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Eating out of home in Portugal: characterisation and effects on dietary intake

Mariana Silva[1,2,3], Sara Simões Pereira Rodrigues[1,2,4], Daniela Macedo Correia[1,2,3], Mariana Correia Castro Rei[1,2,4], Milton Severo[1,2], Ana Isabel Almeida Costa[5], Duarte Paulo Martins Torres[1,2,4] and Carla Maria Moura Lopes[1,2,3]*

[1]*EPIUnit, Institute of Public Health, University of Porto, Porto, Portugal*
[2]*Laboratory for Integrative and Translational Research in Population Health (ITR), University of Porto, Porto, Portugal*
[3]*Department of Public Health and Forensic Sciences, and Medical Education, Faculty of Medicine, University of Porto, Porto, Portugal*
[4]*Faculty of Nutrition and Food Sciences, University of Porto, Porto, Portugal*
[5]*CATÓLICA-LISBON School of Business and Economics, Portuguese Catholic University, Lisbon, Portugal*

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Abstract

This cross-sectional study aims to describe and compare energy, nutrient intake and food consumption according to eating location and by age groups using data from the National Food, Nutrition and Physical Activity Survey (IAN-AF 2015/2016). Dietary intake was estimated by two non-consecutive days of food diaries (children)/24-h recalls (other age groups), and four eating location categories were defined according to the proportion of meals consumed at out-of-home locations: *Home* (at least 80 % of meals at home), *Other Homes*, *School or Work* and *Restaurants and Other Places*. The majority of meals (69·1 %) were consumed at home. Meals were also often taken at school by children and adolescents and in restaurants and similar outlets by adults and elderly. Children and adolescents in the *School or Work* category ate more fruit, vegetables and pulses and cereals and starchy tubers, whereas adults in this category ate more red and processed meats, sugar-sweetened beverages and sweets. Compared with *Home* category, *Restaurants and Other Places* was associated with worse diet adequacies among children ($\beta = -1{\cdot}0$; 95 % CI = −2·0, −0·04), adolescents: ($\beta = -2{\cdot}4$; 95 % CI = −3·2, −1·5) and adults ($\beta = -1{\cdot}3$; 95 % CI = −1·6, −1·0) reflecting higher intakes of energy, fat, *trans*-fatty acids and SFA, and Na. The elderly consumed more free sugars and fat when eating out of home in general. Overall, findings reflect important variation in nutrient profiles by eating location, with meals taken at school or work contributing to higher consumption of nutrient-dense foods and those taken in restaurants and other similar settings implying higher consumption of energy-dense foods.

Keywords: **Eating out of home: Dietary intake: Food patterns: Dietary adequacy: National Survey**

Since the mid-20th century, the world's food environment shifted due to increased urbanisation and market globalisation, resulting in a growing trend for consuming food out of home[1–4]. Demographic and socio-economic changes, such as longer working hours[5,6], time pressure among working women[7,8] and higher availability of food service establishments[9], contributed to less time being spent preparing meals at home and increased reliance on out-of-home meals. In the USA, contribution of out-of-home foods to total energy intake (TEI) has risen from 18 % in 1977–1978 to 32 % in 1994–1996[10]. In Portugal, a survey from Nielsen company reported that, in 2016, about 23 % of the population ate at least one meal out of home, with 15 % ordering food out to eat at home[11]. Recent data from the Eurostat (2019) regarding Portuguese families showed that 9·5 % of total expenses were spent in out-of-home meals[12].

Food environment, age group, area of residence and socio-economic indicators, such as education, income and occupation, have all been associated with eating out of home[9]. This behaviour can be tied to special occasions or merely with routine meals bought at take-away and fast-food restaurants. Indeed, families point out different reasons to eat out, such as convenience, cost-effectiveness, variety and the enjoyment of 'family time'[13]. Diet quality and health status seem to weigh less when deciding to eat away from home. Previous studies have focused on the relation of at-home and out-of-home consumption or considered eating out within restaurants and fast-food establishments. Still, the institutional food services, particularly school and work canteens, are highly relevant provisioners of out-of-home meals[14], as individuals spend more than half of their waking hours working or learning[15].

Abbreviations: HES, healthy eating score; TEI, total energy intake.

* **Corresponding author:** Carla Maria Moura Lopes, email carlal@med.up.pt

Previous research has pinpointed the nutritional shortcomings of out-of-home meals, namely large portion sizes and high energy density, combined with a small offer of healthy options and a lack of food skills and health literacy among some consumer segments, particularly the most vulnerable[15]. A cross-sectional study from the HECTOR project identified men, young adults and those highly educated as the ones who eat more frequently out of home[3]. The energy and nutrients intakes, as well as the types of food groups most consumed by those who often eat out, may differ from those who eat mostly at home. In Europe, out-of-home meals are an important part of dietary habits and have been linked to the increase in overweight and obesity[16–18].

On the one hand, meals at European schools are not always be linked to a better dietary intake in children and adolescents[19,20], whereas those at home seem to frequently be associated with adequate nutrient intake and low dietary energy density[19,21]. However, in a Portuguese study with preschool children[22], eating meals at school was associated with higher dietary adequacy index scores, through greater consumption of fibre, fish, vegetables and fruit, and lower intake of total fat and meat, compared with other eating locations. Yet, consumption in restaurants, when compared with at school or home, was linked to lower dietary adequacy index scores, given the higher consumption of cakes, salty snacks, soft drinks and fruit juices. Similarly, a higher energy intake derived from 'core foods' at home and school, paired with a higher contribution of 'non-core foods' to the daily energy intake from leisure places and food outlets, was observed among children and adolescents in the UK[23].

Identifying priority areas to promote healthy eating is dependent on the eating location profile, which differ from country to country and by age groups, according to extant research. Knowledge of how dietary choices and nutrient intake are linked to consumption settings should therefore be advanced. Very few studies have investigated these issues using data from national representative samples entailing all age groups. Given the above, and using data from the Portuguese National Food, Nutrition and Physical Activity Survey (IAN-AF 2015/2016), the present study aims to describe and compare the food consumption and the energy and macronutrient intakes of the Portuguese population, segmented by age group and across eating location.

Methods

Participants

The protocol and methodology from the IAN-AF 2015/2016 have been published earlier[24,25]. This survey collected nationwide and regional data on food consumption and its relation to health determinants from individuals aged between 3 months and 84 years. The study population was represented by a probabilistic sample obtained from the National Health registry, through multistage sampling: first, by the stratification of the seven statistical geographic units (including mainland and islands); second, by randomly selecting Primary Health Care Units in each region; and finally, individuals were randomly selected from each Health Care Unit according to sex and age. A sample of 6553 individuals participated in one face-to-face interview (response rate among eligible of 33·37 %); 5811 completed two dietary assessments 8–15 d apart (response rate among eligible of 29·60 %). Comparatively to individuals who participated, those who refuse to participate and who filled out a refusal questionnaire were older and less educated. Still, for variables representing dietary consumption, the differences were of a small magnitude. Only data from participants with two complete dietary assessments and aged 3–84 years (n 5005) were analysed in the present study to avoid the inclusion of children who were not totally introduced on the family's diet (aged < 3 years). More detailed descriptions on sampling procedure and participants can be found in previous publications[24,25].

Data collection

Dietary assessment. To capture season effects and daily variations on food consumption, data were collected from October 2015 to September 2016 by trained fieldworkers with background in Nutrition and Dietetics. Computer-assisted personal interviews were distributed over the four seasons and included all days of the week (randomly selected). In children under the age of 10 years, dietary intake was assessed in two non-consecutive 1-d food diaries which were filled by parents or caregivers on paper, followed by a computer-assisted personal interview in the day before to check for completeness and add details on food description and quantification. For the remaining participants, dietary intake was evaluated through two non-consecutive 24-h recalls conducted by computer-assisted personal interviews. For subjects aged from 10 to 14 years, it was mandatory to have the presence of one parent or caregiver during the assessment. Most of the procedures were adapted from the European Food Safety Authority (EFSA) guidance, taking in account the EU Menu methodology[26].

The 'eAT24' software, previously validated[27], integrates an automated multiple-pass method employing five steps[28] and the classification system FoodEx2[29]. This software was used to collect all dietary data and describe the food, recipes and supplements consumed during meals, including information on time and consumption location. The initial food list was based on the Portuguese food composition table[30], being expanded to a total of 2479 food items and 117 supplements for the purpose of the study. Furthermore, a total of 1696 recipes that reflect the Portuguese cuisine were included[24,31]. Food portion size was quantified through a food picture book[32], as well as predefined household measures, weight or volume methods, and standard unit methods. When the participant knew the weight or volume of the food consumed, the quantity was manually entered by the interviewer. A list of default mean portions was made available to participants who did not know how to estimate portion size for a food item. To ensure overall validity of dietary intake information: first, individual energy and macronutrient intake was controlled at the end of interview with outliers being signalised with an alert message allowing the interviewer to perform the corrections directly in the 'eAt24' software; additionally, the accuracy of this software was previously assessed by

examined differences between estimates from dietary and urine measures[27]; and misreporters were identified according to the Goldberg method and their exclusion had a small impact on energy and nutrient estimates[33].

The food groups considered in this study are described elsewhere[31]. Water was excluded from the non-alcoholic beverages for the purpose of the present analysis. Alcoholic beverage intake information was complemented by using a food propensity questionnaire, with a reference period of 12 months. In the present study, this intake was analysed by frequency of consumption for four categories – all alcoholic beverages, wine, beer and other alcoholic beverages – and for each eating location group.

Definition of eating location categories. The distribution of meals per each place of consumption recorded by 'eAT24' was used to group eating locations under *Home*, *Homes of Relatives or Friends*, *School or Work*, *Restaurants* or *Other Out of Home Places*. Based on Naska *et al.* definition of eating out ('meals, beverages and snacks consumed out of home, irrespective of where the items had been prepared')[34], four eating location categories were then defined following a similar methodology of a previous study of the research group[22], grouping participants under *Home* (at least 80 % of meals consumed at home), *Other Homes* (less than 80 % of meals consumed at home and the remaining ones mainly at the home of relatives or friends), *School or Work* (less than 80 % of meals consumed at home and the remaining ones mainly at school or work, including canteens) or *Restaurants and Other Places* (less than 80 % of meals consumed at home and the remaining ones mainly at restaurants, bars, coffee shops, pastry or snack bars, while travelling, outdoors or other public spaces). Among the elderly, the eating location patterns *Home* and *Other Homes* were concatenated, as well as *School or Work* and *Restaurants and Other Places*, due to low frequency of patterns *Other Homes* and *School or Work* (4·8 % and 2·5 %, respectively).

Healthy eating score. A healthy eating score (HES) was computed to assess the individual dietary adequacy of the meals consumed within each eating location category, according to an approach previously used to study diet quality among Portuguese children[35]. This approach is based on the dietary recommendations proposed by the WHO[36] and considers nine food groups (rather than nutrients): (1) 'fruit, vegetables and pulses'; (2) 'dairy' (milk, yogurt and cheese); (3) 'cereals and starchy tubers' (rice, pasta, potatoes, bread and other grains); (4) 'white meat, fish and eggs'; (5) 'red meat and processed meats', (6) 'salty snacks' (chips, snacks, pizzas and commercial burgers); (7) 'sweets' (cakes, candies, sweet pastry, chocolate, biscuits and ice cream, breakfast cereals and cereals bars); (8) 'sugar and honey'; and (9)'sugar-sweetened beverages' (soft drinks and nectars). Quartiles of consumption were calculated for each food group, by age, and a score ranging from 1 to 4 was assigned. For the first four groups, the lowest quartile of consumption was assigned a score of 1, intermediate quartiles were given the scores 2 and 3 and the highest quartile was given a score of 4. The remaining groups (from 5–9) were scored in the reverse direction with the highest quartile of consumption receiving the lowest score. The HES ranged between 9 and 36, with higher scores representing a more adequate diet.

Other variables. Among other variables, all participants reported on the following demographic and socio-economic characteristics, analysed in this study: sex, age, education and degree of urbanisation of area of residence (henceforth, degree of urbanisation). Adults also reported on completed education, with this variable being re-classified as 'No education/primary' (low education), 'Secondary' (middle education) and 'Tertiary' (high education). Children and adolescents were attributed the highest education registered for their parents. Regarding the degree of urbanisation, the Typology of Urban Areas (TIPAU) 2014, developed in Portugal, classifies the country's territory into three categories based on urbanisation levels: Predominantly Urban Areas (APU), Moderately Urban Areas (AMU) and Predominantly Rural Areas (APR). This classification, replacing the 2009 version, utilises quantitative and qualitative criteria to distinguish areas, considering factors such as population density, land use and administrative boundaries.

Statistical analysis

The distribution of meals (%) per eating location was estimated for the total sample, and by sex, age group, degree of urbanisation and education. The mean contribution of meals to TEI (% kcal) per eating location was also estimated for the total sample. The distribution of individuals by the four eating location categories previously defined was performed according to the same sociodemographic variables.

Mean daily intakes of energy (in kcal), nutrients (as % of TEI or in weight (grams/ milligrams)) and food groups (in grams) were estimated per eating location category, stratified by age group. The existence of significant interactions between eating location categories and age groups was tested for each nutrient and food group; significant interactions were included in further analyses. The significance of differences in nutrient and food group intakes between categories and within age groups was tested using ANOVA.

To assess the degree of association between mean daily intakes of energy, nutrients, and food groups, and eating location categories, linear regression coefficients (β) and 95 % CI were estimated, controlling for sex, degree of urbanisation and education. The degree of association between the consumption of alcoholic beverages (overall and per type) in adults and in elderly and eating location categories was evaluated by estimating OR and 95 % CI with logistic regression models. Two models were fitted: a crude model (model 1) and a model adjusted for sex, degree of urbanisation and education (model 2).

The R software version 3.4.1 for Windows was used for the statistical analysis, and all estimates were weighted to the distribution of the Portuguese population. A significance level of 5 % was considered.

Results

Proportion of meals per eating location

Table 1 shows that the majority of meals (69·1 %) was consumed at individuals' homes, and at-home meals were the main contributor to TEI (70·3 %). The second highest proportion of meals was eaten at schools or workplaces (11·7 %), followed closely by restaurants (10·9 %).

Eating location categories

Table 2 shows that, overall, individuals were mostly classified into the *Home* (36·8 %) or the *School or Work* (31·1 %) eating location categories, followed by *Restaurants and Other Places* (24·4 %) and finally by *Other Homes* (7·7 %). Females were mostly classified in the *Home* category (42·1 %), followed by *School or Work* (32·3 %) and *Restaurants and Other Places* (17·9 %), whereas males were evenly distributed across these three categories (31·2 %, 29·8 % and 31·3 %, respectively). Children, adolescents and adults were predominantly classified into the *School or Work* category (54·4 %, 44·7 % and 35·0 %, respectively), but elderly mainly in the *Home* categories (72·2 %). About a third of individuals residing in predominantly rural areas were classified into the *Home* and *Restaurants and Other Places* categories and approximately a quarter in *School or Work*; roughly, the opposite was observed for the remainder. The majority of individuals with low education level were classified into the *Home* category (56·5 %) and represented the smallest proportion of those in the *Restaurants and Other Places* (21·1 %). Individuals with high education level, on the contrary, were predominantly found in the *School or Work* category (40·8 %) and then roughly evenly distributed between *Restaurants and Other Places* (26·7 %) and *Home* (23·8 %) categories.

Dietary intake and diet adequacy

Mean daily intakes of food groups and corresponding HES per eating location group, by age group, weighted for the distribution of the Portuguese population, are depicted in online Supplementary Table S1. Values show that all interactions between eating locations categories and age group were significant, except for 'fruit, vegetables and pulses'.

Children and adolescents. Table 3A shows the associations between children and adolescents' eating location categories and main food groups, using the *Home* category as reference category. For children and adolescents, there was a significant positive association between the *School or Work* category and the consumption of 'fruit, vegetables and pulses', and of 'cereals and starchy tubers'. In the case of adolescents, there was furthermore a negative association for the consumption of 'sugar-sweetened beverages' ($\beta = -59{\cdot}7$ g/d; 95 % CI = −105·4, −14·1).

Children and adolescents classified in the patterns *Other homes* or *Restaurants and Other Places* consume significantly fewer 'dairy' and more 'salty snacks' (children: $\beta = 18{\cdot}6$ g/d; 95 % CI = 3·0, 34·3; adolescents: $\beta = 28{\cdot}8$ g/d; 95 % CI = 12·2, 45·4) and 'sugar-sweetened beverages' (children: $\beta = 113{\cdot}6$ g/d; 95 % CI = 51·8, 175·4; adolescents: $\beta = 130{\cdot}5$ g/d; 95 % CI = 69·3, 191·7). Adolescents in *Restaurants and Other Places* also consume significantly more 'red and processed meats' ($\beta = 21{\cdot}1$ g/d; 95 % CI = 2·8, 39·4) and of 'Sweets' ($\beta = 24{\cdot}1$ g/d; 95 % CI = 4·3, 43·9).

The association between being in the *School or Work* category and HES was positive, only significantly in children ($\beta = 0{\cdot}9$; 95 % CI = 0·3, 1·5), and negative for those being in the *Other Homes* category, only significant in adolescents ($\beta = -1{\cdot}3$; 95 % CI = −2·2, −0·4). Noticeably, negative associations between being classified in the *Restaurants and Other Places* category and HES was observed for both age groups (children: $\beta = -1{\cdot}0$; 95 % CI = −2·0, −0·04; adolescents: $\beta = -2{\cdot}4$; 95 % CI = −3·2, −1·5).

Adults and elderly. Table 3B shows the associations between adults and elderly' eating location categories and main food groups, using the *Home* category as outcome reference. In the case of adults, the consumption of 'red and processed meats', 'sugar-sweetened beverages' and 'sweets' was significantly higher in any of the eating out location patterns, when compared with *Home*. Also, they consume more 'salty snacks' in *Other homes,* more 'white meat, fish and eggs' at *School or work*, and in *Restaurants and Other Places* category they eat significantly more 'salty snacks' and 'sugar and honey', and by the contrary less 'fruit, vegetables and pulses' and 'Dairy'.

In elderly, Table 3B shows that being classified in the *School or Work* and *Restaurants and Other Places* category was significantly positively associated with the consumption of 'red and processed meats', 'salty snacks', 'sugar-sweetened beverages' and 'sugar and honey'.

For all eating out location patterns, when compared with *Home* category, a negative association was observed with HES in adults (*School or Work* ($\beta = -0{\cdot}3$; 95 % CI = −0·6, −0·01), *Other Homes* ($\beta = -0{\cdot}9$; 95 % CI = −1·3, −0·4) and *Restaurants and Other Places* ($\beta = -1{\cdot}3$; 95 % CI = −1·6, −1·0)) and in the elderly (*School or Work* and *Restaurants and Other Places v. Home* and *Other homes* ($\beta = -0{\cdot}8$; 95 % CI = −1·3, −0·3)).

Table 4 displays the associations between the frequency of consumption of alcoholic beverages and eating location groups for adults and elderly, using the *Home* category as outcome reference. In adults, there was a significant positive association between being classified in the *Restaurants and Other Places* category and the frequency of consumption of alcoholic beverages, altogether and per type of beverage (model 2 – all alcoholic beverages: OR = 1·74, 95 % CI = 1·17, 2·58; wine: OR = 1·42, 95 % CI = 1·05, 1·91; beer: OR = 3·02, 95 % CI = 2·00, 4·57). In particular, the frequency of consuming beer was positively linked to being classified in the *School or Work* category, in the case of adults (OR = 1·52, 95 % CI = 1·04, 2·29), and in the *School or Work* and *Restaurants and Other Places* one in the case of elderly (OR = 2·23, 95 % CI = 1·17, 4·23); after the adjustment for sex, degree of urbanisation and education level, however, the latter did not remain statistically significant.

Nutrient profile

Mean daily intakes of energy and nutrients per eating location group, by age group, weighted for the distribution of the Portuguese population, are depicted in online Supplementary

Table 1. Distribution of meals of the Portuguese population (3–84 years old) according to eating location by sociodemographic characteristics and its mean contribution to total energy intake, the IAN-AF 2015/2016

		Meals distribution, % (95 % CI)									
	n	Home		Homes of relatives or friends		School or work		Restaurants		Other out of home places	
		%	95 % CI	%	95 % CI	%	95 % CI	%	95 % CI	%	95 % CI
Total	**5005**	**69·1**	**67·8, 70·4**	**4·8**	**4·3, 5·3**	**12·6**	**11·7, 13·5**	**11·9**	**11·2, 12·6**	**1·7**	**1·4, 2·0**
Sex											
Female	2613	71·8	70·2, 73·4	4·7	4·0, 5·4	12·9	11·7, 14·1	9·0	8·2, 9·8	1·6	1·3, 1·9
Male	2392	66·3	64·7, 67·9	4·8	4·0, 5·6	12·3	11·2, 13·4	14·8	13·7, 15·9	1·8	1·4, 2·2
Age group											
Children (3–9 years)	521	55·3	51·8, 58·8	10·8	8·2, 13·4	26·3	22·8, 29·8	4·6	2·8, 6·4	3·0	2·2, 3·8
Adolescents (10–17 years)	632	63·9	61·4, 66·4	7·5	5·6, 9·4	18·7	16·0, 21·4	6·7	5·3, 8·1	3·3	2·4, 4·2
Adults (18–64 years)	3102	66·1	64·7, 67·5	4·5	3·9, 5·1	13·6	12·5, 14·7	13·9	13·1, 14·7	1·8	1·5, 2·1
Elderly (65–84 years)	750	87·4	85·3, 89·5	2·5	1·5, 3·5	1·2	0·5, 1·9	8·3	6·9, 9·7	0·6	0·4, 0·8
Degree of urbanisation											
Predominantly urban	3650	68·8	67·2, 70·4	4·7	4·1, 5·3	12·7	11·7, 13·7	12·1	11·3, 12·9	1·7	1·4, 2·0
Mostly urban	863	70·0	67·6, 72·4	5·0	4·2, 5·8	13·4	11·2, 15·6	10·3	8·8, 11·8	1·4	1·0, 1·8
Predominantly rural	492	69·8	67·0, 72·6	5·2	3·8, 6·6	9·9	8·0, 11·8	12·2	9·7, 14·7	2·9	1·7, 4·1
Education*											
No education/primary	1497	79·5	77·4, 81·6	3·2	2·4, 4·0	6·9	5·8, 8·0	9·2	8·1, 10·3	1·3	0·8, 1·8
Secondary	2201	66·3	64·7, 67·9	4·9	4·2, 5·6	14·5	13·3, 15·7	12·5	11·4, 13·6	1·7	1·4, 2·0
Tertiary	1291	62·2	60·0, 64·4	6·3	5·3, 7·3	15·4	13·7, 17·1	13·9	12·4, 15·4	2·3	1·9, 2·7
% Total energy intake (in kcal)	**5005**	**70·3**	**69·1, 71·4**	**5·4**	**4·8, 5·9**	**11·7**	**10·8, 12·6**	**10·9**	**10·2, 11·6**	**1·8**	**1·5, 2·0**

All significant values are bold.* Education completed by parents for participants < 18 years of age.

Table 2. Distribution of individuals according to eating location patterns by sociodemographic characteristics, weighted for the distribution of the Portuguese population, the IAN-AF 2015/2016

		Eating location patterns†, % (95 % CI)							
	n	Home		Other homes		School or work		Restaurants and other places	
		%	95 % CI	%	95 % CI	%	95 % CI	%	95 % CI
Total	**5005**	**36·8**	**34·5, 39·1**	**7·7**	**6·6, 8·8**	**31·1**	**28·6, 33·6**	**24·4**	**22·1, 26·7**
Sex									
Female	2613	42·1	38·9, 45·3	7·7	6·2, 9·2	32·3	29·2, 35·4	17·9	15·4, 20·4
Male	2392	31·2	27·9, 34·5	7·7	6·0, 9·4	29·8	26·7, 32·9	31·3	28·3, 34·2
Age group									
Children (3–9 years)	521	18·0	12·7, 23·4	18·5	13·3, 23·7	54·4	46·7, 62·1	9·0	3·6, 14·4
Adolescents (10–17 years)	632	26·2	21·2, 31·1	12·8	9·0, 16·7	44·7	37·0, 52·3	16·3	11·8, 20·9
Adults (18–64 years)	3102	30·4	27·7, 33·1	6·9	5·6, 8·2	35·0	32·0, 37·9	27·8	25·3, 30·2
Elderly (65–84 years)	750	72·2	66·8, 77·6	4·8	2·6, 7·1	2·5	0·8, 4·2	20·4	15·5, 25·4
Degree of urbanisation									
Predominantly urban	3650	36·9	34·2, 39·7	7·5	6·2, 8·8	31·5	28·5, 34·5	24·1	21·7, 26·6
Mostly urban	863	37·7	33·6, 41·8	8·5	5·9, 11·2	33·1	28·8, 37·4	20·7	16·8, 24·6
Predominant rural	492	33·7	24·2, 43·3	8·5	4·9, 12·1	24·6	18·8, 30·4	33·2	24·9, 41·4
Education*									
No education/primary	1497	56·5	52·3, 60·6	6·3	4·2, 8·3	16·2	13·4, 18·9	21·1	17·5, 24·7
Secondary	2201	30·8	27·4, 34·2	8·1	6·3, 9·9	35·6	31·9, 39·3	25·4	22·7, 28·1
Tertiary	1291	23·8	19·9, 27·7	8·7	6·4, 11·0	40·8	36·6, 45·0	26·7	22·4, 30·9

All significant values are bold.* Education completed by parents for participants < 18 years of age.
† *Home*: at least 80 % of meals consumed at home; *Other Homes*: less than 80 % of meals consumed at home and the remaining ones mainly at the home of relatives or friends; *School or Work*: less than 80 % of meals consumed at home and the remaining ones mainly at school or work, including canteens; *Restaurants and Other Places*: less than 80 % of meals consumed at home and the remaining ones mainly at restaurants, bars, coffee shops, pastry or snack bars, while travelling, outdoors or other public spaces.

Table S2. Results showed that all interactions between eating location categories and age group were significant.

Children and adolescents. Table 5A shows the associations between children and adolescents' eating location patterns and energy and nutrients intake, using the *Home* category as reference category. Children, being classified in the *School or Work* category, present lower intake of free sugars ($\beta = -2{\cdot}6$ % TEI; 95 % CI = −3·9, −1·3), but higher of fibre ($\beta = 1{\cdot}8$ g/d; 95 % CI = 0·7, 2·9) and Na ($\beta = 190$ mg/d; 95 % CI = 19, 362). Meanwhile, in the case of adolescents, positive associations were uncovered with the intakes of energy ($\beta = 142$ kcal/d; 95 %

Table 3A. Adjusted association of mean daily intakes of food groups and healthy eating score with eating location patterns in children and adolescents, weighted for the distribution of the Portuguese population, the IAN-AF 2015/2016

	Children (3–9 years), β (95 % CI)							Adolescents (10–17 years), β (95 % CI)						
	Home	Other homes		School or work		Restaurants and other places		Home	Other homes		School or work		Restaurants and other places	
		β	95 % CI	β	95 % CI	β	95 % CI		β	95 % CI	β	95 % CI	β	95 % CI
Fruit, vegetables and pulses (g)	ref	–25·6	–65·9, 14·6	**37·6**	**5·4, 69·8**	0·8	–52·1, 53·6	ref	12·1	–30·1, 54·3	**39·7**	**9·3, 70·0**	–32·8	–73·5, 7·8
Cereals and starchy tubers (g)	ref	8·0	–17·3, 33·3	**42·2**	**21·9, 62·5**	18·7	–14·6, 51·9	ref	16·0	–18·5, 50·6	**39·9**	**15·0, 64·7**	–18·8	–52·0, 14·5
Dairy products (g)	ref	**–82·0**	**–142·6, –21·3**	–44·1	–92·7, 4·5	**–123·8**	**–203·5, –44·1**	ref	–18·9	–70·5, 32·8	13·5	–23·6, 50·6	**–49·8**	**–99·5, –0·03**
White meat, fish and eggs (g)	ref	2·1	–12·0, 16·0	5·1	–6·1, 16·3	–7·0	–25·3, 11·3	ref	**–21·9**	**–41·7, –2·1**	–9·3	–23·5, 5·0	–18·2	–37·3 0·9
Red and processed meat (g)	ref	3·0	–9·3, 15·3	6·3	–3·6, 16·2	5·7	–10·4, 21·9	ref	14·2	–4·9, 33·2	5·8	–7·9, 19·5	**21·1**	**2·8, 39·4**
Salty snacks (g)	ref	0·3	–11·6, 12·2	–8·8	–18·3, 0·8	**18·6**	**3·0, 34·3**	ref	3·2	–14·1, 20·4	–2·4	–14·8, 10·0	**28·8**	**12·2, 45·4**
SSB (g)	ref	41·0	–6·1, 88·1	–37·2	–74·9, 0·5	**113·6**	**51·8, 175·4**	ref	55·3	–8·3, 118·8	**–59·7**	**–105·4, –14·1**	**130·5**	**69·3, 191·7**
Sugar and honey (g)	ref	–0·2	–1·1, 0·7	–0·6	–1·4, 0·05	–1·0	–2·1, 0·2	ref	**1·5**	**0·2, 2·9**	–0·2	–1·2, 0·8	0·004	–1·3, 1·3
Sweets (g)	ref	7·7	–11·1, 26·4	–1·7	–16·7, 13·3	24·0	–0·6, 48·7	ref	2·6	–17·9, 23·2	9·3	–5·4, 24·1	**24·1**	**4·3, 43·9**
HES	ref	–0·5	–1·2, 0·3	**0·9**	**0·3, 1·5**	**–1·0**	**–2·0, –0·04**	ref	**–1·3**	**–2·2, –0·4**	0·2	–0·4, 0·9	**–2·4**	**–3·2, –1·5**

All significant values are bold.
β, standardised coefficient; SSB, sugar-sweetened beverages; HES, Healthy Eating Score.
Models adjusted for sex, degree of urbanisation and education level.

Table 3B. Adjusted association of mean daily intakes of food groups and healthy eating score with eating location patterns in adults and elderly, weighted for the distribution of the Portuguese population, the IAN-AF 2015/2016

	Adults (18–64 years), β (95 % CI)							Elderly (65–84 years), β (95 % CI)			
	Home	Other homes		School or work		Restaurants and other places		Home and other homes	School or work and restaurants and other places		
		β	95 % CI	β	95 % CI	β	95 % CI		β	95 % CI	
Fruit, vegetables and pulses (g)	ref	–12·3	–43·3, 18·7	13·4	–4·8, 31·6	**–33·1**	**–52·7, –13·4**	ref	–29·4	–65·9, 7·0	
Cereals and starchy tubers(g)	ref	18·5	–2·4, 39·4	–1·2	–13·4, 11·1	–2·1	–15·3, 11·1	ref	–17·8	–43·0, 7·3	
Dairy products (g)	ref	–15·9	–43·9, 12·1	–2·6	–19·0, 13·8	**–42·0**	**–59·7, –24·3**	ref	–14·2	–44·2, 15·7	
White meat, fish and eggs (g)	ref	–3·4	–16·8, 10·0	**14·9**	**7·1, 22·8**	4·1	–4·4, 12·6	ref	1·6	–10·6, 13·9	
Red and processed meat (g)	ref	**21·2**	**9·5, 32·9**	**9·5**	**2·6, 16·3**	**17·2**	**9·8, 24·6**	ref	**17·3**	**6·3, 28·2**	
Salty snacks (g)	ref	**11·5**	**2·8, 20·1**	3·1	–2·0, 8·2	**13·6**	**8·2, 19·1**	ref	**5·3**	**0·5, 10·1**	
SSB (g)	ref	**49·6**	**20·1, 79·1**	**21·1**	**3·8, 38·4**	**76·6**	**57·9, 95·3**	ref	**22·8**	**5·9, 39·8**	
Sugar and honey (g)	ref	0·2	–1·1, 1·7	0·6	–0·3, 1·4	**1·6**	**0·7, 2·5**	ref	**2·6**	**1·1, 4·2**	
Sweets (g)	ref	**19·0**	**8·1, 30·0**	**10·9**	**4·5, 17·4**	**12·6**	**5·6, 19·5**	ref	–0·6	–11·4, 10·2	
HES	ref	**–0·9**	**–1·3, –0·4**	**–0·3**	**–0·6, –0·01**	**–1·3**	**–1·6, –1·0**	ref	**–0·8**	**–1·3, –0·3**	

All significant values are bold.
β, standardised coefficient; SSB, sugar-sweetened beverages; HES, Healthy Eating Score.
Models adjusted for sex, degree of urbanisation and education level.

Table 4. Association of consuming alcoholic beverages with eating location patterns in adults and elderly, weighted for the distribution of Portuguese population, the IAN-AF 2015/2016

		Model 1*		Model 2†	
	Consumption frequency (%)	OR	95 % CI	OR	95 % CI
Adults (18–64 years)					
All alcoholic beverages					
Home	68·3	ref		ref	
Other homes	78·6	1·57	0·93, 2·65	1·45	0·85, 2·48
School or work	72·4	1·08	0·81, 1·44	1·05	0·77, 1·41
Restaurants and other places	**82·5**	**2·1**	**1·47, 2·98**	**1·74**	**1·17, 2·58**
Wine					
Home	54·1	ref		ref	
Other homes	73·2	1·59	0·99, 2·56	1·52	0·93, 2·48
School or work	67·7	1·07	0·82, 1·41	1·08	0·81, 1·44
Restaurants and other places	**74·4**	**1·58**	**1·21, 2·07**	**1·42**	**1·05, 1·91**
Beer					
Home	10·6	ref		ref	
Other homes	18·7	1·65	0·91, 2·99	1·45	0·77, 2·71
School or work	**12·9**	**1·59**	**1·04, 2·43**	**1·52**	**1·01, 2·29**
Restaurants and other places	**29·4**	**3·99**	**2·67, 5·97**	**3·02**	**2·00, 4·57**
Other alcoholic beverages					
Home	10·0	ref		ref	
Other homes	12·9	0·82	0·39, 1·75	0·78	0·37, 1·65
School or work	13·1	1·23	0·67, 2·26	1·19	0·65, 2·16
Restaurants and other places	**19·7**	**2·07**	**1·32, 3·22**	**1·80**	**1·13, 2·86**
Elderly (65–84 years)					
All alcoholic beverages					
Home and other homes	70·8	ref		ref	
School or work and restaurants and other places	80·3	1·31	0·61, 2·80	0·83	0·38, 1·81
Wine					
Home and other homes	68·7	ref		ref	
School or work and restaurants and other places	77·0	1·23	0·60, 2·52	0·81	0·39, 1·68
Beer					
Home and other homes	9·4	ref		ref	
School or work and restaurants and other places	**20·2**	**2·23**	**1·17, 4·23**	1·55	0·78, 3·08
Other alcoholic beverages					
Home and other homes	8·7	ref		ref	
School or work and restaurants and other places	15·2	1·47	0·68, 3·15	1·10	0·48, 2·52

All significant values are bold.* Model 1: crude model.
† Model 2: model adjusted for sex, degree of urbanisation and education level.

CI = 35, 250), fibre (β = 2·5 g/d; 95 % CI = 1·4, 3·5) and Na (β = 361 mg/d; 95 % CI = 165, 556) and negative with the intake of protein (β= −1·0 %TEI; 95 % CI = −1·7, −0·3).

In the case of both children and adolescents, being classified in the *Restaurants and Other Places* category present higher intake of energy (β = 163 kcal/d; 95 % CI = 7, 318 and β = 249 kcal/d; 95 % CI = 105, 393, respectively), fat (β = 2·0 %TEI; 95 % CI = 0·1, 3·9 and β = 2·4 %TEI; 95 % CI = 1·0, 3·9, respectively), SFA (β = 1·2 %TEI; 95 % CI = 0·3, 2·0 and β = 1·3 %TEI; 95 % CI = 0·6, 2·0, respectively) and Na (β = 350 mg/d; 95 % CI = 69, 631 and β = 410 mg/d; 95 % CI = 148, 672, respectively) and lower intake of protein (β= −1·8 %TEI; 95 % CI = −2·9, −0·7 and β= −1·3 %TEI; 95 % CI = −2·3, −0·3, respectively). For adolescents in this group, there was also a positive association with the intake of free sugars (β = 2·4 %TEI; 95 % CI = 0·8, 4·0).

In the case of adolescents, being classified in the *Other Homes* category was positively linked to intakes of fat, SFA and Na and negatively associated with the intake of protein.

Adults and elderly. Table 5B shows the associations between adults and elderly' eating location categories and energy and nutrients intake, using the *Home* as reference category. In adults, the intake of energy, free sugars and Na was higher in all eating out location patterns, when compared with *Home* pattern. Additionally, those being classified in the *School or Work* category presents higher fibre intake and SFA and those being classified in the *Restaurants and Other Places* category presents higher intakes of fat (β = 0·9 %TEI; 95 % CI = 0·3, 1·5) and SFA (β = 0·7 %TEI; 95 % CI = 0·4, 2·0), but lower intakes of protein (β = −0·5 %TEI; 95 % CI = −0·9, −0·1) and total carbohydrates (β = −1·8 %TEI; 95 % CI = −2·6, −1·0).

In the case of the elderly, being classified in the *School or Work and Restaurants and Other Places* category was positively linked to the intake of free sugars (β = 1·6 %TEI; 95 % CI = 0·7, 2·4) and fat (β = 0·3 %TEI; 95 % CI = 1·0, 1·5).

Discussion

Based on our knowledge, this is the first study investigating associations between eating locations patterns, food intake and diet adequacy, involving a whole range of age groups[37]. Importantly, it is also one of a small number of reports on out-of-home food consumption that looks specifically at the relevance

Table 5A. Adjusted association of mean daily intakes of energy and nutrients with eating location patterns in children and adolescents, weighted for the distribution of the Portuguese population, the IAN-AF 2015/2016

	Children (3–9 years), β (95 % CI)							Adolescents (10–17 years), β (95 % CI)						
	Home	Other homes		School or work		Restaurants and other places		Home	other homes		School or work		Restaurants and other places	
		β	95 % CI	β	95 % CI	β	95 % CI		β	95 % CI	β	95 % CI	β	95 % CI
Energy (kcal)	ref	7	–111, 126	44	–51, 139	**163**	**7, 318**	ref	140	–9, 289	**142**	**35, 250**	**249**	**105, 393**
Protein (%TEI)	ref	–0·4	–1·3, 0·4	0·3	–0·4, 0·9	**–1·8**	**–2·9, –0·7**	ref	**–1·5**	**–2·5, –0·5**	**–1·0**	**–1·7, –0·3**	**–1·3**	**–2·3, –0·3**
Total carbohydrates (%TEI)	ref	0·4	–1·2, 1·9	0·5	–0·8, 1·7	–0·1	–2·2, 1·9	ref	–0·2	–1·9, 1·5	1·0	–0·2, 2·2	–1·1	–2·8, 0·6
Free sugars (%TEI)	ref	0·5	–1·1, 2·1	**–2·6**	**–3·9, –1·3**	0·8	–1·3, 2·9	ref	0·8	–0·9, 2·4	–0·8	–2·0, 0·4	**2·4**	**0·8, 4·0**
Fibre (g)	ref	–0·8	–2·2, 0·6	**1·8**	**0·7, 2·9**	1·5	–0·4, 3·3	ref	1·0	–0·5, 2·5	**2·5**	**1·4, 3·5**	0·7	–0·8, 2·1
Fat (%TEI)	ref	0·2	–1·3, 1·6	–0·9	–2·1, 0·3	**2·0**	**0·1, 3·9**	ref	**1·7**	**0·1, 3·2**	–0·1	–1·2, 1·0	**2·4**	**1·0, 3·9**
SFA (%TEI)	ref	0·5	–0·2, 1·2	–0·3	–0·9, 0·2	**1·2**	**0·3, 2·0**	ref	**0·9**	**0·1, 1·6**	0·3	–0·3, 0·8	**1·3**	**0·6, 2·0**
Trans-fatty acids (%TEI)	ref	0·1	–0·1, 0·2	–0·1	–0·1, 0·03	**0·2**	**0·003, 0·3**	ref	–0·01	–0·1, 0·08	–0·05	–0·1, 0·01	0·08	–0·01, 0·16
Na (mg)	ref	–7	–221, 207	**190**	**19, 362**	**350**	**69, 631**	ref	**347**	**75, 619**	**361**	**165, 556**	**410**	**148, 672**

All significant values are bold.
β, standardised coefficient; TEI, total energy intake.
Models adjusted for sex, degree of urbanisation and education level.

Table 5B. Adjusted association of mean daily intakes of energy and nutrients with eating location patterns in adults and elderly, weighted for the distribution of the Portuguese population, the IAN-AF 2015/2016

	Adults (18–64 years), β (95 % CI)							Elderly (65–84 years), β (95 % CI)		
	Home	Other homes		School or work		Restaurants and other places		Home and other homes	School or work and restaurants and other places	
		β	95 % CI	β	95 % CI	β	95 % CI		β	95 % CI
Energy (kcal)	ref	**240**	**144, 335**	**161**	**105, 217**	**220**	**159, 280**	ref	23	–70, 116
Protein (%TEI)	ref	**–0·7**	**–1·3, –0·02**	0·2	–0·2, 0·6	**–0·5**	**–0·9, –0·1**	ref	0·6	–0·001, 1·3
Total carbohydrates (%TEI)	ref	–0·7	–1·9, 0·6	–0·7	–1·4, 0·03	**–1·8**	**–2·6, –1·0**	ref	–0·3	–0·9, 1·4
Free sugars (%TEI)	ref	**1·5**	**0·6, 2·4**	**0·8**	**0·3, 1·3**	**1·6**	**1·0, 2·1**	ref	**1·6**	**0·7, 2·4**
Fibre (g)	ref	0·5	–0·6, 1·6	**1·0**	**0·3, 1·6**	–0·3	–1·0, 0·4	ref	–0·8	–2·0, 0·4
Fat (%TEI),	ref	0·6	–0·4, 1·6	0·4	–0·2, 1·0	**0·9**	**0·3, 1·5**	ref	**0·3**	**1·0, 1·5**
SFA (%TEI)	ref	0·4	–0·1, 0·8	**0·3**	**0·1, 0·6**	**0·7**	**0·4, 2·0**	ref	0·3	–0·2, 0·9
Trans-fatty acids (%TEI)	ref	0·003	–0·04, 0·05	0·008	–0·02, 0·03	**0·03**	**0·003, 0·06**	ref	0·03	–0·01, 0·07
Na (mg)	ref	**385**	**194, 576**	**343**	**231, 454**	**401**	**280, 521**	ref	112	–79, 302

All significant values are bold.
β, standardised coefficient; TEI, total energy intake.
Models adjusted for sex, degree of urbanisation and education level.

of the meals taken in non-commercial (i.e. mass catering) establishments, namely school and work food service facilities, to individuals' diet and nutritional status[22,23,38,39].

Home was the most prevalent pattern followed by *School or work* and *Restaurants and Other Places*, with close to a third (30 %) of the TEI deriving from out-of-home meals. Our results regarding this contribution are similar to those found in other European countries that used the same eating out definition as ours[18]. In adults, the contribution of out-of-home meals to TEI varied from 27·1 % in Germany, 27·7 % in the Netherlands and 29 % in Sweden, for men; in women, it varied from 22·1 % in Germany, 20·8 % in the Netherlands and 31 % in Sweden. Still in the European context, a study with adults by Naska *et al.*[40] showed that men ate more at restaurants or at workplace than women. This noticed tendency for women being less frequent out-of-home eaters is observed in our study, and it might relate to their role in meal preparation and consumption within households.

A study with British children and adolescents further support our results given that asides home, school was the main eating location in individuals aged 1·5–18 years[23]. A systematic review by Lachat *et al.*[15] uncovered the existence of an age gradient in the contribution of out-of-home food consumption to energy intake, with a peak during childhood and young adulthood. The lower relevance of away-from-home meals among the elderly may be related to retiring from professional activities combined with less disposable income[41], declining health and mobility, and weaker out-of-home consumption habits[4,42].

Education and income have been shown to be important to the contribution of foods eaten away from home to energy intake. In the UK, Ziauddeen *et al.*[23,43] found that both children/adolescents and adults/elderly from lower-income quintiles were more likely to eat their meals at home. In our study, less-educated individuals consumed more meals at home justified by the tendency to be less well-off and for that reason spend less in out-of-home meals than highly educated individuals. Out of

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home, they did it more frequently in restaurants than at school or work. The educational attainment of these individuals can influence the place to eat out of home, whether due to unemployment or nutritional literacy. Also, they are more prone to have poor nutritional knowledge and are less likely to believe in the relationship between diet and health; subsequently, they might have fewer healthy dietary intakes[44], purchasing fast food and consuming more frequently take-away food[45,46], also attractive given its low price. A higher percentage of high-educated individuals belonged to the *School or Work* category. Working patterns can relate to meal sourcing since among employed parents and individuals with longer working hours or volatile schedules, alternatives to home-cooked meals are preferred due to time pressures[5,6].

Our research also found that the percentage of at-home meals is similar between regions, although lower in the predominantly urban areas. Results from the latest national survey to the household expenses (IDEF 2015/2016)[47,48] showed an inverse relation between the degree of urbanisation and at-home food consumption, and that expenses with out-of-home food consumption were higher in predominantly urban and mostly urban areas comparing with rural areas. There are some important age and education differences since urban areas are commonly populated by younger and higher educated individuals, unlike predominantly rural areas which are mainly occupied by the elderly. About 30 % of the Portuguese population live in rural areas are over 65 years old and about 9 % over 80 years old or more[48]. Simultaneously, there is a lower frequency of working individuals among the elderly. The lower proportion of individuals in the *School or Work* category in rural areas and higher in *Restaurants and Other Places* could be partially explained by the lack of companies or schools able to have functional food services and the availability of supermarkets or retail stores with foods ready to cook. So, professionally active individuals may have to resort to cafes, bakeries, minimarkets or small restaurants that serve meals at very low prices that come as an advantage when comparing to the cost of cooking at home.

Children and adolescents

Compared with the *Home* category, the *School or Work* category was characterised by a higher consumption of fruit, vegetables and pulses and cereals and starchy tubers, which explains the higher fibre intake in this pattern. Similar results were reported among preschool children in Portugal[22] and children and adolescents in the UK[23]. Being in the *School or Work* category was also linked to higher Na intake in these population groups which can be explained through the consumption of soup and bread[22,49,50], important salt contributors in the Portuguese population. Furthermore, adolescents, when compared with children, had higher daily intakes of sugar-sweetened beverages, sugar and honey and sweets at *School*, probably explaining why a negative association with intake of free sugars was observed in children only. As observed in other studies and in our sample, food environments in schools and their impacts on dietary choices may be different for younger and older children[23,51]. It might be more feasible for children to have a healthier diet at school than at home, a result further confirmed by the positive association found between being classified in the *School or Work* category and the HES (but not in adolescents). This is probably due to public policies, such as School Scheme, which distributes fruits and vegetables in preschools and first-cycle students[52]. Adolescents are more autonomous in their food choices and are more vulnerable to the food environment they are in, which influences their dietary choices through differences in availability and access to foods[53–55]. Also, healthy foods are more expensive, a factor that often weighs more than the nutritional value of foods at the moment of purchase[56]. The sale of unhealthy foods outside school (e.g. ultra-processed foods) has been documented in previous studies[57,58] that suggested that an unhealthy school neighbourhood may contribute to poorer dietary choices.

The *Restaurant and Other Places* pattern was associated with a poorer diet quality, supported with positive associations for intakes of salty snacks and sugar-sweetened beverages in both groups and of red and processed meats and sweets in adolescents. As a result, there were as well, positive associations with intakes of total energy, fat, SFA, *trans*-fatty acids, Na and free sugars. In Portuguese preschool children[22] and by using a similar analytical approach, it was reported the lowest dietary adequacy score for children classified in the *Other Out of Home* pattern. A study with Irish children aged 5–12 years, that considered eating location as the place where food was prepared or obtained, showed that there was a higher percentage of energy from fat out of home, comparing with home[59]. Authors observed that mothers are more lenient regarding their child's food choices when eating out in restaurants[60], suggesting the need for healthier menu options and educational strategies.

Both children and adolescents in the *Other Homes* category presented lower HES, but it was only significant in adolescents. Adolescents had higher fat, SFA and Na intake. Peer influence has been shown to contribute to higher consumption of fast food in adolescents of poor neighbourhoods[55] and of snacks high in solid fats and added sugars at friend's homes[61]. Data on social facilitation, that is, eating more in the presence of others, would be an important factor to consider in adolescents, given the effects of peer pressure on their food choices[62].

Adults and elderly

Comparing to *Home,* both adults and elderly had a negative association with the HES regarding out-of-home eating patterns. A vast number of studies, mainly performed with adults, have previously confirmed a worse diet quality when eating at restaurants[37,63]. European multicentre studies conducted on differences of dietary intake with food consumption locations among adults over 35 years of age also found beverages, sugar, desserts, sweet and savoury bakery products to be consumed more out of home than at home[3,34]. Unhealthy dietary choices made out of home, particularly in commercial food service establishments, can be driven by several factors: celebrating special occasions, in which taste preferences or the pleasure of eating can often surpass health eating considerations, eating socially, which may translate into increases portion sizes, and

variety-seeking, which may result both in unusual and more energy-dense food choices, as well as larger portion sizes[64]. Results of the present study further support previous findings about a higher consumption of alcohol taking place out of home[3,65]. Despite wine being the most common alcoholic beverage in Portuguese adults[49] and more frequently consumed in *Restaurants and Other Places* category than at *Home*, beer consumption was two to three times greater than in the *Home*. Bento *et al.*[66] reported a reversal of the relative availability of popular alcoholic beverages in Portugal since 1988, with beer gradually taking the place of wine.

In adults, the higher consumption of sugar-sweetened beverages and sweets probably explains the equally higher intake of free sugars in the *School or Work* category. In the UK, non-milk extrinsic sugars, also known as free sugars, were consumed more at work than at home, a trend that remained from young adults (19–23 years old) to older adults (50–64 years old)[43]. Tea and coffee have been previously documented as foods most eaten out of home among European adults, contributing both in quantity and energy, on account of the added sugar[3]. The higher consumption of white meat, fish and eggs, red and processed meats and sweets possibly contributed to the association between higher intake of SFA and this category. Other studies consistently show that eating at work contributes to higher energy intakes through higher fat and carbohydrates intake[18,67]. Consumption at work *v.* at home can vary with sex, as found in a Norwegian study[68] in working adults, where the consumption of added sugars, meat and meat products, and sugar-sweetened beverages was higher in men than in women eating at work. However, we could not distinguish between the sources of consumption at work, so we cannot infer that this consumption came from workplace canteens. Still, eating at staff canteens should be promoted since this practice has been associated with higher compliance with nutrition guidelines, such as eating vegetables more than once daily[69].

Information regarding consumption in other homes among adults remains scarce, and some authors choose to aggregate data in a single category such as 'home'[67,70].

Strengths and limitations

One main strength of the present study is the use of data from a representative sample of the Portuguese population and of a European harmonised and standardised methodology of dietary assessment[26]. Despite non-participants being older and less educated, common in dietary surveys, these differences were not significant and even though the participation rate was low, results were similar to other national dietary surveys. Other additional strengths of this study are the inclusion of food and beverages and not only nutrients, the use of HES to characterise dietary adequacy and the assessment of a wide range of age groups, especially in children and adolescents which is relevant since many of the existent studies were performed with adults. Still, utilising data from the IAN-AF 2015/2016, which is approximately 7–8 years old, might not accurately depict the present circumstances in Portugal, particularly in light of the COVID-19 pandemic's onset.

Comparisons with other studies might be challenged by the diversity of methodological approaches : evaluation of the whole food service sector or a particular element (take-away restaurants and fast-food restaurants); analysis of a full day or specific meals; different data collection methods or age groups; and different definitions of eating out. Describing food consumption according to eating location categories and not just outside/inside home provides a better comprehension of out-of-home food consumption. Most research regarding eating out practices considered foods prepared out of home irrespective of where the items were consumed and methods to classify instances of eating out are not homogeneous. In our study, eating location patterns were defined *a priori* and did not consider food that was prepared out of home and consumed at home, or the reverse. It also did not consider specific meals; but about 90 % of breakfast and dinner meals eaten by the Portuguese population were made at home and about 40 % of lunch and snacks meals were made out of home. The assessment of the source and/or preparation of the food instead of the place consumption would be an advantage as well as the analysis by specific meals. Despite the current study used the HECTOR consortium[71] core definition of 'eating out', including all meals, beverages and snacks consumed out of home, that was adopted in different multicentre European studies[18], this can be masking the real prevalence of eating out as the place of preparation has a relevant role in the composition of the food independently of the place of consumption.

Additionally, we did not consider the number of people living in the household which could have a moderator effect specifically in differences between living alone or with someone. However, we did not consider this variable in our adjusted models because the expected correlation between living alone and age is high and could result in collinearity.

Conclusions

In the present study, eating location patterns apart from *Home* were strongly associated with higher energy intakes and specifically *Restaurants and other places*, with worse dietary adequacy. One important finding is that among children, it is possible to have a better diet adequacy within the school environment than at home, which demystifies the premise that eating out has necessarily a negative impact on the diet adequacy.

Given that children and adolescents do most of their out-of-home meals at school, food and nutrition policies regarding these groups should consider the role of the school food environment and its surroundings. Among adults, there is a growing acknowledgement that the workplace setting could have a significant impact on health given the contribution of meals to overall diet. Promoting healthy diets in the workplace can benefit individuals, employers and society since diet-related burdens such as obesity are related to increased sickness absence and absenteeism in employees, injuries at work and compensation claims.

The present analysis give light on the issues regarding out of consumption in Portugal, contributing to the current scientific evidence in different age groups, highlighting the need to

improve the supply of health-promoting products in commercial food service establishments and ultimately providing inputs for policymakers and caterers to continue an efficient planning and execution of effective public health policies.

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The authors declare none.

The IAN-AF 2015/2016 was developed under the guidelines present in the Declaration of Helsinki and the national legislation. All personal information was kept in the necessary confidentiality. Procedures were approved by the National Commission for Data Protection, the Ethical Committee of the Institute of Public Health of the University of Porto, and the Ethical Committee of each Regional Health Administration. Participants or legal caregivers (for children and adolescents aged less than 18 years) signed a written informed consent, and for adolescents aged 10–17 years, both caregivers and participants signed the written informed consent. Identifiable information was treated separately and introduced in an exclusive database. All researchers signed a declaration of confidentiality and good practices.

Supplementary material

For supplementary material/s referred to in this article, please visit https://doi.org/10.1017/S0007114524000990

References

1. Guthrie JF, Lin BH & Frazao E (2002) Role of food prepared away from home in the American diet, 1977–78 *v.* 1994–96: changes and consequences. *J Nutr Educ Behav* **34**, 140–150. https://doi.org/10.1016/s1499-4046(06)60083-3.
2. Kwon YS & Ju SY (2014) Trends in nutrient intakes and consumption while eating-out among Korean adults based on Korea National Health and Nutrition Examination Survey (1998–2012) data. *Nutr Res Pract* **8**, 670–678. https://doi.org/10.4162/nrp.2014.8.6.670.
3. Orfanos P, Naska A, Trichopoulos D, *et al.* (2007) Eating out of home and its correlates in 10 European countries. The European Prospective Investigation into Cancer and Nutrition (EPIC) study. *Public Health Nutr* **10**, 1515–1525. https://doi.org/10.1017/S1368980007000171.
4. Kant AK & Graubard BI (2004) Eating out in America, 1987–2000: trends and nutritional correlates. *Prev Med* **38**, 243–249. https://doi.org/10.1016/j.ypmed.2003.10.004.
5. Celnik D, Gillespie L & Lean MEJ (2012) Time-scarcity, ready-meals, ill-health and the obesity epidemic. *Trends Food Sci Technol* **27**, 4–11. https://doi.org/10.1016/j.tifs.2012.06.001.
6. Devine CM, Farrell TJ, Blake CE, *et al.* (2009) Work conditions and the food choice coping strategies of employed parents. *J Nutr Educ Behav* **41**, 365–370. https://doi.org/10.1016/j.jneb.2009.01.007.
7. French SA, Story M & Jeffery RW (2001) Environmental influences on eating and physical activity. *Annu Rev Public Health* **22**, 309–335. https://doi.org/10.1146/annurev.publhealth.22.1.309.
8. Welch N, McNaughton SA, Hunter W, *et al.* (2009) Is the perception of time pressure a barrier to healthy eating and physical activity among women? *Public Health Nutr* **12**, 888–895. https://doi.org/10.1017/S1368980008003066.
9. Janssen HG, Davies IG, Richardson LD, *et al.* (2018) Determinants of takeaway and fast food consumption: a narrative review. *Nutr Res Rev* **31**, 16–34. https://doi.org/10.1017/S0954422417000178.
10. Nielsen SJ, Siega-Riz AM & Popkin BM (2002) Trends in energy intake in U.S. between 1977 and 1996: similar shifts seen across age groups. *Obes Res* **10**, 370–378. https://doi.org/10.1038/oby.2002.51.
11. The Nielsen Company (2016) What's in our Food and on our Mind: Ingredient and Dining-Out Trends around the World. The Nielsen Company. https://nutrimento.pt/activeapp/wp-content/uploads/2016/09/global-ingredient-and-out-of-home-dining-trends-aug-2016.pdf (accessed August 2023).
12. Eurostat (2019) Final Consumption Expenditure of Households by Consumption Purpose (COICOP 3 Digit). https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do (accessed August 2023).
13. McGuffin LE, Price RK, McCaffrey TA, *et al.* (2015) Parent and child perspectives on family out-of-home eating: a qualitative analysis. *Public Health Nutr* **18**, 100–111. https://doi.org/10.1017/S1368980014001384.
14. Ni Mhurchu C, Aston LM & Jebb SA (2010) Effects of worksite health promotion interventions on employee diets: a systematic review. *BMC Public Health* **10**, 62. https://doi.org/10.1186/1471-2458-10-62.

15. Lachat C, Nago E, Verstraeten R, *et al.* (2012) Eating out of home and its association with dietary intake: a systematic review of the evidence. *Obes Rev* **13**, 329–346. https://doi.org/10.1111/j.1467-789X.2011.00953.x.
16. Orfanos P, Naska A, Trichopoulou A, *et al.* (2009) Eating out of home: energy, macro- and micronutrient intakes in 10 European countries. The European Prospective Investigation into Cancer and Nutrition. *Eur J Clin Nutr* **63**, S239–S262. https://doi.org/10.1038/ejcn.2009.84.
17. Bes-Rastrollo M, Basterra-Gortari FJ, Sánchez-Villegas A, *et al.* (2010) A prospective study of eating away-from-home meals and weight gain in a Mediterranean population: the SUN (Seguimiento Universidad de Navarra) cohort. *Public Health Nutr* **13**, 1356–1363. https://doi.org/10.1017/S1368980009992783.
18. Orfanos P, Naska A, Rodrigues S, *et al.* (2017) Eating at restaurants, at work or at home. Is there a difference? A study among adults of 11 European countries in the context of the HECTOR* project. *Eur J Clin Nutr* **71**, 407–419. https://doi.org/10.1038/ejcn.2016.219.
19. Müller K, Libuda L, Diethelm K, *et al.* (2013) Lunch at school, at home or elsewhere. Where do adolescents usually get it and what do they eat? Results of the HELENA Study. *Appetite* **71**, 332–339. https://doi.org/10.1016/j.appet.2013.09.002.
20. Briefel RR, Wilson A & Gleason PM (2009) Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. *J Am Diet Assoc* **109**, S79–S90. https://doi.org/10.1016/j.jada.2008.10.064.
21. Tyrrell RL, Greenhalgh F, Hodgson S, *et al.* (2017) Food environments of young people: linking individual behaviour to environmental context. *J Public Health (Oxf)* **39**, 95–104. https://doi.org/10.1093/pubmed/fdw019.
22. Moreira T, Severo M, Oliveira A, *et al.* (2015) Eating out of home and dietary adequacy in preschool children. *Br J Nutr* **114**, 297–305. https://doi.org/10.1017/S0007114515001713.
23. Ziauddeen N, Page P, Penney TL, *et al.* (2018) Eating at food outlets and leisure places and 'on the go' is associated with less-healthy food choices than eating at home and in school in children: cross-sectional data from the UK National Diet and Nutrition Survey Rolling Program (2008–2014). *Am J Clin Nutr* **107**, 992–1003. https://doi.org/10.1093/ajcn/nqy057.
24. Lopes C, Torres D, Oliveira A, *et al.* (2017) National food, nutrition and physical activity survey of the Portuguese general population. *EFSA Supporting Publ* EN-1341. https://doi.org/10.2903/sp.efsa.2017.EN-1341.
25. Lopes C, Torres D, Oliveira A, *et al.* (2018) National Food, Nutrition, and Physical Activity Survey of the Portuguese General Population (2015–2016): protocol for design and development. *JMIR Res Protoc* **7**, e42. https://doi.org/10.2196/resprot.8990.
26. European Food Safety Authority (2015) Guidance on the EU menu methodology. *EFSA J* **12**, 3944. https://doi.org/10.2903/j.efsa.2014.3944.
27. Goios AC, Severo M, Lloyd AJ, *et al.* (2020) Validation of a new software eAT24 used to assess dietary intake in the adult Portuguese population. *Public Health Nutr* **23**, 3093–3103. https://doi.org/10.1017/S1368980020001044.
28. Moshfegh AJ, Rhodes DG, Baer DJ, *et al.* (2008) The US Department of Agriculture Automated Multiple-Pass Method reduces bias in the collection of energy intakes. *Am J Clin Nutr* **88**, 324–332. https://doi.org/10.1093/ajcn/88.2.324.
29. European Food Safety Authority (2011) Report on the development of a Food Classification and Description System for exposure assessment and guidance on its implementation and use. *EFSA J* **9**, 2489. https://doi.org/10.2903/j.efsa.2011.2489.
30. Instituto Nacional de Saúde Doutor Ricardo Jorge Tabela da Composição de Alimentos (2015) Food Composition Database. https://portfir-insa.min-saude.pt/ (accessed August 2023).
31. Lopes C, Torres D, Oliveira A, *et al.* (2018) *National Food, Nutrition, and Physical Activity Survey of the Portuguese General Population 2015–2016: Summary of Results*. Porto: Universidade do Porto.
32. Vilela S, Lopes C, Guiomar S, *et al.* (2018) Validation of a picture book to be used in a pan-European dietary survey. *Public Health Nutr* **21**, 1654–1663. https://doi.org/10.1017/S1368980017004153.
33. Magalhães V, Severo M, Torres D, *et al.* (2020) Characterizing energy intake misreporting and its effects on intake estimations, in the Portuguese adult population. *Public Health Nutr* **23**, 1031–1040. https://doi.org/10.1017/S1368980019002465.
34. Naska A, Katsoulis M, Orfanos P, *et al.* (2015) Eating out is different from eating at home among individuals who occasionally eat out. A cross-sectional study among middle-aged adults from eleven European countries. *Br J Nutr* **113**, 1951–1964. https://doi.org/10.1017/S0007114515000963.
35. Vilela S, Oliveira A, Ramos E, *et al.* (2014) Association between energy-dense food consumption at 2 years of age and diet quality at 4 years of age. *Br J Nutr* **111**, 1275–1282. https://doi.org/10.1017/S0007114513003620.
36. World Health Organization (2003) *WHO Technical Report Series 916: Diet, Nutrition and the Prevention of Chronic Diseases*. Geneva: World Health Organization.
37. Wellard-Cole L, Davies A & Allman-Farinelli M (2022) Contribution of foods prepared away from home to intakes of energy and nutrients of public health concern in adults: a systematic review. *Crit Rev Food Sci Nutr* **62**, 5511–5522. https://doi.org/10.1080/10408398.2021.1887075.
38. Zang J, Luo B, Wang Y, *et al.* (2018) Eating out-of-home in adult residents in Shanghai and the nutritional differences among dining places. *Nutrients* **10**, 951. https://doi.org/10.3390/nu10070951.
39. Bezerra IN, Medeiros HB, de Moura Souza A, *et al.* (2021) Contribution of away-from-home food to the energy and nutrient intake among Brazilian adolescents. *Public Health Nutr* **24**, 3371–3378. https://doi.org/10.1017/S1368980020001573.
40. Naska A, Orfanos P, Trichopoulou A, *et al.* (2011) Eating out, weight and weight gain. A cross-sectional and prospective analysis in the context of the EPIC-PANACEA study. *Int J Obes (Lond)* **35**, 416–426. https://doi.org/10.1038/ijo.2010.142.
41. Muriel A & Oldfield Z (2010) Financial circumstances and consumption. In *Financial Circumstances, Health and Well-Being of the Older Population in England: ELSA 2008 (Wave 4)* pp. 76–114 [J Banks, C Lessof, J Nazroo, N Rogers, M Stafford, A Steptoe, editors]. London: Institute of Fiscal Studies.
42. Adams J, Goffe L, Brown T, *et al.* (2015) Frequency and socio-demographic correlates of eating meals out and take-away meals at home: cross-sectional analysis of the UK national diet and nutrition survey, waves 1–4 (2008–12). *Int J Behav Nutr Phys Act* **12**, 51. https://doi.org/10.1186/s12966-015-0210-8.
43. Ziauddeen N, Almiron-Roig E, Penney TL, *et al.* (2017) Eating at food outlets and 'On the Go' is associated with less healthy food choices in adults: cross-sectional data from the UK National Diet and Nutrition Survey Rolling Programme (2008–2014). *Nutrients* **9**, 1315. https://doi.org/10.3390/nu9121315.
44. Miura K & Turrell G (2014) Contribution of psychosocial factors to the association between socioeconomic position and takeaway food consumption. *PloS one* **9**, e108799. https://doi.org/10.1371/journal.pone.0108799.
45. Miura K, Giskes K & Turrell G (2012) Socio-economic differences in takeaway food consumption among adults. *Public Health Nutr* **15**, 218–226. https://doi.org/10.1017/S136898001100139X.

46. Wolfson JA, Leung CW & Richardson CR (2020) More frequent cooking at home is associated with higher Healthy Eating Index-2015 score. *Public Health Nutr* **23**, 2384–2394. https://doi.org/10.1017/S1368980019003549.
47. Instituto Nacional de Estatística (2017) Inquérito às Despesas das Famílias 2015–2016 (Household Budget Survey - 2015/2016). https://www.ine.pt/xurl/pub/277098526 (accessed August 2023).
48. Moreira M (2020) *Como Envelhecem os Portugueses: envelhecimento, saúde, idadismo*. Lisboa: Fundação Francisco Manuel dos Santos.
49. Lopes C, Torres D, Oliveira A, *et al.* (2017) *Inquérito Alimentar Nacional e de Atividade Física, IAN-AF 2015–2016: Relatório de resultados* (National Food, Nutrition, and Physical Activity Survey of the Portuguese General Population, IAN-AF 2015-2016: Summary of Results). Porto: Universidade do Porto.
50. Araújo J, Severo M, Lopes C, *et al.* (2011) Food sources of nutrients among 13-year-old Portuguese adolescents. *Public Health Nutr* **14**, 1970–1978. https://doi.org/10.1017/S1368980011001224.
51. Palla L, Chapman A, Beh E, *et al.* (2020) Where do adolescents eat less-healthy foods? Correspondence analysis and logistic regression results from the UK National Diet and Nutrition Survey. *Nutrients* **12**, 2235. https://doi.org/10.3390/nu12082235.
52. Ministério da Educação, Saúde e Agricultura, Florestas e Desenvolvimento Rural (2018) Portaria n.º 113/2018 de 30 de abril, Diário da República, 1.ª série - N.º 83–30 de abril de 2018. Government Order No. 113/2018. —https://diariodarepublica.pt/dr/detalhe/portaria/113–2018–115200303 (accessed August 2023).
53. Nelson M, Nicholas J, Suleiman S, *et al.* (2006) *School Meals in Primary Schools in England*. London (UK): Department for Education and Skills, Food Standards Agency.
54. Nelson M, Bradbury J, Poulter J, *et al.* (2004) *School Meals in Secondary Schools*. London (UK): Department for Education and Skills, Food Standards Agency.
55. Patterson R, Risby A & Chan M-Y (2012) Consumption of takeaway and fast food in a deprived inner London Borough: are they associated with childhood obesity? *BMJ Open* **2**, e000402. https://doi.org/10.1136/bmjopen-2011-000402.
56. Khan T, Powell LM & Wada R (2012) Fast food consumption and food prices: evidence from panel data on 5th and 8th grade children. *J Obes* **2012**, 857697. https://doi.org/10.1155/2012/857697.
57. Andrade GC, da Costa Louzada ML, Azeredo CM, *et al.* (2018) Out-of-home food consumers in Brazil: what do they eat? *Nutrients* **10**, 2. https://doi.org/10.3390/nu10020218.
58. Azeredo CM, de Rezende LF, Canella DS, *et al.* (2016) Food environments in schools and in the immediate vicinity are associated with unhealthy food consumption among Brazilian adolescents. *Prev Med* **88**, 73–79. https://doi.org/10.1016/j.ypmed.2016.03.026.
59. Burke SJ, McCarthy SN, O'Neill JL, *et al.* (2007) An examination of the influence of eating location on the diets of Irish children. *Public Health Nutr* **10**, 599–607. https://doi.org/10.1017/S1368980007258379.
60. Kasparian M, Mann G, Serrano EL, *et al.* (2017) Parenting practices toward food and children's behavior: eating away from home *v.* at home. *Appetite* **114**, 194–199. https://doi.org/10.1016/j.appet.2017.03.045.
61. Cohen DA, Ghosh-Dastidar B, Beckman R, *et al.* (2012) Adolescent girls' most common source of junk food away from home. *Health Place* **18**, 963–970. https://doi.org/10.1016/j.healthplace.2012.06.011.
62. Francis J, Martin K, Costa B, *et al.* (2017) Informing intervention strategies to reduce energy drink consumption in young people: findings from qualitative research. *J Nutr Educ Behav* **49**, 724–733.e1. https://doi.org/10.1016/j.jneb.2017.06.007.
63. Auchincloss AH, Li J, Moore KA, *et al.* (2021) Are neighbourhood restaurants related to frequency of restaurant meals and dietary quality? Prevalence and changes over time in the Multi-Ethnic Study of Atherosclerosis. *Public Health Nutr* **24**, 4630–4641. https://doi.org/10.1017/S1368980021002196.
64. Clendenen VI, Herman CP & Polivy J (1994) Social facilitation of eating among friends and strangers. *Appetite* **23**, 1–13. https://doi.org/10.1006/appe.1994.1030.
65. Bezerra IN, Junior EV, Pereira RA, *et al.* (2015) Away-from-home eating: nutritional status and dietary intake among Brazilian adults. *Public Health Nutr* **18**, 1011–1017. https://doi.org/10.1017/S1368980014001189.
66. Bento A, Gonçalves C, Cordeiro T, *et al.* (2018) Portugal nutritional transition during the last 4 decades: 1974–2011. *Porto Biomed J* **3**, e25. https://doi.org/10.1016/j.pbj.0000000000000025.
67. O'Dwyer NA, Gibney MJ, Burke SJ, *et al.* (2005) The influence of eating location on nutrient intakes in Irish adults: implications for developing food-based dietary guidelines. *Public Health Nutr* **8**, 258–265. https://doi.org/10.1079/phn2004701.
68. Myhre JB, Løken EB, Wandel M, *et al.* (2014) Eating location is associated with the nutritional quality of the diet in Norwegian adults. *Public Health Nutr* **17**, 915–923. https://doi.org/10.1017/S1368980013000268.
69. Roos E, Sarlio-Lähteenkorva S & Lallukka T (2004) Having lunch at a staff canteen is associated with recommended food habits. *Public Health Nutr* **7**, 53–61. https://doi.org/10.1079/phn2003511.
70. Robson SM, Vadiveloo M, Green S, *et al.* (2020) Examining the consumer restaurant environment and dietary intake in children. *Prev Med Rep* **20**, 101274. https://doi.org/10.1016/j.pmedr.2020.101274.
71. Orfanos P, Naska A & Gedrich K (2009) *Deliverable 2.5: Report on Current and Optimal Out-of-Home Dietary Patterns of European Consumers–HECTOR*. Athens: Department of Hygiene and Epidemiology University of Athens, Medical School.