

## Trends in Calorie Intake from Sugar-Sweetened Beverages and Sugar-Sweetened Snacks in Ethiopia (2010-2016)



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## Acronyms

BMI	Body Mass Index
CSA	Central Statistics Agency
EPHI	Ethiopian Public Health Institute
HCES	Household Consumption and Expenditure Survey
FAO	Food and Agriculture Organization
Kcal	Kilocalorie
NCD	Non-Communicable Diseases
SSB	Sugar-Sweetened Beverages
SSS	Sugar-Sweetened Snacks
SNNPR	Southern Nations, Nationalities, and Peoples' Region
WFP	World Food Program
WHO	World Health Organization

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## 1. Introduction

Sugar-sweetened beverages (SSB) include soda, processed fruit drinks, sports and energy drinks, sweetened coffee and tea, sugar cane beverages, non-alcoholic wines or malt beverages, and other sweetened beverages. Sugar-sweetened snacks (SSS), on the other hand, include biscuits, cookies, cereal bars, chocolates, candies, cakes, and cake type snacks such as cake-bars, pastries, muffins. They also include savoury snacks such as crisps, popcorn, and crackers [1, 2]. Both SSB and SSS have little nutritional value [3]. Evidence has linked high intake of SSB with weight gain, obesity, the risk of type 2 diabetes, the development of dental caries, increasing fatty liver, the risk for cardiovascular disease and some types of cancers [1, 4, 5].

The World Health Organization (WHO) strongly recommends reducing the consumption of free sugars throughout the life course. It recommends for adults and children to consume less than 10% of daily total energy, which is roughly about 50g per day of sugars. It also recommends a further reduction to 5% of total daily energy intake for additional health benefits [6].

Limited information is available on the intake of SSB and SSS in Africa. A study from South Africa reported that the consumption of SSB and free sugars among urban adults and adolescents (over 10 years of age) accounted for 12.3% of the total energy intake [7]. Another South African study conducted in 2019, showed that the consumption of 10 or more SSB servings per week by adults was associated with a 50% greater odds of gaining at least 5% body weight [8]. In the United States, research found that adults and children who drank SSB were significantly more likely to also eat sugary snacks than non-SSB drinkers [9], and that the consumption of both SSB and artificially sweetened beverages among young adults (24-34 years) was associated with higher allostatic load, and its emergence at a younger age, for those who consumed these beverages [10].

In Ethiopia, there is a paucity of data on the consumption of SSB and free sugars. According to the World Food Program (WFP) and the Central Statistics Agency (CSA), in 2012, 20g/day per adult equivalent of sugars/sweeteners was consumed in Ethiopia. This is equivalent to 61 calories per day or a 2% share of total calorie intake [11]. Despite this low consumption of sugars/sweeteners in Ethiopia, non-communicable diseases (NCDs) and metabolic risk factors are on the rise. Findings from the STEPS population-based survey showed that among a total of 9, 801 study participants, 5.9% were diabetic (with a fasting blood glucose  $\geq 110$  mg/dl) and 6.3% were overweight (BMI  $\geq 25$ ) [12].

The aim of this secondary data analysis is, therefore, to generate evidence on the trends in the consumption of SSB and SSS by region, by residence (urban versus rural) and by expenditure quintile between 2010 and 2016.

## 2. Objectives

The objectives of the analysis are to describe the following trends between 2010 and 2016:

1. Trends in the percentage of households consuming SSB and SSS.
2. Trends in the estimated amount of daily energy intake from SSB and SSS.
3. Trends in the percent change in energy intake from SSB and SSS.

## 3. Data and Methods

This analysis used data from the Household Consumption and Expenditure Survey (HCES) which is conducted by the CSA of Ethiopia every five years. The primary objectives of the HCES is to monitor levels and trends of poverty, and to provide information on income dimensions of poverty, including household consumption and expenditure [11]. The HCES is not primarily designed for nutrition analysis but the information about household food consumption and expenditure can be used for food and nutrition analysis and for exploring changes in dietary patterns [13]. In Ethiopia, the HCES is a nationally representative repeated cross-sectional survey. The first survey was conducted in 1995/1996, and the most recent, in 2016.

For the 2004/05 and earlier HCES rounds, data on household food consumption were collected for a reference period of 28 days, each household was visited eight times to ask about food consumption and expenditure, and the recall periods for these surveys were 3-4 days. However, for the later surveys (2010/11 and 2015/16) household food consumption and expenditure data were collected for a reference period of one week, with the same recall period of 3-4 days.

We used data from the 2010/11 and 2015/16 HCES for this analysis, because both surveys have the same reference period of one week. Additionally, unlike the other surveys the data was collected over the course of one year to capture seasonal variation in food consumption and expenditure patterns. A total of 27,834, and 30,229 households from the 2010/11 and 2015/16 respective HCES rounds, were included in this analysis.

Data on the quantities of foods and drinks consumed were converted into kilocalories (kcal) using the national food composition table developed in 1998 by the former Ethiopian Health and Nutrition Research Institute (currently the Ethiopian Public Health Institute [EPHI]) and the Food and Agriculture Organization (FAO) [14].

For this analysis, food/drink items were categorized into SSB which include soda/soft drinks, fruit drinks, sports drinks, and sweetened water; and SSS which include biscuits, chocolates, ice cream, candy, cake, and other local sugary snacks (i.e., *baqlaba*, *mushebek*). Estimates for gross calorie intake were reported using “per adult equivalent”, which is calculated by dividing each household’s average daily calorie intake by the number of household members,

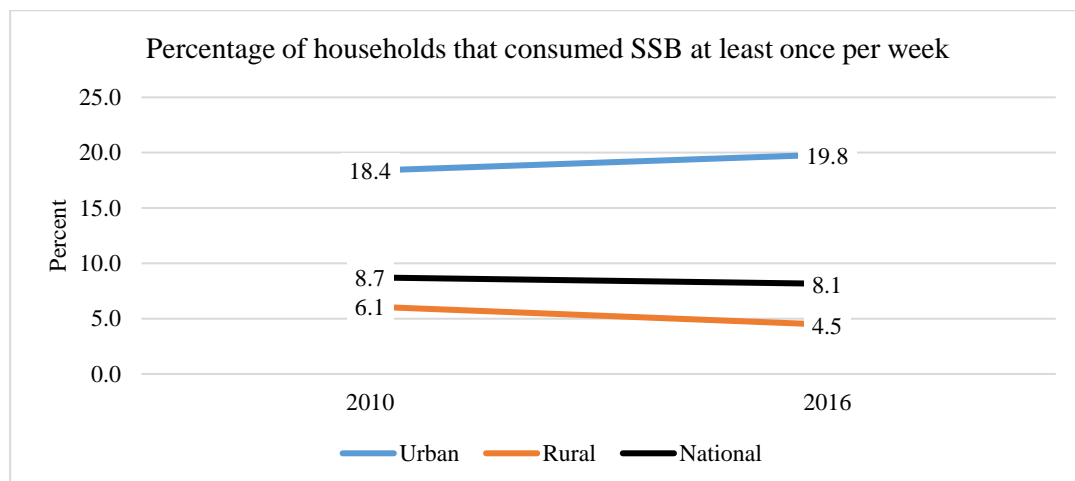
adjusting for age and sex [11, 15]. The analyses were disaggregated by residence (urban/rural), region and expenditure quintile. Household expenditure quintiles were calculated by first arranging all households in ascending order by value of household expenditure, and then dividing them into five equal parts. Whereas expenditure per capita quintiles were constructed by first calculating the annual value of expenditure per capita (total household expenditure divided by the number of people in the household), arranging households' expenditure per capita in ascending order, and then dividing them into five equal parts. This means that the first group (quintile one) included a fifth (20%) of households with the lowest annual expenditure, and the last group (quintile five) included a fifth (20%) of households with the highest annual household expenditure [11]. For this analysis, we used expenditure per capita quintiles because household expenditure quintiles do not account for differences in household size. Sampling weights were used to compute estimates for rural, urban, regional and the expenditure quintiles.

## 4. Results

### 4.1. Percentage of Households that Consume SSB and SSS

#### 4.1.1. Trends in the Percentage of Households that Consume SSB

Figure 1 below shows the percentage of households that consumed SSB at least once per week between 2010 and 2016 across residence. Nationally, the percentage showed a slight decrease (0.6%) during this period. In rural areas the consumption of SSB also decreased by 1.6%, whilst it increased by 1.4% in urban areas. Overall, in urban areas, the percentage of households that consumed SSB was consistently higher compared to those in rural areas.

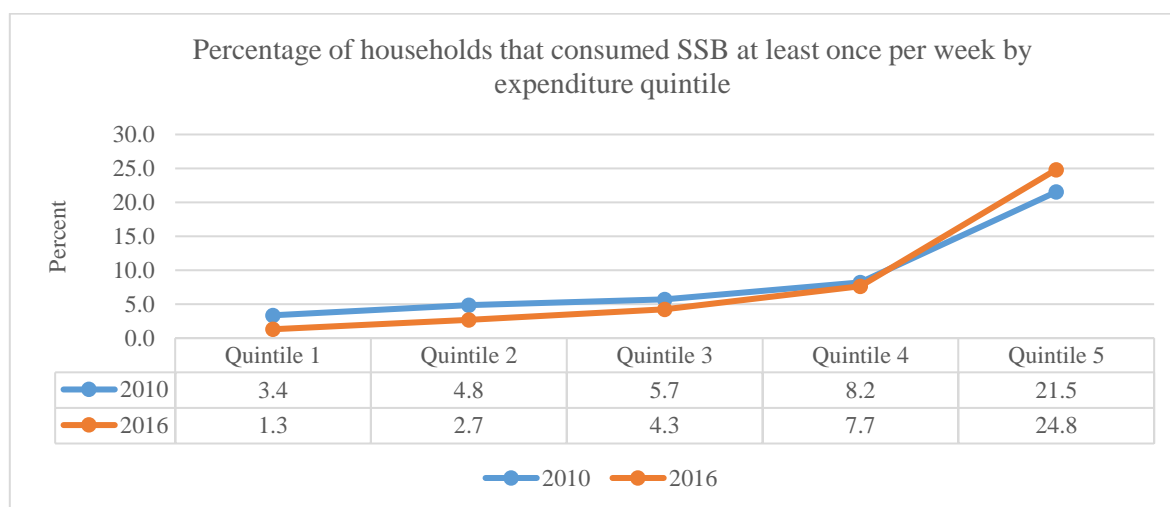


**Figure 1:** Trends in the percentage of households that consumed SSB at least once per week

Figure 2 shows the percentage of households that consumed SSB at least once per week between 2010 and 2016 across expenditure quintiles. At both time points, as the expenditure quintile increased, the percentage of households that consumed SSB also increased. The



percentages for the first four expenditure quintiles were consistently higher in 2010. For the fifth expenditure quintile the situation changed as 2016 showed a higher percentage of households consuming SSB than in 2010.



**Figure 2:** Trends in the percentage of households that consumed SSB at least once per week by expenditure quintile.

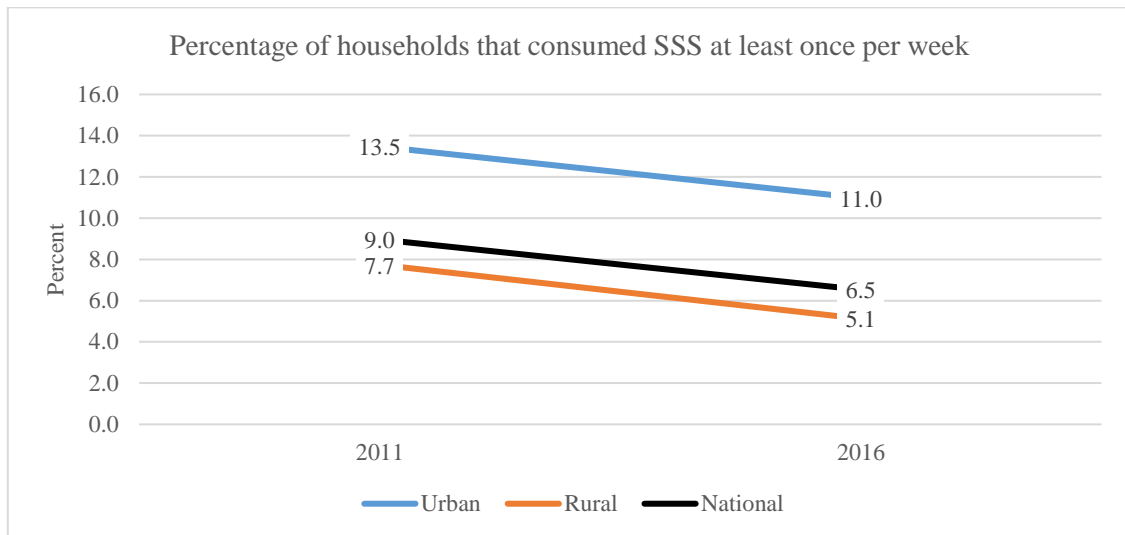
Table 3 shows the percentage of households consuming SSB at least once per week per region. In 2016, Afar had the highest percentage of households that consumed SSB (30.4%) and Somali the lowest (3.7%). Overall, between 2010 and 2016, the consumption of SSB decreased in Oromia, Somali, Southern Nations, Nationalities and Peoples' Region (SNNPR), Addis Ababa, and Dire Dawa but increased in Tigray, Afar, Amhara and Benishangul-Gumuz, Gambella and Harari. The highest percentage increase in the consumption of SSB between 2010 and 2016 were in Afar (21%) followed by Gambella (12.5%).

**Table 1:** Percentage of households that consumed SSB at least once per week per region

Region	2010	2016	Difference (2016-2010)
Tigray	5.0	8.4	3.4
Afar	9.4	30.4	21.0
Amhara	8.0	8.2	0.2
Oromia	8.4	7.3	-1.2
Somali	5.2	3.7	-1.5
Benishangul-Gumuz	6.6	9.8	3.2
SNNPR	8.5	5.5	-3.0
Gambella	5.6	18.1	12.5
Harari	8.0	16.5	8.5
Addis Ababa	23.4	19.0	-4.4
Dire Dawa	19.5	16.9	-2.6
<b>National</b>	<b>8.7</b>	<b>8.1</b>	<b>-0.6</b>

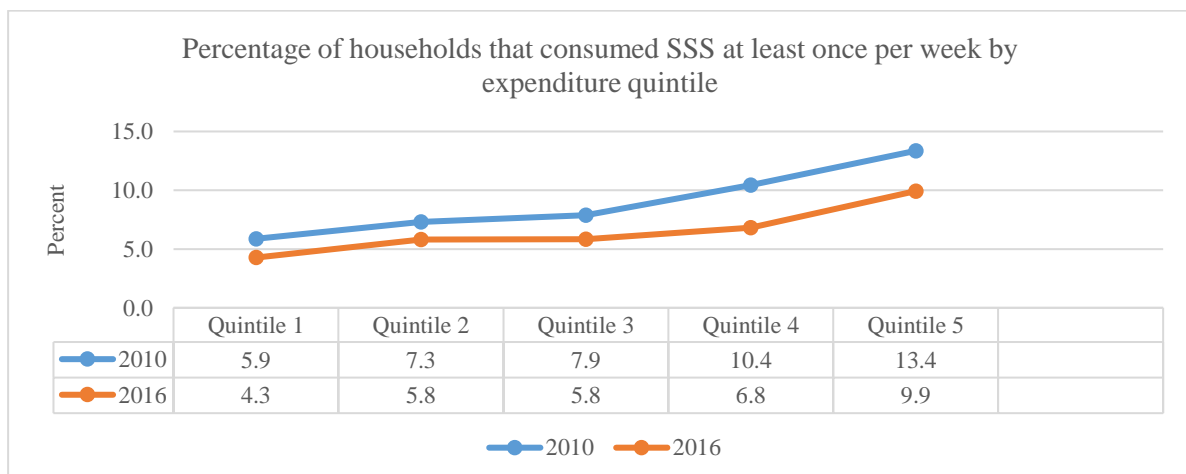
### 4.1.2. Trends in the Percentage of Households that Consume SSS

Figure 3 below shows the percentage of households that consumed SSS at least once per week between 2010 and 2016 across residence. Over the five-year period, the consumption of SSS saw a decrease nationally, as well as in urban and rural areas of Ethiopia. Similar to SSB, the consumption of SSS was constantly higher in urban areas than in rural areas.



**Figure 3:** Trends in percentage of households that consumed SSS at least once per week

Figure 4 shows the trends in the percentage of households that consume SSS at least once per week across expenditure quintiles. Similar to SSB, as the expenditure quintile increased the percentage of households that consumed SSS also increased. For all expenditure quintiles the percentages were consistently higher in 2010, and the higher the expenditure quintile, the bigger the difference in the percentages between the two time points.



**Figure 4:** Trends in the percentage of households that consumed SSS at least once per week by expenditure quintile.

Table 2 shows the percentage of households that consumed SSS at least once per week across regions. In most of the regions, except for Tigray, Afar, Amhara, and Gambella the

percentage of households that consumed SSS decreased between 2010 and 2016. In 2016, the highest and the lowest percentage of households that consumed SSS were in Gambella (26%) and SNNPR (2.6%) respectively. Like with SSB, the highest percentage increase in the consumption of SSS between 2010 and 2016 were observed in Afar (13.1%) and in Gambella (13.8%). The sharpest decline in the consumption in SSS was observed in Dire Dawa (-22.5%).

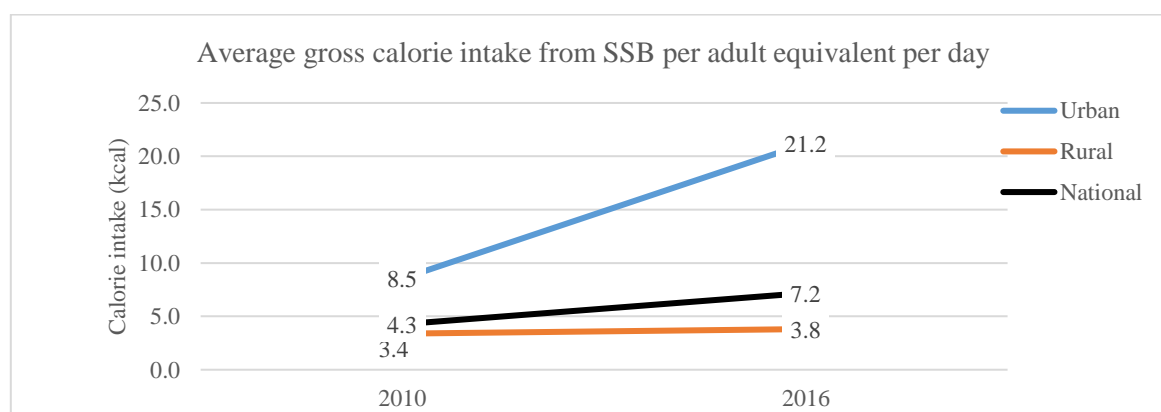
**Table 2:** Percentage of households that consumed SSS at least once per week per region

Region	2010	2016	Difference (2016-2010)
Tigray	4.0	7.4	3.4
Afar	3.9	17.0	13.1
Amhara	7.0	9.8	2.8
Oromia	11.9	5.4	-6.5
Somali	8.2	4.1	-4.1
Benishangul-Gumuz	19.4	9.2	-10.2
SNNPR	5.4	2.6	-2.8
Gambella	12.2	26.0	13.8
Harari	20.6	13.5	-7.1
Addis Ababa	13.0	6.7	-6.2
Dire Dawa	30.5	8.0	-22.5
<b>National</b>	<b>9.0</b>	<b>6.5</b>	<b>-2.4</b>

## 4.2. Average Gross Calorie (kcal) Intake from SSB and SSS

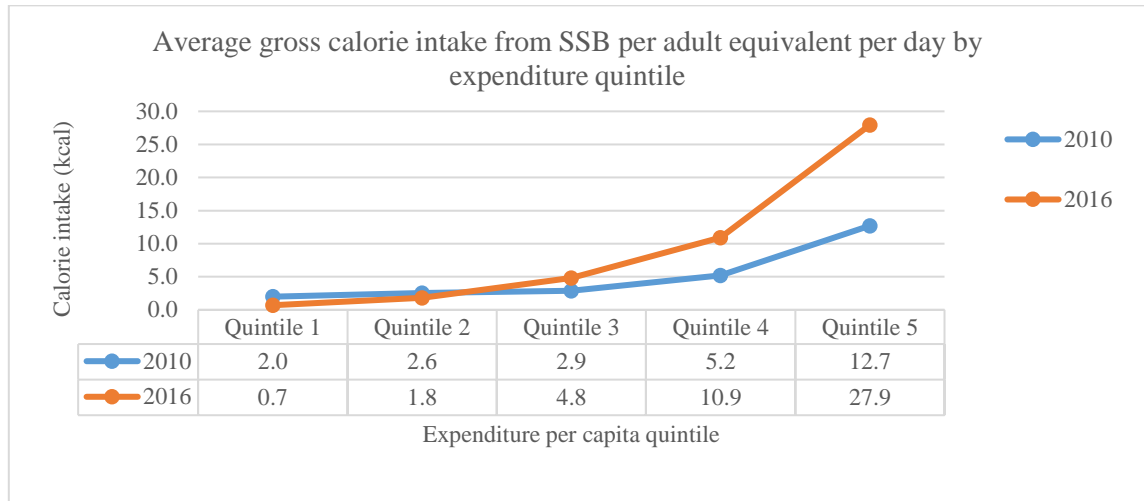
### 4.2.1. Trends in the Average Gross Calorie (kcal) Intake from SSB

Figure 5 shows the average gross calorie intake from SSB per adult equivalent per day by residence. In both 2010 and 2016, calorie intake from SSB was higher in urban areas than in rural areas, and the largest increase was observed in urban areas from 8.5 in 2010 to 21.2 in 2016.



**Figure 5:** Trends in average daily gross calorie intake (kcal) from SSB

Figure 6 shows the trends in average daily gross calorie intake (kcal) from SSB by expenditure quintiles. At both time points, as the expenditure quintile increased the average gross calorie intake from SSB also increased. For the first two quintiles, the average gross calorie intakes from SSB were a bit higher in 2010, but for the remaining three, the calorie intakes in 2016 were consistently higher and the differences larger.



**Figure 6:** Trends in average daily gross calorie intake (kcal) from SSB by expenditure quintile

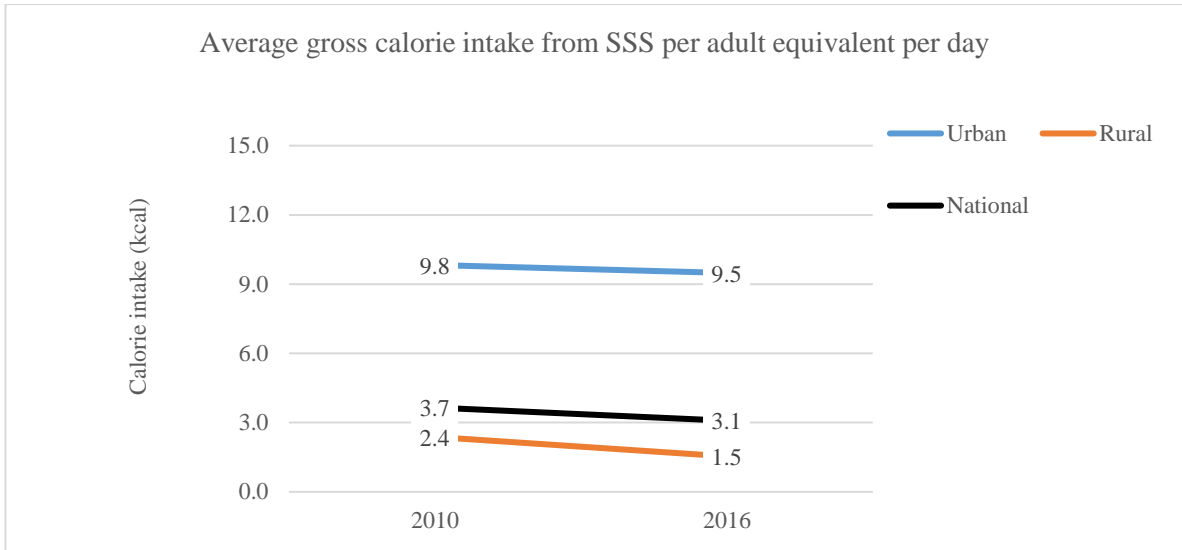
Table 3 shows the trends in the average daily gross calorie intake from SSB per adult equivalent relative to the total population of households and relative to the population of households who consume SSB. Additionally, it also shows the percent change in the average daily gross calorie intake from SSB between 2010 and 2016 across residence, region, and expenditure quintile. Between 2010 to 2016 in all regions except for Addis Ababa, Dire Dawa and Somali, percent increase in the average calorie intake from SSB were observed, the highest percent was in Afar (more than 13 times), followed by Gambella (400%). Similarly, the percent increase in the average calorie intake from SSB were also seen, nationally (67.4%), and in both rural (11.8%) and urban (149.4%) residential populations, and for expenditure quintile 3, 4 and 5. Among those households who consume SSB the percent increase in the average calorie intake from SSB were also observed in rural (70.1%) and urban areas (134%) and also nationally (100%). However, a percent decrease in calorie intake from SSB were observed in the lowest expenditure quintile (-8.4%), and in Tigray (-42.4%), Somali (-85.1%) and Dire Dawa (-71.8%).

**Table 3: Trends and percent change in average daily gross calorie intake (kcal) from SSB**

Characteristics	Calorie intake from SSB in total populations			Calorie intake from SSB in populations that consume SSB		
	2010	2016	Percent change	2010	2016	Percent change
Residence						
Urban	8.5	21.2	149.4	51.2	119.7	133.8
Rural	3.4	3.8	11.8	54.2	92.2	70.1
Expenditure Quintile						
Quintile 1	2	0.7	-65	54.6	50	-8.4
Quintile 2	2.6	1.8	-30.8	48.8	58.2	19.3
Quintile 3	2.9	4.8	65.5	42	109.9	161.7
Quintile 4	5.2	10.9	109.6	58.3	128.6	120.6
Quintile 5	12.7	27.9	119.7	57	111.4	95.4
Region						
Tigray	1.8	1.8	0	45.5	26.2	-42.4
Afar	6.3	91.6	1354	83.3	350.7	321
Amhara	4.9	4.9	0	65	66.2	1.8
Oromia	3.3	5.2	57.6	40.6	89	119.2
Somali	7.3	0.8	-89	158.6	23.7	-85.1
Benishangul-Gumuz	1.8	3.2	77.8	28.8	43.3	50.3
SNNPR	5	9.2	84	65.3	212.8	225.9
Gambella	1.2	6	400	27.1	36.5	34.7
Harari	1.9	7.5	294.7	25.2	62.6	148.4
Addis Ababa	8.3	8.2	-1.2	38.3	47.4	23.8
Dire Dawa	13.8	3.2	-76.8	81.8	23.1	-71.8
<b>National</b>	<b>4.3</b>	<b>7.2</b>	<b>67.4</b>	<b>53.1</b>	<b>106.2</b>	<b>100.0</b>

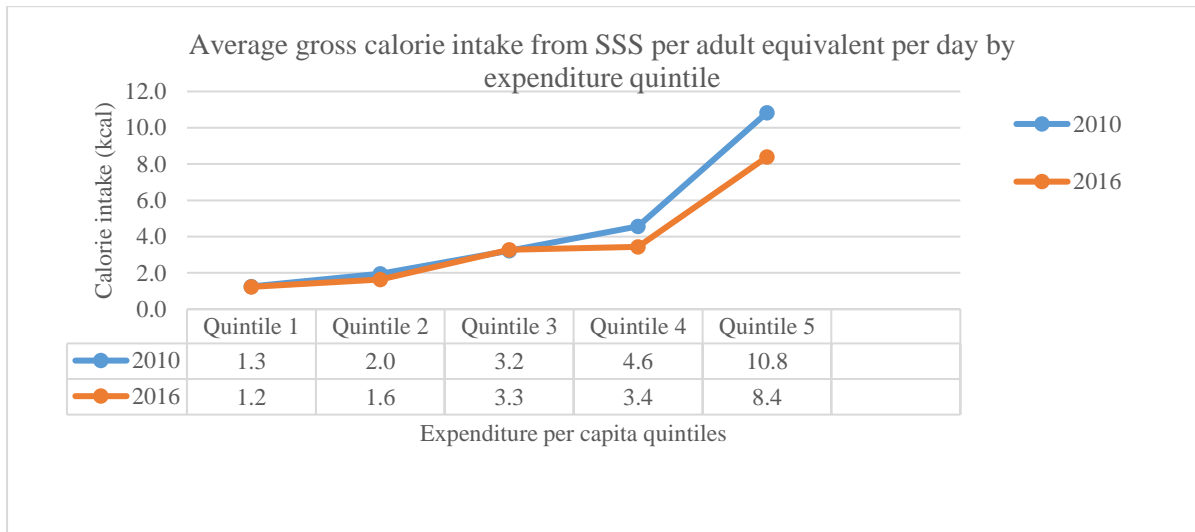
#### **4.2.2. Trends in the Average Gross Calorie (kcal) Intake from SSS**

Figure 7 provides trends in average daily gross calorie intake (kcal) from SSS. In both 2010 and 2016, calorie intake from SSB was higher in urban areas than in rural areas. Unlike with SSB, the average calorie intake from SSS showed a slight decrease nationally, as well as in rural and urban areas.



**Figure 7:** Trends in average daily gross calorie intake (kcal) from SSS

Figure 8 shows trends in the average daily gross calorie intake (kcal) from SSS by expenditure quintiles. Similar to SSB, as the expenditure quintile increased the average gross calorie intake from SSS also increased in 2010 and in 2016. For all expenditure quintiles the average gross calorie intakes from SSS were slightly higher in 2010.



**Figure 8:** Trends in average daily gross calorie intake (kcal) from SSS by expenditure quintile

Table 4 shows the percent change in the average daily gross calorie intake from SSS between 2010 and 2016 across residence, region and expenditure quintile. The average daily calorie intake from SSS showed a minimal decrease between 2010 and 2016, with a percent change of -3.1% for urban areas, -37.5% for rural areas, and -12.5% nationally. However, in the total population, regional variations were observed with the highest percent increase in Afar (391.7%), Tigray (164.3%) and Gambella (156.2%), and the highest percent decrease in Dire Dawa (-75.2%), Harari (-59.7%), and Benishangul Gumuz (-54.4%). In the total population the percent increase was observed only in expenditure quintile three. Unlike in the total

population, among those who consume SSS, the percent increase in the average calorie intake from SSS was observed nationally (12.1%) and in urban areas (5.3%), and across all the expenditure quintiles except for quintile five. In the total population, and in the population who consume SSS, percent increases in calorie intake from SSS were consistently observed in Tigray and Somali.

**Table 4:** Trends and percent change in average daily gross calorie (kcal) intake from SSS

Characteristics	Calorie intake from SSS in total populations			Calorie intake from SSS in populations that consume SSS at least once		
	2010	2016	Percent change	2010	2016	Percent change
Residence						
Urban	9.8	9.5	-3.1	75.3	79.3	5.3
Rural	2.4	1.5	-37.5	29.8	28.6	-4
Expenditure Quintile						
Quintile 1	1.3	1.2	-7.7	19.9	26.4	32.7
Quintile 2	2	1.6	-20	25.3	27.3	7.9
Quintile 3	3.2	3.3	3.1	41.1	53.7	30.7
Quintile 4	4.6	3.4	-26.1	41	45.9	12
Quintile 5	10.8	8.4	-22.2	76.2	73	-4.2
Region						
Tigray	1.4	3.7	164.3	39.4	48.9	24.1
Afar	1.2	5.9	391.7	33.9	31.2	-8
Amhara	2.2	2.5	13.6	29	21.8	-24.8
Oromia	4.6	3.2	-30.4	38.8	62.6	61.3
Somali	2.6	2.7	3.8	32.3	72.5	124.5
Benishangul-Gumuz	9	4.1	-54.4	39.8	45.9	15.3
SNNPR	2.1	1.4	-33.3	47.6	62.8	31.9
Gambella	13	33.3	156.2	106.1	103	-2.9
Harari	14.4	5.8	-59.7	62.2	41.5	-33.3
Addis Ababa	10.8	7.7	-28.7	89.3	109.7	22.8
Dire Dawa	22.6	5.6	-75.2	73.3	66.1	-9.8
<b>National</b>	<b>3.7</b>	<b>3.1</b>	<b>-16.2</b>	<b>41.3</b>	<b>46.3</b>	<b>12.1</b>

## Conclusion

Between 2010 to 2016 the percentage of households that consumed SSB increased in urban areas, but decreased nationally and in rural parts of Ethiopia. However, an increase in the average daily calorie intake from SSB was observed at national level and in both urban and rural areas. The higher the expenditure quintile, the higher the percentage of households that consumed SSB at both time points. In the total population both percentage of households that consumed SSS and average daily calorie intake from SSS decreased nationally and in rural and urban areas. By contrast, among those populations who consume SSS the average calorie

intake from SSS increased nationally and in urban areas. For the first four expenditure quintiles the trend in percentage of households that consumed SSB decreased. However, in most of the expenditure quintiles the average calorie intake from SSS increased.

Generally, both the percentage of households who consume SSB and SSS and the calorie contributions of SSB and SSS were higher in both the urban areas and in the higher expenditure quintiles. In the general population the average daily calorie intake from SSB and SSS were not high. This might be because only a small percentage of households consume these foods. However, among those populations who consume SSB and SSS, the share of calorie intake from these beverages and snacks were higher and increased over time.

## **Recommendations**

Although the consumption of SSS has slightly increased in urban areas, the contributions of these foods to daily caloric intake were low. These findings indicate that dietary patterns with regards to SSB and SSS have not changed dramatically. Ethiopia is still in the early stages of the nutrition transition and actions should be taken to prevent the shift to unhealthy diets.

Interventions that address the double burden of malnutrition are needed to steer the nutrition transition into a direction where undernutrition and micronutrient deficiencies are addressed, without an increase in the diet related NCDs.



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