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Does social class affect nutrition knowledge and food preferences among Chinese urban adults?

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Abstract

The purpose of this article is to analyse the influence of social class on nutrition knowledge and food preferences among Chinese urban adults with an emphasis on the middle class. The empirical investigations conducted as part of this research are based on data from the China Health and Nutrition Survey for 2009. First, we propose a multidimensional definition of social class that combines income, occupation and education to highlight the heterogeneity of the Chinese middle class. We identify four distinct groups: the elderly and inactive middle class, the old middle class, the lower middle class and the new middle class. In a second step, we assess the influence of social class on nutrition knowledge and food preference indices. Our results show that adults belonging to the elderly and inactive middle class and to the new middle class have better nutrition knowledge and healthier food preferences than their poorer counterparts.

Keywords: nutrition knowledge, food preferences, social stratification, middle class, China

La classe sociale affecte-t-elle les connaissances nutritionnelles et les préférences alimentaires parmi les adultes urbains chinois ?

Résumé

L'objectif de cet article est d'analyser l'influence de la classe sociale, et notamment de la classe moyenne, sur les connaissances nutritionnelles et les préférences alimentaires parmi les adultes résidant en Chine urbaine. Les investigations empiriques mises en œuvre sont basées sur les données China Health and Nutrition Survey de 2009. Premièrement, nous proposons une définition multidimensionnelle des classes sociales combinant le revenu, l'emploi et l'éducation afin de mettre en évidence l'hétérogénéité de la classe moyenne chinoise. Nous identifions quatre groupes distincts : la classe moyenne de retraités et d'inactifs, l'ancienne classe moyenne, la classe moyenne inférieure et la nouvelle classe moyenne. Deuxièmement, nous évaluons l'influence de la classe sociale sur des indices de connaissances nutritionnelles et de préférences alimentaires. Nos résultats montrent que les adultes membres de la classe moyenne de retraités et d'inactifs et de la nouvelle classe moyenne ont de meilleures connaissances nutritionnelles et des préférences alimentaires plus saines que le groupe le plus pauvre.

Mots clés: connaissance nutritionnelle, préférences alimentaires, stratification sociale, classe moyenne, Chine

JEL: I12, O53, Z13

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1. Introduction

One of the consequences of the striking economic development that China has experienced since the 1980s has been a strong and extremely rapid change in eating behaviour and dietary patterns. The nutrition transition framework predicts such changes. The concept of nutrition transition refers to the change in diet and activity patterns that has occurred recently in developing countries concomitantly with economic development, globalization and urbanization. More precisely, it describes the shift from traditional diets (high in cereals and fibre) and a high level of physical activity to "Western" diets (high in fats and sugar) and sedentary lifestyles (Popkin, 2003). In China, a growing literature provides evidence of the multiple changes associated with the nutrition transition such as the increasing consumption of animal foods and fats, the development of sedentary lifestyles, the increasing prevalence of overweight and obese individuals, and the emergence of diet-related non communicable diseases (Popkin et al., 1993; Du et al., 2002; Zhai et al., 2009). Among the factors explaining those changes, the role of socioeconomic status (SES) has been a specific focus. For instance, the empirical literature on the social gradient of overweight and obese individuals in China indicates that groups of high SES are more concerned with such nutritional problems (Du et al., 2004; Zhang et al., 2008). However, recent evidence is more ambiguous. Ma (2012) shows that the association between SES and being overweight is positive for adult males but negative for adult females.

To obtain a better understanding of the causes of diet change and the increase in the number of overweight individuals requires the underlying mechanisms to be addressed. Nutrition knowledge and food preferences can be seen as potential mediators between SES and dietary patterns. Nutrition knowledge and food preferences are often considered as important determinants of diet and obesity, especially in the context of the nutrition transition. Popkin (1993) argues that "dietary change is associated with changes in the public's knowledge concerning the role of diet in health promotion and disease prevention" (Popkin, 1993: 144) and Blaylock et al. (1999: 277) explain that "nutrition knowledge arms the consumer with tools for instituting change". In other words, knowledge is crucial for consumers to make informed choices (Ippolito, 1999). The role of food preferences is no less important. According to Asp (1999), food likes play an important role in food selection because they translate the degree of satisfaction that an individual anticipates from eating specific foods.

Investigating the association between SES, food preferences and nutrition knowledge is particularly relevant in the Chinese context. A burgeoning literature focuses on the growing urban middle class and its potential role in socioeconomic development. The development of a large middle class is considered to be an engine for consumption (Banerjee and Duflo, 2008). The extension of the middle class and the subsequent reduction in poverty tend to increase households' expenditure but also lead to a change in consumption patterns. Compared to poor people, middle class individuals are thought to spend proportionally less on basic necessities and low-quality goods and more on discretionary, luxury and high-quality goods as well as on all categories of equipment (Matsuyama, 2002; Foellmi and Zweimuller, 2006). Senauer and Goetz (2003) emphasize the role of the expanding middle class in fast-growing economies in the increasing consumption of high-value food products (fresh fruit, red meat, and food consumed away from home). Using this perspective, it can be argued that the Chinese middle class vehicles specific knowledge, values and preferences regarding food consumption. Epidemiological studies examining the association between SES and nutrition quasi-systematically measure SES using occupation, education and income (Liberatos et al., 1988), but those components are included separately in econometric analyses of the determinants of obesity and dietary patterns. In line with Bonnefond et al. (2015), we suggest that information on income, occupation and education can be combined to propose a multidimensional identification of social

class. We have chosen to concentrate on the middle class that we assume to be strongly heterogeneous in the Chinese context regarding employment and education.

This article offers two main contributions. First, it aims to identify the determinants of nutrition knowledge and food preferences, two elements that we assume to be closely related. Second, we carry out a more specific analysis of the role of social class in the formation of nutrition knowledge and healthy food preferences. A multidimensional definition of social class that combines income, occupation and education is proposed that allows us to highlight the heterogeneity of the Chinese middle class. We choose to focus chiefly on urban China and use household and individual-level data from the China Health and Nutrition Survey (CHNS) for 2009 that are specifically designed to analyze health and nutrition issues. The article is divided into six sections. The second section establishes the potential links between social class and food knowledge and preferences and gives some evidence relating to China. The third section describes the data and the variables. The fourth section focuses on the identification of social classes and analyses the heterogeneity of the Chinese urban middle class. The fifth section presents the results from the econometric analysis, while the final section discusses the implications of our findings for the design of nutrition policies and for further research.

2. Potential links between nutrition knowledge, food preferences and social class

In their seminal article, Link and Phelan (1995) explain that social context is a fundamental cause of disease because it "involves direct access to resources that can be used to avoid risks or to minimize the consequences of disease once it occurs" (Link and Phelan, 1995: 87). Resources are broadly defined "to include money, knowledge, power, prestige and the kinds of interpersonal resources embodied in the concepts of social support and social networks" (Link and Phelan, 1995: 87). Therefore, according to the theory of the fundamental causes of disease, access to health knowledge is socially determined. Applying this framework to nutrition issues leads us to consider that the formation of nutrition knowledge is mediated by socioeconomic position and can affect diet and obesity patterns. The main idea is that groups with high SES have better access to information (and particularly to nutrition information) through multiple channels (media, internet, family, social networks, education, etc.) which could result in healthier eating habits and thus better nutrition.

The empirical literature examining the relationship between nutrition knowledge and SES in high-income countries confirms such a positive association (McLeod et al., 2011; Parmenter et al., 2000; Moxley, 1981; Woolcott et al., 1981) However, there is very little evidence for the link between SES and nutritional knowledge in developing countries and particularly in China. Several studies examine the level of nutrition knowledge in specific Chinese student populations and conclude that there is a lack of nutrition knowledge among these young populations (Sakamaki et al., 2005; Xu et al., 2010; Xiao et al., 2011). Even if these studies provide some pieces of evidence (gender differences for instance), their primary objective is not to investigate the potential determinants of nutrition knowledge and thus they do not directly examine the association between SES and nutritional knowledge. The study by Tan et al. (2010) better meets that objective. It compares the level of nutrition knowledge between non-parent and parent care-providers of children under 7 years old in rural areas and shows that nutrition knowledge is lower in the parent group. The study also highlights a positive association between care-providers' family income and nutrition knowledge, confirming the idea that groups with higher SES have better access to nutrition knowledge.

As for nutrition knowledge, food preferences are also considered to be a mediator between socioeconomic position and food behaviour. Food likes are above all explained by physiological, psychological and cultural factors that are connected to sensory attributes of food such as taste, texture or colour (Asp, 1999). The role of SES and the social functions of food have also been

emphasized (Fieldhouse, 1986; Beardsworth & Keil, 1998; Turrell, 1998). In his seminal work, Bourdieu (1984) shows that taste is socially determined and suggests that food is one means of distinguishing between the upper classes and the working class. Food preferences should thus be seen as a social marker, as a means to distinguish social class membership, to establish class identity. In China, the preference for western-style convenience food or for foreign fast food is often seen as a symbol of modernity (Finkelstein, 1998; Watson, 1997; Curtis et al., 2007) and can be considered as a marker of social class membership. However, a non-negligible proportion of urban consumers remain attached to the traditional diet. Veeck and Burns (2005) explain that "traditional food shopping, preparation, and consumption are deeply rooted in Chinese self-identity" and that "the adoption of new consumption habits (…) may engender a great deal of deliberation" (Veeck & Burns, 2005: 651).

There is strong evidence for the influence of SES on actual food consumption in China but less regarding food preferences. A few studies have analysed food preferences among adolescent populations. For instance, Shi et al. (2005) show that for a sample of school adolescents in Jiangsu province, there are few significant differences with respect to food preferences between adolescents from different SES (low, medium and high) . However, boys from high SES tend to have a greater preference for ice cream and soft drinks (that can be considered as unhealthy preferences). Deng (2011) focuses on a large sample of adolescents in nine Chinese provinces. Food preferences are measured by a composite index of healthy food likes. The SES is defined at household level with household income and household registration type (urban and rural). Both SES variables have a significant and negative effect on the index of food preferences. In other words, adolescents from households of higher SES have food preferences that are significantly unhealthier. However, the study does not find any significant effect of education.

All in all, nutrition knowledge and food preferences can be considered to be mediators between SES and nutritional outcomes. However, empirical studies examining the association between SES, nutrition knowledge and food preferences are very scarce and do not address the role of social class. In China, the expanding middle class is often seen as a catalyst class that displays specific attitudes and behavioural patterns regarding food and nutrition and thus drives changes in food consumption (Elfick, 2011). From that perspective, we formulate two main research hypotheses. First, in line with the literature on the social dimension of nutrition, social class is supposed to be a strong predictor of both nutrition knowledge and food preferences. Second, the expanding Chinese urban middle classes are considered to vehicle specific values and knowledge regarding food.

3. Data

Data used in this paper come from the China Health and Nutrition Survey (CHNS), a collaborative project between the Carolina Population Centre (University of North Carolina) and the Chinese Centre for Disease Control and Prevention. The CHNS survey consists of a multi-wave longitudinal survey that provides detailed information on income, labour market, education, health, nutrition, migration, etc. The survey covers nine provinces including coastal (Shandong and Jiangsu), North-Eastern (Heilongjiang and Liaoning) and inland provinces (Henan, Hubei, Hunan, Guangxi and Guizhou). Even if the survey is not nationally representative, these provinces have been selected to provide a highly-diversified picture of Chinese provinces in terms of geography, economic development and health and nutritional outcomes. The sample was selected through a multistage random cluster procedure[1] and CHNS data are representative of rural and urban areas. For the purpose of our study, we consider the urban sub-sample from 2009 that covers 1,320 households and 2,841 adults aged 18 and over after checking for missing values.

[1] For a description of the sampling scheme, see Popkin et al. (2009).

Nutrition knowledge and food preference indices

Data on health and nutrition are collected at the individual level and are the primary focus of the CHNS survey. We consider information relating to nutrition knowledge and food preferences more specifically.

Nutrition knowledge can take two forms: knowledge of principles and knowledge of the nutrient content of specific foods (Blaylock et al., 1999). In the CHNS survey, only information on knowledge of principles is collected. More precisely, surveyed adults express their opinion on a five-point Likert scale (strongly disagree, disagree, neutral, agree and strongly agree) about twelve diet- and activity-related statements (Table A.1 in the Appendix). We only consider the ten nutrition-related items. For each answer, we have constructed a score ranging from 0 to 4, with a higher score indicating better knowledge. It is worth noting that for "wrong" statements we have reversed the scale. The nutrition knowledge index is the sum of the ten scores divided by two, and thus ranges from 0 to 20. Its distribution is presented in the Appendix (Figure A.1).

CHNS also collects information on preferences for five food categories: fast foods, salty snack foods, fruit, vegetables and soft drinks and sugary fruit drinks. Each adult expresses his preference on a five-point Likert scale (dislike very much, dislike, neutral, like, like very much). On this basis, we have created a score for each category ranging from 0 to 4, with a higher score indicating a healthier preference. The food preference index is the sum of the five scores and thus ranges from 0 to 20. The distribution of this healthy food preferences index is presented in the Appendix (Figure A.2). Moreover, for each of the five categories, we create a dummy that is equal to one for an individual who likes this item (like and like very much) and zero otherwise (neutral, dislike and dislike very much).

Social class variables

Although CHNS data are primarily designed to analyze health and nutrition issues, they also include basic information on income, occupation and education that are the three dimensions that we take into account to identify social classes. The first variable that interests us is household income which is expressed in Yuan per capita and per annum and is composed of wages, retirement income, business income, subsidies, agricultural income and other income (private transfers and rent). At the individual level, CHNS data include detailed information on employment and education. Because our analysis of social class is at the household level, we have selected information on occupation and education for heads of households. Four classification variables are taken into account: primary occupation (professional or technical worker, administrator or executive, office staff, skilled or non-skilled worker, service worker, retired, inactive, etc.), employment position in the occupation (self-employed, paid-employee, etc.), the type of work unit (government department, state service, state-owned or collective enterprise, etc.) and education level (highest level of education completed).

Control variables

The purpose of our econometric analysis is to identify the effect of social class on nutrition knowledge and food preferences. Such an analysis necessitates additional control variables that are seen as important determinants of nutrition knowledge and food preferences. We include demographic characteristics of adults (age, gender, and matrimonial status) and their household (household size, hukou status of head of household). We also include the province of residence that can be considered as a proxy for regional food identities. We try to control for the information environment. The underlying idea is that a high degree of exposure to media, globalization or

advertising, combined with access to modern markets can induce change in food preferences and knowledge. First, we use an index of urbanization. Based on community-level data, this index is a composite measure synthesizing the information on twelve dimensions of urbanicity: population density, economic activity, traditional markets, modern markets, transportation infrastructure, sanitation, communications, housing, education, diversity (in education and income levels), health infrastructure, and social services.[1] Community-level variables are crucial in analysing nutrition issues (Sobal, 2011). They are considered as a relevant proxy for the degree to which the environment is obesogenic but could also measure the degree of access to information on healthy nutritional behaviour. Second, two individual variables are taken into account to describe media exposure: the daily time spent watching TV (in minutes) and a dummy indicating if a person is active in surfing the Internet.

4. The identification of social class

4.1. Methodology

While the preferred method for identifying the middle class in the economic literature is a strictly monetary approach, we propose to strengthen this purely income-based definition by considering occupation and education, which are the chief focus of sociological literature on class structure. To do this, and in line with Bonnefond et al. (2015), we adopt a two-step statistical methodology.

For the first step, we have chosen to prioritize a monetary criterion and thus refer to an income-based definition of the middle class. In the empirical literature, there is absolutely no consensus on the lower and upper boundaries for defining the middle class. Following Birdsall (2010), we propose to identify the Chinese urban middle income class by combining an absolute lower boundary and a relative upper boundary. The lower boundary is set at 10,000 Yuan in order to ensure that people whose income is above have reached a certain level of economic security (Wang and Davis, 2010).[2] As for the upper limit, we use the 95th percentile of the income distribution (Birdsall, 2010). This procedure leads us to distinguish three main income classes: (i) the poor, whose annual per capita household income falls below 10,000 Yuan (43.4% of households); (ii) the middle class, earning between 10,000 and 36,285 Yuan (51.6% of households); and (iii) the rich with an income above 36,285 Yuan (5% of households).

For the second step, we use information on employment (primary occupation, employment position and work unit) and education (highest level completed) to analyze the structure of the middle income class previously identified. Although income is closely correlated to occupation and education, these last characteristics allow us to strengthen the identification of the middle class and to highlight its potential heterogeneity. To implement this second step, we carry out a mixed classification procedure in order to establish homogeneous and meaningful clusters of households with respect to their multidimensional "middle-class status". A mixed classification procedure involves conducting hierarchical cluster analysis and consolidating the relevant partition through some k-means-like iterations aiming at increasing inter-cluster variance while minimizing intra-cluster variance.[3] We finally compare the distributions of each active (classification) variable in order

[1] For each component, a score varying from 0 to 10 is calculated. The global index is the sum of the twelve component scores. A higher urbanization score indicates higher urbanicity. See Jones-Smith and Popkin (2010) for more details.
[2] This implies that a household belonging to the middle class earns at least 8.36 times as much as the Chinese poverty line (set at 1196 Yuan per annum in 2009).
[3] The so-called relevant partition, i.e. the relevant number of clusters, is derived from the analysis of the provided dendrogram and the analysis of two indicators that respectively (i) maximize the marginal improvement of the inter to intra-cluster variance ratio from a given partition to another and (ii) minimize the impact of k-means consolidation on that ratio.

to give a precise description of each cluster. We also consider additional variables (the hukou status of the head of the household and the annual per capita household income) that can help to improve our description of social classes.

4.2. The heterogeneity of the Chinese urban middle class

Results from the mixed classification procedure are presented in Table 1. Generally speaking, this cluster analysis confirms the strong heterogeneity of the urban middle class by identifying four distinct clusters within it. Our results also indicate that those four middle class components display specific features compared to the poor and the rich.[1]

The first cluster, referred to as the *elderly and inactive middle class*, is mainly composed of households whose head is poorly-educated and retired. This group accounts for approximately 50% of the whole Chinese middle class. With a mean income significantly higher than in the other three groups put together, those elderly households are located at the top of the income distribution within the middle class. The role of the urban pension system is crucial in explaining the relatively favourable position of elderly people. There have been recent improvements in the provision of support for the elderly at two levels. First, the coverage of the urban pension system has significantly improved following several institutional reforms (Wang, 2006). Second, Chinese authorities have recently decided upon successive increases in the size of pensions.

[1] A more detailed description of the four middle class clusters can be found in Bonnefond et al. (2015).

Table 1: Socioeconomic characteristics of middle-classes (four clusters derived from mixed classification procedure), poor and rich (urban households, 2009).

	Poor N=573	Elderly and inactive Middle Class N=338	Old Middle Class N=83	Lower Middle Class N=79	New Middle Class N=181	Rich N=66	All N=1320
Education							
No school	**19.7%**	**17.2%**	10.8%	*0%*	*0.6%*	10.6%	14.2%
Primary school	**19.7%**	**14.2%**	7.2%	3.8%	*0.6%*	6.1%	13.3%
Secondary school	48.0%	42.6%	**69.9%**	**73.4%**	*27.1%*	37.9%	46.1%
Technical /Vocational degree	*7.5%*	*13.0%*	*9.6%*	20.3%	**29.8%**	**21.2%**	13.6%
Superior	*5.1%*	*13.0%*	*2.4%*	*2.5%*	**42.0%**	**24.2%**	12.8%
Occupation							
Inactive / Seeking work	**36.3%**	**13.0%**	*0%*	*0%*	*0%*	*1.5%*	19.2%
Professional / Technical worker	*5.1%*	*0%*	8.4%	11.4%	**50.3%**	**24.2%**	11.5%
Administrator / Executive	*2.8%*	*0%*	4.8%	8.3%	**24.3%**	7.6%	5.8%
Office staff	*2.4%*	*0%*	1.2%	2.5%	**19.3%**	3.0%	4.1%
Skilled worker	4.7%	*0%*	2.4%	**44.3%**	*0%*	3.0%	5.0%
Non-skilled worker	**5.4%**	*0%*	1.2%	**26.6%**	*0%*	3.0%	4.2%
Service worker	**12.0%**	*0%*	**51.8%**	5.1%	*2.2%*	**18.2%**	10.0%
Other	**8.0%**	*0%*	**30.1%**	1.3%	3.9%	3.0%	6.1%
Retired	*23.2%*	**87.0%**	*0%*	*0%*	*0%*	36.4%	34.2%
Employment status							
No job	**59.5%**	**100.0%**	*0%*	*0%*	*0%*	*37.9%*	53.3%
Self-employed with employees	2.3%	*0%*	**16.9%**	0%	*0%*	**9.1%**	2.5%
Self-employed with no employees	**12.4%**	*0%*	**53.0%**	*0%*	*0%*	9.1%	9.2%
Paid employee	*24.8%*	*0%*	*26.5%*	**100.0%**	**100.0%**	43.9%	34.3%
Other status	1.0%	*0%*	**3.6%**	0%	0%	0%	0.7%
Work unit							
No job	**59.5%**	**100.0%**	*0%*	*0%*	*0%*	*37.9%*	53.3%
Government / State service	*8.9%*	*0%*	*1.2%*	*12.7%*	**90.1%**	25.8%	18.3%
State-owned enterprise	*3.8%*	*0%*	*0%*	**58.2%**	*1.1%*	6.1%	5.6%
Collective / Private / Individual enterprise	**27.7%**	*0%*	**98.8%**	**29.1%**	*8.8%*	30.3%	22.7%
Characterization variables							
Annual per capita income (mean)	*5,063*	**18,571**	16,818	*16,266*	**18,874**	**66,299**	14,887
Rural hukou	**12.7%**	3.8%	**19.7%**	4.0%	*1.1%*	9.2%	8.4%

Notes: For the poor and the rich, bold characters denote the fact that the value is significantly higher in the group than in the rest of the population (excluding the group concerned), and italic characters do the same for values significantly lower in the group than in the rest of the population. For the four components of the middle class, bold characters denote the fact that the value is significantly higher in the group than in the rest of the middle class (excluding the component concerned), and italic characters do the same for values significantly lower in the group than in the rest of the middle class. Adjusted standardized residuals of khi² for categorical variables ($p<0.05$) and independent samples t-test for continuous variables ($p<0.10$).
Source: CHNS (2009).

The second cluster is composed of self-employed people and wage-earners, who are quasi-exclusively employed in collective and private enterprises. This small business community is often referred to as the *old middle class* in the literature on social stratification (Chunling, 2010), and represents only 12% of the whole middle class. This class (not to be confused with the capitalist class composed of managers and owners of large export-oriented firms) is composed of moderately well-off households. Moreover, approximately 20% of household heads in the *old middle class* are rural-

to-urban migrants with rural hukou. The third cluster describes a working class which consists of skilled and non-skilled workers. On average, households in this group have a significantly lower annual per capita income than the rest of the middle class. The proportion of this *lower middle class* in the whole middle class is quite limited with no more than 12%. The fourth and last cluster accounts for approximately 26% of the middle class as a whole and is composed of the highest-earning and best-educated individuals (mainly professional or technical workers, administrators, executives and office workers). Members of this group are almost exclusively employed in the public sector as state employees. Based on Chunling (2010), this salaried upper middle class may be described as the *new middle class*. It is the richest component of the Chinese urban middle class, with a mean annual per capita household income that is significantly higher than the other middle class groups (particularly the *old* and the *lower middle class* groups). Following Elfick (2011) and Bonnefond et al. (2015), we argue that the *new middle class* is the most westernized component of the Chinese urban middle class and should be considered as a class that drives the spread of new consumption patterns.

The cluster analysis confirms the heterogeneity of the Chinese urban middle class with four distinct components. The core of this middle class is composed of the elderly and inactive middle class and the new middle class that account for approximately 75% of the whole middle class.

5. The effect of social class on nutrition knowledge and food preferences

5.1. Econometric framework

Because the acquisition of nutrition knowledge and the formation of food preferences are possibly non-independent processes, we have chosen to use multivariate regression procedures. Multivariate regressions are an extension of multiple regressions that allow for multiple dependent variables. Several dependent variables are jointly regressed on the same independent variables. It is worth noting that multivariate regression estimates the same coefficients and standard errors as one would obtain using separate linear regressions. However, multivariate regression, being a joint estimator, also estimates the between-equation co-variances. This means that it is possible to test coefficients across equations which gives a more complete view of the influence of independent variables. In order to deepen our analysis, we use the same set of independent variables to estimate multivariate probit regressions for the five kinds of food preferences. For each food preference, the dependent variable equals one for adults who like this item and zero otherwise. As for the previous multivariate regressions, the five probit equations are jointly regressed. The underlying idea is that individual food tastes and preferences are shaped in a non-independent way. For all regression estimates, the non-independence between equations is checked for using a Breusch-Pagan test of independence of residuals.

5.2. Results

Table 2 and Table 3 present the estimates of multivariate regressions for the nutrition knowledge and food preference indices with income class dummies and social class dummies respectively included as covariates. The mean values of nutrition knowledge and food preference indices for income classes and social classes are presented in Table A.2 in the Appendix. The tests of coefficients across equations associated with these estimates are reported in Table A.3 in the Appendix. Table 4 presents the multivariate probit regression estimates for the five categories of food preferences. For

these latter estimates, we do not report the coefficients and t-statistics for control variables. All the results are reported for the whole sample, men and women. The Breusch-Pagan tests are significant in all regressions, thus confirming the non-independence (i) between the formation of nutrition knowledge and food preferences (Tables 2 and 3) and (ii) between the five food preference categories (Table 4).

The influence of control variables

Results reported in Tables 2 and 3 reflect the diversity of factors affecting nutrition knowledge and food preferences. It is worth noting that the determinants of the nutrition knowledge and healthy food preference indices are not clearly gender-specific. The coefficient associated with gender is not statistically significant in any of the regressions. Moreover, for the majority of variables, the associations reported for men are not radically different from those reported for women.

Among the demographic characteristics that significantly affect nutrition knowledge and food preferences, our results underline the influence of age. Broadly speaking, as an individual gets older, he is more likely to have better nutrition knowledge and healthier food preferences, however, this relationship is non-linear. Regarding the food preferences regression, such an inverted U-shaped association is strongly significant for the whole sample, but also for men and women separately. As for the nutrition knowledge regression, the global inverted U-shape seems to be mainly due to the significant relationship in the female sample. Overall, this result is consistent with other empirical work on samples of adult populations which show that people of middle years tend to have a better nutrition knowledge score than the youngest or the oldest (Parmenter et al. 2000; Wardle et al., 2000).

Another demographic characteristic that has a significant impact on nutrition knowledge is the household registration type. According to our results, having a rural hukou is significantly associated with a lower nutrition knowledge score across the whole sample but also for men and women separately. In general, migrants earn higher incomes in cities than in rural areas. However, the rural hukou of migrants implies employment and wage discriminations and restrictions in access to education or health care (Liu, 2005). Perhaps such restrictions result in a lack of knowledge of the health benefits of good nutrition. In support of this argument, McKay et al. (2003: 17), in a seminal review of the relationship between migration and health, report that “it is clear that migrants in general tend to suffer from worse health and display disadvantaged risk factor profiles”. This result suggests that further research is needed to better understand the relationship between rural-to-urban migrant status and health in China.

Table 2: Multivariate regressions for nutrition knowledge and food preferences with income classes.

	ALL ADULTS		MEN		WOMEN	
	Nutrition knowledge	**Healthy food preferences**	**Nutrition knowledge**	**Healthy food preferences**	**Nutrition knowledge**	**Healthy food preferences**
Demographic characteristics						
Age	0.0271**	0.1761***	0.0206	0.1847***	0.0343**	0.1616***
	(2.53)	(11.90)	(1.37)	(9.27)	(2.22)	(7.25)
Age squared	-0.0003***	-0.0012***	-0.0002	-0.0013***	-0.0003**	-0.0011***
	(-2.83)	(-8.85)	(-1.56)	(-7.06)	(-2.41)	(-5.18)
Male	0.0338	0.0218	-	-	-	-
	(0.62)	(0.29)				
Married	0.1370	0.1027	-0.0592	-0.0019	0.2962**	0.1921
	(1.27)	(0.69)	(-0.37)	(-0.01)	(2.00)	(0.90)
Household size	-0.0148	-0.0643*	-0.0191	-0.0448	-0.0063	-0.0861*
	(-0.61)	(-1.92)	(-0.53)	(-0.94)	(-0.19)	(-1.81)
Rural hukou	-0.3517***	-0.1532	-0.4029***	-0.1418	-0.2893*	-0.1497
	(-3.26)	(-1.03)	(-2.58)	(-0.69)	(-1.93)	(-0.69)
Living environment						
Surfing internet	0.2821***	-0.2352**	0.2772***	-0.1143	0.2989***	-0.3457**
	(3.82)	(-2.30)	(2.66)	(-0.83)	(2.88)	(-2.25)
TV time	-0.0005*	0.0002	-0.0005	0.0013**	-0.0006	-0.0009
	(-1.84)	(0.38)	(-1.09)	(2.18)	(-1.42)	(-1.49)
Urbanization index	-0.0001	-0.0097**	-0.0005	-0.00128*	0.0005	-0.0065
	(-0.03)	(-2.00)	(-0.10)	(-1.90)	(0.11)	(-0.92)
Province (ref. = Guizhou)						
Liaoning	0.3477***	-0.0844	0.4157**	0.0730	0.2806	-0.2577
	(2.83)	(-0.50)	(2.36)	(0.31)	(1.63)	(-1.04)
Heilongjiang	0.3063***	0.2747*	0.2866*	0.4471*	0.3370**	0.1033
	(2.57)	(-1.67)	(1.66)	(1.96)	(2.04)	(0.43)
Jiangsu	0.4573***	0.0978	0.5241***	0.2555	0.3966**	-0.0787
	(3.78)	(0.59)	(3.02)	(1.11)	(2.34)	(-0.32)
Shandong	0.0508	-0.1532	0.0381	-0.0547	0.0773	-0.2413
	(0.43)	(-0.93)	(0.22)	(-0.24)	(0.47)	(-1.02)
Henan	0.0939	-0.3103*	0.1067	-0.2717	0.0796	-0.3741
	(0.76)	(-1.81)	(0.59)	(-1.14)	(0.47)	(-1.52)
Hubei	0.3805***	0.5683***	0.3741**	0.7759***	0.3838**	0.3340
	(3.04)	(3.29)	(2.07)	(3.24)	(2.21)	(1.33)
Hunan	0.1718	0.0310	0.2508	0.1651	0.0981	-0.1209
	(1.39)	(0.18)	(1.40)	(0.70)	(0.57)	(-0.48)
Guangxi	0.2125*	0.0948	0.3116*	0.2295	0.1157	-0.0397
	(1.68)	(0.54)	(1.71)	(0.95)	(0.66)	(-0.16)
Social Class (Ref. = Poor)						
Middle Class	0.2514***	0.2030**	0.1628*	0.1609	0.3366***	0.2318*
	(4.06)	(2.37)	(1.79)	(1.34)	(3.97)	(1.89)
Rich	0.0948	0.1397	0.1517	0.1097	0.0339	0.1704
	(0.71)	(0.76)	(0.79)	(0.43)	(0.18)	(0.63)
Constant	12.6791***	8.9945***	13.0993***	8.8230***	12.2493***	9.3426***
	(29.38)	(15.07)	(21.04)	(10.71)	(20.35)	(10.75)
Nb. Obs.	2325	2325	1143	1143	1182	1182
R-squared	0.0553	0.2188	0.0494	0.2389	0.0694	0.2076
Independence of residuals (Breusch-Pagan test) (p. value)	55.849 (0.000)		21.217 (0.000)		35.729 (0.000)	

Notes: t-statistics into brackets. Levels of statistical significance. Levels of statistical significance: *** p<0.001, ** p<0.05, *p<0.1.
Source: CHNS (2009).

Table 3: Multivariate regressions for nutrition knowledge and food preferences with social classes.

	ALL ADULTS		MEN		WOMEN	
	Nutrition knowledge	**Healthy food preferences**	**Nutrition knowledge**	**Healthy food preferences**	**Nutrition knowledge**	**Healthy food preferences**
Demographic characteristics						
Age	0.0257**	0.1770***	0.0179	0.1827***	0.0343**	0.1636***
	(2.39)	(11.91)	(1.18)	(9.09)	(2.21)	(7.33)
Age squared	-0.0003***	-0.0012***	-0.0002	-0.0013***	-0.0004**	-0.0011***
	(-2.68)	(-8.90)	(-1.32)	(-6.88)	(-2.41)	(-5.33)
Gender	0.0374	0.0277	-	-	-	-
	(0.69)	(0.37)				
Married	0.1441	0.1105	-0.0518	0.0089	0.3042**	0.1908
	(1.34)	(0.74)	(-0.32)	(0.04)	(2.06)	(0.89)
Household size	-0.0147	-0.070**	-0.0166	-0.0485	-0.0071	-0.0939**
	(-0.60)	(-2.08)	(-0.46)	(-1.01)	(-0.21)	(-1.97)
Rural hukou	-0.3356***	-0.1302	-0.3900**	-0.1263	-0.2711*	-0.1262
	(-3.10)	(-0.87)	(-2.49)	(-0.61)	(-1.80)	(-0.58)
Living environment						
Surfing internet	0.2567***	-0.2552**	0.2408**	-0.1561	0.2845***	-0.3536**
	(3.44)	(-2.47)	(2.27)	(-1.11)	(2.66)	(-2.29)
TV time	-0.0006*	0.0001	-0.0005	0.0012**	-0.0006	-0.0009
	(-1.93)	(0.29)	(-1.23)	(2.10)	(-1.44)	(-1.52)
Urbanization index	-0.0010	-0.0103**	-0.0016	-0.0136**	-0.0001	-0.0066
	(-0.28)	(-2.11)	(-0.31)	(-2.01)	(-0.03)	(-0.92)
Province (ref. = Guizhou)						
Liaoning	0.3628***	-0.0754	0.4283**	0.0971	0.2967*	-0.2707
	(2.95)	(-0.44)	(2.43)	(0.42)	(1.72)	(-1.09)
Heilongjiang	0.2851**	0.2572	0.2515	0.4306*	0.3269**	0.0810
	(2.38)	(1.55)	(1.45)	(1.87)	(1.97)	(0.34)
Jiangsu	0.4875***	0.1223	0.5607***	0.2832	0.4206**	-0.0646
	(4.01)	(0.73)	(3.21)	(1.23)	(2.47)	(-0.26)
Shandong	0.0580	-0.1522	0.0401	-0.0548	0.0854	-0.2541
	(0.49)	(-0.93)	(0.23)	(-0.24)	(0.52)	(-1.07)
Henan	0.1036	-0.2961*	0.1171	-0.2588	0.0862	-0.3608
	(0.84)	(-1.73)	(0.65)	(-1.08)	(0.50)	(-1.46)
Hubei	0.3874***	0.5813***	0.3740**	0.7942***	0.3945**	0.3428
	(3.09)	(3.36)	(2.06)	(3.31)	(2.27)	(1.37)
Hunan	0.1701	0.0279	0.2562	0.1583	0.0915	-0.1202
	(1.37)	(0.16)	(1.43)	(0.67)	(0.53)	(-0.48)
Guangxi	0.2411*	0.1280	0.3438*	0.2564	0.1421	-0.0170
	(1.90)	(0.73)	(1.88)	(1.06)	(0.80)	(-0.07)
Social class (Ref. = Poor)						
Elderly and inactive MC	0.2590***	0.2952***	0.1415	0.2108	0.3646***	0.3638**
	(3.56)	(2.93)	(1.31)	(1.48)	(3.68)	(2.55)
Old middle class	0.0955	-0.0905	-0.0093	0.0270	0.1978	-0.1915
	(0.82)	(-0.56)	(-0.06)	(0.12)	(1.23)	(-0.82)
Lower middle class	0.1867	0.1222	0.1868	-0.0944	0.1849	0.3549
	(1.56)	(0.74)	(1.10)	(-0.42)	(1.09)	(1.45)
New middle class	0.3839***	0.2343*	0.3402**	0.3053*	0.4376***	0.1389
	(4.07)	(1.80)	(2.43)	(1.65)	(3.41)	(0.75)
Rich	0.1065	0.1513	0.1674	0.1248	0.0427	0.1804
	(0.80)	(0.82)	(0.87)	(0.49)	(0.23)	(0.67)
Constant	12.7755***	9.0741***	13.2300	8.9754***	12.3018***	9.3889***
	(29.47)	(15.14)	(21.09)	(10.82)	(20.37)	(10.79)
Nb. Obs.	2325	2325	1143	1143	1182	1182
R-squared	0.0575	0.2206	0.0524	0.2411	0.0717	0.2116
Independence of residuals (Breusch-Pagan test) (p. value)	54.929 (0.000)		20.815 (0.000)		35.639 (0.000)	

Notes: t-statistics into brackets. Levels of statistical significance: *** p<0.001, ** p<0.05, *p<0.1.
Source: CHNS (2009).

Table 4: Multivariate probit regressions for five food likes with income classes and social classes.

	ALL ADULTS				
	Fast- food	**Snacks**	**Fruits**	**Vegetables**	**Drinks**
Income class (Réf.= Poor)					
Middle class	-0.1178	-0.2248***	0.0930	0.2212***	-0.0927
	(-1.23)	(-2.67)	(1.45)	(2.94)	(-1.33)
Rich	-0.9030**	-0.2009	-0.0368	-0.2139	0.0272
	(-2.53)	(-1.11)	(-0.27)	(-1.43)	(0.18)
Independence of residuals (Breusch-Pagan test)	644.747 (p. value = 0.000)				
Social class (Réf.= Poor)					
Elderly and inactive MC	-0.0204	-0.3003***	0.1644**	0.3247***	-0.1946**
	(-0.18)	(-2.83)	(2.16)	(3.46)	(-2.26)
Old middle class	-0.4676**	-0.3202*	-0.0855	-0.1030	0.1401
	(-2.22)	(-1.89)	(-0.72)	(-0.80)	(1.17)
Lower middle class	-0.1449	-0.1220	0.0272	0.0116	-0.1645
	(-0.81)	(-0.76)	(0.21)	(0.08)	(-1.18)
New middle class	-0.1097	-0.0983	0.0916	0.4699***	-0.0476
	(-0.79)	(-0.82)	(0.90)	(3.54)	(-0.45)
Rich	-0.8944**	-0.1832	-0.297	-0.1872	0.0249
	(-2.53)	(-1.01)	(-0.22)	(-1.25)	(0.16)
Independence of residuals (Breusch-Pagan test)	645.055 (p. value = 0.000)				
	MEN				
	Fast- food	**Snacks**	**Fruits**	**Vegetables**	**Drinks**
Income class (Réf.= Poor)					
Middle class	-0.0821	-0.1241	0.0969	0.1913*	-0.1042
	(-0.54)	(-0.91)	(1.12)	(1.89)	(-0.98)
Rich	-0.7692*	-0.6291*	-0.0576	-0.2784	-0.1547
	(-1.76)	(-1.81)	(-0.32)	(-1.42)	(-0.66)
Independence of residuals (Breusch-Pagan test)	297.118 (p. value = 0.000)				
Social class (Réf.= Poor)					
Elderly and inactive MC	0.0619	-0.2298	0.1347	0.2199*	-0.2737***
	(0.33)	(-1.31)	(1.31)	(1.78)	(-2.03)
Old middle class	-0.5529*	-0.4459	0.0138	-0.0074	0.2122
	(-1.65)	(-1.54)	(0.09)	(-0.04)	(1.20)
Lower middle class	-0.0724	0.1214	-0.0456	-0.0279	-0.1311
	(-0.27)	(0.53)	(-0.28)	(-0.15)	(-0.65)
New middle class	-0.0945	0.0716	0.1682	0.5573***	-0.0498
	(-0.42)	(0.37)	(1.22)	(3.07)	(-0.32)
Rich	-0.7473*	-0.5967*	-0.0481	-0.2463	-0.1602
	(-1.72)	(-1.72)	(-0.26)	(-1.25)	(-0.69)
Independence of residuals (Breusch-Pagan test)	293.866 (p. value = 0.000)				
	WOMEN				
	Fast- food	**Snacks**	**Fruits**	**Vegetables**	**Drinks**
Income class (Réf.= Poor)					
Middle class	-0.1480	-0.2556**	0.1055	0.3535***	-0.0672
	(-1.17)	(-2.33)	(1.10)	(3.12)	(-0.73)
Rich	-1.9062	0.0252	-0.0272	-0.0748	0.1588
	(-0.71)	(0.11)	(-0.13)	(-0.31)	(0.77)
Independence of residuals (Breusch-Pagan test)	345.725 (p. value = 0.000)				
Income class (Réf.= Poor)					
Elderly and inactive MC	-0.0701	-0.3222**	0.1934***	0.5713***	-0.1268
	(-0.46)	(-2.36)	(1.69)	(3.77)	(-1.13)
Old middle class	-0.4771*	-0.2248	-0.1177	-0.1400	0.1262
	(-1.70)	(-1.04)	(-0.65)	(-0.74)	(0.77)
Lower middle class	-0.1727	-0.2038	0.1918	0.2905	-0.1781
	(-0.70)	(-0.93)	(0.89)	(1.19)	(-0.89)
New middle class	-0.1323	-0.1815	0.0279	0.4257**	-0.0540
	(-0.72)	(-1.15)	(0.18)	(2.15)	(-0.38)
Rich	-1.8453	0.0317	-0.0209	-0.0541	0.1536
	(-0.80)	(0.14)	(-0.10)	(-0.23)	(0.74)
Independence of residuals (Breusch-Pagan test)	346.174 (p.value = 0.000)				

Notes: z-statistics into brackets. Levels of statistical significance: *** p<0.001, ** p<0.05, * p<0.1. Only the coefficients on income and social classes are reported. Source: CHNS (2009).

Household size has a significant negative influence on food preferences. Since household size is closely linked to the presence of children, this result may be partially explained by children's preferences for unhealthy food, such as fast food or sodas. In a study in Denmark, Groth et al. (2001) found that women with children have a lower intake of fruit and vegetables than single women or couples with no children. In the literature on children's obesity in China, the role of the one-child policy has often been highlighted (Jing, 2000; Yang, 2007). The expression "little emperor" has been increasingly employed to describe the Chinese only child who has become the centre of attention of his family. Parents and grand-parents tend to spoil him as much as possible, for instance by feeding him with sweet food and beverages and allowing snacking. This phenomenon may have encouraged parents' preference for unhealthy food.

Several variables related to the living environment also significantly affect nutrition knowledge and food preferences. Among this, surfing the Internet has an ambiguous impact since it is significantly associated with a higher level of nutrition knowledge, but also tends to significantly increase the preference for unhealthy food. Watching TV is significantly associated with lower nutrition knowledge. Another important finding is that living in a more urbanized city is significantly associated with unhealthier food preferences. A possible explanation may be linked to the fact that more fast food can be found in highly urbanized cities, resulting in a greater exposure to an obesogenic environment for urban inhabitants. Provincial dummy variables, when significant, are positively associated with nutrition knowledge and/or healthier food preferences. This result may be interpreted as a wealth effect in so far as the reference province is Guizhou, the poorest province of China.

The influence of income and social class variables

Introducing income and social class dummies provides interesting information on the social determinants of nutrition knowledge and food preferences. Results reported in Table 2 show that, compared to their poorer counterparts, members of the Chinese middle income class are significantly more likely to have better nutrition knowledge (for the whole sample and for men and women separately) and healthier food preferences (especially for women). Generally speaking, this finding is consistent with the empirical literature applied to developed countries that tends to emphasize the lack of nutrition knowledge of lower SES groups (Wardle et al., 2000). A higher level of education may lead to better knowledge of healthy dietary practices, but also a better understanding of nutrition and healthy eating messages (Parmenter et al., 2000). Some studies also find a positive association between SES and healthy food habits for developed countries (Darmon and Drewnowski, 2008), with people of higher SES more likely to consume vegetables and fruit (Irala-Estevez et al., 2000; Giskes et al., 2002). More specifically, social class differences in the choice of food have been emphasized. The cost of food and the preferences of partner and children have been pointed out as an important consideration in the food choice of lower-class women, whereas middle-class mothers insist on the health value of food (Calnan, 1990; Hupkens et al. 2000). Our results suggest that the social gradient of food preferences is similar to that observed in industrialized countries with higher social classes having better nutrition knowledge and healthier food preferences. The influence of income classes on the five food likes confirms this idea. Although our results underline the fact that being a member of the rich category rather than the poor group has no significant impact on the nutrition knowledge and food preferences indices (Table 2), Table 4 shows that rich adults have a lower preference for fast food than the poor. We also observe that adults belonging to the middle class have a stronger preference for vegetables and a lower preference for snack foods compared to the poor group.

A focus on the different components of the Chinese middle class helps to clarify the associations identified above. While no significant association is found for the old middle class and the lower

middle class, being a member of the elderly and inactive middle class and of the new middle class is positively associated with the nutrition knowledge and food preference indices. More specifically, belonging to the elderly and inactive middle class is significantly associated with better nutrition knowledge and healthier food preferences in the whole sample and among women (at the 5% level). Despite gender disparities, results for the whole sample reported in Table 4 show that adults of the elderly and inactive middle class have a higher probability of liking fruit and vegetables than the poor, but also a lower probability of liking snacks and soft drinks. This suggests that the food preferences of the elderly and inactive middle class are relatively distant from the western diet (which is higher in sugar and fat) and more attached to the Chinese traditional diet which is often mentioned as one of the world's healthiest. As stated by Veeck and Burns (2005), there is a kind of resistance to the westernization of dietary patterns and food behaviour in China. For instance, they explain that the emphasis on fresh food, on traditional shopping and cooking remains deeply rooted in Chinese society. Our results could indicate that adults belonging to the elderly and inactive middle class contribute to the perpetuation of such traditional Chinese food habits.

As for members of the new middle class, they tend to have significantly better nutrition knowledge, in the whole sample and for both men and women (at least at the 5% level). This finding can be linked to the work of Bonnefond and Clément (2014) who use the same sample of Chinese urban adults and underline the fact that the Chinese new middle class is relatively well-protected against obesity. Nevertheless, the impact of belonging to this group on the food preferences index is not so clear. Regarding the whole sample, being a member of the new middle class is significantly associated with healthier food preferences (at the 10% level), whereas the association is not significant in the female sample. For men, the association is significant at the 10% level, but the value of the t-statistic is very close to the threshold of no statistical significance (1.65), reflecting the fact that the association may be weakly significant. This may reflect the fact that having nutrition knowledge does not necessarily result in healthier food preferences. Some studies have already emphasized that nutrition knowledge is not sufficient to ensure the adoption of healthy dietary behaviour (Dallongeville et al., 2000; Darmon and Drewnowski, 2008). The weak association between membership of the new middle class and healthy food preferences seems to be confirmed by Table 4. Although members of the new middle class have a significantly higher probability of reporting a preference for vegetables compared to the poor (Table 4), no significant association is observed for other food likes.

6. Conclusion and discussion

Based on an urban sub-sample of the 2009 CHNS data, the objective of this article was twofold. First, it aimed to identify social classes in urban China by combining SES dimensions (income, education and occupation) to construct an indicator of social class, with a focus on the middle class. By means of a two-step methodology, we have identified six social classes: (i) the rich; (ii) the poor; (iii) the elderly and the inactive middle class, mainly composed of pensioners; (iv) the old middle class, composed of self-employed workers; (v) the marginal middle class, composed of skilled and unskilled workers; and (vi) the new middle class, composed of highly educated wage earners in the public sector.

Second, an econometric analysis relying on multivariate regression procedures aimed to identify the impact of social class on nutrition knowledge and food preferences. Broadly speaking, our results highlight a positive relationship between nutrition knowledge, healthy food preferences and membership of the middle class. In other words, the social gradient of food preferences is quite similar to that observed in developed countries with higher social classes having better nutrition knowledge and healthier food preferences. We also shed light on the specific role of the middle class

in the diffusion of nutrition knowledge and healthy food preferences and particularly the elderly and inactive middle class and the new middle class that are its richest components and who account for approximately 75% of the total Chinese urban middle class. We show that adults belonging to the elderly and inactive middle class have better nutrition knowledge and healthier food preferences than their poor counterparts which could suggest that they remain under the influence of the healthy traditional Chinese diet. Adults comprising the new middle class also have better nutrition knowledge than the poor, indicating that they are probably more aware of the benefits linked to a healthy diet. They also tend to have healthier food preferences even if the association is less obvious than for the elderly and inactive middle class.

The Chinese authorities have become aware of the crucial role of nutrition knowledge policies in tackling the issue of over-nutrition. For instance, the Chinese Nutrition Society defines food-based dietary guidelines which provide principles related to food behaviours. The first guidelines were drawn up in 1989 and then revised in 1997. The latest version was compiled by the Chinese Nutrition Society in 2007 and proclaimed by the Ministry of Health in 2008. These dietary guidelines establish several nutrition principles and are defined for the general population (with eight nutrition guidelines) but also for specific populations (infants, children, adolescents, pregnant women, etc.). These guidelines have been pictured using a Chinese pagoda indicating daily food recommendations to help people to put the guidelines into practice (Ge, 2011). Those tools have been widely used by the Chinese Nutrition Society to disseminate nutrition knowledge through television programs, newspapers, lectures, posters, etc. (Ge et al., 2007).

Our study has several implications for the targeting of such nutrition policies. First, the transmission of nutrition guidelines should target groups of lower SES: the poor, the lowest components of the middle class (i.e. the lower middle class and the old middle class) and rural-to-urban migrants. Those nutrition principles should also be transmitted more effectively to children and adolescents, regardless of their SES, because food tastes are shaped during childhood and adolescence and because children can influence their parents' food preferences. Second, our results suggest that efforts should be made to ensure the preservation of the Chinese traditional diet. As argued by Shi et al. (2005: 1447), "the safeguarding of the traditional Chinese food habits should be at the core of a nutritional policy aiming at preventing overweight and chronic diseases". We argue that the elderly and inactive middle class is probably more attached to this traditional Chinese diet than other social classes. In view of this fact, nutrition policies should also be based on advertising, nutrition labelling and awareness campaigns to promote traditional Chinese food values and such policies should specifically target younger populations and lower social classes.

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Appendix

Table A.1: Nutrition knowledge statements.

Statement	Reversed score
1. Choosing a diet with a lot of fresh fruits and vegetables is good for one's health	No
2. Eating a lot of sugar is good for one's health	Yes
3. Eating a variety of food is good for one's health	No
4. Choosing a diet high in fat is good for one's health	Yes
5. Choosing a diet with a lot of staple foods (rice and rice products and wheat and wheat products) is not good for one's health	Yes
6. Consuming a lot of animal products daily (fish, poultry, eggs and lean meat) is good for one's health	Yes
7. Reducing the amount of fatty meat and animal fat in the diet is good for one's health	No
8. Consuming milk and dairy products is good for one's health	No
9. Consuming beans and bean products is good for one's health	No
10. The heavier one's body is, the healthier he or she is	Yes

Source: CHNS (2009).

Table A.2: Nutrition knowledge index and food preferences index by income and social class (whole sample, male and female urban adults, 2009).

	ALL ADULTS		MEN		WOMEN	
	Food knowledge	Healthy food preferences	Food knowledge	Healthy food preferences	Food knowledge	Healthy food preferences
Poor	13.472	13.600	13.534	13.639	13.421	13.567
	(1.436)	(2.034)	(1.437)	(1.979)	(1.434)	(2.080)
Middle class	13.808	13.925	13.817	13.928	13.800	13.923
	(1.280)	(2.038)	(1.312)	(2.063)	(1.250)	(2.015)
Elderly and inactive middle class	13.758	14.255	13.763	14.232	13.754	14.276
	(1.198)	(1.908)	(1.183)	(1.963)	(1.213)	(1.859)
Old middle class	13.586	13.303	13.563	13.460	13.609	13.148
	(1.231)	(1.925)	(1.326)	(1.662)	(1.141)	(2.152)
Lower middle class	13.790	13.638	13.849	13.393	13.724	13.908
	(1.365)	(2.281)	(1.251)	(2.454)	(1.485)	(2.054)
New middle class	14.037	13.711	14.046	13.846	14.029	13.583
	(1.392)	(2.112)	(1.537)	(2.135)	(1.247)	(2.087)
Rich	13.694	13.952	13.766	13.906	13.619	14.000
	(1.270)	(1.888)	(1.302)	(2.083)	(1.243)	(1.679)
Total	13.654	13.784	13.693	13.804	13.618	13.766
	(1.361)	(2.035)	(1.373)	(2.032)	(1.349)	(2.038)

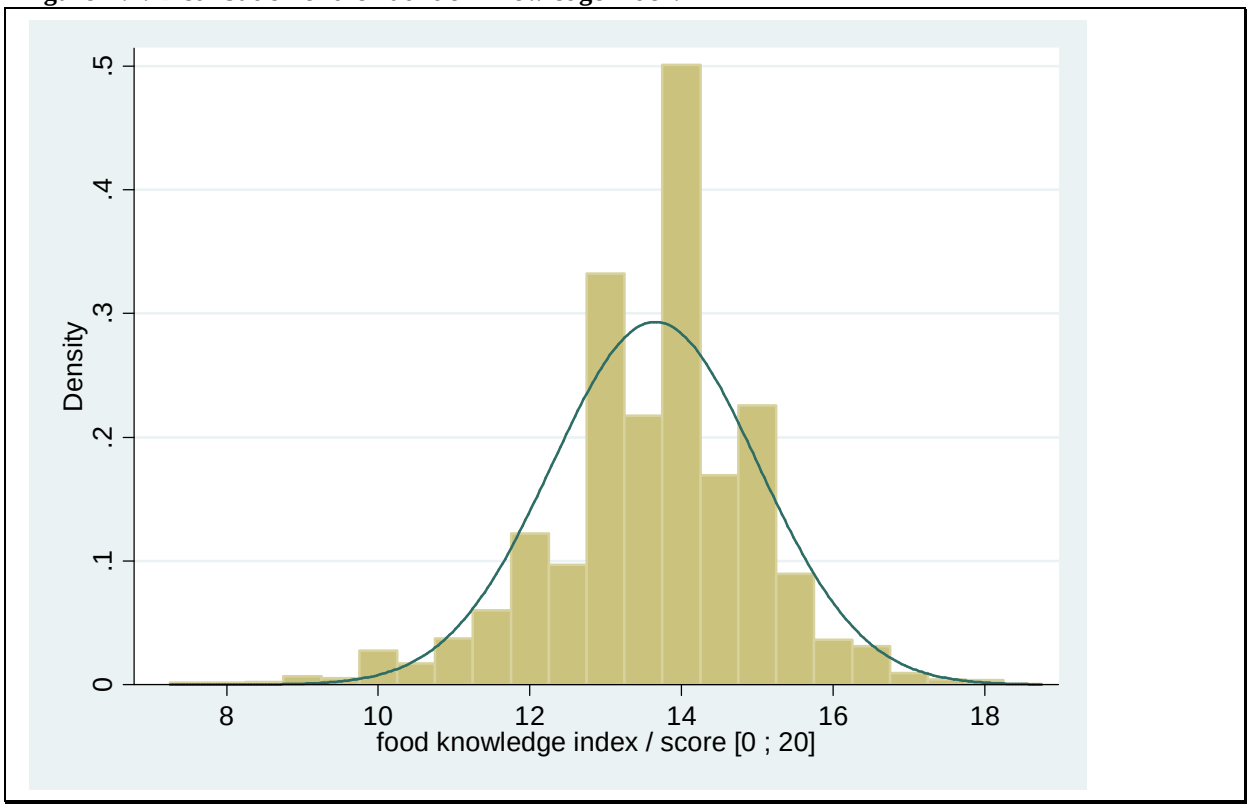
Notes: The food knowledge index and the food preferences index range from 0 to 20. Standard deviations into brackets.
Source: CHNS (2009).

Table A.3: Tests of coefficients across equations (whole sample, women and men urban adults, 2009).

	ALL ADULTS	MEN	WOMEN
Income class (Ref. = Poor)			
Middle class	9.78***	2.21	8.62***
	(0.000)	(0.111)	(0.000)
Rich	0.47	0.36	0.20
	(0.628)	(0.695)	(0.817)
Social class (Ref. = Poor)			
Elderly and inactive MC	9.24***	1.72***	8.65***
	(0.000)	(0.179)	(0.000)
Old middle class	0.58	0.01	1.30
	(0.559)	(0.990)	(0.272)
Lower middle class	1.35	0.77	1.41
	(0.260)	(0.463)	(0.244)
New middle class	8.99***	3.85**	5.83***
	(0.000)	(0.022)	(0.003)
Rich	0.57	0.45	0.23
	(0.568)	(0.639)	(0.794)

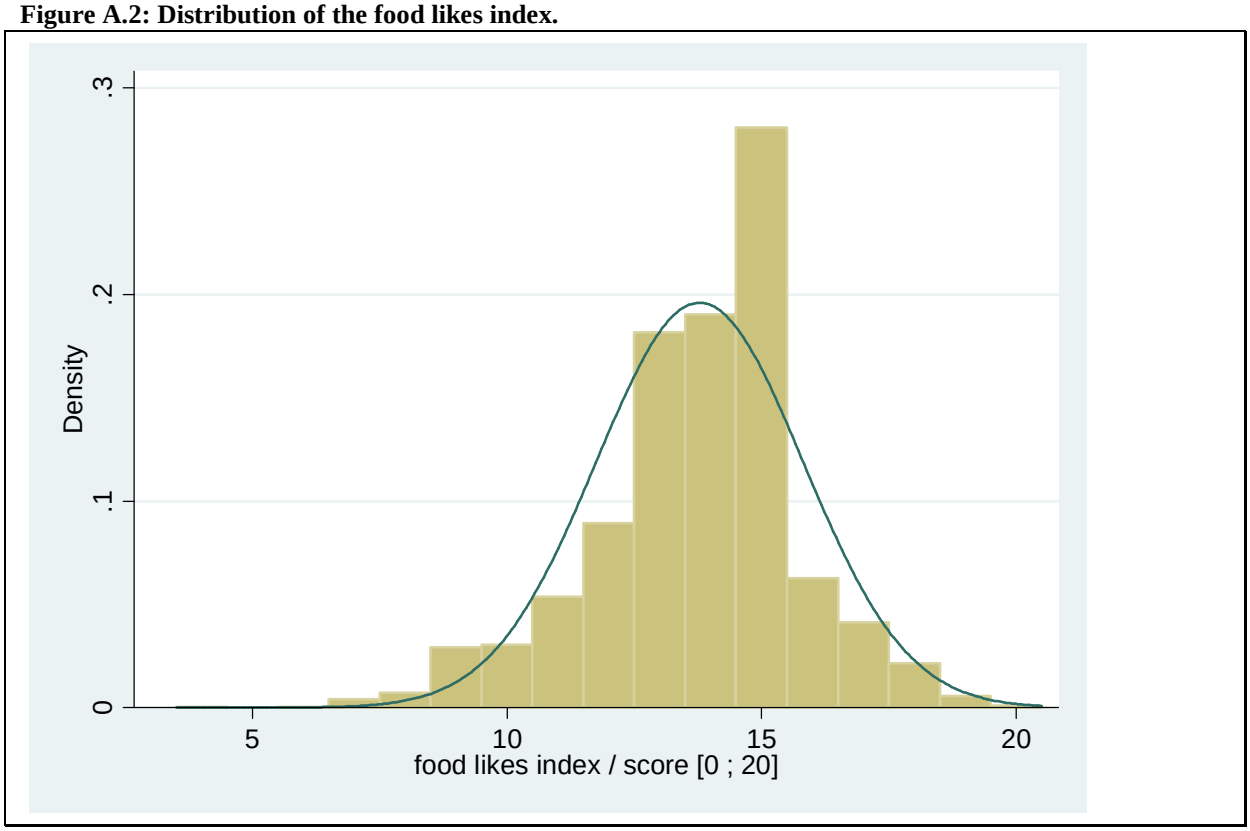
Notes: p-values into brackets. Levels of statistical significance: *** p<0.001, ** p<0.05, *p<0.1.
Source: CHNS (2009).

Figure A.1: Distribution of the nutrition knowledge index.



Source: CHNS (2009).

Figure A.2: Distribution of the food likes index.



Source: CHNS (2009).

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