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Diet transformation in Africa: the case of Ethiopia

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Abstract

Africa's food systems are changing fast amid rapid economic growth, emerging urbanization, and structural transformation. In this study, we use four rounds of nationally representative data from Ethiopia to document changes in household food consumption patterns over a period of unprecedented economic growth. We find that while the share of food in the total consumption basket is declining, food quantities and calorie intakes have considerably increased between 1996 and 2011. A decomposition analysis suggests that this was mostly driven by improvements in household incomes—a finding that is consistent across the calorie distribution. Also, the content of the food basket is changing with a gradual shift toward high-value foods such as animal products, fruits and vegetables and processed foods. Overall, this diet transformation has important implications for the food security debate and for agricultural and food policy in the country.

JEL classifications: D12, O12, Q18

Keywords: Food consumption; Calorie intakes; Structural change; Decomposition

1. Introduction

Sub-Saharan economies are undergoing a rapid transformation. Both micro- and macro-level data show substantial improvements in living standards over the last decade (McKay, 2013; Radelet, 2010; Young, 2012). Also, agricultural productivity is on the rise (Badiane et al., 2014) and, at the same time, employment is gradually shifting away from agriculture into more productive sectors of the economy (McMillan and Harttgen, 2014; McMillan et al., 2014). This growth and structural transformation is likely to bring about considerable changes to domestic food systems. Evidence from different countries suggests, for example, that improvements in living standards are typically accompanied by a shift away from starchy staples toward high-value products such as dairy products, meat, fish, fruits, and vegetables (Pingali, 2007; Popkin, 1998, 2003). More affluent consumers, especially in the urban areas, begin to demand more variety and choice, consume more processed and ready-to-eat foods, and pay more attention to food quality and safety (Jaffee and Henson, 2004; Swinnen, 2007). Moreover, structural transformation of the economy means that more people are employed in the service and manufacturing sectors that are characterized by lower energy requirements than the traditional agricultural sector (Popkin, 1998, 1999, 2001).[1]

In this article, we focus on Ethiopia, one of the fastest growing economies in sub-Saharan Africa over the last decade (World Bank, 2015b), and study how the Ethiopian food economy and diets have changed during a period of unprecedented economic growth.[2] Ethiopia is an interesting country to study this diet transformation given its fast economic growth, its importance in

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[1] Various other dynamics are also likely to take place: changes in lifestyle, with more women working outside the home and access to technology such as refrigerators and microwave ovens; the development of better packaging technologies; and the entrance of modern marketing channels, including modern retail, the processing sector, and the food service industry (Popkin 2001; Reardon and Timmer, 2007; Reardon et al., 2003; Tschirley et al., 2015).

[2] While one should be cautious with analyzing data collected by government institutions, there are reasons to believe that Ethiopia is and has been growing rapidly in recent years. For example, as documented by Bachewe et al. (2015) there has been remarkable improvement in agricultural productivity in the country over the last decade as well as a significant rise in rural real wages. It is of note that these authors use a number of different nongovernment collected surveys that all illustrate strong growth patterns. Similarly, various surveys show how undernutrition rates in the country are much lower than a decade ago (Headey, 2014; Woodruff et al., 2016). On the other hand, changes in employment patterns and in manufacturing have been limited (Priewe, 2016; World Bank, 2015b).

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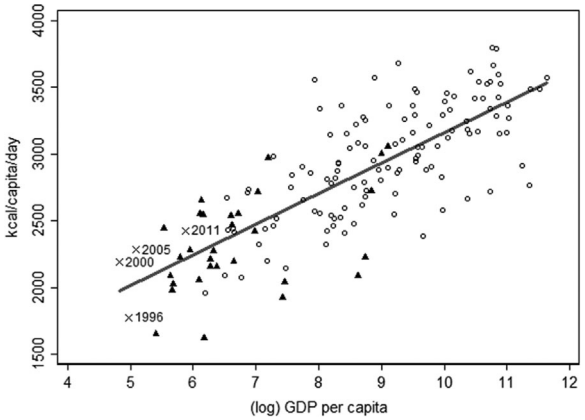
Africa (it is the second most populous country in the continent), and the availability of consistent large-scale household data sets over time. Of particular interest is to understand the linkages between food demand and income levels as this is likely to give an indication of the trend in food consumption patterns, especially within a country where urbanization is encouraged and mid-income status is set as a goal by the year 2025 in several policy documents.

We contribute to the international literature in a number of ways. First, we are one of the first authors to document significant diet transformation in a large and poor African country based on a unique series of large-scale nationally representative data sets over a relatively long period (15 years). Second, we test to what extent changes in calorie consumption are associated with a number of possible drivers, including the link with increasing incomes that are widely seen in Africa (Badiane et al., 2014) as well as the role of prices in this transformation. Third, using quantile decomposition methods based on the Recentered Influence Function (RIF) regression approach (Firpo et al., 2009), we further test in a novel way whether the drivers vary across the calorie distribution. These questions are important for the poverty and food security debate given the high food insecurity levels still seen in Africa and the recent new growth and income dynamics in the continent.

Using four rounds of nationally representative household survey data, we document a host of interesting dynamics in the Ethiopian food economy between 1996 and 2011. For example, we find that the share of food in total expenditures has been declining at an average annual rate of 1.1 percentage points over the four survey rounds. Moreover, the importance of cereals in total food expenditures seems to be decreasing, at an average annual rate of 1.2 percentage points, and we also see suggestive evidence of a shift toward more expensive foods in the average consumption basket. On the nutrition side, economic growth has brought about considerable improvements in calorie intakes—a trend that fits well into the global calorie–income relationship (Fig. 1). Our mean decomposition analysis (Blinder, 1973; Oaxaca, 1973) shows that improvements in income levels explain the overwhelming majority of the improvements in calorie intakes over this period. The quantile decomposition analysis further shows that this holds for the whole calorie distribution suggesting that the income growth has also benefitted the poorest (in terms of calorie intakes) households in the country.



Source: The data for daily per capita kilocalories (*y*-axis) come from the FAO food balance sheets, except for Ethiopia for which the HICES data were used. Data on gross domestic product (*x*-axis, GDP) is from the World Bank. Latest available observation pair was used for each country, except for Ethiopia for which the HICES survey years were used.
Note: X marks Ethiopia in different years (four observations), triangles are other sub-Saharan African countries (31 countries) and hollow circles non-sub-Saharan African countries (123 countries). The solid line is the line of best-fit for the global calorie–income relationship. Gross domestic product (GDP) per capita is expressed in current USD.

Fig. 1. Global calorie–income relationship.

2. Data

We exploit the Ethiopian Household Consumption and Expenditure Survey (HICES) data set from the past four rounds: 1995/96, 1999/00, 2004/05, and 2010/11.[3] In total, 11,923, 17,320, 21,560, and 27,831 households were interviewed over the four periods, respectively. The HICES are repeated cross-sectional surveys collected by the Central Statistical Agency (CSA) and the data serve as the official source for poverty statistics in Ethiopia (MoFED, 2013). The sampling began by stratifying the country into rural and urban areas. After that, the enumeration areas were selected using the probability proportional to size approach where more populated units had a higher probability of being selected into the final sample. We use sampling weights, which are based on selection probabilities and provided by the CSA, to compute representative estimates for rural and urban areas of the country.

Each survey round contained an extensive consumption–expenditure module. In the latest round, the survey module consisted of 275 food items and recorded household's food consumption over the past seven days.[4] We use these data to study trends in the expenditure on different food categories over these periods.[5] To ensure comparability over time in this analysis, expenditures were deflated using the national Consumption Price Index (CPI) and values are expressed in constant 1996 birr.[6] We also computed the quantities consumed (in kilograms). These

[3] Note that income data were not collected in the 2010/11 survey. Therefore, the name of the survey in the latest round was changed from HICES to HCES.

[4] The broad categories in the nonfood category include clothing and footwear; housing, water, fuel, and energy; furnishing, household equipment, and maintenance; health and medical treatment; education; and unincorporated household enterprise expenditures and others.

[5] Note that since a different cleaning procedure was followed before statistics were calculated, there are minor differences with the official estimates.

[6] A comparison with inflation rates published by the International Monetary Fund (at http://data.imf.org/) does not show a meaningful difference with the CPI published by the CSA that is used in this study.

quantities were further converted to calories using the standard conversion rates reported in EHNRI (1968–1997). While not originally designed for nutrition analysis, the HICES data have been found to provide consistent information about various nutrition measures when compared to surveys based on 24-hour recall (Fiedler, 2013).

Consumption and calories in this article are expressed in adult equivalent unit terms calculated by the CSA [Ethiopia] (2012). In contrast to the usual per capita conversion, adult equivalent units take into account the differences in household composition. Using the adult equivalent units we can be more confident that the estimated values reflect changes in consumption patterns and not changes in household demographics (e.g., due to changes in fertility rates) over time or across space and income quintiles.

Some notes of caution with the use of these data and with its interpretation are required. First, consumption data recorded using a recall report of "over the last seven days" might be biased unless collected for the whole sample ideally in the same week. Data collected during some festivity week and normal week might therefore not be the same on consumption (even for the same household). Second, there was a change in the data collection period between 1996, 2000, and 2005 on the one hand (when surveys were conducted in two relative short periods after the main meher harvest (January–February) and in the lean period (July–August)) and in 2011 (when the survey was conducted over the course of a year) on the other hand. Stifel and Woldehanna (2014) test the impact of this change in periods by limiting the sample to those households that were interviewed in the same months as in the previous period and do not detect a significant difference when compared with the whole sample. Third, the food codes used changed over the period considered, especially between 2000 and the two latter periods. Fourth, as there is no panel component to the repeated cross-sectional survey set-up, this limits the techniques as well as the controls that can be used to analyze dietary dynamic over time.

3. Food expenditures

3.1. Overall

We begin by describing the changes in the food consumption basket over the 15-year period. Table 1 shows the mean real expenditure levels and share of different food categories for the four survey years. Table A1 in the Appendix replicates this table using food quantities instead of expenditures. First, we see that the total expenditure levels increased by 56% (from 1,240 to 1,930 birr) between 1996 and 2011. Assuming that changes in total expenditures provide a reasonable proxy for changes in incomes, this indicates that the household's incomes rose during the period under scrutiny.

We also see that the share of nonfood items in the total consumption basket increased considerably over time. In 1996, the share of nonfood consumption expenditures accounted for 40% of the total consumption while in 2011 they accounted for more than half (52%) of total consumption expenditures. Such increases in the share of nonfood expenditures are typical in transforming and improving economies, implying substantial improvements in welfare in the country (McKay, 2013; MoFED, 2012; Stifel and Woldehanna, 2014; Vargas Hill and Tsehaye, 2014; World Bank, 2014). This is also in line with the Engel's law according to which the share of nonfood products in the consumption basket increases with income. Still, it is worth noting that the role of food in total expenditures remains high in 2011 for the average Ethiopian consumer. It is also important to note that there has been no monotonous increase over the period considered. Most notably, the share of food in total expenditures went up in 2000 compared to 1996. This seemingly linked to the major drought that hit Ethiopia in 2000, affecting more than 10 million people in the country (Hammond and Maxwell, 2002).

We also see dramatic changes in the content of the average food basket. Overall, the share of cereals in total food expenditures is declining. While the share made up 45.7% of food expenditures in 1996, it had declined to 36.0% 15 years later. Using all survey rounds, we calculate that the share of food expenditures have been declining at an average annual rate of 1.1 percentage points. During the same period, animal source foods (meat, poultry, fish, and dairy products) became more important. While the expenditure share of these products is still relatively low, it grew from 7.5% of the total food expenditures in 2000 to 10.8% in 2011. These patterns are a reflection of Bennett's (1941) law that describes a relative decline in starchy staples and an increase in animal proteins with an increase in income.[7] The share of fruits and vegetables in total food expenditures also increased over that period, from 3.7% to 6.4%. In 2011, average household consumed 45 kg of fruits and vegetables per adult equivalent (up from 31 kg in 1996). This level is among the lowest in sub-Saharan Africa and is far from meeting the WHO recommendation of 146 kg per year (Ruel et al., 2005). While the importance of cereals in the food expenditures is on the decline, the quantities of cereals consumption increased by 29% (Table A1 in the Appendix). The categories "roots and tubers" and "enset/kocho"[8] show a similar pattern: their consumption more than doubled in quantity terms, but at the same time their share in the consumption–expenditure declined. In contrast, the share of animal products in quantities consumed is rather stable over the last three rounds.

Within cereal expenditures, teff, wheat, and maize constitute about 62% of all expenditures on cereals in 2011. Over time, some minor shifts within the consumption of cereals are

[7] Ethiopia is generally characterized by monotonous diets (Headey, 2014), but this seems to be slowly changing over time. There were, on average, more diverse consumption expenditures in 2011 than 15 years earlier.

[8] Enset, also known as the false banana, is a root crop that is especially important in the southern part of the country. Kocho is a traditional flat-bread made of enset.

Table 1
Real food expenditures, by food category (birr per adult equivalent per year)

	1996		2000		2005		2011	
	birr	Share (%)	birr	Share (%)	birr	Share (%)	birr	Share (%)
Food								
Teff	85	11.6	96	12.6	72	8.9	69	7.5
Wheat	53	7.2	66	8.7	71	8.9	68	7.4
Barley	34	4.7	29	3.8	35	4.4	22	2.4
Maize	74	10.1	82	10.8	69	8.6	71	7.7
Sorghum	52	7.1	46	6.1	65	8.1	46	5.0
Other cereals	22	3.0	24	3.2	13	1.7	13	1.4
Processed cereals	15	2.1	15	2.0	26	3.2	42	4.6
All cereals	*337*	*45.7*	*357*	*47.1*	*351*	*43.8*	*333*	*36.0*
Pulses	56	7.6	75	9.9	62	7.7	88	9.5
Oilseeds	2	0.3	2	0.3	2	0.2	1	0.2
Animal products	56	7.5	60	7.9	70	8.7	100	10.8
Oil and fat	34	4.6	27	3.6	31	3.9	61	6.6
Vegetables and fruits	28	3.7	34	4.5	37	4.6	59	6.4
Pepper	36	4.9	30	4.0	21	2.6	61	6.6
Enset/kocho	38	5.1	57	7.5	36	4.4	39	4.2
Coffee/tea/khat	72	9.8	52	6.9	62	7.7	84	9.1
Root crops	19	2.6	26	3.4	25	3.1	16	1.8
Sugar and salt	18	2.5	15	2.0	15	1.9	25	2.7
Other foods	42	5.7	23	3.0	90	11.3	57	6.2
Total food	**739**	**100.0**	**759**	**100.0**	**802**	**100.0**	**925**	**100.0**
Food versus nonfood								
Food	739	59.6	759	63.6	802	54.1	925	47.9
Nonfood	502	40.4	434	36.4	681	45.9	1,005	52.1
Total	**1,240**	**100.0**	**1,193**	**100.0**	**1,483**	**100.0**	**1,930**	**100.0**
No. of observations	**11,923**		**17,320**		**21,560**		**27,831**	
t-Test on growth in real cereal expenditures compared to the base period (1996)								
Significance level			**		n.s.		***	
t-Test on growth in real food expenditures compared to the base period (1996)								
Significance level			n.s.		**		***	

***, **, and * indicate that the mean differences are statistically significant at the 1%, 5%, and 10% level, while n.s. indicates that the difference is not statistically significant.
Source: Authors' calculations based on HICES, CSA.
Note: Statistical significance tests are conducted taking 1996 as base period.

observed. For example, the share of expenditures of sorghum in cereal expenditures was 7.1% in 1996 and 5.0% in 2011. Compared to 1996, the share of maize in cereal expenditures has also decreased. However, in quantity terms, maize is still by far the most important crop. Within the cereal category, we note the increase of processed cereals, from 2.1% to 4.6% of total food expenditures and from 5 kg to 9 kg in terms of quantities consumed, still relatively low compared to other African countries (Tschirley et al., 2015).

3.2. Rural versus urban

It is estimated that more than half of the world population was living in cities in 2010, up from 30% in the 1950s. Also, Africa is urbanizing: the urbanization rate is projected to be as high as 60% by 2050 (United Nations, Department of Economic and Social Affairs, Population Division, 2012). Urbanization has important implications on the food economy for two reasons. First, urban consumers typically do not grow their own food and therefore urbanization is typically associated with increasing commercial food flows.[9] Second, urban consumers usually have different consumption baskets than rural consumers (Pinstrup-Andersen, 1986; Popkin, 1999). While the share of the urban population in Ethiopia is still small, at 17% in 2012 (World Bank, 2015a), recent urbanization rates have been high (Schmidt and Kedir, 2009). The World Bank (2015a) estimates that 30% of the Ethiopian population will live in cities in 2028.

Table 2 illustrates the differences in expenditure patterns between rural and urban areas. Table A2 in the Appendix reports the corresponding kilogram values. We see that the average per adult equivalent expenditures are higher in urban than in rural areas and that the share of nonfood expenditures is also higher in urban (61.8%) than in rural (48.1%) areas. Compared to the

[9] This is also noted by local policymakers who often worry about the increasing dependence of African cities on imported foods (Rakotoarisoa et al., 2011).

Table 2
Food expenditures in 2011 (per adult equivalent, birr), urban versus rural, by food category

	Rural		Urban							
	birr	Share (%)	Total urban		Addis Ababa		Secondary cities		Other urban	
			birr	Share (%)	birr	Share (%)	birr	Share (%)	birr	Share (%)
Real expenditures (birr/per adult equivalent/year)										
Food										
Teff	51	6	153	12.6	190	14.6	150	10.8	141	12.2
Wheat	59	6.8	113	9.3	124	9.5	171	12.3	99	8.6
Barley	25	2.9	10	0.8	7	0.5	7	0.5	12	1
Maize	80	9.3	30	2.4	12	0.9	35	2.5	35	3
Sorghum	52	6	18	1.5	1	0.1	14	1	25	2.2
Other cereals	14	1.6	11	0.9	9	0.7	22	1.6	10	0.8
Processed cereals	28	3.3	109	8.9	133	10.2	125	9	97	8.4
All cereals	*309*	*35.8*	*445*	*36.5*	*477*	*36.6*	*524*	*37.6*	*419*	*36.2*
Pulses	84	9.8	105	8.6	122	9.3	92	6.6	101	8.7
Oilseeds	2	0.2	1	0.1	0	0	1	0.1	1	0.1
Animal products	84	9.8	175	14.3	211	16.2	224	16.1	153	13.2
Oil and fat	51	5.9	110	9	129	9.9	119	8.6	102	8.8
Vegetables and fruits	51	5.9	99	8.1	109	8.4	127	9.1	91	7.8
Pepper	59	6.8	73	6	83	6.4	55	3.9	73	6.3
Enset/kocho	45	5.3	7	0.6	3	0.2	2	0.1	9	0.8
Coffee/tea/chat	85	9.9	78	6.4	52	4	99	7.1	83	7.1
Root crops	16	1.9	17	1.4	15	1.1	20	1.4	17	1.5
Sugar and salt	21	2.4	44	3.6	43	3.3	57	4.1	42	3.6
Other foods	55	6.4	67	5.5	60	4.6	71	5.1	68	5.9
Total food	**863**	**100**	**1219**	**100**	**1,303**	**100**	**1,391**	**100**	**1,160**	**100**
Food versus nonfood										
Food	863	51.9	1,219	38.2	1,303	38.9	1,391	36.9	1,160	38.2
Nonfood	799	48.1	1,975	61.8	2,050	61.1	2,380	63.1	1,874	61.8
Total	**1,662**	**100**	**3,194**	**100**	**3,353**	**100**	**3,771**	**100**	**3,034**	**100**
No. of observations	**10,321**		**17,510**		**3,739**		**3,819**		**9,952**	
t-Test on difference of real cereal expenditures compared to rural areas										
Significance level			***							
t-Test on difference of real food expenditures compared to rural areas										
Significance level			***							

***, **, and * indicate that the mean differences are statistically significant at the 1%, 5%, and 10% level, while n.s. indicates that the difference is not statistically significant.
Source: Authors' calculations based on HICES, CSA.
Note: Statistical significance tests are conducted taking rural as the base.

rural areas, urban households spend more money on food than their rural counterparts (1,219 birr versus 863 birr, respectively). Despite this, the actual quantities consumed are somewhat lower (462 kg in rural versus 376 kg in urban areas), likely because of higher food prices paid in urban areas, but also possibly because of lower calorie requirements in these urban settings (Deaton and Drèze, 2009; Popkin, 1999).

Interestingly, there are almost no differences in the share of cereals in the food consumption basket, and the quantities consumed of cereals are also similar. However, root crops and enset/kocho consumption is much higher in rural areas suggesting that overall the rural diet depends somewhat more on starchy staples. Also, the consumption patterns differ considerably within the cereal category. Rural consumers consume considerably more sorghum (40 kg versus 14 kg) and maize (72 kg versus 22 kg). In contrast, the share of teff in the urban food consumption basket is substantially higher than in rural areas, more than twice as high. Moreover, urban consumers eat 69 kg of teff per adult equivalent per year, nearly three times the level consumed in rural areas.

Research from other countries shows that urbanization is associated with increased demand of vegetables, animal source foods (meat and dairy products), and oils and fats (Pinstrup-Andersen, 1986; Popkin and Bisgrove, 1988).[10] Our estimates are in line with these predictions. First, urban dwellers allocate a much larger share of their food budget to animal products than the rural ones (14.3% versus 9.8%). Similarly, the average household in the urban area consumed 11 kg of oils and fats per adult equivalent while the corresponding figure for the average rural household was 4 kg. The consumption of fruits and

[10] Whether this is caused by the urban environment that is often characterized by greater availability of different types of food, or by something else (e.g., by income differences) remains debated (see Cockx et al., 2017; Stage et al., 2010).

vegetables is also considerably higher in the urban areas, both in terms of expenditures and quantities consumed.

Furthermore, we compare consumption in the capital Addis Ababa to secondary cities.[11] We note that quantities and expenditures on food are at rather similar levels. The share of the food consumption basket spent on cereals is about 37% in both cases. However, we do see some higher consumption levels of teff in Addis Ababa (14.6%) compared to secondary cities (10.8%). On the other hand, wheat products are relatively more important in secondary cities (12.3% versus 9.5%). We also note a somewhat higher importance of processed cereals in Addis Ababa (10.2% versus 9.0% in secondary cities).

The dynamics of food shares in total expenditures and of cereal shares in food expenditures for urban and rural areas are further shown in Figs. 2a and b, respectively. In the period between 1996 and 2000, we see an increase in food shares and cereal shares (except for urban areas for the former), indicative of the food stress because of the drought in the country in 2000. However, the situation has improved for all these measures over the next three rounds of the consumption surveys, for rural as well as urban areas.[12]

3.3. Income and its link with food consumption

Agricultural economists have long been interested in the link between income and food consumption (e.g., Deaton and Muellbauer, 1980). The parameters resulting from such research are important as they allow for economic modeling to assess impacts on consumption of food policy changes, as well as for projecting food requirements in the future, given reasonable assumptions on income—and population—growth. Researchers have also tried to improve their understanding of transforming food systems in economic development and the drivers responsible for changes in consumption (e.g., Popkin, 2003; Reardon and Timmer, 2007). A number of food consumption patterns can be distinguished with increasing income and economic development: (1) processed and ready-to-eat foods take off; (2) cereals become less important; and (3) the share of high-value crops such as fruits and vegetables, dairy and animal products, and fish in food consumption baskets increases. Comparing the differences in consumption patterns between richer and poorer households is often indicative of how transformation of food systems will shape food economies in the country.

In an effort to understand these patterns in Ethiopia, all households in the latest HICES survey (2011) were ranked by quintile, from the poorest quintile 1 to the richest quintile 5, based on their total consumption–expenditure level. The shares of different consumption categories were then calculated. Table 3 provides the results of this exercise. As expected (Bouis, 1994; Bouis and Haddad, 1992; Pingali, 2007; Subramanian and Deaton, 1996), strong differences in the composition of consumption baskets are seen over these quintiles. While food expenditures make up 55.0% of total consumption expenditures for the poorest quintile, this declines to 38.6% for the richest one. The five major cereals make up 38.6% of the poorest quintile and this declines a surprisingly little when we consider the richest quintile, to 32.0%. Notably, the share is relatively stable for the poorest three quintiles and drops off only for quintiles 4 and 5, suggesting that transformation in the food basket has only started to occur in the richest two quintiles. The food budget for animal foods for the richest households comprises 17.6%, yet this is only 6.6% for the poorest ones. As for cereals, the higher consumption of animal products is especially noted for the richest quintiles 4 and 5.

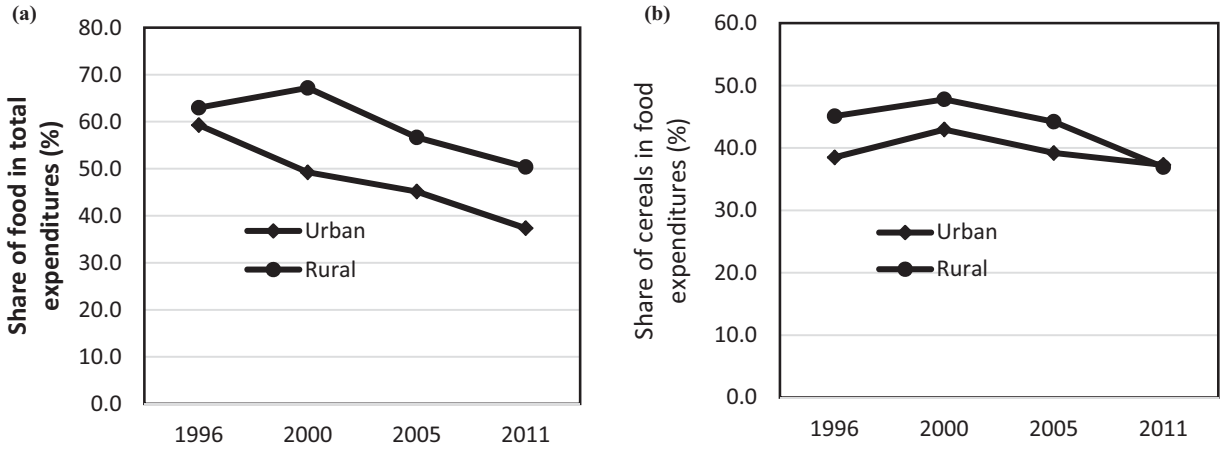
The share of cereals in total food consumption is relatively stable over the expenditure quintiles but there are, however, notable differences within the cereal category. Maize and sorghum are the two cereals that are typically consumed more by the poor than by the rich. About 13% of all food expenditures of the poor goes toward maize. This compares to 2.6% for the rich. These numbers are 6.9% and 1.8%, respectively, in the case of sorghum. The consumption of barley is low overall but its share also decreases when incomes increase. There is less variation in wheat, based on the total expenditure level, however, it is consumed slightly more by the rich, possibly indicating issues regarding the targeting of wheat subsidies in the country (Minot et al., 2015). Teff consumption also shows a distinctive pattern by the expenditure level. It increases consistently over expenditure quintiles. Teff only makes up 4.4% of the food expenditures of the poorest quintile. By contrast, it comprises 9.1% of all food expenditures of the richest quintile. Teff is therefore clearly a preferred food of the rich.[13]

To further explore patterns of consistency between quintiles and the changes in consumption behavior patterns, Fig. 3a shows how the share of food in the total consumption basket has evolved over time by quintiles. We see that the Engel's law holds for all time periods, though there has been parallel shift in this relationship. While food expenditures made

[11] They include Mekelle, Asaita, Bahir Dar, Adama, Jijiga, Assosa, Awasa, Gambella, Harar, and Dire Dawa.

[12] Consumption patterns also vary considerably across regions. A regional breakdown of the food consumption and expenditure shares is provided in Table A3 in the Appendix.

[13] In a more complete quantitative approach, Tafere et al. (2010) use an Almost Ideal Demand Systems (AIDS) model developed by Deaton and Muellbauer (1980) to estimate income elasticities from the HICES data of 2004/05. In line with Table 3, they find that animal products have the highest income elasticity of all the food product categories considered. A doubling of income leads to a 172% increase in animal expenditures in urban areas and a 198% increase in rural areas. Animal products are therefore an economically superior product (Berhane et al., 2012; Delgado et al., 1999; Delgado, 2003). Tafere et al. (2010) document interesting differences in income elasticities within the main cereals consumed in the country. Teff shows high income elasticities, indicating that a doubling of income increases expenditures by 120% in rural areas and by 110% in urban areas. On the other hand, other cereals show much lower elasticities. Sorghum even has a negative income elasticity in urban areas, indicating that it is an economically inferior commodity: when households become richer, the consumption of such goods is reduced. As the country gets richer, the importance of sorghum is likely to decline while teff is likely to become a more important food item in the food basket.



Source: Authors' calculations based on HICES, CSA.

Fig. 2. Share of food in total consumption expenditures and share of cereals in food expenditures, 2000–2011, urban versus rural.

Table 3
Share of expenditures by expenditure quintile, 2011

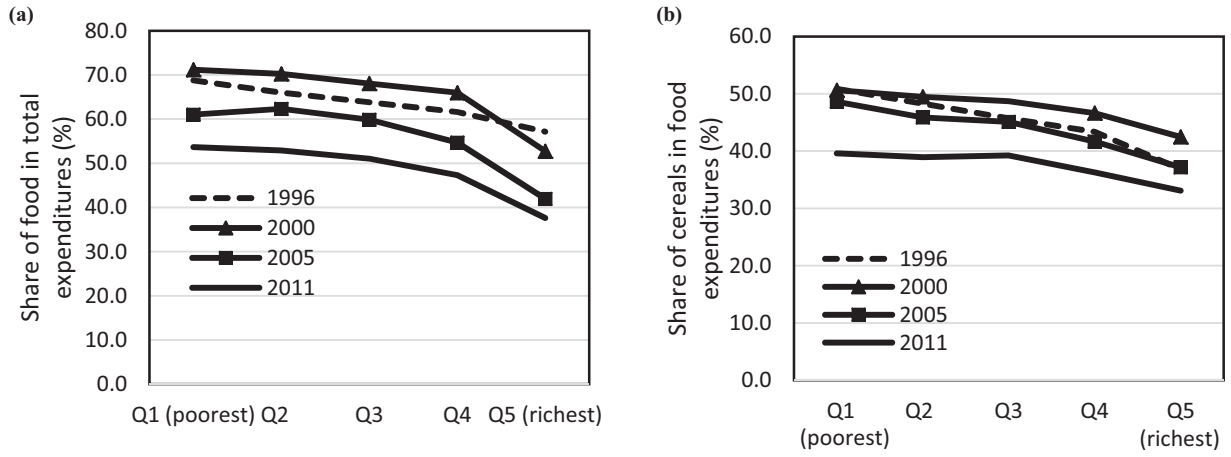
	Q1 (poorest)	Q2	Q3	Q4	Q5 (richest)	Total
Food						
Teff	4.4	6.3	7.7	8.5	9.1	7.5
Wheat	6.5	6.9	7.8	7.8	7.6	7.4
Barley	3.4	3.2	2.8	2.1	1.1	2.4
Maize	13.0	10.4	8.8	6.5	2.6	7.7
Sorghum	6.9	6.4	6.3	4.8	1.8	5.0
Other cereals	1.9	2.0	1.6	1.2	0.8	1.4
Processed cereals	2.6	2.6	3.1	4.3	8.9	4.6
All cereals	*38.6*	*37.8*	*38.0*	*35.1*	*32.0*	*36.0*
Pulses	10.1	10.0	10.7	9.7	7.6	9.5
Oilseeds	0.2	0.2	0.2	0.2	0.1	0.2
Animal products	6.6	7.6	8.1	11.4	17.6	10.8
Oil and fat	4.8	6.0	6.1	7.1	8.3	6.6
Vegetables and fruits	6.4	6.4	6.2	6.3	6.7	6.4
Pepper	7.2	7.3	6.9	6.6	5.6	6.6
Enset/kocho	6.4	5.8	4.0	4.2	1.7	4.2
Coffee/tea/khat	9.1	9.5	9.6	9.1	8.2	9.1
Root crops	3.6	2.1	1.6	1.3	1.0	1.8
Sugar and salt	2.4	2.4	2.5	2.9	3.0	2.7
Other foods	4.7	4.9	6.1	6.0	8.3	6.2
Total food	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Food versus nonfood						
Food	55.0	54.6	51.9	48.2	38.6	47.9
Nonfood	45.0	45.4	48.1	51.8	61.4	52.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Authors' calculations based on HICES, CSA.

up 71% of total expenditures of the poorest quintile in 2000, this came down to 54% in 2011. Similar reductions over time are seen for all quintiles. In Fig. 3b, the share of cereals in food expenditures is shown for the five quintiles over these last four surveys. The share of cereals for the poorest quintile was 47% in 2000 but it declined to 38% in 2011. Again, there has been a consistent decrease in the share of cereals for all quintiles in the consumption basket, even though the average quantities consumed increased over time. It is to be noted that there has not been a consistent decline over the period 1996–2011 as seen earlier as most quintiles are shown to have been worse off for these indicators in 2000 than in 1996.

4. Calorie consumption

Table 4 reports consumption in terms of calories per adult equivalent. A consistent increase in calorie consumption is seen over the years, reflecting the improving food security situation in the country (MoFED, 2012). Average calorie consumption



Source: Authors' calculations based on HICES, CSA.

Fig. 3. Share of food in total consumption expenditures and share of cereals in food expenditures, 2000–2011, by quintile.

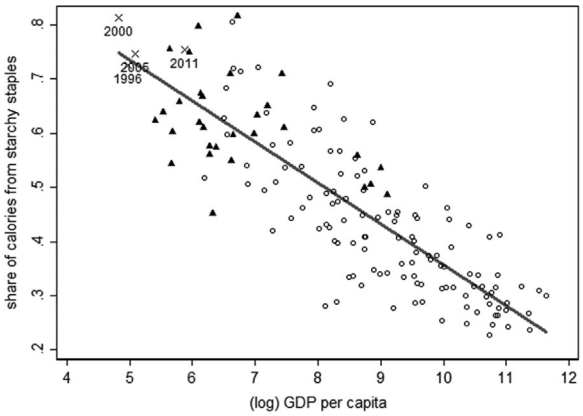
Table 4
Calorie consumption per adult equivalent per day

	1996		2000		2005		2011	
	kcal.	Share (%)	kcal.	Share (%)	kcal.	Share (%)	kcal.	Share (%)
Teff	305	13.9	372	13.6	316	11.1	323	10.8
Wheat	261	11.9	316	11.5	364	12.8	301	10.0
Barley	129	5.9	92	3.4	113	4.0	121	4.0
Maize	432	19.7	490	17.9	441	15.5	608	20.3
Sorghum	213	9.7	289	10.5	363	12.7	353	11.8
Other cereals	72	3.3	168	6.1	63	2.2	91	3.0
Processed cereals	52	2.4	57	2.1	86	3.0	57	1.9
All cereals	*1,465*	*66.7*	*1,784*	*65.1*	*1,745*	*61.3*	*1,854*	*61.8*
Pulses	240	10.9	205	7.5	203	7.1	214	7.1
Oilseeds	11	0.5	7	0.3	7	0.2	5	0.2
Animal products	72	3.3	64	2.3	76	2.7	59	2.0
Oil and fat	54	2.5	39	1.4	63	2.2	130	4.3
Vegetables and fruits	60	2.7	65	2.4	76	2.7	62	2.1
Pepper	8	0.4	5	0.2	5	0.2	52	1.7
Enset/kocho	63	2.8	323	11.8	235	8.2	306	10.2
Coffee/tea/khat	43	2.0	39	1.4	41	1.5	60	2.0
Root crops	67	3.1	122	4.5	149	5.2	104	3.5
Sugar and salt	85	3.9	67	2.4	72	2.5	58	1.9
Other foods	29	1.3	21	0.8	174	6.1	97	3.2
Total food	**2,197**	**100.0**	**2,741**	**100.0**	**2,847**	**100.0**	**3,001**	**100.0**
No. of observations	**11,923**		**17,320**		**21,560**		**27,831**	
t-Test on growth in cereal calories compared to the base period (1996)								
Significance level			***		***		***	
t-Test on growth in total calories compared to the base period (1996)								
Significance level			***		***		***	

***, **, and * indicate that the mean differences are statistically significant at the 1%, 5%, and 10% level, while n.s. indicates that the difference is not statistically significant.
Source: Authors' calculations based on HICES, CSA.
Note: Statistical significance tests are conducted taking 1996 as base period.

was only 2,197 kcal per day per adult equivalent in 1996 but increased to 3,001 kcal in 2011. Starchy staples remain the major contributor to the total calorie consumption.[14] There has been remarkably little change in this regard over the 15-year period. Starchy staples contributed 72.6% to total calorie intake

[14] Starchy staples typically provide a cheap source of calories and are rich in carbohydrates. In Ethiopia, as in many other parts of Africa, cereals are the most important source of calories. To facilitate comparison with other countries, we define starchy staples as cereals, root crops (potatoes, sweet potatoes, cassava, and other root crops), and enset/kocho.



Source: The data for share of calories from starchy staples (*y*-axis) come from the FAO food balance sheets, except for Ethiopia for which the HICES data were used. Data on gross domestic product (*x*-axis, GDP) is from the World Bank. Latest available observation pair was used for each country, except for Ethiopia for which the HICES survey years were used.
Note: X marks Ethiopia in different years (four observations), triangles are other sub-Saharan African countries (31 countries) and hollow circles non-sub-Saharan African countries (123 countries). The solid line is the line of best-fit for the global calorie share from starchy staples–income relationship. Gross domestic product (GDP) per capita is expressed in current USD. Starchy staples include cereals and root crops (including enset and kocho).

Fig. 4. Global share of calories from starchy staples–income relationship.

in 1996, while in 2010 the share was 75.5%. Contrary to what would be expected, the Ethiopian diet has not shifted away from starchy staples during the period of high economic growth. Indeed, the contemporary Ethiopian diet relies more on starchy staples than what would be expected for the country's level of income (see Fig. 4).

The most important crop contributing to calories is maize. It accounts for nearly 20% of the average calories consumed per adult equivalent. Sorghum accounts for 12% while teff and wheat make up 11% and 10% of the calories, respectively. Barley and other cereals are less important. While processed cereals account for almost 5% of expenditures, they however contribute relatively less toward calories, with 2% of calories provided by this category. Among other food items, a noteworthy change is that the calories from oils and fats have more than doubled: from 54 kcal per day per adult equivalent in 1996 to 130 kcal in 2011.

We also look at the cost of calories (Subramanian and Deaton, 1996). The real cost of calorie per day is computed by dividing per adult equivalent calorie intakes with per adult equivalent expenditures. Table 5 shows that the price per calorie differs considerably between food groups. When the prices for 2011 are considered, prices of cereals are considerably lower than those of most other categories. These other crops are therefore usually called "high-value" crops. Animal products carry the highest price for calories with a calorie price that is eight times as high as the average price paid for cereals. The price for fruits and vegetables is also relatively high as it has a price tag that is about five times as high per calorie than for cereals. The price for other foods—except for enset/kocho and root crops—is also considerably higher than the average. Within the cereal category, the lowest calorie prices are found for maize and sorghum. These prices are considerably below the level that consumers pay per calorie for teff and wheat products. The prices for barley fall in between maize or sorghum and teff. Note also the considerably higher price per calorie for processed cereals.

Table 5
Real price per kilo-calorie paid (birr/kcal)

	Year			
	1996	2000	2005	2011
Teff	0.28	0.26	0.23	0.21
Wheat	0.20	0.21	0.20	0.23
Barley	0.27	0.31	0.31	0.18
Maize	0.17	0.17	0.16	0.12
Sorghum	0.25	0.16	0.18	0.13
Other cereals	0.30	0.14	0.21	0.15
Processed cereals	0.29	0.26	0.30	0.74
All cereals	0.23	0.20	0.20	0.18
Pulses	0.23	0.37	0.30	0.41
Oilseeds	0.20	0.27	0.25	0.29
Animal products	0.77	0.94	0.92	1.71
Oil and fat	0.63	0.70	0.50	0.47
Vegetables and fruits	0.46	0.53	0.49	0.95
Pepper	4.60	5.87	3.94	1.18
Enset/kocho	0.60	0.18	0.15	0.13
Coffee/tea/khat	1.67	1.33	1.49	1.41
Root crops	0.29	0.21	0.17	0.16
Sugar and salt	0.22	0.23	0.21	0.43
Other foods	1.46	1.10	0.52	0.59
Total food	**0.34**	**0.28**	**0.28**	**0.31**

Source: Authors' calculations based on HICES, CSA.

Notably, the shift that is seen over time in food preferences shows a relative reduction in consumption of low-priced calories, while there is an increase in consumption of more expensive ones. The average price that consumers pay per calorie has increased by 8% over the last decade, often seen in countries where income improve (Bouis, 1994). This is mostly driven by a shift to more expensive food items. For example, Table 5 shows that prices paid for calories of basic staples have consistently decreased over time and real prices paid for calories from cereals were 20% lower in 2011 than the price paid in 1996. The real prices of other food categories has mostly gone up, but especially so for the period between 2005 and 2011.

5. Decomposition of changes in calorie intakes

5.1. Methodology

So far we have seen that calorie intakes in the country have substantially increased over the 15-year period. In this section, we use decomposition techniques to gain a better

understanding of the drivers of this change. More specifically, following Oaxaca (1973) and Blinder (1973), we decompose the changes in calorie intakes.[15] The difference in the mean (log) calorie intakes between 2011 and 1996 ($\bar{D}$) is formally expressed as:

$$\bar{D} = \bar{C}_{2011} - \bar{C}_{1996}, \tag{1}$$

where $\bar{C}_{2011}$ captures the mean (log) calorie consumption in 2011 and $\bar{C}_{1996}$ in 1996. Using linear regression methods, we can decompose the difference using the following equation:

$$\bar{D} = \left[\bar{X}_{2011} - \bar{X}_{1996}\right]' \hat{\beta}_{2011} + \bar{X}'_{1996}\left[\hat{\beta}_{2011} - \hat{\beta}_{1996}\right], \tag{2}$$

where $\bar{X}$ refers to the mean values of the covariates (observed either in 2011 or 1996) that we use to predict the change. The term $\hat{\beta}$ refers to the estimated coefficients on the covariates. Equation (2) decomposes the changes in (log) calorie intakes over the two periods into two components. The first part of the equation is usually referred as the "explained" component ($[\bar{X}_{2011} - \bar{X}_{1996}]'\hat{\beta}_{2011}$)—the part of the difference that is due to changes in characteristics or endowments (in 2011 coefficients). The second part of the equation is the "unexplained" component ($\bar{X}'_{1996}[\hat{\beta}_{2011} - \hat{\beta}_{1996}]$)—the part that is due to the changes in the estimated coefficients.

Equation (2) can be broken down further in order to identify the contribution of each covariate ($\bar{X}_1$, $\bar{X}_2$, ...). Constructing such detailed decomposition is straightforward. For example, the detailed decomposition for the explained part can be calculated as:

$$\bar{D} = \left[\bar{X}_{2011} - \bar{X}_{1996}\right]' \hat{\beta}_{2011} = \left(\bar{X}_{1,\,2011} - \bar{X}_{1,1996}\right)' \hat{\beta}_{1,2011} + \left(\bar{X}_{2,\,2011} - \bar{X}_{2,1996}\right)' \hat{\beta}_{2,2011} + \cdots \tag{3}$$

As covariates in Eqs. (2) and (3), we use variables that are likely to be associated with changes in calorie intakes. Fig. 1 and previous work in this area suggests that income growth is associated with increase in calorie intakes (Subramanian and Deaton, 1996). We proxy income with (log) real per capita expenditure per day.[16] We also include a squared term to capture potential nonlinear relationship between calorie intakes and household incomes. Economic theory predicts that price increases are associated with lower demand, and vice versa. To capture such price effects, we follow Subramanian and Deaton (1996) and Valero-Gil and Valero (2013) by including a (log) cost of calories per day to the model.[17] Moreover, previous literature shows how occupational shifts in the economy and urbanization shape calorie intakes. For example, the calorie needs are lower in occupations that require less physical activity (Paeratakul et al., 1998). Furthermore, urban residents typically have access to a wider variety of foods but also have lower physical activity levels due to better access to public transportation (Popkin, 1999). To capture these trends, we include occupational categories of the head and a dummy if the household is located in an urban area. We also include the highest level of education in the household to capture the effect of the changes in educational levels in Ethiopia on calorie intakes. Other covariates include household size and household head's age and sex. Table B1 in the Appendix provides the summary statistics of these variables for both rounds (1996 and 2011). The β coefficients in Eq. (2) are obtained using an Ordinary Least Squares (OLS) regression model. These regression results are provided in Table B2 in the Appendix.

Equation (2) decomposes the changes in mean calorie intakes. The implicit assumption is that the factors responsible for the changes at the mean are the same across the whole calorie intake distribution. This may not be the case. For example, it may well be that the income growth experienced in Ethiopia has only benefitted the top part of the distribution. To study the changes across different points of the calorie intake distribution, we apply the RIF regression method proposed by Firpo et al. (2009). This unconditional quantile regression approach is similar to the standard OLS regression, except that the dependent variable is replaced with a RIF for quantile $q(t)$:

$$RIF\left(C_{it}, w\left(t\right)\right) = q\left(t\right) + \frac{I\left(C_{it} \leq q\left(t\right)\right)}{f_c\left(q\left(t\right)\right)}, \tag{4}$$

where $I()$ is an indicator variable obtaining value 1 if the calorie intake (C_{it}) for household i observed in period t is smaller or equal to the quantile and zero otherwise. f_c is the density function evaluated at quantile $q(t)$. We conduct the decomposition at the 10th, 25th, 50th (median), 75th, and 90th quantiles.

6. Results

Column 1 in Table 6 provides the mean decomposition results.[18] The top panel of the table provides the decomposition results based on Eq. (2) and the bottom panel provides the detailed decomposition. First, the changes in endowments (i.e., covariates) between the two survey rounds explain 98% of the

[15] Fortin et al. (2011) provide an accessible overview of decomposition methods.

[16] Measuring consumption and expenditures is difficult and therefore our expenditure variable is likely to contain some measurement error. Classical (random with zero mean) measurement error leads to attenuation bias in the estimated coefficients. As a result, our coefficients should be considered as lower-bound estimates.

[17] The real cost of calorie per day variable is computed here by dividing the mean per adult equivalent calorie intakes in the community with the mean per adult equivalent expenditures in the community. In order to minimize reverse causality concerns, the real cost of calories is imputed at the community level, rather than at the household level. More specifically, we divide the mean per adult equivalent calorie intakes in the community with the mean per adult equivalent expenditures in the community.

[18] We computed the decompositions using the "oaxaca" command in Stata 13 (see Jann, 2008).

Table 6
Decomposition of the changes in calorie intakes

Overall	(1) Mean	(2) q10	(3) q25	(4) q50	(5) q75	(6) q90
Overall						
Year 2011	7.99***	7.5***	7.67***	7.97***	8.35***	8.55***
Year 1996	7.73***	7.13***	7.34***	7.74***	8.11***	8.31***
Difference	0.26***	0.374***	0.331***	0.234***	0.24***	0.243***
Explained	0.255***	0.309***	0.254***	0.265***	0.263***	0.258***
Unexplained	0.00464	0.0642***	.0775***	−0.0316***	−0.0236*	−0.0153
Explained						
(log) real expenditure (aeu) + squared	0.219***	0.272***	0.219***	0.225***	0.221***	0.218***
(log) real calorie cost per day	0.0477***	0.0516***	0.0429***	0.0469******	0.0564***	0.0597***
Occupation	−0.00458***	−0.00464***	−0.00402***	−0.00539***	−0.00543***	−0.00486**
Age of head	8.20E-05	0.00059	.00052**	1.20E-05	−3.00E-05	−0.00021
Male head	0.00028	−0.00058	−0.00036	0.00024	0.0009	0.0017
Household size (aeu)	0.00631***	0.00628***	0.00614***	0.00751***	0.00669***	0.00621***
Education level	−0.00843***	−0.00719**	−0.00751***	−0.00282	−0.00936***	−0.0156***
Urban	−0.00538***	−0.00826***	−0.00255**	−0.00629***	−0.00739***	−0.00632***
Unexplained						
(log) real expenditure (aeu) + squared	−0.0804***	0.143**	−0.163***	−0.101***	−0.0306	−0.0788
(log) of real calorie cost per day	−0.0227***	−0.0366***	−0.0551***	−0.0363***	0.0126*	.0275***
Occupation	−0.00901***	−0.00253	0.00297	−0.00856**	−.0188***	−0.0179**
Age of head	−0.0266*	−0.0124	−0.0169	0.0071	−0.018	−0.102***
Gender	−0.00572	0.0353*	−0.0132	−0.0234*	−0.0339**	−0.0403*
Household size (aeu)	0.248***	0.262***	0.296***	0.311***	0.200***	0.129***
Education	0.0112	0.0365**	0.0193*	0.00844	0.0026	0.00344
Urban	−0.0416***	−0.0738***	−.0487***	−0.0417***	−.0306***	−0.0238**
Constant	−0.0686*	−0.287***	0.0557	−0.146***	−0.107*	0.0876
No of observations	**39,748**	**39,748**	**39,748**	**39,748**	**39,748**	**39,748**

Source: Authors' calculations based on HICES, CSA.
Note: aeu refers to adult equivalent units. Statistical significance based on standard errors clustered at the community level and denoted at $^{***}P < 0.01$, $^{**}P < 0.05$, $^{*}P < 0.1$.

difference in calorie intakes between 1996 and 2011. The detailed decomposition shows that the increased calorie intakes are mostly associated to increases in expenditures. The increase in expenditure over the two periods explains 84% of the observed changes in calorie intakes. The remaining 16% are mostly explained by the decrease in real price of calories. Changes in the occupational structure, educational levels, household sizes, and urbanization explain an unimportant share of the changes in calorie intakes over the 15-year period. However, it is worth emphasizing that inferences from these decomposition results should be made with caution. In particular, this is largely an observational study and therefore one should not attribute causality to these findings.

So far the decomposition analysis has focused on the first (1996) and the last (2011) round of the data. In Tables B3 and B4 in the Appendix, we conduct the same decomposition over the 1996–2005 and 2005–2011 periods. Our results are robust to using these intervals as well. This means that our main results are not sensitive to exogenous events (e.g., weather, pests) pertaining to a specific survey year. Our results are further robust to the inclusion of zone level dummies that control for time-invariant unobserved factors (e.g., agricultural production patterns and dietary habits) fixed to the zones. These results are reported in Table B5 in the Appendix.

The attention now shifts to the quantile decomposition based on the RIF regression approach.[19] Columns 2–6 provide the results for the 10th, 25th, 50th, 75th, and 90th quantiles, respectively. First, we see that the growth in calories (difference in calorie intakes across the two survey rounds) has been faster at the bottom quintiles. Moreover, income growth remains the main driver of changes in calorie intakes across the whole calorie distribution.[20] This suggests that the economic growth in the last decade in Ethiopia has also benefited the poorest part of the population. As before, using different time periods yields similar conclusions (see Tables B3 and B4 in the Appendix).[21]

7. Conclusions

Africa has witnessed impressive and unprecedented growth in the last decade (Arndt et al., 2016). This growth has

[19] We thank Barry Reilly and Paola Salardi for sharing the Stata code for the quantile decomposition.

[20] The portions explained by the income growth at different quantiles are: q10: 73%, q25: 66%; q50: 96%, q75: 92%, and q90: 90%.

[21] In contrast to 1996–2011 and 1996–2005 periods, real cost of calories increased between 2005 and 2011 (from 0.81 birr/kcal to 0.90 birr/kcal). This explains why the real calorie cost turns negative in Table B4 in the Appendix: this *increase* in real cost of calories is associated with a *decrease* in calorie intakes.

important implications on its agricultural and food economies. However, there is a lack of evidence on how these economies are transforming and what the implications are for the agricultural and food sectors, often because no reliable and representative data are available (Jerven, 2013). Relying on unique large-scale household surveys over a 15-year period, this article studied the transformations that are taking place in Ethiopia's food economy during a period of high growth and emerging structural transformation. Ethiopia is an important case study for this transformation in Africa because of the size of the country (with almost 100 million people residing in the country), its fast economic growth, as well as the availability of these household data over a long period.

We find that average quantities and calorie consumption per adult equivalent have consistently and considerably improved over the last 15 years. Also, the content of the diet is changing with a gradual shift toward high-value foods such as animal products, fruits and vegetables, and processed foods. While the quantities of cereals slightly increased over the last decade, we see a shift away from lower-priced cereals (e.g., sorghum and maize) to more expensive ones (e.g., teff).

These changes in diets seem shaped by improvements in household income levels. Our decomposition analysis suggests that the 27% increase in calorie intakes between 1996 and 2011 is mainly due to increased incomes. The reduction in real cost of calories over the same period has also played a role, albeit a much smaller one. Furthermore, the quantile decomposition analysis shows the calorie intakes have increased across different points of the calorie distribution and further suggests that growth in incomes have been the driver of this improvement. Overall, this indicates improvements in the calorie intakes are likely to continue if the economic growth persists and is distributed equally across the income distribution.

Moreover, while urbanization rates have been low in Ethiopia, the situation is changing fast (Schmidt and Kedir, 2009). People in cities are shown to have different diets than rural populations and increasing urbanization will therefore require a different food system. But increased urbanization and income growth will also bring about concerns. In particular, income growth and urbanization are associated with increased consumption of oils and fats as well as animal products and processed foods. This, together with structural change where calorie needs decline as a result of the shift away from agriculture to low-activity occupations, mean that overweight and obesity could become a problem in the not-so-distant-future (Popkin et al., 2012), especially in the urban areas of the country. If these predictions turn out to be correct, the next decade will see Ethiopia battling with high undernutrition rates in rural areas and increasing overweight and obesity rates in the cities. This phenomenon has been coined in the literature as the double-burden of malnutrition (Gillespie and Haddad, 2001).

We recognize that our study has limitations. First, we rely on repeated cross-sectional surveys. Consequently, some of the changes observed over time could be due to some to exogenous events (e.g., weather, pests) linked to a specific survey year. Second, our study is largely an observational one and therefore one should not attribute causality to these findings. Third, these dietary trends and patterns observed in the past 15 years may not necessarily carry on post-2011. Indeed, due to data constraints we are not able to study the more recent patterns in food consumption and diet transformation in Ethiopia. This is left for future research. Mindful of these caveats, we believe that many of the stylized facts documented in this article are of considerable interest to policy making. For example, the changing food consumption basket has implications to Ethiopia's agricultural sector. Over the last two decades, the agricultural policy in Ethiopia has been successful in improving productivity and availability of cereals in the country (e.g., Bachewe et al., 2015), contributing to improved food security for large parts of the population. However, there is a heavy focus on starchy staples in the Ethiopian diet. This lack of diversity in diets could be linked to the high child undernutrition rates in the country (Headey, 2014). More emphasis on diversification in agricultural production as well as on diversification of diets seems required. Moreover, agricultural markets play an increasing role in providing consumers with the food that they require (Minten et al., 2014).[22] It is therefore important to gain a better understanding of how these markets can cater consumers with adequate and nutritionally diverse diets. Of particular importance is to solve issues related to the distrust that usually exists toward food markets. Further understanding of producer, wholesale, and retail markets; agricultural processing; trade logistics; and the role of each of these factors in shaping food prices and consumption patterns is required in order to design appropriate policies and interventions to improve diets in Ethiopia.

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[22] An emerging body of research shows how market access is an important determinant of diets in Ethiopia (Abay and Hirvonen 2017; Hirvonen and Hoddinott, 2017; Hoddinott et al., 2015; Stifel and Minten, 2017).

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix A: Food expenditures and consumption
Appendix B: Decomposition analysis