

The nutrition transition, supermarkets, and nutritional outcomes in developing countries

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Summary

Many developing countries are currently undergoing a rapid nutrition transition. This transition is characterized by changes in dietary habits towards more energy-dense, often processed foods with high fat and sugar contents, and more sedentary lifestyles. As a result, overweight and obesity rates have increased. Worldwide obesity has more than doubled since 1980. In 2008, 34% of all adults were overweight or obese. For children under five, an estimated 6.6% were either overweight or obese in 2011, an increase from 4.5% in 1990. At the same time, undernutrition rates are still high. Globally, about 26% of all children under five were stunted, while 16% were underweight in 2011. This coexistence of undernutrition and overweight/obesity, referred to as the dual burden of malnutrition, has been observed in many developing countries, sometimes even within the same households. The nutrition transition is driven by demand-side factors, such as rising incomes and urbanization, as well as supply-side factors, such as globalizing food systems. The food retail sector is becoming more and more modernized, and supermarkets are playing an increasing role. In fact, some developing countries have witnessed a ‘supermarket revolution’, depicting a rapid spread of supermarkets within a short period of time. The retail format has an influence on the types of foods offered, as well as on sales prices and shopping atmosphere, which may affect consumer food choices.

This dissertation comprises three essays. In the first two essays, we analyze whether the spread of supermarkets in developing countries has an effect on food consumption patterns, and whether it contributes directly to rising overweight and obesity. We address this question using cross-section household and individual level data collected in Kenya in a quasi-experimental setting. Kenya has recently witnessed a rapid spread of supermarkets that now account for about 10% of national grocery sales. In addition, over 25% of the women in Kenya are overweight or obese. In the third essay, we analyze the effect of the nutrition transition on child malnutrition indicators using a cross-country regression approach with secondary panel data.

In the first essay, we analyze the effect of supermarkets on dietary behavior. The available literature suggests that supermarkets affect dietary patterns, although hard evidence is scarce. A study in Guatemala found that supermarket shoppers consume more processed foods with adverse nutritional outcomes. This is in contrast to a study in Tunisia showing that supermarket shoppers had higher dietary quality. We contribute to this limited literature by collecting and

using detailed household level data on food purchases from different retail formats. We account for potential endogeneity of supermarket purchases in the regression models using instrumental variable techniques. We find that supermarket purchases increase the consumption of processed foods, both in terms of expenditure shares as well as calorie shares. An increase in the share of supermarket expenditure by one percentage point increases the share of expenditure on processed foods by 0.38 percentage points. In addition, a one percentage point increase in the share of supermarket purchases increases calorie consumption by 0.85%. For average consumers that currently do not purchase any food in supermarkets, a switch to supermarkets would translate into an additional daily consumption of 200 kilocalories, everything else held constant. This effect is partly driven by lower prices per calorie. We conclude that supermarkets affect dietary behavior, thus contributing directly to the nutrition transition.

In the second essay, we extend this analysis to examine whether supermarkets are a causal factor of overweight or obesity. Research on the impact of supermarkets on consumer nutritional status in developing countries is rare; we are only aware of one study in Guatemala. In that study, it was found that food purchase in supermarkets increases the body mass index (BMI) of consumers. However, the research for Guatemala builds on a household living standard survey that was not specifically designed for analyzing the nutritional impact of supermarkets. Hence, a few variables of interest, such as food quantities purchased in different retail outlets, were not properly captured. Moreover, the impact on BMI was analyzed for all individuals in the sample above 10 years of age, an approach that masks possible differences between adults and children. BMI is only a suitable indicator of nutritional status for adults. We use the household level data from Kenya, which we supplement with individual level anthropometric measures. To deal with the likely endogeneity of supermarket purchase variable, we employ instrumental variable regressions. We analyze the impact of supermarket purchase on nutritional status, separately for adults and for children and adolescents. We also examine impact pathways through which supermarkets affect nutritional status by estimating a system of structural equations. Controlling for other factors, buying in a supermarket increases the BMI of adults by 1.7 kg/m^2 and raises the probability of adult overweight or obesity by 13 percentage points. For children and adolescents we do not find a significant impact on overweight. Instead, buying in a supermarket tends to decrease child undernutrition through a positive impact on height-for-age z-scores and a negative

effect on severe stunting. For both adults and children, the nutrition impacts of supermarkets occur through higher calorie consumption and changes in dietary composition.

In the third essay, we study the effect of the nutrition transition on childhood nutritional status. One point of criticism against the use of underweight as an indicator of child undernutrition is that it is likely affected by the nutrition transition, indicating a reduction in undernutrition although nutritional quality may not really have improved. As an alternative, stunting is viewed as a more reliable indicator. It has been argued that stunting is less affected by the nutrition transition, although this has hardly been studied. We analyze the effect of the nutrition transition on childhood underweight, overweight, and stunting, employing a cross-country regression approach. We use fat consumption, share of modern retail in grocery sales, and the prevalence of overweight women as indicators of the nutrition transition. Pooling data from Demographic and Health Surveys, Planet Retail, FAOSTAT, and World Development Indicators, we estimate fixed effects and random effects panel models. Our results show that the nutrition transition has an effect on child weight, as hypothesized previously. It significantly and consistently reduces underweight rates, while the effects on child overweight are less clear. In contrast to widely held beliefs, we also find clear and consistent evidence that the nutrition transition reduces child stunting.

We derive several general conclusions. Among other factors, supermarkets are drivers of the nutrition transition in developing countries, contributing to dietary changes among consumers. Supermarkets are causing consumers not only to eat more calories, but also to get a bigger share of their calories from processed foods. The direct impact of supermarket purchase on nutrition outcomes varies by age cohort and initial nutritional status. The results for Kenya show that supermarkets increase adult BMI and overweight, whereas for children the effect is a reduction in undernutrition. Based on the cross-country analysis, we find that the nutrition transition reduces both child underweight and stunting, while the expected impact on child overweight is not so clear. Hence, the primary and secondary data analyses suggest that the nutrition transition has positive effects in terms of reducing child stunting. These results challenge the general view that the nutrition transition would only have undesirable health effects in developing countries. Of course, more research is needed to confirm these results, but our findings indicate that simplistic conclusions may not be justified.

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1 General Introduction

1.1 Background

Many developing countries are currently undergoing a rapid nutrition transition. This transition is characterized by changes in dietary habits towards more energy-dense, often processed foods with high fat and sugar contents, and more sedentary lifestyles (Popkin & Ng, 2007). While the nutrition transition in developed countries occurred gradually, in many developing countries it is taking place within a much shorter period of time (Popkin, 2004). The nutrition transition in developing countries follows several phases. It begins with increased importation and domestic production, and hence consumption, of edible oils (Popkin & Ng, 2007). This phase is then followed by the increased consumption of foods with higher fat content such as animal source foods (meats and dairy). As observed, a striking feature of dietary transformation in Asian countries was the increasing consumption of meat, milk, and other animal products, as consumption of traditional cereals declined (Pingali, 2007). The next phase is characterized by an increased demand and consumption of convenience foods and beverages, as rates of urbanization increase and as more women enter into the labor force (Pingali, 2007). Another characteristic of this phase is increased consumption of food away from home (Hawkes *et al.*, 2009).

In addition to the changes in dietary patterns, declining physical activity and increasing sedentary time have been observed in the globe (Ng & Popkin, 2012), with 31% of all adults in the world being insufficiently active (WHO, 2011). These trends are not limited to developed countries, but are being observed in the developing world as well. In fact, China and Brazil are identified as the countries with the “highest absolute and relative rates of decline in total physical activity and some of the higher increases in sedentary time” (Ng & Popkin, 2012). One of the reasons for reductions in physical activity in the world is a declining importance of the agriculture and other traditional sectors, as sectors that require less physical activity such as manufacturing and services become more important (Ng & Popkin, 2012). Even in previously labor-intensive sectors such as farming and mining, there has been increased use of technology, contributing to low physical activity at work (Popkin *et al.*, 2012). Better access to home technologies, vehicles for transportation, and increased abandonment of active-leisure activities are important factors that reduce leisure-related physical activity. As physical activity reductions

take place, time allocated to sedentary activities has increased, a situation that is mostly associated with access to and growth of different media technologies (Ng & Popkin, 2012).

A consequence of the nutrition transition are rising rates of overweight and obesity (Popkin, 2004, Popkin & Ng 2007). In 2008, 34% of all adults, or about 1.46 billion people, were overweight or obese (Finucane *et al.*, 2011). Almost 500 million people, or 11% of all adults, were obese. Worldwide, adult obesity has more than doubled since 1980. For children under five years of age, an estimated 6.6%, or about 40 million, were either overweight or obese in 2011, an increase from 4.5% in 1990 (UNICEF *et al.*, 2012). Increasing overweight rates may give the perception that undernourishment is no longer a big problem. However, this is not the case. Globally, about 26% of all children under five, or about 165 million, were stunted in 2011. About 16%, or 101 million, were underweight. Regionally, Africa has the largest child undernutrition rates, with 35% of children under five being stunted in 2011. This coexistence of undernutrition and overweight/obesity, referred to as the dual burden of malnutrition, has been observed in many developing countries, sometimes even within the same households (Doak *et al.*, 2005; Lee *et al.*, 2012; Roemling & Qaim, 2013).

Overweight and obesity are important risk factors for non-communicable diseases (NCDs). Increased body mass increases the risk of coronary heart disease, stroke, and type 2 diabetes and some cancers. Globally, overweight and obesity contribute to 44% of the diabetes burden and 23% of the ischemic heart disease burden (WHO, 2009). These NCDs are major causes of death in the world. Out of the 57 million deaths that occurred in the world in 2008, 36 million, or 63%, were due to NCDs, principally cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases. Nearly 80% of these NCD deaths, or 29 million, occurred in low- and middle-income countries (WHO, 2011). In some regions of the world such as the African continent, there are still more deaths from infectious diseases than NCDs. Even there, however, NCDs are growing rapidly in importance and are projected to be the most common cause of death by 2030 (WHO, 2011). Even before causing death, NCDs come with other costs, mainly increased medical expenditures for individuals, households, and countries. It is estimated that obese individuals have medical costs that are about 30% higher than their normal weight counterparts, and that obesity may account for up to 3% of a country's total healthcare expenditures (Withrow & Alter, 2011). Since in poorer countries most health-care costs must be

paid by patients out-of-pocket, such costs of health care for NCDs create significant strains on household resources.

The nutrition transition being witnessed in developing countries can be attributed to several factors. Demand-side factors, such as increasing incomes, urbanization, and formal employment play an important role. Income growth leads to major shifts in demand across different types of food, while urbanization brings about lifestyle changes, including those related to levels of physical activity and dietary needs. As a result of these factors, consumers are shifting from less expensive staple foods to higher-value products, and they are spending an increasing share of their income on processed convenience foods (Pingali, 2007). Demand-side factors are only part of the explanation though. Globalization aspects, such as freer trade, a push towards the reduction of trade barriers in the developing world, and the increasing penetration of international corporations perpetuate these factors (Hawkes et al., 2009). Globalization of food systems is an important aspect that is driving the nutrition transition from the supply side. Changes in the food systems have been influenced by global food advertising and promotion, liberalization of international food trade and foreign direct investment (FDI), and growth of transnational food companies (Hawkes *et al.*, 2009). The growth of transnational food companies, including global supermarket chains, is particularly important, especially considering the speed at which it has occurred. In some of the developing countries without global supermarket chains, there are domestic chains that have usually adopted the look and functioning like those of global chains (Popkin *et al.*, 2012). While it took several decades in developed countries, the spread of supermarkets is now occurring within a much shorter time period in developing countries. In fact, supermarkets have spread so rapidly in some developing countries that the term “supermarket revolution” has been coined (Reardon *et al.*, 2003). The share of modern retail in food markets increased from 5–10% in 1990 to 50–60% in 2000 in South America, South Africa, and East Asia, the so called first-wave countries of the supermarket revolution (Reardon & Timmer, 2007). In the second wave countries, which include parts of Southeast Asia, Central America and Mexico, and Southern–Central Europe, the share of modern retail increased to 30-50% in the early 2000s, and 10-20% in the third-wave countries. Third wave countries include some in Africa such as Kenya and Zambia, some countries in Central and South America such as Nicaragua and Peru, and Southeast Asia such as Vietnam.

This wave also includes China, India, and Russia (Reardon & Timmer, 2007). Thus the retail market is increasingly becoming modernized in most of the developing world.

The retail format can have an influence on the types of products offered, prices and shopping atmosphere, which may affect consumer food choices (Hawkes, 2008; Timmer, 2008). It is known that emerging supermarkets have readily available stocks of highly processed foods and drinks (Hawkes, 2008; Pingali, 2007; Reardon *et al.*, 2003), which are likely to increase consumption of such foods among supermarket shoppers. Additionally, supermarkets engage in marketing strategies. Pricing and promotion are some of the strategies that food marketers use to influence the volume of consumption (Chandon & Wansink, 2012). Since supermarkets are dealing with large quantities of branded and packaged (often processed) goods, they have a greater flexibility in determining prices for such goods.

1.2 Problem Statement

As a result of the spread of supermarkets in developing countries, recent research has analyzed their effects. Several studies looked at farms and other rural households that may be impacted through participating in supermarket procurement channels (Dube *et al.*, 2012; Rao *et al.*, 2012; Rao & Qaim, 2011; Reardon *et al.*, 2012; Stokke, 2009). The dietary implications of the supermarket revolution have received less attention, however. The few studies that look at the relationship between supermarkets and nutrition have been carried out in high-income countries (Laraia *et al.*, 2004; Moore *et al.*, 2008; Pearce *et al.*, 2008). Most of this work shows that supermarkets increase the consumption of healthy foods such as fresh fruits and vegetables. For developing countries, the reigning hypothesis is that supermarkets would increase the consumption of energy-dense, processed foods (Hawkes, 2008), but empirical studies are hardly available. We are aware of only two studies that have looked at the dietary implications of supermarkets for consumers in developing countries (Asfaw, 2008; Tessier *et al.*, 2008). While Asfaw (2008) showed that supermarket purchases in Guatemala increased the share of processed foods at the expense of traditional staple foods, Tessier *et al.* (2008) found that regular users of supermarkets in Tunis had a slightly improved dietary quality. Methodologically, only Asfaw (2008) addressed the potential endogeneity of supermarket purchases in the statistical analysis. However, his research for Guatemala builds on a general household living standard survey that was not specifically designed for analyzing dietary implications of supermarkets. Hence, key

variables of interest, such as food quantities purchased in different retail outlets, were not properly captured. In this dissertation, this small body of literature is extended, addressing some of the data and methodological limitations of previous work.

Research on the impact of supermarkets on consumer nutritional status in developing countries is rare. In the USA, access to supermarkets is often associated with lower obesity rates (Drewnowski *et al.*, 2012; Lear *et al.*, 2013; Michimi & Wimberly, 2010 ; Morland *et al.*, 2006). This may not be the case in developing countries. Our literature search revealed only one study that has analyzed the impacts of supermarkets on nutritional status in a developing country (Asfaw, 2008). In that study that was carried out in Guatemala, food purchase in supermarkets was found to have an increasing effect on the body mass index (BMI) of consumers. As similarly argued above, this research for Guatemala is based on a household living standard survey that was not specifically designed for analyzing the nutritional impact of supermarkets. Important variables in such an analysis, such as food quantities purchased in different retail outlets, were not properly captured. The study analyzed the impact of supermarket purchase on BMI for all individuals above 10 years of age. This approach may mask possible differences between adults and children since BMI is only a suitable indicator of nutritional status for adults. For children and adolescents, literature recommends other indicators that compare individual measures to a reference population of the same age (de Onis *et al.*, 2007).

This dissertation comprises three essays. The first essay focuses on the impact of supermarkets on dietary behavior. In the second essay, we analyze whether supermarkets are a direct causal factor of overweight or obesity. These two essays are based on a household and individual level survey that was specifically designed to answer these questions in a quasi-experimental setting in Kenya.

The focus of the third essay is on the effect of the nutrition transition on child malnutrition. The generally accepted hypothesis is that the nutrition transition will affect adult weight (Hawkes, 2008; Hawkes *et al.*, 2009; Popkin *et al.*, 2012). Empirical research, though scarce, shows that buying in supermarkets, which is one aspect of the nutrition transition, increases adult BMI and the probability of being overweight (Asfaw, 2008). Related research for children does not exist. However, it is naturally expected that the nutrition transition will increase child weight, especially with numbers showing that child overweight rates in developing countries are also increasing. As the number of children who are overweight increases, the number of those who

are underweight has reduced. Since underweight is a weight-based indicator, a growing observation is that this reduction may actually be due to the nutrition transition (de Haen *et al.*, 2011; de Onis *et al.*, 2004; Haddad, 2013; Lutter *et al.*, 2011; Misselhorn, 2010; UNICEF, 2013). In contrast, stunting has decreased much slower, and it remains a problem of higher magnitude. This has given rise to the notion that the nutrition transition would only have an effect on child weight and not growth. If this were the case, reduced child undernutrition as suggested by the underweight indicator would be misleading. However, the notion that the nutrition transition would reduce child underweight but not stunting is not based on strong empirical evidence. In fact, this relation has never been analyzed explicitly. We address this research using a cross-country regression approach.

1.3 Research Objectives and Dissertation Outline

As discussed above, this dissertation has three essays with the following focus: the impact of supermarkets on dietary behavior, the impact of supermarkets on nutrition status, and the impact of the nutrition transition on child malnutrition indicators. Specifically, this dissertation addresses the following research questions:

1. Does the spread of supermarkets in developing countries affect food dietary behavior?
2. Does the spread of supermarkets in developing contribute directly to rising overweight and obesity?
3. What is the effect of the nutrition transition on child malnutrition indicators in developing countries?

To address the first two research questions, we rely on cross-section household and individual level data collected in Kenya in 2012 in a quasi-experimental setting. The data collection was specifically tailored to answer these questions. Kenya has recently witnessed a rapid spread of supermarkets that now account for about 10% of national grocery sales (PlanetRetail, 2013a). In addition, over 25% of the women in Kenya are overweight or obese (KNBS & ICFMacro, 2010). In the analysis, we account for potential endogeneity of supermarket purchases in the regression models using instrumental variable techniques. Analysis for the second research question is done separately for adults and for children and adolescents. In addition, we examine impact pathways

through which supermarkets affect nutritional status by estimating a system of structural equations. Specific details on data collection (see the household questionnaire used in the General Appendix) and variables, and the detailed information on the estimation methods are given in the respective chapters 2 and 3 of this dissertation.

The analysis for the third question relies on a cross-country approach, where we regress measures of child malnutrition on indicators of the nutrition transition and a set of control variables. We use fat consumption, share of modern retail in grocery sales, and the prevalence of overweight women as indicators of the nutrition transition. We pool data from Demographic and Health Surveys, Planet Retail, FAOSTAT, and World Development Indicators and estimate fixed effects and random effects panel data models. Chapter 4 of this dissertation gives detailed information on variables used and the sources of data, as well as the specific estimation strategies used. In chapter 5, the main findings are summarized and a general conclusion is given.

2 Supermarkets and the Nutrition Transition in Kenya¹

Abstract. Many low income countries experience a “nutrition transition” towards the consumption of more energy-dense, highly processed foods and more sedentary lifestyles. Among the consequences, overweight and obesity and related non-communicable diseases are rising. It remains unclear to what extent the concurrent spread of supermarkets is spurring the nutrition transition. This paper investigates the effect of supermarkets on consumption patterns using cross-sectional household survey data collected in Kenya in 2012. To establish causality, we use quasi-experimental data, with study sites differing in supermarket access, and employ instrumental variable techniques to allow for endogeneity of supermarket purchases. We find that supermarket purchases increase the consumption of processed foods at the expense of unprocessed foods. Supermarket purchases increase per capita calorie availability, which is supported by lower prices per calorie, particularly for processed foods. Our results imply that supermarkets contribute to the nutrition transition, while effects on nutrient adequacy are less clear.

2.1 Introduction

Many low and middle income countries are experiencing a nutrition transition, which is understood as a rapid change of diets towards more energy-dense, often (highly) processed and convenience foods and beverages that tend to be rich in fat, caloric sweeteners and salt. In some countries, the onset of these trends was in the mid-1990s already (1997). This “westernization” of diets (Pingali, 2007, p. 4) and a concurrent trend towards more sedentary lifestyles were soon being observed with concern, because they were found to contribute to surging rates of overweight and obesity, which are risk factors for nutrition related non-communicable diseases such as diabetes, cardiovascular diseases and certain types of cancer (e.g. Rosin, 2008; Sturm, 2002). Given still prevailing rates of undernutrition and related nutritional deficiencies, many low income countries are now facing a double burden of malnutrition where undernutrition and

¹ ¹ This chapter is co-authored by Ramona Rischke, Stephan Klasen, and Matin Qaim. The following roles were performed by me: conceptualization and designing of the study in cooperation with all co-authors; implementation of the survey in cooperation with Ramona Rischke; interpretation of the research results in cooperation with all co-authors; and revision of the paper in cooperation with all co-authors.

obesity coexist, sometimes even in the same households (Popkin *et al.*, 2012; Roemling and Qaim, 2013).

These nutritional transformations have been associated with changes on both the demand as well as the supply side: changing demand patterns, commonly linked to rising incomes, and urbanization processes, coincided with a ‘retail revolution’, a rapid spread of supermarkets (SMs) and fast food outlets. While Mergenthaler *et al.* (2009) provide case study evidence to suggest demand side factors to predominate, both trends are often believed to be mutually reinforcing (Hawkes, 2008; Popkin *et al.*, 2012; Reardon *et al.*, 2004).

The consumption of processed and highly processed foods and beverages is often singled out as an important factor contributing to unhealthy diets, as this category includes high calorie foods with only poor micronutrient content, such as sugary beverages, sweets, and all kinds of salted snacks (Monteiro *et al.*, 2010). Spreading supermarkets and fast food outlets, in turn, are suspected to improve the availability of these products and to increase their desirability even among poor households in remote areas (Asfaw, 2008; Hawkes *et al.*, 2009). On the other hand, supermarkets could provide more stable and affordable access to a greater variety of foods and drinks, which might improve the dietary diversity and overall dietary quality of consumers (Asfaw, 2008; Hawkes, 2008).

In any case, supermarkets have the potential to affect dietary choices to the better or worse, and it is important to better understand the dynamics at play. For this reason, our research questions are: How do supermarkets affect consumption patterns of households? Secondly, what factors determine where consumers source their food from? For our empirical analysis, we rely on survey data collected from in Kenya in 2012. Very rich and highly disaggregated food consumption data allow us to analyze consumption patterns with a particular focus on goods associated with the nutrition transition, and at different levels of processing.

Our contribution to the literature is threefold: first, we use detailed data on actual food purchases from different retail formats in addition to measures of physical access which the food environment literature is often restricted to (notable exceptions are Asfaw, 2008; Tessier *et al.*, 2008). Secondly, in contrast to most other studies, we account for potential endogeneity of supermarket purchases (selection effects) using instrumental variable techniques and further improve identification by a quasi-experimental survey design. Lastly, given the very few studies

on this issue in developing countries, we add the first case study of this issue in Sub-Saharan Africa.

For our quasi-experimental design, we chose survey locations among small towns such that they differ in terms of when, if at all, a local supermarket was established, whereas being comparable in other aspects. While most households in large Kenyan towns have fairly good access to supermarkets, this is not yet true for small towns. Small towns in Kenya (less than 50,000 inhabitants) are of particular relevance also because they accommodate 70% of the urban population, and manifestations of lifestyle changes are less obvious and less well studied (KNBS, 2010a; KNBS, 2010b). Adding to the relevance of our case study, Kenya can be classified a double burden country with 2008/09 Demographic and Health Survey data showing 25% of women of ages 15-49 being overweight or obese and 35% of children below age 5 being stunted (KNBS and ICFMacro, 2010).

In a contribution to the non-empirical literature, we provide a detailed account of the current food environment and different retail formats in Kenya and shed some light on the rationale behind consumer decisions. This is relevant as it creates a reference point in a highly dynamic market (Neven *et al.*, 2006; PlanetRetail, 2013a). In order to understand potential interactions between the food environment and consumption patterns, we refine a theoretical framework from the literature for the setting at hand.

2.2 Theoretical Framework

The term food environment refers to the “[food related] physical and infrastructural features of the area” (Giskes *et al.*, 2011, p. e96) such as access to and the density of different types of retail outlets, including supermarkets. There are several pathways through which supermarkets can influence consumption patterns that go beyond making goods available. To inform our hypotheses, we will characterize the Kenyan food environment before elaborating on the impact channels.

2.2.1 Food Environment in Kenya

In Kenya, typical for a low-income country, common alternatives to supermarkets are smaller self-service stores and, more traditionally, kiosks. Comparing supermarkets and relevant competitors (see Table 2.1 for details), several features stand out: supermarkets are self-service

stores, while kiosks are strictly over-the-counter shops. As opposed to kiosks, supermarkets stock large varieties of different kinds of food and non-food products. This is in terms of product ranges and in terms of brands and features of the same product, i.e. different flavors, functionalities (e.g. nutrients added to food) and levels of processing. High value non-food items (e.g. electronics, furniture) are uniquely offered by supermarkets. The characteristics of small self-service stores are in between those of supermarkets and kiosk.

Table 2.1. Defining features of different retail outlets – the case of Kenya

	Supermarket	Small self-service store	Kiosk (traditional retail)
Size indicators	<ul style="list-style-type: none"> > 150 m² (Neven and Reardon, 2004) ▪ Typically >1 floor ▪ Typically >2 modern cash counters 	<ul style="list-style-type: none"> < 150 m², though size in small towns typically 10-30 m² ▪ Typically 1 floor ▪ Typically 0-2 modern cash counters 	<ul style="list-style-type: none"> ▪ 1-10 m² ▪ No modern cash counter
Service features	<ul style="list-style-type: none"> ▪ Self-service ▪ One-stop shopping ▪ More sophisticated shopping atmosphere: <ul style="list-style-type: none"> - Spacious isles - Full shelves - Clean & bright ▪ No credit 	<ul style="list-style-type: none"> ▪ Self-service ▪ Narrow aisles, often little light ▪ No credit 	<ul style="list-style-type: none"> ▪ Over-the-counter service ▪ Direct contact to shop owner ▪ Gives credit
Product features	<ul style="list-style-type: none"> ▪ Large variety of different food and non-food products ▪ Large variety of brands and features within product categories ▪ Frozen and refrigerated foods ▪ Small to very large packaging sizes ▪ High value non-food items, e.g. electronics, furniture, clothes 	<ul style="list-style-type: none"> ▪ Large variety of different food products ▪ Limited variety of non-food products, brands and product features ▪ Neither frozen, nor cooled foods ▪ Small to fairly large packaging sizes ▪ No high value non-food items 	<ul style="list-style-type: none"> ▪ Limited but often fair variety of different food products ▪ Only fast-moving non-food products, limited brands and product features ▪ Neither frozen, nor cooled foods ▪ Very small to small packaging sizes ▪ No high value non-food items

2.2.2 Impact Channels

The basic argument for an effect of supermarkets on diets is that the food environment affects where people do their shopping, which in turn influences their dietary practice (Asfaw, 2008), and that introducing supermarkets significantly alters the food environment. Figure 2.1 illustrates potential relationships between food environments, consumption choices and dietary practice (see Figure 2.1, column 3) as developed and refined from the literature. Supermarkets improve physical access to and increase the availability of goods. By offering more types of goods, brands, flavors, functional foods and levels of processing supermarkets offer a larger variety of all types: healthy, ‘health neutral’ and unhealthy products, regardless of the consumer’s dietary needs. This is expected to increase the dietary diversity of consumers. At the same time, changing quantities and substitution within and across food categories could be enhancing as well as deteriorating dietary quality (Asfaw, 2008; Hawkes, 2008). Thus, the expected magnitude of these effects has to be further elaborated on and will closely be linked to likely effects on relative prices.

Reardon *et al.* (2004) argue that supermarkets in low income countries have a price advantage with industrially processed goods with long shelf-lives. In this context, the term ‘processed foods’ refers mainly to highly processed foods. These are predominantly ready-to-eat products, produced for instance by adding spices, preservatives, synthetic vitamins, by frying, cooking or baking (Monteiro *et al.*, 2004). It is highly processed foods for which supermarkets are expected to have the strongest advantage over other retail formats. Even though this classification puts flour enriched with vitamins and potato chips in the same processing category, highly processed foods tend to be high in salt, sugar and saturated fats, are often considered unhealthy and found to contribute to developing non-communicable diseases. See Monteiro *et al* (2010) and Asfaw (2011) for a discussion of underlying evidence from the medical literature. The effect of supermarkets on prices is, however, controversial in the empirical literature. Price premiums were detected in some cases (Schipmann and Qaim, 2011) and examples of consistently smaller prices in others (Hawkes, 2008).

Following another line of argument, Chandon and Wansink (2012, p. 572) point out that highly processed foods are highly differentiated and not bound to commodity prices because: “With these branded products, marketers can establish their own price depending on which

consumer segment they wish to target.” As an example to the contrary, Popkin *et al.* (2012) mention production related price reductions in edible oils that had already by the mid 1990’s enabled poor households to increase their energy intake. Reviewing evidence on pricing strategies of supermarkets in low income countries, Hawkes (2008) finds that supermarkets tend to be more expensive upon market entry but become more price-competitive later, and first among processed foods as discussed above. On a related note, supermarkets facilitate bulk shopping by offering large packaging sizes, which is likely accompanied by quantity discounts. However, poor consumers have a limited capacity to utilize these discounts. In fact, one advantage of kiosks is that they often offer credit and smallest amounts of products.

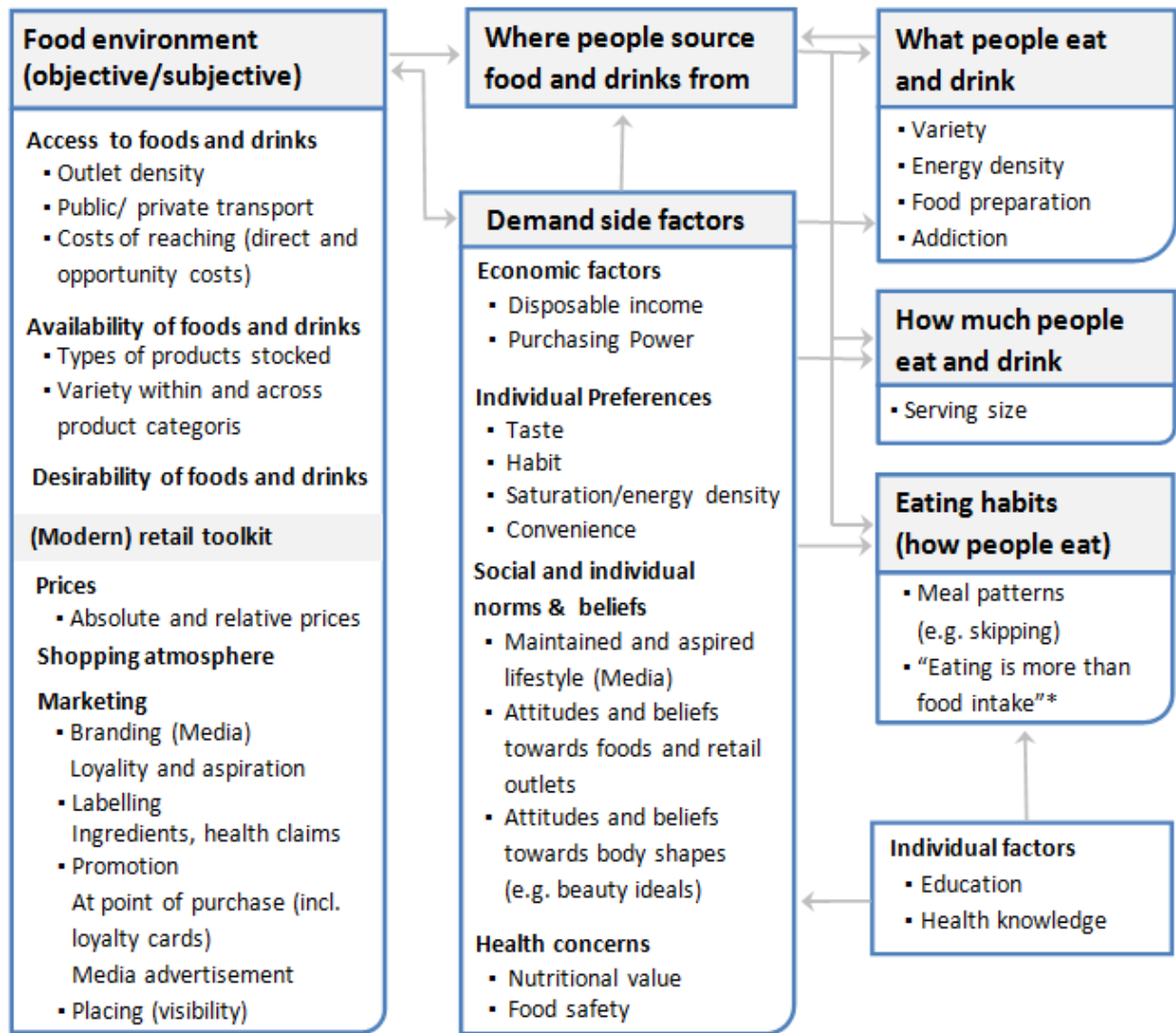
Apart from influencing relative prices, supermarkets use a variety of marketing strategies to influence what and how much customers are buying, many of them affecting consumers subconsciously (Monteiro *et al.*, 2010). In this context, Hawkes (2008, p. 682) talks about the food industry making food desirable. See Chandon and Wansink (2012) for a comprehensive review of marketing strategies and related outcomes. Interestingly, the authors refer to studies showing that temporary price discounts and offering large packaging sizes, relevant strategies for supermarkets in our survey locations, can increase the consumption of respective goods rather than merely shifting it across brands or time. Following this line of argument, supermarkets are hypothesized to increase overall consumption of all food groups (Hawkes, 2008).

At the same time, a number of demand side factors can directly influence both dietary practices and the place of shopping. These include economic factors (e.g. disposable income), individual and household preferences (e.g. for taste or habits), social and individual norms and beliefs (e.g. attitudes towards modern or traditional foods and outlets, the maintained and aspired lifestyle and beauty ideals) and personal health concerns. We will incorporate proxies for them as control variables in the empirical analysis.

Existing studies confirm that the impact of supermarkets on diets is context specific in nature and that important research gaps remain with respect to mediating factors: most studies have been carried out in high income countries (e.g. Cummins *et al.*, 2005; Laraia *et al.*, 2004; Moore *et al.*, 2008; Morland *et al.*, 2006; Pearce *et al.*, 2008; Powell *et al.*, 2007; Wrigley *et al.*, 2003). Two studies were conducted in a developing country context, which further contribute to the literature by considering supermarket purchases rather than supermarket access. Asfaw (2008) finds that supermarket purchases in Guatemala increase the share of partially and highly

processed foods at the expense of staple foods and that supermarket purchases are positively associated with BMI. Tessier et al. (2008) in a similarly titled paper conclude that regular users of supermarkets in Tunis have a slightly improved dietary quality.

Figure 2.1. Conceptual framework - food environment, consumption and influencing factors



Because supermarkets in small towns have a limited catchment area and thus need to target a broad customer base, we assume them to offer a wide range of product qualities and prices. Yet, following the discussion of this section, we hypothesize that their pricing strategy leads to lower

prices per calorie. In terms of consumption, as a result of food environment changes due to supermarkets and their pricing strategy we hypothesize that:

H1₁: Supermarket customers eat differently: supermarket purchases increase per capita consumption shares of processed and highly-processed foods.

H1₂: Supermarket customers eat more: supermarket purchases increase total per capita consumption.

H1₃: Supermarket customers eat more types of food: supermarket purchases increase the dietary diversity of consumers.

2.3 Survey Site and Study Design

2.3.1 The Case of Kenya

Supermarkets have been spreading rapidly throughout Kenya and the pattern has been similar to the retail revolution described in other low income countries (Neven *et al.*, 2006; Reardon *et al.*, 2004). In the early 2000s, Kenya's retail sector was already classified as one of the most dynamic in Sub-Saharan Africa (Neven *et al.*, 2006). Today, despite being highly fragmented, it is among the most developed retail sectors in Sub-Saharan Africa (PlanetRetail, 2013a). This fragmentation explains why the top three retailers in 2013 only had a market share of around 5% while in 2003 already, supermarkets more generally had a 20% market share of the urban food retail market (Neven and Reardon, 2004; PlanetRetail, 2013a). Interestingly from a domestic policy perspective and in contrast to the experience of countries with an early supermarket revolution (Reardon *et al.*, 2004), none of today's top five supermarket chains in Kenya are owned by international corporations or foreign firms, but by Kenyan enterprises. It should also be noted that while quite a number of supermarkets do not belong to chains at all or have only a few outlets, they do not qualitatively differ from chain supermarkets.

For a full picture of the urban food environment in Kenya, please note that international and other fast food chains are still restricted to large towns. Only in large towns are supermarkets offering fresh fruits and vegetables, have built-in butcheries, restaurants and large bakeries. Western style convenience processing (pre-cut vegetables, prepared salads, frozen or tinned ready-to-heat food) is only available there. Visiting large town supermarkets or hypermarkets ten times larger in size (Neven *et al.*, 2006), it becomes evident that lifestyle and status play a

significant role and that ‘shopping atmosphere’ is not an abstract concept but a strong force. However, Neven *et al.* (2006), who analyze patterns of the retail revolution in Kenya and consumer attitudes in Nairobi, already put forward that the introduction of supermarkets in small towns, from a consumer perspective, is likely to be as impressive and as powerful in influencing consumer choices, as the introduction of hypermarkets in large towns or mini-supermarkets in rural areas. Note that product ranges of supermarkets, small self-service stores and kiosks in small towns are surprisingly similar. The main differences are qualitative in nature and as outlined in the section 2.2.1.

2.3.2 Study Design and Data

This study uses data from a household consumption survey conducted in three small towns in Central Province, Kenya. A total of 453 households were interviewed between July and August 2012. Our identification strategy to test for a causal relationship between supermarkets and consumption patterns relies on a quasi-experimental survey design: we selected three towns that differ in terms of their access to supermarkets while being comparable in other aspects: One with a well-established supermarket (Ol Kalou: one supermarket since 2002), One with a supermarket opened fairly recently but with a sufficient time lag to allow inhabitants to get used to it (Mwea: one supermarket since August 2011) and One town with no supermarket up to that point in time. We applied systematic random sampling. Our sampling frame, produced for this survey, covered the town centers and close peripheries (about 2.5 km radius), which corresponded to the most densely populated parts of the town and town outskirts.

2.4 Empirical Strategy

In general terms, our model can be specified as proposed by Asfaw (2008):

$$\mathbf{D}_i = \alpha \mathbf{X}_i + \beta S_i + \varepsilon_i \quad (2.1)$$

$$S_i = \gamma \mathbf{X}_i + \delta \mathbf{Z}_i + \omega_i \quad (2.2)$$

where \mathbf{D}_i refers to dietary indicators of household i , \mathbf{X}_i to explanatory variables and S_i to the measure of supermarket purchases, our main variable of interest. Because supermarket purchases are likely to be endogenous, we use a two stage least squares instrumental variable approach and

thus add equation (2.2) to the model, where Z_i refers to the excluded instruments. ε_i and ω_i are error terms.

Supermarket purchases, i.e. the intensity of supermarket purchases, are conceptualized using the share of supermarket purchases from the overall food basket. Note that this share can be positive for non-supermarket locations due to out-of-town shopping. Endogeneity of supermarket purchases might result from self-selection on non-observables, i.e. systematic differences between frequent supermarket customers and others. We use distance to the nearest supermarket as an instrument. This reflects our initial hypothesis that supermarket access will induce people to shop there. At the same time, we claim this variable to be exogenous: while market potential drives the decision to establish a supermarket in a particular town, we argue that this potential boils down to demand side factors, which we control for, and to road infrastructure so as to facilitate logistics. While supermarket managers in our survey towns explained that the location within town was substantially driven by the availability of large plots, we believe between town road infrastructure to be exogenous to our analysis. Distance is measured as physical linear distance between household and nearest supermarket based on GPS readings. Note that there is only one supermarket per supermarket location, consumers mostly go there by foot and linear distances approximate walking distances well. For the town without a supermarket, the closest supermarkets can only be reached using public or private transport.

Our explanatory variables mirror the demand side and individual factors from our conceptual framework presented earlier (see Figure 2.1). Individual level factors, such as education or age, refer to either the household head or to the person responsible for food purchases and preparation. Food consumption was captured with a 30 day recall period because we expect decisions regarding where to shop to vary during a wage cycle (e.g. households shopping in bulk in supermarkets after getting paid while increasingly shopping for small portion sizes at kiosks towards the end of the month). In very disaggregated form (e.g. differentiating between fortified and unfortified flour and different types of cooking oil), we asked how much quantity was consumed by the household during the last month. This was for consumption inside the house, since food eaten outside the home is more specific to the individual and usually not sourced from supermarkets, but from street hawkers, restaurants and sometimes kiosks. We asked the households to break down the total quantity consumed into quantities consumed from purchases, own production, or other sources (e.g. gifts). For purchases, the respondents were also

reporting how much they spent and what quantity they bought where (supermarkets, smaller self-service stores or traditional, i.e. all other outlets). Because outlets in the latter category only have few overlapping products, we can still and most notably identify the quantity bought in kiosks. Monetary values for own production and other sources are imputed so as to include it in the food expenditure aggregate. For this, we use median unit values reported for the same good by neighboring households. The expenditure share of a particular retail outlet is from the total food expenditure of that household.

Based on the classifications used by Asfaw (2011) and Monteiro et al. (2010), we differentiate products by levels of industrial processing into unprocessed foods (e.g. fresh fruits and vegetables), primary processed foods (e.g. rice, sugar and cooking oils), and highly processed foods (e.g. breakfast cereals, bread and sweets). These categories are mutually exclusive and jointly exhaustive with the exception of alcoholic beverages, which are excluded. We then conceptualize consumption patterns by expenditure shares and calorie shares on different processing categories. Overall consumption is considered in terms of per capita calorie availability per day and we briefly analyze households' food budget shares also.

2.5 Empirical Results

2.5.1 Descriptive Statistics

The survey locations differ quite substantially in terms of size: Njabini is the smallest and least urbanized town with an estimate of 1870 households (estimate based on our sampling frame). Mwea is the largest town with an estimate of 7650 households. Still, in terms of physical and social infrastructure (e.g. main roads being tarmac roads, having access to banks, a hospital, several health centers and other services, having similar administrative structures), all survey locations are comparable. In terms of ethnicity and religion, Kikuyu and Christian are by far the most prevalent in all survey towns, with rates exceeding 80% and 90%, respectively.

Table 2.2 summarizes household characteristics by survey locations. The sample size across survey locations ranges from 134 to 161 households. The average household size in Njabini exceeds the other locations by one additional household member. Three quarters of all households in the sample are male headed. Household heads, on average, are 38 years old, with

significant differences for Ol Kalou (younger heads) and Njabini (older ones). Despite having older heads, Njabini seems to be lagging behind regarding their highest level of education.

Table 2.2. Household characteristics of sample

	All		Njabini (no SM)		Mwea (SM since 2011)		Ol Kalou (SM since 2002)	
	Mean	mean	diff to others	Mean	diff to others	Mean	diff to others	
Household size	3.63 (1.93)	4.28 (2.38)	1.01*** (0.18)	3.14 (1.44)	-0.70*** (0.20)	3.38 (1.57)	-0.38** (0.19)	
Male head (%)	0.74	0.77	0.05	0.69	-0.06	0.74	0.00	
Monthly p.c. exp. (food + non-food) in KSh	9425.15 (7995.69)	8105.58 (8788.48)	-2059.81*** (782.13)	10415.12 (6840.21)	1412.44* (823.26)	9946.68 (7923.59)	792.02 (796.61)	
Age of head	37.51 (13.01)	40.61 (14.21)	4.84*** (1.26)	36.87 (12.37)	-0.91 (1.34)	34.80 (11.56)	-4.11*** (1.28)	
Education of head completed								
No formal educ.	0.03	0.06	0.04**	0.01	-0.02	0.02	-0.02	
Primary	0.38	0.48	0.16***	0.32	-0.09*	0.33	-0.08	
Secondary	0.38	0.30	-0.11**	0.44	0.09*	0.39	0.03	
Tertiary	0.21	0.16	-0.09**	0.22	0.02	0.25	0.07*	
Observations	448	161	161	134	134	153	153	

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Means are shown with standard deviation in parenthesis. KSh, Kenya shillings

Average monthly per capita expenditure amount to 9,425 KSh, while being significantly and quite substantially smaller in Njabini. We are not aware of an up to date poverty estimate, but based on the latest poverty line (year 2005) and subsequent consumer price statistics publicly available, we extrapolate today's poverty line to be around 7,500 KSh per capita per month. This would yield a poverty headcount of 47% in our sample. The latest poverty estimate according to World Bank statistics was 46% in 2005.

Table 2.3 provides an overview of access to different retail outlets and shopping behavior: in our supermarket locations, the average distance to the local supermarket is below 1km, while the nearest supermarket is 40km away from Njabini. Kiosks are very close to most households and can be reached within 5 minutes on average. Food expenditure shares devoted to different retail outlets are as expected: Ol Kalou has the highest food expenditure share from supermarkets, followed by Mwea and Njabini. In Ol Kalou, the average supermarket share is

17%, in Mwea already 11% of the food expenditure goes to supermarkets. Even in Njabini, the mean supermarket share is positive and 14% of households bought some food in supermarkets. In Ol Kalou, 84% of households frequented the supermarket, 80% in Mwea. Interestingly, in all towns, the frequency of shopping in kiosks is very high, it does not vary much from the overall mean of 25 times last month and traditional retail is by far the most important source for food with expenditure shares ranging from 66% to 75% across towns.

Table 2.3. Access to retail outlets and shopping behavior

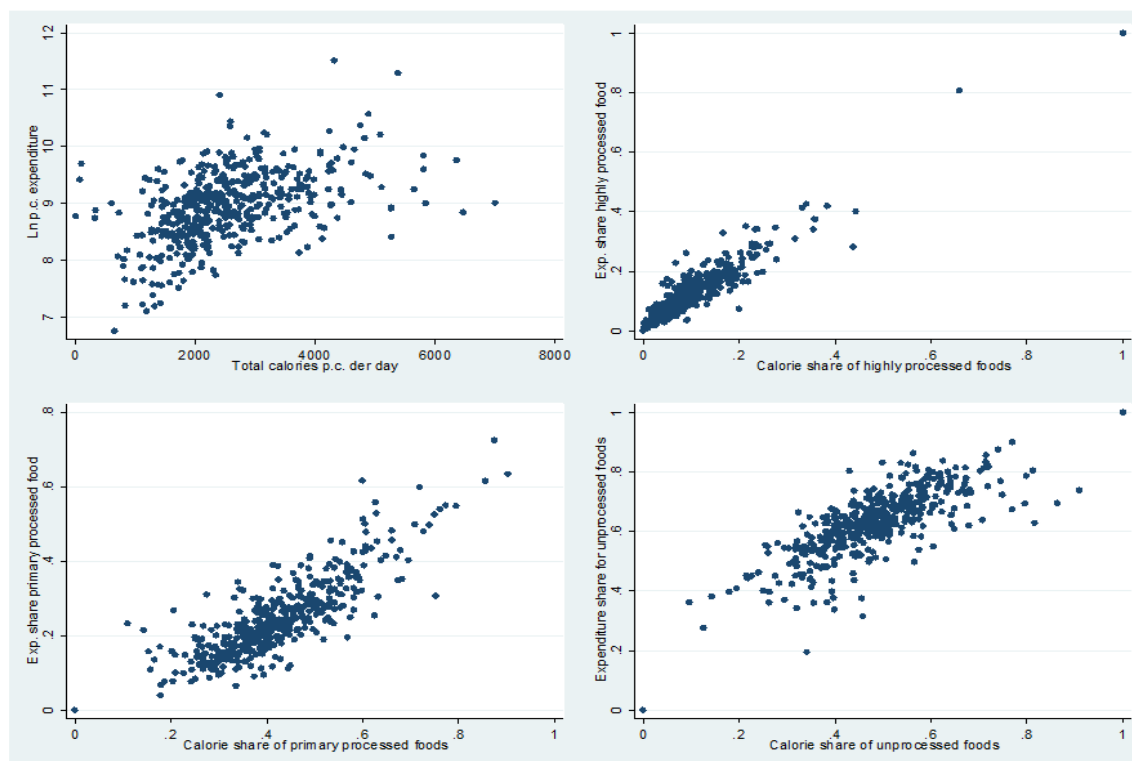
	All	Njabini (no SM)	Mwea (SM since 2011)	Ol Kalou (SM since 2002)
	mean/sd	mean/sd	mean/sd	mean/sd
Number of times shopping in [...] last month				
Supermarket	3.05 (5.36)	0.36 (0.98)	2.70 (3.27)	5.77 (7.46)
Small self-service store	2.50 (5.73)	4.08 (8.44)	0.53 (1.91)	2.71 (3.66)
Kiosk	25.62 (16.82)	23.84 (17.69)	29.33 (15.78)	24.18 (16.38)
Distance to SM in km				
	14.55 (20.44)	39.29 (14.35)	0.67 (0.49)	0.68 (0.41)
Travelling time to [...] (min. one way)				
Supermarket	47.64 (47.29)	103.68 (33.73)	16.54 (9.08)	15.90 (10.59)
Kiosk	5.33 (5.82)	8.30 (7.58)	2.95 (2.73)	4.31 (4.15)
Share of HHs buying in supermarket				
	0.58	0.14	0.80	0.84
Expenditure shares in [...]				
Supermarket	0.10 (0.12)	0.02 (0.06)	0.11 (0.10)	0.17 (0.13)
Small self-service store	0.05 (0.11)	0.08 (0.13)	0.02 (0.10)	0.05 (0.08)
Traditional retail	0.70 (0.19)	0.71 (0.20)	0.75 (0.17)	0.66 (0.17)
Own production	0.11 (0.15)	0.16 (0.17)	0.08 (0.13)	0.09 (0.13)
Observations	448	161	134	153

Note: Expenditure shares don't add up to 100% because of left out category 'gift and other sources'.

Asked for the most important reasons to shop in different retail outlets, more than half of the respondents in supermarket locations reported (perceived) lower prices (see Table 2.4). Improved availability, e.g. more variety of food and non-food products, was reported by 16% of respondents in Ol Kalou and 8% in Mwea. The possibility for one-stop-shopping and other factors we attribute to convenience were most important to 11% of respondents in SM locations. For shopping in kiosks on the other hand, physical access is by far the most important reason in all towns, ranging from 52% in Njabini to 69% in Mwea. Note that the importance of perceived lower prices in supermarkets and physical access in the case of kiosks is consistent to what Neven et al. (2006) found in the case of consumers in Nairobi.

Comparing price ranges across outlets (not shown) cannot easily support the perception of lower prices (per kg) offered by supermarkets. Irrespective of quality differences, most price ranges do not seem to differ much across stores. We will return to this issue below, but at this point the question remains if food expenditure serves as an accurate indicator of food consumption across retail outlets given that they might reflect price differences. Figure 2.2 plots several expenditure indicators against calorie indicators, with per capita variables using adult equivalent scales.

Figure 2.2. Expenditure and calorie indicators



The upper left plot could suggest a non-linear relationship between log p.c. expenditure and p.c. calorie availability, which is particularly pronounced once calorie availability becomes very large and likely to exceed actual p.c. calorie intake (e.g. due to food wastage or hosting guests). Plotting food expenditure shares against calorie shares for different levels of processing (remaining plots) reveal strong positive and rather linear relationships so that both indicators seem to capture the same aspects of food consumption and are thus interesting for further analysis. Only in the case of highly processed foods, however, are expenditure and calorie shares so close to each other in absolute terms. Note that 5% of households do not report any consumption of highly processed foods. For primary processed foods, median expenditure shares are 23%, calorie shares 40%, suggesting that prices per calorie are lowest in this food category. Unprocessed foods contribute around 47% of calories for the median consumer, while 63% of food expenditure is spent on these items.

2.4.2 Food Expenditure Shares by Levels of Processing

Our main empirical results regarding expenditure shares by levels of processing using OLS and IV specifications are shown in Table 2.4 (2.4a and 2.4b). Summary statistics of all variables used, first stage results and some robustness checks are found in the Appendix A2. Robust standard errors are used in all specifications. We tested each model for cluster effects at the neighborhood level, our primary sampling unit, and use cluster robust standard errors whenever required. Note that all IV specifications reported in this paper have first stage test statistics, i.e. exclusion and weak instrument criteria meeting or well exceeding conventional thresholds.

The OLS results confirm our initial expectations: supermarket purchases are positively associated with expenditure shares of highly and primary processed foods, while the share of unprocessed foods is declining. In the IV specifications, supermarket purchases lose their significance in case of highly processed foods, and remain significant in all other cases. At the same time, the effect size of supermarket purchases changes in some cases, with the point estimate for all processed foods, for example, increasing from 0.21 to 0.38. In sum we take this as an indication that endogeneity is a relevant issue here that we rightfully account for.

How are these coefficients to be interpreted? If the supermarket expenditure share increased by 1 percentage point (the average share is 9%), the expenditure share on processed foods would increase by 0.38 percentage points. However, considering that the average share in

our supermarket locations is 14% against 1% where no SM is present, looking at a 10 percentage point increase in purchases seems like a plausible treatment scenario, and would be associated with a 3.8 percentage point increase in expenditure shares on processed food (an increase from 34 to around 38% for the average consumer in the non-SM location). We find positive income effects regarding highly and unprocessed foods, and negative income effects with respect to primary processed food. Note that these effects include quality effects of unknown magnitude. Other variables have the expected signs.

Robustness checks (not shown) include testing different sets of control variables, and restricting the sample to the supermarket locations only. Generally we find the direction of main effects and their statistical significance to be robust, but effect sizes are sensitive to model specifications. Interestingly, for all expenditure shares, the effects remain stable when excluding our non-supermarket location from the sample. Another interesting finding regards interaction effects that we find between supermarket shares and an indicator variable for households whose kiosk consumption exceeds the town median. The idea was that depending on their shopping intensity in traditional outlets, households might frequent supermarkets for different reasons and with different outcomes. Indeed, in the case of primary and all processed foods, controlling for frequent kiosk consumption increases the effect of supermarket purchases, but less among frequent kiosk consumer. It is the other way around for unprocessed foods. Note, however that the interaction effects should be interpreted with care because first, frequent consumers tend to have lower supermarket expenditure shares and second, kiosk purchases might be subject to selection effects also. Other interaction effects with total expenditure or education, for example, were not significant.

Table 2.4a. OLS and IV regression results – Food expenditure shares by levels of industrial processing

	(1) OLS Expenditure share <i>highly</i> <i>processed</i> food	(2) IV Expenditure share <i>highly</i> <i>processed</i> food	(3) OLS Exp. share <i>primary</i> <i>processed</i> food	(4) IV Expenditure share <i>primary processed</i> food
SM expenditure share	0.0766* (0.041)	0.0712 (0.091)	0.1336*** (0.039)	0.2109** (0.086)
Ln p.c. expenditure	0.0225*** (0.008)	0.0227** (0.010)	-0.0829*** (0.009)	-0.0863*** (0.010)
Household size	-0.0009 (0.003)	-0.0009 (0.003)	0.0062 (0.005)	0.0062 (0.004)
=1 if head is married	-0.0228** (0.009)	-0.0228** (0.009)	-0.0089 (0.012)	-0.0089 (0.011)
Education of head in years	0.0041*** (0.001)	0.0041*** (0.001)	-0.0009 (0.001)	-0.0014 (0.001)
Age of cook	-0.0061*** (0.002)	-0.0061*** (0.002)	0.0002 (0.002)	0.0003 (0.002)
Age of cook squared	0.0001*** (0.000)	0.0001*** (0.000)	0.0000 (0.000)	0.0000 (0.000)
=1 if HH does farming	-0.0346*** (0.008)	-0.0347*** (0.008)	-0.0243** (0.009)	-0.0224** (0.009)
Mwea (SM 2011)			0.0247** (0.010)	0.0241** (0.009)
Constant	0.0462 (0.079)	0.0445 (0.090)	0.9562*** (0.077)	0.9810*** (0.084)
Observations	448	448	448	448
R ²	0.256	0.256	0.316	0.310

*, **, ***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with robust (1),(2) and cluster robust (3),(4) standard errors

Table 2.4b. OLS and IV regression results – Food expenditure shares by levels of industrial processing

	(5) OLS Expenditure share <i>all processed food</i>	(6) IV Expenditure share <i>all processed food</i>	(7) OLS Expenditure share for <i>unprocessed foods</i>	(8) IV Expenditure share for <i>unprocessed foods</i>
SM expenditure share	0.2134*** (0.041)	0.3781*** (0.101)	-0.2127*** (0.046)	-0.3220*** (0.077)
Ln p.c. expenditure	-0.0595*** (0.010)	-0.0668*** (0.011)	0.0313** (0.012)	0.0361*** (0.012)
Household size	0.0045 (0.004)	0.0044 (0.004)	-0.0141*** (0.005)	-0.0141*** (0.005)
=1 if head is married	-0.0313*** (0.011)	-0.0314*** (0.012)	0.0412*** (0.012)	0.0413*** (0.012)
Education of head in years	0.0032** (0.002)	0.0021 (0.002)	-0.0016 (0.002)	-0.0009 (0.002)
Age of cook	-0.0055*** (0.002)	-0.0053** (0.002)	0.0055*** (0.002)	0.0054*** (0.002)
Age of cook squared	0.0001** (0.000)	0.0001** (0.000)	-0.0001** (0.000)	-0.0001** (0.000)
=1 if HH does farming	-0.0609*** (0.010)	-0.0569*** (0.010)	0.0702*** (0.010)	0.0675*** (0.010)
# female adults			0.0371*** (0.010)	0.0376*** (0.010)
Constant	0.9955*** (0.090)	1.0487*** (0.094)	0.2164** (0.101)	0.1812* (0.099)
Observations	448	448	448	448
R ²	0.233	0.208	0.240	0.229

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with robust (5),(6) and cluster robust (7),(8) standard errors

2.5.3 Calorie Consumption

Turning to the models on calorie shares from different kinds of food, supermarkets have less pronounced effects than before (see Table A2.3 in Appendix A2). A positive relationship between supermarket purchases and calorie shares remains significant over both OLS and IV specifications in the case of all processed foods only. The direction of all other effects is as expected but mostly insignificant. In accordance with our previous findings, negative income effects are found for primary foods and positive for both highly and unprocessed foods. In other robustness checks (not shown), the effect size of supermarket purchases on calorie shares from all processed foods ranges from 1.1 percentage point in OLS to 2.2 percentage points in IV

specifications given a 10 percentage point increase in supermarket purchases. The average household in our non-supermarket location consumed 49% of their calories from primary processed food. Again, the effect size rises when we include a dummy for frequent kiosk consumers and an interaction with supermarket purchases but in this case, for high frequency consumers, the effect of supermarket purchases almost cancels out.

What do we take away up to this point? Supermarkets indeed influence consumption patterns in that they are associated with higher consumption shares of processed foods (incl. beverages). This is in terms of expenditure as well as calorie shares of these goods and at the expense of unprocessed foods. These results partly confirm our hypothesis 1 (see section 2.2). The contradicting part concerns highly processed foods, where we expected stronger and significant effects of supermarkets purchases. Given positive income effects we find for highly processed foods, however, we expect a stronger shift towards these goods as income levels are increasing.

In order to address our second hypothesis that supermarket purchases increase overall consumption, we analyze per capita calorie availability per day. Because of a high standard deviation (see Table A2.1 in Appendix A2), we use the log of p.c. calories in our regressions. This produces more robust results as compared to using absolute values. Table 2.5 presents our main results. We find supermarkets to be positively and significantly associated with higher p.c. calories so that we cautiously confirm our hypothesis. In the IV specification, the semi-elasticities indicate that p.c. calories increase by 0.85% in response to a 1 percentage point increase of supermarket purchases. In case of our example used before, a 10 percentage point increase in supermarket purchases would increase p.c. calories by 8.5% or around 200 calories per capita per day in the case of an average consumer in the non-supermarket location. Models (4) and (6) again show a significant interaction between frequent kiosk consumers and supermarket purchases. Above median kiosk purchases are associated with higher p.c. calories while supermarket purchases among frequent kiosk consumers have a negative effect on p.c. calories. Effect sizes of supermarket purchases are higher in the IV as compared to the OLS specifications. This might reflect measurement errors in calories consumed which would bias OLS results towards zero if they are random. IV techniques account for random measurement errors.

Table 2.5. OLS and IV regression results – Calorie availability at home

	(1) OLS log of <i>per capita</i> <i>calories per</i> day	(2) IV log of <i>per capita</i> <i>calories per</i> day	(3) 1 st stage SM expenditure share	(4) OLS log of <i>per capita</i> <i>calories per</i> day	(5) IV log of <i>per capita</i> <i>calories per</i> day
SM expenditure share	0.3706** (0.186)	0.8485* (0.504)		0.9140*** (0.291)	1.2479* (0.672)
Ln p.c. expenditure	0.3599*** (0.056)	0.3397*** (0.068)	0.0348*** (0.009)	0.3943*** (0.057)	0.3854*** (0.067)
HH size using adult equivalent scales = 1 for male head	-0.0055 (0.024)	-0.0067 (0.024)	0.0067** (0.003)	-0.0091 (0.022)	-0.0104 (0.023)
	-0.2220*** (0.060)	-0.2155*** (0.060)	-0.0071 (0.011)	-0.2151*** (0.058)	-0.2105*** (0.059)
Education of head in years	0.0025 (0.008)	0.0001 (0.008)	0.0033** (0.001)	0.0031 (0.008)	0.0018 (0.008)
Age of cook	-0.0060 (0.008)	-0.0051 (0.008)	-0.0029 (0.002)	-0.0062 (0.008)	-0.0058 (0.008)
Age of cook squared	0.0001 (0.000)	0.0001 (0.000)	0.0000 (0.000)	0.0001 (0.000)	0.0001 (0.000)
=1 if HH does farming	0.1996*** (0.053)	0.2066*** (0.053)	-0.0090 (0.011)	0.2220*** (0.055)	0.2279*** (0.054)
Livelihood: public sector employment	-0.1599** (0.070)	-0.1963*** (0.075)	0.0616*** (0.019)	-0.2059*** (0.074)	-0.2317*** (0.084)
Livelihood: private sector employment	0.0202 (0.066)	-0.0063 (0.074)	0.0324** (0.013)	-0.0482 (0.065)	-0.0680 (0.078)
Livelihood: self- employment	-0.0862 (0.063)	-0.0972 (0.060)	0.0008 (0.011)	-0.1443** (0.066)	-0.1550** (0.061)
Livelihood: casual labor	0.0864 (0.084)	0.0760 (0.088)	0.0067 (0.014)	0.0056 (0.085)	-0.0114 (0.101)
Ln distance to SM			-0.0250*** (0.002)		
=1 for >median KIOSK consumpt.				0.2941*** (0.082)	0.3317*** (0.100)
Interaction i.KIOSK*SMshare				-1.2260*** (0.387)	-1.5326** (0.684)
Constant	4.6185*** (0.493)	4.7705*** (0.579)	-0.1928** (0.096)	4.1970*** (0.535)	4.2512*** (0.588)
Observations	448	448	448	448	448
R ²	0.238	0.229	0.379	0.277	0.274

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with robust standard errors in parentheses.

The finding that supermarket purchases are associated with higher calorie availability is interesting in itself. However, it is worthwhile to investigate further demand effects: since calorie availability is significantly higher holding total expenditure fixed, we expect households either to

spend a higher proportion of their expenditure on food, or to source calories at lower prices. Note that this concerns prices per calories and not prices per physical unit (kg) as discussed in chapter 0. In fact, we cannot find significant effects of supermarket purchases on the food budget share (controlling for total expenditure, see Table A2.4 in Appendix A2). Prices per calories however, are indeed significantly negatively affected by supermarket purchases in the IV specifications, which are much more reliable in this case because of reversed causality between prices and expenditure shares by construction (Table A2.4 in Appendix A2). Thus an important reason for the higher calorie consumption resulting from supermarket purchases is their lower price.

It is not straightforward to assess implications of these findings on nutrient adequacy. One crude proxy of dietary quality is dietary diversity, usually measured by the number of distinct food products or major food categories (e.g. cereals, roots and tubers, dairy) consumed (Ruel, 2002). We do find supermarket purchases to increase the dietary diversity of households (see Table A2.5 in Appendix A2), which is notable since we established that supermarkets add very few products to what is available in other outlets. Yet, a 10 percentage point increase in supermarket purchases, adds 3.2 products to the diet. However, this measure has several weaknesses. First, measures of dietary diversity typically use shorter recall periods. Also, even if we took a positive relationship between dietary diversity and nutrient adequacy as a given, determining the threshold between a high and a low quality diet is a sensitive and context specific issue and requires further research (Ibid). This is especially true in a nutrition transition context where the nature of products are added to the diet consumed is crucial.

One weakness of our empirical setup regards the lack of town dummies in our main specifications. Inclusion would be appealing in order to capture systematic town differences, such as general price or consumption differences. However, including town dummies in the IV specification renders our instrument to work poorly: because we only sampled three towns, town dummies are highly correlated with distance to supermarkets and distance becomes insignificant in our first stage. However, once livelihood sources are controlled for, towns remain significant only in few cases and furthermore, the coefficients of supermarket purchases remain fairly robust. Furthermore, using expenditure shares rather than absolute expenditures as a measure of consumption should reduce the impact of general price differences across towns.

Note again that the food consumption we are analyzing here is limited to the food that is consumed or better available for consumption at home, which is most relevant for supermarkets

and competing outlets. Substitution effects with consumption outside home are possible but not explicitly addressed. For robustness checks, we control for food expenditure away from home, which does not alter our main results. The median expenditure shares on food away from home ranges from 5-9% per town (the mean budget share on food inside home is 46%).

2.6 Conclusion

This paper was motivated by the literature of the nutrition transition and negative health consequences in low income countries. Alongside other lifestyle changes, dietary changes have been linked in the literature to rising rates of nutrition-related non-communicable diseases and argued to be demand as well as supply side driven. The rapid spread of supermarkets in low income countries is suspected to advance the nutrition transition by increasing the availability, affordability and by purposeful marketing associated foods and beverages to consumers. We analyze the effect of supermarkets on consumption patterns using very detailed household survey data collected for this purpose in a quasi-experimental setting in Kenya in 2012.

With respect to the affordability of food products, we established that lower (perceived) prices are by far the most important reason for consumer to shop at supermarkets. The strongest incentive to shop at kiosks, the main traditional competitor to supermarkets, is physical access. In sum, drivers of retail outlet choices in small urban towns are similar to the ones that have been reported for large towns (Neven *et al.*, 2006), which suggests that our findings are relevant beyond the important group of small towns that we are looking at.

In terms of consumption patterns, we find that supermarket purchases increase the consumption of processed at the expense of unprocessed foods. This holds in terms of expenditure shares as well as calorie shares and is mainly driven by an increased consumption of primary processed goods. While we had expected a stronger effect on highly processed foods (hypothesis H1₁), this does nevertheless suggest that the nutrition transition is advancing with spreading supermarkets, which is further expected to accelerate as income levels are rising.

As consumption patterns change towards more processed food, we find a positive effect of supermarket purchases on p.c. calorie availability, which confirms our hypothesis that frequent supermarket consumers consume more (hypothesis H1₂). We do not find that households increase their food budget share but we confirm that the increase in total calories is

supported by a negative effect of supermarket purchases on prices paid per calorie. Particularly with primary processed foods, money can buy more calories.

Supermarket purchases also increase the dietary diversity of consumers, confirming our hypothesis (H1₃). However, it is out of the scope of this paper to investigate implications for nutrient adequacy that we are ultimately concerned with and which are not straightforward. For the reason that supermarket purchases are not found to significantly increase the consumption of highly processed foods, negative health effects might be less pronounced than initially expected. To the extent that supermarket purchases contribute to a well-balanced diet, beneficial effects might be detected for some parts of the population. It also remains unclear how rising income levels will change the picture since we found positive income effects for both, highly processed as well as unprocessed foods, i.e. fresh produce. More research is needed to assess nutritional outcomes and dynamics of the nutrition transition in the long run.

Methodologically, our results confirm the adequacy of addressing endogeneity in supermarket purchases, which former studies have often neglected.

While our results contribute to causally linking the retail revolution with the nutrition transition in developing countries, they lead to further research questions. In particular, future research should investigate what type of supermarket and associated food environment leads to stronger or weaker effects; also, the net effect of lower prices per calorie, more diversity, and a higher share of processed foods might have different nutritional implications in different contexts. Lastly, considering the impact of very large supermarkets with a drastically expanded offering (including fresh fruit and vegetables as well as meat) on consumption pattern would be an important question for future research.

Appendix A2

Table A2.1. Summary statistics of main dependent and explanatory variables

Explanatory variables	All	Njabini (no SM)		Mwea (SM since 2011)		OI Kalou (SM since 2002)	
	Mean	Mean	Diff to others	Mean	Diff to others	Mean	Diff to others
Food expenditure shares:							
Unprocessed	0.63 (0.11)	0.65 (0.12)	0.03*** (0.01)	0.62 (0.12)	-0.02 (0.01)	0.62 (0.10)	-0.02 (0.01)
Primary processed	0.25 (0.11)	0.24 (0.12)	-0.00 (0.01)	0.25 (0.10)	0.01 (0.01)	0.24 (0.09)	-0.00 (0.01)
Highly processed	0.12 (0.10)	0.10 (0.10)	-0.03*** (0.01)	0.13 (0.11)	0.01 (0.01)	0.13 (0.08)	0.02** (0.01)
All processed	0.36 (0.11)	0.34 (0.12)	-0.04*** (0.01)	0.38 (0.12)	0.02* (0.01)	0.38 (0.10)	0.02* (0.01)
Calorie shares:							
Unprocessed	0.48 (0.12)	0.50 (0.13)	0.03** (0.01)	0.47 (0.12)	-0.02 (0.01)	0.47 (0.11)	-0.01 (0.01)
Primary processed	0.42 (0.13)	0.42 (0.14)	0.00 (0.01)	0.43 (0.12)	0.01 (0.01)	0.42 (0.12)	-0.01 (0.01)
Highly processed	0.10 (0.09)	0.08 (0.09)	-0.03*** (0.01)	0.11 (0.10)	0.01 (0.01)	0.11 (0.08)	0.02* (0.01)
All processed	0.52 (0.12)	0.50 (0.13)	-0.03** (0.01)	0.53 (0.12)	0.02 (0.01)	0.52 (0.11)	0.01 (0.01)
Calories p.c. per day (adult equivalent)	2561.01 (1049.87)	2311.84 (958.24)	-388.94*** (101.84)	2608.23 (1095.87)	67.38 (108.41)	2781.84 (1052.26)	335.36*** (103.50)
Price per calorie	0.04 (0.02)	0.04 (0.02)	-0.00 (0.00)	0.05 (0.01)	0.00 (0.00)	0.04 (0.01)	-0.00 (0.00)
Food budget share (inside home)	0.46 (0.15)	0.49 (0.15)	0.06*** (0.01)	0.42 (0.15)	-0.05*** (0.02)	0.45 (0.13)	-0.01 (0.01)
Food diversity:							
# products con-sumed (less alcohol)	39.72 (12.69)	35.29 (12.55)	-6.92*** (1.21)	44.12 (12.53)	6.28*** (1.28)	40.53 (11.48)	1.23 (1.26)
# food groups consumed	10.86 (1.35)	10.53 (1.36)	-0.52*** (0.13)	11.04 (1.61)	0.25* (0.14)	11.05 (0.97)	0.29** (0.13)
Observations	448	161	161	134	134	153	153

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses.

Table A2.2. Expenditure shares 1st stage results of main models

	(1) 1st stage <i>Highly processed/ all processed food</i>	(2) 1st stage <i>Primary processed food</i>	(3) 1st stage <i>Unprocessed food</i>
	SM expenditure share	SM expenditure share	SM expenditure share
Ln p.c. expenditure	0.0353*** (0.009)	0.0358*** (0.010)	0.0354*** (0.012)
HH size	0.0043 (0.003)	0.0034 (0.003)	0.0046 (0.003)
=1 if head is married	0.0010 (0.011)	0.0019 (0.009)	0.0010 (0.008)
Education of head in years	0.0051*** (0.001)	0.0050*** (0.002)	0.0051*** (0.001)
Age of cook	-0.0025 (0.002)	-0.0018 (0.002)	-0.0025 (0.002)
Age of cook squared	0.0000 (0.000)	0.0000 (0.000)	0.0000 (0.000)
Mwea (SM 2011)		-0.0157* (0.008)	
# female adults			-0.0011 (0.005)
=1 if HH does farming	-0.0135 (0.010)	-0.0532*** (0.018)	-0.0135 (0.009)
Ln distance to SM	-0.0252*** (0.002)	-0.0305*** (0.003)	-0.0252*** (0.002)
Constant	-0.2056** (0.093)	-0.1976* (0.100)	-0.2058* (0.116)
Observations	448	448	448
R ²	0.351	0.384	0.351

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with robust (2) and cluster (3) standard errors in parentheses.

Table A2.3. Share of calories from different food categories – OLS and IV estimates

	(1) OLS Calorie share <i>highly processed foods</i>	(2) IV Calorie share <i>highly processed foods</i>	(3) OLS Calorie share <i>primary processed foods</i>	(4) IV Calorie share <i>primary processed foods</i>	(5) OLS Calorie share <i>all processed food</i>	(6) IV Calorie share <i>all processed food</i>	(7) OLS Calorie share <i>unprocessed foods</i>	(8) IV Calorie share <i>unprocessed foods</i>
SM expenditure share	0.0261 (0.035)	0.0381 (0.079)	0.0949* (0.048)	0.1475 (0.116)	0.1209*** (0.042)	0.1857* (0.111)	-0.1167*** (0.042)	-0.1787* (0.108)
Ln p.c. expenditure	0.0286*** (0.007)	0.0281*** (0.008)	-0.0712*** (0.012)	-0.0735*** (0.012)	-0.0426*** (0.012)	-0.0454*** (0.013)	0.0387*** (0.012)	0.0414*** (0.013)
HHsize (ad. equiv.)	-0.0018 (0.003)	-0.0018 (0.003)	0.0016 (0.005)	0.0016 (0.005)	-0.0002 (0.006)	-0.0002 (0.006)	-0.0002 (0.006)	-0.0002 (0.006)
Other controls	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-0.0405 (0.067)	-0.0366 (0.078)	1.0224*** (0.110)	1.0393*** (0.110)	0.9819*** (0.111)	1.0027*** (0.117)	0.0495 (0.107)	0.0296 (0.113)
Observations	448	448	448	448	448	448	448	448
R^2	0.264	0.264	0.141	0.139	0.148	0.145	0.147	0.144

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with robust (1)-(4) and cluster robust (5)-(8) standard errors in parentheses.

Table A2.4. Food budget shares and prices per calories, OLS and IV estimation

	(1) OLS Food budget share	(2) IV Food budget share	(3) OLS Price per calorie	(4) IV Price per calorie	(5) OLS Price per calorie	(6) IV Price per calorie
SM expenditure share	-0.0244 (0.046)	-0.1494 (0.106)	-0.0109* (0.006)	-0.0534*** (0.012)	-0.0167*** (0.006)	-0.0472*** (0.011)
Ln p.c. expenditure	-0.1280*** (0.012)	-0.1220*** (0.014)	0.0138*** (0.002)	0.0157*** (0.002)	0.0123*** (0.002)	0.0133*** (0.002)
=1 if HH does farming	0.0150 (0.011)	0.0118 (0.011)	-0.0045*** (0.001)	-0.0054*** (0.001)	-0.0053*** (0.001)	-0.0062*** (0.001)
Exp share on food away from home	-0.3593*** (0.061)	-0.3680*** (0.065)				
=1 for >median KIOSK consumpt.					-0.0063*** (0.001)	-0.0078*** (0.001)
Other controls	yes	yes	yes	yes	Yes	Yes
Constant	1.8027*** (0.117)	1.7598*** (0.132)	-0.0722*** (0.016)	-0.0859*** (0.017)	-0.0549*** (0.015)	-0.0601*** (0.017)
Observations	448	448	448	448	448	448
R^2	0.492	0.484	0.437	0.348	0.472	0.428

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with cluster robust standard errors in parentheses.

Table A2.5. Food diversity indicators, OLS and IV estimation

	(1) OLS # food groups consumed by HH (excl. alcohol)	(2) IV # food groups consumed by HH (excl. alcohol)	(3) OLS # products consumed by HH (excl. alcohol)	(4) IV # products consumed by HH (excl. alcohol)
SM expenditure share	1.6550 ^{***} (0.534)	2.8555 ^{***} (1.076)	11.1922 ^{***} (3.866)	31.7750 ^{***} (6.308)
Ln p.c. expenditure	0.2472 [*] (0.125)	0.1940 (0.146)	8.0892 ^{***} (1.277)	7.1769 ^{***} (1.148)
=1 if HH does farming	0.3997 ^{***} (0.136)	0.4264 ^{***} (0.136)	4.5453 ^{***} (1.244)	5.0019 ^{***} (1.142)
Other controls yes		yes	yes	Yes
Constant	8.8784 ^{***} (1.088)	9.2635 ^{***} (1.179)	-38.5969 ^{***} (10.774)	-31.9951 ^{***} (9.666)
Observations	448	448	448	448
R^2	0.172	0.163	0.327	0.297

^{*}, ^{**}, ^{***}, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses.

3 Do Supermarkets Contribute to the Obesity Pandemic in Developing Countries?²

Abstract. Many developing countries are currently undergoing a nutrition transition with rising rates of obesity, and a resulting surge in chronic diseases. This nutrition transition coincides with a rapid expansion of supermarkets, partly replacing more traditional food retail outlets. One important question is whether this expansion of supermarkets in developing countries is just a business response to changing consumer demands and lifestyles, or whether supermarkets are a causal factor of overweight and obesity. We address this question, building on cross-section observational data collected in Kenya using a quasi-experimental survey design. We employ instrumental variable regressions to analyze the impact of supermarket purchase on nutritional status of adults and of children and adolescents. We also estimate causal chain models to examine the pathways through which supermarkets affect nutritional status. Controlling for other factors, buying in a supermarket increases the body mass index of adults and raises the probability of adult overweight or obesity by 13 percentage points. For children and adolescents we do not find a significant impact on overweight. Instead, buying in a supermarket tends to decrease child undernutrition measured by height-for-age z-scores. Impacts of supermarkets depend on many factors, including people's initial nutritional status. Kenya and many other developing countries face a dual burden of malnutrition, where adult overweight coexists with childhood stunting. For both, adults and children, the nutrition impacts of supermarkets occur through higher calorie consumption and changes in dietary composition.

3.1 Introduction

Many developing countries are currently undergoing a rapid nutrition transition characterized by changes in dietary habits towards more energy-dense, processed foods and more sedentary lifestyles (Pingali, 2007). A conspicuous result are rising rates of overweight and obesity with serious negative implications for people's health (Hawkes *et al.*, 2009; Popkin *et al.*, 2012; Wang

² This chapter is co-authored by Ramona Rischke, Stephan Klasen, and Matin Qaim. The following roles were performed by me: conceptualization and designing of the study in cooperation with all co-authors; implementation of the survey in cooperation with Ramona Rischke; data analysis; interpretation of the research results in cooperation all co-authors; writing of the paper in cooperation with Matin Qaim; and revision of the paper with all co-authors.

et al., 2011). In 2008, 34% of all adults in the world were overweight or obese (Finucane *et al.*, 2011). While average overweight rates are still higher in most industrialized countries, many developing countries are rapidly catching up. The nutrition transition is driven by rising incomes, urbanization, and globalizing food systems (Hawkes *et al.*, 2009; Mergenthaler *et al.*, 2009; Popkin *et al.*, 2012). It is associated with a modernization of the food retail sector, including a growing role of supermarkets (Timmer, 2009). In some developing countries, supermarkets have spread so rapidly that the term ‘supermarket revolution’ has been coined (Reardon *et al.*, 2003). The retail format has an influence on the types of products offered, as well as on sales prices and shopping atmosphere, which may affect consumer food choices (Hawkes, 2008; Swinburn *et al.*, 2011; Timmer, 2009). Hence, one important question is whether the expansion of supermarkets contributes directly to rising overweight and obesity in developing countries. Here, we address this question using observational data collected in Kenya.

Recent research has analyzed effects of supermarkets in developing countries. Several studies suggest that the spread of supermarkets leads to dietary changes for urban consumers in developing countries (Asfaw, 2008; Asfaw, 2011; Hawkes, 2008; Tessier *et al.*, 2008). Most of this work shows that supermarket purchase is associated with increased consumption of energy-dense, processed foods (Asfaw, 2008; Asfaw, 2011; Hawkes, 2008), although in one case supermarkets were found to increase dietary quality (Tessier *et al.*, 2008). Research on the impact of supermarkets on consumer nutritional status in developing countries is rare. Studies in the USA show that access to supermarkets is nowadays often associated with lower obesity rates (Drewnowski *et al.*, 2012; Lear *et al.*, 2013; Michimi & Wimberly, 2010 ; Morland *et al.*, 2006), but the situation in developing countries is different. We are aware of only one study that has looked at impacts of supermarkets on nutritional status in a developing country, namely Guatemala (Asfaw, 2008). In that study it was found that food purchase in supermarkets increases the BMI of consumers. However, the research for Guatemala builds on a household living standard survey that was not specifically designed for analyzing the nutritional impact of supermarkets. Hence, a few variables of interest, such as food quantities purchased in different retail outlets, were not properly captured. Moreover, the impact on BMI was analyzed for all individuals in the sample above 10 years of age, an approach that masks possible differences between adults and children. BMI is a suitable indicator of nutritional status only for people who have reached their final body height. For children and adolescents, it is recommended to use

indicators such as BMI-for-age or height-for-age Z-scores, which set individual measures in relation to a reference population of the same age (de Onis *et al.*, 2007).

We address these shortcomings in the previous literature by using data from a survey of Kenyan consumers that was specifically designed for this purpose. Kenya has recently witnessed a rapid spread of supermarkets that now account for about 10% of national grocery sales (PlanetRetail, 2013a). This retail share of supermarkets in Kenya is lower than in many middle-income countries, but it is already higher than in most other low-income countries in Sub-Saharan Africa and Asia. Hence, trends observed in Kenya may be helpful to predict future developments in other poor regions. We use data from a survey of households and individuals to analyze the impact of supermarket purchase on nutritional status. We also examine impact pathways. The analysis is carried out separately for adults and for children and adolescents, because impacts may differ by age cohort.

3.2 Methods

3.2.1 Study Design

We conducted a cross-section survey of 453 households to collect observational data at household and individual levels. The survey was carried out in July and August 2012 in Central Province of Kenya. Central Province has the second highest prevalence of overweight and obesity in Kenya after Nairobi. About 35% of the women aged 15-49 years are overweight or obese in Central Province (KNBS & ICFMacro, 2010). We decided to sample households from small towns, some of which already have a supermarket, while others do not. This provided a quasi-experimental setting, which we exploit for our analysis. Three towns were purposively selected: Ol Kalou, where a supermarket has been operating since 2002, Mwea, where a supermarket was opened in 2011, and Njabini, where no supermarket had yet been established at the time of the survey. The three towns are similar in general characteristics, such as size of the urban catchment area, infrastructure, as well as financial and social institutions. We deliberately did not choose bigger towns and cities for the survey, because all of them already have one or more supermarkets. Hence, it would have been impossible to identify control locations without a supermarket.

Systematic random sampling was used to select households for interview within the urban and peri-urban areas of the three towns. A group of eight local enumerators was involved in the survey; we used the same enumerators in all locations. Prior to data collection, the enumerators were trained thoroughly in all aspects of administering the questionnaire, including anthropometric measurements. Data on socioeconomic characteristics, including food consumption and expenditure, were collected at the household level. Details on food consumption at home were collected using a 30-day recall period (de Haen *et al.*, 2011), which allowed us to also capture purchases that are undertaken by households only once per month. During a questionnaire pre-test we learned that shopping behavior and places of purchase may differ according to the wage cycle. Data on food consumption quantities, expenditures, and place of purchase were collected in disaggregated form for 170 food items.

In addition to the household-level data, we collected individual-level data such as food eaten away from home as well as work and leisure related physical activity from household members. In each household, up to three household members were randomly selected for anthropometric measurement: one male adult, one female adult, and one child or adolescent in the 5-19 years age range. Children below 5 years of age were not chosen for measurement. Participation was voluntary. Prior to taking anthropometric measures we obtained written consent from all adults through signatures for themselves and their children. In total, we took individual data from 615 adults and 216 children and adolescents.

3.2.2 Procedures

The main nutritional outcome variable for adults is body mass index (BMI), defined as weight in kilograms divided by squared height in meters. Adults with a BMI ≥ 25 kg/m² are classified as overweight or obese (WHO, 2000). For children, we use two nutritional outcome variables, namely BMI-for-age Z-scores (BAZ) and height-for age Z-scores (HAZ), which are calculated based on the World Health Organization (WHO) growth reference for school-aged children and adolescents (de Onis *et al.*, 2007). Childhood overweight/obesity is defined as a BAZ > 1 standard deviation (SD) from the median of the reference population (WHO, 2006). Stunting is defined as HAZ < -2 SD, mild stunting as HAZ < -1 , and severe stunting as HAZ < -3 .

The exposure variable for the impact assessment is food purchase in supermarkets. Supermarkets in this context are defined as large modern retail formats with at least two cash

counters and offering a relatively large variety of food items, including cooled and frozen foods. Supermarkets also have a variety of non-food items, such as clothing, electronic devices, and furniture. Supermarkets are distinguished from more traditional retail outlets, including wet markets, kiosks, and small corner stores. Supermarket purchase is measured in two different ways, first as a dummy variable that takes a value of one for households that purchased at least some of their food in supermarkets, and second as a continuous variable measuring the share of supermarket purchases in total household food expenditure. Households that do not buy in supermarkets (i.e., the dummy and the supermarket share are equal to zero) obtained all of their food from traditional sources.

Other factors that may influence nutritional status and for which we collected data include age, gender, education, physical activity during work and leisure, and household living standard. We measure living standard in terms of consumption expenditure. Furthermore, nutritional knowledge and awareness may play a role. In Kenya, district hospitals are responsible for coordinating nutrition awareness programs. We used household distance to the nearest district hospital as a proxy for nutritional awareness.

We also analyze the impact of supermarkets on calorie consumption and on calories from processed foods. Quantities of food consumed in the household were converted into calories using food composition tables developed for Kenyan foods (FAO, 2010; Sehmi, 1993). A few foods that could not be found in these local food composition tables were converted into calories using international values (FAO, 2012). For food away from home, survey respondents reported dishes consumed, not ingredients. To determine calories from these dishes, actual cooking was done with the help of restaurant operators who advised on types and quantities of ingredients that went into a particular dish, and serving portions. The dishes were then converted into calories after adjusting for edible portions and weight changes due to cooking (EuroFIR, 2008). Calories consumed at home at the household level were allocated to individuals based on adult equivalence scales for energy requirements, assuming light physical activity (FAO *et al.*, 2004). We also took into account the number of meals consumed away from home by individual household members. For adults, individual calories consumed away from home were added. For children and adolescents, the data on food away from home are less accurate and contain several missing values, so that only calories from foods consumed at home were considered. Since all supermarket purchases fall into this “consumed at home” category, this limitation should not

affect our analysis much. To differentiate between calories from processed and unprocessed foods, we follow common classifications in the literature (Asfaw, 2011; Monteiro *et al.*, 2011). Foods are considered processed if any industrial method was used to develop food products from fresh whole foods.

3.2.3 Statistical Analysis

Our main objective is to analyze the impact of supermarket purchase on nutritional status of adults and of children and adolescents. For this purpose, we estimate models of the following type:

$$N_i = \beta_0 + \beta_1 S_i + \beta_2 \mathbf{Z}_i + \varepsilon_i \quad [3.1]$$

where N_i is the outcome variable characterizing nutritional status of individual i , S_i is supermarket purchase, \mathbf{Z}_i is a vector of control variables, including individual and household characteristics, and ε_i is a random error term.

In this model, the supermarket purchase variable may potentially be endogenous, since there could be unobserved factors that determine supermarket purchase and nutritional status simultaneously. This could lead to biased impact estimates. To avoid this problem, we use an instrumental variable (IV) approach. Supermarket purchase is instrumented with the household distance to the nearest supermarket (measured through GPS coordinates), which can be located in the same town or, in the case of Njabini, also in a different town. Distance to supermarket is a valid instrument, since it is exogenous, significantly correlated with supermarket purchase, and not directly correlated with nutritional status. For continuous outcome variables (such as BMI or HAZ), we use an IV two-stage least squares estimator. For binary outcome variables (such as overweight/obese or stunted) we use an IV probit estimator. Marginal effects from the IV probit are evaluated at sample mean values.

In addition to the reduced-form models in equation (3.1), we also analyze possible pathways through which supermarkets affect nutritional outcomes of adults and children/adolescents by estimating structural equation models. On the one hand, supermarket purchase may influence the amount of calories consumed. On the other hand, dietary composition and the types of calories consumed may also be affected. The available literature suggests that the share of calories from processed foods may increase BMI even after controlling for the total amount of calories consumed.¹¹ We model a causal chain, hypothesizing that supermarket purchase affects total calorie consumption and the share of calories from processed

foods, and that these two variables both affect nutritional status. The causal chain is modeled as follows:

$$N_i = \beta_0 + \beta_1 C_i + \beta_2 P_i + \beta_3 \mathbf{T}_i + \varepsilon_{i1} \quad [3.2]$$

$$C_i = \alpha_0 + \alpha_1 S_i + \alpha_2 \mathbf{U}_i + \varepsilon_{i2} \quad [3.3]$$

$$P_i = \delta_0 + \delta_1 S_i + \delta_2 \mathbf{V}_i + \varepsilon_{i3} \quad [3.4]$$

$$S_i = \gamma_0 + \gamma_1 D_i + \gamma_2 \mathbf{W}_i + \varepsilon_{i4} \quad [3.5]$$

where N_i is the nutritional status of individual i , C_i is calorie consumption of the same individual, P_i is the share of calories from processed foods, S_i is supermarket purchase, and D_i is distance to the nearest supermarket. \mathbf{T}_i , \mathbf{U}_i , \mathbf{V}_i , and \mathbf{W}_i are vectors of individual and household characteristics, while ε_{i1} to ε_{i4} are random error terms. This system of simultaneous equations is estimated using a three-stage least squares estimator. We estimate separate models for adults and for children and adolescents.

3.3 Results

While 41% of the adults in our sample are classified as either overweight or obese, only 10% of the children and adolescents fall into this category. On the other hand, 21% of the children in our sample are affected by stunting, a common indicator of child undernutrition (see Tables A3.1 and A3.2 in Appendix A3). Table 3.1 compares nutrition related variables between individuals from households that buy and do not buy in supermarkets. Adults in supermarket-buying households have a significantly higher BMI and are more likely to be overweight or obese. They also consume significantly more calories, and a greater share of their calories comes from processed foods. For children and adolescents, the patterns are different. While there is a slight difference in mean BAZ between supermarket buyers and non-buyers, this difference is not statistically significant. Yet we observe significantly higher HAZ among children from households that buy in a supermarket, and a lower prevalence of stunting. This points at possible differences between adults and children.

Table 3.1. Comparison of nutrition variables by supermarket purchase

Category	Variable	Household buys in supermarket	Household does not buy in supermarket
Adults	BMI	25.22* (4.73)	24.43 (4.98)
	Overweight or obese (dummy)	0.45* (0.50)	0.36 (0.48)
	Underweight (dummy)	0.04 (0.19)	0.04 (0.20)
	Calorie consumption per day (kcal)	3500.70** (1230.79)	3143.32 (1426.80)
	Share of calories from processed foods (%)	51.52*** (11.25)	44.36 (20.55)
	Food expenditure (Ksh per AE and month)	6954.96*** (5351.4)	4916.79 (3016.0)
	Number of observations	357	258
Children/ adolescents	BMI-for-age Z-score	-0.26 (1.09)	-0.36 (0.90)
	Overweight or obese (dummy)	0.10 (0.30)	0.09 (0.30)
	Height-for-age Z-score	-0.76*** (1.09)	-1.35 (1.43)
	Stunted (dummy)	0.14 (0.34)	0.28** (0.45)
	Calorie consumption per day (kcal)	2531.67 (959.88)	2310.54 (1428.13)
	Share of calories from processed foods (%)	52.15*** (10.27)	44.14 (21.66)
	Number of observations	110	106

*, **, ***, mean value is significantly higher than that of the other group at the 10%, 5%, and 1% level, respectively. Mean values are shown with standard deviations in parentheses. BMI, body mass index; Ksh, Kenyan shillings; AE, adult equivalent.

3.3.1 Impact of Supermarket Purchase on Nutritional Status

The mean differences in Table 3.1 are a first indication that buying food in a supermarket may contribute to increasing BMI and a higher prevalence of overnutrition among adults. To test this hypothesis, we regress BMI and the probability of being overweight or obese on supermarket purchase. Estimation results are shown in Table 3.2. Independent of the exact specification, supermarket purchase has significant effects on nutritional outcomes. Buying in a supermarket increases BMI by 1.7 kg/m² and the probability of being overweight or obese by 13 percentage points. Similarly, an increase in the share of supermarket purchases by one percentage point increases BMI by 0.08 kg/m² and the probability of being overweight or obese by one percentage point. Most of the control variables have the expected signs, with age and living standard contributing to higher BMI, and physical activity to lower BMI.

Table 3.2. Impact of supermarket purchase on adult nutrition

Explanatory variables	BMI	BMI	Overweight/ obese (dummy)	Overweight/ obese (dummy)
Buys in supermarket (dummy)	1.688 [*] (0.72)	--	0.132 [*] (0.07)	--
Supermarket purchase share (%)	--	0.080 [*] (0.04)		0.008 ^{**} (0.00)
Age (years)	0.110 ^{***} (0.02)	0.112 ^{***} (0.02)	0.011 ^{***} (0.00)	0.011 ^{***} (0.00)
Female (dummy)	0.501 (1.08)	0.590 (1.09)	0.150 (0.12)	0.151 (0.12)
Female-age interaction	0.066 ^{**} (0.03)	0.066 ^{**} (0.03)	0.003 (0.00)	0.002 (0.00)
Heavy work (dummy)	-0.892 ^{**} (0.35)	-0.946 ^{***} (0.36)	-0.093 ^{**} (0.04)	-0.097 ^{***} (0.04)
Leisure-time physical activity (hours per week)	-0.047 ^{**} (0.02)	-0.040 [*] (0.02)	-0.003 (0.00)	-0.002 (0.00)
Household expenditure (1000 Ksh per AE and month)	0.077 ^{***} (0.03)	0.077 ^{**} (0.03)	0.005 (0.00)	0.005 (0.00)
Education of person responsible for food (years)	0.168 ^{***} (0.05)	0.166 ^{***} (0.06)	0.020 ^{***} (0.01)	0.018 ^{***} (0.01)
Married household head (dummy)	0.915 ^{**} (0.39)	1.066 ^{***} (0.40)	0.100 ^{**} (0.04)	0.111 ^{***} (0.04)
Distance to nearest district hospital (log of km)	0.316 ^{**} (0.13)	0.386 ^{**} (0.17)	0.017 (0.01)	0.028 [*] (0.02)
Constant	15.401 ^{***} (0.98)	15.280 ^{***} (1.01)	--	--
Number of observations	615	615	615	615
Chi-squared test statistic	504.98 ^{***}	--	560.46 ^{***}	339.24 ^{***}

*, **, ***, statistically significant at the 10%, 5%, and 1% level, respectively. Marginal effects are shown with robust standard errors in parentheses. Estimates are based on instrumental variable models with the supermarket purchase variables instrumented. For the last two table columns (overweight/obese), instrumental variable probit models were used. First-stage regression results are shown in Appendix A3 (Table A3.3). BMI, body mass index; Ksh, Kenyan shillings; AE, adult equivalent.

Table 3.1 did not reveal significant differences in overweight and obesity between children/adolescents from households that buy and do not buy in supermarkets. The regression results in Table 3.3 confirm that supermarket purchase does not affect BAZ in a significant way. However, supermarket purchase has a positive and significant effect on HAZ. Buying in a supermarket increases HAZ by 0.63. Similarly, an increase in the share of supermarket purchases by one percentage point increases HAZ by 0.03. This is evidence that supermarkets contribute to reducing problems of undernutrition among children and adolescents. The supermarket coefficients in the stunting models are negative, but not statistically significant. This may be related to the relatively small sample size. Moreover, how many individuals can be lifted above a threshold depends on the variable distribution and the magnitude of the threshold. The standard threshold for stunting is $HAZ < -2$, which is what we used for the estimates in Table 3.2. Using common thresholds for mild stunting ($HAZ < -1$) and severe stunting ($HAZ < -3$), we do find significant effects (Table A3.5 in Appendix A3). Buying in a supermarket decreases the probability of severe stunting by 23 percentage points.

Table 3.3. Impact of supermarket purchase on child/adolescent nutrition

Explanatory variables	BAZ	HAZ	HAZ	Stunted (dummy)	Stunted (dummy)
Buys in supermarket (dummy)	0.183 (0.34)	0.634** (0.27)	--	-0.056 (0.10)	--
Supermarket purchase share (%)	--	--	0.033*** (0.01)	--	-0.004 (0.00)
Age (months)	-0.004** (0.00)	-0.007*** (0.00)	-0.008*** (0.00)	0.002*** (0.00)	0.002*** (0.00)
Female (dummy)	0.107 (0.13)	0.082 (0.15)	0.130 (0.15)	-0.022 (0.05)	-0.028 (0.05)
Household expenditure (1000 Ksh per AE and month)	0.001 (0.01)	0.029* (0.02)	0.024 (0.02)	-0.013** (0.01)	-0.013** (0.01)
Education of person responsible for food (years)	0.027 (0.02)	0.002 (0.03)	0.003 (0.03)	-0.000 (0.01)	0.000 (0.01)
Married household head (dummy)	-0.115 (0.16)	0.138 (0.20)	0.181 (0.20)	-0.073 (0.05)	-0.081 (0.05)
Malaria or respiratory infection (dummy)	--	-0.440* (0.26)	-0.430* (0.24)	0.038 (0.09)	0.038 (0.08)
Height of female adult (cm)	--	0.057*** (0.02)	0.057*** (0.02)	-0.014** (0.00)	-0.014*** (0.00)
Age of female adult when the child was born (years)	--	0.025** (0.01)	0.025** (0.01)	-0.000 (0.00)	-0.000 (0.00)
Household treats drinking water (dummy)	--	0.357** (0.15)	0.345** (0.15)	-0.066 (0.05)	-0.063 (0.05)
Distance to nearest health care center (log of km)	--	-0.040 (0.07)	0.025 (0.07)	0.047* (0.03)	0.042 (0.03)
Age of female adult (years)	0.014* (0.01)	--	--	--	--
Physical education at school (hours per week)	-0.024 (0.03)	--	--	--	--
Leisure-time physical activity (hours per week)	-0.004 (0.01)	--	--	--	--
Distance to nearest district hospital (log of km)	0.011 (0.06)	--	--	--	--
Constant	-0.607 (0.45)	-10.760*** (2.57)	-10.715*** (2.54)	--	--
Number of observations	216	216	216	216	216
Chi-squared test statistic	169.347***	211.088***	--	156.787***	336.572***

*, **, ***, statistically significant at the 10%, 5%, and 1% level, respectively. Marginal effects are shown with robust standard errors in parentheses. Estimates are based on instrumental variable models with the supermarket purchase variables instrumented. For the last two table columns (stunted), instrumental variable probit models were used. First-stage regression results are shown in Appendix A3 (Table A3.4). BAZ, BMI-for-age Z-score; HAZ, height-for-age Z-score; Ksh, Kenyan shillings; AE, adult equivalent.

Control variables for these child/adolescent models were chosen based on the broad nutrition and health literature (Asfaw, 2011; Black *et al.*, 2013; Jones-Smith *et al.*, 2012; Kanter & Caballero, 2012; Lear *et al.*, 2013; Roemling & Qaim, 2013; Simon *et al.*, 2014). Factors that contribute to overnutrition may be somewhat different from factors that contribute to undernutrition, which is why model specifications in Table 3.3 are not uniform. Most of the

control variables show the expected signs. Household living standard, height and age of the mother, and treated drinking water increase HAZ and thus reduce child undernutrition, while recent episodes of infectious diseases have a significantly negative effect on HAZ.

3.3.2 Impact Pathways

We have shown that buying in supermarkets increases BMI and the probability of overweight and obesity among adults. Now we explore possible impact pathways. Estimation results from the causal chain model for adults are summarized in Table 3.4. The results confirm the hypothesis that total calorie consumption and the share of calories from processed foods both play a significant role. An increase in the supermarket purchase share by one percentage point entails a calorie consumption increase of 15 kcal per day, and an increase in the processed calorie share of 0.33 percentage points. Furthermore, both variables significantly increase adult BMI.

Table 3.4. Impact pathways of supermarket purchase on adult BMI

Pathway	Marginal effect (standard error)
Effect on BMI from	
Calorie consumption per day (kcal)	0.002 ^{***} (0.00)
Share of calories from processed foods (%)	0.118 ^{***} (0.04)
Effect of supermarket purchase share (%) on calorie consumption per day (kcal)	15.443 [*] (8.53)
Effect of supermarket purchase share (%) on share of calorie from processed food (%)	0.330 ^{***} (0.11)
Number of observations	615
Chi-squared test statistic	130.044 ^{***}

*, ***, statistically significant at the 10% and 1% level, respectively. Estimates are based on causal chain model, full results of which are shown in Appendix A3 (Table A3.6). BMI, body mass index.

For children and adolescents, supermarkets do not seem to increase overweight and obesity, but we found that supermarket purchase contributes to reduced undernutrition in terms of higher HAZ. Like overnutrition, undernutrition is determined by the quantity and types of foods consumed, among other factors. Hence, we estimated a causal chain model similar to the one used for adults, but with child/adolescent HAZ as nutritional outcome variable. The main results are shown in Table 3.5. While the effect of supermarket purchase on calorie consumption is positive, it is not statistically significant. Yet, supermarket purchase has a significantly positive

effect on calories from processed foods, indicating changes in dietary composition. An increase in the supermarket purchase share by one percentage point increases the share of calories from processed foods by 0.45 percentage points. The amount of calories and the share of calories from processed foods both have positive and significant effects on individual HAZ.

Table 3.5. Impact pathways of supermarket purchase on child/adolescent HAZ

Pathway	Marginal effect (standard error)
Effect on HAZ from	
Calorie consumption per day (kcal)	0.001* (0.00)
Share of calories from processed foods (%)	0.025* (0.01)
Effect of supermarket purchase share (%) on calorie consumption per day (kcal)	17.240 (13.25)
Effect of supermarket purchase share (%) on share of calorie from processed food (%)	0.447** (0.18)
Number of observations	216
Chi-squared test statistic	65.561***

*, **, statistically significant at the 10%, 5%, and 1% level, respectively. Estimates are based on causal chain model, full results of which are shown in Appendix A3 (Table A3.7). HAZ, height-for-age Z-score.

3.4 Discussion

The results show that buying in supermarkets increases BMI and the probability of being overweight or obese among adults in Kenya. These effects even hold when we control for other factors that influence BMI and that may be correlated with supermarket purchases, such as household living standard and physical activity. This finding is consistent with the scant literature on the relationship between supermarkets and consumer nutritional outcomes for adults in developing countries (Asfaw, 2008). For children, this relationship has not been analyzed previously. Our data suggest that buying in supermarkets does not contribute to higher overweight and obesity in children and adolescents. Rather, supermarket purchase reduces child undernutrition through a positive impact on HAZ. Supermarkets also reduce the probability of severe stunting.

Supermarket purchase increases adult BMI through two pathways, namely through more calories consumed and through a higher share of calories from processed foods. The impact pathways for child HAZ seem to be similar, although the effect of supermarkets on total calorie consumption is not statistically significant, possibly due to the smaller sample size. Why do supermarkets cause consumers to eat more and change their dietary composition? A

comprehensive analysis of this question is beyond the scope of this article, but a brief discussion may be useful. While some of the supermarkets in larger Kenyan cities offer fresh products, such as fruits and vegetables or whole grains, this is not yet the case for supermarkets in smaller towns, as analyzed here. Hence, small town consumers who buy a lot in supermarkets will automatically increase the share of processed food in their diet. Also in other developing countries it was shown that supermarkets start to sell processed products first, dealing with fresh foods only at a later stage (Mergenthaler *et al.*, 2009; Reardon *et al.*, 2003; Timmer, 2009). Packaging sizes, prices, and shopping atmosphere may play an important role for consumer food choices, too (Chandon & Wansink, 2012; Hawkes, 2008; Schipmann & Qaim, 2011). When asked why they buy in supermarkets, 65% of the respondents in our sample reported lower food prices as the most important reason (Figure A3.1 in Appendix A3). Whether prices in supermarkets are really lower may be difficult to judge for consumers, due to differences in product choices and packaging sizes. But the perception of lower prices may suffice to increase consumption.

The fact that the same mechanisms lead to nutritional outcomes that differ by age cohort is interesting and underlines the need for disaggregated analysis. For adults who have already reached their final body height, increasing calorie consumption can only lead to higher BMI when other factors are held constant. Waistlines will increase especially when levels of physical activity are low, as is the case with more sedentary lifestyles. For children and adolescents, the situation is different, because higher calorie consumption can also lead to gains in body height, as observed in our study. Moreover, children and adolescents in our sample are more physically active than adults (Tables A3.1 and A3.2 in Appendix A3). Concerning effects on body height, it should be mentioned that – beyond calories – certain micronutrients also play an important role for child growth (Martorell *et al.*, 1994). While not analyzed here, dietary changes through buying in supermarkets may potentially be associated with higher micronutrient consumption. This could be true especially for children from poor households who otherwise have relatively low dietary diversity.

Clearly, the impact of expanding supermarkets in developing countries will much depend on people's initial nutritional status. In Kenya, we observe relatively high overweight rates among adults, while stunting is a more widespread problem among children and adolescents. This so-called dual burden of malnutrition is common in many developing countries (Doak *et al.*, 2005; Roemling & Qaim, 2013), implying that some of our results may also be of relevance for other

settings. Reducing child stunting and controlling the global obesity pandemic are both important public health objectives.

The results suggest that the supermarket revolution in developing countries is not just a business response to the rapid nutrition transition, but that supermarkets also contribute to changing food consumption habits and nutritional outcomes. Yet the types of outcomes can be diverse, depending on many factors. Hence, simple conclusions on whether supermarkets are good or bad for nutrition and health are not justified. It should also be noted that impacts may change over time. Rates of child undernutrition will decrease and childhood obesity may increase when household incomes rise. Furthermore, supermarkets may gradually offer a greater variety of products, including more fresh and healthy foods, which can contribute to nutritional improvements, as shown in the USA (Lear *et al.*, 2013; Michimi & Wimberly, 2010). Our analysis should not be seen as the final judgment about supermarket nutritional impacts in developing countries, but as early evidence that can contribute to a better understanding of this complex and emerging theme. To reduce negative health outcomes, the nutrition transition should be accompanied by broader nutrition education and awareness campaigns. In some cases, specific regulations for supermarkets and other actors in the food industry may be required.

Appendix A3

Table A3.1. Descriptive statistics for variables used in adult nutrition models

Variable	Mean	Standard deviation
BMI	24.893	4.845
Overweight (dummy)	0.270	0.444
Obese (dummy)	0.143	0.350
Underweight (dummy)	0.039	0.194
Calorie consumption per day (kcal)	3350.776	1327.238
Share of calories from processed foods (%)	48.51	16.21
Food expenditure (Ksh per AE and month)	6099.922	4628.725
Buys in supermarket (dummy)	0.580	0.494
Supermarket purchase share (% of total food expenditure)	9.671	11.596
Distance to nearest supermarket (km)	15.105	20.478
Age (years)	34.763	11.905
Female (dummy)	0.641	0.480
Heavy work (dummy)	0.460	0.499
Leisure-time physical activity (hours per week)	8.806	7.221
Household expenditure (Ksh per AE and month)	12005.460	10041.010
Education of person responsible for food (years)	9.724	3.778
Household size (AE)	2.642	1.233
Married household head (dummy)	0.735	0.442
Household does farming (dummy)	0.654	0.476
Household owns television (dummy)	0.598	0.491
Distance to nearest district hospital (km)	10.426	7.171
Number of observations	615	

BMI, body mass index; Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.2. Descriptive statistics for variables used in child/adolescent nutrition models

Variable	Mean	Standard deviation
Height-for-age Z-scores (HAZ)	-1.049	1.296
Stunted (dummy)	0.208	0.407
BMI-for-age Z-scores (BAZ)	-0.308	1.000
Overweight/obese (dummy)	0.097	0.297
Calorie consumption per day (kcal)	2423.15	1214.68
Share of calories from processed foods (%)	48.22	17.29
Buys in supermarket (dummy)	0.509	0.501
Supermarket purchase share (% of total food expenditure)	8.480	11.204
Distance to nearest supermarket (km)	15.489	19.763
Age (months)	115.755	43.717
Female (dummy)	0.481	0.501
Physical education at school (hours per week)	1.473	2.076
Leisure-time physical activity (hours per week)	16.589	9.504
Malaria or respiratory infection during last month (dummy)	0.093	0.291
Height of female adult measured in household (cm)	158.126	5.845
Age of female adult measured in the household (years)	35.213	10.513
Age of female adult when the child was born (years)	25.567	9.791
Female adult is the mother (dummy)	0.833	0.374
Household treats drinking water (dummy)	0.477	0.501
Household expenditure (Ksh per AE and month)	9223.462	6193.470
Education of person responsible for food (years)	8.769	3.833
Household size (AE)	3.228	1.196
Married household head (dummy)	0.75	0.434
Household does farming (dummy)	0.699	0.460
Household owns television (dummy)	0.537	0.500
Distance to nearest district hospital (km)	9.747	7.050
Distance to nearest health care center (km)	2.087	2.159
Number of observations	216	

Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.3. First-stage results of instrumental variable models for impact of supermarket purchase on adult nutrition

Explanatory variables	Buys in supermarket (dummy)	Supermarket purchase share (%)
Distance to nearest supermarket (log of km)	-0.502 ^{***} (0.04)	-2.272 ^{***} (0.19)
Age (years)	-0.021 ^{**} (0.01)	-0.097 ^{**} (0.04)
Female (dummy)	-0.115 (0.43)	-1.249 (2.19)
Female-age interaction	0.007 (0.01)	0.033 (0.05)
Heavy work (dummy)	-0.177 (0.14)	-0.249 (0.72)
Leisure-time physical activity (hours per week)	0.016 [*] (0.01)	-0.008 (0.05)
Household expenditure (1000 Ksh per AE and month)	0.072 ^{***} (0.01)	0.183 ^{***} (0.04)
Education of person responsible for food (years)	0.048 ^{**} (0.02)	0.411 ^{***} (0.11)
Married household head (dummy)	0.676 ^{***} (0.17)	0.788 (0.96)
Distance to nearest district hospital (log of km)	0.004 (0.05)	-1.363 ^{***} (0.33)
Constant	-0.401 (0.44)	11.065 ^{***} (2.34)
Number of observations	615	615
Chi-squared test statistic	242.159 ^{***}	--
<i>F</i> statistic	--	44.73 ^{***}

*, **,***, statistically significant at the 10%, 5%, and 1% level, respectively. Coefficient estimates are shown with robust standard errors in parentheses. Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.4. First-stage results of instrumental variable models for impact of supermarket purchase on child/adolescent nutrition

Explanatory variables	Buys in supermarket (dummy)		Supermarket purchase share (%)
	BAZ model	HAZ/stunted models	
Distance to nearest supermarket (log of km)	-0.547*** (0.07)	-0.567*** (0.07)	-3.092*** (0.28)
Age (months)	-0.007** (0.00)	-0.009*** (0.00)	-0.017 (0.01)
Female (dummy)	0.073 (0.24)	0.044 (0.24)	-1.241 (1.16)
Household expenditure (1000 Ksh per AE and month)	0.092*** (0.03)	0.080*** (0.03)	0.347*** (0.11)
Education of person responsible for food (years)	0.024 (0.04)	0.028 (0.04)	0.169 (0.21)
Married household head (dummy)	0.206 (0.28)	0.163 (0.28)	-0.362 (1.49)
Malaria or respiratory infection (dummy)	--	0.144 (0.40)	-0.675 (2.15)
Height of female adult (cm)	--	-0.010 (0.02)	-0.024 (0.08)
Age of female adult when child was born (years)	--	-0.007 (0.01)	0.015 (0.06)
Household treats drinking water (dummy)	--	0.281 (0.24)	1.464 (1.16)
Distance to nearest health care center (log of km)	--	0.052 (0.13)	-1.812** (0.71)
Physical education at school (hours per week)	0.036 (0.05)	--	--
Leisure-time physical activity (hours per week)	0.018 (0.01)	--	--
Age of female adult (years)	-0.006 (0.01)	--	--
Distance to nearest district hospital (log of km)	-0.029 (0.10)	--	--
Constant	0.033 (0.79)	2.219 (3.02)	13.296 (12.68)
Observations	216	216	216
Chi-squared test statistic	96.365***	111.231***	--
<i>F</i> statistic	--	--	22.2***

*, **,***, statistically significant at the 10%, 5%, and 1% level, respectively. Coefficient estimates are shown with robust standard errors in parentheses. BAZ, BMI-for-age Z-score; HAZ, height-for-age Z-score; Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.5. Impact of supermarket purchase on child/adolescent mild and severe stunting

	Mildly stunted (HAZ < -1)		Severely stunted (HAZ < -3)	
Buys in supermarket (dummy)	-0.131 (0.09)	--	-0.231 ^{***} (0.05)	--
Supermarket purchase share (%)	--	-0.009 ^{**} (0.00)	--	-0.016 ^{***} (0.00)
Age (months)	0.003 ^{***} (0.00)	0.003 ^{***} (0.00)	0.001 ^{**} (0.00)	0.001 ^{***} (0.00)
Female (dummy)	-0.021 (0.06)	-0.032 (0.06)	-0.004 (0.03)	-0.025 (0.03)
Household expenditure (1000 Ksh per AE and month)	-0.007 (0.01)	-0.005 (0.01)	0.003 (0.00)	0.004 (0.00)
Education of person responsible for food (years)	-0.006 (0.01)	-0.004 (0.01)	-0.012 ^{***} (0.00)	-0.012 [*] (0.01)
Married household head (dummy)	-0.087 (0.07)	-0.099 (0.07)	-0.033 (0.03)	-0.063 [*] (0.03)
Malaria or respiratory infection (dummy)	0.097 (0.10)	0.095 (0.10)	0.177 ^{***} (0.04)	0.185 ^{***} (0.05)
Height of female adult (cm)	-0.019 ^{***} (0.00)	-0.019 ^{***} (0.00)	-0.005 (0.00)	-0.005 (0.00)
Age of female when the child was born (years)	-0.010 ^{***} (0.00)	-0.010 ^{***} (0.00)	-0.003 [*] (0.00)	-0.003 [*] (0.00)
Household treats drinking water	-0.105 [*] (0.06)	-0.096 [*] (0.06)	-0.017 (0.04)	-0.009 (0.03)
Distance to nearest health care center (log of km)	-0.052 [*] (0.03)	-0.065 ^{**} (0.03)	0.048 ^{**} (0.02)	0.037 [*] (0.02)
Number of observations	216	216	216	216

*, **, ***, statistically significant at the 10%, 5%, and 1% level, respectively. Marginal effects are shown with robust standard errors in parentheses. Estimates are based on instrumental variable probit models with the supermarket purchase variables instrumented. HAZ, height-for-age Z-score; Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.6. Causal chain model to explain the impact of supermarket purchase on adult BMI

Explanatory variables	BMI (Kg/m ²)	Calorie consumption per day (kcal)	Share of calories from processed foods (%)	Supermarket purchase share (%)
Calorie consumption per day (kcal)	0.002 ^{***} (0.00)	--	--	--
Share of calories from processed foods (%)	0.118 ^{***} (0.04)	--	--	--
Age (years)	0.112 ^{***} (0.02)	--	--	--
Female (dummy)	1.344 (1.23)	--	--	--
Female-age interaction	0.040 (0.03)	--	--	--
Heavy work (dummy)	-0.672 [*] (0.37)	--	--	--
Leisure-time physical activity (hours per week)	-0.041 [*] (0.02)	--	--	--
Supermarket purchase share (%)	--	15.443 [*] (8.53)	0.330 ^{***} (0.11)	--
Household expenditure (1000 Ksh per AE and month)	--	39.060 ^{***} (5.78)	-0.241 ^{***} (0.07)	0.144 ^{***} (0.04)
Education of person responsible for food (years)	--	-12.780 (15.06)	0.755 ^{***} (0.19)	0.448 ^{***} (0.11)
Household size (AE)	--	-30.612 (41.79)	-0.990 [*] (0.52)	--
Household does farming (dummy)	--	179.862 [*] (108.04)	-4.230 ^{***} (1.37)	-2.522 ^{***} (0.79)
Household owns television (dummy)	--	--	3.075 ^{**} (1.29)	2.274 ^{***} (0.80)
Distance to nearest supermarket (log of km)	--	--	--	-2.564 ^{***} (0.18)
Constant	6.996 ^{**} (2.88)	2820.068 ^{***} (199.77)	44.416 ^{***} (2.48)	6.420 ^{***} (1.22)
Number of observations			615	
Chi-squared			130.044 ^{***}	

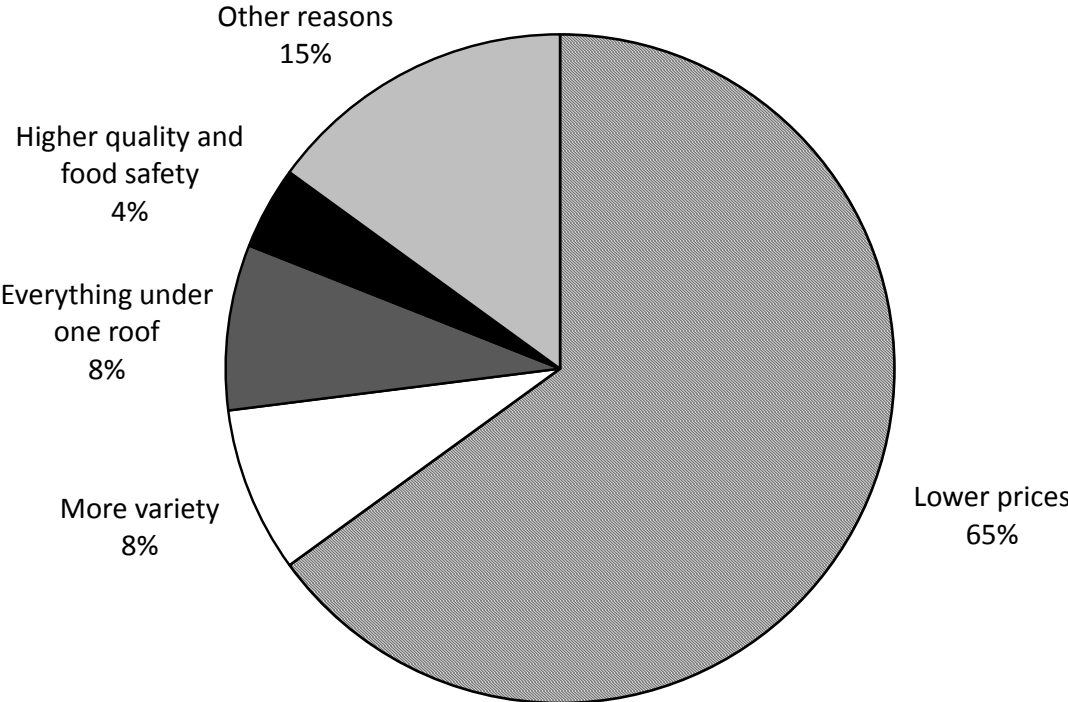
*, **, ***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. The system of simultaneous equations was estimated with three-stage least squares. BMI, body mass index; Ksh, Kenyan shillings; AE, adult equivalent.

Table A3.7. Causal chain model to explain the impact of supermarket purchase on child/adolescent HAZ

Explanatory variables	HAZ	Calorie consumption per day (kcal)	Share of calories from processed foods (%)	Supermarket purchase share (%)
Calorie consumption per day (kcal)	0.001* (0.00)	--	--	--
Share of calories from processed foods (%)	0.025* (0.01)	--	--	--
Age (months)	-0.009*** (0.00)	--	--	--
Female (dummy)	0.105 (0.15)	--	--	--
Malaria or respiratory infection (dummy)	-0.436* (0.26)	--	--	--
Height of female adult (cm)	0.059*** (0.01)	--	--	--
Age of female adult when the child was born (years)	0.019* (0.01)	--	--	--
Household treats drinking water (dummy)	0.364** (0.16)	--	--	--
Supermarket purchase share (%)	--	17.240 (13.25)	0.447** (0.18)	--
Household expenditure (1000 Ksh per AE and month)	--	49.278*** (16.12)	-0.358 (0.23)	0.331*** (0.11)
Education of person responsible for food (years)	--	-23.578 (30.37)	-2.356** (0.96)	0.201 (0.18)
Household size (AE)	--	-41.883 (69.42)	0.876*** (0.33)	--
Household does farming (dummy)	--	-41.328 (174.76)	-6.007** (2.42)	-1.456 (1.28)
Education of household head (years)	--	-32.853 (27.60)	--	--
Age of female adult (years)	--	3.467 (7.89)	--	--
Household owns television (dummy)	--	--	1.918 (2.17)	0.566 (1.28)
Distance to nearest supermarket (log of km)	--	--	--	-2.830*** (0.30)
Constant	-12.428*** (2.40)	2383.898*** (449.13)	50.831*** (4.52)	7.586*** (1.84)
Number of observations			216	
Chi-squared			65.561***	

*, **, ***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. The system of simultaneous equations was estimated with three-stage least squares. HAZ, height-for-age Z-score; Ksh, Kenyan shillings; AE, adult equivalent.

Figure A3.1. Most important reason for shopping in supermarket. Based on household survey responses. Only households that buy in a supermarket are included.



4 The Nutrition Transition and Indicators of Child Malnutrition³

Abstract. Many developing countries are undergoing a nutrition transition. At the same time, child overweight has been increasing, while child undernutrition rates have been falling. The observed reductions in underweight are higher than for stunting. This creates the notion that the reductions in underweight are due to the nutrition transition, which would primarily affect child weight but not growth. However, the relation between the nutrition transition and child malnutrition indicators has never been analyzed. We use a cross-country regression approach to estimate the effect of the nutrition transition on both child weight and growth indicators. Our results show that, indeed, the nutrition has effects on child weight. While the effects on child overweight are less clear, we get consistent results that the nutrition transition reduces underweight. In addition, we get clear and consistent results that the nutrition transition reduces stunting. A simple conclusion that the nutrition transition will only have undesirable effects in developing countries is therefore not justified.

4.1 Introduction

The nutrition transition, which consists of a rapid change in dietary habits towards more energy-dense, processed foods and more sedentary lifestyles, is being witnessed in many developing countries (Popkin & Ng 2007). This nutrition transition is being driven by demand side-factors such as increasing incomes and urbanization (Pingali, 2007), as well as supply-side factors such as globalizing food systems (Hawkes *et al.*, 2009). A result of the nutrition transition is increasing overweight and obesity rates (Popkin & Ng, 2007; Popkin *et al.*, 2012). In 2008, 34% of all adults were overweight or obese (Finucane *et al.*, 2011). Though the effects of the nutrition transition have primarily been observed in adults, the same is expected for children. Statistics show that an estimated 6.6% of children below five years were either overweight or obese in 2011, an increase from 4.5% in 1990 (UNICEF *et al.*, 2012).

As the rates of child overweight increase, the prevalence of underweight for children below five years has reduced by an annual rate of 2.2% since 1990, to an estimate of 16% in 2011. With

³ This chapter is co-authored by Matin Qaim. The following roles were performed by me: designing of the study, data analysis, and interpretation of the research results in cooperation with Matin Qaim; writing of the paper.

this reduction, the world is almost on track to meet the MDG one target of halving underweight by 2015 (Haddad, 2013). Observed reductions in child underweight in many developing countries may be spurred by the nutrition transition and its related dietary changes (de Haen *et al.*, 2011; de Onis *et al.*, 2004; Haddad, 2013; Lutter *et al.*, 2011; Misselhorn, 2010; UNICEF, 2013). In comparison, reduction in child stunting is lower: an estimated 26% of children below five years were stunted in 2011 (UNICEF *et al.*, 2012). This has given rise to the notion that the nutrition transition may have primarily effects on child weight, but not on child growth (de Haen *et al.*, 2011; de Onis *et al.*, 2004; Haddad, 2013; Lutter *et al.*, 2011; Misselhorn, 2010; UNICEF, 2013).

If this is the case, the nutrition transition would be an additional reason why using child underweight as a single indicator of child undernutrition, as done in the millennium development goal (MDG) nutrition target, is misleading. Previous arguments against the use of underweight stem from the observations that it is just a summary indicator (Black *et al.*, 2013), and that stunting, a suggested alternative tracking indicator, is a problem of higher magnitude with long-term consequences on child health (Black *et al.*, 2013; Haddad, 2013; UNICEF, 1998). However, the notion that the nutrition transition would reduce child underweight but not stunting is not based on conclusive empirical evidence. In fact, the relation has never been analyzed. In this paper, we challenge this notion by using a cross-country regression approach to estimate the effect of the nutrition transition on both child weight and growth indicators. Pooling datasets from Demographic and Health Surveys, Planet Retail, FAOSTAT, and World Development Indicators, we estimate fixed and random effects regression models to analyze this relation.

4.2 Dietary Trends and Child Nutrition: Expected Relationships

In this section, we describe how the nutrition transition might influence child malnutrition based on past studies. According to the UNICEF conceptual model, inadequate dietary intake and disease are the immediate determinants of child undernutrition (UNICEF, 1990). Underweight and stunting are commonly used measures of child undernutrition. A modified version of this conceptual model focuses on optimal child growth, hence allowing the inclusion of overweight and obesity in children as a deviation from optimal child growth (Black *et al.*, 2013). In this study, we use fat consumption, share of modern retail in grocery sales, and the prevalence of women overweight as indicators of the nutrition transition. These indicators would fall within

underlying determinants in the UNICEF conceptual model. Based on the literature, we hypothesize that nutrition transition would mainly affect household dietary patterns, and to some extent, provision of care to children, which would in turn have an effect on dietary intake by children and disease likelihood, the immediate causes of childhood malnutrition.

Various past studies show that fat consumption can have an effect on childhood malnutrition. On the beneficial aspect, dietary fat provides a sufficiently energy-dense diet to meet energy needs, supplies essential fatty acids and allows absorption of fat-soluble vitamins (Biesalski, 1997; Brown *et al.*, 1995; Prentice & Pau, 2000). We would thus expect fat consumption to be beneficial to child health and hence reduce the prevalence of underweight and stunting. On the other hand, consumption of fats in excess of requirements, or increased consumption of saturated fats, is expected to have a positive effect on child overweight. A positive association of increased fat intake and the probability of overweight and obesity in children has been shown (Patterson *et al.*, 2010). In recognition of this association, diet recommendations for children advocate for less saturated fats (Gidding *et al.*, 2006; Patterson *et al.*, 2010).

An expectation of a positive association between share of modern retail in grocery sales and child overweight and obesity seems straightforward based on literature. Emerging supermarkets have readily available stocks of highly processed foods and drinks (Hawkes, 2008; Pingali, 2007; Reardon *et al.*, 2003). In addition to the types of products they offer, the retail format influences dietary choice through prices and marketing strategies, some of which are directly targeted at children (Bragg *et al.*, 2012; Hawkes, 2008; Swinburn *et al.*, 2011). There is evidence that supermarkets increase the consumption of processed foods for households in developing countries (Asfaw, 2008; Hawkes, 2008; Rischke *et al.*, 2014). For adults, supermarkets significantly increase adult BMI and the probability of being overweight (Asfaw, 2008). We would expect the same effects on children, since growing up in obesogenic environments would come with increased risks for childhood overweight (Black *et al.*, 2013). One can also hypothesize that increase in the share of modern retail in grocery sales would reduce child undernutrition. We do not find research evidence towards this direction. However, it is possible that a larger variety of processed foods would lead to a more diversified diet that is supplying more micronutrients, especially for children from poor settings.

We also draw expectations of a positive association between prevalence of women overweight and child overweight based on past studies. A positive effect of consumption of processed foods and adult overweight indicators has been observed (Asfaw, 2011). Overweight and obese adults are also known to engage in less physical activity (Simon *et al.*, 2014). We argue that children growing up in such environments, characterized by sedentary behavior and consumption of more calories and processed foods, have a higher risk for overweight and obesity. Such children are likely to learn and imitate such dietary behavior and sedentary lifestyles (Danesh *et al.*, 2011; Grote *et al.*, 2012; Savage *et al.*, 2007). In addition, there is evidence that maternal overweight and obesity during pregnancy increase the risk of childhood obesity (McGuire *et al.*, 2010). Within the intra-uterine environment, programming for such things as food preferences is already taking place and children born of obese mothers are likely to have more fat mass at birth (Catalano *et al.*, 2009; Fall, 2011; Sewell *et al.*, 2006). Overweight or obese mothers are also less likely to meet recommended breastfeeding requirements hence increasing the risk of overweight for their children (Baker *et al.*, 2007). On the other side, children from overweight or obese mothers are more likely to enjoy better socioeconomic status, such as higher education and more household assets, which may come with better nutrition and care. Literature towards this direction is scarce, but an inverse relationship of maternal overweight and child undernutrition has been observed (Dieffenbach & Stein, 2012). In South Africa, significantly higher mean Z-scores were observed for children of obese mothers as compared to those of mothers who were not obese (Steyn *et al.*, 2011). That study showed a lower likelihood of underweight and stunting for children of obese mothers, and a bigger risk for children of underweight mothers, mainly because of difference in socioeconomic status. We would therefore expect the prevalence of women overweight to have a negative effect on child undernutrition.

4.3 Materials and Methods

4.3.1 Estimation Strategy

Given the longitudinal nature of our data, we estimate models of the following general form:

$$CM_{it} = \beta_0 + \beta_1 NT_{it} + \beta_2 \mathbf{X}_{it} + c_i + u_{it}, i=1;N; t=1;T \quad (4.1)$$

where CM_{it} is the child malnutrition indicator, NT_{it} is the nutrition transition indicator, X_{it} is a vector of other explanatory variables, i denotes countries, t denotes time in years, c_i denotes unobserved effects (unobserved heterogeneity), and u_{it} are idiosyncratic errors.

Common methods for estimating this model are either fixed or random effects models. The choice between fixed or random effects estimation depends on how c_i is interpreted. If the unobserved effects are treated as parameters to be estimated, this yields the fixed effects model. Treating c_i as a fixed effect (hence time-invariant country specific effects) means that we are allowing c_i to be correlated with the observed explanatory variables. The fixed-effects estimator removes the fixed-effects parameters from the estimator during estimation. If c_i is treated as a random effect, we assume that the unobserved effects are not correlated with observed explanatory variables and therefore c_i is treated as a random error, giving rise to a composite error ($c_i + u_{it}$). Whether c_i is correlated with the observed explanatory variables is the criteria for choosing between a random effects and a fixed effects model. We use the Hausman test (Hausman, 1978) to decide which estimator is more efficient, and this is the result we report. This test compares the results of the fixed and random effects models. A significant Hausman test statistic implies that the unobserved heterogeneity cannot be considered as random and hence we use the fixed effects model. We show this test statistics in the results.

4.3.2 Child Nutritional Indicators

Undernutrition is mainly the outcome of insufficient food intake and repeated infectious diseases. Commonly used indicators for measuring undernutrition in children are stunting, wasting, underweight and micronutrient deficiency (Black *et al.*, 2008). In this study, we analyze the effect of nutrition transition on both the underweight and stunting indicators. A stunted child has a low height for their age, reflecting chronic hunger, while a wasted child has a low weight for their height, reflecting acute weight loss (Black *et al.*, 2008; UNICEF, 1998). Underweight, which refers to a low weight-for-age, is used as a summary indicator which can result due to a child being stunted or wasted. These indicators are usually determined with the help of Z-scores, depicting minus two standard deviations from the median of a reference population (WHO, 2006). Undernutrition in children increases the risk of mortality. In fact, each of these anthropometric indicators is responsible for at least 14.5% of deaths of children below five years

globally (Black *et al.*, 2008). In addition, undernutrition leads to the weakening of the immune system, lifetime disabilities and poor growth and cognition development (UNICEF, 1998), with negative consequences in life. Reducing children undernutrition comes with many desirable effects even beyond the individual or household level. For instance, there is evidence that improvements in early childhood nutrition have an effect on economic growth (Hoddinott *et al.*, 2008).

In addition to undernutrition, overweight and obesity in children is the other aspect of child malnutrition (Black *et al.*, 2013). A child is considered overweight if their weight for height is greater than two standard deviations of the median of the reference population based on WHO's new child growth standards (WHO, 2006). While rapid weight gain in the first 1000 days is considered beneficial to child health, there is evidence that weight-gained later on in children leads to a high adult fat mass (Black *et al.*, 2013). This weight gain confers a greater risk for adult obesity and non-communicable diseases, especially for children who experienced undernutrition in early life (Victora *et al.*, 2008).

Among the current global efforts to tackle child undernutrition is the Millennium Development Goals (MDG), with the first goal being “to halve, between 1990 and 2015, the proportion of people who suffer from hunger” (UN Millennium, 2005). For children, underweight is the official indicator for tracking progress under MDG1 (UNSCN, 2012). Current initiatives being formulated, such as World Health Assembly (WHO, 2012) and the Zero Hunger Challenge have targets to reduce childhood overweight and obesity, in addition to those directed at undernutrition.

4.3.3 Indicators of the Nutrition Transition

Nutrition transition is characterized by two components: a rapid change in dietary habits towards more energy-dense, processed foods, and a reduction in physical activity leading to more sedentary lifestyles (Popkin & Ng 2007). If data were available on any of these two components, we could use it to measure nutrition transition. Such data is not available however. Instead, we could use data on consumption of certain foods or nutrients associated with the nutrition transition as a proxy for it. Fats, sugar or caloric sweeteners are an example of foods and nutrients associated with the nutrition transition. Though there has been the observation that diets have become more and more sweet (Popkin & Ng, 2007), data on overall sugar consumption is

not available. We argue that fat consumption would be suitable to proxy nutrition transition. This is because a common element of the dietary transformation in developing countries, be it towards increased consumption of animal source foods, or towards increased consumption of processed and convenience foods, is that it increases the supply of fats in diets (Pingali, 2007); (Popkin *et al.*, 2012). Research shows that consumers have been increasingly getting their energy from fats as the importance of carbohydrates as a source of energy falls (Popkin & Ng, 2007). We argue therefore that fat consumption would be a good proxy of the nutrition transition. Fortunately, data on fat consumption is available for many countries. In this study, we use this data on fat consumption as one indicator of the nutrition transition.

In addition to fat consumption, we use two other indicators, whose data are available, to proxy nutrition transition. These are share of modern retail in grocery sales and prevalence of women overweight. The term supermarket as used in literature refers to several types of chain stores that include supermarkets, hypermarkets, and convenience and neighborhood stores (Reardon & Gulati, 2008), which is essentially modern retail. Hence the two terms may be taken to mean the same thing. Supermarkets have spread so rapidly in developing countries that the term “supermarket revolution” has been coined (Reardon *et al.*, 2003). Several demand-side factors such as liberalization of foreign direct investment (FDI) rules, rapid urbanization, and a growing middle class attracted global supermarkets to locate in developing countries (Hawkes, 2008). In some of the developing countries where there are no global chains, there are domestic chains that have usually adopted the look and functioning like that of global chains (Popkin *et al.*, 2012). How would spread of supermarkets fuel the nutrition transition and hence be a good proxy for it? Literature shows that highly processed foods and drinks are not only readily available in emerging supermarkets (Pingali, 2007), but they also occupy large shelf-spaces and are targets of various promoting strategies (Hawkes, 2008). Some of these strategies are directed specifically at children (Bragg *et al.*, 2012). These strategies have largely been effective, and supermarkets are hypothesized to be major driving forces of shifts in food expenditure and consumption behavior (Hawkes *et al.*, 2009; Popkin, 2006; Popkin *et al.*, 2012). Empirical evidence shows that buying in supermarkets increases the consumption of processed foods (Asfaw, 2008; Rischke *et al.*, 2014). We therefore argue that the size of the modern retail sector in a country can be taken as a reflection of the level of the nutrition transition. Hence we use the share of modern retail in grocery sales as the second proxy of the nutrition transition.

Finally, we capture nutrition transition with one of its outcomes: prevalence of women overweight. Dietary change that is associated with the nutrition transition is one hypothesized cause of adult overweight and obesity in developing countries (Hawkes *et al.*, 2009). Rigorous empirical research on this topic is rare, but there is limited evidence that consumption of processed foods, a characteristic of the nutrition transition, has a causal effect on overweight/obesity in adults in developing countries (Asfaw, 2008). Low physical activity and increased sedentary behavior, the other component of the nutrition transition, have been found to have a positive effect on body mass index (BMI) of adults and their probability of being overweight (Prentice & Pau, 2000; Roemling & Qaim, 2012; Simon *et al.*, 2014; Strong *et al.*, 2005; WHO, 2004). Therefore, the two components of the nutrition transition are associated with increased probability of overweight for adults. We therefore argue that prevalence of adult overweight in a country is a reflection of the nutrition transition and would be a good indicator of the nutrition transition. Most available data on overweight and obesity in developing countries is for women of child-bearing age, which we use as the last nutrition transition indicator.

4.3.4 Control Variables

We use two main control variables that have been found to have an influence on child malnutrition; economic growth and female education. Evidence on the influence of economic growth on child nutritional outcomes has been mixed, with some studies finding a significant negative relationship of economic growth and undernutrition (Heady, 2013; Smith & Haddad, 2002) and others finding almost null associations (Vollmer *et al.*, 2014). Most of the studies that found significant effects estimated cross-country regressions like we do in this study. While we expect a negative association between economic growth and undernutrition, a positive relation is the more likely outcome for economic growth and child overweight. We capture economic growth using GDP per capita.

Our other main control variable is maternal education. Maternal education affects child malnutrition by influencing how children are cared for. Several studies have shown that child undernutrition is affected negatively by formal maternal education (Aslam & Kingdon, 2012; Desai & Alva, 1998; Semba *et al.*, 2008) as well as female literacy (Gokhale *et al.*, 2004; Heaton & Forste, 2003; Smith & Haddad, 1999). We use female literacy to capture maternal education in this study.

In addition to economic growth and maternal education, we control for other factors such as the prevalence of undernourishment and proportion with improved sanitation. One of the underlying determinants of child undernutrition is household food insecurity, and significant effects have been shown (Ali *et al.*, 2013; Psaki *et al.*, 2012). To capture food insecurity status, we use the undernourishment indicator, which refers to the proportion of those who are below minimum level of dietary energy requirement as measured by Food and Agriculture Organization (FAO). Though there is criticism on how this indicator is calculated (de Haen *et al.*, 2011; Klasen, 2008), small effects on child undernutrition have been observed (Klasen, 2008). The other additional control, improved sanitation, has been found to have a positive effect on child undernutrition (Fink *et al.*, 2011; Heaton & Forste, 2003; Spears, 2013).

In the child overweight models, we additionally include urbanization as a control variable so as to capture rural-urban differences that may influence probability of overweight. Literature shows that there is more likelihood for overweight in urban areas due to consumption of more animal-source foods, more processed foods and engaging in less physical activity (Popkin & Gordon-Larsen, 2004). This may not just be applicable to adults but also to children. In addition, there is evidence that urban mothers do less breastfeeding, resulting to more bottle feeding, with increased risks of overweight for children (Savage *et al.*, 2007).

In the full-control models where we use share of modern retail in grocery sales as an indicator of the nutrition transition, we further control for country openness, measured as total of exports and imports as a proportion of GDP. This is a commonly used measure of country openness (Liargovas & Skandalis, 2012). We would expect country openness to be strongly correlated with share of modern retail in grocery sales through its effects on inflows of FDI. In fact, it has been observed that liberalization of FDI is one aspect of globalization that is fueling the spread of supermarkets (Hawkes *et al.*, 2009). Inflows of FDI may have effects on child malnutrition as well, such that not controlling for country openness would likely bias the results.

4.3.5 Data Sources

We are using three outcome variables: prevalence of child overweight, underweight and stunting for children below five years at country level. Prevalence of underweight and stunting are sourced from Demographic and Health Surveys (DHS) (ICF, 2012). Data on prevalence of child overweight is available in the World Development Indicators (WB, 2014).

The treatment variable is nutrition transition, proxied in this case by three indicators: fat consumption, share of modern retail in grocery sales, and prevalence of women overweight. Data on fat consumption comes from food balance sheets available from FAO (FAO, 2014). In compiling the food balance sheets, production, trade, stock changes, non-food uses, and extra-household waste are put into consideration (de Haen *et al.*, 2011). From all foods available for consumption in these balance sheets, we aggregate the total amount of fat which is in grams per capita per day. The data is available for many countries from as early as 1961 to 2009.

Data on share of modern retail in grocery sales comes from Planet Retail (PlanetRetail, 2013b). Planet Retail is a leading retail data services firm in the world, tracking leading retailers at a national level in more than 200 countries (Reardon *et al.*, 2012). Though this list of leading retailers may not include several important local chains in a country for some cases, the data on market share growth can be taken to represent the general picture of the importance of modern retail in these countries (Reardon *et al.*, 2012). In the Planet Retail dataset, the share of modern retail in grocery sales refers to the total grocery sales by modern retail as a percentage of total market spending by consumers on grocery for a certain country and year (PlanetRetail, 2013b). Planet Retail defines modern grocery retailers as largely multiple and chain stores such as hypermarkets and supermarkets, but it also includes other smaller formats such as neighborhood stores, discount stores and cash & carries/warehouse clubs. In this dataset, total grocery comprises food, drinks, tobacco, household & pet care, and health & beauty products. This data is available for several countries from as early as 1994 to present.

Data on prevalence of women overweight is from DHS (ICF, 2012). Prevalence of women overweight refers to the proportion of women who are either overweight or obese. An adult is classified as either overweight or obese if their BMI, defined as weight in kilograms divided by squared height in meters, is equal to or greater than 25 kg/m^2 (WHO, 2000). In DHS, the target is usually women of child bearing age (between 15 to 49 years) though in a few of these surveys, the age range deviated from the typical (Vollmer *et al.*, 2014). DHS data is representative at the country level and it follows a multiple-stage cluster design.

We are using two main control variables. We capture economic growth using GDP per capita expressed in 2005 dollars and adjusted for purchasing power parity exchange rates, which is available from World Development Indicators (WDI) (WB, 2014). Data on female literacy, which we use to capture maternal education, is available in DHS, and it reflects the proportion of

females, mainly between 15-49 years, who can read part of a sentence (ICF, 2012). Missing data on female literacy is filled mainly from WDI. In WDI, female literacy refers to the proportion of women 15 years and above who can read and write a short, simple statement with understanding (WB, 2014).

Other control variables we use are proportion undernourished, improved sanitation, country openness, and urbanization. Data on proportion undernourished is available in the WDI (WB, 2014). Data on improved sanitation comes also from WDI, and it refers to the percentage of the population with adequate access to excreta disposal facilities such as protected pit latrines and flush toilets (WB, 2014). Data on country openness as well as the rate of urbanization come from WDI. In this case, urbanization refers to “the percentage of a country's population living in metropolitan areas that in 2000 had a population of more than one million people” (WB, 2014).

4.3.6 Sample Size and Handling of Missing Data

We merge country level data from DHS, WDI, FAOSTAT and Planet Retail for this analysis. The sample size is driven mainly by the undernutrition indicators that are sourced from DHS. Though DHS has collected this data for more than 82 countries (Vollmer *et al.*, 2014), the prevalence rates are not available for download from the DHS STATcompiler for all countries. We drop all countries for which we have one data point (one DHS survey year) since our aim is to use panel econometric estimations. For years that we have data for most other key variables and not undernutrition indicators, we result to WDI to fill such gaps; WDI has data on child underweight and stunting. We fill these gaps with WDI for similar years, or when such is not available, with adjacent two years on both sides but not beyond. For instance, if we are missing stunting rate for a certain country for the year 2000, we take the stunting figure for the same year from WDI, and if this is not available, we check for the years 1998, 1999, 2001 or 2002, and we take the closest available figure. In total, we have a sample of 109 observations in 41 countries, for the years 1996 to 2012.

We also fill missing years for other key variables as well. For prevalence of women overweight, we fill missing years with data from WDI, mostly for the same years, or the closest years from the adjacent two years on both sides. For the prevalence of child overweight, which comes from WDI, we fill missing years with near ones from the same dataset, but also ensuring that we are not going beyond two adjacent years on both sides. Female literacy data comes from

DHS, but we also had missing years. We fill mainly from WDI using as close years as possible. We also get a few data years from DHS comparative or country reports (ICF, 2014), and in very few cases country statistics from index mundi (Index Mundi, 2014) which are based on data from United Nations Educational Scientific and Cultural Organization (UNESCO).

In addition to the above cases, data for some variables are missing some figures for recent years for which we have data on child undernourishment indicators. For instance, fat consumption data is not available for years beyond 2009. To fill for the consecutive three years (2010-2012), we predict using the average annual increment rate based on the last 10 years (2000 to 2009). Undernourishment and improved sanitation variables are missing data for the year 2012, and we use the 2011 figures. We still have missing years for some of the variables in particular countries. Since missing data on any variable means we cannot use that country year in the estimation, most of our model results are based on samples sizes below 109.

4.4 Results

Descriptive results show that stunting is a problem of higher magnitude as opposed to underweight, which is in agreement with literature. The overall mean for stunting is 34%, as compared to 16.1% for underweight. Trends for these two indicators show that child undernutrition has decreased with time (Figures A4.1 and A4.2 in appendix A4). The overall mean for child overweight is 6.6%. Unlike the undernutrition indicators, child overweight is increasing with time (Figure A4.3 in appendix A4).

In challenging the notion that the nutrition transition would affect child weight and not growth, we present the results of our estimation in two subsections. First, we show the effect of the nutrition transition on child weight, that is, child overweight and underweight. Though this effect has not been analyzed before, it is largely expected considering the large body of hypothesis and few empirical evidence on the effect of the nutrition transition on adult weight. In the second subsection, we show the effect of the nutrition transition on stunting, a relation that is not even been mentioned in literature.

4.4.1 Effect of the Nutrition Transition on Child Weight

We start by examining the association between the nutrition transition and child weight without controlling for other factors. We therefore regress both child overweight and underweight on the

nutrition transition indicators, estimating either a fixed or random effects regression, whichever is suggested by the Hausman test. We find a mainly positive association between the nutrition transition indicators and child overweight (Table 4.1). Two of the nutrition transition indicators, fat consumption and women overweight, are associated positively and significantly with child overweight.

Table 4.1. Association between the nutrition transition, child overweight and underweight

Explanatory variables	Child overweight %			Underweight %		
	RE	RE	RE	RE	RE	RE
Model specification	0.093 ^{***}			-0.324 ^{***}		
Fat consumption (g/capita/day)	(0.03)			(0.05)		
Share of modern retail in grocery sales (log)		-0.238			-1.816 ^{***}	
		(0.24)			(0.24)	
Women overweight %			0.102 ^{***}			-0.477 ^{***}
			(0.02)			(0.05)
Constant	1.805	7.351 ^{***}	3.241 ^{***}	33.608 ^{***}	14.011 ^{***}	30.637 ^{***}
	(1.69)	(0.93)	(0.78)	(3.13)	(1.48)	(1.72)
Observations	101	69	82	109	76	88
Chi-squared	9.794 ^{***}	1.018	17.810 ^{***}	37.284 ^{***}	56.965 ^{***}	88.000 ^{***}
Hausman test statistic	0.01	0.08	0.37	0.31	0.03	0.00

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. RE, Random effects

However, the share of grocery market by modern retail has a negative, but insignificant association. For underweight, we find that, irrespective of the nutrition indicator used, nutrition transition has is negatively associated with the prevalence of underweight significantly.

To examine causal effects, we estimate equation (4.1) while controlling for confounding factors, both for child overweight and underweight. We first control for GDP per capita and female literacy only, in a shorter model, before including other controls in a longer model. In both cases, we test whether the results are robust to controlling for period effects by adding 16 year dummies to the regressions. The results we report are for models without year dummies, but we indicate whether the coefficient for the particular nutrition transition indicator is significant with a “Yes” or a “No”, in a similar model with year dummies included. We also add trade as a

percentage of GDP in the models with share of modern retail in grocery sales as discussed earlier.

Table 4.2 shows the results for child overweight. The results are not consistent. When we control for only GDP per capita and female literacy, we only find one indicator of the nutrition transition, women overweight, having the expected significant and positive effect on child overweight. This effect is robust to controlling for period effects and adding more controls, in this case the prevalence of undernourishment and urbanization. The coefficient for fat consumption is positive but insignificant when we include only our main controls. With more controls in the model, this coefficient turns negative though it is still insignificant. On the other hand, the share modern retail in grocery sales has a significant negative effect on child overweight when controlling for GDP per capita and female literacy. This result remains even when we control for period effects. With more controls, the coefficient for share of modern retail in grocery sales remains negative but it is no longer significant. GDP per capita has a positive effect on child overweight in some of the models, but other controls remain insignificant.

Table 4.2. Effect of the nutrition transition on child overweight

Explanatory variables	Child overweight %					
	RE	RE	RE	RE	RE	RE
Model Specification						
Fat consumption (g/capita/day)	0.028 (0.04)	-0.023 (0.04)				
Share of modern retail in grocery sales (log)			-0.613** (0.25)	-0.150 (0.28)		
Women overweight %					0.132*** (0.04)	0.142*** (0.04)
GDP per capita, PPP (log)	1.560 (1.18)	4.302*** (1.41)	3.375*** (1.21)	4.981*** (1.58)	-0.817 (0.91)	1.183 (1.63)
Female literacy %	0.012 (0.03)	-0.047 (0.03)	0.027 (0.05)	-0.051 (0.05)	-0.004 (0.02)	-0.025 (0.03)
Undernourished %		0.024 (0.05)		0.015 (0.07)		0.037 (0.05)
Urbanization %		-0.070 (0.09)		-0.156 (0.11)		-0.142 (0.09)
Trade (% of GDP)				-0.011 (0.02)		
Constant	-7.842 (6.79)	-22.307** (9.03)	-21.277** (8.39)	-26.008** (11.65)	8.909 (5.78)	-4.006 (10.80)
Significant effect with year dummies	No	No	Yes	No	Yes	Yes
Observations	95	77	69	60	78	64
Chi-squared	9.813***	15.337***	13.584***	13.599**	18.347***	19.985***
Hausman test statistic	1.05	6.21	6.05	8.94	3.49	3.54

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. RE, Random effects.

Results for child underweight are much more consistent (Table 4.3). Two indicators of the nutrition transition, fat consumption and share of modern retail in grocery sales, have a negative and significant effect on underweight.

Table 4.3. Effect of the nutrition transition on underweight

Explanatory variables	Underweight %					
	RE	RE	RE	RE	FE	FE
Model Specification						
Fat consumption (g/capita/day)	-0.168*** (0.06)	-0.156** (0.07)				
Share of modern retail in grocery sales (log)			-1.396*** (0.25)	-1.380*** (0.26)		
Women overweight %					-0.139 (0.13)	-0.128 (0.13)
GDP per capita, PPP (log)	-4.219** (1.74)	-4.032* (2.22)	-4.469*** (1.52)	-3.457 (2.13)	-6.551** (2.73)	-6.071* (3.40)
Female literacy %	-0.186*** (0.05)	-0.165*** (0.06)	-0.043 (0.07)	-0.035 (0.07)	-0.257*** (0.08)	-0.253** (0.11)
Undernourished %		-0.002 (0.09)		-0.032 (0.09)		0.108 (0.12)
Improved sanitation facilities %		-0.038 (0.07)		-0.069 (0.07)		0.054 (0.20)
Trade (% of GDP)				-0.000 (0.02)		
Constant	71.078*** (10.28)	69.448*** (14.70)	52.634*** (10.55)	48.506*** (14.79)	88.246*** (16.79)	79.155*** (22.52)
Significant effect with year dummies	Yes	No	Yes	Yes	Yes	Yes
Observations	103	101	76	76	84	82
F statistic					22.099***	12.434***
Chi-squared	94.359***	88.838***	79.190***	77.757***		
Hausman test statistic	5.32	7.25	0.31	2.21	19.36***	26.85***

*, **, ***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. RE, Random effects; FE, Fixed effects

This effect is mainly robust to controlling for year dummies. The results are also robust to including additional controls, namely undernourishment and improved sanitation. The coefficient for women overweight, though negative, is insignificant in both the short and the long models. However, when we control for period effects by adding year dummies, the coefficients turn significant with the sign remaining negative in both models. In most of the cases, the coefficients for GDP per capita and female literacy are negative and significant negative as expected. These results show that nutrition transition reduces child underweight.

4.4.2 Effect of the Nutrition Transition on Stunting

So far, our results show that the nutrition transition has an effect on child weight. We do not find a consistent result on the effect of the nutrition transition on child overweight, but there is a robust negative effect on underweight. In this subsection, we examine whether the nutrition transition has any effect on stunting. Table 4.4 shows the results of associations between our indicators of the nutrition transition and stunting. We see significant negative associations with all cases, an indicator that the nutrition transition might be reducing stunting.

Table 4.4. Association between the nutrition transition and stunting

Explanatory variables	Stunting (%)		
	RE	RE	FE
Model specification			
Fat consumption (g/capita/day)	-0.412*** (0.06)		
Share of modern retail in grocery sales (log)		-1.671*** (0.43)	
Women overweight %			-0.876*** (0.12)
Constant	55.599*** (3.31)	32.299*** (2.11)	59.465*** (3.40)
Observations	109	76	88
F statistic			51.700***
Chi-squared	50.426***	14.761***	
Hausman test statistic	0.86	0.00	8.80***

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. RE, Random effects; FE, Fixed effects

To analyze the effect of the nutrition transition on stunting, we estimate equation (4.1) using the same controls like the ones we used in the underweight regressions (Table 4.3). Controlling for GDP per capita and female literacy only, we find that all indicators of the nutrition transition have a negative and significant effect on stunting (Table 4.5). In most cases, the result is robust to controlling for period effects. We find the same negative and significant effects when we add more controls in the model, which are also robust to including period effects in the estimation. This is a clear and consistent result that the nutrition transition reduces child stunting.

Table 4.5. Effect of the nutrition transition on stunting

Explanatory variables	Stunting %					
	RE	RE	RE	RE	FE	FE
Model specification						
Fat consumption (g/capita/day)	-0.242*** (0.07)	-0.244*** (0.08)				
Share of modern retail in grocery sales (log)			-0.847* (0.45)	-0.985** (0.48)		
Women overweight %					-0.654*** (0.18)	-0.638*** (0.18)
GDP per capita, PPP (log)	-5.290*** (2.03)	-4.809* (2.54)	-8.997*** (2.21)	-5.988* (3.13)	-1.174 (3.81)	-0.887 (4.72)
Female literacy %	-0.113* (0.06)	-0.112* (0.06)	-0.009 (0.10)	-0.016 (0.10)	-0.285** (0.11)	-0.272* (0.15)
Undernourished %		0.090 (0.10)		0.220 (0.15)		0.150 (0.17)
Improved sanitation facilities %		0.026 (0.07)		-0.039 (0.09)		0.088 (0.28)
Trade (% of GDP)				0.016 (0.04)		
Constant	95.477** * (11.62)	88.764*** (16.46)	104.206*** (15.07)	77.525*** (22.04)	81.329*** (23.44)	70.653** (31.32)
Significant effect with year dummies	Yes	Yes	No	No	Yes	Yes
Observations	103	101	76	76	84	82
F statistic					18.593***	10.388***
Chi-squared	90.795** *	86.588***	39.852***	43.336***		
Hausman test statistic	3.07	3.02	1.56	2.58	16.71***	13.94**

*, **,***, statistically significant at the 10%, 5%, and 1%, level respectively. Coefficient estimates are shown with standard errors in parentheses. RE, Random effects; FE, Fixed effects

4.5 Conclusion

The results on the effect of the nutrition transition on child overweight are not clear and they depend on the indicator used. Fat consumption does not have a significant effect while share of modern retail in grocery sales has a negative and significant effect. On the other hand,

prevalence of women overweight has a strong and robust positive effect on child overweight. Contrary to this, we get clear and consistent results showing that the nutrition transition reduces underweight. Two indicators of the nutrition transition, fat consumption and share of modern retail in grocery sales, have a negative and significant effect on underweight when we control for GDP per capita and female literacy. This result is in most cases robust to including period effects and adding more controls in the model. The other indicator, prevalence of women overweight, has a negative and significant effect when we control for year dummies. These results show that the nutrition transition has an effect on child weight. The results on the effect of the nutrition transition on stunting are clear and consistent. All our nutrition transition indicators have a significant negative effect on stunting, and this effect is robust to adding more controls in our models. In addition, the result is robust to inclusion of year dummies in most of the models. This is a clear result that the nutrition transition reduces stunting.

By reducing underweight, these results support the first part of the notion that the nutrition transition will have an effect on child weight. However, our results do not support the other part of this notion, that the nutrition transition does not have an effect on child growth. Contrary to this notion, the results are showing that nutrition transition has a desirable effect on child growth. We have discussed possible pathways on how the nutrition transition can affect child growth. To start with, fat is an essential nutrient for optimal child growth. In addition to supplying essential fatty acids, it is a source of energy and its consumption allows absorption of fat-soluble vitamins. For children from poor settings who may not yet be meeting their fat requirements, increased fat consumption would largely have such beneficial outcomes. It is also possible that increase in the share of modern retail in grocery sales, which comes with increased supply of consumption of processed foods, would come with beneficial effects on child growth. Such diets are likely to come with increased supply of micronutrients, which is more likely for children from poor backgrounds with a low dietary diversity. Because of a positive association of women overweight and better socioeconomic status such as household assets, it is possible that children living in settings characterized by high women overweight receive better care and feeding practices.

Our indicators of the nutrition transition may be challenged, but we have argued why we think they are good proxies. Our sample sizes are also relatively small, largely due to unavailability of large datasets. But even with this limited data, we have done rigorous analysis to find results that partly support earlier views, and in addition challenge the view that the effects

of the nutrition transition in developing countries will mainly be undesirable. We see desirable effects towards reduction of stunting. The nutrition transition is evolving, the rates of children undernutrition are falling, and the prevalence of child overweight increasing. In addition, more data will become available in future. More research will be needed to explore these relations further, especially with larger datasets and if possible with additional indicators of the nutrition transition.

Appendix A4

Figure A4.1. Prevalence of stunting overtime

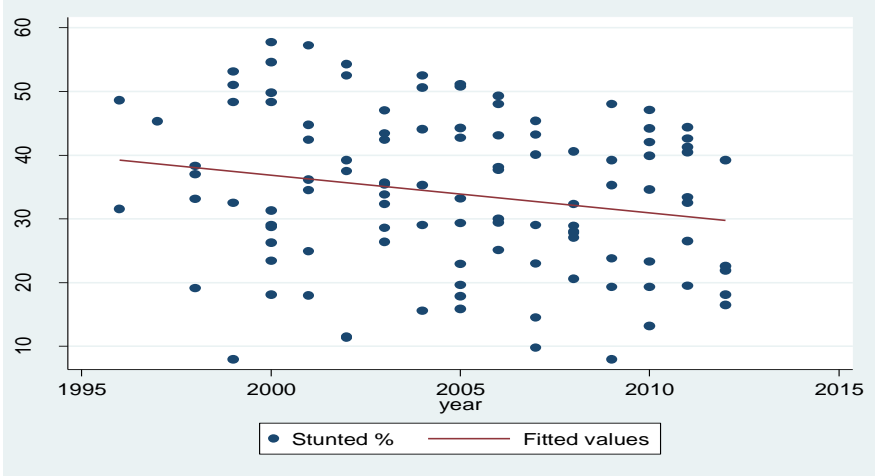


Figure A4.2. Prevalence of underweight over time

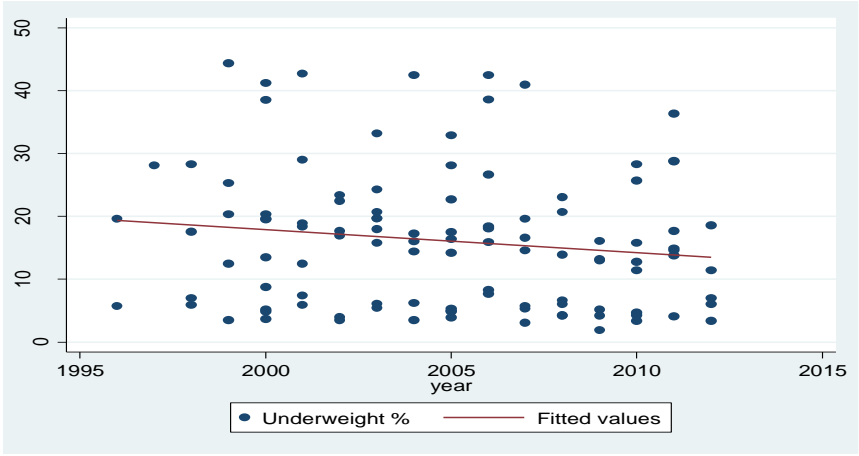
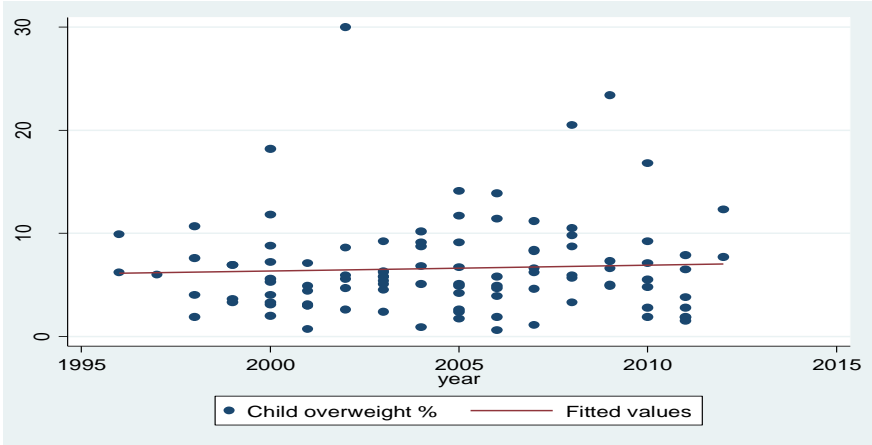


Figure A4.3. Prevalence of child overweight overtime



5 General Conclusion

5.1 Main Findings

Many developing countries are currently undergoing a rapid nutrition transition. This transition is characterized by changes in dietary habits towards more energy-dense, often processed foods with high fat and sugar contents, and more sedentary lifestyles. As a result, overweight and obesity rates have increased. In 2008, 34% of all adults were overweight or obese. For children below five years of age, an estimated 6.6% were either overweight or obese in 2011. At the same time, undernutrition rates are still high. Globally, about 26% of all children under five were stunted, while 16% were underweight in 2011. One important driver of the nutrition transition is globalizing food systems. The food retail sector is becoming more and more modernized, and supermarkets are playing an increasing role. Some developing countries have witnessed a ‘supermarket revolution’, depicting a rapid spread of supermarkets within a short period of time. The retail format has an influence on the types of products offered, as well as on sales prices and shopping atmosphere, which may affect consumer food choices.

Despite many hypotheses, the impact of spreading supermarkets on dietary behavior in developing countries has only been analyzed in very few studies. Studies on the impact of spreading supermarkets on nutritional outcomes in developing countries are even rarer. In the first two essays (chapters 2 and 3), this dissertation sought to evaluate the impact of spreading supermarkets on dietary behavior and nutritional outcomes. This analysis relies on a cross-sectional data collected in Kenya in 2012, a country that has witnessed a rapid spread of supermarkets recently and more than 25% of the women are overweight or obese. This study was specifically designed to answer these questions.

In a third essay (chapter 4), we turn the focus to the effect of the nutrition transition on child malnutrition. Due to many hypotheses and few empirical evidence showing that the nutrition transition has an effect on adult weight, it has been taken as a given conclusion that the nutrition transition will increase child weight but not growth, despite there being no empirical evidence on this. In the third essay, we evaluate the impact of the nutrition transition on child malnutrition indicators based on secondary panel data and using cross-country regressions.

Our results based on the primary survey in Kenya show that, first, supermarkets are drivers of the nutrition transition, causing dietary changes among consumers in developing

countries. In Kenya, supermarkets are causing consumers not only to eat more calories, but also to get a bigger share of their calories from processed foods. An increase in the share of supermarket expenditure by one percentage point increases the share of expenditure on processed foods by 0.38 percentage points. However, our results do not support the expected outcome that supermarkets increase consumption of highly processed foods. In addition, we find that a one percentage point increase in the share of supermarket purchases increases calorie consumption by 0.85%. This would translate to an additional daily consumption of 200 kilocalories for average consumers that currently do not purchase any food in supermarkets, if they were to switch to supermarkets, everything else held constant. This effect is partly driven by lower prices per calorie. Supermarket purchases also increase the dietary diversity of consumers. Second, we find that the direct impact of supermarket purchase on nutritional status depends on age cohorts and their initial nutritional status. Controlling for other factors, buying in a supermarket increases the BMI of adults by 1.7 kg/m^2 and raises the probability of adult overweight or obesity by 13 percentage points. For children and adolescents we do not find a significant impact on overweight. Instead, buying in a supermarket tends to decrease child undernutrition through an increase in HAZ and a reduction in severe stunting. Buying in a supermarket increases HAZ by 0.63 and it decreases the probability of severe stunting by 23 percentage points.

Results from the cross-country regressions show that the nutrition transition has an effect on child weight, as hypothesized. While the effects on child overweight are less clear, the nutrition transition significantly and consistently reduces underweight rates. In contrast to widely held views, we also find clear and consistent evidence that the nutrition transition reduces child stunting. This result is in agreement with the one based on our cross-section data from Kenya; that the nutrition transition has desirable effects in terms of reducing child stunting.

Taken together, these results support some previous hypotheses and notions while challenging others. The expectation in the literature is that the spread of supermarkets in developing countries would increase consumption of processed foods and total calories, and consequently overweight and obesity. Focusing on the first part of this expectation, we have found that indeed, supermarkets increase consumption of processed foods and total calories consumed. We do not find this effect with highly processed foods. Rather, we find that supermarkets increase dietary diversity. On the second part of the hypothesis, our results confirm

expectations that supermarkets increase BMI and the probability of overweight for adults. This result is not observed for children. Instead, we find that supermarkets have a desirable effect on increasing HAZ and reducing severe stunting. This means that the effect on nutritional status varies by age cohort and initial nutritional status. From our sample in Kenya, we observed relatively high overweight rates among adults, while stunting was a more widespread problem among children and adolescents. Results in the third essay confirm that the nutrition transition indeed affects weight, but only by reducing underweight. The expected result that the nutrition transition would increase child overweight is not consistent.

A widely held view is that the nutrition transition, and the associated spread of supermarkets, would have undesirable effects in developing countries. Undesirable effects have been confirmed, in that supermarket purchase increases adult BMI and the probability of adult overweight. We however find desirable results as well: supermarkets increase dietary diversity (probably through supplying a large number of processed foods) and total calories consumed. For children and adolescents, this leads to a desirable effect, in that supermarkets increase HAZ and reduce stunting. Based on the available literature, this result was not expected. Therefore, simple statements or judgments on whether supermarkets are good or bad for nutrition and health are not justified. The results from the secondary data analyses show that the nutrition transition has positive effects in terms of reducing child stunting. These results challenge the general view that the nutrition transition will only have undesirable health effects in developing countries. Again, we conclude that simplistic statements or judgments about the nutrition transition in developing countries may not be justified.

Our analysis should not be seen as the final judgment about the nutrition transition and supermarkets in developing countries, but only as early evidence. The nutrition transition is evolving, and supermarkets may gradually offer a greater variety of products, including more fresh and healthy foods, or even a larger amount of highly processed foods. Rates of child undernutrition will decrease and childhood obesity may continue to increase, if current global trends are maintained. In addition, more data will become available in future. More research will be needed to confirm these results, especially with larger datasets and possibly in different contexts for comparisons.

5.2 Policy and Research Implications

Our findings lead to several policy recommendations. First and foremost, policy making should be guided by rigorous research. The results in this dissertation are partly challenging widely held notions. Relying on such notions alone, without considering results of rigorous research, may lead to wrong policy decisions. This calls not only for policy makers to proactively work closely with scientists, but for scientists to seek mechanisms that allow their findings to reach policy makers.

The fact that our results show both desirable and undesirable effects of the nutrition transition makes it harder for policy making. Careful balancing would be needed so as to benefit from the desirable aspects of the nutrition transition, while putting mechanisms that mitigate the negative effects. The nutrition transition and the spread of supermarkets may come with other costs and benefits that are not analyzed here, but which may be of interest to policy makers. Such costs and benefits may include supermarket impacts on the rural economy, especially through household income distribution, and employment effects. Other research has shown that smallholder farmers and rural workers can improve their living standards through participating in supermarket supply chains. Despite such benefits, measures should be put in place to mitigate the negative health outcomes of the nutrition transition, especially in terms of rising overweight and obesity rates. These measures can either be directed at the consumer or the retail sector itself.

For consumers, one possible measure is the provision of broader nutrition education and awareness campaigns. Making consumers more nutritionally-aware so as to influence their preferences towards healthier foods is likely to have an effect on the behavior of the retail sector. This is because the retail sector usually does not just drive preferences, but also seeks to conform to existing and changing preferences, especially in the presence of competition. In such a case, a more nutritionally aware consumer base would affect what is stocked and promoted by retailers.

Beyond consumers, it is also possible that policy intervenes directly in the retail sector, for instance through specific regulations for supermarkets and other actors in the food industry. Such measures may include incentives or requirements to stock certain healthy products. As noted earlier, the supermarkets in our study sites did not stock fresh fruits and vegetables, which is unlike major supermarkets in bigger Kenyan cities. One direct policy intervention would be to give incentives to these smaller supermarkets to stock and promote healthier items such as unprocessed grains and fresh fruits and vegetables. Other possible direct interventions include

stricter rules on labeling of products, or a restriction against stocking or promoting certain products or category of products.

Our results have shown that supermarkets have an influence, which can result in either desirable or undesirable effects on dietary behavior and nutritional outcomes. Results from other studies indicate that the spread of supermarkets in developing countries is continuing. It is therefore important that global, regional or national food and public health policies or programs consider retail sector or supermarkets. An important research question would be how the influence of the retail sector on consumers could be harnessed to bring about desirable changes in nutrition knowledge and dietary habits.

Important research questions still remain to be answered. First, this dissertation is not to be taken as the conclusive judgment on the effect of the nutrition transition or supermarkets but just as early evidence. More research needs to be done in different contexts and with larger datasets to confirm these results. Future research should also explore the exact mechanisms, in addition to price, through which supermarkets affect dietary behavior and nutritional outcomes. Also, there is need for research to determine what is causing childhood overweight in developing countries, as results from this dissertation show that the nutrition transition may not be the main driver.

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General Appendix
Household Questionnaire (Kenya)

KENYA HOUSEHOLD CONSUMPTION SURVEY 2012

IF < 6 MONTHS,
REPLACE HH AND
▶ (1.22)

(1.01) FOR HOW LONG IS HOUSE-HOLD RESIDING IN THIS TOWN?	
YEARS	MONTHS

(1.02) HOUSEHOLD ID		
TOWN	ESTATE	NUMBER FROM LISTING

(1.03) NAME OF HOUSEHOLD HEAD
REPORT 1 st , 2 nd AND 3 rd NAME
FULL NAME

(1.04) ADDRESS
(1.04)a SUBLOCATION:
(1.04)b ESTATE: (NAME)
(1.04)c FEATURES THAT HELP FINDING HOUSEHOLD AGAIN

(1.05) INTERVIEWER	ID
NAME	

(1.06) INTERVIEW COMPLETED 1	PARTLY COMPLETED (GIVE REASONS) 2
COMPLETION	

VISIT 1 (ONE DAY)							
(1.07) a			(1.07) b		(1.07) c		(1.07) d
DAY	MONTH	YEAR	TIME STARTED		TIME ENDED		TOTAL BREAKS
			HOURS	MINUTES	HOURS	MINUTES	MINUTES

VISIT 2 (ONE DAY)							
(1.08) a			(1.08) b		(1.08) c		(1.08) d
DAY	MONTH	YEAR	TIME STARTED		TIME ENDED		TOTAL BREAKS
			HOURS	MINUTES	HOURS	MINUTES	MINUTES

VISIT 3 (ONE DAY)							
(1.09) a			(1.09) b		(1.09) c		(1.09) d
DAY	MONTH	YEAR	TIME STARTED		TIME ENDED		TOTAL BREAKS
			HOURS	MINUTES	HOURS	MINUTES	MINUTES

(1.10) NUMBER OF QUESTIONNAIRES USED FOR THIS HOUSEHOLD			
NUMBER		OF	

(1.11) MAIN LANGUAGE OF THE INTERVIEW	
ENGLISH 1	
KISWAHILI 2	
KIKUYU 3	

(1.12) TOWN OF SURVEY	
OL KALOU 1	
NJABINI 2	
MWEA 3	

(1.13) SUPERVISOR
SIGNATURE

SUPERVISOR CHECKED	DAY	MONTH	YEAR
(1.14)			

(1.15) DATA ENTRANT	ID
SIGNATURE	

SUPERVISOR CHECKED	DAY	MONTH	YEAR
(1.16)			

(1.17) DATA ENTRANT	NO. OF INCONSISTENCIES DETECTED
NOTES	

(1.18) GPS NUMBER	GPS COORDINATES OF DWELLING
	SAVE THE WAYPOINT IN THE GPS USING HHID
	(1.19) N
	(1.20) E

(1.21) CENSUS ID FROM HOUSEWALL
IF NO CENSUS ID, CROSS OUT

(1.22) IS THIS HOUSEHOLD A REPLACEMENT?
YES 1 FILL IN HOUSEHOLD ID OF HOUSEHOLD REPLACED IN (1.24)
NO 2 ▶ (1.25)

(1.23) WHY WAS HOUSEHOLD REPLACED?	
HOUSE NOT FOUND 1	NO SUITABLE INTERVIEW PARTNER PRESENT 6
HOUSE NOT INHABITATED 2	
INTERVIEW WAS REFUSED 3	HH MOVED TO TOWN LATER < 6 MONTHS AGO 7
SECURITY PROBLEM 4	
ALL MEMBERS REFUSED MEASUREMENTS 5	BUSINESS BUILDING 8
	OTHER (SPECIFY) 96

(1.24) ID OF REPLACED HOUSEHOLD		
TOWN	ESTATE	NUMBER FROM LISTING

LAST YEAR:		RESPONDENT ID:	
LAST MONTH:	EVENING		

ID CODE	(1.25)	(1.26)	(1.27)
	Could you please give me the names of all people currently living in this household?	How old is [NAME]?	What is [NAME]'s gender? Male 1 Female 2
	RECORD HOUSEHOLD HEAD IN FIRST LINE	IF BABY LESS THAN 1 YEAR ENTER ZERO	
		ESTIMATE FOR ELDERLY USING THEIR CHILDREN'S AGE OR AN EVENT	
	IF MORE THAN 15 HOUSEHOLD MEMBERS USE SECOND QUESTIONAIRE	YEARS	
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SECTION 1: Household Composition

RESPONDENT ID:

ID CODE	(1.28)	(1.29)			(1.30)	(1.31)	(1.32)	
	How is [NAME] related to the household head?	ONLY ASK FOR AGE 5 AND HIGHER			Is [NAME] currently enrolled in educational institute (incl vocational training and university)?	During the last year , how many days was [NAME] not present in the household?	During the last month , how many days was [NAME] not present in the household?	
	Head	What is the highest level of formal education [NAME] completed ?						
	Spouse	IF NEVER BEEN TO SCHOOL ENTER 0 ▶ (1.31)						
	Co-wife							
	Son/daughter	IF CURRENTLY IN STANDARD 1 ENTER 97						
	Spouse of son/daughter							
	Grandchild							
	Brother/sister	Primary	Secondary	Tertiary				
	Father/mother	Std. 1	1 Form 1	10 College 1				17
	Father/mother of spouse	Std. 2	2 Form 2	11 College 2				18
	Child of relative	Std. 3	3 Form 3	12 College 3				19
	Child of non-relative	Std. 4	4 Form 4	13 University 1				20
	Househelp CROSS OUT AND ▶ NEXT PERSON	Std. 5	5 Form 5	14 University 2				21
		Std. 6	6 Form 6	15 University 3				22
Std. 7		7 Vocational	16 University 4	23				
Other relative	Std. 8	8	University 5	24				
Other non-relative	Vocational	9	and above	24				
				Yes, 1 Day School	IF > 180 DAYS, AND NOT HH-HEAD, CROSS OUT THIS PERSON AND ▶ NEXT PERSON			
				Yes, 2 Boarding School				
				No 3	DAYS ABSENT	DAYS ABSENT		
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HHID: _____

Household Composition

OCCUPATION CODES

ID CODE	(1.33)	(1.34)	(1.35)	(1.36)
	ONLY ASK FOR AGE 10 AND OLDER			
	What is [NAME]'s main profession ?	During last 6 months, did [NAME] mainly work in [MAIN PROFESSION] ?	What was the main job [NAME] worked in during last 6 months?	ONLY ASK IF MAIN JOB IS NOT A STUDENT OR HOUSEWIFE Did [NAME] contribute to covering household expenses any time during the last 6 months?
	USE OCCUPATION CODES ON THE RIGHT		USE OCCUPATION CODES ON THE RIGHT	
IF NO PROFESSION CODE 97	Yes 1	IF NOT WORKING DURING LAST SIX MONTHS, CODE 97 AND	Yes 1	
► (1,35)	► (1,36)	► (1,37)	Yes 1	
CODE	No 2	CODE	No 2	
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- 96 Other(specify)
- 1 Accountant
 - 2 Agricultural trading (incl timber)
 - 3 Banker
 - 4 Bicycle repair
 - 5 Blacksmith
 - 6 Boda boda operator (bicycle)
 - 7 Boda boda operator (motor)
 - 8 Butcher
 - 9 Carpentry
 - 10 Casual worker-farm
 - 11 Casual worker-non-farm
 - 12 Cleaning Personnel
 - 13 Clerical/secretarial
 - 14 Clothes/shoes business (trading)
 - 15 Cobbler
 - 16 Cook
 - 17 Doctor
 - 18 Door-to-door salesman (eg insurances)
 - 19 Driver
 - 20 Electrician
 - 21 Farmer (working on own farm)
 - 22 Hair dresser / barber
 - 23 Handicraft trader
 - 24 Hawker (incl street and office)
 - 25 Househelp
 - 26 Housewife
 - 27 Livestock trader
 - 28 Making handicraft
 - 29 Manegerial/higher office
 - 30 Masonry
 - 31 Midwife
 - 32 Nurse
 - 33 Painter
 - 34 Photographer/video maker
 - 35 Plumber
 - 36 Posho miller operator
 - 37 Retail shop/kiosk/shopkeeping
 - 38 Student
 - 39 Surveyor
 - 40 Tailor
 - 41 Teacher
 - 42 Tour guide
 - 43 Turn boy/Tout
 - 44 Vehicle mechanic
 - 45 Veterinary doctor
 - 46 Waiter/ bartender
 - 47 Watchman/security
 - 48 Welder

SECTION 1: Household Composition

ID CODE	(1.37)	(1.38)	(1.39)	(1.40)	(1.41)	(1.42)	(1.43)	(1.44)	(1.45)						
	ONLY ASK FOR AGE 13 & OLDER														
	What is [NAME]'s present marital status?	Spouse's ID code	IF [NAME] CANNOT POSSIBLY HAVE FATHER/MOTHER WITHIN HH CODE 98		What is [NAME]'s ethnicity?		What is [NAME]'s religion?		During the last month , how many times did [NAME] eat meals within the household ?						
	Never married 1 ► (1.39)	IF MULTIPLE WIVES ENTER ALL, SEPARATING USING "/"	DON'T ASK IF HH ONLY CONSIST OF A MARRIED COUPLE AND CHILD BELONGS TO ONE OF THEM, BUT CODE THEIR IDs.		Embu 1	Catholic 1	During the last month , how many times did [NAME] eat meals outside the household ?		During the last month , how much in total was spend on all food (meals and snacks) as well as drinks that were prepared and [NAME] was consuming outside the household ?						
	Married 2				Indian 2	Kalenjin 3					Kamba 4	Protestant 2			
	Divorced/ Separated 3 ► (1.39)				Who is [NAME]'s father/ male care-giver?	Who is [NAME]'s mother/f emale care-giver?					Luhya 7	christian	Muslim 4	DEFINE MEALS	
	Widowed 4 ► (1.39)				IF NOT ON THE FLAP CODE 98						Luo 8	Hindu 5	Tradition- alist 6		
	Other (specify) 96 ► (1.39)										Meru 10	Somali 11	No religion 7		
	ID CODE	ID CODE	ID CODE	ID CODE	Other (specify) 96	Other (specify) 96	NUMBER OF TIMES	NUMBER OF TIMES	KSh						
	1														
2															
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Respondent Selection

SELECTION OF HOUSEHOLD MEMBERS FOR CONSUMPTION RELATED SECTIONS

(1.46)	Who is mostly preparing food consumed in this household?	IF NOT ON FLAP CODE 98
		<input type="text"/> MEMBER ID CODE
(1.47)	Who is mostly buying food items that are consumed in this household?	IF NOT ON FLAP CODE 98
		<input type="text"/> MEMBER ID CODE
(1.48)	Who is mostly deciding what food items are bought for consumption in this household?	<input type="text"/> MEMBER ID CODE
(1.49)	Who is mostly deciding how food items are prepared for consumption in this household?	<input type="text"/> MEMBER ID CODE

SELECTION OF HOUSEHOLD MEMBERS FOR WEIGHT MEASUREMENT

- PLEASE LIST ALL HOUSEHOLD MEMBERS BY THEIR MEMBER ID ACCORDING TO THEIR SEX AND AGE IN (1,5)-(1,520).
- FOR EACH CASE (MALE ADULT, FEMALE ADULT, CHILD/ADOLESCENT):

- CROSS OUT THE ONES THAT WERE CROSSED OUT IN (1,28), OR IN (1,31) CODE 97 AS REASON.
- COUNT OUT TO RANDOM NUMBER GOING THROUGH THE REMAINING LIST OF HOUSEHOLD MEMBERS AND ENCIRCLE THE PERSON YOU ARRIVE AT.
- PROBE FOR CONSENT TO INTERVIEW AND TO TAKE THE MEASUREMENTS OF THIS HOUSEHOLD MEMBER LATER. IN THE CASE OF CHILD/ ADOLESCENT, YOU NEED TO ASK CAREGIVER FOR CONSENT. IF CONSENT IS GIVEN, PROCEED.
- IF INTERVIEWING THIS HOUSEHOLD MEMBER IS NOT POSSIBLE, CROSS HIM/HER OUT, REPORT THE REASON AND REPEAT THE COUNTING EXERCISE AMONG THE REMAINING LIST OF HOUSEHOLD MEMBERS TO FIND A REPLACEMENT
- IF THE CASE MAY BE, REPEAT THE LAST STEP UNTIL YOU FIND A HOUSEHOLD MEMBER THAT YOU WILL BE ABLE TO INTERVIEW/ TAKE MEASUREMENTS FROM.

(1.50)		(1.51)		(1.52)		
ADULT MALES (AGE 19 AND OLDER)		ADULT FEMALES (AGE 19 AND OLDER)		CHILDREN/ADOLESC. (AGE 0-18)		
RANDOM NUMBER:		RANDOM NUMBER:		RANDOM NUMBER:		
REASON FOR CROSS OUT:		REASON FOR CROSS OUT:		REASON FOR CROSS OUT:		REASON FOR CROSS OUT:
						Will not be present in household 1
						Child too young Age 0-4 2
						Refused 97
						Does not qualify as household member within the scope of this study 97
						Other (specify) 96



IF CHILD BELOW AGE OF 13, INTERVIEW CAREGIVER FOR SECTIONS 13-17 ON BEHALF OF CHILD/ ADOLESCENT SP

BEFORE YOU PROCEED WITH THE INTERVIEW, MAKE SURE TO SCHEDULE APPOINTMENTS FOR INTERVIEWING THE RESPONDENTS SELECTED FOR WEIGHT MEASUREMENT IF NECESSARY

HHID: _____

SECTION 2: Food Consumption Within Household

 RESPONDENT ID:

READ OUT: IF YOU HOSTED A **BIG FUNCTION** DURING THE LAST MONTH (EG WEDDING, GRADUATION) PLEASE **DO NOT** INCLUDE THE ADDITIONAL FOOD CONSUMED DURING THAT EVENT. I WILL ALSO ASK YOU FOR THE VALUE OF FOOD YOU CONSUMED FROM PURCHASES DURING THE LAST MONTH. WITH THIS I DO NOT MEAN HOW MUCH FOOD YOU PURCHASED DURING THE LAST MONTH, BUT HOW MUCH THE FOOD YOUR HOUSEHOLD **ACTUALLY CONSUMED FROM PURCHASES** WAS WORTH.

(2.01)	
During last month , did your household consume any own produced food (fruits, vegetables, animal products eg meat, eggs, milk)?	Yes 1 ► PROBE FOR ALL PRODUCTS AND LIST ON FLAP No 2

(2.02)	(2.03)	(2.04)	(2.05)	(2.06)			(2.07)	(2.08)			
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).	How much of [...] in total did your household consume during the last month ?	How much of the [...] that you consumed last month came from purchases?	How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?	Where exactly did you purchases [THIS AMOUNT OF ITEM]? PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.			During last month , how much [...] was consumed that came from own production?	During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?			
								Yes	1		
								No	2		
								NEXT ITEM			
								UNIT (CODES AT THE RIGHT)			
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(2.02)		(2.03)		(2.04)		(2.05)	(2.06)			(2.07)		(2.08)					
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]? KSh	Where exactly did you purchases [THIS AMOUNT OF ITEM]? PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.			During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?					
							(2.06)a							(2.06)b		(2.06)c	
							LARGE SUPERMARKET	SMALL SUPERMARKET	TRADITIONAL RETAIL					QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)
Yes	1	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	KSh	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)					
No	2																
	NEXT ITEM																
23	SWEET POTATOES																
24	ARROW ROOTS													KILOGRAMS KG			
25	CASSAVA TUBER, FLOUR													GRAMS GR			
26	YAMS													MILLILITER ML			
27	COOKING BANANA													LITER L			
28	OTHER ROOTS AND TUBERS (SPECIFY)													5 KG BAG B5			
	PULSES AND NUTS													10 KG BAG B10			
29	BEANS DRY													25 KG BAG B25			
30	BEANS FRESH													50 KG BAG B50			
31	BLACK BEANS (NJAHI)													90 KG BAG B90			
32	GREEN GRAMS													DEBE DB			
33	PEAS (INCL COWPEA AND PIGEONPEA)													TABLE SPOON TAS			
34	LENTILS													TEA SPOON TS			
35	RAW NUTS (EG GROUNDNUT, CASHEW NUT) NON SALTED													COOKING SPOON CS			
36	OTHER PULSES (SPECIFY)																
	VEGETABLES													PIECE/NUMBER PI			
37	ONION													GOROGORO GO			
38	GARLIC													1/4 KG TIN T0.25			
39	CABBAGES													1/2 KG TIN T0.5			
40	CARROTS													1 KG TIN T1			
41	TOMATOES													CUP 15 C15			
42	SPINACH													OTHER			
43	KALE-SUKUMA WIKI													(Specify) 96			
44	COWPEA LEAVES																
45	PUMPKIN LEAVES/ KAHURURA																
46	MANAGU/ OSUGA																
47	AMARANTH LEAVES																

(2.02)		(2.03)		(2.04)		(2.05)		(2.06)						(2.07)		(2.08)		
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		Yes 1 No 2 ▶ NEXT ITEM	How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?		Where exactly did you purchases [THIS AMOUNT OF ITEM]?						During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?	
			PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.															
			(2.06)a		(2.06)b		(2.06)c											
			QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	KSh	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	
48	GINGER																UNIT CODES	
49	CUCUMBER																KILOGRAMS	KG
50	CAPSICUMS (PILIPILI HOHO)																GRAMS	GR
51	FRENCH BEANS																MILILITER	ML
52	COURGETTE																LITER	L
53	PUMPKINS																5 KG BAG	B5
54	CORIANDER LEAVES (DANIA)																10 KG BAG	B10
55	OTHER VEGETABLES (SPECIFY)																25 KG BAG	B25
	MEAT																50 KG BAG	B50
56	BEEF																90 KG BAG	B90
57	PORK																DEBE	DB
58	MUTTON/GOAT MEAT																TABLE SPOON	TAS
59	FROZEN CHICKEN																TEA SPOON	TS
60	NON-FROZEN CHICKEN KIENYEJI																COOKING SPOON	CS
61	OTHER NON-FROZEN CHICKEN																	
62	OFFAL'S (EG LIVER, KIDNEY)-MATUMBO																PIECE/NUMBER	PI
63	SAUSAGES (INCL SMOKIES; MINI BITES)																GOROGORO	GO
64	FROZEN SAUSAGES																	
65	BACON, HAM, SALAMI, BRAUN																1/4 KG TIN	T0.25
66	RABBIT																1/2 KG TIN	T0.5
67	SOYA MEAT																1 KG TIN	T1
68	OTHER MEAT (SPECIFY)																CUP 15	C15
	FISH																OTHER (Specify)	96
69	FRESH FISH (NON TAKEAWAY)																	
70	FROZEN FISH (NON TAKEAWAY)																	
71	OMENA																	
72	OTHER FISH (SPECIFY)																	
	DAIRY PRODUCTS AND EGGS																	
73	MILK WHOLE																	
74	MILK LOW FAT / SKIMMED																	
75	MILK FLAVOURED																	

(2.02)		(2.03)		(2.04)		(2.05)	(2.06)						(2.07)		(2.08)		
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		Yes 1 No 2 ▶ NEXT ITEM	How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?	Where exactly did you purchases [THIS AMOUNT OF ITEM]?						During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?	
			PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.					(2.06)a		(2.06)b		(2.06)c					
			LARGE SUPERMARKET		SMALL SUPERMARKET		TRADITIONAL RETAIL		QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY
76	MILK DRIED (POWDER)															UNIT CODES	
77	BABY MILK - TINNED															KILOGRAMS	KG
78	MILK SOUR - MALA															GRAMS	GR
79	NATURAL YOGHURT															MILILITER	ML
80	FLAVOURED YOGHURT															LITER	L
81	BUTTER															5 KG BAG	B5
82	EGGS															10 KG BAG	B10
83	OTHER DAIRY (INCL SOYA MILK, GHEE, SPECIFY)															25 KG BAG	B25
FRUITS																50 KG BAG	B50
84	SWEET BANANA (SMALL)															90 KG BAG	B90
85	OTHER BANANA - RIPE															DEBE	DB
86	ORANGES															TABLE SPOON	TAS
87	TANGERINE															TEA SPOON	TS
88	PAWPAWS															COOKING SPOON	CS
89	AVOCADO															PIECE/NUMBER	PI
90	MANGOES															GOROGORO	GO
91	PINEAPPLES															1/4 KG TIN	T0.25
92	PASSION FRUITS/ MELO															1/2 KG TIN	T0.5
93	PEARS															1 KG TIN	T1
94	TAMARILLO/ TREE TOMATO															CUP 15	C15
95	APPLES															OTHER	96
96	LEMONS															(Specify)	
97	MELONS																
98	OTHER FRUITS (SPECIFY)																
SUGAR																	
99	SUGAR																
100	SUGAR WITH ADDED VITAMINS																
101	SUGAR CANE																
102	GLUCOSE POWDER																
103	OTHER SUGAR (INCL JAGGERY, SPECIFY)																

(2.02)		(2.03)		(2.04)		(2.05)	(2.06)						(2.07)		(2.08)			
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?	Where exactly did you purchases [THIS AMOUNT OF ITEM]?						During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?			
							PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.											
							(2.06)a		(2.06)b		(2.06)c							
		UNIT (CODES AT THE RIGHT)		UNIT (CODES AT THE RIGHT)		KSh	LARGE SUPERMARKET		SMALL SUPERMARKET		TRADITIONAL RETAIL		UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)		
Yes 1		No	2	QUANTITY	QUANTITY	KSh	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)		
JAM, HONEY AND SWEETS																UNIT CODES		
104 JAM/ MARMELADE																KILOGRAMS		KG
105 HONEY																GRAMS		GR
106 PEANUT BUTTER																MILILITER		ML
107 CHOCOLATE BARS AND CHOCOLATE DROPS																LITER		L
108 CAKES, COOKIES, BISCUITS																5 KG BAG		B5
109 ICE CREAM																10 KG BAG		B10
110 SWEETS																25 KG BAG		B25
111 OTHER SWEETS (SPECIFY)																50 KG BAG		B50
NON-ALCOHOLIC BEVERAGES																90 KG BAG		B90
FRUIT JUICES - ASK: "WHAT KIND OF FRUIT JUICES DID YOUR HOUSEHOLD CONSUME LAST MONTH?" PROBE FOR ANY OTHER.																DEBE		DB
112 FRUIT JUICE WITHOUT ADDED SUGAR																TABLE SPOON		TAS
113 FRUIT JUICE WITH ADDED SUGAR																TEA SPOON		TS
114 FRUIT FLAVOURED DRINK (EG QUENCHER, PICANA, HIGHLANDS)																		
115 DRINKING CHOCOLATE POWDER (INCL MILO, CHOCO PRIMO)																COOKING SPOON		CS
116 SOYA DRINK POWDER																		
117 COFFEE POWDER																PIECE/NUMBER		PI
118 TEA LEAVES OR BAGS																GOROGORO		GO
119 BOTTLED WATER																1/4 KG TIN		T0.25
120 HEALTH DRINK (EG LUCOZADE, RIBENA)																1/2 KG TIN		T0.5
121 ENERGY DRINK (EG RED BULLS, SHARK)																1 KG TIN		T1
122 COCA COLA, FANTA OR OTHER SODAS WITH SUGAR																CUP 15		C15
123 OTHER NON-ALCOHOLIC BEVERAGES (SPECIFY)																OTHER		96
ALCOHOLIC BEVERAGES - PROBE FIRST IF ANY ALCOHOLIC BEVERAGES WERE CONSUMED IN HOUSEHOLD DURING LAST MONTH																(Specify)		
124 SPIRITS, LIQUOR AND WINE																		
125 BEER (EG TUSKER, WHITE CAP)																		
126 TRADITIONAL BREW (EG MURATINA, BUZAA, CHANGAA)																		

(2.02)		(2.03)		(2.04)		(2.05)		(2.06)			(2.07)		(2.08)			
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		Yes	1	How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?		Where exactly did you purchases [THIS AMOUNT OF ITEM]?			During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?	
										PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.						
										(2.06)a	(2.06)b	(2.06)c				
				QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	KSh	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)	QUANTITY	UNIT (CODES AT THE RIGHT)		
127	OTHER ALCOHOLIC BEVERAGES (SPECIFY)															
SPICES & MISCELLANEOUS														UNIT CODES		
128	SALT														KILOGRAMS	KG
129	KETCHUP, TOMATO SAUCE														GRAMS	GR
130	CHILI SAUCE														MILLILITER	ML
131	STEW SPICE MIX, SOUP POWDER, ROICO, OTHER SALTY SPICE MIXES														LITER	L
132	OTHER SPICES (SPECIFY)														5 KG BAG	B5
COOKING OIL AND FATS - ASK: "WHAT COOKING FAT/ OIL DID YOU USE LAST MONTH?" PROBE FOR ANIMAL FAT AND ANY OTHER.														10 KG BAG	B10	
133	MARGARINE BLUE BAND														25 KG BAG	B25
134	MARGARINE BLUE BAND LOW FAT														50 KG BAG	B50
135	MARGARINE YELLOW BAND														90 KG BAG	B90
136	MARGARINE BIDDY														DEBE	DB
137	MARGARINE PRIME														TABLE SPOON	TAS
138	ANIMAL FAT														TEA SPOON	TS
139	VEGETABLE FAT														COOKING SPOON	CS
140	VEGETABLE FAT, CHOL. FREE														PIECE/NUMBER	PI
141	VEGETABLE OIL														GOROGORO	GO
142	CORN OIL														1/4 KG TIN	T0.25
143	SUNFLOWER OIL														1/2 KG TIN	T0.5
144	PALM OIL														1 KG TIN	T1
145	PALM OIL, CHOLEST. FREE														CUP 15	C15
146	OLIVE OIL														OTHER	
147	OTHER COOKING OIL AND FAT (SPECIFY)														(Specify)	96
TINNED PRODUCTS/ PRODUCTS IN GLASS - PROBE FIRST IF ANY TINNED PRODUCTS/ PRODUCTS IN GLASS WERE CONSUMED DURING LAST MONTH																
148	VEGETABLES (EG BEANS, BABYCORN, PEAS) TINNED OR IN GLASS															
149	FRUIT TINNED OR IN GLASS															
150	SOUPS TINNED OR IN GLASS															
151	FISH TINNED OR IN GLASS															

(2.02)		(2.03)		(2.04)		(2.05)		(2.06)						(2.07)		(2.08)	
During last month , did you or others in your household consume any [...] ? READ OUT: PLEASE INCLUDE FOOD THAT WAS EATEN TOGETHER BY ALL HOUSEHOLD MEMBERS BUT ALSO FOOD THAT WAS EATEN BY INDIVIDUAL HOUSEHOLD MEMBERS ALONE. PLEASE INCLUDE FOOD PREPARED AT HOME BUT EATEN OUTSIDE (EG LUNCHBOXES). DO NOT INCLUDE MEALS THAT WERE BOTH PREPARED AND EATEN OUTSIDE THE HOME (EG RESTAURANT VISITS).		How much of [...] in total did your household consume during the last month ?		How much of the [...] that you consumed last month came from purchases?		How much did you spend on [THIS AMOUNT OF PURCH. ITEM]?		Where exactly did you purchases [THIS AMOUNT OF ITEM]?						During last month , how much [...] was consumed that came from own production?		During last month , how much [...] was consumed that came from gifts or other sources (eg in-kind payment, food aid program) ?	
								PROBE IF ALL PURCHASES CAME FROM ONE SOURCE.									
								(2.06)a		(2.06)b		(2.06)c					
						KSh		LARGE SUPERMARKET	SMALL SUPERMARKET	TRADITIONAL RETAIL							
		UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)	UNIT (CODES AT THE RIGHT)		
152	OTHER PRODUCTS TINNED OR IN GLASS (SPECIFY)																
OTHER (PARTIALLY) PREPARED FOOD																	
153	CRISPS																
154	PUFFED SALTED CORN CHIPS																
155	SALTED NUTS (INCL SIMSIM)																
156	POPCORN																
157	INSTANT NOODLES (EG INDOMIE)																
158	OTHER PREPARED FOOD (SPECIFY)																
TAKEAWAY FOOD - PROBE FIRST HOUSEHOLD CONSUMED ANY FOOD INSIDE THE HOUSE THAT WAS PREPARED OUTSIDE DURING LAST MONTH, INCL EG PRE-COOKED BEANS.																	
159	BOILED GITHERI																
160	BOILED PULSES (EG BEANS, BLACK BEANS, GREEN GRAMS)																
161	PREPARED VEGETABLES (EG SUKUMA, CABBAGE)																
162	PREPARED MEAT (EG NYAMA CHOMA, FRIED SAUSAGES)																
163	DEEP FRIED FISH																
164	CHIPS																
165	CHAPATI																
166	MANDAZI																
167	SAMOSAS																
168	OTHER TAKEAWAYS (SPECIFY)																
CATERING FOR NON-HOUSEHOLD MEMBERS - REMEMBER HOUSEHOLD TO EXCLUDE BIG FUNCTIONS																	
(2.09)	During last month , did you cater for someone other than your household members for a period of two weeks in total or more ? (eg household help, relative)	Yes	1			(2.12)	During last month , how many times did you cater for other non-household members (eg having friends over for dinner)?	IF "0" <input type="text"/>		▶ NEXT SECTION							
		No	2														
(2.10)	During last month , for how many non-household members did you cater for a period of two weeks in total or more ?					(2.13)	During last month , for how many other non-household members did you usually cater each time ?										
(2.11)	When you reported the food consumed within your household during the last month , did you include the food that you used for catering for [THESE NON-HOUSEHOLD MEMBERS]?	Yes	1			(2.14)	When you reported the food consumed within your household during the last month , did you include the food that you used for catering for [THESE NON-HOUSEHOLD MEMBERS]?	Yes	1								
		No	2					No	2								

SECTION 3: Shopping Behaviour and Attitudes

RESPONDENT ID:

INTRODUCTION: DEFINE RETAIL OUTLETS

(3.01)	During the last month , how many times did you buy food and drinks in [...] ?	(3.01)a	LARGE SUPERMARKET	<input type="text"/>	times		
	READ OUT	(3.01)b	SMALL SUPERMARKET	<input type="text"/>	times		
		(3.01)c	KIOSK/ SHOP	<input type="text"/>	times		
	IF NO FOOD BOUGHT IN THIS OUTLET, ENTER 0	(3.01)d	OTHER TRADITIONAL RETAIL	<input type="text"/>	times	LAST MONTH	
(3.02)	Since you shop in [...], what are the most important reasons for you to shop there?	FOR EACH OUTLET ONLY IF (3.01) IS NOT ZERO					
		ALLOW UP TO THREE RESPONSES PER OUTLET					
				1st	2nd	3rd	
	Lower prices 1	(3.02)a	LARGE SUPERMARKET	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	More variety of food products (e.g. flavour, brands) 2	(3.02)b	SMALL SUPERMARKET	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	Availability of more kinds of food products 3	(3.02)c	KIOSK/ SHOP	<input type="text"/>	<input type="text"/>	<input type="text"/>	
	Possibility to read labels 4		Proximity to work 9			Possibility to talk to the shop owner or staff 18	
	It has everything that I need under one roof 5		Availability of large packaging sizes 10			Habit - I always used to shop there 19	
	Shopping Atmosphere/ spacious 6		Availability of small packaging sizes 11			Self-service 20	
	I happen to be in the neighbourhood/outlet was along my travel route 7		Social status/ prestige/ lifestyle 12			Personal service (by staff or owner) 21	
	Proximity to home 8		Availability of more kinds of non-food products 13			Meeting people 22	
			Higher perceived quality 14			I just need a small number of items 23	
			Higher perceived food safety 15			Know the shop owner or staff 24	
			Get credit 16			Long opening hours 25	
			Get discount 17			Other (specify) 96	
(3.03)	If you try new food products , how do you generally learn about them?	ALLOW UP TO THREE RESPONSES					
		1st	2nd	3rd			
	Rarely try new food-products 1		Other promotion 6			Friends 11	
	See it in large supermarkets 2		Special offer in large supermarket 7			Radio advertisement 12	
	See it in other stores 3		Special offer in other store 8			Medical adviser 13	
	TV advertisement 4		Relatives 9			Newspaper advertisement/ Poster 14	
	Promotion in large supermarket 5		Neighbours 10			Other (specify) 96	
	(3.04)	When you actually buy a product : How much do/does [...] influence your buying choice?	READ OUT				
			FOR EACH FACTOR, TICK THE ONE THAT APPLIES				
			VERY MUCH	CONSIDER-ABLY	A LITTLE BIT	NOT AT ALL/ NEVER THOUGHT ABOUT IT	
(3.04)a		PRICE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)b		TASTE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)c		ABILITY TO KEEP THE STOMACH FULL FOR A LONG PERIOD	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)d		HABITS	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)e		NUTRITIONAL VALUE OF A FOOD ITEM	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)f		PRODUCTS CONTRIBUTION TO A BALANCED DIET OF ALL FOOD PRODUCTS	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)g		FRESHNESS (EG MEAT, FRUITS, VEGETABLES)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)h		ABILITY TO KEEP IN STORAGE (LONGEVITY)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)i		THE FACT THAT THE FOOD IS EASY TO PREPARE	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
(3.04)k		FOOD SAFETY	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

SECTION 3: Shopping Behaviour and Attitudes

When you actually buy a product : How much do/does [...] influence your buying choice?		READ OUT				
		FOR EACH FACTOR, TICK THE ONE THAT APPLIES				
		VERY MUCH	CONSIDER-ABLY	A LITTLE BIT	NOT AT ALL/ NEVER THOUGHT ABOUT IT	
(3.04)l	BRAND/ MANUFACTURER	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	
(3.04)m	THE FACT THAT THE FOOD IS TRADITIONAL (EG ARROW ROOTS, SWEET POTATOES)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	
(3.04)n	THE FACT THAT THE FOOD IS MODERN (EG WEETABIX, NOODLES, CRISPS, TINNED FRUITS AND VEGETABLES)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	
(3.04)o	WHO SELLS THE FOOD	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	
In your opinion, what do you think are (in Njabini: would be) the main advantages of having a large supermarket in this town , if any?		ALLOW UP TO THREE RESPONSES				
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>		
(3.05)	There are no advantages	1	Long opening hours	9	Provides opportunities to supply own produce to them	17
	Lower prices of food items	2	Attracts people from neighbouring locations	10	Having everything under one roof	18
	More variety of food products (eg flavour, brand)	3	Possibility to read labels	11	Symbolises more modern lifestyle	19
	Availability of more kinds of food items	4	Attracts other businesses	12	It symbolises that the town is prospering	20
	Shopping atmosphere/ spacious	5	Provides employment opportunities	13	Availability of large packaging sizes	21
	Availability of more kinds of non-food items	6	Higher perceived food quality	14	Self - service	22
	More stable food supply	7	Higher perceived food safety	15	Products move faster/ are more fresh	23
	More stable prices of food items	8	Possibility to compare prices	16	Other (specify)	96
In your opinion, what do you think are (in Njabini: would be) the main disadvantages of having a large supermarket in this town, if any?		ALLOW UP TO THREE RESPONSES				
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>		
(3.06)	There are no disadvantages	1	Lower perceived food quality	5	Attracts people from neighbouring locations	10
	Pushes small stores out of business	2	Lower perceived food safety	6	People buy less of my farm produce	11
	Pushes farmers out of business	3	Symbolises more modern lifestyle	7	Traditional food disappears	12
	Increases prices of food items	4	Encourages eating of more unhealthy food	8	Other (specify)	96
			Necessary to queue for a long time	9		
(3.07)	In your opinion, do you (in Njabini: would you) see more advantages or disadvantages of having a large supermarket in this town ?	MORE ADVANTAGES <input type="checkbox"/> 1				
		SAME ADVANTAGES AS DISADVANTAGES <input type="checkbox"/> 2				
		MORE DISADVANTAGES <input type="checkbox"/> 3				
READ OUT. TICK THE ONE THAT APPLIES						
ONLY IF IN TOWN OL KALOU OR MWEA. OTHERWISE ► (3.12)						
(3.08)	When did you start to buy food products in [LARGE SUPERMARKET] in this town, if you did?	<input type="text"/>	MONTH	<input type="text"/>	YEAR	
(3.09)	Has your household changed their food consumption due to the introduction of [LARGE SUPERMARKET] in this town?	Yes <input type="checkbox"/> 1 Don't know <input type="checkbox"/> 99				
		No <input type="checkbox"/> 2 ► (3.11)				
TICK THE ONE THAT APPLIES						
In what way has your household changed their food consumption due to the introduction of [LARGE SUPERMARKET] in this town?		ALLOW UP TO THREE RESPONSES				
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>		
(3.10)	Consume more food	1	Increase consumption of sweets and biscuits	5	Increase consumption of crisps	8
	Consume more kinds of food	2	Increase consumption of meat/ sausages	6	Increase consumption of dairy	9
	Reduce consumption of traditional food	3	Increase consumption of tinned products/ products in glass	7	Increase consumption of sodas	10
	Increase consumption of meat	4			Consume same food but other brands	11
					Other (specify)	96

SECTION 3: SHOPPING BEHAVIOUR AND ATTITUDES

(3.11)	Has your household changed their agricultural activities due to the introduction of [LARGE SUPERMARKET]?	Yes, produce more <u>for sale</u> <input type="checkbox"/> 1	Yes, produce less <u>for own consumption</u> <input type="checkbox"/> 4
	TICK ALL THE ONES THAT APPLY	Yes, produce less <u>for sale</u> <input type="checkbox"/> 2	No, changed nothing <input type="checkbox"/> 5
		Yes, produce more <u>for own consumption</u> <input type="checkbox"/> 3	No, don't have agricultural activities <input type="checkbox"/> 97
			Other (specify) <input type="checkbox"/> 96
(3.12)	Is your household supplying agricultural production to any large supermarket ?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ▶ (3.14)
	TICK THE ONES THAT APPLIES		
(3.13)	Is your household supplying to the local [LARGE SUPERMARKET]?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
	TICK THE ONES THAT APPLIES		

USE OF FOOD LABELS - READ OUT: "A FOOD LABEL IS EVERY INFORMATION WRITTEN ON THE PACKAGE, EXCEPT THE PRICE"

(3.14)	For the foods & drinks that you buy: To what extent does the information written on the package (other than price) influence your choice to buy or keep buying a product?	VERY MUCH <input type="checkbox"/> 1	CONSIDER-ABLY <input type="checkbox"/> 2	A LITTLE BIT <input type="checkbox"/> 3	NOT AT ALL/ NEVER THOUGHT ABOUT IT <input type="checkbox"/> 4	DONT KNOW INFORMATION <input type="checkbox"/> 5
	READ OUT & TICK THE ONE THAT APPLIES	▶ (3.16)	▶ (3.16)	▶ (3.16)		
(3.15)	Why does the information written on the package (other than price) not influence your choice to buy or keep buying a product?	ALLOW UP TO THREE RESPONSES				
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>	▶ (4.01)	
	Does not contain the information I am looking for 1	Do not trust the information 3	I already know and am used to the product 5	Don't know 99		
	Hard to understand information 2	I'm not interested in information 4		Other (specify) 96		
(3.16)	What are the kind of information written on the packages (other than the price) that influence your buying decision?	ALLOW UP TO THREE RESPONSES				
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>		
	Expiry date 1	Added sugar 7	Other mineral 13	List of ingredients 19		
	Serving size 2	Fibre 8	Halaal label 14	Brand name 20		
	Calories/ Energy 3	Protein 9	KEBS/Diamond mark of quality label 15	Salt/sodium 21		
	Total fat 4	Vitamins 10	Place of manufacture 16	Date of manufacture 22		
	Saturated fat 5	Calcium 11	Instructions of preparing food 17	Other (specify) 96		
	Total carbohydrates 6	Iron 12	% of daily recommendation 18			

SECTION 4: Food Preparation

RESPONDENT ID:

(4.01)	In your household, how is meat prepared most of the times ?	BOILING <input type="checkbox"/> 1	ROASTING <input type="checkbox"/> 3	
	READ OUT AND TICK THE ONE THAT APPLIES	FRYING/STEWING <input type="checkbox"/> 2	DEEP FRYING <input type="checkbox"/> 4	
(4.02)	In your household, how are potatoes prepared most of the times ?	BOILING/MASHING <input type="checkbox"/> 1	ROASTING <input type="checkbox"/> 3	
	READ OUT AND TICK THE ONE THAT APPLIES	FRYING/STEWING <input type="checkbox"/> 2	DEEP FRYING <input type="checkbox"/> 4	
(4.03)	In your household, how are vegetables prepared most of the times ?	BOILING <input type="checkbox"/> 1	STEAMING <input type="checkbox"/> 3	RAW <input type="checkbox"/> 3
	READ OUT AND TICK THE ONE THAT APPLIES	FRYING/STEWING <input type="checkbox"/> 2	DEEP FRYING <input type="checkbox"/> 4	
(4.04)	How long does it usually take to prepare meals all for the household members (to eat inside home and carry to work/ school) during a day?	DO NOT COUNT TIME THAT YOU ARE NOT PAYING ATTENTION DUE TO MEALS COOKING ALONG.		
		<input type="text"/> HOURS	<input type="text"/> MINUTES	

SECTION 5: Food Security and Accessibility

 RESPONDENT ID:

(5.01) During last month how often...					
(5.01)a ...did you worry that your household would not have enough food? <small>READ OUT.TICK THE ONE THAT APPLIES</small>	21-30 days in last month: ALL THE TIME	more than 11-20 days last month: OFTEN	3 to 10 days last month: SOMETIMES	one or two days last month: RARELY	NEVER
	1	2	3	4	5
(5.01)b ...were you or any household member not able to eat the kinds of food you preferred because of a lack of resources?	[] NUMBER OF TIMES				
(5.01)c ... did you or any household member eat just a few kinds of food due to a lack of resources?	[] NUMBER OF TIMES				
(5.01)d ...did you or any household member eat a smaller meal than you felt you needed to get full because there was not enough food?	[] NUMBER OF TIMES				
(5.01)e ...did you or any other household member eat fewer meals in a day because there was not enough food?	[] NUMBER OF TIMES				
(5.01)f ...did you or any household member go to sleep at night hungry because there was not enough food?	ONLY ASK IF EITHER (5.01)d OR (5.01)e IS NOT ZERO				
	[] NUMBER OF TIMES				
(5.01)g ...was there ever no food at all in your household because there were no resources to get more?	ONLY ASK IF EITHER (5.01)d OR (5.01)e IS NOT ZERO				
	[] NUMBER OF TIMES				
(5.01)h ...did you or any household member eat more than necessary to be full because more food was available than usual?	DO NOT INCLUDE EATING AT FUNCTIONS [] NUMBER OF TIMES				
(5.01)i What meals do your household members usually eat in a day? <small>READ OUT AND TICK ALL THE ONES THAT APPLY</small>	BREAKFAST [] 1	MORNING SNACK [] 3	LUNCH [] 5	AFTERNOON SNACK [] 2	DINNER [] 4
			OTHER SNACK [] 6		
(5.02) If you consider the food consumption of your household over the last year : During last month, did your household consume more/less or the same amount of food than compared to the other months of last year? <small>READ OUT.TICK THE ONE THAT APPLIES</small>	MORE [] 1		THE SAME AMOUNT [] 3		
	LESS [] 2		DON'T KNOW [] 99		
READ OUT: NOW, I WILL ASK YOU SOME QUESTIONS ABOUT THE 2011 FOOD PRICE AND OTHER SHOCKS AFFECTING CONSUMPTION.					
(5.03) Was your food consumption behaviour affected by the food price shock 2011 ?	DEFINE FOOD PRICE SHOCK 2012 Yes No [] 1 [] 2				
(5.04) Have there been any other shocks to your household (eg. death of a family member, destruction of business) that affected your household's food consumption during the last year ? (SPECIFY)	Yes No [] 1 [] 2 IF (5,03) ALSO NO ► (5,07)				
(5.05) In terms of food consumption, to which extent has your household recovered from the food price/ other shock?	SPECIFY:				
(5.06) During the last year , how often did your household use the following strategies in order to cope with the 2011 food price (and other shock)? <small>READ OUT.TICK THE ONE THAT APPLIES</small>	NOTE: CHANGE OF RECALL PERIOD AND DEFINITION OF FREQUENCIES				
	more than 9 months in total: ALL THE TIME	more than 3-9 months in total: OFTEN	1-3 months in total: SOMETIMES	less than one month in total: RARELY	NEVER
(5.06)a EAT A SMALLER NUMBER OF MEALS PER DAY	[] 1	[] 2	[] 3	[] 4	[] 5
(5.06)b EAT SMALER PORTION SIZES	[] 1	[] 2	[] 3	[] 4	[] 5
(5.06)c EAT LESS KINDS OF FOOD	[] 1	[] 2	[] 3	[] 4	[] 5
(5.06)d EAT ONLY ONE KIND OF FOOD MOST OF THE TIMES	[] 1	[] 2	[] 3	[] 4	[] 5
(5.06)e CUT DOWN FRESH FRUITS AND VEGETABLES	[] 1	[] 2	[] 3	[] 4	[] 5

SECTION 5: Food Security and Accessibility

	more than 9 months in total: ALL THE TIME	more than 3-9 months in total: OFTEN	1-3 months in total: SOMETIMES	less than one month in total: RARELY	NEVER	
(5,06)f	During the last year, how often did your household use the following strategies in order to cope with the 2011 food price (and other shock)?					
	SUBSTITUTE MAIZE WITH OTHER CEREALS	<input type="text"/> 1	<input type="text"/> 2	<input type="text"/> 3	<input type="text"/> 4	<input type="text"/> 5
(5,06)g	CUT DOWN MEAT	<input type="text"/> 1	<input type="text"/> 2	<input type="text"/> 3	<input type="text"/> 4	<input type="text"/> 5
(5,06)h	CUT DOWN DAIRY PRODUCTS	<input type="text"/> 1	<input type="text"/> 2	<input type="text"/> 3	<input type="text"/> 4	<input type="text"/> 5
(5,06)i	USE LESS COOKING OIL/FAT WHEN PREPARING MEALS	<input type="text"/> 1	<input type="text"/> 2	<input type="text"/> 3	<input type="text"/> 4	<input type="text"/> 5
(5,06)j	CUT DOWN SUGAR	<input type="text"/> 1	<input type="text"/> 2	<input type="text"/> 3	<input type="text"/> 4	<input type="text"/> 5
(5,07)	Was your non-food expenditure affected by the 2011 food price (and other) shock during the last year?	Yes <input type="text"/> 1		No <input type="text"/> 2		

READ OUT: NOW, I AM GOING TO ASK YOU A FEW QUESTIONS ABOUT FOOD ACCESSIBILITY

	LARGE SUPER-MARKET	SMALL SUPERMARKET	KIOSK	PLACE FOR FRESH FRUITS + VEGETABLES	RESTAURANT	
(5,08)	How long does it take you/ would it take you to travel from here (one way) to nearest [...]?	(5,08)a	(5,08)b	(5,08)c	(5,08)d	(5,08)e
	READ OUT: GIVE TIME IN MINUTES AND INCLUDE TIME WAITING (EG FOR A BUS)	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min
(5,09)	How do you usually get to/ would you travel to nearest [...]? (one way)	(5,09)a	(5,09)b	(5,09)c	(5,09)d	(5,09)e
	Foot 1 ► (5,11) Motorcycle 4 Bicycle 2 ► (5,11) Boda boda 5 Car 3 Matatu 6 Other(specify) 96	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
(5,10)	How much does it cost you/ would it cost you to get to nearest [...] by [THIS MEANS OF TRANSPORT]? (one way)	(5,10)a	(5,10)b	(5,10)c	(5,10)d	(5,10)e
	<input type="text"/> KSh	<input type="text"/> KSh	<input type="text"/> KSh	<input type="text"/> KSh	<input type="text"/> KSh	<input type="text"/> KSh
(5,11)	Is most of the food for your household that is bought in [...] usually done on the way to work of some household member or on the way from work back home?	(5,11)a	(5,11)b	(5,11)c	(5,11)d	(5,11)e
	IF NO FOOD IS BOUGHT IN [...] CROSS OUT AND ► NEXT OUTLET	1 <input type="text"/> Yes	1 <input type="text"/> Yes	1 <input type="text"/> Yes	1 <input type="text"/> Yes	1 <input type="text"/> Yes
		2 <input type="text"/> No ► NEXT OUTLET	2 <input type="text"/> No ► NEXT OUTLET	2 <input type="text"/> No ► NEXT OUTLET	2 <input type="text"/> No ► NEXT OUTLET	2 <input type="text"/> No ► NEXT SECTION
HELP FOR INTERVIEWER: WHICH WAY?						
FROM HOME TO WORK ► a)						
FROM WORK TO HOME ► b)						
(5,12)	How long would it take this household member to travel: a) from home straight to work? b) from work straight home?	(5,12)a	(5,12)b	(5,12)c	(5,12)d	(5,12)e
		<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min
(5,13)	How long does it take this household member to travel (one way): b) from home to [...] and then to work? a) from work to [...] and then home?	(5,13)a	(5,13)b	(5,13)c	(5,13)d	(5,13)e
	GIVE TIME IN MINUTES AND INCLUDE TIME WAITING (EG FOR A BUS). EXCLUDE TIME SPENT SHOPPING	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min	<input type="text"/> min
(5,14)	How does this household member usually travel to [...] on the way a) to work b) from work?	(5,14)a	(5,14)b	(5,14)c	(5,14)d	(5,14)e
	Foot 1 Motorcycle 4 Bicycle 2 Boda boda 5 Car 3 Matatu 6 Other(specify) 96	WAY TO [...] TO a)/ b)	WAY TO [...] TO a)/ b)	WAY TO [...] TO a)/ b)	WAY TO [...] TO a)/ b)	WAY TO [...] TO a)/ b)

SECTION 6: Non-Food Expenditure

RESPONDENT ID:

		(6.01)	(6.02)	(6.03)	
EXPENDITURE DURING LAST MONTH		Did your household purchase or pay for any [ITEM]/[SERVICE] during the last month ? Yes 1 No 2 ► (6.03)	How much did your household spend on [ITEM]/[SERVICE] during the last month ? VALUE IN KSh	How much of [ITEM]/[SERVICE] did your household receive without payment during the last month (eg gifts, subsidies)? DO NOT INCLUDE STOCKS INCL OWN PRODUCTION VALUE IN KSh	
READ OUT: PLEASE EXCLUDE BUSINESS EXPENDITURES.					
IN OTHER (SPECIFY) EXCLUDE VERY INFREQUENT HIGH VALUE PURCHASES (EG PURCHASING A TV SET) ENTER 99 IF RESPONDENT DOESN'T KNOW					
READ OUT: INCLUDE ONLY WHAT IS NOT ALREADY INCLUDED IN RENT					
Housing and cooking fuel	1	MAINTENANCE AND REPAIRS			
	2	GARBAGE (SOLID WASTE) COLLECTION			
	3	ELECTRICITY			
	4	GAS			
	5	KEROSENE/ FUEL FOR COOKING/ LIGHT			
	6	FIREWOOD/ CHARCOAL			
	7	WATER (EXCL. BOTTLED WATER)			
	8	WATER FILTER AND OTHER TREATMENT			
	9	BATTERIES, LIGHTBULBS, LIGHTERS			
	10	HOUSEHOLD HELP (EG GARDNER, PERSON DOING LAUNDRY, SECURITY GUARD)			
	11	OTHER HOUSING EXPENDITURE (EXCLUDE RENT)			
Hygiene	12	SOAP FOR WASHING HANDS AND BODY			
	13	CLEANING EQUIPMENT (INCL LAUNDRY DETERGENT)			
	14	TOOTHPASTE AND TOOTHBRUSHES			
	15	BEAUTY PRODUCTS/ COSMETICS/ PERFUMES			
	16	TOILET PAPER AND OTHER TISSUES			
	17	BABY DIAPERS			
	18	INSECTICIDES/ MOSQUITO COILS			
	19	CANDLES/ MATCHES/ INCENSE			
	20	HAIR CUTS AND DRESSING			
	21	OTHER HYGIENE EXPENDITURES			
TRANSPORT	22	FUEL/ LUBRICATION PERSONAL VEHICLE			
	23	REPAIRS PERSONAL VEHICLE (EG CAR)			
	24	BUS, MATATU, BODA BODA, TAXI			
	25	PARKING FEES			
	26	OTHER TRANSPORTATION EXPENDITURE			
COMMUNICATION	27	AIRTIME FOR MOBILE PHONES (INCL MPESA)			
	28	BILL FOR LANDLINE PHONES			
	29	AIRTIME OR BILL FOR INTERNET			
	30	POSTAL EXPENSES (POSTBOX AND SENDING LETTERS/ PARCEL)			
	31	DAILY OR WEEKLY NEWSPAPER			
	32	OTHER COMMUNICATION EXPENDITURE			
TOBACCO	33	TOBACCO (INCL SNUFF AND MIRAA(KHAT))			

SECTION 6: Non-Food Expenditure

		(6.01)	(6.02)	(6.03)
LAST YEAR		Did your household purchase or pay for any [ITEM]/[SERVICE] during the last year ?	How much did your household spend on [ITEM]/[SERVICE] during the last year ?	How much of [ITEM]/[SERVICE] did your household receive without payment during the last year (eg gifts, subsidies)?
READ OUT: PLEASE EXCLUDE BUSINESS EXPENDITURES.				DO NOT INCLUDE STOCKS
ENTER 99 IF RESPONDENT DOESN'T KNOW				Yes 1 No 2
Education	34	SCHOOL FEES		
	35	SCHOOL TEXTBOOKS		
	36	STATIONARY (EG PENCILS, NOTEBOOKS)		
	37	SCHOOL UNIFORMS		
	38	OTHER EDUCATION EXPENSES		
Health	39	MEDICATION (PURCHASED PRIVATELY)		
	40	NUTRIENT SUPPLEMENTS (EG IRON, VITAMIN A PILLS, NUTRITIOUS STONES)		
	41	FEES FOR DOCTORS/ CLINICAL OFFICER (INCL REGISTRATION FEES)		
	42	FEES FOR MIDWIVES/ DELIVERY		
	43	FEES FOR HOSPITAL STAYS (EXCL DELIVERIES)		
	44	FEES FOR TRADITIONAL HEALERS		
	45	THERAPEUTIC APPLIANCES (EG GLASSES, CRUTCHES)		
46	OTHER HEALTH EXPENSES			
Clothing, textiles	INCLUDE CLOTHING, SHOES, SHEETS, FABRIC, REPAIRS			
	47	WOMEN'S CLOTHING		
	48	CHILDREN'S CLOTHING (NOT INCL CHILDREN BORN LAST YEAR)		
	49	MEN'S CLOTHING		
50	OTHER TEXTILES (INCL. DRYCLEANING, NOT INCL CHILDREN BORN LAST YEAR)			
Entertainment	51	NATIONAL PARK (ENTRANCE & GAME DRIVE)		
	52	CINEMA		
	53	CONCERTS		
	54	SPORT GAMES		
	55	ENTRANCE FOR BARS AND DISCOS		
	56	CDS AND VIDEOS		
	57	PAY TV		
	58	OTHER ENTERTAINMENT		
Other	59	MAGAZINES AND BOOKS (NO SCHOOLBOOKS)		
	60	EXPENSES ON CHILDREN BORN LAST YEAR (FIRST SUPPLY, EG TEXTILES, CRIB)		
	61	KITCHEN UTENSILS		
	62	LOAN REPAYMENTS		
	63	CONTRIBUTIONS (EG CHURCH, GROUPS)		
	64	INSURANCE (EG CAR, LIFE, HEALTH)		
	65	REMITTANCES TRANSFERED TO OTHER HOUSEHOLDS		
66	ATTENDING OR HOSTING SPECIAL OCCASIONS (EG WEDDING, GRADUATION)			
(6.04)	Taken together, how much did your household approximately spend on last months food consumption and non-food expenditure ?			KSh

SECTION 7:Livelihood

RESPONDENT ID:

(7.01)	During the last year , did your household rely on [...] as a source of livelihood? READ OUT AND TICK ALL THE ONES THAT APPLY	PUBLIC SECTOR EMPLOYMENT <input type="checkbox"/> 1 PRIVATE SECTOR EMPLOYMENT <input type="checkbox"/> 2 SELF EMPLOYMENT <input type="checkbox"/> 3 RECEIVING PENSIONS <input type="checkbox"/> 4 RECEIVING REMITTANCES (REGULAR MONETARY SUPPORT FROM FAMILY OR FRIENDS) <input type="checkbox"/> 5 RECEIVING GIFTS (MONETARY & IN-KIND) <input type="checkbox"/> 6 RENT (FROM RENTING OUT ASSETS, LAND, AND BUILDINGS) <input type="checkbox"/> 7 USING MONEY FROM LOANS OR CREDIT <input type="checkbox"/> 8	STATE TRANSFERS (EG SUBSIDIES, SCHOLARSHIP, FOOD AID) <input type="checkbox"/> 9 USING SAVINGS <input type="checkbox"/> 10 RECEIVING INTEREST RATES <input type="checkbox"/> 11 SELLING OF OWN AGRICULTURAL PRODUCTION <input type="checkbox"/> 12 CONSUMPTION OF OWN AGRICULTURAL PRODUCTION <input type="checkbox"/> 13 FARM CASUAL LABOR <input type="checkbox"/> 14 NON-FARM CASUAL LABOR <input type="checkbox"/> 15 OTHER (SPECIFY) <input type="checkbox"/> 96
(7.02)	During the last year , what were the three most important livelihood sources for your household?	ALLOW UP TO THREE RESPONSES 1st <input type="checkbox"/> 2nd <input type="checkbox"/> 3rd <input type="checkbox"/>	
(7.03)	During the last year , what was the contribution of [MOST IMPORTANT LIVELIHOOD SOURCE] to household consumption and expenditure? READ OUT AND TICK THE ONE IN EACH COLUMN THAT APPLIES	MORE THAN HALF <input type="checkbox"/> 1 HALF <input type="checkbox"/> 3 LESS THAN HALF <input type="checkbox"/> 5	MORE THAN THREE QUARTERS <input type="checkbox"/> 1 LESS THAN THREE QUARTERS <input type="checkbox"/> 2 MORE THAN ONE QUARTER <input type="checkbox"/> 4 LESS THAN ONE QUARTER <input type="checkbox"/> 5
(7.04)	CHANGE OF RECALL PERIOD During the last year, what was the average monthly income of your household? READ OUT AND TICK THE ONE THAT APPLIES	INCLUDE <u>ALL SOURCES</u> FROM <u>ALL HOUSEHOLD MEMBERS</u> . INCLUDE ALSO CASUAL LABOR & REMITTANCES 0-5000 KSh <input type="checkbox"/> 1 25001-35000 KSh <input type="checkbox"/> 4 5001-15000 KSh <input type="checkbox"/> 2 35001-50000 KSh <input type="checkbox"/> 5 15001-25000 KSh <input type="checkbox"/> 3 above 50000 KSh <input type="checkbox"/> 6	

SECTION 8: Health

RESPONDENT ID:

ID CODE	(8.01)	(8.02)	(8.03)	(8.04)	(8.06)	(8.07)	RECORD UP TO TWO ILLNESSES PER MEMBER
	What chronic illnesses/ conditions has [NAME] been diagnosed with and is still suffering from, if any? READ OUT CHRONIC DISEASES ON THE RIGHT IF NO ILLNESS FILL IN 97, IF DON'T KNOW, FILL IN 99 AND ► NEXT PERSON	For how long has [NAME] been diagnosed with this [CHRONIC ILLNESS/CONDITION]?	Who told [NAME] that he/she was suffering from this [CHRONIC ILLNESS/CONDITION]?	Since the diagnosis of this [CHRONIC ILLNESS/CONDITION], what have been the total direct costs associated with diagnosis and treatment?	During the last month , has [NAME] suffered from any other illnesses/ conditions ?	From whom did [NAME] seek medical advice for this [ILLNESS/ CONDITION], if any?	IF MORE THAN TWO ILLNESSES RECORD THE TWO MOST SEVERE
			Medical Doctor/ Clinical Officer 1 Medical worker in hospital 2 Medical worker at dispensary 3 Medical worker at non-health facility 4 Pharmacist 5 Traditional healer 6 Community Health Worker 7 Self diagnosis/ other household members 8 Other (Specify) 96 Don't know 99	TRANSPORTATION, DIAGNOSIS, MEDICATION, MEDICAL CARE. DO NOT INCLUDE INCOME LOSS AND OTHER OPPORTUNITY COSTS	IF NO ILLNESS FILL IN 97, IF DON'T KNOW, FILL IN 99 AND ► NEXT PERSON	Medical Doctor/ Clinical Officer 1 Medical worker in hospital 2 Medical worker at dispensary 3 Medical worker at non-health facility 4 Pharmacist 5 Traditional healer 6 Community Health Worker 7 Advice from non-medical persons (eg friend, neighbour) 8 Did not seek advice 9 Other (Specify) 96 Don't know 99	CHRONIC ILLNESSES
CODE	MONTHS	CODE	KSh	CODE	CODE	NON-CHRONIC ILLNESSES	
1	1st	1st	1st	1st	1st	1st	FEVER, MALARIA 1
	2nd	2nd	2nd	2nd	2nd	2nd	DIARRHOEA 2
2	1st	1st	1st	1st	1st	1st	STOMACH ACHE 3
	2nd	2nd	2nd	2nd	2nd	2nd	VOMITING 4
3	1st	1st	1st	1st	1st	1st	FLU/ COLD 5
	2nd	2nd	2nd	2nd	2nd	2nd	HEADACHE 6
4	1st	1st	1st	1st	1st	1st	SKIN PROBLEM 7
	2nd	2nd	2nd	2nd	2nd	2nd	BAD TEETH (ACHE) 8
5	1st	1st	1st	1st	1st	1st	EYE PROBLEM 9
	2nd	2nd	2nd	2nd	2nd	2nd	EAR/NOSE/THROAT 10
6	1st	1st	1st	1st	1st	1st	PAIN WHEN PASSING URIN 11
	2nd	2nd	2nd	2nd	2nd	2nd	
7	1st	1st	1st	1st	1st	1st	TUBERCULOSIS 12
	2nd	2nd	2nd	2nd	2nd	2nd	KWASHIAKOR 13
8	1st	1st	1st	1st	1st	1st	TYPHOID 14
	2nd	2nd	2nd	2nd	2nd	2nd	PNEUMONIA 15
9	1st	1st	1st	1st	1st	1st	FAINTING 16
	2nd	2nd	2nd	2nd	2nd	2nd	INTESTINAL WORMS 17
10	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	OTHER (SPECIFY) 96
11	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	
12	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	
13	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	
14	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	
15	1st	1st	1st	1st	1st	1st	
	2nd	2nd	2nd	2nd	2nd	2nd	

SECTION 9: Health Knowledge

RESPONDENT ID:

READ OUT: NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS THAT WILL HELP US UNDERSTAND THE KNOWLEDGE ABOUT NUTRITION AND HEALTH OF THIS HOUSEHOLD. IF YOU ARE **UNSURE** ABOUT SOME QUESTIONS, PLEASE ALWAYS SAY SO AND DO NOT GUESS A RESPONSE.

(9.01)	<p>How would you rate the overall healthiness of the diet consumed in your household during the last month?</p> <p>READ OUT AND TICK THE ONE THAT APPLIES</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Not sure</td> <td style="width: 15%;">VERY GOOD</td> <td style="width: 15%;">GOOD</td> <td style="width: 15%;">OK: NOT GOOD NOT POOR</td> <td style="width: 15%;">A LITTLE POOR</td> <td style="width: 15%;">VERY POOR</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>99</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> </table>	Not sure	VERY GOOD	GOOD	OK: NOT GOOD NOT POOR	A LITTLE POOR	VERY POOR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	99	1	2	3	4	5																																				
Not sure	VERY GOOD	GOOD	OK: NOT GOOD NOT POOR	A LITTLE POOR	VERY POOR																																																			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																			
99	1	2	3	4	5																																																			
(9.02)	<p>How would you rate your household's total fat consumption during last month as compared to a healthy amount?</p> <p>READ OUT AND TICK THE ONE THAT APPLIES</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Not sure</td> <td style="width: 15%;">TOO MUCH</td> <td style="width: 15%;">GOOD AMOUNT</td> <td style="width: 15%;">OK: NOT GOOD NOT INSUFFICIENT</td> <td style="width: 15%;">A LITTLE INSUFFICIENT</td> <td style="width: 15%;">SEVERELY INSUFFICIENT</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>99</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> </table> <p>INCL ALL SOURCES: COOKING OIL/FAT & FAT FROM FOOD ITEMS EG MEAT</p>	Not sure	TOO MUCH	GOOD AMOUNT	OK: NOT GOOD NOT INSUFFICIENT	A LITTLE INSUFFICIENT	SEVERELY INSUFFICIENT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	99	1	2	3	4	5																																				
Not sure	TOO MUCH	GOOD AMOUNT	OK: NOT GOOD NOT INSUFFICIENT	A LITTLE INSUFFICIENT	SEVERELY INSUFFICIENT																																																			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																			
99	1	2	3	4	5																																																			
(9.03)	<p>How would you rate your household's sugar consumption during last month as compared to a healthy amount?</p> <p>READ OUT AND TICK THE ONE THAT APPLIES</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Not sure</td> <td style="width: 15%;">TOO MUCH</td> <td style="width: 15%;">GOOD AMOUNT</td> <td style="width: 15%;">OK: NOT GOOD NOT INSUFFICIENT</td> <td style="width: 15%;">A LITTLE INSUFFICIENT</td> <td style="width: 15%;">SEVERELY INSUFFICIENT</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>99</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> </table> <p>INCL ALL SOURCES: EG SUGAR ADDED TO TEA, SUGAR IN CAKES & SODAS</p>	Not sure	TOO MUCH	GOOD AMOUNT	OK: NOT GOOD NOT INSUFFICIENT	A LITTLE INSUFFICIENT	SEVERELY INSUFFICIENT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	99	1	2	3	4	5																																				
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(9.06)	<p>Do you think these food-products are high, medium or low in salt?</p> <p>READ OUT</p> <p>TICK ONE BOX PER FOOD ITEM</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;">HIGH</td> <td style="width: 15%;">MEDIUM</td> <td style="width: 15%;">LOW</td> <td style="width: 15%;">Not Sure</td> </tr> <tr> <td style="text-align: center;">(9.06)a</td> <td>SAUSAGES</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.06)b</td> <td>BROWN BREAD</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.06)c</td> <td>POPCORN</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.06)d</td> <td>TOMATO KETCHUP</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.06)e</td> <td>INSTANT NOODLES (EG INDOMIE)</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>			HIGH	MEDIUM	LOW	Not Sure	(9.06)a	SAUSAGES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.06)b	BROWN BREAD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.06)c	POPCORN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.06)d	TOMATO KETCHUP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.06)e	INSTANT NOODLES (EG INDOMIE)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																		
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(9.07)	<p>READ OUT: NOW I WOULD LIKE TO ASK YOU ABOUT HEALTH MESSAGES GIVEN BY HEALTH EXPERTS TO ALL PEOPLE</p> <p>Do you think health experts recommend that people should be consuming more, the same amount, or less of the following foods/ beverages as compared to what people are currently consuming on average?</p> <p>TICK ONE BOX PER FOOD ITEM</p>	<p>DO YOU THINK EXPERTS SAY PEOPLE SHOULD [...]:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;">EAT MORE</td> <td style="width: 15%;">KEEP EATING THE SAME AMOUNT</td> <td style="width: 15%;">EAT LESS</td> <td style="width: 15%;">Not Sure</td> </tr> <tr> <td style="text-align: center;">(9.07)a</td> <td>VEGETABLES</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)b</td> <td>SUGARY FOODS/ DRINKS</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)c</td> <td>MEAT</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)d</td> <td>FATTY FOODS</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)e</td> <td>HIGH FIBRE FOODS</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)f</td> <td>FRUITS</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)g</td> <td>SALTY FOODS</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">(9.07)h</td> <td>ALCOHOL</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>			EAT MORE	KEEP EATING THE SAME AMOUNT	EAT LESS	Not Sure	(9.07)a	VEGETABLES	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)b	SUGARY FOODS/ DRINKS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)c	MEAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)d	FATTY FOODS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)e	HIGH FIBRE FOODS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)f	FRUITS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)g	SALTY FOODS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(9.07)h	ALCOHOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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(9.08)	<p>How many servings of fruits and vegetables together do you think experts are advising people to eat every day? (One serving could be an apple or a handful of Sukuma)</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><input style="width: 50px; height: 20px;" type="text"/></td> <td>number of servings</td> </tr> </table>	<input style="width: 50px; height: 20px;" type="text"/>	number of servings																																																				
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SECTION 9: Health Knowledge

(9.09)	Do you agree with the following statement? "A glass of fruit juice without added sugar counts as a serving of fruit."	Yes, agree <input type="checkbox"/> 1
	TICK THE ONE THAT APPLIES	No, disagree <input type="checkbox"/> 2 Not sure <input type="checkbox"/> 99
(9.10)	Which of these breads contain the most vitamins and minerals? (tick one)	WHITE BREAD <input type="checkbox"/> 1
	READ OUT AND TICK THE ONE THAT APPLIES	BROWN BREAD <input type="checkbox"/> 2 Not sure <input type="checkbox"/> 99
(9.11)	Do you agree with the following statement? "A balanced diet implies eating about the same amount of food from all food groups"	Yes, agree <input type="checkbox"/> 1
	READ OUT AND TICK THE ONE THAT APPLIES	No, disagree <input type="checkbox"/> 2 Not sure <input type="checkbox"/> 99
(9.12)	If you drink 0.33 litre of Coca Cola (a small bottle), how many full (heaped) tea spoons of sugar do you think you get?	<input type="text"/> FULL (HEAPED) TEA SPOONS <input type="checkbox"/> Not sure 99
(9.13)	Do you agree with the following statement? "Consuming food products that are labelled cholesterol free prevents heart diseases."	Yes, Agree <input type="checkbox"/> 1 Not necessarily but helps <input type="checkbox"/> 3
	TICK THE ONE THAT APPLIES	No, disagree <input type="checkbox"/> 2 Not sure <input type="checkbox"/> 99
(9.14)	What do you think is the meaning of (kilo)calories in the context of nutrition?	Unit of energy <input type="checkbox"/> 1
	TICK THE ONE THAT APPLIES	Other (specify) <input type="text"/> 96 Not sure <input type="checkbox"/> 99 ▶ (9.16)
(9.15)	How many (kilo)calories should a 40 year old male teacher consume in a day?	<input type="text"/> Number of Kcals <input type="checkbox"/> 99 Not sure

READ OUT: THE NEXT FEW QUESTIONS ARE ABOUT CHOOSING FOODS. PLEASE ANSWER WHAT IS BEING ASKED AND NOT WHETHER YOU LIKE OR DISLIKE THE FOOD!

(9.16)	If a person wanted to reduce the amount of fat in their diet, which would be the best choice to eat?	STEWED KIENYEJI CHICKEN (1/4 KG) <input type="checkbox"/> 1
	READ OUT AND TICK THE ONE THAT APPLIES	ROASTED GOAT MEAT (1/4 KG) <input type="checkbox"/> 2 DEEP FRIED TILAPIA FISH (1/4 KG) <input type="checkbox"/> 3
(9.17)	If a person felt like eating something sweet, but was trying to cut down on sugar, which would be the best choice?	2 SLICES OF WHITE BREAD WITH FRUIT JAM <input type="checkbox"/> 1
	READ OUT AND TICK THE ONE THAT APPLIES	1 SMALL BOTTLE OF COKE OR FANTA <input type="checkbox"/> 2 1 BANANA AND 500 ML PACK OF FLAVOURED YOGHURT <input type="checkbox"/> 3

READ OUT: THE NEXT QUESTIONS ARE ABOUT THE RELATIONSHIP BETWEEN NUTRITION AND HEALTH

(9.18)	Are you aware of any health problems that are associated with <u>eating none or too little of fresh fruits and vegetables?</u>	Yes <input type="checkbox"/> 1 Not sure <input type="checkbox"/> 99
	TICK THE ONE THAT APPLIES	No <input type="checkbox"/> 2 ▶ (9.20)
(9.19)	Which diseases/symptoms do you think are associated with eating none or too little of fresh fruits and vegetables?	ALLOW UP TO THREE RESPONSES. RANK ACCORDING TO LIKELIHOOD.
	Loss of vision 1 Weakness/ weak immune system 4 Aneamia 2 Bad skin 5 Migraine 3 Bad hair 8	1st <input type="text"/> 2nd <input type="text"/> 3rd <input type="text"/> Bad teeth 6 Other (specify) 96 Kwashiakor 7

SECTION 9: Health Knowledge

(9.20)	Are you aware of any health problems or diseases that are associated with <u>excess weight</u> ?	Yes <input type="checkbox"/> 1 No <input type="checkbox"/> 2 ▶ (9.22)	Not sure <input type="checkbox"/> 99		
	TICK THE ONE THAT APPLIES	DO NOT DEFINE EXCESS WEIGHT HERE.			
(9.21)	Which diseases do you think are associated with excess weight?	ALLOW UP TO THREE RESPONSES. RANK ACCORDING TO LIKELIHOOD.			
		1st <input type="checkbox"/>	2nd <input type="checkbox"/> 3rd <input type="checkbox"/>		
	Hypertension 1 Diabetes 3 High cholesterol 5 Other (Specify) 96 Cardiovascular 2 Cancer 4 Lack of stamina 6				
(9.22)	What do you think is the recommended period of <u>exclusively breastfeeding infants</u> ?	IF UNSURE, FILL IN 99 <input type="text"/> Number of months			
(9.23)	Which health problems or diseases do you think are associated with not exclusively breastfeeding infants for [THIS PERIOD], if any?	ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.			
		1st <input type="checkbox"/>	2nd <input type="checkbox"/> 3rd <input type="checkbox"/>		
	Death 1 Low weight for age 4 Delayed achievement of development 6 Weak immune system 7 Low weight for height 2 Stomach Ache 5 milestones (eg smiling, grabbing) No health problems 8 Low height for age 3 Other (specify) 96				
(9.24)	Do you agree with the following statement? "Losing a lot of weight over a period of several weeks to months is associated with an illness."	Agree <input type="checkbox"/> 1 Is not necessarily true <input type="checkbox"/> 2	Disagree <input type="checkbox"/> 3 Not sure <input type="checkbox"/> 99 ▶ (9.26)		
	TICK THE ONE THAT APPLIES				
(9.25)	Which illnesses do you think are or could potentially be linked to such a weight loss?	ALLOW UP TO THREE RESPONSES. RANK ACCORDING TO LIKELIHOOD.			
		1st <input type="checkbox"/>	2nd <input type="checkbox"/> 3rd <input type="checkbox"/>		
	HIV/AIDS 1 Tuberculosis 3 Cancer 5 Other (specify) 96 Depression 2 Stress 4				
(9.26)	How would you rate your knowledge about a healthy nutrition ?	OK: NOT VERY GOOD GOOD GOOD NOT A LITTLE VERY Not sure POOR POOR POOR POOR			
	READ OUT AND TICK THE ONE THAT APPLIES	<input type="checkbox"/> 99	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
(9.27)	How would you rate your knowledge about relationships between nutrition and health ?	OK: NOT VERY GOOD GOOD GOOD NOT A LITTLE VERY Not sure POOR POOR POOR POOR			
	READ OUT AND TICK THE ONE THAT APPLIES	<input type="checkbox"/> 99	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
READ OUT: THE NEXT QUESTIONS ARE ABOUT SOURCES OF NUTRITION AND HEALTH INFORMATION					
(9.28)	Where do you usually get health/nutrition information from?	ALLOW UP TO THREE RESPONSES			
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>	
	Radio English 1 Doctor 6 Internet 11 Nutritionist 16 Radio Kiswahili 2 Nutrition education 7 Relatives/ 12 Church 17 Radio vanacular 3 Newspaper English 8 School 13 Community TV 4 Newspaper Kiswahili 9 Books/ Magazines 14 organisation Food labels 5 Health Centre 10 Community Health 15 Work 19 Worker Other (specify) 96				
(9.29)	What do you think about the following statement? "There are so many health/nutrition information available, it is hard to decide what to believe"	STRONGLY AGREE <input type="checkbox"/> 1 SOMEWHAT AGREE <input type="checkbox"/> 2 SOMEWHAT DISAGREE <input type="checkbox"/> 3	STRONGLY DISAGREE <input type="checkbox"/> 4 Not sure <input type="checkbox"/> 99		
	READ OUT AND TICK THE ONE THAT APPLIES				
(9.30)	What are some of the barriers you face in consuming a healthy diet, if any?	ALLOW UP TO THREE RESPONSES			
		1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>	
	I already eat a healthy diet 1 Poor availability of healthy foods 4 Taste - 7 Time constraints 8 Affordability: costs too high 2 Lack of knowledge/ information 5 unhealthy food Inconvenience 9 Lack cooking skills 3 Habits 6 tastes better Other (specify) 96				

SECTION 10: Housing

RESPONDENT ID:

(10.01)	What is the tenure status of this house/apartment? TICK THE ONE THAT APPLIES	Rented <input type="checkbox"/> 1 ▶ (10.03) Given without rent <input type="checkbox"/> 2	Owned <input type="checkbox"/> 3 Don't know <input type="checkbox"/> 99
(10.02)	How much would you get per month if you rented out this house/apartment in its current state?	KSh ▶ (10.04) PER MONTH	
(10.03)	How much rent do you pay per month for this house/apartment? HELP RESPONDENT TO ESTIMATE MONTHLY VALUE	KSh PER MONTH	
(10.04)	How many rooms do your household members use (incl househelp)? EXCLUDING KITCHEN, BATHROOM AND CORRIDORS	<input style="width: 40px; height: 20px;" type="text"/> Rooms	
(10.05)	During last month , did you have electricity working in your dwelling? TICK THE ONE THAT APPLIES	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
(10.06)	Is the toilet facility located within the apartment/ house?	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2
(10.07)	What is the main toilet facility for this household? TICK THE ONE THAT APPLIES	Flush toilet <input type="checkbox"/> 1 Uncovered pit latrine <input type="checkbox"/> 2	Covered pit latrine <input type="checkbox"/> 3 Bucket <input type="checkbox"/> 4 Other (specify) <input type="checkbox"/> 96
(10.08)	Is this toilet facility for the use of: READ OUT AND TICK THE ONE THAT APPLIES	HOUSEHOLD MEMBERS ONLY <input type="checkbox"/> 1 2 HOUSEHOLDS <input type="checkbox"/> 2	3 HOUSEHOLDS <input type="checkbox"/> 3 4 HOUSEHOLDS OR MORE <input type="checkbox"/> 4
(10.09)	What is the household's main source of water for [DRINKING/HOUSEHOLD USE] during [...] ? (EXCLUDE USE FOR FARMING ACTIVITIES)	(10.09)a DRINKING WATER DRY S. <input type="checkbox"/> RAIN S. <input type="checkbox"/>	(10.09)b HOUSEHOLD USE (EXCL. DRINKING) DRY SEASON <input type="checkbox"/> RAIN SEASON <input type="checkbox"/>
	Piped into dwelling 1 Piped into plot/yard 2 Unprotected dug well/springs 3 Tubewell/borehole with pump 4	Protected dug well 5 Protected spring 6 Rain water collection 7 Public tap 8	River/ponds/streams 9 Tankers-truck/vendor 10 Bottled water 11 Other (specify) 96
(10.10)	Do you usually treat your water before drinking during [...] ? (Point of use) YES 1 NO 2 NO - IT IS ALREADY TREATED 3 READ OUT	(10.10)a <input type="checkbox"/> DRY S. (10.10)b <input type="checkbox"/> RAIN S.	How do you usually treat your drinking water during [...] ? Boil 1 Chlorine/bleach (incl Waterguard) 2 Let it stand and settle 3 Filter 4 Don't treat it 5 Other (specify) 96
	INTERVIEWER ONLY ASK IF UNABLE TO OBSERVE	(10.11)a DRY S. <input type="checkbox"/>	(10.11)b RAIN S. <input type="checkbox"/>
(10.12)	How is the floor of this house/apartment covered? IF SEVERAL TYPES, RECORD MATERIAL OF MAJORITY OF FLOORS - TICK ONLY 1 ANSWER	Cement <input type="checkbox"/> 1 Tiles <input type="checkbox"/> 2 Wood <input type="checkbox"/> 3	Earth <input type="checkbox"/> 4 Other (specify) <input type="checkbox"/> 96
(10.13)	What is the roof of this house/apartment made of? IF SEVERAL TYPES, RECORD MATERIAL OF MAJORITY OF ROOF - TICK ONLY 1 ANSWER	Tin <input type="checkbox"/> 1 Tiles <input type="checkbox"/> 2 Concrete <input type="checkbox"/> 3 Asbestos sheets <input type="checkbox"/> 4 Corrugated iron sheets <input type="checkbox"/> 5	Improved iron sheets <input type="checkbox"/> 6 Grass <input type="checkbox"/> 7 Makuti <input type="checkbox"/> 8 Other (specify) <input type="checkbox"/> 96
(10.14)	What type of house/apartment does your household live in? TICK THE ONE THAT APPLIES	Flat <input type="checkbox"/> 1 Maisonnett <input type="checkbox"/> 2 House/Bungalow <input type="checkbox"/> 3	Shanty <input type="checkbox"/> 4 Manyatta/Traditional Hut <input type="checkbox"/> 5 Other (specify) <input type="checkbox"/> 96
(10.15)	What are the outer walls of your house/apartment made of? IF SEVERAL TYPES, RECORD MATERIAL OF MAJORITY OF WALLS - TICK ONLY 1 ANSWER	Stone <input type="checkbox"/> 1 Brick <input type="checkbox"/> 2 Mud & Wood <input type="checkbox"/> 3 Mud & Cement <input type="checkbox"/> 4 Wood only <input type="checkbox"/> 5	Corrugated iron sheet <input type="checkbox"/> 6 Grass/Straw <input type="checkbox"/> 7 Tin <input type="checkbox"/> 8 Stone & Wood <input type="checkbox"/> 9 Other (specify) <input type="checkbox"/> 96

HHID: _____

SECTION 11: Assets

 RESPONDENT ID:
INTRODUCTION: DO NOT COUNT PERMANENTLY BROKEN ITEMS. COUNT ITEMS OF ALL HOUSEHOLD MEMBERS.

(11.01)		(11.02)	(11.03)
How many pieces of [ITEM] does your household own, if any?		Since when does household own [ITEM]?	How much would you get, if you sold all [ITEMs] today?
DO NOT COUNT ITEMS BORROWED. IF NONE, FILL IN ZERO		IF MORE THAN ONE, AKS FOR THE ONE OWNED THE LONGEST	IF MORE THAN ONE, GIVE TOTAL VALUE
READ OUT	PIECES	YEAR	VALUE IN KSh
1	RADIO		
2	TELEPHONE (MOBILE)		
3	WRIST WATCH		
4	IRON		
5	MOSQUITO NET		
6	BED		
7	TV		
8	DVD/VCR PLAYER		
9	MEKO COOKER		
10	ELECTRONIC KETTLE		
11	MICROWAVE		
12	2 PLATES GAS COOKER		
13	ELECTRIC/ GAS STOVE WITH OVEN		
14	REFRIGERATOR		
15	LAUNDRY MACHINE		
16	LAPTOP OR COMPUTER		
17	WEIGHING SCALE FOR PERSONS		
18	GENERATOR		
19	SOLAR PANEL		
20	BICYCLE		
21	MOTOR CYCLE		
22	CAR		

(11.04)	Does your household have any agricultural activities?	<input type="text"/>	Yes	1
		<input type="text"/>	No	2
(11.05)	Is your household usually able to store food you produce to the extent and for the period that you wanted to?	<input type="text"/>	Yes	1
		<input type="text"/>	No	2
(11.06)	Why is your household not able to store food to the extent and for the period that you wanted to?	1 st	Not enough production	1
		2 nd	No appropriate storing facility	2
		3 rd	Sell right away in need for cash	3
	ALLOW UP TO THREE RESPONSES		Only produce perishable items	4
			Sell after harvest because price is high	5
			Don't want to incur costs for storage (eg chemicals, storage space in commercial storage)	6
			Danger of theft	7
			Other (specify)	96

SECTION 12: Mortality

RESPONDENT ID:

READ OUT: AS YOU KNOW; WE HAVE ASKED YOU QUESTIONS ABOUT HEALTH AND DISEASES IN THE PREVIOUS SECTIONS. WE ARE ALSO INTERESTED TO KNOW IF YOUR HOUSEHOLD HAS LOST MEMBERS THROUGH DEATH IN THE PAST FIVE YEARS DUE TO THE DISEASES WE PREVIOUSLY TALKED ABOUT. THIS IS WHY I WILL ASK YOU SOME QUESTIONS ABOUT DECEASED HOUSEHOLD MEMBERS AND CLOSE RELATIVES (PARENTS, GRANDPARENTS, CHILDREN AND SIBLINGS). PLEASE ANSWER AS ACCURATELY AS YOU CAN.

(12.01)	(12.02)	(12.03)	(12.04)	(12.05)	(12.06)	(12.07)	
During the last 5 years, did your household lose any household members or close relatives through death? Yes 1 No 2 ► NEXT SECTION CODE	During the last 5 years, how many household members or close relatives has your household lost through death? PEOPLE	How was [...] related to the current household head?	Was [...] living in your household?	In which year did [...] die?	How old was [...] when he/she died?	What was the cause of [...]’s death?	
		Spouse 1					Old age 1
		Co-wife 2					Accident 2
		Son/daughter 3					HIV/AIDS 3
		Spouse of son/daughter 4				IF LESS THAN AGE 1 WRITE ZERO	Heart Problem/ failure 4
		Grandchild 5					Cancer (specify) 5
		Brother/sister 6					Kidney disease 6
		Father/mother 7				IF AGE UNKNOWN ESTIMATE	Diaphorrea incl other gatro-intestinal diseases 7
		Father/mother of spouse 8					Malaria 8
		Aunt/ Uncle 9					Diabetes 9
		Child of relative 10					Stroke 10
		Child of non-relative 11					Hypertension 11
		Other relative (specify) 12			Yes 1		Pneumonia 12
Other non-relative (specify) 13			No 2	YEAR	YEARS	TB 13	
						Other (specify) 96	

SECTION 13: Weight and Health Related Behaviour and Food Eaten Away From Home

READ OUT: NOW, I WILL ASK YOU ABOUT YOUR INDIVIDUAL SPECIFIC CONSUMPTION, NOT THAT OF OTHER HOUSEHOLD MEMBERS.

SAMPLE SELECTION OF SPS	(13.01)	(13.02)	(13.03)	(13.04)	(13.05)	(13.06)	(13.07)	(13.08)	(13.09)	(13.10)	(13.11)	(13.12)	(13.13)	(13.14)	(13.15)
	REPORT MEMBER ID FROM FLAP FOR PERSONS SELECTED FOR WEIGHT MEASUREMENT	Have you ever taken part in any nutrition and health related education training?	Where did you take part in nutrition and health related education training? Workplace 1 NGO 2 Church 3 Medical center 4 School 5	During the last six months, have you been trying to change your weight? Yes 1 No 2	What have you been trying to do to your weight? GAIN 1 LOSE 2	What have been the most important strategies for you to lose weight? ALLOW UP TO 2 RESPONSES Increase physical activity 1 Drink more water 2 Eat less cake/chocol. 4 Eat less 3 Eat more protein 5 Eat less carbohydrates 6 Reduce fat (eg chips, oil use) 7 Reduce snacking 8 Eat more fruits and vegetab. 9 Take pills 10	Have you been successful in losing weight? Yes 1 No 2	What have been the most important strategies for you to gain weight? ALLOW UP TO TWO RESPONSES Reduce physical activity 1 Eat more 2 Eat later in the day 3 Eat more carbohydrates 4 Eat more protein 5 Eat more fat 6 Eat more fruits and veg. 7 Take pills 8 Increase snacking 9	Have you been successful in gaining weight? Yes 1 No 2	Why have you been trying to change your weight? Medical advice 1 Family advice 2 Friends advice 3 Partners advice 4 Own health concern 5 Own beauty ideal 6 Was told partner does not take good care 7	Do you intend to change your weight within the next month? Yes 1 No 2	Are you trying to gain or to lose weight? Gain 1 Lose 2	Are you actively trying to maintain your weight? Yes 1 No 2	Do you intend to change your weight within the next six months? Yes 1 No 2	Are you trying to gain or to lose weight? Gain 1 Lose 2
ID CODE	(13.04)	Other(specify) 96	(13.11)	(13.11)	(13.08)	(13.10)	(13.10)	(13.10)	(13.13)	(13.13)	(13.13)	(13.13)	(13.13)	(13.13)	(13.13)
male adult						1 st	2 nd		1 st	2 nd					
female adult						1 st	2 nd		1 st	2 nd					
child/adoles.						1 st	2 nd		1 st	2 nd					

RESPONDENT ID ON BEHALF OF CHILD IF CHILD IS BELOW 13:

	(13,16)a	(13,16)b	(13,17)a	(13,17)b	(13,17)c	(13,17)d
	Are you confident that if you wanted to lose weight, you could?	Are you confident that if you wanted to gain weight, you could?	During the last month, how often did "I eat even though I am already full"	"I deliberately avoid certain foods or eat small portion sizes in order not to gain weight"	"If I am tense, stress or bored I start eating even though I am not hungry"	"I can't bring myself to leaving food on the plate even if I'm full"
	Yes 1 Maybe 2 No 3	Don't know 99	READ OUT: ALL THE TIME (21 - 30 days) 1	OFTEN (11-20 times) 2	SOMETIMES (3 to 10 times) 3	RARELY (once or twice) 4 NEVER 5
male adult						
female adult						
child/adoles.						

SECTION 13: Weight and Health Related Behaviour and Food Eaten Away From Home

ONLY REFER TO FOOD AND DRINKS BOTH PREPARED AND TAKEN OUTSIDE HOME														
SAMPLE SELECTION OF SPS	(13.28)	(13.29)	(13.30)			(13.31)	(13.32)		(13.33)	(13.34)	(13.35)	(13.36)		
	Where did you most commonly eat main meals outside home last month ?	How many snacks did you eat outside home that were also prepared outside home last month ?	Which kind of snacks did you eat outside home that were prepared outside home last month ? ALLOW UP TO THREE RESPONSES			Where did you most commonly eat snacks outside home last month ?	How much roasted meat did you eat outside home that was also prepared outside home last month ?		How many litres of sweetened sodas (eg Coca Cola) did you drink outside home last month ?	ONLY IF >AGE 12 PROBE IF ANY BEER IS TAKEN, THEN: How many litres of beer did you drink outside home last month ?	In total, how much did you spend on all food and drinks prepared and consumed outside home last month ?	Which are the most important factors you consider when buying food and drinks away from home? ALLOW UP TO THREE RESPONSES		
	School/ work restaur./ canteen 1	IF NONE ENTER ZERO AND ► (13.32) Nb. of snacks	Roasted maize, boiled maize	1		School/ work restaur./ canteen 1			UNIT CODES KG KG GRAM GR			Price	1	
	Butchery rest. 2		Brown bread, brown chapati, pulses, raw nuts, seeds	2		Butchery rest. 2						Taste	2	
	Hawker 3		Meat stew, eggs, sausage, fish	3		Hawker 3						Habits	3	
	Kiosk/ Shop 4		Candy, cake, dessert	4		Kiosk/ Shop 4						Social status/ lifestyle	4	
	Other restaurant 5		White bread, mandazi, samosa, meat pie, sandwich	5		Other restaurant 5						Nutritional value/healthiness	5	
	Friends/ Neighbours 6		Roasted meat	6		Friends/ Neighbours 6						Food safety	6	
	Other (specify) 96		Salty snack, eg. crisps, chips	7		Other (specify) 96						Balanced diet	7	
			Milk or yoghurt	8								Freshness	8	
	Vegetables, fruits		9					Other (Specify)				96		
	Other (specify) 96													
male adult		1 st	2 nd	3 rd						1 st	2 nd	3 rd		
female adult		1 st	2 nd	3 rd						1 st	2 nd	3 rd		
child/ adoles.		1 st	2 nd	3 rd						1 st	2 nd	3 rd		

SECTION 14: Physical Activity at Work

READ OUT: NOW, I AM ASKING ABOUT WORK RELATED PHYSICAL ACTIVITY. FOR THE RESPONSES, PLEASE CONSIDER THE PERIOD OF **THE LAST 6 MONTHS**. PLEASE CONSIDER ALL OCCUPATIONAL ACTIVITIES.

SAMPLE SELECTION OF SPS	(14.01)	HELP FOR INTERVIEWER	(14.02)	(14.03)	(14.04)	(14.05)	(14.06)	(14.07)	(14.08)	(14.09)	(14.10)	(14.11)	(14.12)	(14.13)
	REPORT MEMBER ID FROM FLAP FOR PERSONS SELECTED FOR WEIGHT MEASUREMENT	During the last six months, what kind of work activities did you do in a typical week ?	During the last six months, how many days did you usually work in a typical week ?	During the last six months, how many hours did you usually work in a typical working day ?	How often do you think A's occupational activities require lots of physical effort in a typical week ?	How often do you think B's occupational activities require lots of physical effort in a typical week ?	How often do you think C's occupational activities require lots of physical effort in a typical week ?	How often do your occupational activities require lots of physical effort in a typical week ?	Does your job require you to lift, pull, or push above 5 kgs (eg more than 5l jerrycan of water) regularly ?	Does your job require you to lift, pull, or push weights more than 0.5 kg but less than 5 kgs regularly ?	Does your job require you to climb stairs, inclines, or hills regularly ?	Does your job require you to stoop, kneel, bend over or crouch regularly ?	Does your job require you to reach for supplies, materials, or balance items etc. regularly ?	Does your job require you to walk around regularly ?
					READ OUT STORY A	READ OUT STORY B	READ OUT STORY C	INCLUDE ALL OCCUPATION. ACTIVITIES						
					ALL OF THE TIME 1	ALL OF THE TIME 1	ALL OF THE TIME 1	ALL OF THE TIME 1						
					MOST OF THE TIME 2	MOST OF THE TIME 2	MOST OF THE TIME 2	MOST OF THE TIME 2						
	PROBE TO SEE WHAT TO INCLUDE	INCLUDE ALL OCCUPATIONAL ACTIVITIES	INCLUDE ALL OCCUPATIONAL ACTIVITIES	SOME OF THE TIME 3	SOME OF THE TIME 3	SOME OF THE TIME 3	SOME OF THE TIME 3							
ID CODE				NONE/ ALMOST NONE OF THE TIME 4	NONE/ ALMOST NONE OF THE TIME 4	NONE/ ALMOST NONE OF THE TIME 4	NONE/ ALMOST NONE OF THE TIME 4	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	
male adult														
female adult														
ONLY ASK FOR AGE 10 AND ABOVE.				FOR <13: ONLY ASK CAREGIVER IF NOT ASKED ABOVE ALREADY										
child/adoles														

STORY A

Person A is a primary school teacher. Person A is teaching English and Math lessons.

A is usually teaching 7 hours a day, 5 days a week. Person A does teaching mainly standing but sometimes sitting down.

1 day a week for 7 hours that day, Person A is operating the kiosk of his/her spouse.

RESPONDENT ID ON BEHALF OF CHILD
IF CHILD IS BELOW 13:

STORY B

Person B is a casual construction worker

B usually works 7 hours a day, 6 days a week.

Most of the times, B is responsible for providing coworkers with a sand cement mix. This involves transporting the ingredients to the mixing point, manually mixing sand, cement and water and transporting the mix to the coworkers with a wheelbarrow.

STORY C

Person C works in a butchery.

C usually works 7 hours a day, 6 days a week.

C usually receives a full cow carcass three times a week that he has to cut into large pieces and hang. This takes him 30 minutes per cow.

When serving customers, C sometimes has to unhang the pieces. Most of the time C can cut the meat for the customers from the hanging pieces directly.

C also is responsible for weighing and wrapping the meat and cutting into small pieces if the customer wishes.

SECTION 15: Physical and leisure related activity

FEMALE SP
RESPONDENT ID:

(15.01)	How do you usually get to/ from school/ work? (IF MAIN JOB IS HOUSEWIFE ► (15.05b)) TICK THE ONE THAT APPLIES.	Foot <input type="checkbox"/> 1 Boda boda <input type="checkbox"/> 5	Car <input type="checkbox"/> 2	Bicycle <input type="checkbox"/> 3	Motor-cycle <input type="checkbox"/> 6	Matatu <input type="checkbox"/> 4 Don't work/ don't attend school <input type="checkbox"/> 97	<input type="checkbox"/> 96 ↑Other (specify)
ONLY IF (15.01) IS FOOT OR BICYCLE							
(15.02)	How many times did you go to/ from school/work like this during the last month? (1 WAY = 1 TIME)	<input type="checkbox"/> Times	(15.03)	About how many minutes did this take you each time?	<input type="checkbox"/> Min	IF HIGH FLUCTUATION, REPORT AVERAGE	
(15.04)	How many times did you choose to do this for the purpose of engaging in physical activity, if any?						<input type="checkbox"/> Times
READ OUT ACTIVITIES		ONLY CAPTURE ACTIVITIES DURING LEISURE TIME, i.e. THAT ARE NOT RELATED TO OCCUPATIONAL ACTIVITIES		During last month, did you do [...] in your leisure time? TICK THE ONE THAT APPLIES	During last month, how many times did you do [...]?	During last month, for how many minutes did you do [...]?	
(15.05)a	HOUSEHOLD CHORES, EG CLEANING (OTHER THAN FOR HOUSEHELP AS MAIN OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)b	GARDENING AND LIVESTOCK CARE (OTHER THAN FOR FARMING OR FARMHELP AS OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
NOT TO SCHOOL/ WORK:							
(15.05)c	WALKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)d	BIKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)e	WALKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)f	BIKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)g	PHYSICAL EXERCISE EDUCATION (ONLY FOR INDIVIDUALS ATTENDING SCHOOL)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)h	JOGGING/RUNNING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)i	USING JUMPING ROPE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)k	AEROBICS (EG SITUPS, STRETCHING)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)l	WEIGHT LIFTING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)m	FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)n	VOLLEYBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)o	BASKETBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)p	DANCING (EG WHEN GOING OUT)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)q	OTHER PHYSICAL GAMES OR PLAYS	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)r	WATCHING TELEVISION/MOVIES/FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)s	SURFING INTERNET	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)t	SITTING TOGETHER WITH FAMILY AND FRIENDS AS YOU DRINK BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)u	SITTING TOGETHER WITH FAMILY OR FRIENDS WITHOUT DRINKING BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.05)v	READING (EG NEWSPAPER/MAGAZINES)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY		<input type="checkbox"/>	<input type="checkbox"/> min	
(15.06)	Are you satisfied with the kinds of physical activities you are currently doing during leisure time and the extent to which you do them?	Yes <input type="checkbox"/> 1	(15.07)	It's too much <input type="checkbox"/> 3	Would like to shift to/ add other physical activities <input type="checkbox"/> 3	↑1	
		No <input type="checkbox"/> 2	Why are you not satisfied?	It's too little <input type="checkbox"/> 2	Other (Specify) <input type="checkbox"/> 96		
(15.08)	Why don't you engage in the kinds of physical activities that you would like or to the extent that you would like to do them?	ALLOW UP TO THREE RESPONSES			1st <input type="checkbox"/>	2nd <input type="checkbox"/>	3rd <input type="checkbox"/>
	Physical disability (chronic) 1	Negative society attitude 5	Bad weather 8	Laziness/ lack of motivation or discipline 11			
	Illness/ injury (non-chronic) 2	Lack of facilities/grounds 6	Gym is too costly 9	Other (specify) 96			
	Injury (chronic) 3	Insecurity 7	There is no need 10				
	Lack of time 4						
(15.09)	Taking into account the physical activity you do during work and leisure, how would you rate your current amount of physical activity as compared to a healthy amount of physical activity? READ OUT	TOO MUCH <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT INSUFFIC. <input type="checkbox"/> 3	A LITTLE IN-SUFFICIENT <input type="checkbox"/> 4	SEVERELY IN-SUFFICIENT <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.10)	Taking into account the physical activity you do during work and leisure, how would you rate your current amount of physical activity as compared to the amount of one year ago? READ OUT	MUCH MORE <input type="checkbox"/> 1	A LITTLE MORE <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE LESS <input type="checkbox"/> 4	MUCH LESS <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.11)	How would you rate your current overall healthiness? READ OUT	VERY GOOD <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT POOR <input type="checkbox"/> 3	A LITTLE POOR <input type="checkbox"/> 4	VERY POOR <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.12)	How would you rate your healthiness as compared to one year ago? READ OUT	MUCH BETTER <input type="checkbox"/> 1	A LITTLE BETTER <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE WORSE <input type="checkbox"/> 4	MUCH WORSE <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99

SECTION 15: Physical and leisure related activity

MALE SP
RESPONDENT ID:

(15.01)	How do you usually get to/ from school/ work? (IF MAIN JOB IS HOUSEWIFE ► (15.05)b)	Foot <input type="checkbox"/> 1	Car <input type="checkbox"/> 2	Bicycle <input type="checkbox"/> 3	Matafu <input type="checkbox"/> 4	<input type="checkbox"/> 96	
	TICK THE ONE THAT APPLIES.	Boda boda <input type="checkbox"/> 5	Motor-cycle <input type="checkbox"/> 6	Don't work/ don't attend school <input type="checkbox"/> 97	↑ Other (specify)		
ONLY IF (15.01) IS FOOT OR BICYCLE							
(15.02)	How many times did you go to/ from school/work like this during the last month? (1 WAY = 1 TIME)	<input type="text"/> Times	(15.03)	About how many minutes did this take you each time?	<input type="text"/> Min		
				IF HIGH FLUCTUATION, REPORT AVERAGE			
(15.04)	How many times did you choose to do this for the purpose of engaging in physical activity, if any?					<input type="text"/> Times	
READ OUT ACTIVITIES		During last month, did you do [...] in your leisure time? TICK THE ONE THAT APPLIES		During last month, how many times did you do [...]?	During last month, for how many minutes did you do [...]?		
ONLY CAPTURE ACTIVITIES DURING LEISURE TIME, i.e. THAT ARE NOT RELATED TO OCCUPATIONAL ACTIVITIES							
(15.05)a	HOUSEHOLD CHORES, EG CLEANING (OTHER THAN FOR HOUSEHELP AS MAIN OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)b	GARDENING AND LIVESTOCK CARE (OTHER THAN FOR FARMING OR FARMHELP AS OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
NOT TO SCHOOL/ WORK:							
(15.05)c	WALKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)d	BIKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)e	WALKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)f	BIKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)g	PHYSICAL EXERCISE EDUCATION (ONLY FOR INDIVIDUALS ATTENDING SCHOOL)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)h	JOGGING/RUNNING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)i	USING JUMPING ROPE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)k	AEROBICS (EG SITUPS, STRETCHING)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)l	WEIGHT LIFTING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)m	FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)n	VOLLEYBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)o	BASKETBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)p	DANCING (EG WHEN GOING OUT)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)q	OTHER PHYSICAL GAMES OR PLAYS	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)r	WATCHING TELEVISION/MOVIES/FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)s	SURFING INTERNET	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)t	SITTING TOGETHER WITH FAMILY AND FRIENDS AS YOU DRINK BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)u	SITTING TOGETHER WITH FAMILY OR FRIENDS WITHOUT DRINKING BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.05)v	READING (EG NEWSPAPER/MAGAZINES)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	min	
(15.06)	Are you satisfied with the kinds of physical activities you are currently doing during leisure time and the extent to which you do them?	Yes <input type="checkbox"/> 1	(15.07) It's too much <input type="checkbox"/> 1	Would like to shift to/ add other physical activities <input type="text"/> 3			
		No <input type="checkbox"/> 2	Why are you not satisfied? <input type="text"/>	It's too little <input type="checkbox"/> 2	Other (Specify) <input type="text"/> 96		
(15.08)	Why don't you engage in the kinds of physical activities that you would like or to the extent that you would like to do them?	ALLOW UP TO THREE RESPONSES					
		Physical disability (chronic) 1	Negative society attitude 5	Bad weather 8	Laziness/ lack of motivation or discipline 11		
		Illness/ injury (non-chronic) 2	Lack of facilities/grounds 6	Gym is too costly 9			
		Injury (chronic) 3	Insecurity 7	There is no need 10	Other (specify) 96		
		Lack of time 4					
(15.09)	Taking into account the physical activities you do during work and leisure, how would you rate your current amount of physical activity as compared to a healthy amount of physical activity? READ OUT	TOO MUCH <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT INSUFFIC. <input type="checkbox"/> 3	A LITTLE IN-SUFFICIENT <input type="checkbox"/> 4	SEVERELY IN-SUFFICIENT <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.10)	Taking into account the physical activities you do during work and leisure, how would you rate your current amount of physical activity as compared to the amount of one year ago? READ OUT	MUCH MORE <input type="checkbox"/> 1	A LITTLE MORE <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE LESS <input type="checkbox"/> 4	MUCH LESS <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.11)	How would you rate your current overall healthiness? READ OUT	VERY GOOD <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT POOR <input type="checkbox"/> 3	A LITTLE POOR <input type="checkbox"/> 4	VERY POOR <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.12)	How would you rate your healthiness as compared to one year ago? READ OUT	MUCH BETTER <input type="checkbox"/> 1	A LITTLE BETTER <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE WORSE <input type="checkbox"/> 4	MUCH WORSE <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99

SECTION 15: Physical and leisure related activity

CHILD SP/CAREGIVER
RESPONDENT ID:

(15.01)	How do you usually get to/ from school/ work? (IF MAIN JOB IS HOUSEWIFE ► (15.05)b)	Foot <input type="checkbox"/> 1	Car <input type="checkbox"/> 2	Bicycle <input type="checkbox"/> 3	Matafu <input type="checkbox"/> 4	<input type="checkbox"/> 96	
	TICK THE ONE THAT APPLIES.	Boda <input type="checkbox"/> 5	Motor-cycle <input type="checkbox"/> 6	Don't work/ don't attend school <input type="checkbox"/> 97	↑ Other (specify)		
ONLY IF (15.01) IS FOOT OR BICYCLE							
(15.02)	How many times did you go to/ from school/work like this during the last month? (1 WAY = 1 TIME)	<input type="text"/> Times	(15.03)	About how many minutes did this take you each time?	<input type="text"/> Min		
				IF HIGH FLUCTUATION, REPORT AVERAGE			
(15.04)	How many times did you choose to do this for the purpose of engaging in physical activity, if any?					<input type="text"/> Times	
READ OUT ACTIVITIES		During last month, did you do [...] in your leisure time?		During last month, how many times did you do [...]?		During last month, for how many minutes did you do [...]?	
ONLY CAPTURE ACTIVITIES DURING LEISURE TIME, i.e. THAT ARE NOT RELATED TO OCCUPATIONAL ACTIVITIES		TICK THE ONE THAT APPLIES					
(15.05)a	HOUSEHOLD CHORES, EG CLEANING (OTHER THAN FOR HOUSEHELP AS MAIN OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)b	GARDENING AND LIVESTOCK CARE (OTHER THAN FOR FARMING OR FARMHELP AS OCCUPATION)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
NOT TO SCHOOL/ WORK:							
(15.05)c	WALKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)d	BIKING FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)e	WALKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)f	BIKING NOT FOR EXERCISE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)g	PHYSICAL EXERCISE EDUCATION (ONLY FOR INDIVIDUALS ATTENDING SCHOOL)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)h	JOGGING/RUNNING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)i	USING JUMPING ROPE	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)k	AEROBICS (EG SITUPS, STRETCHING)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)l	WEIGHT LIFTING	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)m	FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)n	VOLLEYBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)o	BASKETBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)p	DANCING (EG WHEN GOING OUT)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)q	OTHER PHYSICAL GAMES OR PLAYS	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)r	WATCHING TELEVISION/MOVIES/FOOTBALL	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)s	SURFING INTERNET	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)t	ONLY IF AGE>12: SITTING TOGETHER WITH FAMILY AND FRIENDS AS YOU DRINK BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)u	SITTING TOGETHER WITH FAMILY OR FRIENDS WITHOUT DRINKING BEER	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.05)v	READING (EG NEWSPAPER/MAGAZINES)	Yes <input type="checkbox"/> 1	No <input type="checkbox"/> 2 ► NEXT ACTIVITY	<input type="text"/>	<input type="text"/>	<input type="text"/> min	
(15.06)	Are you satisfied with the kinds of physical activities you are currently doing during leisure time and the extent to which you do them?	Yes <input type="checkbox"/> 1	(15.07) It's too much <input type="checkbox"/> 3	Would like to shift to/ add other physical activities <input type="text"/>			
		► (15.09) Why are you not satisfied? <input type="text"/>	It's too little <input type="checkbox"/> 2	Other (Specify) <input type="text"/> 96			
		No <input type="checkbox"/> 2					
(15.08)		Why don't you engage in the kinds of physical activities that you would like or to the extent that you would like to do them?			ALLOW UP TO THREE RESPONSES		
		Physical disability (chronic) 1	Negative society attitude 5	Bad weather 8	Laziness/ lack of motivation or discipline 11		
		Illness/ injury (non-chronic) 2	Lack of facilities/grounds 6	Gym is too costly 9			
		Injury (chronic) 3	Insecurity 7	There is no need 10	Other (specify) 96		
		Lack of time 4					
(15.09)	Taking into account the physical activity you do during work and leisure, how would you rate your current amount of physical activity as compared to a healthy amount of physical activity? READ OUT	TOO MUCH <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT INSUFFIC. <input type="checkbox"/> 3	A LITTLE INSUFFICIENT <input type="checkbox"/> 4	SEVERELY INSUFFICIENT <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.10)	Taking into account the physical activity you do during work and leisure, how would you rate your current amount of physical activity as compared to the amount of one year ago? READ OUT	MUCH MORE <input type="checkbox"/> 1	A LITTLE MORE <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE LESS <input type="checkbox"/> 4	MUCH LESS <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.11)	How would you rate your current overall healthiness? READ OUT	VERY GOOD <input type="checkbox"/> 1	GOOD <input type="checkbox"/> 2	OK, NOT GOOD NOT POOR <input type="checkbox"/> 3	A LITTLE POOR <input type="checkbox"/> 4	VERY POOR <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99
(15.12)	How would you rate your healthiness as compared to one year ago? READ OUT	MUCH BETTER <input type="checkbox"/> 1	A LITTLE BETTER <input type="checkbox"/> 2	THE SAME <input type="checkbox"/> 3	A LITTLE WORSE <input type="checkbox"/> 4	MUCH WORSE <input type="checkbox"/> 5	Not sure <input type="checkbox"/> 99

SECTION 16: Beauty Ideals

READ OUT: NOW, I WILL ASK QUESTIONS ABOUT YOUR PERCEPTION OF DIFFERENT BODY IMAGES.
PLEASE CONSIDER THE PICTURES OF FEMALE AND MALE ADULTS.

		IF CHILD/ADOL. SP AGE 13 AND ABOVE					
		FEMALE SP			MALE SP		
		RESPON-			RESPON-		
		DENT ID:			DENT ID:		ADOLESCENT SP
							RESPON-
							DENT ID:
IF DON'T KNOW CODE 99. IF NONE CODE "NONE"							
(16.01)	Which one of the bodies resembles your current stature?						
(16.02)	Which one of the bodies would you say resembles your body stature of one year ago ?						
(16.03)	Which one of the bodies do you think resembles your ideal body stature?						
(16.04)	What would be your ideal weight?		kg		kg		kg
FOR ALL QUESTIONS BELOW: IF YES, PROBE: "WHICH ONE(S)?" IF NO, CODE "NONE"							
(16.05)	Would you say that any of the female bodies is healthiest?						
(16.06)	Would you say that any of the male bodies is healthiest?						
(16.07)	Would you say that any of the female bodies might financially be most successful?						
(16.08)	Would you say that any of the male bodies might financially most successful?						
(16.09)	If the females were married, would you say that any one resembles a female who is best taken care of by her husband?						
(16.10)	If the males were married, would you say that any one resembles a male who is best taken care of by his wife?						
DEFINE EXCESS WEIGHT: WEIGHING MORE THAN BEST FOR HEALTH							
(16.11)	Would you classify any female body as having excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST BODY.						
(16.12)	Would you classify any male body as having excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST BODY.						
DEFINE STRONG EXCESS WEIGHT: WEIGHING MUCH MORE THAN BEST FOR HEALTH							
(16.13)	Would you classify any female body as having strong excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST BODY.						
(16.14)	Would you classify any male body as having strong excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST BOY.						
DEFINE WEIGHING TOO LITTLE: WEIGHING LESS THAN BEST FOR HEALTH							
(16.15)	Would you classify any female body as weighing too little ? PROBE FOR FIRST ONE LOOKING FROM BIGGEST TO SKINNIEST BODY.						
(16.16)	Would you classify any male body as weighing too little ? PROBE FOR FIRST ONE LOOKING FROM BIGGEST TO SKINNIEST BODY.						
(16.17)	Would you say that any female body has a high risk of developing diabetes? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd
(16.18)	Would you say that any male body has a high risk of developing diabetes? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd
(16.19)	Would you say that any female body has a high risk of developing a heart disease? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd
(16.20)	Would you say that any male body has a high risk of developing a heart disease? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd
(16.21)	Would you say that any female body has a high risk of developing cancer? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd
(16.22)	Would you say that any male body has a high risk of developing cancer? ALLOW UP TO 3 RESPONSES. RANK ACCORDING TO LIKELIHOOD.	1st	2nd	3rd	1st	2nd	3rd

IF CHILD/ ADOLESCENT SP AGE 5-12 ASK THE FOLLOWING QUESTIONS TO MOTHER OF THAT SP

READ OUT: PLEASE CONSIDER THIS PICTURE OF CHILDREN.

DEFINE EXCESS/ STRONG EXCESS/ TOO LITTLE WEIGHT PRIOR TO CORRESPONDING QUESTIONS

		MOTHER OF CHILD	
		RESPONDENT ID:	
(16.23)	Which one of the bodies would you say resembles an ideal body stature for boys ?	(16.29)	Would you classify any boy as weighing too little (low weight for height) ? PROBE FOR FIRST ONE LOOKING FROM BIGGEST TO SKINNIEST.
(16.24)	Which one of the bodies would you say resembles an ideal body stature for girls ?	(16.30)	Would you classify any girl as weighing too little (low weight for height) ? PROBE FOR FIRST ONE LOOKING FROM BIGGEST TO SKINNIEST.
FOR ALL FOLLOWING QUESTIONS: IF YES, PROBE "WHICH ONE".			
(16.25)	Would classify any boy as having excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST.	(16.31)	Would you say that any boys is healthiest?
(16.26)	Would classify any girl as having excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST.	(16.32)	Would you say that any girls is healthiest?
(16.27)	Would classify any boy as having strong excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST.		
(16.28)	Would classify any girl as having strong excess weight ? PROBE FOR FIRST ONE LOOKING FROM SKINNIEST TO BIGGEST.		

SECTION 17: Anthropometry and Weight Related Risk Factors

SAMPLE SELECTION OF SPS	(17.01)	(17.02)	(17.03)	(17.04)	(17.05)	(17.06)	(17.07)		(17.08)	(17.09) - (17.12)				
	REPORT MEMBER ID FROM FLAP FOR PERSONS SELECTED FOR WEIGHT MEASUREMENT	ASK THE RESPONDENTS TO SIGN HERE AS TO SHOW THEIR CONSENT TO THE MEASUREMENTS IF THE RESPONDENT CANNOT WRITE, LET A REPRESENTATIVE SIGN IF THE RESPONDENT IS YOUNGER THAN AGE 18 , LET THE LEGAL REPRESENTATIVE SIGN	ONLY ASK FEMALE AGE 13-50	How old is the pregnancy?	ONLY ASK MOTHER OF INFANT (0-2)	During the last 2 weeks, have you suffered from an acute illness/condition that resulted in weight loss?	When is your birthday?		Do you drink alcohol?	ONLY ASK IF AGE 13 OR OLDER				
			Are you pregnant?		Are you currently breastfeeding an infant?		MONTH (2 DIGITS)	YEAR (4 DIGITS)		During last month, how much alcoholic beverages did you drink?	During last month, on how many days did you drink alcoholic beverages?	Did you ever regularly smoke cigarettes?	During last month, how many cigarettes did you smoke?	
			Yes 1 No 2 ▶ (17.05)		Yes 1 No 2 Don't know 99 ▶ (17.05)									Yes 1 No 2
ID CODE	SIGNATURE	▶ (17.05)	MONTHS (2 DIGITS)	Yes 1 No 2	No 2	Yes 1 No 2 ▶ (17.11)	LITRES	DAYS	▶ (17.13)					NUMBER OF CIGAR.
male adult			X		X									
female adult														
child/adoles.														

	(17.13)	(17.14)	(17.15)	(17.16)	(17.17)	(17.18)	(17.19)	(17.20)				(17.21)
	When you were born, how much did you weigh?	How many month were you breastfed exclusively?	Did your get pre-natal care before you were born?	What do you think is your current weight?	By how much kilograms did your weight change as compared to one year ago?	Does or did either one of your mother/ father/ grandparents or siblings suffer from diabetes?	Did either one of your mother/ father/ grandparents or siblings suffer from a heart attack before the age of 60?	NOW I WOULD LIKE TO DO SOME MEASUREMENTS I WILL EXPLAIN EACH PROCEDURE TO YOU			CALIBRATION WEIGHT	DO NOT ASK, OBSERVE. What kind of cloth did [NAME] wear during measurements?
		ASK MOTHER IF POSSIBLE	ASK MOTHER IF POSSIBLE					WRITE 97 IF RESPONDENT REFUSES			KG	
		WEIGHT IN KG	MONTHS					Yes 1 No 2	WEIGHT IN KG	WEIGHT CHANGE IN KG	Yes (specify) 1 No 2 Don't know (specify) 99	
male adult		X	X					HEIGHT IN CM	WEIGHT IN KG	CM HIP CIRCUM-FERENCE	CM WAIST CIRCUM-FERENCE	Light clothing 1 Light clothing + medical appliance 2 Other (specify) 96
female adult												
child/adoles.												

→ CONFIRM WITH IMMUNIZATION CARD

Section 18: End of the Questionnaire

Could you please give us your cellphone number?

NAME	PHONE NUMBER

Could you please give us also the cellphone numbers of at least two other family members/relatives/friends of your household such that we can contact you if we need more information?

NAME	PHONE NUMBER

For enumerator's comments/notes
