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Social status and the consumption of highly processed foods in Nigeria

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Abstract

Food has been used to define social classes and as a means of embodying the 'good life'. Depending on the food culture and food environment, certain foods may be consumed more by the relatively higher income groups and therefore are perceived as 'positional'. This study examines whether social status—proxied by the relative consumption expenditures (the rank in the consumption expenditure distribution) and the relative deprivation in consumption expenditures—can explain household food choices. Based on the nationally representative Nigeria General Household Panel Surveys and using fixed effects estimations, we find that consumption of highly processed foods is strongly associated with the social status of the household. We observe differences among highly processed foods consumed at home and away from home, across geographic locations and consumption expenditure terciles. The results of this study provide suggestive evidence that reducing income inequality is required to support healthier household food preferences beyond social status.

Keywords: Processed foods, Consumption, Social status, Nigeria

JEL codes:D120, I130, I320

1. Introduction

The middle-class and urban populations in Africa are expanding rapidly (Lufumpa et al. 2015; Tschirley et al. 2015; OECD/SWAC 2020). This is likely to stimulate changes in the food systems, lifestyle, and eating habits. Evidence shows that changes in lifestyle and food systems are associated with a nutrition transition towards highly processed, cheap, and nutrient-poor but fat-, sugar-, salt-, and energy-rich products (Tschirley et al. 2015; Reardon et al. 2021).

Consumption of highly processed foods together with inadequate physical activities is associated with overweight and obesity and non-communicable diseases (NCDs) (Periera et al. 2005; Holmes et al. 2018; Hall et al. 2019; Srour et al. 2019). Overweight and obesity have become major public health problems in many low- and middle-income countries that are also dealing with the problems of undernutrition, a situation commonly referred to as the double burden of malnutrition (DBM) (Popkin 2003; Popkin et al. 2020; WHO 2020).

In Nigeria, high body mass index-related deaths have increased by 29 per cent among females and by 79 per cent among males between 1990 and 2015 (GBD 2015 Obesity Collaborators 2017). In fact, recent studies show that NCDs associated with overweight

and obesity have overtaken communicable diseases as the leading causes of morbidity and mortality in Nigeria (Chukwuonye et al. 2013). One of the potential solutions to addressing overweight and obesity in the population is by promoting healthier lifestyle and eating behaviours (WHO 2004). This requires a better understanding of consumer behaviour and factors that determine dietary choices.

Income (in this study proxied by household consumption expenditures) is one of the key determinants of food choices (Drewnowski 2012; Miller et al. 2016; Muhammad et al. 2017), despite heterogeneity in the quality of dietary items across regions and countries (Imamura et al. 2015). A recent study on East and Southern Africa finds that the purchased share of highly processed foods increases with income class in both rural and urban areas (Tschirley et al. 2015). In a similar vein, de Brauw and Herskowitz (2020) find that the income elasticity of demand for food away from home—which is likely to be processed food—is highest for the relatively wealthy and in the urban South in Nigeria. Other studies identify a tendency of middle-class consumption towards highly processed foods (Gomez and Ricketts 2013; Monteiro et al. 2013; Popkin 2014).

The higher purchasing power of the middle class relative to the poor may explain this tendency since food consumption choices are highly dependent on affordability (FAO et al. 2020; Bai et al. 2021). At the same time, food is used to define social classes and as a means of embodying the 'good life' (Finn 2011). For example, based on qualitative interviews in Montpellier, Costa et al. (2014) report that organic foods are used to signal social identity, class, or status, and this social value depends on the venue where organic foods are purchased and also on whether consumers or producers exhibit additional green behaviours to validate their commitment to sustainability.

Similarly, anecdotal evidence from Ghana shows that the consumption of fast food is considered an indicator of social status (Searcey and Richtel 2017). This is reflected in the aforementioned article quoting one of the interviewees who suggested that 'People march their sons and daughters to buy KFC and buy pizza and they like to show them what we can afford, …. KFC isn't just food, … it's social status'. This implies that, if social status is important to the consumer, as many studies suggest (e.g. Anderson et al. 2015)[1], food consumption choices will not only be influenced by the actual income (expenditure) status, but also by the relative consumption expenditure position one has within the community, given that the relative consumption expenditure position reflects their social status.

In general, characteristics that are perceived as valuable, while may vary from one social environment to another, can be a source of social status when one holds them relatively higher than others in the local context (Anderson et al. 2015). In this study, we measure social status using two components of the relative consumption expenditure position: the rank in the consumption expenditure distribution and the relative deprivation (RD, the relative magnitude of consumption expenditure difference from the mean consumption expenditures).

The influence of social status on food consumption also should be examined and understood at a larger scale in the population. In particular, there is scarce evidence on the relationship between the relative consumption expenditure position (both the rank and the RD) and consumer food choice in the context of emerging middle-income countries. Understanding such a relationship is important for policy purposes because processed foods consumption is rising in many of these countries that are also facing the DBM and noncommunicable diet-related public health problems as described above. Therefore, this study examines whether and how social status, proxied by the rank in the consumption expenditure distribution and the RD in consumption expenditures, influences consumption of highly processed foods in Nigeria.

Key results of this study show that consumption of highly processed foods is strongly associated with the social status of the household, especially amongst richer consumption expenditure groups, urban areas, and the southern zones of Nigeria. The novelty of this

study lies in the attempt to provide empirical evidence of the relationship between social status (proxied by the rank in the consumption expenditure distribution and the RD in consumption expenditures) and food choice behaviour using large data from a lower-middle income country.

The remainder of this article is structured as follows: in Section 2, we outline the theoretical background of the study and review the related literature to further motivate our main research question. Section 3 describes the data and empirical approach. Section 4 presents the descriptive and econometric results. Finally, in section 5, we discuss the major findings in light of their relevance for policymaking, outlining directions for future research.

2. Theoretical background and related literature

The food environment—comprising of food availability and physical and economic access to food, promotion, advertising and information, and rules and procedures for managing food quality and safety—affects major consumer choices and their decisions on what type of food to acquire, store, prepare, cook, and eat (HLPE 2017). Personal preferences, food prices, income level, knowledge and skills, available time and equipment, and social and cultural norms are considered key determinants of food choices (HLPE 2017).

People are more likely to follow an eating norm if it is perceived to be appropriate, based on social comparison and including shared cultural expectations and environmental cues (e.g. Autio et al. 2013; Séré de Lanauze and Sirieix 2021). That is, people use others' eating as a guide for what and how much to eat, also referred to as 'social modeling' (Nisbett and Storms 1974). Social modeling is motivated by affiliation (the need to be liked, accepted, and to belong) and uncertainty reduction (the need to be right) (Cruwys et al. 2015).

Relatedly, people may make food choices based on their social status. Depending on the food culture, however, this may not necessarily mean that people make 'healthy' choices from the options available and accessible to them, suggesting that 'not all food choice behavior is rational, reflexive, or discrete, but is embedded in wider activities of daily lives' (Blake et al. 2021). This implies that understanding the factors that influence the decision-making process on food choice requires a multidisciplinary approach.

By reviewing conceptual models from multiple disciplines to understand the drivers of individual food choice, Chen and Antonelli (2020) identify five main factors: food-internal factors (sensory and perceptual features), food-external factors (information, social environment, and physical environment), personal-state factors (biological features and physiological needs, psychological components, habits, and experiences), cognitive factors (knowledge and skills, attitude, liking and preference, anticipated consequences, and personal identity), and sociocultural factors (culture, economic variables, and political elements). These conceptual variables shape the science of food choice which attempts to answer the questions of 'what, how, and why do people eat the way they do' (Blake et al. 2021).

Based on these theoretical concepts, this study attempts to better understand the relationship between social status (proxied by the rank in the consumption expenditure distribution and the RD in consumption expenditures) and the consumption of highly processed foods in Nigeria.

2.1 Social status and food consumption

Food choices may be determined by the consumer's purchasing power and other food environment factors as described above. However, depending on the food culture, certain foods may be consumed by the relatively higher expenditure groups and, hence, will be perceived as 'positional' or 'aspirational'. Hopkins and Kornienko (2004) show that if individuals care about their status, the consumer's problem becomes strategic as utility depends also on the consumption behaviour of others (the reference group (RG)). For example, eating

outside of home is considered 'a part of modern life' (Lachat et al. 2011) and is associated with 'sophistication and style' (Warde and Martens 1998). Such perception is likely to inspire status-seeking individuals to eating more outside of home.

The status motive to eating outside of home in this context may also hold for low-income consumers, regardless of differences in diet quality that such consumers can afford. From related research, for example, van Kempen (2003) shows that low-income consumers in developing countries may engage in status signalling through consumption of counterfeit instead of original status-intensive goods. This is because 'counterfeit products may offer status-conscious consumers with limited resources a more optimal combination of functionality and status than original goods' (van Kempen (2003, 174). In the context of food, the analogy would be eating outside of home at fast food versus full-service restaurants with healthier options.

The effect of social status on individual behaviour is widely explored rather outside the domain of food consumption, and key lessons can provide useful perspectives for this study. For example, Veblen (1899) suggests that individuals may engage in 'conspicuous consumption' to exhibit their preference towards publicly displaying economic power. Motives for this are consumption externalities (or 'keeping up with the Joneses') (Gali 1994), or signalling one's wealth as there is intrinsic satisfaction in being viewed as prosperous (Hopkins and Korienko 2004; Kappes et al. 2021).

Relatedly, studies show that savings depend not on absolute income but on relative income (Duesenberry 1949), indicating that people's decisions are more influenced by the state of the RG than their own state of wealth (Kahneman and Tversky 1979). For example, some empirical studies find the individual's rank in wage distribution to be a relevant driving force for people's job satisfaction and well-being (Brown et al. 2008; Card et al. 2012), or even happiness (Ferrer-i-Carbonell 2005). Brown et al. (2015) also show that the relative income effect is sensitive to the definition of the RG, the utility proxy, and the estimation method.

The different studies reviewed above show some of the channels through which social status may shape individual behavior. In this context, we test the hypothesis that social status, proxied by the rank in the consumption expenditure distribution and the RD in consumption expenditures, influences the consumption of highly processed foods in Nigeria.

3. Data and methods

3.1 Data description

We use the first six rounds of the Nigeria General Household Survey (NGHS) panel collected by the National Bureau of Statistics of Nigeria in conjunction with its partners (NBS et al. 2016). This unique panel was collected in three waves (2011–2012, 2013–2014, and 2015–2016). Each wave consisted of two seasonal visits, post-planting and post-harvest, and targeted the same set of 5,000 households. The NGHS has been designed to be representative of the population at the zonal level, which includes three Northern and three Southern zones, as well as by rural and urban areas within these zones. The survey, therefore, interviewed each household up to six times. Although response rates declined over time, 85 per cent of households were reached for all six visits (de Brauw and Herskowitz 2020). The final sample with complete information and used in this study was 4,195 households. This study uses data that de Brauw and Herskowitz (2020) made readily available for this study for analysis.[2]

The NGHS contains extensive household expenditure modules (both food and non-food expenditures) in each round of the survey. The section on food consumption asked respondents up to 120 different food items consumed in the household in the previous week, by food source including own production and purchases. The consumption value for each food item from own production was calculated based on the median prices generated from reported expenditures and reported quantities for purchased foods from within the primary

sampling unit level, or at the smallest possible geographic level above that if a price was not available at the primary sampling unit level.

The survey also contains information on the amount spent, conditional on consumption, on about nine categories of meals 'prepared and consumed outside the home' by any one member of the household in the previous week. The categories include breakfast, lunch, dinner, side dishes, snacks, dairy-based beverages, vegetables, non-alcoholic drinks, and alcoholic drinks. However, as it is often the case in general household surveys, the Nigerian GHS panel lacks information on the ingredients, quantities, the degree of processing, and nutritional content of meals consumed outside the home.

Closely following recent literature, including de Brauw and Herskowitz (2020), Monteiro et al. (2010), and Tschirley et al. (2015), we characterized foods consumed away from home as highly processed; and foods consumed at home as highly processed, low processed, and unprocessed (see Table A.1. of the referred study for a summary table of categorization of food items from Nigeria GHS).[3] For example, according to de Brauw and Herskowitz (2020), snacks like fresh fruit and vegetables or simple meals like rice and beans would be categorized as 'highly processed' if consumed outside of home, because preparation and processing are not documented. However, these same foods if consumed at home, for which preparation is known would be considered low-processed or unprocessed (for detailed rule, see Footnote 3).

Further, de Brauw and Herskowitz (2020) calculated the total household consumption expenditures and the expenditure shares of highly processed foods, highly processed foods consumed outside of home, and highly processed foods consumed at home. For this study, we construct the relative expenditures (the rank in the consumption expenditure distribution) and the RD from total consumption expenditures (excluding expenditures on highly processed foods). We treat all households in a particular enumeration area (EA, primary sampling unit) as the RG for a given household in that location.

3.2 Empirical approach

Following the theoretical background described above, individuals may behave in some ways corresponding to the RG, (for example, in terms of dietary choices), due to their social status in the community, including their rank in the consumption expenditure distribution and their RD in consumption expenditures. Part of the motive is because social rank reflects dominance (inducing fear in others) and prestige (gaining others' respect) (Cheng and Tracy 2014), and higher social rank entails privileged influence and access to valued resources (Cheng and Tracy 2014; Anderson et al. 2015).

The RD may result from 'not having "X" when others in the RG have it' (Runciman 1966), which is an increasing function of the number of persons in the RG who have X (Yitzhaki 1979). According to Runciman (1966), a person is 'relatively deprived of X when: (i) he does not have X, (ii) he sees some other person, which may include himself at some previous or expected time, as having X (whether or not this is or will be, in fact, the case), (iii) he wants X, and (iv) he sees it as feasible that he should have X' (Runciman 1966, 10).

This implies that the household's demand for highly processed foods is determined by its absolute consumption expenditures and social status (proxied by both the rank in the consumption expenditure distribution and the RD (the relative magnitude of the expenditure difference from the mean expenditure of the RG) (Stark 1991; Vernazza 2013)). This can be described as:

$$A\ (y) = y, \tag{1a}$$

$$R\ (y, j) = \frac{y}{E\left(Y_j\right)}, \tag{1b}$$

$$D\ (y, j) = \int_y^{\infty} [1 - F(x)]\, dx\, [1 - F(y)] \cdot E(x - y \mid x \rangle y), \tag{1c}$$

where $A(y)$ is the absolute consumption expenditure of household i; $R(y, j)$ is the relative consumption expenditure (the rank)—the ratio of i's consumption expenditure to the average consumption expenditure of the RG j; and $D(y, j)$ is the RD—the proportion of those in i's RG with higher consumption expenditures than the individual times their mean excess expenditure (for the theoretical exposition of $D(y, j)$, see Stark and Wang 2005; Vernazza 2013); $F(x)$ is the cumulative distribution of consumption expenditure in the RG j. Since social status is proxied by the relative consumption expenditure position (both the rank and the RD), we exclude expenditures on highly processed foods from A, R, and D so that expenditures on highly processed foods do not enter estimations as both the regressors and the regressand.[4]

Formally, the relationship between the consumption of highly processed foods (p) and the relative consumption expenditure position of household i with consumption expenditure A and reference[5] group j can be expressed in the following function:

$$p_i = p(A,\ R, D, Z), \tag{2}$$

where R is the relative consumption expenditure (the rank), D is the RD in consumption expenditures, and Z denotes a vector of covariates including the age of the household head and its squared term, household size, local food prices, common shocks, and other location-specific effects at a given point in time. p_i is measured alternatively in terms of the food expenditure share on highly processed foods, highly processed foods consumed at home, and highly processed foods consumed outside of home.

The consumption expenditure of the household and its relative status in the consumption expenditure distribution may change over time. This may bring about a corresponding change in the household's food preferences. The potential relationship can be expressed by re-writing equation (2) in the standard panel data estimation framework:

$$p_{it} = W_{it}'\phi + \alpha_i + \varepsilon_{it}, \tag{3}$$

where W_{it} denotes a set of regressors A, R, D, Z, and α_i is un-observed household-specific effects and ε_{it} is an idiosyncratic error. Equation (3) can be estimated consistently with random effects (RE) if α_i is distributed independently of W_{it} and $E(\varepsilon_{it}|W_{it}) = 0$, or fixed effects (FE) if α_i is correlated with regressors but $E(\varepsilon_{it}|\alpha_i, W_{it}) = 0$ (Cameroon and Trivedi 2010). The key variables of interest can be shown by expanding equation (3) as:

$$p_{it} = \delta + \beta R_{it} + \gamma D_{it} + \lambda A_{it} + \sum_k \theta_k Z_{k,it} + \alpha_i + \varepsilon_{it}, \tag{4}$$

where δ is the constant and R, D, A, and Z are as defined above. The unobserved components can be written in a composite form as $\alpha_i + \varepsilon_{it} = \mu_{it}$. The key parameters of interest are β and γ. Since there is potential for error μ_{it} to be correlated over time for a given household or households within a cluster, we estimate variants of equation (4) with cluster-robust standard errors that cluster on the group (Cameroon and Trivedi 2010). Further, concern for status may differ across expenditure groups (Hopkins and Kornienko 2004) or by location with implications for food preferences. For example, de Brauw and Herskowitz (2020) show that the elasticity of demand for food away from home is highest for the relatively wealthy and in the urban South in Nigeria. We explore such heterogeneities by fitting separate specifications for rural and urban, the northern and southern regions, and each expenditure tercile group.

4. Results

4.1 Descriptive statistics

Table 1 presents the summary statistics of sample characteristics on key variables. The average consumption expenditure share of highly processed foods (ESHPF) over the total food expenditure (TFE) was 0.26. The corresponding shares of ESHPF consumed at home

Table 1. Summary statistics of variables used in the estimations.

Variable	Mean	Standard deviation	Minimun	Maximum
ESHPF over TFE	0.26	0.16	0	1
ESHPF consumed at home over TFE (ESHPF home/TFE)	0.14	0.09	0	1
ESHPF consumed outside home over TFE (ESHPF OH/TFE)	0.12	0.14	0	1
Per-capita household expenditures (log)[1] (log PC income)	2.68	0.63	−1.20	4.44
RD (*D*)	5.45	4.53	0.00	46.22
Relative expenditures (*R*)	1.03	0.61	0	10.68
Age of the household head in years	51.55	14.88	15	112
Household size in AE	4.67	2.27	0.5	27.5
South (0/1)	0.45	0.50	0	1
Urban (0/1)	0.30	0.46	0	1

[1] *Note*: The total household consumption expenditure is the sum of food and non-food expenditures excluding expenditures on highly processed foods. The total consumption expenditures are in 2010 US dollars.

and consumed away from home were, respectively, 0.14 and 0.12. The means of per-capita household consumption expenditures (excluding expenditures on highly processed foods) (in log), the relative consumption expenditures, and the RD were 2.68, 1.03, and 5.45, respectively. The means of age of the household head and the household size in adult equivalent (AE) were 51 and 4.7. The shares of households that were from urban areas, and from the southern region were 30 and 45 per cent, respectively.

The descriptive statistics are further disaggregated by location (urban/rural), region (south/north), and consumption expenditure terciles and presented in Table 2. The data suggest that, on average, the ESHPF over the TFEs was relatively higher in urban than rural areas, and increased with expenditure tercile. A similar trend is observed when the ESHPF was further disaggregated into foods consumed at home and outside of home. Further, the relative consumption expenditure was relatively higher in urban areas and the southern region compared to the rural and the northern region, respectively. The RD shows an opposite trend to the relative consumption expenditure by location and region. The average age of the household head was comparable between urban and rural locations and across consumption expenditure terciles. However, household heads in the northern region were relatively younger than those in the southern region.

4.2 Econometric results

Table 3 summarizes the baseline results of the RE and FE estimation of equation number 4. The column headers indicate the dependent variables including the food expenditure share of all highly processed foods (ALL), highly processed foods consumed at home (HOME), and highly processed foods consumed away from home (AWAY). Controls include the household consumption expenditures per capita (excluding expenditures on highly processed foods) (log), the age of the household head and its squared term, and the family size in AE.

Additional controls include time (survey round) FE (panel a) and the interaction of survey round by state FE (panel b). We use state-level FE instead of EAFE because all households within a given EA face similar RG, and hence controlling for EAFE is inappropriate. This is because potentially important variations between individuals across EAs would be lost. However, we cluster the standard errors at the sampling cluster level.

According to Table 3, column 2, results of the FE estimations suggest that the relative consumption expenditure (the rank) is positively and statistically significantly associated

Table 2. Summary statistics disaggregated by location, region, and consumption expenditure terciles.

	Location				Region				Expenditure tercile					
	Urban		Rural		South		North		Bottom tercile		Middle tercile		Top tercile	
Variable	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
ESHPF/TFE	0.31	0.17	0.24	0.15	0.26	0.16	0.26	0.15	0.22	0.15	0.25	0.15	0.31	0.17
ESHPF home/TFE	0.15	0.08	0.13	0.09	0.15	0.09	0.14	0.09	0.14	0.10	0.14	0.09	0.15	0.08
ESHPF OH/TFE	0.16	0.16	0.10	0.13	0.12	0.15	0.12	0.14	0.09	0.12	0.11	0.13	0.16	0.16
log PC expenditures	2.94	0.57	2.58	0.62	2.87	0.60	2.53	0.62	1.99	0.41	2.71	0.15	3.35	0.29
RD	6.34	5.24	5.09	4.16	6.27	5.10	4.81	3.93	7.29	4.72	5.21	4.31	3.22	3.31
Relative expenditure	1.08	0.61	1.01	0.60	1.08	0.66	0.99	0.56	0.59	0.26	0.95	0.37	1.55	0.66
Age of head in years	51.60	14.60	51.53	14.99	54.93	14.96	48.80	14.23	52.36	14.52	51.70	14.88	50.60	15.18
Household size in AE	4.34	2.24	4.81	2.27	4.01	1.98	5.21	2.35	5.45	2.39	4.68	2.10	3.88	2.04

Table 3. The relationship between ESHPF and social status (proxied by the rank and the RD in consumption expenditures), baseline results.

	ALL		HOME		AWAY	
	−1 RE	−2 FE	−3 RE	−4 FE	−5 RE	−6 FE
Panel a						
RD (D)	0.002**	−0.000	0.001***	0.000	0.001**	−0.000
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Relative expenditure (R)	0.001	0.016**	−0.005	0.002	0.005	0.015*
	(0.008)	(0.008)	(0.004)	(0.005)	(0.007)	(0.007)
Panel b						
RD	0.003***	−0.000	0.001***	0.000	0.002***	−0.000
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Relative expenditure	0.003	0.017**	0.002	0.002	0.002	0.015**
	(0.008)	(0.008)	(0.004)	(0.005)	(0.007)	(0.007)

Note: Controls include: the total household consumption expenditure per capita (excluding expenditures on highly processed foods) (log), the age of the household head and its squared term, and the family size in AE. Additional controls include time (survey round) FE (panel a) and the interaction of survey round and state FE (panel b).
Standard errors (clustered at primary sampling cluster level) in parentheses. $^{*}P < 0.10$, $^{**}P < 0.05$, $^{***}P < 0.01$.

with the share of expenditures on highly processed foods (in both panels a and b). When the highly processed foods are further disaggregated into those consumed at home and consumed away from home, the correlation with the relative consumption expenditure (the rank) remains statistically significant only for the processed foods consumed away from home (see column 6 in both panels a and b). On the other hand, results of the RE estimation suggest that the RD (D) is positively and significantly associated with the dependent variable across all but one specification in both panels a and b.

However, the RE assumption that regressors are completely exogenous is likely to be too strong. Instrumental variables that would help isolate the effects of A, R, and D are hard to identify. Since the FE method allows time-invariant unobserved heterogeneities to be correlated with regressors, this method is preferred and is further employed in the analyses, not to mention that test results also rejected the null in favour of FE estimations.[6] In addition, even if the regressors were exogeneous, the coefficients in Table 3 may have been imprecisely estimated due to the imperfect collinearity[7] between the rank (relative consumption expenditures) and RD arising from the fact that the total household consumption expenditure enters into the calculation of the former two equations.

Hence, with regard to the multicollinearity concern, we fit various specifications of equation 4 that alternatively exclude R and D. In addition, the relative consumption expenditure is replaced with the average consumption expenditure of the RG, since the former can be calculated from the later (Vernazza 2013). However, despite various attempts made to obtain consistent estimates, results presented in this study may not necessarily carry a causal interpretation.

Table 4 summarizes the results of the FE estimations that alternatively exclude R and D from equation 4, and one that replaces R with the average consumption expenditure of the RG. Similar to the baseline results, the relative consumption expenditure (the rank) remains positively and statistically significantly associated with the ESHPF (column 2) and ESHPF consumed away from home (column 8). Despite minor differences in the magnitude of coefficient estimates of R in panels a and b (columns 2 and 8), the relationship remains positive and statistically significant.

With regard to the RD, results in both panels a and b show evidence of a negative and statistically significant ($P < 0.05$) relationship with the ESHPF (columns 1 and 3) and ESHPF

Table 4. The relationship between ESHPF and relative consumption expenditure status, FE results.

	ALL			HOME			AWAY		
	−1	−2	−3	−4	−5	−6	−7	−8	−9
Panel a									
RD	−0.001**		−0.004***	−0.000		−0.001**	−0.001		−0.003***
	(0.000)		(0.001)	(0.000)		(0.001)	(0.000)		(0.001)
Relative expenditure		0.008**			0.002			0.006***	
		(0.004)			(0.002)			(0.004)	
RG average income			0.003***			0.001**			0.002**
			(0.001)			(0.001)			(0.001)
Panel b									
RD	−0.001**		−0.004*	0.000		−0.002**	−0.001**		−0.002*
	(0.000)		(0.001)	(0.001)		(0.001)	(0.000)		(0.001)
Relative expenditure		0.008*			0.001			0.007*	
		(0.004)			(0.002)			(0.004)	
RG average income			0.003**			0.002**			0.001*
			(0.001)			(0.001)			(0.001)

Note: Similar controls as in Table 3. Standard errors (clustered at primary sampling cluster level) in parentheses. $^{*}P < 0.10$, $^{**}P < 0.05$, $^{***}P < 0.01$.

consumed at home (column 6) and that consumed away from home (column 9). Also note that the key specification differences (within each column) across panels is the type of FE used, including time (panel a) and the interaction of time by state FE (panel b).

4.2.1 Heterogeneities

As noted above, de Brauw and Herskowitz (2020) uncovered heterogeneities in the elasticity of demand for highly processed foods in Nigeria. In this sub-section, potential heterogeneities on the relationship between *R* and *D* and the consumption of highly processed foods is explored by fitting separate specifications (variants of equation 4) for rural and urban areas (Table 5) the northern and southern regions (Table 6) and by consumption expenditure terciles (Table 7).

Similar to the summary results presented in Table 4, Table 5 shows that the relative consumption expenditure (the rank) remains positively and statistically significantly associated with the ESHPF in urban areas (panels 1 and 3, column 2) and ESHPF consumed away from home in urban areas (panel 3, columns 2). The RD, on the other hand, seems to be negatively and statistically significantly associated with the ESHPF in both urban and rural areas (panel 1, columns 3 and 6) and ESHPF consumed away from home in both urban and rural areas (panel 3, columns 1, 3, and 4).

Across regions (Table 6), the relative consumption expenditure (the rank) remains positively and statistically significantly associated with the ESHPF in both southern and northern regions (panel 1, columns 2 and 5) and ESHPF consumed at home in southern regions (panel 2, columns 2) and ESHPF consumed away from home in northern regions of Nigeria (panel 3, column 5). The RD on the other hand seems to be negatively and statistically significantly associated with the ESHPF only in the northern region (panel 1, columns 4 and 6) and ESHPF consumed away from home in the northern region (panel 3, column 4).

As noted above, concern for social status may differ across consumption expenditure groups with potential implications for food preferences. Accordingly, we examine whether the relationship between the relative position (i.e. *R* and *D*) and the consumption of highly processed foods differs by consumption expenditure terciles. Results are summarized in Table 7: panel (a) for all highly processed foods (ALL), panel (b) for highly processed foods consumed at home (HOME), and panel (c) for highly processed foods consumed away from home (AWAY). The column headers indicate the consumption expenditure

Table 5. The relationship between ESHPF and relative consumption expenditure status, FE results by rural/urban.

	Urban			Rural		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel 1: ALL						
RD	−0.001		−0.005*	−0.001		−0.003**
	(0.001)		(0.002)	(0.001)		(0.001)
Relative expenditure		0.016*			0.005	
		(0.008)			(0.005)	
RG average expenditure			0.004***			0.002**
			(0.001)			(0.001)
Panel 2: HOME						
RD	0.001*		−0.000	0.000		−0.001
	(0.000)		(0.001)	(0.000)		(0.001)
Relative expenditure		−0.005			0.003	
		(0.005)			(0.003)	
RG average expenditure			0.001			0.001*
			(0.001)			(0.001)
Panel 3: AWAY						
RD	−0.001*		−0.004***	−0.001**		−0.002
	(0.001)		(0.001)	(0.001)		(0.001)
Relative expenditure		0.020**			0.002	
		(0.008)			(0.004)	
RG average expenditure			0.003***			0.001
			(0.001)			(0.001)

Note: Controls include: the total household consumption expenditure per capita (log), the age of the household head and its squared term, the family size in AE, and survey round by state FE. Standard errors (clustered at primary sampling cluster level) in parentheses. $^{*}P < 0.10$, $^{**}P < 0.05$, $^{***}P < 0.01$.

tercile. When all highly processed foods are considered (panel a), results suggest that highly processed foods are associated with *R* and *D* only for the relatively poorest consumption expenditure tercile, with the sign of correlation with *R* and *D* being positive and negative, respectively (columns 2 and 3). When highly processed foods are disaggregated into HOME and AWAY, results suggest that highly processed foods consumed away from home are negatively associated with *D* for the relatively poorest and the relatively richest consumption expenditure terciles (panel c, columns 1, 3, and 7), and positively associated with *R* only for the relatively richest consumption expenditure tercile (panel c, column 8).

5. Discussion and outlook

5.1 Summary of key findings

The food environment—including social and cultural norms—shapes food preferences. Convenience entices people to consuming highly processed foods, especially outside of home (Reardon et al. 2021). Processed foods could also be perceived as 'aspirational' or 'positional' in the local context if such foods are deemed desirable, more affordable, and more accessible by sections of the community (Searcey and Richtel 2017). This may inspire status-seeking individuals to leverage their relative consumption expenditure position for consuming more of such foods. This study applied an econometric approach to examine the relationship between the consumption of highly processed foods and social status in Nigeria. Social status was proxied by two components of the relative consumption expenditure position: the rank in the consumption expenditure distribution and the RD in consumption expenditures.

After controlling for household consumption expenditures, time, location, and household FE, we find that consumption of highly processed foods, proxied by the share of highly

Table 6. The relationship between ESHPF and relative consumption expenditure status, FE results by region.

	South			North		
	−1	−2	−3	−4	−5	−6
Panel 1: ALL						
RD	−0.001		−0.002	−0.002***		−0.004***
	(0.001)		(0.001)	(0.001)		(0.001)
Relative expenditure		0.010**			0.011*	
		(0.005)			(0.006)	
RG average expenditure			0.001			0.002*
			(0.001)			(0.001)
Panel 2: HOME						
RD	−0.000		−0.001	−0.000		0.002**
	(0.000)		(0.001)	(0.000)		(0.001)
Relative expenditure		0.006**			−0.001	
		(0.003)			(0.004)	
RG average expenditure			0.001			0.002**
			(0.001)			(0.001)
Panel 3: AWAY						
RD	−0.001		−0.001	−0.002***		−0.002
	(0.000)		(0.001)	(0.001)		(0.001)
Relative expenditure		0.004			0.012**	
		(0.005)			(0.006)	
RG average expenditure			0.000			−0.000
			(0.001)			(0.001)

Note: Controls include: the total household consumption expenditure per capita (log), the age of the household head and its squared term, the family size in AE, and survey round by state FE. Standard errors (clustered at primary sampling cluster level) in parentheses. $^{*}P < 0.10$, $^{**}P < 0.05$, $^{***}P < 0.01$.

processed foods in TFEs, is positively and significantly associated with the household's rank in the consumption expenditure distribution. When highly processed foods are further disaggregated into foods consumed at home and foods consumed away from home, the association with the rank in the consumption expenditure distribution is statistically significant only for the foods consumed away from home. A similar pattern is observed for the urban sample, when the sample is divided by urban–rural location.

Further, when the sample is divided by region and consumption expenditure terciles, the household's rank in the consumption expenditure distribution is positively associated with the share of consumption expenditures in highly processed foods in both Northern and Southern regions, and for the relatively poorest consumption expenditure tercile. When highly processed foods are further disaggregated into foods consumed at home and foods consumed away from home, the relative consumption expenditure (the rank) remains positively and statistically significantly associated with the ESHPF only for the Southern region and for the richest consumption expenditure tercile.

People choose processed foods partly due to convenience. However, if processed foods are perceived as 'positional' in the local context, this implies that individuals consume processed foods also to manage their social status in the community, as anecdotal evidence from Ghana suggests (Searcey and Richtel 2017). This is because the desire for status is a fundamental human motive (Anderson et al. 2015), as higher social status is usually associated with various material and nonmaterial benefits, including subjective well-being, self-esteem, mental and physical health (Anderson et al., 2015), and privileged influence and access to valued resources (see Cheng and Tracy 2014, for a review of insights from psychology).

The results also show a negative and statistically significant association between the RD in consumption expenditures and the consumption of highly processed foods for the full

Table 7. The relationship between ESHPF and relative consumption expenditure status, FE results by consumption expenditure terciles.

	Tercile 1			Tercile 2			Tercile 3		
	−1	−2	−3	−4	−5	−6	−7	−8	−9
Panel a: ALL									
RD	−0.001		−0.011***	0.001		0.002	−0.001		−0.000
	(0.001)		(0.004)	(0.001)		(0.002)	(0.001)		(0.002)
Relative expenditure		0.028*			0.003			0.007	
		(0.016)			(0.009)			(0.005)	
RG average expenditure			0.009***			−0.001			−0.001
			(0.003)			(0.002)			(0.001)
Panel b: HOME									
RD	0.000		0.000	0.001**		0.001	0.000		−0.000
	(0.001)		(0.003)	(0.000)		(0.001)	(0.001)		(0.001)
Relative expenditure		−0.007			−0.005			−0.002	
		(0.011)			(0.005)			(0.003)	
RG average expenditure			−0.000			−0.000			0.001
			(0.003)			(0.001)			(0.001)
Panel c: AWAY									
RD	−0.002*		−0.011***	−0.000		0.001	−0.002*		−0.000
	(0.001)		(0.004)	(0.001)		(0.002)	(0.001)		(0.001)
Relative expenditure		0.020			0.008			0.009**	
		(0.014)			(0.009)			(0.004)	
RG average expenditure			0.009**			−0.001			−0.001
			(0.004)			(0.002)			(0.001)

Note: Controls include: the age of the household head and its squared term, the family size in AE, and survey round by state FE. Standard errors (clustered at primary sampling cluster level) in parentheses. $^{*}P < 0.10$, $^{**}P < 0.05$, $^{***}P < 0.01$.

sample, for both urban and rural locations, the northern region, and the relatively poorest consumption expenditure tercile. For highly processed foods consumed away from home, the relationship with the RD remains negative and statistically significant for the full sample and the sub-samples including both urban and rural, the northern region, and the relatively poorest and relatively richest consumption expenditure terciles.

From the perspective of human nutrition and health, the negative correlations may appear desirable since the consumption of highly processed foods together with inadequate physical activities is linked to overweight and obesity and NCDs (Popkin et al. 2020). Nonetheless, there is little evidence that people had sufficient information about the health implications of highly processed foods and behaved accordingly. If, in fact, highly processed foods were the healthier option and people draw utility from consumption of such foods, these results may well be interpreted in terms of 'comparison income' effect (Easterlin 1995), indicating that consumption of such foods is negatively affected by the consumption expenditure of others with higher consumption expenditures. This corroborates the results discussed above that one's own consumption expenditure positions in relation to others' (i.e. the rank in the consumption expenditure distribution) is strongly associated with the household's food choice. This suggests that social status is an important correlate of food choice, as long as the relative consumption expenditure position (both the rank and the RD in consumption expenditures) in the community reflects social status.

To our knowledge, this is the first empirical test of the links between social status (proxied by the relative consumption expenditures (the rank) and the RD) and food choice behaviour using large data from a lower-middle income country in sub-Saharan Africa. The findings are important also because the rising trend in highly processed foods consumption in Africa is likely to contribute to non-communicable diet-related public health problems that are

also emerging (Reardon et al. 2021). Hence, the results of this study provide suggestive evidence of a social status perspective that should be taken into account for identifying appropriate policies (such as inequality-reducing policies) for reaching better nutrition and health outcomes beyond social status.

5.2 Limitations and challenges for future research

The results of this study need to be interpreted with caution because of the following limitations. First, due to a lack of detailed information on ingredients, quantities, the degree of processing, and nutritional content, meals consumed outside of the home were treated as highly processed. Hence, consumption expenditure shares of highly processed foods are likely to be overestimated (de Brauw and Herskowitz 2020). In addition, there is a fine line between differentiating the convenience motive from the status motive in the consumption of highly processed foods especially outside of home. We need therefore to collect more detailed data on the consumption packages of different social groups. Such data may allow a more direct treatment of the rank and the RD computed from individual food categories, and may give more light to better isolate the 'status' effect from the convenience effect. Such exercise may benefit if both quantitative and qualitative data are used to validate and supplement findings. This is because a study in France, for example, finds that organic food shopping signals social identity, but that social value depends on the venue where organic foods were purchased (Costa et al. 2014).

Second, due to attrition and missing observations, the final sample used for analysis was only 84 per cent of the total; hence, results may suffer from corresponding bias. However, key results did not show qualitative differences when data were disaggregated by urban–rural, geographic zone, and consumption expenditure terciles, possibly suggesting that sample attrition may not have been systematic.[8] This limitation may partly be overcome through more frequent data collection, using digital communication methods (e.g. Wahl et al. 2020).

Third, while previous studies suggest that characteristics that are perceived as valuable can be a source of social status when one holds them relatively higher than others in the local context (Anderson et al. 2015), the relative consumption expenditure position (both the rank and the RD in consumption expenditures) may not fully capture social status. It is therefore important to enrich consumption surveys with indicators that better capture social status in the local context.

Finally, due to lack of information about the 'right' RG to a given household, all households in the primary sampling unit (EA) were treated as the RG to the household. This may not be necessarily the case as individuals may have different RGs across many aspects of their lives and the composition of these RGs may change over time with new information, better infrastructure such as markets, and access to ICT (e.g. Cruwys et al. 2012; Block and Grund 2014). Hence, future studies need to identify the 'right' RGs that provide better insight into social status and dietary choices and preferences.

Supplementary material

Supplementary data are available at *Q Open* online.

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Conflict of interest

The authors declare that they have no conflict of interest.

Data availability

The data underlying this article will be shared on reasonable request to the corresponding author.

End Notes

1 By reviewing the related literature, Anderson et al. (2015) identify three major components of status: respect and admiration, voluntary deference, and perceived instrumental social value; and define status as 'the respect, admiration, and voluntary deference individuals are afforded by others.' Relatedly, the Editors of Encyclopaedia Britannica define social status as 'the relative rank that an individual holds, with attendant rights, duties, and lifestyle, in a social hierarchy based upon honor or prestige,' and note that status tends to vary with the social context (https://www.britannica.com/topic/social-status).

2 Detailed information about the data used in this study, including the data cleaning process, is described elsewhere (de Brauw and Herskowitz 2020). In brief, the aforementioned study describes two levels of data cleaning that were conducted. 'First, households reporting expenditure values above the 95th percentile 2.56 standard deviations more frequently than others were flagged and those observations were set as missing. Second, for the main categories of household expenditures (by processing level, non-food expenditures, and food away from home), the top 1 per cent of values within each geographic region and survey round were trimmed.' (de Brauw and Herskowitz 2020, 4). More general information about the GHS panel can be referred to NBS et al. (2016).

3 To assign the processing levels of each food item, de Brauw and Herskowitz (2020) adopted the following criteria described in Tschirley et al. (2015, 5). Foods are 'unprocessed' if they undergo no transformation from their original state beyond removal from the plant and (for non-perishables) drying; examples include pulses, whole grains, and fresh fruit and vegetables. Processed foods are assigned to the 'low value-added' category if they satisfy only one of the following three conditions: have multiple ingredients; underwent physical change induced by heating, freezing, extrusion, or chemical processes (i.e. more than simple physical transformation); and have packaging more complex than simple paper or plastic. Examples in this 'low processed' class include maize meal and milled rice. Foods meeting two of the three categories are classified as high value-added processed; examples are breads and other bakery products, industrially packaged vegetable oils, and food away from home.

4 We thank the anonymous reviewer for the suggestion.

5 In this study, the RG for household i is defined as all households living in the same enumeration area (primary sampling unit) j.

6 Summary of the Hausman test results are reported in the Annex Table A1.

7 Pairwise correlation between R and D was -0.75.

8 This is also true when the reference group was defined at state level. Results not reported.

Appendix

Table A1.

Table A1. Summary of Hausman test results comparing RE and FE specifications of Table 3.

	$chi^2(11)$	Probability > chi^2
Panel a		
Column 1 versus column 2	780.23	0.0000
Column 3 versus column 4	377.40	0.0000
Column 5 versus column 6	335.08	0.0000
Panel b		
Column 1 versus column 2	1777.90	0.0000
Column 3 versus column 4	869.80	0.0000
Column 5 versus column 6	1249.08	0.0000

Note: b = consistent under Ho and Ha; obtained from xtreg.
B = inconsistent under Ha, efficient under Ho; obtained from xtreg.
Test: Ho: difference in coefficients not systematic.
$chi^2(11) = (b - B)'[(V\_b - V\_B)^{(-1)}](b - B)$.
Probability > chi^2 = ?

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