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How important are supermarkets for the diets of the urban poor in Africa?

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42 **1. Introduction**

43 Many developing countries are undergoing a profound transformation of food systems and
44 dietary patterns. Evidence suggests that consumers in these countries are shifting towards the
45 consumption of more energy-dense, processed foods and sedentary lifestyles (Worku et al. 2017;
46 Rischke et al. 2015; Pingali 2015; Pingali 2007; Popkin et al. 2012). This transformation is
47 influenced by various supply and demand side factors, including income growth, urbanization,
48 technological advances, and modernization of the retail sector (Worku et al. 2017; Popkin 2017;
49 Qaim 2017; Hawkes et al. 2009; Pingali 2007). The modernization of the retail sector is particularly
50 characterized by the rapid spread of supermarkets (Reardon and Hopkins 2006). While
51 supermarkets have had significant market shares in developed countries for several decades, they
52 also gained importance in many parts of Latin America and Asia since the early-1990s (Reardon
53 et al. 2012). In sub-Saharan Africa, the “supermarket revolution” started more recently.
54 Nevertheless, supermarkets already account for more than 10% of total food retailing in countries
55 like Kenya, and for more than 20% when only looking at some of the large cities in Africa (Khonje
56 and Qaim 2019; Planet Retail 2017; Chege et al. 2015; Rischke et al. 2015). The modernization of
57 the African retail sector will likely continue in the coming years and decades.

58 There is a growing body of literature on the link between the growth of supermarkets in
59 developing countries and consumer diets and nutrition (Demmler et al. 2018; Demmler et al. 2017;
60 Kimenju et al. 2015; Rischke et al. 2015; Umberger et al. 2015; Asfaw 2008; Hawkes 2008; Tessier
61 et al. 2008). While a few studies mention that the growth of supermarkets may have positive
62 nutrition effects through improving consumer access to diverse foods at affordable prices (Rischke
63 et al. 2015; Tessier et al. 2008), others stress that supermarket use may contribute to unhealthy
64 diets because of consumption shifts towards processed foods with high sugar and fat contents
65 (Popkin 2017; Asfaw 2008; Hawkes 2008). Indeed, recent studies showed that supermarket use
66 contributes to overweight and obesity among urban consumers in developing countries (Demmler
67 et al. 2018; Demmler et al. 2017; Kimenju et al. 2015, Umberger et al. 2015).

68 These findings are interesting and important from a food policy perspective. However, the fact
69 that supermarkets play an important and further growing role for consumers in developing
70 countries is possibly not the full story when it comes to understanding urban food consumption
71 patterns and their association with changing retail environments. The use of supermarkets in
72 developing countries is known to be positively correlated with household income (Khonje and

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73 Qaim 2019; Demmler et al. 2018). Hence, what is true for middle- and upper-income consumers is
74 not necessarily true for low-income consumers. From a development policy perspective, a
75 particular focus should be on the poorest population segments, as these are most affected by
76 undernutrition, micronutrient malnutrition, and poor health (FAO 2018). In urban areas, many of
77 the poor live in informal settlements, also known as slums. These slums are typically characterized
78 by abject poverty, food insecurity, overcrowding, and limited access to health and sanitation
79 (APHRC 2014; Kimani-Murage et al. 2015; UN-HABITAT 2010). According to UN-HABITAT
80 (2010), over 60% of the urban population in sub-Saharan Africa lives in slums. The dietary and
81 food purchase patterns of slum dwellers are not well understood (Bloem and de Pee 2017). This is
82 largely owing to the fact that households in rapidly growing informal settlements are systematically
83 underrepresented in national surveys.

84 The objective of this article is to analyze the dietary patterns of slum dwellers in Africa and –
85 in doing so – also better understand the role of supermarkets and traditional retail outlets for the
86 food purchases of these households. The study complements the emerging evidence on the food
87 system transformation in Africa with a particular focus on some of the most vulnerable population
88 segments. The results may help to draw some conclusions on possible entry points for improving
89 food and nutrition security in urban areas. The research builds on data collected in some of the
90 poorest neighborhoods of Nairobi and Kampala, the Capital Cities of Kenya and Uganda. Nairobi
91 and Kampala were chosen not only because they are among the largest cities in East Africa, but
92 also because they differ in terms of average living standards and retail environments. Thus, the data
93 provide a more representative picture than when focusing on cities in only one country.

94

95 **2. Materials and methods**

96 **2.1. Household survey**

97 Data for this research were collected through an interview-based household survey in Nairobi
98 and Kampala implemented between November 2016 and February 2017. Recent statistics estimate
99 that in both countries, Kenya and Uganda, more than 50% of the urban population reside in slums
100 (World Bank 2017). To select households for inclusion in the surveys, a multi-stage sampling
101 strategy was used. We started with a list of all constituencies in Nairobi County and all divisions
102 in Kampala District. Based on official data (KNBS 2015; Ministry of Lands, Housing and Urban

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103 Development 2014; UBOS 2014), these constituencies and divisions were ordered by average
104 income, poverty levels, and other indicators of living standards. Out of those
105 constituencies/divisions with the highest poverty levels or lowest standard of living, two in each
106 city were purposively selected. In Nairobi, Mathare and Kibra (formerly Kibera) constituencies
107 were selected. In Uganda, Kawempe and Nakawa divisions were selected.

108 In these constituencies and divisions, the poorest wards and villages were sampled based on
109 information from local administrative offices.¹ In Kenya, three wards in Kibra (Laini Saba, Lindi,
110 and Makina) and one village in Mathare (Mradi) were selected. In Uganda, two villages in
111 Kawempe (Bwaise I and Bwaise III) and two villages in Nakawa (Kinawataka and Banda) were
112 selected. In these wards and villages, households were sampled randomly, using the random walk
113 method. Given that census data for these slum areas do not exist and that most of the houses have
114 temporary structures and no permanent address, the random walk method was the most suitable
115 approach to get a random sample of the current population. Only households with at least one child
116 aged 6-59 months were considered, as childhood undernutrition is particularly serious in terms of
117 irreversible negative health consequences (Development Initiatives 2018). In total, 600 households
118 were interviewed; 300 in Nairobi and 300 in Kampala. Further details of the sampling distribution
119 by ward/village are shown in Table A1 in the Online Appendix.

120 The interviews were carried out in local languages using a structured questionnaire
121 programmed into tablet computers. The questionnaire was carefully pretested prior to the actual
122 survey.² It contained modules on general socioeconomic characteristics as well as food
123 consumption and food purchase behavior. The interviews were conducted with the household head
124 and/or the spouse. For the food-related parts, the person responsible for food purchases and food
125 preparation in the household was interviewed.

126 Food consumption details were elicited through a 7-day recall at the household level. While
127 household-level data do not account for intra-household food distribution, the 7-day recall format
128 is a common approach to analyze dietary patterns and issues of food security (Zezza et al. 2017; de
129 Haen et al. 2011). We collected data on the consumption of 112 different food items. When the
130 consumption of mixed dishes was reported, the different ingredients of these dishes were recorded

¹ The term “village” does not imply that these are rural areas. Also in urban areas, this term is used locally to demarcate administrative boundaries.

² Questionnaire pretests were carried out with 20 households, which were not included in the actual survey.

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131 separately. For each of the food items consumed, we also recorded the different food sources,
132 including purchases, gifts and transfers, and own production for those who did urban farming or
133 carried food from their rural homes. For all purchased food items consumed during the 7-day recall
134 period, we also recorded the type of retail outlet from which the item was obtained. In different
135 sections of the questionnaire, we asked households about their preferred packaging sizes for
136 frequently purchased food items. As will be discussed in more detail below, packaging sizes tend
137 to differ between the different types of retail outlets, which may explain why poor consumers prefer
138 certain outlets over others.

139

140 **2.2. Statistical methods**

141 In this article, descriptive statistical methods are used to analyze dietary and food purchase
142 patterns of sample households, including levels of calorie consumption, rates of undernourishment,
143 the role of different types of foods, and the role of different retail formats. While some of the results
144 are also shown for the pooled sample, most of the analyses are carried out separately for the
145 subsamples from Nairobi and Kampala. Moreover, to show differences by income level, both
146 subsamples are subdivided into terciles using household per capita expenditures as a proxy of
147 income and living standard. The key variables used and their measurement are explained in the
148 following subsections.

149

150 **2.3. Household expenditures**

151 Household expenditures, our proxy of income and living standard, are computed as the sum of
152 the value of all food and non-food goods and services consumed by the household over the recall
153 period. The value of food consumption was derived from the 7-day food consumption recall, where
154 quantities and prices of all food items were recorded. For foods from own production or gifts and
155 transfers, values were imputed by using the average market price of each item observed in the
156 ward/village or the next larger geographic unit. Data on non-food expenditures were collected
157 through 30-day and 12-month recall periods, depending on the good/service and the typical
158 frequency of purchase. All expenditures and consumption values were converted to monthly
159 equivalents and expressed in international dollar (purchasing power parity, PPP) per capita, taking
160 into account local consumer price indices (KNBS 2016; UBOS 2017). These monthly per capita

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161 expenditures are also used to generate expenditure terciles for the subsamples in Nairobi and
162 Kampala.

163 **2.4. Dietary indicators**

164 Based on the 7-day food consumption recall data, various indicators are calculated to analyze
165 household access to food, dietary diversity, and rates of undernourishment. A simple indicator of
166 household access to food and dietary diversity is the household dietary diversity score (HDDS)
167 (Kennedy et al. 2010; Swindale and Bilinsky 2006). HDDS is a count of the number of food groups
168 consumed by the household within the recall period. We use a common food group classification
169 as described by Kennedy et al. (2010). The 12 food groups considered in this classification are:
170 cereals; white roots and tubers, and plantains; vegetables; fruits; meat; eggs; fish and other sea
171 food; legumes, nuts, and seeds; milk and milk products; oils and fats; sweets and sugars; and spices,
172 condiments, and beverages. The larger the HDDS, the higher is the level of food security and
173 dietary diversity. There is no generally agreed cutoff point for the HDDS below which a household
174 is considered food-insecure (Kennedy et al. 2010). When comparing HDDS across different
175 settings, the length of the recall period needs to be considered, as the number of food groups
176 consumed during a 7-day recall period is systematically larger than the number of food groups
177 consumed during a 24-hour recall period (Fongar et al. 2019).

178 In addition to the HDDS, we calculate the amount of calories consumed as a common method
179 of assessing food security and rates of undernourishment (Zezza et al. 2017; de Haen et al. 2011).
180 For the calculations, the reported food quantities consumed by households during the 7-day recall
181 period were corrected for nonedible portions and converted to calories using food composition
182 tables for Kenya (Sehmi 1993) and Uganda (Hotz et al. 2012). The quantity of calories thus
183 obtained for each household was divided by 7 to result in average calorie consumption per day.
184 Total consumption per day at the household level was adjusted using male adult equivalents (AE)
185 to enable comparison across households of different sizes and composition. We report absolute
186 values of calorie consumption, as well as rates of undernourishment, classifying a household as
187 undernourished when the calorie consumption is below 2400 kcal per AE and day (FAO et al.
188 2001).

189 **2.5. Modern and traditional retail formats**

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190 We classify all food retail outlets used by sample households into different categories, as shown
 191 in Table 1. The characteristics shown in Table 1 build on observations during visits of the various
 192 retail outlets in the study regions, backed up by informal discussions with shop assistants or shop
 193 owners and available literature sources.

194

195 **Table 1.** Characterization of food retail outlets

Source	Characteristics	Main food items
Supermarket (Modern retail)	Self-service; Large variety of foods and brands; Highly processed foods; Refrigerated and frozen food; Limited offer of fresh foods; Non-food products; No credit possibility.	Bread, pasta, cereals, instant noodles, snacks, fats, oils, dairy products, sugar, fruits and vegetables.
Local market (Traditional retail)	Operate within fixed hours of the day; Clustered at specific points; Operate daily but the number of retailers might increase on specific days of the week (market days).	Fruits, vegetables, cereals, roots and tubers, spices.
Roadside vendors (Traditional retail)	Operate along busy roads/streets; No permanent location; Limited variety of food and non-food items; Individual ownership; Credit possibility.	Fruits, vegetables, cereals, roots and tubers.
Kiosks (Traditional retail)	Over the counter-service; Very limited variety of brands; Fresh fruits and vegetables; Unprocessed staples; Small packaging; Individual ownership; Credit possibility	Maize, other staple foods, fruits, vegetables, meat, milk.
Mom-and-pop shops (Traditional retail)	Fixed locations; Over the counter-service; Moderate variety of foods and brands; Some refrigerated foods; Small packaging; Processed staples; Individual/family ownership; Credit possibility.	Rice, wheat flour, edible oils, spices and condiments, sugars, milk.
Hawkers (Traditional retail)	No fixed locations; Move around residential areas; Single or a limited food variety of both food and non-food items; Possibility of door-step delivery; Credit possibility.	Vegetables, fruits, dry fish, fresh milk.

196 *Source:* Adapted from Demmler et al. (2018).

197 The only modern retail outlet of relevance in the study regions are supermarkets,³ which are
 198 characterized by their self-service format and the large variety of foods on offer. Supermarkets can
 199 be of different size, even though in the poor neighborhoods they tend to be rather small. Food items
 200 typically sold in supermarkets include cereals at various processing stages, legumes, vegetable oils,
 201 packaged milk and dairy products, packaged meat and meat products, spices, various types of
 202 snacks and beverages, and to some limited extent also fruits and vegetables.

203 In contrast to modern retail outlets, there are different categories of traditional retailers of
 204 relevance to sample households. Traditional food retailers include local markets (wet markets),
 205 mom-and-pop shops (small traditional shops), roadside vendors, kiosks, and hawkers. None of

³ Other types of modern retailers, such as hypermarkets or convenience stores, exist in Nairobi and Kampala but are not used by sample households and not located in the studied neighborhoods.

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206 these traditional retailers have self-service options. Mom-and-pop shops are similar to small
207 supermarkets in terms of the types of foods sold. However, mom-and-pop shops typically have no
208 fresh fruits and vegetables, a smaller range of processed foods (fewer brands, less diversity), and
209 smaller packaging sizes than supermarkets. Sometimes, mom-and-pop shops sell sugar, flour, and
210 other commodities also in loose form depending on customer needs. Mom-and-pop shops are
211 mostly operated personally by the shop owner and his/her family members (Kumar et al. 2008).
212 Most of these shops offer goods on credit to personally-known customers.

213 Local markets (wet markets) are mainly operated during specified times in designated
214 locations. Although most markets are open on a daily basis, the number of stalls typically increases
215 on particular days of the week (Minten et al. 2010). The main food items sold in traditional local
216 markets include fresh fruits and vegetables, cereals, legumes, roots, tubers, and plantains. Most of
217 the food items sold are sourced from the surrounding rural areas and peri-urban farms.

218 Unlike local markets, kiosks are temporary structures located close to residential areas with a
219 very limited variety of food items. Common food items sold in kiosks include cereals, fruits and
220 vegetables, roots and tubers, and small units of processed and packaged foods and beverages. Most
221 kiosks also sell cooked foods, such as boiled and roasted green maize and beans. Roadside vendors
222 have no fixed locations and operate mainly along busy roads/streets. They also sell certain cooked
223 foods, along with fresh fruits and vegetables. Finally, hawkers move around residential areas by
224 foot, bicycle, or motorcycle, selling food items at people's doorstep. Hawkers tend to have a very
225 limited variety of food items, or sometimes only one type of food (e.g., fruits, milk, fish).

226 **3. Results and discussion**

227 **3.1. Socioeconomic characteristics**

228 Table 2 shows general socioeconomic characteristics of the sample households in Nairobi and
229 Kampala. In Nairobi, most of the households are male-headed, while in Kampala about half of the
230 households are female-headed. In both cities, the majority of the households are poor, meaning that
231 they have less than 1.90 \$ (PPP) a day on a per capita basis. The sample poverty rate is 56% and
232 90% in Nairobi and Kampala, respectively. Low living standards are also reflected in poor housing
233 and sanitation conditions (Table A2 in the Online Appendix). Typically, in the study
234 neighborhoods houses for families with four and more members only have one single room.

235

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236 **Table 2.** Socioeconomic characteristics

Variables	Pooled sample (N=600)		Nairobi (N=300)		Kampala (N=300)	
	Mean	SE	Mean	SE	Mean	SE
Male headed household (dummy)	0.67	0.02	0.85***	0.02	0.49	0.03
Age of household head (years)	35.72	0.44	35.84	0.50	35.60	0.72
Education of household head (years)	8.66	0.14	9.63***	0.15	7.70	0.23
Household size	4.96	0.09	5.09	0.11	4.84	0.13
Proportion of poor (dummy) ^a	0.73	0.02	0.56***	0.03	0.90	0.02
Total dependency ratio	137.69	4.02	111.03***	3.68	164.35	6.81

237 *Notes:* ^a Poor households are those with a per capita income below the international poverty line of 1.90 \$ in purchasing
238 power parity terms; SE, standard error; *** Mean difference between Nairobi and Kampala significant at the 1% level.

239 *Source:* Authors' household survey.

240
241 Table 3 shows total household expenditures and household food expenditures by expenditure
242 tercile. As expected, in both cities the food expenditures increase from the lowest to the highest
243 tercile in absolute terms, whereas the food expenditure shares decline with rising incomes. As can
244 be seen, even the highest-tercile households still spend more than half of their total expenditures
245 on food. This is consistent with research from other countries showing that poor and moderately
246 poor households spend a large part of their total budget on food (Bloem and de Pee 2017; Banerjee
247 and Duflo 2007).

248

249

250 **Table 3.** Household expenditures by expenditure tercile

Expenditure tercile	Monthly per capita expenditures (PPP\$)		Monthly food per capita expenditures (PPP\$)		Share of food expenditures	
	Nairobi (N=300)	Kampala (N=300)	Nairobi (N=300)	Kampala (N=300)	Nairobi (N=300)	Kampala (N=300)
Lowest tercile ^a	54.80 (2.40)	48.83 (2.18)	32.88 (1.70)	28.59 (1.22)	0.60 (0.01)	0.61 (0.01)
Middle tercile ^a	81.07 (2.45)	80.32 (3.18)	44.91 (1.45)	44.54 (1.94)	0.56 (0.01)	0.56 (0.01)
Highest tercile ^a	112.40 (3.61)	120.15 (5.23)	59.36 (2.37)	64.12 (3.72)	0.53 (0.01)	0.53 (0.01)
Average	85.83 (2.17)	79.33 (2.64)	47.13 (1.27)	43.86 (1.58)	0.56 (0.01)	0.57 (0.55)
Pooled	82.58 (1.71)		45.49 (1.02)		0.56 (0.01)	

251 *Note:* Mean values are shown with standard errors in parentheses. ^a Each tercile includes one-third of the total number
252 of observations. PPP, purchasing power parity.

253 *Source:* Authors' household survey.

254

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255 3.2. Prevalence of undernourishment

256 Table 4 shows the different food security and dietary indicators for sample households by
 257 expenditure tercile. The HDDS suggests that dietary diversity is somewhat higher in Nairobi than
 258 in Kampala, and increases with people’s overall living standard. As mentioned, there is no agreed
 259 upon cutoff for the HDDS below which households are considered food-insecure. Recent research
 260 that had used 7-day recall data from rural households in Kenya and Uganda found mean values for
 261 HDDS of 9-10 food groups (Fongar et al. 2019; Sibhatu and Qaim 2018). In other words, mean
 262 dietary diversity in the urban slum households sampled here is similar to dietary diversity found in
 263 rural areas of Africa. Especially in the poorest expenditure tercile in Kampala, dietary diversity is
 264 particularly low.

265 Average calorie consumption per AE is also shown in Table 4. In Nairobi, 31% of the sample
 266 households are undernourished, whereas in Kampala the prevalence of undernourishment is 59%.
 267 These rates are higher than the FAO country-level rates of undernourishment, which are estimated
 268 at 24% and 41% for Kenya and Uganda, respectively (FAO 2018). We focus on the poorest urban
 269 population segments, so higher than average rates of undernourishment are to be expected. In our
 270 sample, even many of the households in the highest expenditure tercile are still affected by calorie
 271 deficiency and low dietary quality.

272

273 **Table 4.** Household food security and dietary indicators by expenditure tercile

Expenditure tercile	Household dietary diversity score (HDDS)		Calorie consumption (kcal/day/AE)		Prevalence of undernourishment (%)	
	Nairobi (N=300)	Kampala (N=300)	Nairobi (N=300)	Kampala (N=300)	Kenya (N=300)	Kampala (N=300)
Lowest tercile ^a	9.46 (0.17)	7.49 (0.15)	2344 (92)	2063 (96)	52.56	73.77
Middle tercile ^a	10.43 (0.12)	8.99 (1.47)	3078 (102)	2567 (107)	25.23	57.30
Highest tercile ^a	10.91 (0.11)	10.36 (0.12)	3187 (93)	2844 (127)	22.52	41.57
Average	10.36 (0.08)	8.79 (0.11)	2928 (60)	2444 (66)	31.33	59.33
Pooled (N=600)	9.57 (0.08)		2686 (45)		45.33	

274 *Notes:* Mean values are shown with standard errors in parentheses. ^a Each tercile includes one-third of the total number
 275 of observations. AE, adult equivalents. The mean differences between Nairobi and Kampala for all food security and
 276 dietary indicators are statistically significant at the 1% level.

277 *Source:* Authors’ household survey.

278

279 **3.3. Role of different food groups**

280 To better understand the composition of diets in sample households, we analyze the
 281 contribution of the 12 different food groups to total household calorie consumption. Results of this
 282 analysis are shown in Table 5 (the contribution of the food groups to total household food
 283 expenditures is shown in Table A3 in the Online Appendix). Cereals are the most important food
 284 group in both cities, accounting for 58% and 47% of total calorie consumption in Nairobi and
 285 Kampala, respectively. In Kenya, maize is the main staple food. In addition, rice and wheat are
 286 also widely consumed among urban households. In Kampala, maize, rice, and wheat are consumed,
 287 but other important staple foods are cooking bananas (*matooke*), cassava, sweetpotatoes, and beans.
 288 This larger variety of staple foods is also the reason for the lower calorie contribution of cereals in
 289 Kampala than in Nairobi. Analogously, the calorie contributions of root, tubers, and plantains and
 290 of legumes, nuts, and seeds are higher in Kampala.

291 Interestingly, in Kampala the share of calories from cereals decreases for sample households in
 292 the middle and upper expenditure terciles, whereas the share of calories from roots, tubers, and
 293 plantains increases. This suggests that households substitute away from cereals towards other staple
 294 foods when they are getting richer, at least among these relatively poor urban population segments.
 295 Nevertheless, the share of staple foods in total calorie consumption remains high across all
 296 expenditure terciles.

297 **Table 5.** Calorie contribution of different food groups by expenditure tercile (%)

Food groups	Nairobi (N=300)				Kampala (N=300)			
	Total	Lowest	Middle	Highest	Total	Lowest	Middle	Highest
Cereals	57.91	58.43	57.80	57.66	46.73	51.97	44.17	42.10
White roots, tubers, plantains	2.87	2.33	2.71	3.41	11.12	8.55	11.77	13.97
Vegetables	3.87	4.07	3.71	3.89	1.18	1.23	1.07	1.23
Fruits	2.65	2.12	2.65	3.02	1.09	0.54	1.10	1.84
Meat	1.38	0.77	1.04	2.16	1.28	0.35	0.96	2.86
Eggs	0.64	0.72	0.58	0.63	0.20	0.09	0.23	0.32
Fish, other seafood	2.14	1.84	2.32	2.16	3.70	4.95	2.90	2.78
Legumes, nuts, seeds	4.20	4.03	4.23	4.29	16.95	17.95	18.76	13.76
Milk, milk products	3.14	2.75	3.37	3.19	1.98	0.73	2.38	3.30
Oils, fats	12.89	14.31	13.57	11.22	6.73	6.50	7.13	6.64
Sweets, sugars	8.21	8.59	7.94	8.20	8.89	7.04	9.26	11.04
Spices, condiments, beverages	0.10	0.05	0.07	0.17	0.17	0.11	0.26	0.15

298 *Source:* Authors' household survey.

299

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300 In Nairobi, oils and fats are the second food group after cereals to contribute significantly to
301 total calorie consumption. Strikingly, in Nairobi the share of oils and fats in household diets is
302 larger in the lowest tercile than in the middle and upper terciles. This is somewhat unusual when
303 comparing international trends in developing countries (Kearney 2010), and may be attributable to
304 the availability of inexpensive vegetable oils in the market.

305 For sample households in both cities, the consumption of more nutritious foods, such as
306 vegetables, fruits, meat, eggs, fish, and milk, is relatively low. As one would expect, the calorie
307 contribution of some of these more nutritious foods increases from the lowest to the highest
308 expenditures tercile, which is especially true for meat, milk, and milk products, and to a somewhat
309 lesser extent for fruits. However, for other nutritious foods the calorie contribution changes only
310 very slowly. For instance, the calorie contribution of vegetables and legumes hardly increases with
311 rising income, or it even decreases, as observed for legumes and fish in Kampala. While these
312 patterns are broadly in line with the nutrition transition observed elsewhere (FAO 2017; Popkin et
313 al. 2012), the results suggest that rising incomes alone will likely not lead to healthy and balanced
314 diets any time soon. Several healthy food groups, especially vegetables, legumes, and fish, are
315 under-consumed (Willet et al. 2019).

316

317 **3.4. Role of different food processing levels**

318 It is a common phenomenon that households switch from the purchase of unprocessed foods to
319 more processed foods with rising levels of income (Worku et al. 2017; Kearney 2010). As
320 mentioned, this shift seems to be supported by the transformation and modernization of the retail
321 sector, and the growth of supermarkets in particular (Demmler et al. 2018; Popkin 2017). Before
322 we analyze the role of supermarkets, we first examine to what extent the relatively poor sample
323 households in Nairobi and Kampala already consume processed foods. This is shown for the 12
324 food groups in Figure 1. We use the classification suggested by FAO (2015) and differentiate
325 between unprocessed, medium processed, and highly processed foods (see Table A4 in the Online
326 Appendix for examples of food products with different levels of processing).

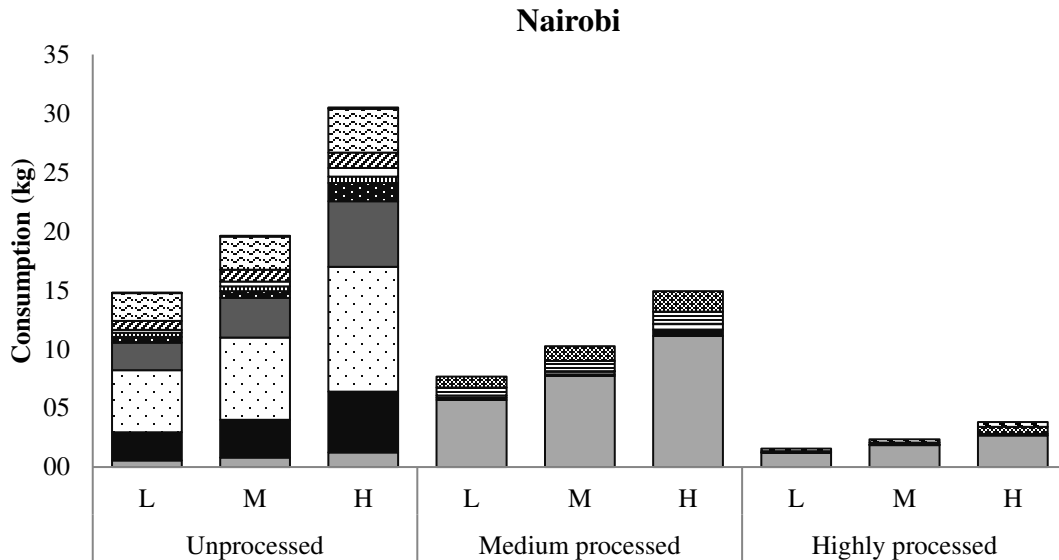
327 The results in Figure 1 show that most of the foods are consumed (purchased) in unprocessed
328 form. However, since food consumption in Figure 1 is shown in terms of absolute quantities, and
329 the quantities consumed differ remarkably by food group, a closer look is required to detect that
330 the purchase of processed products actually already plays an important role for some of the food

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331 groups.⁴ For instance, most sample households in both cities purchase cereals either as flour
 332 (medium processed) or in the form of bread and pasta (highly processed). In Kampala, roots, tubers,
 333 and plantains are partly purchased in processed form (e.g., flour, boiled, fried). And in both cities,
 334 food groups such as oils and fats, sweets, and condiments and beverages are purchased entirely in
 335 processed form, even though absolute consumption levels of these food groups are relatively low.

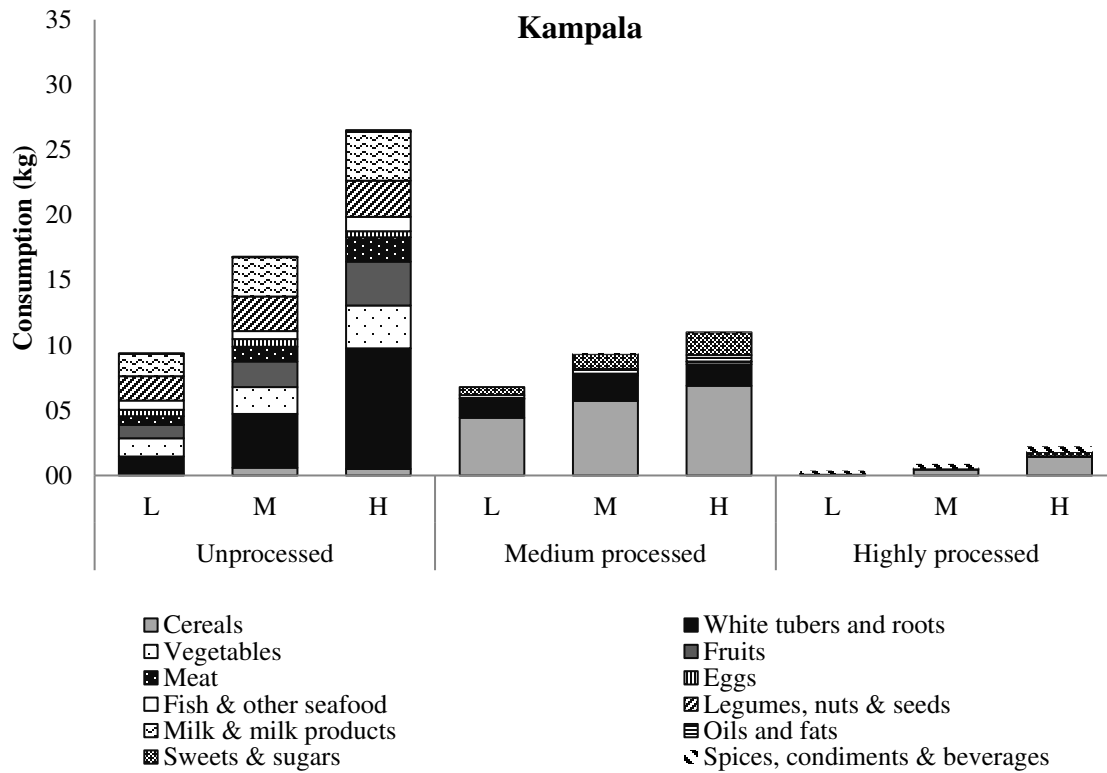
336 Overall, the consumption of processed foods is somewhat higher in Nairobi than in Kampala,
 337 and in both cities it increases from the lowest to the highest expenditure tercile. It should be stressed
 338 that the consumption of processed foods does not necessarily mean that households buy these items
 339 in supermarkets, because traditional retailers also sell processed food items, as explained above.
 340 To what extent sample households use supermarkets is analyzed in the following.

341



⁴ When the share of processed foods is expressed in value terms rather than absolute quantities, it is larger than what is shown in Figure 1. Especially highly processed foods are not necessarily heavy in weight, but more expensive than unprocessed foods. A recent study showed that even poor households in urban Africa sometimes spend around 30% of their total food expenditures on highly processed food items (GLOPAN 2016).

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342 **Figure 1.** Consumption of different food groups by processing level

343 *Notes:* L, M, and H stand for lowest, middle, and highest tertile, respectively. The tertiles are disaggregated based on expenditure
 344 per capita per month. See Table A4 in the Online Appendix for examples of food products with different levels of processing.

345 *Source:* Authors' household survey.

346

347 **3.5. Role of supermarkets**

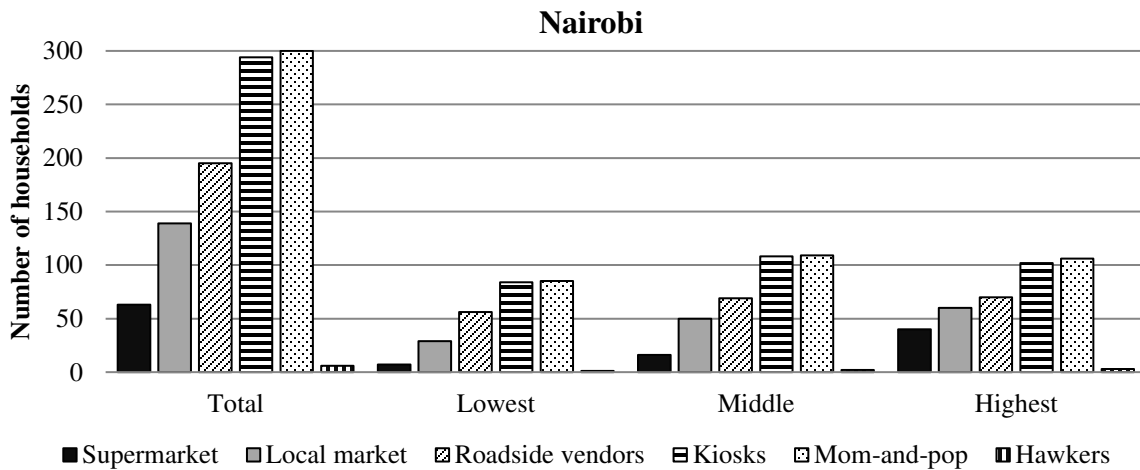
348 Figure 2 shows the number of sample households using the different retail outlets in Nairobi
 349 and Kampala. Using a retail outlet is defined here as having consumed at least one food item during
 350 the 7-day recall period that was purchased in the particular type of retail outlet (it does not
 351 necessarily mean that the purchase itself must have occurred during the 7-day recall period).
 352 Strikingly, only 63 of all the 300 households sampled in Nairobi (21%) use supermarkets at all. In
 353 Kampala, the proportion of supermarket users is even much lower at 4% of the sample households.
 354 This clearly shows that supermarkets are not yet much influencing the diets of the majority of these
 355 poor population segments.

356 While we have no comparable data on the proportion of supermarket users in richer
 357 neighborhoods of Nairobi and Kampala, recent studies with representative data from smaller cities
 358 in Kenya showed that more than 50% of all households already use supermarkets on a regular basis
 359 (Demmler et al. 2018; Kimenju et al. 2015). In other words, slum dwellers are not yet really part

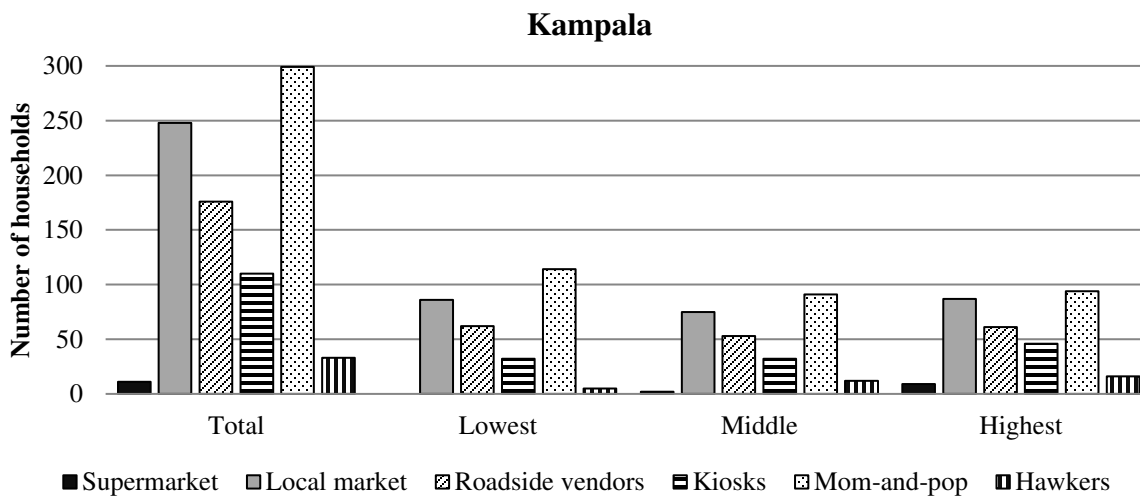
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360 of the supermarket revolution that is observed in many other places of Africa. For instance, in the
 361 lowest expenditure tercile in Kampala, no single household consumed any item purchased in a
 362 supermarket. The use of supermarkets increases with household living standard, which is consistent
 363 with observations elsewhere (Khonje and Qaim 2019; Rischke et al. 2015; Figuié and Moustier
 364 2009; Hawkes 2008). But even in the highest expenditure terciles of our sample, the proportion of
 365 supermarket users remains quite low: 40% in Nairobi and 9% in Kampala (Figure 2).

366 In both cities, mom-and-pop shops are the most widely used retail outlet for households in all
 367 expenditure terciles. In Nairobi, kiosks and roadside vendors are used by the majority of households
 368 in all expenditure terciles. In Kampala, roadside vendors are also important sources of food,
 369 whereas kiosks play a less important role. More than 80% of the sample households in Kampala
 370 use local markets (wet markets), which is true in all three expenditure terciles.



371



372

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373 **Figure 2.** Use of different retail outlets by expenditure tercile

374 *Source:* Authors' household survey.

375

376 The results in Figure 2 show users of the different retail outlets, irrespective of how much food
 377 was actually purchased in each of the outlets. Additional insights can be gained when looking at
 378 the share of the total household food budget spent in each type of retail outlet. This information is
 379 provided in Table 6 and underlines that supermarkets do not yet play an important role for the diets
 380 of the urban poor. In Nairobi, only 3% of the total food budget is spent in supermarkets. The share
 381 of the budget spent in supermarkets increases with rising total household expenditures, but even in
 382 the highest tercile the supermarket expenditure share is only 6.7%. In Kampala, the share of the
 383 budget spent in supermarkets is negligible, with only 0.4% across all expenditure terciles. In both
 384 cities, households purchase most of their food in mom-and-pop shops, which account for 51% and
 385 62% of total food expenditures in Nairobi and Kampala, respectively.

386 **Table 6.** Share of total food budget spent in different retail outlets (%)

Retail outlet	Nairobi (N=300)				Kampala (N=300)			
	Expenditure tercile				Expenditure tercile			
	Total	Highest	Middle	Lowest	Total	Highest	Middle	Lowest
Supermarket	3.0	6.7	1.0	0.7	0.4	0.4	0.8	0.0
Local market	7.5	9.0	7.4	5.5	21.6	31.3	20.8	15.1
Roadside vendors	7.6	7.7	7.0	8.3	10.2	8.1	11.0	11.2
Kiosks	30.5	29.33	31.2	31.1	4.6	6.3	4.4	3.5
Mom-and-pop	51.3	47.3	53.4	54.3	62.3	52.3	62.3	69.7
Hawkers	0.1	0.1	0.0	0.1	0.9	1.6	0.7	0.5

387 *Source:* Authors' household survey.

388

389 **3.6. Possible reasons for the low use of supermarkets**

390 Why are households in the slums of Nairobi and Kampala using supermarkets to such a limited
 391 extent? One possible reason could be that supermarkets do not exist in these neighborhoods, so that
 392 the distance might be too far to purchase in supermarkets on a regular basis. However, this
 393 argument does not apply in our case. In fact, supermarkets do exist in the neighborhoods included
 394 in our survey. Table 7 shows that the average distance to the closest supermarket is around 1200
 395 meters for households in Nairobi and only about 700 meters for households in Kampala.⁵ The

⁵ This is the mean distance from households to the closest supermarket irrespective of whether any food items were actually purchased there.

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396 distance to mom-and-pop shops and kiosks is still closer than to supermarkets, but the distance to
397 local markets is longer, and in spite of this longer distance many more households buy in local
398 markets than in supermarkets. Hence, unavailability of supermarkets or long distances cannot be
399 the main reasons for the low use of supermarkets among sample households.

400 Another possible reason could be price differences between supermarkets and traditional
401 outlets. Fresh fruits and vegetables are often more expensive in supermarkets than in local markets
402 and other traditional retail outlets (Schipmann and Qaim 2011; Gómez and Ricketts 2013). This is
403 also true in our settings. In addition, the supermarkets in or near the slum areas only have very
404 small fruit and vegetable sections, quite different from large supermarkets and hypermarkets in
405 richer neighborhoods.

406

407 **Table 7.** Mean distance to nearest food retail outlet

Retail outlet	Pooled (N=600)		Nairobi (N=300)		Kampala (N=300)	
	Mean	SE	Mean	SE	Mean	SE
Supermarket (meters)	953.07	31.40	1209.27	45.20	696.87	38.31
Local markets (meters)	1504.84	55.75	2117.77	88.23	891.92	46.41
Mom-and-pop shop (meters)	112.68	5.52	136.42	8.25	88.93	7.10
Kiosk (meters)	98.08	4.95	113.68	7.03	82.48	6.86

408 *Notes:* The means are distances to the closest food retail outlet irrespective of whether any foods were actually
409 purchased in a particular outlet. SE, standard error.

410 *Source:* Authors' household survey.

411

412 Price differences between supermarkets and traditional outlets are less clear-cut for other food
413 groups. Some of the processed and packaged foods may be more expensive in supermarkets,
414 because supermarkets often sell more branded products than traditional retailers (Minten et al.
415 2010). However, processed food items may also be cheaper in supermarkets, due to more efficient
416 logistics and positive economies-of-scale. Rischke et al. (2015) showed for Kenya that the average
417 price of processed foods expressed per calorie is lower in supermarkets than in traditional retail
418 outlets.

419 Low prices per calorie should be particularly attractive for poor households. However, an
420 obstacle to buy more foods in supermarkets for poor households seems to be the packaging size.
421 On average, packaging sizes in supermarkets are larger than those in traditional outlets. This was
422 mentioned by sample households and confirmed through visits in various retail outlets in the study

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423 regions. Moreover, packaging sizes in supermarkets are fixed, whereas traditional retailers are
424 much more flexible. For instance, mom-and-pop shops and kiosks often buy food items in larger
425 units from wholesalers, and then repack into smaller units based on consumer preferences. Our
426 survey data reveal that the majority of the slum households prefer to buy foods in relatively small
427 units with less than one kilogram of weight. Traditional retailers also sell many food items in loose
428 form (e.g., flour, sugar, meat, dairy products), which is not the case in supermarkets. And finally,
429 some of the traditional retailers offer food items on credit to regular customers, which is especially
430 important for poor households with irregular incomes.

431 To better understand the role of supermarkets for different types of foods, we used the survey
432 data to compute what share of total household expenditures on particular food groups was spent in
433 supermarkets in comparison to other types of retail outlets. Results are shown in Figure 3. As
434 expected, the role of supermarkets differs remarkably by food group. Among the sample
435 households in Nairobi, around 20% of the cereals are actually purchased in supermarkets. For
436 cereals and cereal flour the typical packaging sizes of supermarkets seem to be less of an obstacle
437 than for other food groups. Also for milk products and meat, supermarkets have an average market
438 share of over 20% for the slum households in Nairobi. While poor households consume these
439 animal source products only occasionally, some of them have a preference for packaged products,
440 which tend to be more hygienic and have a longer shelf life than fresh products offered by
441 traditional retailers. In Kampala, meat is not purchased in supermarkets, and also for other animal
442 source foods traditional retailers play a more important role than supermarkets.

443 Strikingly, supermarkets play no role for fruit and vegetable purchases of sample households
444 in Nairobi and Kampala. This is consistent with studies in other developing countries, which did
445 not specifically focus on poor population segments but also showed that most of the fruits and
446 vegetables are purchased in traditional retail outlets (Gómez and Ricketts 2013; Reardon et al.
447 2010; Tschirley et al. 2010; Neven et al. 2006). This is probably related to higher prices for fresh
448 fruits and vegetables in supermarkets, as mentioned above.

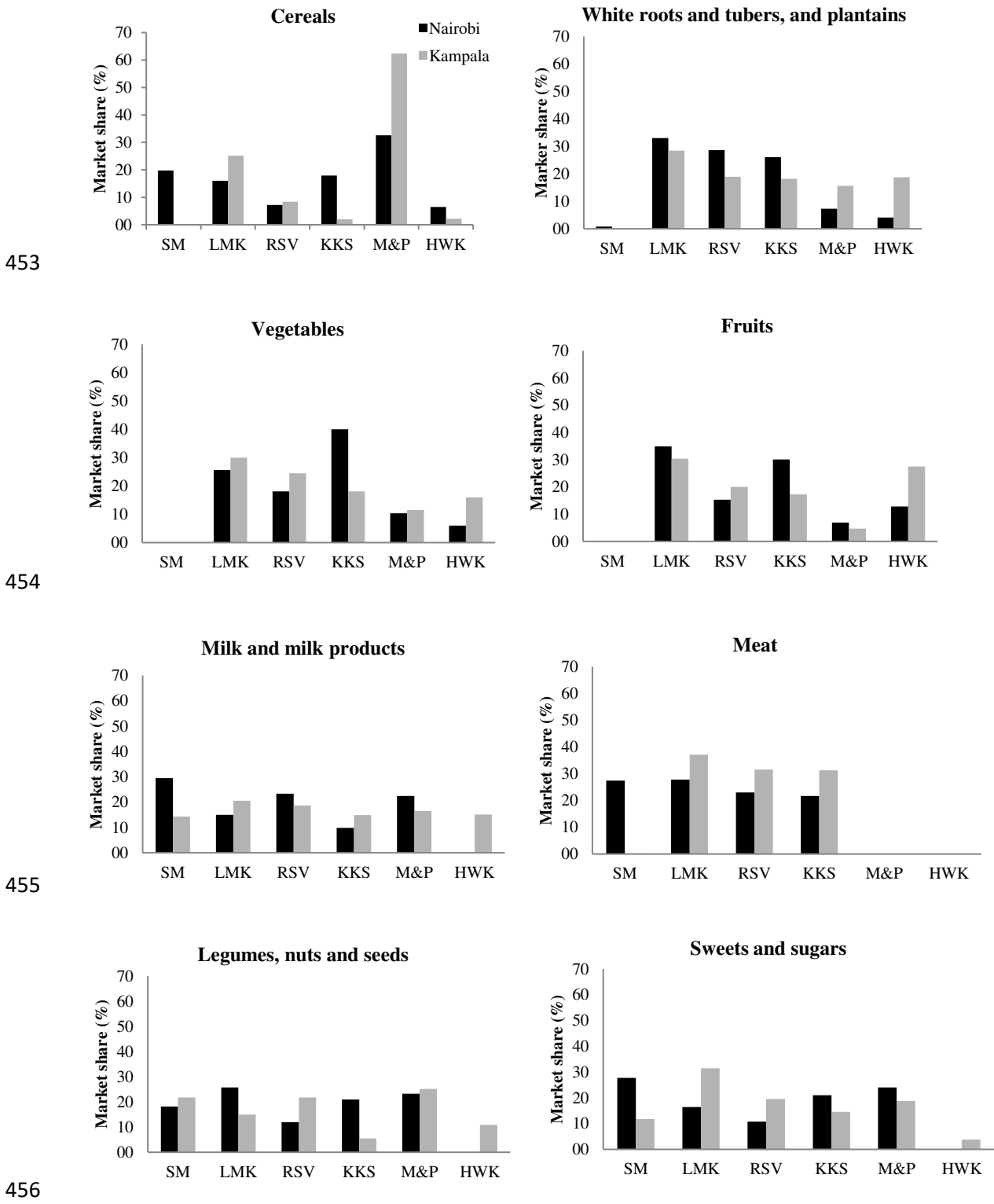
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457 **Figure 3.** Market shares of different retailers by food group

458 *Notes:* Calculations are based on total household food expenditures and stated purchase sources for the different food
 459 items consumed. SM, supermarket; LMK, local markets; RSV, roadside vendors; KKS, kiosks; M&P, mom-and-pop
 460 shops; HWK, hawkers.

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461 *Source:* Authors' household survey.

462

463

464 **4. Conclusion**

465 Previous research has shown that supermarkets and other modern retail outlets increasingly
466 influence the diets of urban consumers in Africa. We have analyzed the diets and food purchase
467 patterns of households in the poorest neighborhoods of Nairobi and Kampala, in slum areas, and
468 found that supermarkets do not yet play an important role for most of these households. Only a
469 relatively small proportion of sample households use supermarkets at all: 21% in Nairobi and 4%
470 in Kampala. The average food budget shares spent in supermarkets are even smaller: 3% in Nairobi
471 and only 0.4% in Kampala. In both cities, poor consumers buy most of their foods in traditional
472 retail outlets, especially mom-and-pop shops, local markets, and kiosks. The main reason for the
473 low use of supermarkets is not that supermarkets are not available in the poor neighborhoods
474 surveyed. In fact, supermarkets are available in slum areas and even offer some of the food products
475 at lower prices than traditional retailers. But most foods sold in supermarkets come in larger
476 packaging sizes, whereas poor households prefer buying smaller quantities of food whenever cash
477 resources are available. Supermarkets also offer no credits, which some of the traditional retailers
478 do. The low use of supermarkets should not be misunderstood as if the urban poor would not
479 consume any processed and packaged food items. While unprocessed foods make up the largest
480 share of these people's regular purchases, some of the cereals and other food groups are also
481 purchased in processed form. But processed and highly processed foods are also sold by traditional
482 retailers.

483 Disaggregation of the data by expenditure tercile showed that richer households consume more
484 processed foods and also more foods from supermarkets. Hence, the role of supermarkets will
485 likely increase when poor households are gradually getting richer. But even in the highest
486 expenditure tercile of our sample, the food budget shares spent in supermarkets remain well below
487 10%, suggesting that the supermarket growth in poor urban neighborhoods may be slower than
488 often assumed. It should also be mentioned that households that are getting richer will usually move
489 away to richer neighborhoods, whereas other poor households will take their place in the slum
490 areas. In Nairobi and Kampala, more than 50% of the population is estimated to live in slums

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491 (World Bank 2017). These population segments are systematically underrepresented in national
492 surveys.

493 We also analyzed household diets in terms of calorie consumption and dietary diversity, finding
494 high rates of undernourishment. In Nairobi, 31% of the sample households suffer from calorie
495 deficiencies, whereas in Kampala the rate is 59%. Hence, improving these people's access to food
496 and dietary quality should be of high priority from a development policy perspective. Our results
497 help to better understand some of the possible entry points for suitable food and nutrition policies.
498 A focus on modern retail outlets alone will not suffice. The efficiency of traditional food supply
499 chains will also have to be improved. Better road, market, and storage infrastructure, as well as
500 better functioning institutions, will help to reduce costs along the supply chains and thus also lower
501 market prices for the end-consumer. Mom-and-pop shops, which are ubiquitous in slum areas and
502 the most important source of food for the urban poor, do hardly sell any fresh products. Finding
503 ways to encourage these shops to also sell more fresh and healthy foodstuffs might be a potential
504 avenue to improve dietary quality.

505 We do not claim that the data collected in the poor neighborhoods of Nairobi and Kampala are
506 fully representative of all the urban poor in Africa. Our sample size is also relatively small.
507 Nevertheless, we feel that the situations analyzed here are quite typical at least for slum areas in
508 East Africa, so that some of the broader findings will likely also hold beyond these concrete
509 settings. Follow-up research with larger samples of slum households from different parts of Africa
510 will be useful to analyze further details.

511

512 **Compliance with ethical standards**

513 **Conflict of Interest:** The Authors declare that they have no conflict of interest.

514

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