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Foodgrain Consumption and Calorie Intake Patterns in Ethiopia

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1. Introduction

Levels and composition of food consumption are major determinants of the nutritional well-being of individuals, which in turn, have important implications for health, productivity, and income. Analyzing food consumption patterns in poor countries, such as Ethiopia, is therefore pivotal to designing national policies to promote food security.

Food consumption patterns in Ethiopia are diverse, and unlike in many other countries, no single crop dominates the national food basket (e.g., rice in most of East Asia, maize in Latin America, or cassava in Central Africa). The Ethiopian food basket consists of a wide variety of grains and other staples. However, consumption levels and mixes of these grains vary widely according to differences in agro-ecology, socioeconomic levels, and livelihood strategies. Moreover, given dependence on own production, particularly in rural areas, foodgrain consumption varies at different times of the year. As in many other traditional societies, dietary preferences and consumption patterns are heavily influenced by cultural values and traditions and may not necessarily reflect availability or the nutritional quality of specific food items.

This chapter presents an analysis of consumption patterns and intake of selected foodgrains across rural and urban locations, agroecological zones, and income groups. The research focuses on the six principal staples in the country: teff, wheat, maize, sorghum, barley, and *enset* – often called “False Banana.” A quick look at the nationally representative data used in this analysis shows that these major staples dominate the national food basket in Ethiopia, supplying more than 70 percent of calories (Table 1.1).

Table 1.1. Rural vs urban per capita calorie consumption of food items (2004/05)

Food Item	Per Capita Calories			%
	Urban	Rural	National	
Cereals				
Teff	601.70	196.69	254.13	10.9
Wheat	200.59	309.79	294.30	12.6
Barley	38.16	144.58	129.48	5.6
Maize	107.53	435.99	389.40	16.7
Sorghum	94.72	366.21	327.70	14.1
Other-cereals	25.21	53.29	49.31	2.1
Processed-cereals	195.15	17.10	42.35	1.8
Enset/kocho/bulla	27.18	215.15	188.49	8.1
Total Cereals & Enset	1290.24	1738.79	1675.17	71.9
Non-cereals				
Pulses	123.94	167.06	160.95	6.9
Oil-seeds	2.49	5.43	5.01	0.2
Animal-products	65.43	58.07	59.12	2.5
Oil&fat	145.18	31.91	47.98	2.1
Vegetables&fruits	60.78	59.43	59.62	2.6
Pepper	6.89	3.57	4.04	0.2
Coffee/tea/chat	30.62	42.72	41.01	1.8
Root-crops	72.36	124.52	117.12	5.0
Sugar&salt	93.54	51.67	57.61	2.5
Other-foods	96.47	103.28	102.31	4.4
Total (National)	1987.96	2386.46	2329.94	100.0

Source: Author's calculation using HICES 2004/05.

The data used in the analysis come from the Household, Income, and Consumption Expenditure Survey (HICES), conducted by the Ethiopian Central Statistical Agency (CSA). The HICES, conducted roughly every five years since 1995/96, is a large dataset collected from a nationally representative sample of households and has detailed information on consumption expenditures for food and non-food items.

2. General trends in food consumption in Ethiopia

For those with low levels of income, food accounts for the majority of a households' consumption budget. Engel's Law dictates that as household income rises, the share spent on food falls. In Ethiopia, the HICES datasets show that food consumption expenditures have declined from 60 percent in 1995/96 to 56 percent in 2004/05 (MoFED 2008), consistent with Engel's Law. The data also show that there has been a rapid growth in non-food expenditure levels in urban areas in the same period (MoFED 2008). The decline in food expenditure slightly varies between rural and urban locations. Figure 2.1A presents the density of per capita food expenditure by location, divided by rural and urban areas. While the national food consumption pattern clearly follows the rural consumption distribution, urban consumption was significantly higher than rural consumption.

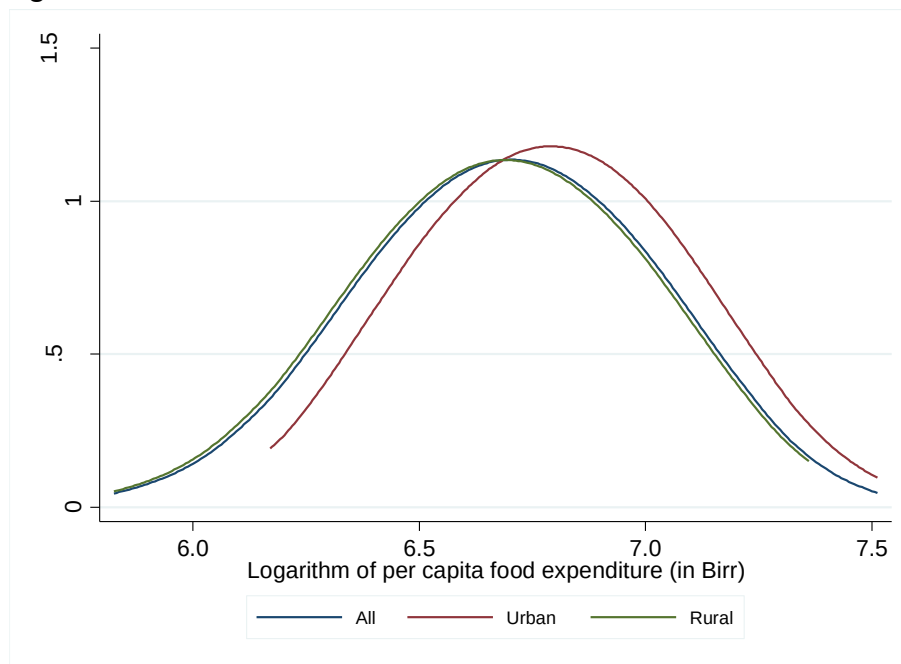
The average pattern in Figure 2.1A conceals considerable heterogeneity across income (expenditure) levels in both rural and urban areas, however. Figure 2.1B presents a nonparametric Engel curve that captures such heterogeneity, depicting per capita total expenditure against per capita food expenditure. As expected, the share spent on food falls as household per capita consumption expenditure rises.

That is to say, while households (i.e., rural and urban combined) at the lower end of the distribution allocate about 60 percent of their budget to food, households at the top end allocate less than 50 percent of total consumption expenditure to food consumption.¹ Again, figure 2.1B shows that among those at the lower end of the income distribution, rural households spend more on food, and the decrease in food share as income rises is lower for rural than for urban households. While the Engel curve indicates that there are differing consumption expenditures across income levels, the analysis so far does not provide a clear picture of which foodgrains are consumed by which income group in which location, or how consumption patterns evolve over time. The following sections are devoted to explain variations in consumption patterns of the six major cereal grains (i.e., teff, wheat, maize, sorghum, barely, and enset) disaggregated by spatial, temporal, and socioeconomic parameters.

¹ Although expenditure shares are considered here, this pattern can be viewed as consistent with Engel's law given the strong positive correlation between expenditure and income.

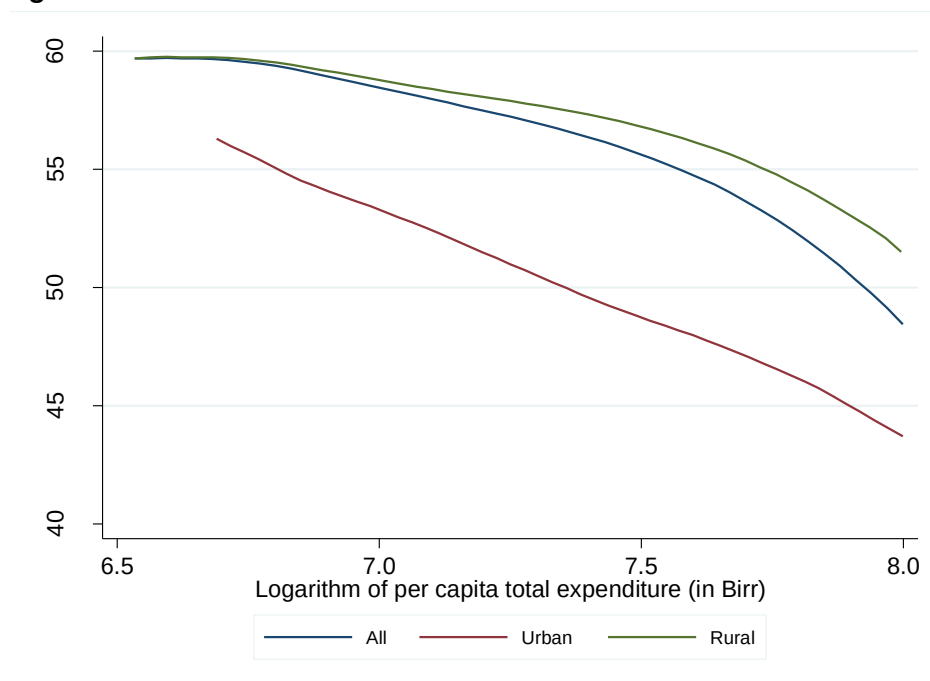
Figure 2.1 (A and B). Nonparametric regression estimates of per capita food expenditure²

Figure 2.1A



Source: Authors' calculation using HICES 2004/05 dataset.

Figure 2.1B



Source: Authors' calculation using HICES 2004/05 dataset.

² The natural log of 6 corresponds to a value of 403 Birr; the natural log of 7 corresponds to a value of 1,097 Birr; the natural log of 8 corresponds to a value of 2,981 Birr; the natural log of 9 corresponds to a value of 8,103 Birr. Both graphs use Band width (BW) of 0.25.

3. Livelihoods and consumption patterns of major foodgrains

Ethiopia's geography is very heterogeneous, and livelihood strategies tend to vary across locations. More specifically, food consumption patterns in Ethiopia are directly related to the geography of food production. Traditionally, people consumed what they produced; due to poor market linkages and the tendency to be food self-sufficient, household consumption patterns are often linked to foodgrain production. It follows that foodgrain consumption patterns can be explained by disaggregating national consumption into rural-urban livelihood differences and by agro-climatic regions, which largely determine production.

Teff is largely consumed in urban and semi-urban Ethiopia, whereas maize and sorghum are major lowland staples. These two cereals are, however, minimally consumed in the urban areas of Ethiopia. Wheat has become a very important staple in recent decades throughout the country, in part due to the massive wheat food aid shipments. Barley is consumed mostly in the colder highlands and *Belg*³ growing areas, but again to a limited extent. *Enset* is another major staple in the highland areas of the Southern Nations, Nationalities and Peoples administrative region (SNNP). It accounts for the majority of food and calorie intake in these areas.

3.1. Consumption patterns across rural-urban locations

Part of the diversity in consumption patterns across Ethiopia can be explained by the variations in rural and urban livelihoods. Due to the inherent characteristics of living in urban areas, urban consumption patterns are expected to be more dynamic than in rural areas. One such inherent characteristic of urban consumption is that it is highly monetized and sensitive to relative price and supply changes. Moreover, consumption patterns are likely to change more quickly in urban than in rural areas due to the relatively increased exposure of urban areas to changing global food consumption patterns.

Thus, comparing per capita budget shares of major foodgrains in both locations can provide insights into differences in consumption patterns under the two livelihood structures. Such analysis also hints at what to expect in the future, with respect to the increased urbanization of rural areas in recent years. Table 3.1 shows the share of (per capita) consumption expenditures of the major foodgrains and *enset*, by rural and urban categories (see also Table 3.2 for quantity of per capita food consumption). The five major cereals, excluding other (processed) cereals, constitute 43 percent and 39 percent of total food consumption, respectively, in rural and urban areas. Teff only constitutes 23 percent of urban food consumption, and maize and sorghum, respectively, constitute 13 percent and 11 percent of rural food consumption.

Table 3.1. Rural and urban per capita consumption expenditure percentages of major cereals and *enset* in Ethiopia , 2004/05

Location	Teff	Wheat	Barley	Maize	Sorghum	Other Cereals (inc. processed)	Total Cereals	Enset
Rural	0.06	0.09	0.04	0.13	0.11	0.02	0.46	0.14
Urban	0.23	0.08	0.01	0.04	0.03	0.12	0.51	0.02
National	0.08	0.09	0.04	0.12	0.10	0.04	0.46	0.13

Source: Authors' calculation based on the HICES 2004/05 dataset.

³ The Ethiopian production season is divided into two periods of productivity: the more productive *Meher* and the less productive *Belg*.

Table 3.2. Quantity of per capita food consumption in Ethiopia by location (Kg), 2004/05

Location	Teff	Wheat	Barley	Maize	Sorghum	Other (incl. processed) Cereals	Total Cereals	Enset	Other food items	Total Foods
Rural	20.1	31.2	14.3	42.2	35.9	8.1	151.7	47.2	133.9	332.9
Urban	61.4	20.2	3.8	10.4	9.3	32.2	137.2	6.0	126.0	269.3
National	25.9	29.6	12.8	37.7	32.2	11.4	149.6	41.4	132.9	323.8

Source: Authors' calculation based on HICES 2004/05 dataset.

Note: Kg: kilogram

Two distinct features of consumption patterns between rural and urban areas are worth noting here. First, while other cereals and processed cereals occupy a sizeable share of urban per capita budget shares (12 percent of total food spending compared to 2 percent for rural areas), rural consumption is dominated by the main (raw) cereal grains and *enset*. Second, despite the increased shift to processed cereals and other cereals, teff continues to keep its prominence on urban food plates (23 percent of total per capita food spending). Wheat also takes a substantial share (8 percent) of urban per capita food expenditure, next to teff and other cereals, including processed ones. This may be due to the relative price effects of frequent wheat food injections into the economy as food aid and food-for-work. In contrast, maize, sorghum, and *enset* remain predominantly rural foodgrains. In sum, mainly owing to the sizeable consumption of teff and the shift to processed cereals and other cereals, urban consumers spend a little more than half (51 percent) of their food budgets on cereals – which is 10 percentage points higher than in rural areas as well as national per capita spending (46 percent for both).

In terms of policy, it is interesting to see how these consumption patterns respond to changes in incomes and prices. Estimated income (expenditure) and price elasticities of demand for the 2004/05 HICE dataset are presented in Table 3.3 (Tafere et al. 2009)⁴. Consistent with the budget allocations, elasticity estimates reflect the rural-urban taste and preference differences for major food items. All major foodgrains (except sorghum) in urban areas are normal goods and sensitive to income changes in both rural and urban areas. Teff boasts the highest income elasticity among cereals in both rural and urban areas: one percent increase in income increases demand by more than one percent. In fact, in rural areas, teff is more of a luxury foodgrain, often consumed in special festivities, or offered for special guests, and in some instances only older family members eat it. Wheat and maize seem to be necessity foodgrains, respectively, in urban and rural areas. However, both grains seem to be more price elastic for urban residents versus rural residents. While sorghum is an important foodgrain for rural residents, it remains inferior among urban residents. Cross-price elasticity estimates also suggest that sorghum is complementary to teff in urban areas, perhaps engendering the common practice by poorer urban residents in Ethiopia of mixing sorghum with teff. In general, all major foodgrains have close to unitary own-price elasticities in both locations. However, compared to urban consumers, rural consumers seem to have greater propensity to react to changes in incomes than to changes in prices (Table 3.3).

⁴ Using the same dataset, Tafere et al (2010) estimate a demand system of 10 equations (9 equations in their linear model) and applied Iterative Feasible Generalized Non-Linear Least Squares (IFGNLS) estimation procedure to both the linear Almost Ideal Demand System - AIDS and Quadratic Almost Ideal Demand System - QUAIDS demand models.

Table 3.3. Budget shares, and own and income (expenditure) elasticities of demand for selected food items in rural and urban areas, 2004/05

Food items	Urban			Rural		
	% of Total Budget Spent	Own Price Elasticity of Demand	Income Elasticity of Demand	% of Total Budget Spent	Own Price Elasticity of Demand	Income Elasticity of Demand
Teff	16.7	-0.92	1.10	7.5	-0.92	1.20
Wheat	4.9	-1.00	0.78	9.6	-0.94	1.19
Maize	1.1	-0.93	0.37	5.0	-0.70	0.82
Sorghum	1.8	-0.93	-0.36	9.3	-0.71	0.51
Pulses and other cereals	6.6	-0.88	0.90	9.8	-1.03	0.74
Animal products	12.7	-0.91	1.72	8.0	-0.94	1.98
Fruits, vegetables, and root crops	7.8	-0.99	1.22	7.7	-1.01	1.18
Other foods	10.5	-0.92	0.66	8.9	-0.92	0.92

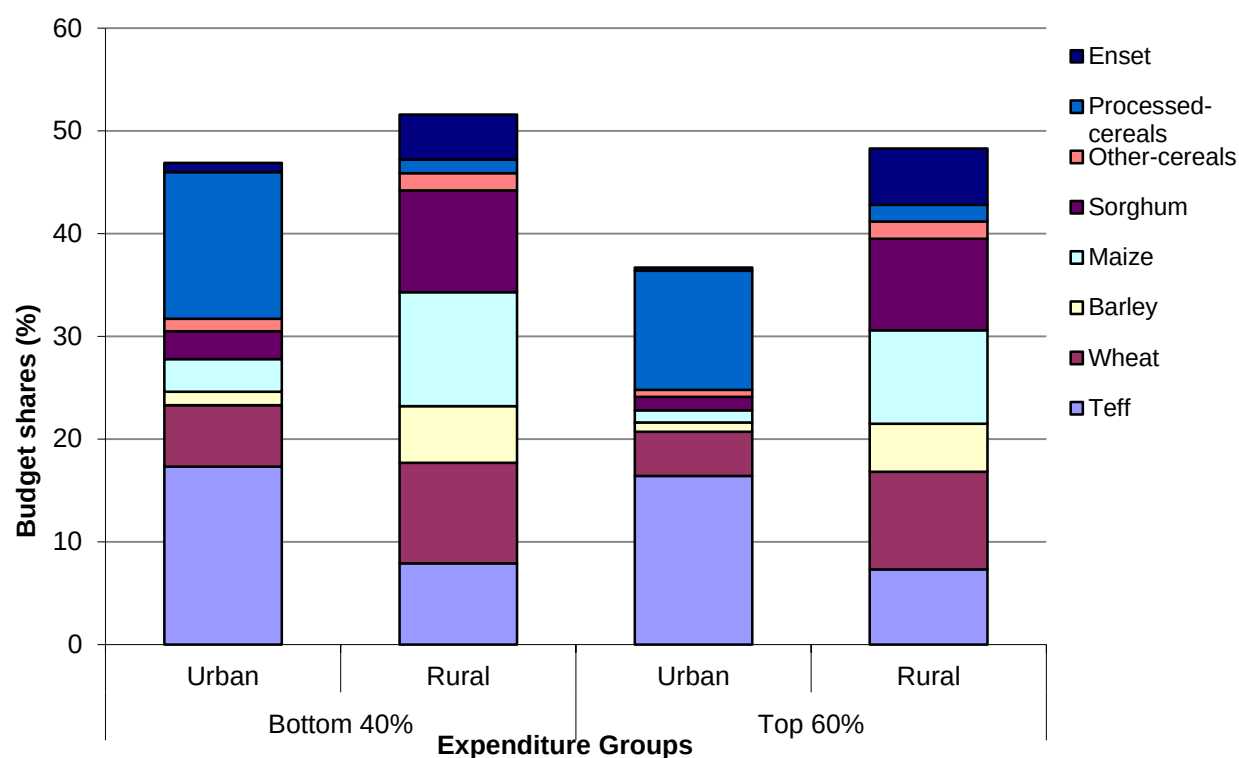
Source: The elasticities are based on Tafere et al (2010). The budget shares are authors' calculations. All based on the HICE 2004/05 dataset.

The analysis thus far reveals differences in consumption patterns between rural and urban residents. However, such aggregated rural-urban classifications may mask a great deal of variations across income groups between and within each category. Figure 3.1 presents expenditure shares of major cereals (in total food consumption) from the 2004/05 dataset, disaggregated by the top 60 and bottom 40 percent income groups (see also Table 3.4). An interesting pattern in this figure is that the bottom 40 percent of rural residents are among the relatively highest consumers, in terms of budget shares, of cereals in general, and maize, wheat, and sorghum in particular; among the lowest consumers, in terms of budget shares, are the top 60 percent of urban residents. Note that this is much lower if the processed cereals, which take a good share of expenditure among urban residents, are taken out of total cereals. It is also interesting to see that the top 60 percent of rural residents consume relatively less total cereals than what the bottom 40 percent of urban residents consume. The overall conclusion to draw from this pattern is that expenditure shares of cereals in Ethiopia decline as income increases.

Looking at individual cereals within income groups of the rural or urban category, one observes that while teff still remains an urban staple regardless of income, maize, sorghum and other cereals, although important in the food basket of the bottom 40 percent, are rarely consumed by the highest 60 percent of urban residents. This is quite noteworthy, given that teff is traditionally a luxury good for the vast majority of urban poor and the other cereals, like sorghum and maize, are inferior among the top richest urban sections⁵. On the other hand, teff is a luxury for most households in rural areas and is produced as a cash crop.

⁵ Note that Teff has an elasticity of 1.1 in urban areas, indicating that it is a luxury for the average urban resident.

Figure 3.1. Percentage share of major cereals in total food expenditures in Ethiopia, 2004/05



Source: Authors' calculation using HICES 2004/05 dataset.

Table 3.4. Share (%) of major cereals in total food expenditures in Ethiopia, 2004/05

Food item	Bottom 40% of income groups		Top 60% of income groups	
	Urban	Rural	Urban	Rural
Teff	17.3	7.9	16.4	7.3
Wheat	6.0	9.8	4.3	9.5
Barley	1.3	5.5	0.9	4.7
Maize	3.2	11.1	1.2	9.1
Sorghum	2.7	9.9	1.3	8.9
Other-cereals	1.2	1.7	0.7	1.7
Processed-cereals	14.3	1.3	11.6	1.6
Total Cereals	46.0	47.3	36.4	43.0
Enset	0.9	4.4	0.3	5.5

Source: Author's calculations based on data from HICES 2004/05.

3.2. Consumption patterns across agroecological zones

Based on moisture levels and livelihood patterns, Ethiopia's landscape can be classified as humid agricultural highlands (further categorized as cereal and Enset growing areas), humid lowlands, arid and drought prone areas, pastoralist lowlands, and densely populated urban areas. Regarding consumption patterns of the major foodgrains listed earlier, the 2004/05 HICES dataset shows considerable variations across these agroecological and rural-urban areas. Table 3.5 presents information on per capita shares of food consumption by agro-ecology and rural-urban categories.

Table 3.5. Per capita share of quantity of food consumption by rural-urban and agroecological zones, 2004/05

Food Item	Rural					Urban	
	Humid lowland	Humid Highland (Cereal growing)	Humid Highland (Enset growing)	Drought Prone	Pastoralist Areas	Small Cities	Large Cities
Teff	0.01	0.11	0.01	0.04	0.02	0.19	0.29
Wheat	0.01	0.12	0.04	0.11	0.20	0.09	0.06
Barley	0.01	0.06	0.01	0.05	0.00	0.02	0.01
Maize	0.16	0.13	0.12	0.13	0.15	0.05	0.01
Sorghum	0.16	0.09	0.06	0.17	0.23	0.05	0.01
Other cereals (incl. processed)	0.01	0.04	0.01	0.02	0.03	0.10	0.15
Total cereals	0.36	0.55	0.25	0.52	0.63	0.50	0.53
Enset	0.21	0.06	0.29	0.12	0.00	0.04	0.00

Source: Authors' calculation, based on the HICES 2004/05 dataset.

Generally, except for *enset* growing areas, the five major cereals and their processed products account for more than 50 percent of total food consumption in Ethiopia. The pastoralist areas are among the highest cereal grain consumers in the country. Followed by wheat and maize, sorghum is consumed most in the pastoralist lowlands, accounting for up to 23 percent of total food consumption in the area.

Traditionally, the lowland areas are known for growing maize and sorghum, but not wheat. Wheat is grown in areas of the country that lie between 1500 and 2500 meters above sea level (EEA 2004, 59). The high wheat consumption in the pastoralist areas may therefore be due to food aid distribution in recent years.

The cereal-growing humid (rural) highlands and large cities, followed by the drought-prone areas, are the second major consumers of cereal grains. The three main cereal grains – teff, wheat, and maize – account for 36 percent of total food consumption in the humid rural highlands. The cereal-growing humid highlands are the cereal-growing areas in Ethiopia. Not surprisingly, compared to the rest of the agroecological zones, these areas have the highest per capita consumption expenditures on cereals. Teff is the most important staple in urban Ethiopia where *injera*, a domestically prepared pancake made of teff flour, is eaten at almost every meal. Sorghum and maize dominate food consumption in the humid lowlands (accounting for 16 percent each of total food consumption) and drought-prone areas (accounting for 13 percent and 17 percent of total food consumption, respectively). *Enset*, a root crop that grows predominantly in the humid highlands of SNNP and associated humid lowlands, is a major staple in those areas. Thus, the *enset* growing humid highlands are one of the zones with the lowest per capita cereal consumption.

3.3. Consumption patterns across regions

In addition to location and agroecological differences, ethno-cultural differences may also explain differences in consumption patterns across Ethiopia. Major regional boundaries in Ethiopia have been drawn largely on the basis of ethnicity. Overall regional consumption levels may vary depending on income and poverty levels. For example, HICES data indicate that real per capita consumption levels are highest in Addis Ababa, followed by Harari and Dire-Dawa, and with Amhara, Oromia, Benshangul-Gumuz, and Somale being the regions with the lowest consumption levels between 1995/96 and 2004/05 (MoFED 2008).

Table 3.6 presents the shares of the five major cereals plus *enset* in households' total food expenditures disaggregated by region. The 2004/05 data show substantial interregional variations in the share of major cereals and *enset* in total food expenditures. In general, Tigray allocates more than half of its food budget to cereals. Amhara, Dire-Dawa and Oromia follow Tigray allocating 49.3, 45.3 and 45.0 percent respectively, of their total food expenditure on the five major cereals.

Given the poor market integration and inefficiency in the mobility of goods and information among regions (see e.g., Negassa & Myers 2007; Osborne 2004), one would expect such regional consumption variations to follow the regions' specialization in the production of specific grains. However, as can be seen from Table 3.6, this is not consistently the case for all grains.

For example, in the period 2003/04, reports showed Oromia as the highest teff producer, both in terms of total and per capita production, after Amhara region (EEA 2004, 56). However, Oromia's share of consumption expenditure on teff (8 percent) is a little less than its expenditure share on maize (11 percent) and wheat (10 percent), and not comparable to its contribution in production (compared to Amhara, which is 13 percent). In direct contrast, Afar, a region known in Ethiopia for its limited teff production potential, allocated higher budgets to teff (10 percent) compared to Oromia, which allocated only 8 percent of its food budget to teff.

Teff accounts for the largest share of regional food expenditure in the regions of Amhara and Tigray, after Addis Ababa, which is the highest consumer nationally. Wheat accounts for more than 10 percent of the food budget in many regions, including Tigray, Amhara, Oromia, Somale, and Afar. Again, it is important to note that these regions are among the largest wheat food aid recipients in the country. Consistent with its production potential, the population of Benishangul Gumuz is the highest consumer of sorghum in the country, followed by Tigray, which also has a great deal of sorghum production potential in its western lowlands. In line with earlier findings, the expenditure share of processed cereals (and other cereals) is highest in the urban regions of Dire-Dawa, Addis Ababa, and Harari, in ascending order. Overall, contrary to the urban regions, the lowland regions of Afar, Somale, Harari, and especially the SNNPR, are among the lowest consumers of cereals in Ethiopia.

Table 3.6. Share of major cereals and enset in total food expenditures by region⁶, 2004/05

Region	Per Capita Expenditure			Share in total food expenditures (%)								
	Rural	Urban	Total	Teff	Wheat	Barley	Maize	Sorghum	Other (inc. processed) cereals	Total Cereals	Enset	Other foods
Tigray	1,481	3,123	1,771	10.2	13.1	7.0	2.7	13.7	3.7	50.4	0.0	49.6
Afar	1,586	2,396	1,923	9.6	10.0	0.2	6.3	1.4	8.3	35.8	0.0	64.2
Amhara	1,469	2,307	1,548	12.8	10.4	6.7	5.3	9.6	4.5	49.3	0.0	50.7
Oromiya	1,641	2,583	1,737	8.2	9.6	4.7	10.8	7.9	3.8	45.0	4.9	59.9
Somale	1,462	2,041	1,651	1.0	9.7	0.8	7.0	8.1	10.8	37.4	0.0	62.6
Benishangul Gumuz	1,682	2,891	1,822	5.2	0.9	0.2	8.4	21.9	7.5	44.1	0.0	55.9
SNNP	1,525	2,340	1,594	4.0	5.5	1.5	11.9	5.7	4.5	33.1	12.1	79.0
Harari	2,252	2,774	2,532	6.0	7.0	0.4	1.9	9.4	12.9	37.6	0.0	62.4
Addis Ababa	2,042	2,584	2,577	19.6	3.4	0.5	0.5	0.1	17.1	41.2	0.1	58.9
Dire-Dawa	1,421	2,473	2,128	5.8	7.4	0.7	0.7	9.2	21.5	45.3	0.0	54.7

Source: Authors' calculation, based on the HICES 2004/05 dataset.

⁶ Data were not collected for the Gambella region during the 2004-05 HICE Survey.

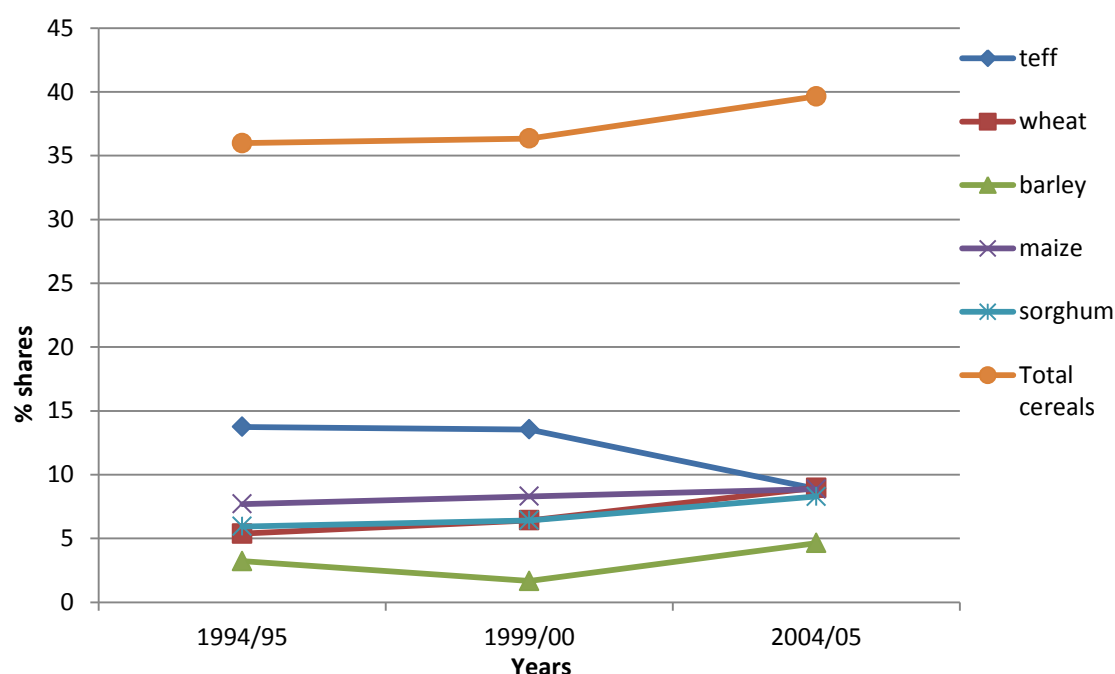
4. Trends in foodgrain consumption

Exploring the 2004/05 HICES dataset, the discussion so far has focused on describing spatial consumption patterns in Ethiopia. Consumption is dynamic in nature, however, and a strong understanding of household consumption patterns requires analyzing consumption trends over time. The question now is: how has food consumption, particularly of major cereals, been changing over time?

Using data from the last three HICES (1994/95, 1999/00 and 2004/05), Figure 4.1 presents the percentage of household expenditures of the five major cereal grains between 1994/95 and 2004/05. It shows that cereal grains share of total consumption expenditures has been increasing during the ten year period. However, the trend for individual cereal grains varies substantially.

Clearly, the share of teff has declined sharply after 1999/00, while the shares of maize, sorghum, and wheat have been slowly but steadily rising. The share of expenditures allocated to barley remained almost the same throughout. It is not clear what drives such movements in consumption patterns across time, or how such movements affect overall caloric intake levels.

Figure 4.1. Share of major cereals in total food expenditure, 1994/95, 1999/2000, and 2004/05.



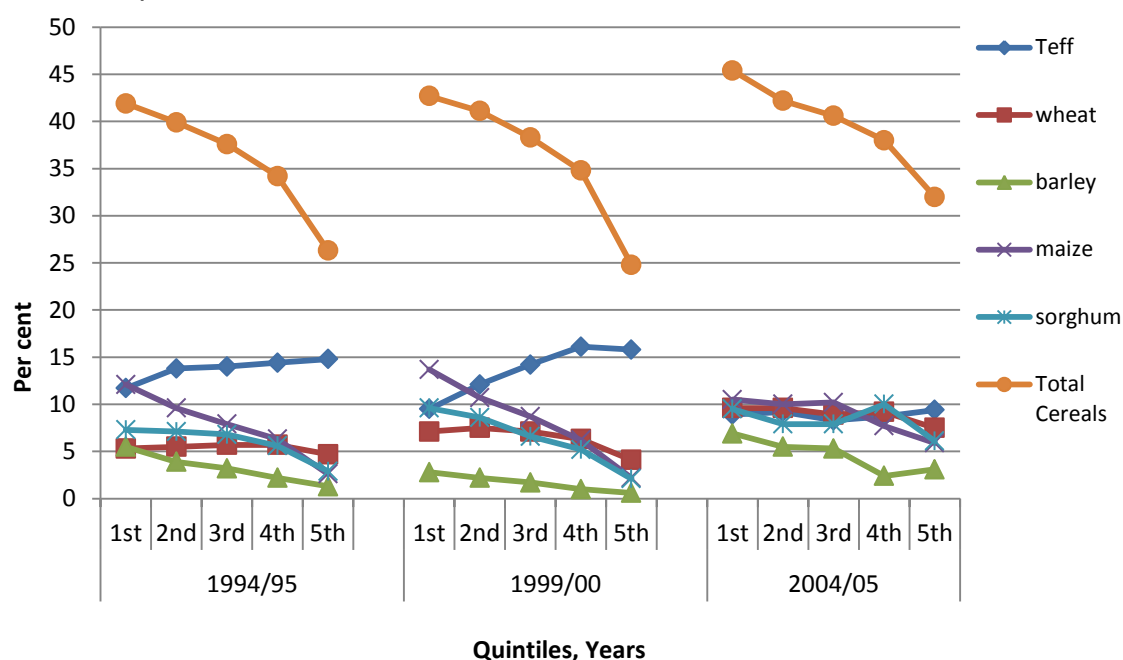
Source: Authors' calculation, based on the HICES 1994/95, 1999/2000 and 2004/05 dataset.

Note that Figure 4.1 is based on (national) average consumption shares over time and masks differences across income groups. Thus, disaggregation of these trends by income quintiles is necessary. This is presented in Figure 4.2. While the share of overall cereal consumption has been slightly increasing over the years, the trend in each expenditure quintile shows a decline in expenditure shares from the first quintile to the fifth quintile annually. However, the trends for individual cereal grains vary between expenditure quintiles.

For example, consistent with Figure 4.1, the share of teff has declined while the share of other cereals has slightly increased. An important feature to note in Figure 4.2 is that the

total cereal consumption pattern is largely influenced by maize, wheat, and sorghum consumption patterns. Total cereal consumption also declines moving from the first to the fifth quintile: in general, the shares of maize, wheat, and sorghum decline, while, except in the last year, the share of teff increases. This trend makes sense given that teff is more income elastic than the other foodgrains, and that the highest quintile allocates higher budget shares to teff than on the rest of the foodgrains. As a result, a slightly striking trend is the decline in budget shares of all cereals, including teff, across quintiles in 2004/05. Lastly, it is clear from Figure 4.2 that barley takes the lowest share of the household budget across all times and income quintiles.

Figure 4.2. Share of major cereals in total food expenditure across quintiles*, 1994/95, 1999/2000, and 2004/05



Source: Authors' calculation, based on the HICES 1994/95, 1999/2000 and 2004/05 dataset.

Note: * quintiles based on household income; with 1st quintile having the lowest income and 5th quintile having the highest income

5. Trends in food and calorie availability

As discussed in the previous sections, there is a wide range of variation across regions and agroecological zones in Ethiopia regarding overall consumption levels, and food consumption in particular. One obvious reason for such variation is the difference in food availability across regions and agroecological zones in the country.

The geography of food availability in Ethiopia is often classified into food deficit areas, food balanced areas, and food surplus areas. For example, Diao and Pratt (2007) classify woredas with cereal equivalent output per rural household at levels 20 percent below the national average as food deficit, and those woredas with cereal equivalent output per rural household at levels of 80 to 120 percent of national average as food balanced, and those woredas with cereal equivalent output per rural household at levels 20 percent higher than the national average as food surplus. Based on the 2001/2002 Agricultural Census Survey of Ethiopia, Diao and Pratt (2007) calculated that about 26 million Ethiopians (which accounts for 50 percent of the rural poor, or 37 percent of the total rural population) live in food deficit areas, where average annual food availability (530 kg/household) is only half of the national average. In contrast, food availability in the surplus areas averaged (1,800 kg/household) about 170 percent of the national average.

Clearly, such disparities in food availability imply differences in calorie availability across regions or agroecologies in the country. At the national level, there has been a remarkable increase (about 40%) of calorie availability between 1995/96 and 2004/05 (Table 5.1). However, the increase varies between rural and urban areas: by 45 percent in rural and by 16 percent in urban areas. A disaggregated analysis of the extent of calorie availability by agroecological zones, regions, and income quintiles presents a more complete picture of the national food consumption pattern. Table 5.2 presents daily per capita kilo calorie intake per adult equivalent (see also Table 5.3 for a break down by region). Average per capita calories at the national level amounts to 2906.57 calories per day, and is predominately calories from cereals. Rural areas portray higher daily per capita caloric intake levels (3006.87) than do urban areas (2339.74). Wheat, barley, and maize are consumed more in rural areas and also generate more calories per kilo compared to teff, a crop consumed more in urban areas.

The level of per capita calorie intake varies across regions and is highest in SNNPR while lowest in Addis Ababa at 3,155.09 and 2,156.95 calories per day respectively. Calorie intake also varies by agroecological area, with the humid *enset* producing highlands recording the highest level of calorie intake per day at 3,197.54. The pastoralist areas have the lowest level of calorie intake, totaling 2,632.07 calories per day. The breakdown by expenditure quintile groups shows that the level of daily per capita calorie intake increases as household socioeconomic status rises.

It is interesting to note that despite the fact that consumption levels are higher in urban than in rural areas, the total per capita calorie intake per day is higher for rural than for urban dwellers. This may be due to the fact that rural dwellers' consumption of maize and sorghum, which are relatively less expensive, are much higher than urban residents' whose food consumption pattern concentrates more on teff, a crop that inherently has fewer calories per gram in comparison to sorghum and maize.

Considering caloric intake in a more spatially disaggregated manner, of the ten federal regions of Ethiopia, SNNPR has the highest total per capita caloric intake, whereas *enset* and maize contribute 42 percent of the total caloric intake in the region. In Oromia sorghum, wheat, and maize are the main sources of calories, contributing to 48 percent of the total 3,102.5 calorie intake. SNNPR and Oromia also contain 61 percent of Ethiopia's population.

In contrast, the regions dominated by urban cities, such as Addis Ababa, Dire-Dawa, and Harari have the lowest per capita caloric intake levels.

A similar trend is observed when disaggregating data by agroecological zones in that the highest caloric intake levels recorded are for the *enset* growing humid highlands, composed largely of SNNPR. Surprisingly, per capita calorie intake is second highest in the drought-prone areas of the country, which may be reflective of the effectiveness of the Productive Safety Net Programme (PSNP) being implemented in these areas since 2005. The pastoralist areas, accounting for about 1.5 percent of the population, have the lowest calorie intake.

The level of calorie intake improved significantly along with the economic status of the households. For instance, households in the second quintile had per capita calorie intakes that were 39 percent greater when compared to the calorie intake levels of the households in the lowest quintile.

Table 5.1. Calorie intake per adult per day, by region and place of residence; 1995/96, 1999/2000, and 2004/05*

Region	1995/96			1999/00			2004/05			(% Change between 1995/96 – 2004/05		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
Tigray	1,902	1,734	1,876	2,529	1,811	2,422	2,613	2,368	2,570	37	36	36
Afar	2,055	2,569	2,240	1,852	1,990	1,892	2,594	2,347	2,492	26	-8	11
Amhara	1,957	2,107	1,975	2,613	1,929	2,550	2,530	2,298	2,508	29	9	26
Oromiya	2,004	2,126	2,016	2,798	1,736	2,688	2,936	2,516	2,893	46	18	43
Somale	2,109	2,417	2,144	2,272	1,991	2,175	2,711	2,718	2,713	28	12	26
B/Gumuz	1,767	2,341	1,801	2,665	2,110	2,627	2,649	2,438	2,625	49	44	45
SNNP	1,800	2,039	1,817	2,815	1,915	2,753	2,964	2,524	2,926	64	23	61
Gambela*	1,917	1,650	1,801	2,563	1,981	2,417	-	-	-	-	-	-
Harari	2,488	2,085	2,268	2,759	1,882	2,286	3,229	2,274	2,715	29	9	19
Addis Ababa	2,014	1,993	1,993	2,409	1,906	1,917	2,756	2,233	2,239	36	12	12
Dire-Dawa	1,814	1,831	1,824	2,528	1,929	2,104	2,923	2,172	2,418	61	18	32
Total	1,938	2,050	1,953	2,722	1,860	2,606	2,805	2,386	2,746	44	16	40

Source: MoFED 2008

Note: *The 2004/05 round of HICE Survey doesn't cover Gambella region.

Table 5.2. Calories consumed and the cost of calories, 2004/05⁷

	Population	Per Capita Expenditure on cereals and enset (Birr)	Total calories per capita per day (adult equivalent)	Cost per kg in Birr (adult equivalent)
National	64,477,709	398.6	2906.6	0.81
Quintiles*				
Quintile 1	16,769,981	318.4	1948.0	0.86
Quintile 2	14,830,344	372.5	2706.9	0.77
Quintile 3	13,026,853	422.7	3272.7	0.70
Quintile 4	11,303,966	432.6	3479.9	0.71
Quintile 5	8,546,563	449.7	3716.2	0.75
Agroecological zones				
Humid lowland	903,299	368.9	2857.1	0.71
Humid highland (cereals)	29,592,244	414.8	2812.6	0.82
Humid highland (enset)	12,007,397	344.3	3197.5	0.67
Drought prone	20,960,771	409.2	2890.3	0.78
Pastoralist areas	1,013,998	374.1	2632.1	0.96
Urban	9,145,689	360.713	2339.7	1.05
Rural	55,332,020	404.817	3006.9	0.74

Source: Authors' calculations, based on the HICES 2004/05 dataset.

Note: *quintiles based on household income, with Quintile 1 having the lowest income and Quintile 5 having the highest income

Table 5.3. Calories consumed and the cost of calories, by region, 2004/05

Region	Population (Mn)	Per Capita Expenditure on cereals and enset (Birr)	Total calories per capita per day (adult equivalent)	Cost per kg in Birr (adult equivalent)
Tigray	4,167,111	387.9	2618.5	0.81
Afar	224,994	317.5	2548.1	0.96
Amhara	16,658,153	385.3	2638.0	0.81
Oromiya	25,655,559	445.1	3102.5	0.79
Somale	676,435	328.6	2705.5	0.89
Benishangul Gumuz	761,013	403.4	2684.2	0.93
SNNPR	13,460,202	344.7	3155.1	0.66
Harari	169,533	404.6	2768.0	1.07
Addis Ababa	2,439,216	336.7	2157.0	1.04
Dire Dawa	265,493	427.4	2437.2	1.06

Source: Author's calculations, based on the HICES 2004/05 dataset.

⁷ The calorie conversion units are obtained from Ethiopian Health and Nutrition Research Institute (EHNRI). Schmidt and Dorosh (2009) compared these conversion units against FAO conversion factors and found little variation between them. Note however that since the HICE dataset is at household level, calories reported here are computed by aggregating food items into 18 categories and taking average calorie conversion units for each category consumed by each household. Our estimates, although crude, are close to the Central Statistical Agency (CSA) estimates (CSA 2007).

6. Conclusions

Overall, there is much variation in Ethiopia's consumption patterns, depending on specific geographical and sociocultural characteristics. Due to this wide variety, there is no single crop which dominates the national food basket. Teff is consumed much more frequently in urban areas, whereas in rural areas it is considered a luxury good. In contrast, *enset*, maize, and sorghum are predominantly rural grains. It is important for policymakers to remember the cultural aspect to consumption as well, as it can override mere price and location-related factors. In terms of regional preferences, Afar, Somale, Harari, and SNNPR consume the lowest amounts of cereals.

In general, calorie consumption across Ethiopia is low, but a high percentage of this consumption is coming from cereals. Per capita intake of calories is higher in rural than in urban areas, as urban consumption focuses on teff, which has a lower calorie content. Additionally, the pastoralist areas have the lowest calorie intake levels. Food expenditures' share of total expenditures remains fairly high, but has been declining over time. This is consistent with Engel's Law, wherein as incomes rise the proportion of money spent on food decreases. As incomes in Ethiopia continue to grow, the expectation is that the proportion of money spent on food continues to decline, consistent with current trends. The proportion of income spent on (raw) cereals is high, implying that the purchase of processed cereals and non-cereal food is low. This may be partly due to the underdeveloped food processing market in the country. Policy makers may need to look into this sector as it has potential linkage effects to agricultural growth as well as national food consumption patterns.

Teff is considered a luxury good, and with the highest income elasticity among cereals in both urban and rural areas, as incomes grow, teff demand will increase. Teff is consumed predominantly in urban areas, so continued increases in urbanization will also contribute to increased demand for teff. It should be noted that there are limits to increased teff production potentials, at least in the short to medium run, mainly because teff grows only in Ethiopia and significant productivity increase through improved variety is restricted brought about by the limited international public goods dedicated to teff research. In contrast, due to the negative income elasticity of sorghum in urban environments, the demand for sorghum is likely to decrease as incomes increase. It would be good to note, however, that sorghum continues to figure prominently as drought insurance. This is important for Ethiopian policymakers in agricultural policy planning because teff already represents a cash crop for many farmers. Overall, policymakers should expect that as incomes increase, the share of cereals in total food expenditures will decrease.

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