Urban food security in the context of inequality and dietary change: a study of school children in Accra

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Abstract

Diets are changing globally, as agricultural and food systems have become globalised and created new forms of food production, distribution, and trade. Understanding how patterns of globalisation affect the welfare of populations is a key development question, but we know little about the way that the globalisation of food and agriculture systems affect different individuals or groups. By looking at schoolchildren in Accra, this study explores food security in the context of inequality and dietary change. We use a novel approach based on triangulation of primary data on food consumption and a synthesis of secondary literature on food trade, food policy and urban food environment. Thus, we bridge a divide between micro-level analyses of food consumption and macro-level studies of food systems, and seek to contextualise children's food consumption patterns in the broad picture of global dietary change. We find that socio-economic status is a critical dimension of food security and food consumption, with poorer children more vulnerable to food insecurity and narrow dietary diversity. However, consumption of packaged and processed foods, often sugar-rich and nutrient-poor, cuts across wealth groups. In the 1990s, the question of urban food security was seen as embedded in that of urban poverty. We argue that the urban food security question today is defined by two intersecting phenomena: intra-urban inequality and global dietary change. The urban poor continue to face the fundamental challenge of adequate food access. In addition, urban food security is endangered by a food environment that provides consumers with unhealthy food options that are widely available, cheap and enticing. Therefore urban food security can no longer be addressed only through agricultural policies that ensure availability of affordable staples for a growing urban population, but it strongly needs agricultural and trade policies that regulate imports of cheap, processed, unhealthy foods.

1. Introduction

Diet is a key issue for development economists. Diets are changing globally, as agricultural and food systems have become globalised and created new forms of food production, distribution, and trade (Hawkes et al. 2010). The nutritional implications for the Global South are seen in rising obesity and non-communicable diseases alongside the persistence of food insecurity and undernutrition (Popkin et al. 2012). Understanding how patterns of globalisation affect the welfare of populations is a key development question, but we know

little about the way that the globalisation of food and agriculture systems affect different individuals or groups. Hawkes (2006) has suggested that dietary change will be experienced differently by rich and poor, by urban and rural populations. However, more context-specific evidence is needed to capture the complexity of impacts, and to identify who is at risk of what form of malnutrition.

This study explores food security and food consumption among schoolchildren from different socio-economic backgrounds in Accra. We use a novel approach based on triangulation of primary data on food consumption and a synthesis of secondary literature on food trade, food policy and urban food environment. Thus we bridge a divide between micro-level analyses of food consumption and macro-level studies of food systems, and seek to contextualise children's food consumption patterns in the broad picture of global dietary change. This paper has two main objectives. First, it seeks to illuminate key aspects of urban food security and food consumption among schoolchildren. Urban food security is recognised as a critical area in the context of rapid urbanisation, urban unemployment and increasing intra-urban inequality, but a gap persists in our knowledge on food access in urban areas (Floro and Swain 2013). Second, it interrogates the urban food security question today, in the context of rising inequality and global dietary change. Thus it engages with studies that explore the nature of urban food security in African cities in the 1990s, some of which looked specifically at Accra, and reflects on what has remained the same or changed in the context of radically altered food systems (Atkinson 1995; Haddad et al. 1999; Levin et al. 1999; Maxwell 1999; Morris et al. 1999; Maxwell et al. 2000). Finally, this paper integrates the research instruments used by those in public health and those working in political economy in order to foster a dialogue between two different research groups, both of which are deeply concerned with welfare.

We find that socio-economic status is a critical dimension of food security and food consumption, with poorer children more vulnerable to food insecurity and narrow dietary diversity. However, consumption of packaged and processed foods, often sugar-rich and nutrient-poor, cuts across wealth groups. This suggests that a central issue of today's urban food security is the widespread availability of cheap, ultra-processed and unhealthy foods (Monteiro et al 2013). Thus food and trade policies that regulate food processing and content, as well as production and imports of cheap unhealthy foods are much needed.

The next section provides the background on dietary change, agricultural policy and visions of urban food security in Ghana, highlighting how concerns about urban food security have changed over time. The third section describes the study setting and the methodology. The fourth section presents the findings on food acquisition practices, food security, dietary diversity and food knowledge. Section 5 discusses the findings and section 6 concludes.

2. Agricultural policy, dietary change and urban food security in Ghana

Between 1970 and 1982, the pre-structural adjustment period, agricultural policy in Ghana had at its core Operation Feed Yourself (OFY), aimed at promoting national food self-sufficiency through increased production of maize and rice (Girdner et al. 1980; Nyanteng and Seini 2000). The central aim was to produce sufficient food to feed the growing urban population and the industrial sector by improving food availability (Maxwell 1999). Rice production increased and cocoa production, the country's most important export crop since the colonial time, declined (Nyanteng and Seini 2000). Thus attempts to diversify agricultural production away from cocoa were partly successful, except that large-scale farms were not able to meet domestic food needs (Amanor and Chichava 2016). Girdner et al. (1980) argue that, while agricultural policy of the 1970s promoted domestic food production, Ghana was overly reliant on colonial export commodities – cocoa and palm oil – and, by consequence, had to pay a high bill for food imports.

The Ghanaian economy was hit by macroeconomic and political instability in the second half of the 1970s, which resulted in protests driven by food shortages and high food prices (Maxwell 1999) and led to the implementation of the Economic Recovery Programme (ERP) in 1983, a set of reforms supported by the International Monetary Fund. At first, the ERP for the agricultural sector sought to maintain self-sufficiency in cereals production but also to increase prices paid to cocoa farmers, as a way to boost foreign exchange earnings (Nyanteng and Seini 2000). In later phases of the programme, focus shifted to non-traditional export crops due to decline of traditional commodity prices (Ouma 2015; Amanor and Chichava 2016). With the removal of agricultural subsidies and later expansion of export horticulture, food imports continued to grow (Amanor and Chichava 2016).

Structural adjustment also caused rising unemployment and declining urban wages, thus affecting urban population's ability to buy food (Maxwell 1999). Therefore, the question of *access* to food became central (*Ibid.*), reflecting the shift of focus from availability to demand in debates on famine and food (Sen 1976). In Accra, as elsewhere in African countries, households responded by diversifying income sources and taking up various paid jobs and cash-earning activities in the informal economy (Levin 1999; Maxwell 1999). Women's increased participation in income-generating activities, such as petty trading and food preparation for sale, and increasing prominence of street food have been seen as outcomes of this period of economic liberalisation (*Ibid.*).

Thus reliance on food imports and informalisation of employment, which has shaped food supply in urban areas through, *inter alia*, the expansion of street food and imported (packaged) foods, are key features of the Ghanaian food environment from the 1990s to the present. Based on broad national data, we know that Ghana produces approximately 50 per cent of its cereal and meat needs and spends one billion USD on food imports (Amanor and Chichava 2016). While the country is estimated to be self-sufficient in maize, cassava and

yam production, it is dependent on imports of wheat and rice (Cudjoe et al. 2010). Over 70 per cent of rice, now the major staple in Ghana, is imported mostly from Thailand and Vietnam (Amanor 2015). Cudjoe et al. (2010) find that during the 2007-2008 food crisis, when international prices of wheat and rice sharply increased, the urban poor were the hardest hit because urban food prices follow more closely the movements of world prices. Thus the food crisis has exposed the country's vulnerability due to dependence on food imports, and that the urban poor are at risk of urban food insecurity, especially in the context of high and volatile international food prices.

What are the implications for patterns of dietary and nutritional change? Over the past few decades, progress in reducing hunger and undernutrition has been remarkable in Ghana, with the Global Hunger Index (GHI) decreasing from 42.7 in 1992 – *alarming* hunger – to 13.9 in 2016 – *moderate* hunger (GHI 2016).[1] Data by region suggest that child undernutrition is highest in the poorer regions of the North and lowest in Greater Accra (Demographic and Health Survey [DHS] 2014). At the same time, overweight and obesity are on the rise (Ofori-Asenso et al. 2016). Overnutrition appears to affect predominantly urban and wealthier individuals, and it is higher among women than men (DHS 2014). Thus these figures paint a picture of a country undergoing a process of nutrition transition (Popkin et al. 2012). However, national and regional averages do not tell us the full story and leave us with no tools to identify the most vulnerable in specific contexts. The table below shows that the Greater Accra region has the lowest levels of undernutrition and the highest of overweight in the country. But is it correct to assume that food insecurity is a problem of the rural poor? Who is at risk of poor eating practices, which may be conducive to obesity and associated health issues? Is there a clear-cut distinction between those at risk of undernutrition (too few

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[1] The GHI is compiled by the International Food Policy Research Institute (IFPRI) combining four indicators: FAO prevalence of undernourishment, child stunting, child wasting and child mortality. The GHI is considered to be a good proxy of hidden hunger, linked to micronutrient imbalances.

calories), overnutrition (too many calories) and malnutrition (inadequate levels of key nutrients)?

Table 1. Nutrition in Ghana and Greater Accra Region (percentages)

	Child nutrition (under 5)		Women nutrition	
	Stunting	Overweight	Underweight	Overweight
National average	18.8	2.6	6.2	40.1[1]
Greater Accra Region	10.4	3.2	4.5	57.3

Source: Compiled by authors using WHO and DHS data
[1] The national average for both women and men is 33.6 per cent.

Dietary change is underway in Ghana. Broad brush estimates suggest that the share of dietary energy supply derived from cereals, roots and tubers is decreasing (FAOSTAT), which indicates that diets are becoming less reliant on cereals and more reliant on other foodstuff.[2] This is in line with data on caloric intake on developing countries as a group suggesting that relative importance of cereals is stagnant or decreasing, and that of vegetable oils, sugar and meat is increasing (Food and Agriculture Organisation [FAO] 2015). National-level data on food trade in Ghana also indicate that imports of milk, dairy products, poultry and sugar are on an upward trend since the mid-1990s. Imports of vegetable oils and fruit have exceeded exports since the early 2000s (FAOSTAT). These patterns may suggest that diets are diversifying; however, there are also concerns about the deterioration of diet quality, with increased consumption of sugar-rich, nutrient-poor and ultra-processed foods, which is in turn linked *inter alia* to globalisation and liberalisation of food trade (Hawkes 2006; Hawkes and Murphy 2010). Ultra-processed food is defined as foods that have been industrially-processed so that they are high in sugar, fat, salt, low in fibre and may contain industrial ingredients.

A comprehensive analysis of the multi-fold determinants of food security and nutrition in Ghana is beyond the scope of this article. We are interested in tracing the connections between visions of urban food security, agricultural and food policy in Ghana, and in

[2] It is recognised that the national statistics on food production and trade compiled by the Food and Agriculture Organisation (FAO) are subject to errors. The quality of this data is especially low for poorer countries, where data gaps are filled with model-based estimations, which often differ substantially from actual production and trade volumes (Hawkesworth et al. 2010). These statistics may be useful to describe some broad patterns of food production and trade, but given their limitations they should only be used in combination with other evidence.

integrating what pictures of dietary diversity tell us about the way food systems are affected by agriculture, trade and economic policies.

Debates on urban food security in the late 1990s, as illustrated by Maxwell (1999), were concerned with making urban food security visible as a political issue in the context of urban poverty. The emphasis on urban poverty was renewed in the aftermath of the 2007 food crisis, when the food price shock brought to light the fragility of food security, especially for the urban poor, in economies that are reliant on food imports. While urban poverty continues to need attention, due to rapid urbanisation and scarcity of decent employment across urban areas in the Global South (Floro and Swain 2013), we argue that it is now also necessary to look at urban food security in the context of rising inequality and dietary change. An analysis of food security must also look at inequalities in quality of food. To understand how dietary change intersects with poverty and inequality it is necessary to capture the complexity of food consumption, by analysing the micro-level dynamics of urban food sourcing practices and food consumption. This brief overview provides the broader context in which our micro-level analysis of urban food security and food consumption among schoolchildren is to be situated.

3. Study setting and methods

Since 2010, Ghana attained lower middle-income country status. The upward jump took place after a revision of the GDP estimates that led to an increase in the size of the Ghanaian economy by 60 per cent (Jerven 2016). Undoubtedly, Ghana has been considered by many as a success story, against the backdrop of sustained GDP growth and good performance on human development indicators (Cooke et al. 2016). Ghana reached some of the targets set by the Millennium Development Goals (MDGs), such as halving extreme poverty and the proportion of people with no access of safe water (UNDP Ghana 2015). This socio-economic progress has also been accompanied by Ghana's reputation for being a functioning African

democracy. This has contributed to the emergence, or expansion, of the so-called middle class (Luckman et al. 2005). However, as Lentz (2015) describes, much of the Ghanaian middle class laments it cannot make ends meet.

The story of success has come under serious threat due to collapse in export revenues for oil, cocoa and gold in recent years, and a worsening fiscal position.[3] This was accompanied by increase in prices of fuel, water and electricity paid by consumers, resulting in malcontent and protests, and the election of the opposition candidate at the 2016 elections. It is news, at the time of writing, that the new administration revealed a 7 billion cedi budget hole. Economic downturn and rising cost of living are concerning especially for the poorer population, and for the impact on poverty and inequality. While poverty rates have fallen, inequality in Ghana has been on the rise since the early 1990s (Annim et al. 2012; Obeng-Odoom 2012; Cooke et al. 2016). Inter-regional inequality gaps remain characterised by the persistence of a North-South divide (Abdulai and Hulme 2015). Besides, intra-regional and intra-district inequality has increased (Annim et al. 2012; Ghana Statistical Service [GSS] 2015; Cooke et al. 2016).

The Greater Accra Region shows the lowest levels of poverty and intra-regional inequality nationally, with poverty incidence at 2.6 per cent and a GINI coefficient of 35.4 (GSS 2015). However, these statistics hide manifestations and dynamics of inequality that are visible only at the micro-level, beyond the level of the region or district. For instance, Obeng-Odoom (2012) suggests that inequality in Accra has been driven by, *inter alia*, in-migration of poorer people from other urban and rural areas. Studies of the housing market in Accra highlight the precarious conditions in which many urban residents live, with rents gradually increasing and a lump-sum payment system – i.e. whereby landlords request one or more years advance rent – that is particularly daunting for the poor (Arku et al. 2012). Earlier studies of livelihoods in

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[3] On 19th January 2016, Ghana Web reports that the total revenue for the three most important export commodities - oil, gold and cocoa – has declined by 2.4 billion USD between 2014 and 2015.

Accra find that many households are vulnerable due to low-paid jobs and informalised, unsecure employment (Maxwell et al. 2000). Thus, low levels of poverty and inequality in the Greater Accra Region, relative to other regions, obscure intra-regional and intra-urban vulnerabilities.

This study explores intra-urban inequality in the city of Accra through the lens of inequality in food consumption among schoolchildren. The findings presented in this paper are based on triangulation of primary and secondary data, which were collected and analysed between 2015 and 2017. Primary data collection consisted of a student survey and qualitative focus groups with schoolchildren in five Junior High Schools (JHS) in the Accra Metropolitan Area. In addition, throughout field research, semi-structured interviews were conducted with representatives of key governmental and non-governmental organisations as well as the food industry. A summary of the methods for primary data collection is provided in the table below, and the methodology used for interviewing schoolchildren is described in turn.

Table 2. Summary of methods for primary data collection

Phase	Method	Purpose
I	Student survey on food consumption and nutrition knowledge (sample = 139 schoolchildren enrolled in JHS)	To gather information on children's - Food security - Dietary Diversity - Food preferences and nutrition knowledge - Food consumption
II	Focus groups with sub-groups of survey respondents	To deepen understanding of - Intra-urban mobility and food acquisition - Exposure to food advertising and food preferences - Nutrition knowledge and food consumption
Cross-cutting	Semi-structured interviews with key stakeholders (ministries, international organisations, food industry, school and street food vendors)	To gather information on - Children's food environment - Key stakeholders' relations to nutrition narratives - Food and nutrition policy

Source: Created by authors

Selection of schools and student survey

Having gained permission from the Ghana Education Service (GES) to conduct research activities in JHS, we selected four schools in the Accra Metropolitan Area (AMA). The selection process was informed by interviews with key informants at the Accra Metro GES Office and by criteria such as school type (i.e. public or private), location, indicators of

minimum teaching equipment and school's infrastructure.[4] The main aim was to choose schools attended by children from different socio-economic backgrounds. We selected two public and two private schools, representing a wide range, from a public school attended by many children in Nima, a low-class neighbourhood in Accra (Aguda 2009), to a top private school charging tuition fees in USD. A clear-cut classification of neighbourhoods based on income or class is impossible due to lack of household income data at the level of the locality and intra-locality heterogeneity (Maxwell et al. 2000). In addition, classifying localities by income does not serve the scope of our study as children going to private schools tend not to live in the same area where the school is located. The key characteristics of the four selected schools are summarised in the table below.

Table 2. Key characteristics of four selected JHS in Accra Metropolitan Area

School	Kanda Estate Cluster[1]	Osu Presby[2]	Jack & Jill	Association International School (AIS)
Location	Nima/Kanda	Osu	Roman Ridge	Airport Residential Area
Type	Public	Public	Private	Private
Student-teacher ratio	11.8	15.7	13.6	5.4
Access to functioning library	No	Yes (Girls) No (Boys)	Yes	Yes
Access to functioning computer lab	No	No	Yes	Yes
Minimum teaching equipment	Yes	Yes	Yes	Yes
Minimum school infrastructure	No	No	Yes	Yes

Source: Compiled by authors
[1] Kanda Cluster includes four schools sharing the same courtyard, these are: Ring Road East, Kanda 1, Kanda 5 and Kanda A.M.A. Data on student-teacher ratio are given as the average across the four schools.
[2] Osu Presby includes Osu Presby Girls and Osu Presby Boys. Data on student-teacher ratio are given as the average between the two schools.

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[4] *Minimum teaching equipment* and *minimum school infrastructure* are two World Bank's Service Delivery Indicators (Molina and Martin 2015) used to assess the delivery of education and health. *Minimum teaching resources* captures availability of (i) whether a random classroom has a functioning blackboard and chalk, (ii) the share of students with pens, and (iii) the share of students with notebooks. *Minimum infrastructure resources* reflects availability of (i) functioning toilets operationalized as being clean, private, and accessible (ii) sufficient light to read the blackboard from the back of the classroom. The indicators, operationalized as binary, are based on researchers' observation of selected schools.

Respondents were selected randomly and the process was facilitated by teachers in each school.[5] We planned to conduct at least 30 structured interviews in each school. However, we could not complete all interviews at AIS and therefore added a fifth school, Tema International School (TIS), in Tema, just outside of Accra, and analogous to AIS. TIS is a top private and boarding school. The overall sample is as reported in the table below.

Table 4. Student survey sample

School	No. of students interviewed
Osu Presby Boys and Girls	32
Kanda Estate Cluster	30
Jack & Jill	31
AIS	16
TIS	30
Total	139

Source: Compiled by authors

The questionnaire was composed of the following components: basic demographic information, child's assets, food security questions, child dietary diversity score, food preference and nutrition knowledge questions, food consumption questions. The data collected allowed for the construction of a child's asset index, child dietary diversity score and an adapted food consumption score, which will be discussed in turn in later sections. Critically though, we were able to link these to food provisioning practices (defined as the range of ways in which food is acquired), which told us more about the structural features of food systems, using both questionnaire and focus group data. This understanding of food provisioning allowed us to link individual data with the wider analysis of changing food systems.

Focus groups

Based on a preliminary analysis of survey data, a sub-sample of schoolchildren from the four schools in AMA were selected to take part in a series of qualitative focus groups. Children

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[5] We considered the possibility that teacher's participation could introduce some forms of bias, towards higher-achieving pupils for example. However, it is difficult to predict what would drive the bias, as some teachers may have given priority to children from more vulnerable backgrounds. Thus, overall we made an assumption that teachers' possible bias would not contaminate data on children's food consumption because different types of bias would (partially) offset each other.

were not grouped by gender or age, but on the basis of some of the answers previously given in the survey.[6] We conducted three thematic focus groups, using an interactive exercise as the basis upon which to build a collective discussion. Focus group 1 looked at patterns of intra-urban mobility, or how children move in the urban space on a daily basis, and food acquisition practices. Focus group 2 explored the theme of children's exposure to food advertising and food preferences. Focus group 3 investigated children's food and nutrition knowledge, trying to discern whether knowledge shapes consumption. The sample of children who took part in the focus groups is reported in the table below.

Table 5. Focus groups sample

School	No. of children in focus group 1	No. of children in focus group 2	No. of children in focus group 3
Osu Presby Girls	4	4	3
Osu Presby Boys	5	5	3
Kanda Estate Cluster	6	5	4
Jack & Jill	4	5	4
AIS	6	5	-
Total	25	24	14

 Source: Compiled by authors

Child asset index

Literature on child poverty discusses the challenges of measuring child poverty and, where household data is available, highlights the severe limitations of income- and consumption-based indicators as measurements of child poverty (Gordon et al. 2003). Where household data is not collected, as it is the case for education or student-based health surveys, it is a slippery exercise to ask children questions on household income, consumption, or also possessions as they may not have good knowledge of any of these (Gordon et al. 2003; Hannum et al. 2016). One route is to collect data on children's assets, which minimises measurement errors (*Ibid.*). This approach adapts the use asset indices, considered to have several advantages over income or consumption measures of wealth (Johnston and Abreu 2016), to child-focussed surveys. The obvious limitation is that an indicator based on children's assets is a proxy of underlying household welfare (i.e. we assume that the child

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[6] For example, children were grouped based on mode of transportation to go to school, possession of technological devices and level of food knowledge.

asset index varies with underlying household wealth), rather the choice of asset that directly produce welfare (c.f. Johnston and Abreu 2016). As such this is not a measure of child deprivation but a measure that correlates with household wealth. While we recognise the limitations, we considered this approach to be the most theoretically and practically appropriate as a measure of child socio-economic status.

We collected data on a set of assets that children have direct access to – books, tablet, computer, dvd player, smartphone, video game console and own bedroom – and constructed a child's asset index. We used principal component analysis (PCA) as a weighting technique, thus following Filmer and Pritchett (2001), Wall and Johnston (2008) and Abreu (2012). The extracted principal component accounts for 32.4 per cent of the variance in the data set, which is considered to be good to proceed with PCA (Abreu 2012). The index obtained is slightly skewed towards the bottom of the distribution, suggesting that a considerable percentage of children in the sample tend to have fewer assets.[7] The sample was then grouped in wealth quintiles based on the asset index.

4. Results

4.1 Sites and means of food acquisition

As our study focuses on schoolchildren, we explored the school as a site for food consumption. Food sourcing and consumption at school, or during school time, is diverse: children may source food from within the school's premises or the immediate school's neighbourhood, from school canteens or food vendors. As a point of clarification, it is worth mentioning that in Ghana there is a School Feeding Programme for pupils in public primary schools, however this excludes children in JHS and therefore the programme is not relevant for the children in this study.

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[7] This is known as *clumping* issue, which occurs when the asset distribution is so skewed that it becomes difficult to differentiate households (Vyas and Kumanarayake 2006). However, we consider this problem to be only mild for this asset index and not to constitute a serious reason for rejecting the use of the index.

In private schools, food tends to be served at the school's canteen. In AIS, the canteen is the only place where children can obtain food. The canteen, run by a catering company, has a pre-set menu with alternative options that are selected in advance by children or their families. The canteen meal includes fruit or dessert, and vegetables as sides. Children can also buy snacks at break times from the canteen. In Jack & Jill, children can get food from the canteen or from the food vendors on the school's premises. The canteen is managed by a woman who sources supplies, sets the menu and cooks. In a semi-structured interview, the canteen manager explained to us that she buys food at weekends, mostly from big wholesale markets such as the Makola market. Children buy food items from the canteen, and the price is by piece, not by meal. The other food vendors sell mostly snacks and drinks. Based on interviews with children, it emerged that the most popular options there were bread and fried egg, and various packaged sweets, although there is also a fruit stall.

In public schools, there are no canteens, and stationary food vendors operate within the school's premises and in the surrounding areas. Where options are limited at school, children prefer to go to the street food vendors in the school's surroundings.[8] Children may also buy food before entering the school in the morning. For example, at Osu Presby, it was common among schoolchildren to buy porridge from the stall in front of the school in the morning. Children explained that they can find various meals and snacks, and at times there is a fruit vendor too. Besides permanent food stalls in the proximity of schools, public schools tend to be a target of mobile food vendors. It is very typical, for example, to see FanMilk vendors[9] around schools at break time, as we will discuss later on.

Street food, defined as 'any ready to eat food or beverage sold and sometimes prepared in outdoor public spaces by vendors or cooks, either itinerant or stationary, either on foot or from mobile outlets' (FAO 2016: 1), is central in children's food consumption practices.

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[8] Most children interviewed at Kanda Estate reported that they buy food from the food vendors across the road from the school, where there is also a mini bus (*trotro*) station and there are more options.

[9] FanMilk produces a range of packaged snacks that are popular in Ghana.

Much of the food consumed during school time is street food, especially in public schools. Street food can be found virtually everywhere in Accra. Street food employs an estimated 60,000 individuals in Accra, many of whom are women, and its ubiquitous presence has directed attention to issues of food hygiene and safety (Ackah et al. 2011; FAO 2016). It can be also bought at traffic lights, while driving in the city and children who are driven to school by their parents reported instances when their parents purchased street food for them while they were driving home after school. A high number of children in the sample, 72.6 per cent, had purchased street food at least once in the week before the interview. Interestingly, street food is especially important for children from poorer backgrounds, with 60 per cent and 75 per cent of children in the two poorest quintiles, respectively, who had bought street food more than once in the previous week.

Children mentioned two other sites where food consumption takes place: home, which was the main place for the evening meal, and the church. Among the majority Christian population of Ghana, it is common practice to go to church on Sundays and children explained that they are normally given food, mostly snacks such as fruit juice, frozen ice-cream, meat pies or other, by their parents or other relatives. Based on a far more limited number of interviews with Muslim children, it would appear that also going to the mosque on Fridays entails some form of food consumption, but more interviews would be needed to confirm this.

In some cases, especially when eating at home, children are given food directly by their parents or someone else in their families. Alternatively, children are given money to buy food sold outside. An important distinction needs to be made between *chop* and *pocket* money. Most children in the sample, everyone except from children at AIS and TIS, buy food for themselves with chop money. This is money handed out on a daily basis, unless the families

cannot afford to do so daily,[10] and serves the specific purpose of buying food, and in some cases for other expenses, such as transportation. The amount of chop money ranges from 1 or 2 GHS to 10 GHS per day, the average is 5 GHS/day. Thus the practice of pricing food by item, rather than by meal, implies that children buying food from the same canteen have varying types and quantities of food depending on how much they can afford. The same obviously applies to street food.

In contrast, pocket money is handed out mostly weekly and not used to buy meals. Indeed, at AIS, meals are paid for by families in advance and therefore children can use pocket money to buy some snacks. In focus groups at AIS, children explained that they use pocket money to buy food when they go to shopping malls with friends at weekends. This is a substantial difference for children from different socio-economic backgrounds and one that has direct implications on the quantity and quality of food consumed.

4.2 Food security

Food security can be measured in a variety of ways, ranging from food availability at the national level to various scores based on food consumption data at the household level. In this study we are concerned with individuals' access to adequate food. Therefore, we follow the approach used by a similar type of study, the WHO Global School-Based Student Health Survey, which is conducted in a number of countries including Ghana. Food security is assessed by modifying the USAID/FAO Household Hunger Scale (Ballard et al 2011) to investigate two aspects: going hungry because of lack of food, and having breakfast over a recall period of 30 days.

The majority of children in the sample, 76 per cent, have not gone hungry due to lack of food in the month before the interview. However, a remarkable 24 per cent of the sample reported

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[10] Five children said that they do not receive chop money on a daily basis, and therefore they need to spread the available cash over two or three days. At Kanda Estate, the teachers told us that, if there is any left-over food from the School Feeding Programme in the primary schools (which are in the same buildings), they give it to children in JHS who struggle to buy their own food.

that they felt hungry once or a few times due to lack of food. In a context characterised by the lowest levels of undernutrition in the country, this finding stands out. This result shows that inability to access sufficient quantities of food does occur among schoolchildren in Accra, thus suggesting that urban food insecurity is an issue that needs attention.[11]

Who are the food insecure children? Looking at the association between food insecurity and wealth, we observe that most food insecure children are in the poorer quintiles. We find a negative and statistically significant association (p-value = 0.065) between food insecurity and wealth. The graph below shows that the percentage of respondents who are food insecure decreases with wealth.

Figure 2. Food insecurity by quintile (percentages)
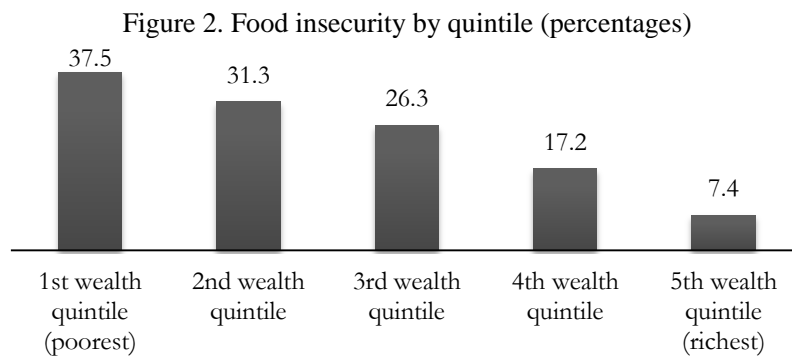
Source: Created by authors

The question on breakfast reveals that the majority of children interviewed, 68 per cent, have breakfast before going to school. However, a significant 32 per cent of children in the sample go to school without having had breakfast. Many of these children have the habit of buying breakfast while on their way to school, from street food vendors, or at school from the school canteen or food vendors on the school's premises. With the focus groups, we explored some of the reasons for not having breakfast at home. Children mentioned a variety of factors that may *prima facie* appear to reflect family's practices and habits. For example, some children said they have to wake up very early to arrive at school on time and therefore indicated lack of time as the reason for not having breakfast at home, others said their parents do not prepare

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[11] We note that the question has a subjective character and may have captured, in some cases, feeling hungry due to circumstantial lack of food rather than real lack of resources to acquire food.

breakfast at home and instead give them money to buy breakfast on their way to school. However, we also find a negative association (p-value = 0.000) between not having breakfast before going to school and wealth, with the majority of children in this group in the two poorest quintiles, as represented in the graph below.

Figure 3. No breakfast before going to school by quintile (percentages)
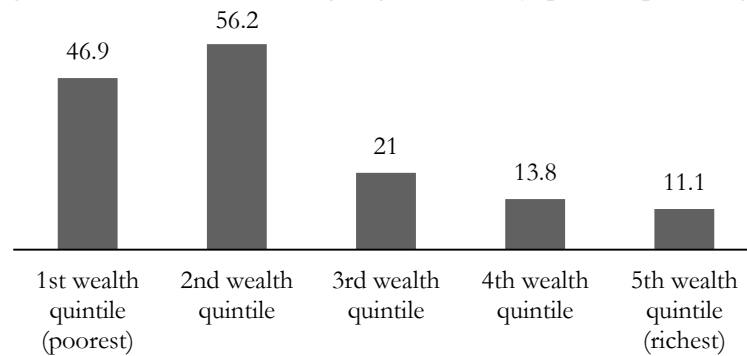
Source: Created by authors

This finding suggests that reasons mentioned for not having breakfast may conceal an underlying link with socio-economic status. Having to wake up very early in the morning may reflect the location and housing conditions of children's homes, how they go to school, their parents' occupations, and their roles within their households. For example, we find that 93.5 per cent of children in public schools walk to school while this percentage drops to only 10.4 per cent of children in private schools, as more than half of them are driven to schools by their parents or someone else on their behalf. This shapes where children acquire food, with food vendors concentrating in proximity of public schools. There are many ways in which daily mobility provides insights on food acquisition practices in an urban context, but this discussion is beyond the scope of this paper.

With regard to food security, a key concern is when children have their first meal of the day. Not having breakfast at home may not be a sign of food insecurity if children have their first breakfast as soon as they get to school. However, on the day before the interview 53.4% of the sample had breakfast by 7:30 while the rest of the sample had their first meal between 8:00 and 13:00. There was a group of children, 15 per cent, who had their first meal at the

first school break, around 10:00 or later. Most of these children are in the two poorest wealth quintiles. This may reflect the lack of resources to have two meals in the morning, resulting in the practice of postponing breakfast.

4.3 Dietary diversity

As the importance of balanced diets is increasingly recognised (IFPRI 2016), the quality of food consumed matters as much as the quantity. A widely-used proxy of diet quality and micronutrient adequacy is dietary diversity (Ruel 2002; Arimond et al. 2010). We follow the guidelines for measuring dietary diversity at the individual level (FAO 2010). If we look at outcomes in terms of food groups consumed, the sample splits in half between five and six food groups, with a clustering of children with diets made of four to eight food groups on the day before the interview. High consumption was recorded for cereals (99.3%), oils and fats (65.5%), sweets (50.4%), meat (48.2%), vegetables (48.2%) and dairy products (43.9%). Instead very low levels of consumption were recorded for vitamin-A-rich fruit and vegetables (3.6% and 9.4%, respectively) and nuts and seeds (9.4%). We find a positive and statistically significant association between dietary diversity and wealth (p-value = 0.007).

We also constructed an indicator of food consumption that is based on the consumption frequency of particular food items in the seven days before the interview. It is an adapted version of the World Food Programme's (WFP) Food Consumption Score (FCS) (WFP 2008).[12] The FCS is associated positively with wealth, with a high level of statistical significance (p-value = 0.000). This suggests that children in wealthier quintiles consume more foods with higher weightings, which are those richer in nutrients. In particular, we see that dairy and vegetables consumption increases in frequency with wealth.

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[12] It is an adapted FCS because we did not collect all data to calculate the full FCS. We have information on a smaller number of food items grouped in five food groups – fruit, vegetables, dairy, meat/fish, and sugar. Therefore we did not calculate a score but instead used the continuum variable based on the weightings provided by WFP (2008).

However, for other food items the association with wealth is not clear-cut. In particular this appears to be the case for foods and drinks that are consumed as snacks, rather than as ingredients of main meals. Consumption of fruit, packaged snacks and carbonated drinks appears to cut across wealth quintiles, with poorer and wealthier children reporting similar levels of consumption. We argue that these forms of food consumption reflect the widespread availability and relative affordability of these foods. Packaged snacks and soft drinks are sold by food vendors on the schools' premises or in surrounding areas. Prices are such that most children can afford to buy these foods, at least occasionally. Indeed packaged snacks, such as biscuits and FanMilk products, and soft drinks are among the cheapest foods at school or on the road. The WHO (2012) study finds high levels of carbonated drinks consumption among children in JHS nationwide, with 55.8 per cent of children having soft drinks on a daily basis. To provide an example, we briefly discuss FanMilk snacks. FanMilk is a Danish multinational, recently acquired by Danone, that has been present in Ghana since the 1960s. FanMilk has adopted an effective distribution structure that relies, at the bottom, on thousands of mobile street vendors.[13] Its main products are a range of packaged frozen snacks, some of which are yoghurt-based or chocolate-based, or have a fruit flavour. In interviews conducted with vendors at FanMilk training centre in Kasoa, it emerged that many vendors go to public schools at break times and at the end of the school day. According to the vendors, FanMilk snacks are popular among children, which is confirmed by 72.7 per cent of children in our sample reporting to have had FanMilk snacks in the previous week. The table below reports frequency of consumption of FanMilk snacks by wealth quintile.

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[13] The exact number of FanMilk street vendors is unknown because they are not employed by FanMilk, but considered to be independent vendors, fully operating in the informal economy. The structure of employment is similar to that becoming prominent in the gig economy: vendors are given equipment (so they are recognisable on the streets) and training by FanMilk but they are nonetheless treated as self-employed.

Table 6. Frequency of FanMilk snacks consumption in the previous week, by wealth quintile (percentages)

Consumption frequency	1st quintile (poorest)	2nd quintile	3rd quintile	4th quintile	5th quintile (richest)
0	31.3	34.4	15.8	17.2	33.3
1	34.3	34.4	21	24.1	33.3
>1	34.4	31.2	**63.2**	**58.7**	33.4

Source: Created by authors

Children use their chop or pocket money to buy these snacks that are widely available and relatively affordable. It is interesting to note that the highest consumption frequency is found in the middle wealth quintiles. These snacks are less available to children in top private schools because food vendors are not allowed to operate on the school's premises and proximity. Conversely, children from the poorest quintile can easily find these snacks at school but the lower frequency reflects smaller amounts of chop money. At times, vendors cut the snacks in half so that two children can share the cost. This example illustrates that availability and affordability of foods are at the basis of consumption.

4.4 Food knowledge

Food and nutrition knowledge is often considered to be crucial to have healthy diets, and often is a core component of nutrition interventions targeting schoolchildren or mothers (Adelman et al. 2008; Imdad et al. 2011). The majority of children in the sample (67.7 per cent) have basic food knowledge, defined as awareness of key healthy foods, such as fruit and vegetables, or basic nutrition facts, such as the importance of balanced diets or nutrient intake. In focus groups, it emerged that children learn about nutrition in a range of ways: at school, at home, through their families, or by watching television. In an interactive exercise preceding the focus group on food knowledge, children were asked to indicate whether particular foods are healthy or unhealthy. All children answered that fruit and vegetables are healthy foods, but their answers on the healthiness of soft drinks were mixed.

The association between food knowledge and wealth is positive but statistically insignificant (p-value = 0.107). The graph below shows that basic food knowledge increases with wealth, suggesting that children from better-off backgrounds have greater nutrition awareness. It is

unlikely that the association is driven by quality of nutrition education at school, as children in AIS and TIS, over-represented in the wealthiest quintile, do not have home science classes at school while all other children in the sample do. For example, in Osu Presby Girls, children were well aware of the importance of checking expiry dates and labels of purchased food as they were taught so by their home science teacher. In contrast, with the absence of home science class, it is more likely that children in the wealthier quintiles are more exposed to food and nutrition messages within their families.

Figure 4. Basic food knowledge by quintile
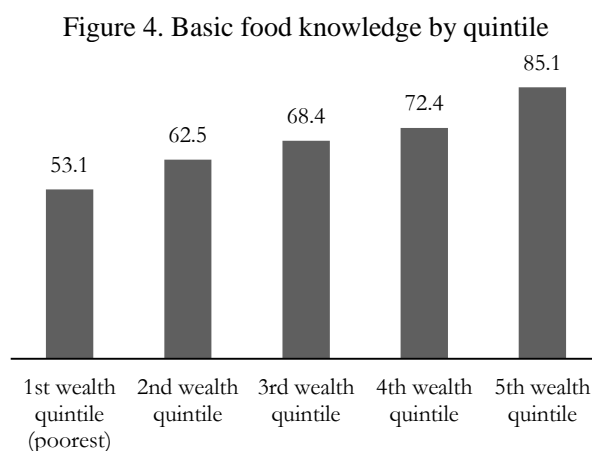
Source: Created by authors

In focus groups, children often mentioned the importance of hygiene. Food safety, which is captured by the national nutrition policy 2013-2017 (Ministry of Food and Agriculture [MOH] 2013), has been incorporated into the teaching curriculum. The Ghanaian government, has paid attention to this issue, especially in relation to street food (MOH 2013; FAO 2016). In some interviews, children said that their mothers did not allow them to buy street due to food safety concerns. Importantly, the focus groups participants in public schools believed that the food available to them during school time was not hygienic but the lack of alternative options meant that they would still buy it.

All children said that they normally have healthy foods at home and unhealthy foods at school or in the street, which reflects ideas that home-made foods are healthier than street foods. Nevertheless, taste may be different, with many children mentioning fast foods as their favourite ones. Does nutrition knowledge inform food consumption then? Linear regression

analysis suggests that food knowledge is positively associated with dietary diversity but the relationship with food consumption score is insignificant. The results reported in the table below suggest that wealth has a stronger explanatory power for both dietary diversity and food consumption. Food consumption appears to be negatively associated with the child's age, which is a result that is difficult to interpret.

Table 7. Linear regression analysis

	Child dietary diversity		Child food consumption score	
	b	SE	B	SE
Age	-0.118	(0.15)	-3.247***	(0.94)
Gender	0.615	(0.39)	0.404	(2.43)
Wealth	1.621***	(0.51)	12.267***	(3.14)
Food knowledge	0.948*	(0.43)	2.35	(2.66)
Constant	1.331	(1.83)	34.083***	(11.35)
R²	0.120		0.256	
Observations	139		139	

Source: Own analysis from survey data
*p<0.10 **p<0.05 ***p<0.01

Linear regression analysis does not illuminate all aspects of the relationship. In qualitative interviews, children said that they select foods based on taste and would eat foods that they think are unhealthy, if they like them. Accessibility, affordability and desirability of food are critical factors. Children eat foods that are available and accessible. On visits to public schools, we occasionally found that all interviewed children had the same food for lunch because they all bought it from the food stall in front of the school buildings. For children who buy food with chop money, food needs to be affordable. Food also needs to be desirable. We explored children's exposure to food advertisement and it emerged that most children could easily recall food adverts that they see on television and on billboards on the streets. Many of them were also aware that some adverts target children specifically, using messages that are appealing to children, such as the promise of increased energy for sport, catchy colours and memorable jingles. Interestingly, many children doubted of the reliability of advertisements and were particularly sceptical when foods are publicised as healthy and nutritious.

5. Discussion: The urban food security question today

What is the relevance of the micro-level findings for understanding the complexity of today's urban food security question?

First, the evidence shows that inequality in food security and food consumption among schoolchildren in Accra exists, and appears in different ways. A key finding is that socio-economic status is critical for the attainment of food security and better diets. Children from poorer backgrounds are more vulnerable to food insecurity, lower dietary diversity, and poor food consumption. Thus food insecurity, far from being only a rural problem, concerns the urban poor too, and it does so even in the region with the lowest levels of undernutrition nationwide. Low or irregular chop money, which is most likely linked to low and fluctuating household incomes, poses a major obstacle to the ability of children to meet their food needs during the school day. It is also important to look at the timings of meals, based on the finding that a group of children in the sample have their first meal of the day at the first or second break during a school day.

Although we do not have longitudinal data and therefore we cannot describe a process of change, it is likely, given the importance of socio-economic status in relation to food outcomes, that macro dietary change is filtered by wealth levels, with poorer and richer groups being impacted differently (Hawkes 2006). However, the mechanisms are complex. As demonstrated by another important finding of this study, consumption of packaged and processed foods, which are often sugar-rich and nutrient-poor, is not only accessible to the middle classes or the wealthier groups of the population, but it cuts across wealth groups. This type of consumption is considered to be among the culprits of rising obesity and associated health problems (Monteiro et al. 2013).

As we have seen, packaged and processed foods are readily accessible for all children, they tend to be relatively affordable and manufactured as desirable through marketing and

advertisement. The use of informal distribution channels for packaged foods, which means they can be bought from street vendors at school and on the roadside, and not only at supermarkets, seems to be crucial to ensure the widespread accessibility of these products. With regard to affordability, one of few studies looking at food pricing of processed foods in middle-income countries, found that the cost of processed foods has either stagnated or fallen while the price of fruit and vegetables has increased (Wiggins et al. 2015). The authors tentatively argue that the food industry has been able to control prices by using cheap ingredients but conclude that more research is needed to capture the determinants of these price trends, which are making healthy diets costlier (*Ibid.*).

In the 1990s, the question of urban food security was seen as embedded in that of urban poverty (Maxwell 1999). We argue that the urban food security question today is defined by two intersecting phenomena: intra-urban inequality and global dietary change. The urban poor continue to face the fundamental challenge of adequate food access. Our study shows that there are schoolchildren in Accra who lack resources to buy sufficient food and have irregular breakfast consumption patterns. Inadequate food access is amplified by volatile food prices and rising cost of living in cities such as Accra. In addition, urban food security is endangered by a food environment that provides consumers with unhealthy food options that are widely available, cheap and enticing. Therefore the urban food security question today cannot be addressed only through agricultural policies that ensure availability of affordable staples for a growing urban population, but it strongly needs agricultural, industrial and trade policies that regulate production of cheap, processed, unhealthy foods.

6. Conclusions

In this study we have married detailed empirical evidence on food consumption, dietary diversity and food provisioning to illustrate features of urban food security in Africa. This novel approach is used to bridge the gap between micro-level evidence of food consumption

and broader analyses of food systems, agricultural and trade policies. Thus it links the structural determinants of diets and nutrition outcomes, and seeks to foster a dialogue between nutrition studies and agrarian political economy.

We recognise that our findings are limited by a narrow focus on schoolchildren and much more research is needed to capture the underlying determinants of food consumption patterns. Methodological advancements are also needed to connect the micro-level evidence on individual outcomes and the macro-level evidence on food systems, while our paper provides a tentative approach to this, we hope it stimulates a debate about to integrate these different kinds of evidence in order to have a better understanding of food quality and nutrition. We conclude by highlighting three lacunae where future research and policy should expand into to enhance our ability to respond to the question of urban food security amidst growing inequality and dietary change. First, scholars and policy makers are both guilty of overlooking food processing. A handful of interesting perspectives on food processing are found in the field of critical nutrition studies. For example, Scrinis (2013) suggests that the current nutrition paradigm, whereby we assess foods based on their nutrient composition, should be replaced by a food quality paradigm based on different types of processing. Second, data on consumption, production and imports of processed foods is either patchy or missing. While some recognition of the growing importance of food consumption away from home is now seeking to improve data collection of food consumption data by using questions aimed at capturing food consumption that not is home-based (Farfan et al. 2015), particular attention for processed foods is still lacking. Finally, while policies that can radically improve food environments are both necessary but complex, enhancing children's food environment at school may be more straightforward. In Ghana there is currently no regulation on the types of food available to children at school. This type of policy would be helpful to improve food

options available to children and shape children's eating habits, with potential long-lasting

benefits for them as future adults.

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