projected below the threshold of 234 kg for some (deciles 3 and 4) or all years (deciles 1 and 2).

Decomposing the growth of food demand

The projected growth of food demand in Tanzania is decomposed by major sources of changes—average per capita demand growth and population growth. Per capita demand growth is further decomposed in terms of income response and price response of consumers (decomposed into a real world price response and real exchange rate response). Concretely, for corn, the major grain consumed in Tanzania, aggregate food demand is projected to increase by 76 percent in the projected decade, given the growth of projected real income per capita (+18 percent), real world price for corn (-49 percent) real exchange rate (-22 percent), and population (+35 percent). Per capita demand for corn is projected to grow by 30 percent given the outlook of lower prices, stronger currency, and higher

income. The interaction of population growth (the largest predictor of projected food demand) and per capita demand is responsible for 11 percent of total demand growth.

The decomposition of demand growth per capita indicates that change in the real world price of corn, after being scaled down by the price response of consumers and the presence of frictions in markets, is still a large contributor to per capita demand growth (14 percent growth of per capita demand). The projected real appreciation of the Tanzanian currency leads to 6 percent growth of per capita food demand. Finally, income growth contributes 9 percent growth of per capita demand.

Food security assessment

The projection of food demand by income decile allows for the analysis of food insecurity in terms of "access," which estimates if people can purchase enough food to be food secure.

Two approaches are used. First, we use the decile food demands and compare them with nutritional targets (1,800 and 2,100 calories) to determine whether a given income group would be considered food

Table 1. Projected Food Insecure Population in Tanzania(Estimated with two food security thresholds and two methods)

| Year | | 2012 | 2013 | 2018 | 2023 |
|---|-------------------------|------------|------------|------------|------------|
| Average per capita daily calorie intake | Projected | 2,430 | 2,538 | 3,105 | 3,306 |
| Food insecure population 1800 calorie target | Lognormal approach | 11,571,381 | 10,088,020 | 4,581,702 | 3,718,825 |
| Percent of population falling below 1800 | Lognormal approach | 24.67% | 20.90% | 8.26% | 5.86% |
| Food insecure population 1800 calories | USDA decile approach | 14,073,830 | 9,652,388 | 5,545,134 | 6,346,112 |
| Percent of population food insecure 1800 calories/day | USDA decile approach | 30% | 20% | 10% | 10% |
| Food insecure population 2100 calorie target | Lognormal approach | 18,944,397 | 17,198,274 | 9,541,100 | 8,267,888 |
| Percent of population falling below 2100 calories/day | Lognormal approach | 40.38% | 35.64% | 17.21% | 13.03% |
| Food insecure population 2100 calorie target | USDA decile approach | 18,765,107 | 19,304,777 | 11,090,269 | 12,692,225 |
| Percent of population food insecure 2100 calories/day | USDA decile approach | 40% | 40% | 20% | 20% |

secure. USDA has used this approach with the 2,100-daily calorie threshold and an 1,800-calorie target alternative for sedentary people. There is no universal standard for food security but these two targets are plausible.

In this decile method, if the estimated decile food demand falls below the target the entire income group is counted as food insecure. Aggregating the people in these fooddeficit income deciles provides the number of food-insecure people. Hence, the variation in food-insecure population changes by 10 percent increments when population deciles come in or out of food insecurity. Figure 1 informally illustrates this method. All deciles falling below the red line of 234 kg are deemed food insecure. One can also gauge the food gap between the target and consumption level by decile. The gap provides an indication of the depth of the insecurity. Table 1 presents the projected population that would be insecure.

The second method uses an estimate of the food distribution (assumed lognormal) within the population based on distribution parameters provided in SOFI, which are updated to reflect the projected mean food availability over time. This second approach is more refined as it provides an estimate of the share of population falling below a preset threshold.

Table 1 shows the estimates of food insecure population projected over the decade (2013, 2018, and 2023). Both approaches concur that population in the first decile will remain food insecure even under the low threshold of 1,800 calories. Under the more stringent criterion of 2,100 calories, people in the two bottom deciles will remain food insecure in 2023. The decile approach overstates the share of population (20 percent) that is food insecure compared to the distribution-based estimate of 13 percent. Assessing future food security remains an imprecise exercise!

Further readings:

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