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# Food System Transformation and Diet Quality among a Rising Middle Class in Mozambique

Jenny C. Smart<sup>1</sup>, David Tschirley<sup>2</sup>, Francis C. Smart<sup>3</sup>

<sup>1</sup> Research Analyst, International Food Policy Research Institute

<sup>2</sup> Professor, Department of Agricultural, Food, and Resource Economics, Michigan State University

<sup>3</sup> PhD Candidate, Department of Counseling, Educational Psychology, and Special Education, Michigan State University

Contact: [j.smart@cgiar.org](mailto:j.smart@cgiar.org)

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# Food System Transformation and Diet Quality among a Rising Middle Class in Mozambique

Jenny C. Smart<sup>1</sup>, David L. Tschirley<sup>2</sup>, Francis C. Smart<sup>2</sup>

<sup>1</sup>International Food Policy Research Institute <sup>2</sup>Michigan State University

## INTRODUCTION

- The overweight and obesity epidemic is on the rise globally among developed nations, as it is also quickly evolving among the rapidly expanding middle class in developing nations such as those in sub-Saharan Africa (SSA).
- As incomes rise, households increasingly purchase more perishable foods such as meats, dairy, fruits and vegetables, as well as processed foods, many of which are of little nutritional worth.
- Meanwhile, the rural population continues to grow in SSA and in Mozambique, like in other countries, migration by those exiting farming life to pursue jobs in a nearby urban center is leading to a proliferation of rapidly expanding towns and cities across the country.
- For some, it is possible to continue farming a plot of land, even from within a town or city, to help supply personal food consumption.
- No one has analytically showed a relationship between own farming, city size, and nutritional outcomes.

## OBJECTIVES

In the context of rapid urbanization and income growth, this paper seeks to understand the key drivers and likely evolution of diet quality in Mozambique, while specifically examining the potential role that urban farming might play within this transition.

## DATA

This study uses Mozambique's nationally representative 2008/09 IOF (*Inquérito de Orçamento Familiar*) household budget survey, which includes a large number of food items (384 unique food items in 2009).

We adapted Imamura et al.'s diet quality measure for this data set (2015), which is a combined score calculated by assigning to each household a combination of positive points on the basis of increasing acquisition of nine healthy food or nutrient items (wholegrains, fruit, vegetables, fish, nuts/seeds, beans/legumes, fiber, calcium, and polyunsaturated fat) and negative points on the basis of acquisition of six unhealthy food/nutrient items (sugar-sweetened beverages, unprocessed red meat, processed meat, cholesterol, sodium and saturated fat). Corresponding applied nutritional parameters come primarily from the U.S. Department of Agriculture (USDA) food composition table, complemented when needed by other sources.

**Table 1. Most commonly represented food groups purchased among Mozambique households**

Food Group	Participation Rate	Mean (g)	Median (g)	Std Dev	COV	Participation Rate Ranking
Vegetables	93%	160.8	61.5	0.54	3.38	1
Cereals	87%	300.5	322.2	0.21	0.68	2
Fruit	84%	186.0	94.1	0.38	2.06	3
Nuts	78%	61.9	36.2	0.09	1.43	4
Fish	72%	29.4	10.8	0.06	2.04	5
Roots	53%	130.1	24.3	0.24	1.84	6
Miscellaneous	41%	10.0	0.0	0.05	6.59	7
Oil	49%	7.0	0.0	0.02	2.15	8
Sugars	36%	14.8	0.0	0.04	2.45	9
Meat	31%	20.7	0.0	0.07	3.22	10
Beverages	21%	17.1	0.0	0.23	13.55	11
Egg	8%	1.2	0.0	0.01	6.27	12
Milk	3%	1.0	0.0	0.01	10.52	13

Source: 2008/2009 IOF data and author's calculations

Notes: Quantities are daily per adult equivalent edible percentage kgs acquired. The coefficient of variation (COV) for the categories of beverages, milk, vegetables and fruits are high due to the standardization to a 2,000 kcal diet, which in many cases causes the quantities of these high density, low calorie items, to be overrepresented in the household's collective diet.

## DESCRIPTIVE STATISTICS

- The share of households owning land falls significantly with the household's location in a city of increasing size.
- Fifty-eight percent of urban households own a farm compared to 98% in rural areas.

**Table 2. Farm ownership and city size**

City Size where Household is located	Someone in the household owns land	
Rural	4,301	98%
Small Town (<100k)	2,542	83%
Secondary city (100k-999k)	1,094	49%
Large city (> 1m)	152	13%
All urban (Towns, secondary cities, and large cities)	6,478	58%
Total (N = 10,877)	8,089	74%

## REGRESSION RESULTS

This section assesses the patterns and drivers of current household level dietary quality over space (rural, small towns, secondary cities, and large cities), household income levels (proxied by total household expenditure), household education, and other demographic variables. All reported relationships are based on a statistically significant regression coefficient.

Female headed households eat healthier diets, purchasing greater shares of cereals and vegetables and less sugars, syrups, sweet, oils and fats.

Households with older household heads eat less healthy diets, purchasing smaller shares of positive and negative food items.

Urban households eat less healthy diets, primarily because they purchase greater shares of negative food items (sugars, fat and (non-specific) beverages), as city size increases, as well as purchase lesser shares of positive foods (nuts/seeds/legumes and vegetables).

However, urban households eat more *diverse* diets. Households in Maputo city spend greater shares on fruit, and fish purchase shares increase as households graduate from rural to small towns (less than 100k) and medium size urban centers (100-999k).

Households which own their own farm eat less healthy diets, perhaps because farming households are located in lower income urban areas where more oily or fatty foods are common.

Households which own their own farm, controlling for the share of those who own their own farm in the surrounding area, eat healthier diets, purchasing fewer negative foods (sugars, fats, beverages and meats). At the same time, these households eat less *diverse* diets. This may be due to farmers relying more heavily on their own production, and not visiting a market as frequently. Households owning their own farms purchase greater shares of cereals/grains, starchy/roots/tubers/legumes and nut/seed/legume and less sugar, fat, beverages and meats.

Total expenditure has a negative effect on dietary quality; however these results are mixed between both of our methodological approaches of normalizing daily per capita consumption. Food group share analysis indicates that as total expenditure increases, meat, beverages, eggs and milk product food expenditure shares increase, and vegetable, fish, nut/seed/legume and roots/tubers shares as well as sugary foods decrease.

Households with educated male or female heads eat more diverse diets, purchasing greater shares of milk and meat. This positive effect is stronger for households with educated female heads.

Households with educated male heads eat less healthy diets, purchasing more negative food items, although also purchasing foods less dense in saturated fats and with greater ratios of monosaturated fat to saturated fat. Households with educated male heads purchase lesser shares of nuts/legumes and vegetables and greater shares of oil/fats and beverages.

## REGRESSION RESULTS CONT.

Larger households (measured in adult equivalents) eat less healthy diets, purchasing more negative food items, including greater shares of sugars, syrups and sweets, although also purchase foods with more favorable ratios of monosaturated fat to saturated fat.

Households with self-employed male heads have more healthy and more diverse diets, purchasing more positive foods including greater shares of cereals and grains, and less negative foods including lower shares of oils and fats.

Households with salaried female heads have a less healthy and less diverse diets, purchasing greater shares of foods high in saturated fat and sugar, although also purchasing greater shares of fish and milk.

Households with children less than five or teens 12 to 20 have generally less healthy diets, purchasing more negative food items, especially among the families with adolescents.

**Table 3. Regression results summarized**

	Healthier Diets	Less Healthy Diets
Household Head Characteristics	-Female -Self Employed and Male	-Older -Salaried and Female -Educated and Male
Household Characteristics	-Larger -Own their own farm	-Urban -Has children under 5 -Has adolescents 12-20
	Diverse Diets	Less Diverse Diets
Household Head Characteristics	-Educated -Self Employed and Male	-Salaried and Female
Household Characteristics	-Urban	-Own their own farm

As incomes rise and Mozambique's expenditure capacity increases, there will be significant and positive increases in the shares of purchased food which is highly processed, and are shown to decrease dietary quality. This will be concurrently accompanied by a significant drop in shares of own production of food consumed, as well as a drop in the share of food purchased which is unprocessed and nonperishable, both of which are associated with significantly increasing dietary quality.

**Table 4. How much of our combined dietary quality measure is explained by the budget shares of an eight-group processing and perishability food categorization**

These categories increase diet quality:		Level of Significance	
Food Category	Most Representative foods consumed in each category	HH R2= 0.20	Community R2=0.27
2 Own production and non-perishable	12% coconut, 7% white maize grain, 4% fresh corn, sweet potato, dried cassava	2.3***	2.0
4 Unprocessed and non-perishable	57% coconut consumption	8.2***	20.0***
These categories decrease diet quality:			
3 Unprocessed and perishable	24% tomato, 23% fish, 15% kale	0.4	-12.1***
5 Low processed and perishable	41% dried fish, 13% chicken, 10% goat	-8.9***	-19.6***
6 Low processed and non-perishable	41% common quality rice, 28% xima cooked corn meal, 14% brown sugar	-4.1***	-5.6***
7 High processed and perishable	17% traditional liquor, 13% wine, 11% fruit juice	-8.7***	-9.1***
8 High processed and non-perishable	74% normal wheat bread, 9% vegetable oil	-9.2***	-10.0***

Source: 2008/2009 IOF data and author's calculations

Notes: Results are relative to the "own production and perishable" default group number one. (\*\*\*) p<0.01, \*\* p<0.05, \* p<0.1

## CONCLUSIONS

The consumption of processed foods is significantly and strongly associated with the worsening of negative factors in the diet.

Income growth is associated with the worsening of negative dimensions of diet, however is not consistently associated with simultaneous improvement in positive dimensions of diet, nor are these results, when positive, significant. In fact, some of our results do show the troubling result of significant decreases in consumption of positive dimensions of diet with households' rising income.

Whether the income effect on diet significantly differs across rural and urban areas varies based on the method of standardization we applied to household food acquisition. When the approach is used that normalizes total food acquisition to a 1,000 calorie diet, the income effect on diet is negative and significant and this does not significantly differ across rural and urban areas, as we hypothesized. However when the approach is used that normalizes food acquisition by day and per adult equivalent, the income effect is negative and significant in the urban areas, but positive and significant in the rural areas.

As we hypothesized, urbanization, controlling for income, is associated more strongly with a worsening of negative factors than with an improvement in positive factors.

We assumed that households interested in eating fresh foods are more likely to seek out land to farm so that they can eat more fresh food, regardless of if they are actually able to achieve access to land to do so or not. We then asked, for those that do gain access to farm land, does this allow them to eat even more healthy diets than they would otherwise? Our results show that controlling for the share of others in one household's area that own a farm, the effect on nutrition of owning one's own farm is positive and significant, primarily driven by these households purchasing lesser amounts of negative food items.

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## CONTACT INFORMATION

Jenny Smart ([j.smart@cgiar.org](mailto:j.smart@cgiar.org)) was a Survey Data Analysis Advisor in the Agricultural, Food and Resource Economics Department of Michigan State University, East Lansing, when she wrote most of this work. She is currently a Research Analyst II in the Development Strategy and Governance Division of the International Food Policy Research Institute, Washington, D.C., USA.

David Tschirley ([tschirle@msu.edu](mailto:tschirle@msu.edu)) is a Professor of International Development and the Co-director of the Food Security Group in the Agricultural, Food and Resource Economics Department of Michigan State University, East Lansing, MI, USA.

Francis Smart ([smartfra@msu.edu](mailto:smartfra@msu.edu)) is a PhD candidate in the Counseling, Educational Psychology, and Special Education Department of Michigan State University, East Lansing, MI, USA.