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Adherence to recommended intake of pulses and related factors in university students in the UniHcos

Project

Intake of pulses in university students

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ABSTRACT

Pulses such as peas, beans or lentils are one of the most complete foods at the nutritional level, however, it is one of the most often neglected in the diets of university students. Entrance to university translates to a major lifestyle change for many young people and the habits acquired or cemented at this time will remain into adulthood. The objective of this study is to analyze the association between personal/sociodemographic factors, dietary intake of other food groups and the consumption of pulses in first-year university students. This cross-sectional study is part of the UniHcos project, a multicenter study of multipurpose prospective cohorts in 11 Spanish universities. Data from 9862 university students was collected through an online self-questionnaire completed by all students who met the selection criteria and agreed to participate in the project during the 2011–2018 academic years. 75.8% of students presented an inadequate (≤ 2 times / week) consumption of pulses. Living outside the family home in either a student residence [OR = 0.76; 95%CI: (0.69 – 0.84)] or rental [OR = 0.81; 95%CI: (0.70 – 0.95)] decreased compliance with recommendations on the consumption of pulses. Low consumption of pulses is seemingly not restricted to a specific profile or dietary pattern among university students and no specific focus group for intervention can be identified. Policies promoting the consumption of pulses among the university population as a whole are necessary to increase compliance rates with the dietary recommendations.

KEYWORDS

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INTRODUCTION

An adequate diet not only provides certain amount of energy and nutrients but one that promotes and maintains good health. If a diet is varied and balanced, the body will be able to obtain the necessary nutrients and energy to maintain an optimal state of health[1].

In recent years, the general population has undergone a nutritional transition, causing significant changes in the perception and consumption of food. Previous studies in the university population have shown a decrease in the consumption of fruits, vegetables, cereals, pulses and fish, together with an increase in the consumption of meats, sweets, snacks and sugary drinks[2, 3]. The Spanish youth population has abandoned the traditional balanced Mediterranean diet characterized by combining foods such as: olive oil, cereals, pulses, vegetables, fruits, nuts, fish, fermented beverages such as wine and beer, as well as a moderate intake of dairy, meat, eggs and low consumption of red meat and sausages[4, 5] in favor of more westernized diet patterns[6] characterized by the abandonment of "basic foods" in favor of more elaborate and processed ones.

Pulses are a plant species of edible seeds, that have been consumed for thousands of years by humans and animals. The Food and Agriculture Organization (FAO) defines pulses as leguminous crops with dry and low-fat edible seeds. It does not consider the species used as vegetables (for example, green peas or green beans), for the extraction of oil (such as soybeans or peanuts) or others for planting purposes (such as clover and alfalfa) as pulses. Among the most well-known and consumed pulses worldwide are the common beans, chickpeas, mung beans, cowpeas, care beans, lupins, mesquite, carob, tamarind and lentils[7].

While pulses are one of the most nutritionally complete foods as well as a climate friendly source of protein, they are one of the least consumed food groups in Spain[8-12]. The Spanish Society of Community Nutrition recommends that healthy adult population consume pulses > 2 times / week with each serving being 60-80 g dry or 150-200 g cooked[13, 14].

Pulses are recognized as being a good source of protein with a high lysine and low methionine and cysteine content, however, the biological value of this protein is lower than that of protein from animal sources such as egg, milk and meat. The biological value of a protein depends on the composition of amino acids and the proportions between them[15]. The protein value is maximum when these proportions are those necessary to meet the nitrogen requirements to cover physiological needs[15]. In addition, other factors such as protein structure and the presence of proteases may reduce the digestibility and biological use by the body of

vegetable proteins[15, 16]. Pulses are also a source of resistant starch, fiber (soluble and insoluble), vitamins (B complex), minerals (iron, zinc, folate, magnesium and calcium) and have a low lipid content. In addition, the phytochemicals, saponins, and tannins found in pulses possess antioxidant and anti-carcinogenic effects[17-20]. Different international agencies recommend the regular consumption of pulses as an alternative to meat in order to reduce the intake of saturated fats[6, 21]. Pulse consumption can improve serum lipid profiles and positively affect cardiovascular disease risk factors, such as blood pressure, platelet activity, and inflammation. Pulses also have a low glycemic index, making them particularly beneficial to people with diabetes by assisting in maintaining healthy blood glucose and insulin levels[17-20].

Entrance to university translates to a major lifestyle change for many young people. It can entail important changes such as living outside the family home, adapting to new activities and taking responsibility for their meals for the first time[22-24]. Assuming this responsibility will be determined by socioeconomic factors and economic constraints, and / or the greater or lesser ability to cook. The dietary habits acquired during the university stage are generally those that will remain in adulthood[3, 25-27]. The social conditions and the way of life have a special impact on the habits of these young people and there are even differences in the food inherent to the region or community where they live, for example, between the north and the south of the same country[28, 29].

The hypothesis on which this study is based is that certain personal/sociodemographic factors and intakes of other food groups are related to worse adherence to the recommendations for the consumption of pulses. Identifying these factors could aid in the development of policies geared towards improving pulse consumption among university students. The objectives of this study are to determine the rate of adherence to the recommended intake of pulses and analyze the association between this adherence and personal/sociodemographic factors and dietary intake of other food groups in first-year university students.

MATERIAL AND METHODS

This cross-sectional study is part of the UniHcos project, a multicenter study of multipurpose prospective cohorts in 11 Spanish universities (Alicante, Cantabria, Castilla – La Mancha, Granada, Huelva, Jaén, León, Salamanca, Valencia, Valladolid and Vigo); whose general objective is to know the students' lifestyles when they enter to the university and their modification during their stay. The UniHcos project has

the approval of the Ethics Committees of the collaborating universities, has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments and the integration of the information file in the Data Protection Agency complies with the Organic Law of Protection of Personal Data.

The main inclusion criteria for students in this study were to be both a first-year student and enrolled in all first-year courses for the first time in each of the participating universities. All students who met the selection criteria and agreed to participate in the project during the 2011–2018 academic years completed an online self-questionnaire that included informed consent and ethical permission.

The questionnaire was sent to the students by way of institutional email and students were given ample time and reminders to respond as well as assured confidentiality. Measuring and adjusting for non-response bias using weighting-class adjustments, post-stratification, or propensity models was not possible due to the lack of sufficient demographic or database variables. Meanwhile, item non-response bias was not a concern as those students without sufficient information (not answering the question regarding intake of pulses in the questionnaire and/or not completing at least 85% of the remaining questionnaire) were excluded from the study.

277 325 students were invited to participate 9874 returned the questionnaire but 12 (0.12%) had to be excluded due to providing incomplete data (Figure 1). Finally, data from 9862 (3.6% participation rate) university students were included in the study. Based on the nature of this study, the demographic profile of the population included in the sample was representative of university students in Spain.

Data collected

Analyses were conducted for those who provided complete dietary, demographic and socioeconomic data. The personal and sociodemographic variables collected were: sex (male, female); age (years); body mass index (BMI) (<18.5, 18.5–24.5, 25–30, >30); marital status (single, domestic partner, married, separated, divorced, widowed); employment status (only study and I do not look for work, study and I look for work, study and work part-time, study and work full-time); housing, defined as the place where students live during the course (home—family, residence—hall/residence—university, rental, home—own, others);

and coexistence, defined as people with whom the student lives during the course (with my parents, roommates/friends, with my partner, with my children, alone).

To simplify the interpretation of the data, the variables were re-categorized for some of the analyses as follows:

- Marital status: Single (single, separated, divorced, widowed), married (married, domestic partner);

- Employment status: Unemployed (only study and do not look for work, study and look for work), employed (study and work part time, study and work full time);

- Housing: Family home, university residence (residence hall/university residence), rental (rental, home-own, others);

- Coexistence: Parents, roommates (roommates/friends), partner (with my partner, with my children), alone.

Dietary assessment

The dietary intake estimations were constructed from the answers to the food frequency consumption section (FFCS) of the online self-questionnaire which was modeled after question 96 of Section H4 of the 2006 Spanish National Health Survey[25, 30]. There were five options (daily; 3-4 times / week, but not daily; 1-2 times / week; <1 time / week; never / almost never) for the frequency of consumption of pulses and other food groups assessed (meat (chicken, beef, pork, lamb); hamburgers, hot dogs kebabs; eggs; fish; processed meats; dairy; pizza; sweets (biscuits, cookies, pastries, jams etc.); sugary drinks; juices and milkshakes; fresh fruit; pasta, rice, potatoes; bread and grains; vegetables). In this study, the five frequency options were regrouped into four during analysis, more specifically, the frequency "daily" and "3-4 times, but not daily" were joined to create the group ≥ 3-4 times / week.

For the assessment of compliance with the recommendations of the consumption of pulses, the recommendations established in the "dietary guidelines for the Spanish population"[13] were used as a gold standard; the recommended consumption of pulses for a healthy adult population is > 2 times / week. For the interpretation of the result of the frequency of consumption of pulses, students were grouped according to their compliance with the established recommendations as follows: "complies" or "does not comply". The category "complies" corresponds to the FFCS responses "3-4 times a week, but not daily" and "daily"; the

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category "does not comply" corresponds to "1-2 times a week", "less than 1 time a week" and "never or almost never".

Statistical analysis

All analyses were conducted using survey routines and the dietary survey weights to maintain the nationally representative character of the data. Analyses were conducted in IBM-SPSS version 20.0 (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY, USA: IBM Corp.)

A descriptive analysis was used for frequencies of consumption (absolute and relative) and was performed for the total sample, according to sociodemographic variables. Chi-square test χ^2 or Fisher's exact test with a statistical significance level of $p < 0.05$ were performed to check if there was a relationship between the groups.

Logistic regression modelling was employed to determine the contributors to students' odds of meeting the dietary intake recommendation for pulses. All models controlled for age, sex, household income, total energy intake, and survey year. The crude odds ratios (OR) and 95% confidence intervals (CI) were stratified by university of origin. A decision tree analysis was performed to corroborate the results of the logistic regression analysis and detect the strongest predictor variables in regard to compliance with pulses intake recommendations[31].

RESULTS

Table 1 shows compliance with pulses consumption recommendations depending on location and living situation without re-categorization. 75.8% of students in the 11 participating universities presented an inadequate consumption of pulses. It is noted that there was no significant difference between compliance with the frequency of consumption of pulses according to sex ($p = 0.299$), BMI ($p = 0.151$) or marital status ($p = 0.558$). However, regarding the frequency of consumption of pulses according to the current situation in terms of work and study, there was a significant difference ($p = 0.001$). Students who study and look for work were the group that comply with the recommended frequency of consumption of pulses in the greatest proportions (27.3%). A significant difference ($p < 0.001$) was found between compliance with the frequency of consumption of pulses with respect to where they lived during the course. Those who lived in the family

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home comply with the frequency of consumption of pulses in the highest proportion (26.5%) while those who did so in rental apartments had the lowest rate of compliance (21.2%). Compliance with the frequency of consumption of pulses with respect to coexistence shows a significant difference (p < 0.001), with those who lived with their parents / partner / friends having the highest compliance rate (50.0%) for groups whose members represent at least 1% of the population sample. The lowest rate of compliance is found in those living with partner / friends (19.6%). There was a statistical difference (p <0.001) between compliance with the frequency of consumption of pulses regarding the university attended. The highest rate of adequate consumption of pulses was in the Universities of León (29.0%) and Valladolid (28.1%) with those with the lowest rate compliance being the Universities of Castilla-La Mancha (20.1%) and Vigo (19.8%) (p <0.001).

Table 2 describes the re-categorized characteristics of the population studied according to geographical location. It was observed that women accounted for 72.2% of the studied population which had an average age of 20 years, (SD: 4.52), without significant difference between north and south. There was no significant difference in the BMI distribution or the current situation in terms of work and study. There was a significant difference in relation to marital status and student accommodation and coexistence during the academic year. Students in the north lived in a significant proportion in university residences (16.6% vs 7.4%) or alone (11.7% vs 7.3%) compared to those from the south which in turn were more likely to be married (9.1% vs 7.9%).

Table 3 shows the factors associated with compliance with the nutritional recommendations on the frequency of consumption of pulses, according to the geographical region. Sex, BMI, marital status, employment and coexistence did not appear to affect compliance with the recommendations on the consumption of pulses in either group of universities. In relation to place of residence during the academic year, living in a student residence decreased compliance [OR = 0.76; 95%CI: (0.69 – 0.84)] with recommendations on the consumption of pulses without showing significant differences between northern [OR = 0.79; 95%CI: (0.67 – 0.93)] and southern [OR = 0.74; 95%CI: (0.65 – 0.84)] universities. Meanwhile, living in a rental decreased overall compliance [OR = 0.81; 95%CI: (0.70 – 0.95)] with recommendations on the consumption of pulses and compliance in northern universities [OR = 0.76; 95%CI: (0.62 – 0.93)].

In the decision tree created for compliance with recommended pulses intake, it was observed that the strongest associated variable among the studied personal and sociodemographic characteristics was place of

residence during the academic year. The dependent variable of this tree diagram was compliance with the pulses consumption recommendations, while its independent variables were: sex, BMI, marital status, employment status, place of residence during the academic year and coexistence during the academic year. However, place of residence was the strongest predictor of compliance during the study period. According to node 1, 26.3% of the students that lived in the family home complied with the recommendations. The results show that as in the odds ratio calculations, only the place of residence during the school year presents a significant effect on the rate of compliance with the recommendation for pulses consumption.

Table 4, shows the compliance with the recommendations on the frequency of consumption of pulses by the frequency of different types of food consumed by the university population. Statistical differences in compliance rates with the recommendations on the frequency of consumption of pulses appear for all the studied food items.

Within those students who comply with the frequency of consumption of pulses, 84.3% consumed pulses 3 to 4 times per week and 15.7% consumed them daily. The majority (60.9%) of students that did not meet the recommended weekly pulses intake consumed them 1-2 times a week while those that never consume pulses forming the smallest group (13.0%).

The foods whose daily or almost daily consumption is associated with higher adherence to the recommended frequency of consumption of pulses are hamburgers, hot dogs and kebabs; eggs; fish; sausages and cold meats; pizza; juices and milkshakes; fresh fruits; pasta, rice and potatoes; bread and cereals. On the other hand, for meat and dairy, students that consumed these products never or almost never present the highest proportion of adherence to the recommended frequency of consumption of pulses. In the case of sweets and sugary drinks, compliance rates were similar across all intake groups but the group with the worst compliance was that which consumed sweets or sugary drinks 3-4 times per week.

DISCUSSION

It was identified that 75.8% of participating students presented an inadequate consumption of pulses, which indicates that the standard recommendations of consumption of pulses as > 2 times / week,[13] are not being met. This is higher than found in previous studies where compliance was found to be close to 50%[4, 32-34] but is in accordance with another Chilean study where compliance was around 22.5%[35] and much better

than the results found in a Canadian study where none of the subjects met recommendations[36] and a Mexican study where pulses were consumed by less than 10% of the population[37]. A study carried out in Costa Rica in medical students found that they consumed significantly greater amounts than the recommendations[38]. Meanwhile, two Spanish studies showed that 70.9% and 91.9% of female and 84.6% and 95.2% of male students in Madrid[39] and Murcia[40] respectively consumed pulses at least once a week but no data is given as to the actual quantities consumed and compliance with the recommendation cannot be assessed. However, the national average consumption per capita of pulses in Spain of 3.20 kg per person per year corresponds to an average of less than 1 weekly ration (80g/ ration)[12], well below the recommended amount.

The sample consists primarily of women (72.2%), women are over represented given that the official statistics for the 2018-2019 academic year in Spain shows only 55% of newly enrolled students being women[41]. Regarding geographical location, the students of universities of the south account for 59.6% of the sample while those of universities of the north for 40.4%. This difference in participation between regions must be highlighted as there can exist inherent diet differences according to the region or community of origin of the student[42].

Most students do not work (89.4%), however, compliance with the recommendations is higher among those that look for work. In this case, the low price of pulses, compared to other food groups, may perhaps be a factor in the higher compliance with the recommendations in those looking for work, however, with the currently available data no further conclusion can be made. Among those students that do work, those that work full time have better compliance rates. There seems to be a relation between working more hours or actively seeking work and adequate pulses consumption. No other studies on the association between employment status in university students and pulses consumption have been found for comparison.

In this study, students who lived at home or in university residences were significantly more likely to meet the recommendations for pulses intake than those that lived in rented accommodations. As for coexistence or who the student lives with during the academic year, it can be observed that those students who live with their parents have the highest compliance rates while those that live with roommates, be it a partner or friends, have the lowest rate of compliance. These finding are also supported by other previous thus suggesting that young people living away from the parental home comply less with the recommendations[22, 40]. This may be because many students assume responsibility for their food for the first time; the purchase of

food, elaboration of a daily menu and the preparation of food, which are all factors that will strongly influence eating habits, now fall to the students. Lack of practice or knowledge may lead students to include foods in their diets that do not require complex processing or prolonged cooking times, such as frozen foods, pizzas, sausages or precooked meats[4].

No clear pattern can be detected between the consumption of pulses and that of other foods but some trends do appear. Higher consumption of pulses is associated with higher intakes of healthy foods and also seems to be associated with lower consumption of unhealthy foods such as sweets and sugary drinks but at the same time with a higher consumption of pizza. When studying the association with meat products, fish and dairy, there appears to be a polarization of the consumption of these products related to pulses intake. The higher compliance rates among those with little to no consumption of these products may be due to following a restrictive diet (vegetarian, flexitarian, vegan etc. which have recently increased in popularity[43]) in which animal products have been substituted in part by pulses. However, for those without diet restrictions it seems that pulses intake is positively associated with the consumption of these products. Further specific and detailed information on diet restriction in not available in this study. A study relating the consumption of pulses and other foods in the university population carried out by the Spanish Nutrition Foundation in 21 Spanish universities coincides with this study when comparing the consumption of meat products and sweets with the consumption of pulses[5].

Limitations

This work has limitations but can serve as a launching pad for future research on this topic. Although a large number of information was collected in the UniHcos survey, information such as the diet restrictions mentioned previously is missing. Another of the limitations of this study is its transversal design given which the results must be interpreted with caution. The questionnaire used to collect the information, a self-completed FFCS, could present a possible bias of social desirability in terms of wanting to indicate the consumption of foods that young people consider to have better or healthier characteristics. However, it is possible that this bias was controlled because the user had to concentrate on determining the number of times he/she consumes pulses and not on its healthy characteristics. In addition, FFCS is one of the most used

questionnaires in population studies, to obtain information on the times or frequency with which a specific food is consumed in order to compare it with nutritional recommendations.

Participation in the study was completely voluntary and invitations were sent by way of email to the students' academic email accounts. These two factors could have influenced the participation as first year university students may not prioritize taking part in such studies and/or may not utilize the academic emails often. The low participation rates in research similar to that presented here is common among first-year university students and this carries with it the potential for unit non-response bias. To avoid this as much as possible, the online self-questionnaire was designed to try to avoid making it more likely for certain groups to participate or not in the study. However, the very low participation rate observed may still be the most important limitation of this study as the sample may not be representative of the Spanish university student population. This limitation is a difficult one to overcome but changes in the methodology used to collect the data that may improve response rates should be studied and applied in future similar studies.

Conclusion

The results of this study show that compliance with the recommendations for consumption of pulses in Spanish university students is very low across all studied universities denoting a deviation from the traditional Mediterranean dietary pattern which is increasingly being abandoned by the younger generations. Compliance rates are not related to sex, BMI, marital status, employment status or coexistence but are related to the students' place of residence during the academic year. Those who live outside the family home are less likely to comply with pulses consumption recommendations. Compliance with the recommendations for consumption of pulses seems to be associated with higher intakes of healthy foods and lower intakes of unhealthy foods with a dichotomy appearing for animal derived products. Therefore, low consumption of pulses is seemingly not restricted to a specific profile or dietary pattern among university students and no specific focus group for intervention can be identified. Policies promoting the consumption of pulses among the university population as a whole are necessary to increase compliance rates with the dietary recommendations.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All of the authors have read and approved the submission and the paper has not been published previously nor is it being considered by any other peer-reviewed journal. **Project conceptualization:** MMSV.

Development of methodology: MMSV, CAPrieto, CAPerez, LFVJ, ROM, AAG, JAO, MDR, GBA, MJC, EJM, ALM, ABC and TFV.

Conducted research: MMSV, CAPrieto, IPC, CAPerez, LFVJ, ROM, AAG, JAO, MDR, GBA, MJC, EJM, ALM, ABC and TFV.

Data curation: MMSV and IPC.

Data analysis: MMSV, CAPrieto, IPC, CAPerez, LFVJ, ROM, AAG, JAO, MDR, GBA, MJC, EJM, ALM, ABC and TFV.

Writing – original draft: MMSV and IPC.

Writing – review & editing: MMSV, CAPrieto, IPC, CAPerez, LFVJ, ROM, AAG, JAO, MDR, GBA, MJC, EJM, ALM, ABC and TFV.

Primary responsibility: MMSV.

Project administration: TFV.

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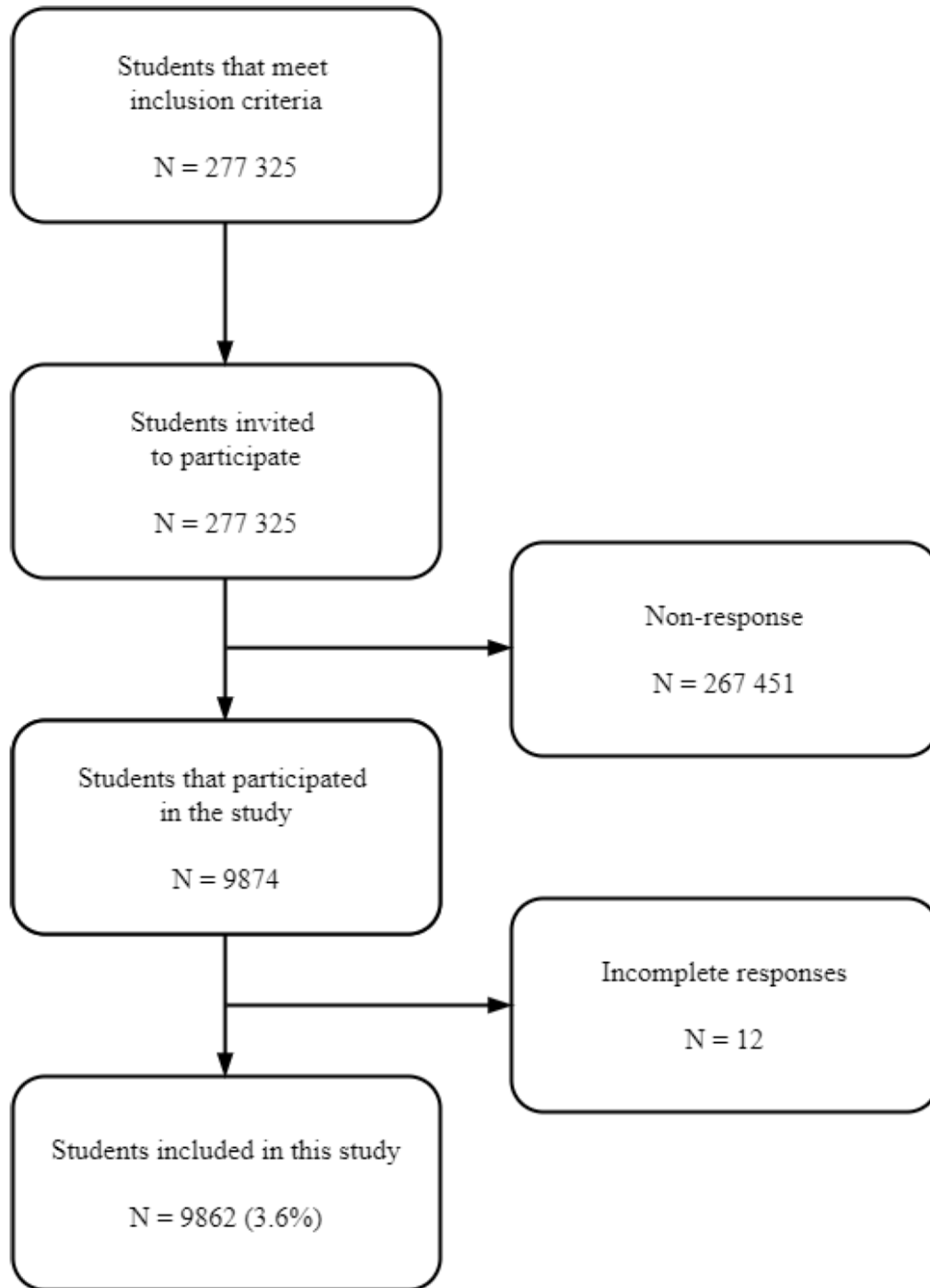
FIGURE LEGEND

Figure 1. Participant flow chart

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TABLES

Table 1. Compliance with the recommendations on the frequency of consumption of pulses by universities and according to geographical distribution and living situation

	Compliant		Non-compliant		
	n (%)	(CI 95%)	n (%)	(CI 95%)	p- value [a]
Sex					0.31
					0.30
Male	682 (28.6)	(26.76 - 30.42)	2055 (27.5)	(26.49 - 28.52)	
	(24.9)	(23.32 - 26.59)	(75.1)	(73.41 - 76.68)	
Female	1706 (71.4)	(69.57 - 73.24)	5419 (72.5)	(71.47 - 73.51)	
	(23.9)	(22.96 - 24.96)	(76.1)	(75.04 - 77.04)	
BMI					0.16
					0.15
Underweight (< 18.5)	227 (9.5)	(8.37 - 10.77)	762 (10.2)	(9.52 - 10.91)	
	(23.0)	(20.39 - 25.73)	(77.0)	(74.27 - 79.61)	
Normal weight (18.5-24.5)	1752 (73.6)	(71.54 - 75.12)	5321 (71.4)	(70.15 - 72.22)	
	(24.8)	(23.77 - 25.80)	(75.2)	(74.20 - 76.23)	
Overweight (25-30)	316 (13.3)	(11.91 - 24.48)	1107 (14.9)	(14.02 - 15.64)	
	(22.2)	(20.09 - 24.48)	(77.8)	(75.52 - 79.91)	
Obese (> 30)	85 (3.6)	(2.87 - 4.40)	258 (3.5)	(3.06 - 3.90)	
	(24.8)	(20.37 - 29.77)	(75.2)	(70.23 - 79.62)	
Marital status					0.59
					0.56
Married	40 (1.7)	(1.21 – 2.30)	116 (1.6)	(1.29 – 1.86)	
	(26.6)	(19.14 - 33.36)	(74.4)	(66.64 - 80.85)	
Divorce	5 (0.2)	(0.07 – 0.52)	21 (0.3)	(0.18 – 0.44)	
	(19.2)	(7.31 - 39.98)	(80.8)	(60.02 - 92.69)	
Common-law partnership	185 (7.7)	(6.72 – 8.91)	511 (6.8)	(6.28 – 7.44)	
	(26.6)	(23.36 - 30.06)	(73.4)	(69.94 - 76.64)	
Separated	4 (0.2)	(0.05 – 0.46)	7 (0.1)	(0.04 – 0.20)	
	(36.4)	(12.36 - 68.39)	(63.6)	(31.61 - 87.64)	
Single	2152 (90.1)	(88.83 – 91.27)	6813 (91.2)	(90.48 - 91.78)	
	(24.0)	(23.13 - 24.91)	(76.0)	(75.09 - 76.87)	
Widowed	2 (0.1)	(0.01 – 0.33)	6 (0.1)	(0.03 – 0.18)	
	(25.0)	(4.45 - 64.43)	(75.0)	(35.58 - 95.55)	
Employment status					<0.001
					0.001
Look for work	622 (26.0)	(24.31 – 27.87)	1659 (22.2)	(21.26 – 23.16)	
	(27.3)	(25.46 - 29.46)	(72.7)	(70.84 - 74.54)	
Work full time	63 (2.6)	(2.05 – 3.38)	187 (2.5)	(2.16 – 2.89)	
	(25.2)	(20.04 - 31.14)	(74.8)	(68.86 - 79.96)	
Work part time	182 (7.6)	(6.60 – 8.78)	609 (8.1)	(7.54 – 8.80)	
	(23.0)	(20.15 - 26.13)	(77.0)	(73.87 - 79.85)	
Do not look for work	1521 (63.7)	(61.72 – 65.62)	5019 (67.2)	(66.07 – 68.22)	
	(23.3)	(22.24 - 24.30)	(76.7)	(75.70 - 77.76)	
Place of residence					<0.001
					<0.001
University residence	278 (11.6)	(10.40 – 13.01)	823 (11.0)	(10.32 – 11.75)	
	(25.2)	(22.73 - 27.95)	(74.8)	(72.05 - 77.27)	
Family home	1190 (49.8)	(47.81 – 51.86)	3294 (44.1)	(42.94 – 45.21)	
	(26.5)	(22.26 - 27.86)	(73.5)	(72.13 - 74.74)	
Own home	65 (2.7)	(2.12 – 3.48)	205 (2.7)	(2.39 – 3.14)	
	(24.1)	(19.19 - 29.71)	(75.9)	(70.29 - 80.81)	
Rental	821 (34.4)	(32.48 – 36.33)	3050 (40.8)	(39.69 – 41.93)	
	(21.2)	(19.94 - 22.54)	(78.8)	(77.46 - 80.06)	
Other	34 (1.4)	(1.00 – 2.01)	102 (1.4)	(1.12 – 1.66)	
	(25.0)	(18.15 - 33.29)	75.0)	(66.71 - 81.85)	
Coexistence					<0.001
					<0.001
Roommates/friends	854 (35.8)	(33.84 – 37.73)	3091 (41.4)	(40.24 – 42.48)	
	(21.6)	(20.38 - 22.97)	(78.4)	(77.03 - 79.62)	
Partner	69 (2.9)	(2.27 – 3.66)	253 (3.4)	(2.99 – 3.83)	
	(21.4)	(17.16 - 26.40)	(78,6)	(73.60 - 82.84)	
Partner/roomates/friends	19 (0.8)	(0.49 – 1.26)	78 (1.0)	(0.83 – 1.31)	
	(19.6)	(12.49 - 29.15)	(80,4)	(70.85 - 87.51)	

Partner/children	26 (1.1)	(0.73 – 1.62)	84 (1.1)	(0.90 – 1.40)
	(23.6)	(16.28 - 32.87)	(76.4)	(67.13 - 83.72)
Partner/children/roommates/friends	0 (0.0)	(0.00 – 0.20)	1 (0.0)	(0.00 – 0.09)
	(0.0)	(0 - 94.54)	(100.0)	(5.46 - 100)
Children	11 (0.5)	(0.24 – 0.85)	21 (0.3)	(0.18 – 0.44)
	(34.4)	(19.17 - 53.23)	(65.6)	(46.77 - 80.81)
Children/roommates/friends	3 (0.1)	(0.03 – 0.40)	0 (0.0)	(0.00 – 0.06)
	(100.0)	(31.00 - 100)	(0.0)	(0 - 69.00)
Parents	1109 (46.4)	(44.43 – 48.47)	3069 (41.1)	(39.94 – 42.19)
	(26.5)	(25.22-27.92)	(73.5)	(72.08-74.78)
Parents/roommates/friends	55 (2.3)	(1.76 – 3.01)	189 (2.5)	(2.19 – 2.92)
	(22.5)	(17.56 - 28.40)	(77.5)	(71.60 - 82.44)
Parents/partner	20 (0.8)	(0.53 – 1.32)	44 (0.6)	(0.43 – 0.80)
	(31.3)	(20.57 - 44.20)	(68.8)	(55.80 - 79.43)
Parents/partner/roommates/friends	3 (0.1)	(0.03 – 0.40)	7 (0.1)	(0.04 – 0.20)
	(30.0)	(8.09 - 64.63)	(70.0)	(35.37 - 91.91)
Parents/partner/children	1 (0.0)	(0.00 – 0.27)	1 (0.0)	(0.00 – 0.09)
	(50.0)	(2.67 - 97.33)	(50.0)	(2.67 - 97.33)
Parents/children	6 (0.3)	(0.10 – 0.58)	12 (0.2)	(0.09 – 0.29)
	(33.3)	(14.36 - 58.85)	(66.7)	(41.15 - 85.64)
Alone	147 (6.2)	(5.24 – 7.21)	409 (5.5)	(4.97 – 6.02)
	(26.4)	(22.85 - 30.35)	(73.6)	(69.65 - 77.14)
Alone/roommates/friends	36 (1.5)	(1.07 – 2.10)	108 (1.4)	(1.19 – 1.75)
	(25.0)	(18.33 - 33.03)	(75.0)	(66.97 - 81.67)
Alone/partner	4 (0.2)	(0.05 – 0.46)	14 (0.2)	(0.11 – 0.32)
	(22.2)	(7.37 - 48.08)	(77.8)	(51.92 - 92.63)
Alone/partner/roommates/friends	0 (0.0)	(0.00 – 0.20)	6 (0.1)	(0.03 – 0.18)
	(0.0)	(0 - 48.32)	(100.0)	(51.68 - 100)
Alone/parents	18 (0.8)	(0.46 – 1.21)	65 (0.9)	(0.68 – 1.11)
	(21.7)	(13.69 - 32.35)	(78.3)	(67.65 - 86.31)
Alone/ parents/ roommates/friends	4 (0.2)	(0.05 – 0.46)	16 (0.2)	(0.13 – 0.35)
	(20.0)	(6.61 - 44.27)	(80.0)	(55.65 - 86.31)
Alone/parents/partner	2 (0.1)	(0.01 – 0.33)	6 (0.1)	(0.03 – 0.18)
	(25.0)	(4.45 - 64.43)	(75.0)	(35.58 - 95.55)
Alone/parents/children	1 (100)	(0.00 – 0.20)	0 (0.0)	(0.03 – 0.18)
	(100)	(5.46 - 100)	(0.0)	(0 - 94.54)
Universities				<0.001 <0.001
Alicante	194 (8.1)	(7.07 – 9.31)	594 (7.9)	(7.35 – 8.59)
	(24.6)	(21.68 - 27.81)	(75.4)	(72.19 - 78.32)
Cantabria	20 (0.8)	(0.53 – 1.32)	65 (0.9)	(0.68 – 1.11)
	(23.5)	(15.29 - 34.20)	(76.5)	(70.65 - 88.79)
Castilla La mancha	32 (1.3)	(0.93 – 1.91)	127 (1.7)	(1.42 – 2.02)
	(20.1)	(14.36 - 27.37)	(79.9)	(72.63 - 85.64)
Granada	739 (30.9)	(29.10 – 32.85)	2191 (29.3)	(28.29 – 30.36)
	(25.2)	(23.67 - 26.84)	(74.8)	(73.13 - 76.31)
Huelva	113 (4.7)	(3.93 – 5.68)	314 (4.2)	(3.76 – 4.69)
	(26.5)	(22.39 - 30.97)	(73.5)	(69.03 - 77.61)
Jaén	72 (3.0)	(2.38 – 3.80)	216 (2.9)	(2.53 – 3.30)
	(25.0)	(20.19 - 30.49)	(75.0)	(69.51 - 79.81)
León	240 (10.1)	(8.89 – 11.34)	588 (7.9)	(7.27 – 8.51)
	(29.0)	(25.94 - 32.23)	(71.0)	(67.77 - 74.06)
Salamanca	266 (11.1)	(9.92 – 12.48)	831 (11.1)	(10.42 – 11.86)
	(24.2)	(21.76 - 26.92)	(75.8)	(73.08 - 72.24)
Valencia	302 (12.6)	(11.35 – 14.06)	1145 (15.3)	(14.51 – 16.16)
	(20.9)	(18.82 - 23.08)	(79.1)	(76.92 - 81.18)
Valladolid	173 (7.2)	(6.25 – 8.38)	443 (5.9)	(5.41 – 6.49)
	(28.1)	(24.60 - 31.84)	(71.9)	(68.16 - 75.40)
Vigo	237 (9.9)	(8.77 – 11.21)	960 (12.8)	(12.10 – 13.63)
	(19.8)	(17.60 - 22.20)	(80.2)	(77.80 - 82.40)

[a] p-value obtained through the Chi-square test or Fisher's exact test for percentages in both column and rows.

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Table 2. Characteristics of the university sample according to the geographical location of the universities

	Universities of the north [a]		Universities of the south [b]		
	n (%)	(CI 95%)	n (%)	(CI 95%)	p- value [c]
Sex					0.001
Male	1181 (29.7)	(28.24-31.11)	1556 (26.5)	(25.34-27.61)	
Female	2801 (70.3)	(68.89-71.75)	4324 (73.5)	(72.39-74.66)	
BMI					0.82
Underweight (< 18.5)	391 (9.9)	(8.92-10.80)	598 (10.2)	(9.42-10.98)	
Normal weight (18.5-24.5)	2860 (72.1)	(70.39-73.21)	4213 (71.9)	(70.48-72.80)	
Overweight (25-30)	584 (14.7)	(13.59-15.81)	839 (14.3)	(13.39-15.19)	
Obese (> 30)	133 (3.4)	(2.81-3.96)	210 (3.6)	(3.12-4.09)	
Marital status					0.019
Married	315 (7.9)	(7.10 - 8.80)	537 (9.1)	(8.41 – 9.90)	
Single	3662 (92.1)	(91.06 - 92.78)	5340 (90.9)	(90.04 – 91.54)	
Employment status					0.20
Not working	3575 (89.8)	(88.79 – 90.69)	5246 (89.2)	(88.39 – 89.99)	
Working	407 (10.2)	(9.31 – 11.21)	634 (10.8)	(10.00 – 11.61)	
Place of residence					<0.001
Family home	1705 (42.8)	(41.28 – 44.37)	2779 (47.3)	(45.98 – 48.55)	
University residence	663 (16.6)	(15.51 – 17.85)	438 (7.4)	(6.80 – 8.16)	
Own home	109 (2.7)	(2.26 – 3.30)	161 (2.7)	(2.34 – 3.20)	
Rental	1429 (35.9)	(34.39 – 37.40)	2442 (41.5)	(40.27 – 42.80)	
Other	76 (1.9)	(1.52 – 2.40)	60 (1.0)	(0.79 – 1.32)	
Coexistence					<0.001
Parents	1760 (44.2)	(42.65 – 45.76)	2756 (46.9)	(45.59 – 48.15)	
Roomates	1604 (40.3)	(38.76 – 41.82)	2438 (41.5)	(40.20 – 42.74)	
Partner	173 (4.3)	(3.74 – 5.04)	259 (4.4)	(3.90 – 4.97)	
Alone	443 (11.7)	(10.17 – 12.15)	427 (7.3)	(6.61 – 7.96)	

[a] Universities of the north: Cantabria, León, Vigo, Salamanca, and Valladolid. [b] Universities of the south: Granada, Jaén, Huelva, Alicante. [c] p-value obtained through the Chi-square test.

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Table 3. Factors associated with compliance with the nutritional recommendations on the frequency of consumption of pulses, according to the geographical region

	Universities of the north [a]	Universities of the south [b]
	ORcrude [c] (CI 95%)	ORcrude [c] (CI 95%)
Sex		
Male	1	1
Female	0.88 (0.76 – 1.04)	0.99 (0.87 – 1.14)
BMI		
Underweight (< 18.5)	1.11 (0.75-1.65)	0.93 (0.67-1.29)
Normal weight (18.5-24.5)	1	1
Overweight (25-30)	1.21 (0.77-1.89)	1.04 (0.72-1.51)
Obese (> 30)	1.38 (0.89-2.11)	1.03 (0.71-1.47)
Marital status		
Married	1	1
Single	1.23 (0.95 – 1.59)	1.08 (0.88 – 1.33)
Employment status		
Not working	1	1
Working	1.06 (0.83 – 1.35)	0.97 (0.79 – 1.18)
Place of residence		
Family home	1	1
University residence	0.79 (0.67 – 0.93)	0.74 (0.65 – 0.84)
Own home/rental	0.76 (0.62 – 0.93)	0.91 (0.71 – 1.16)
Coexistence		
Parents	1	1
Roomates	1.00 (0.79 – 1.27)	0.94 (0.74 – 1.19)
Partner	1.27 (0.99 – 1.62)	1.25 (0.98 – 1.58)
Alone	1.52 (0.99 – 2.35)	1.07 (0.75 – 1.54)

[a] Universities of the north: Cantabria, León, Vigo, Salamanca, and Valladolid. b Universities of the south: Granada, Jaén, Huelva, Alicante. [c] OR and IC (95%) obtained through logistic regression.

Table 4. Compliance with the recommendations on the frequency of consumption of legumes, according to the SENC, by the frequency of different types of food consumed by the university population

	Compliant		Non-compliant		
	n (%)	(CI 95%)	n (%)	(CI 95%)	p- value [a]
Total	2388 (100) (24.2)	(99.80 - 100) (23.37 – 25.07)	7474 (100) (75,8)	(99.94 - 100) (74.92 – 76.62)	
Pulses					<0.001 <0.001
Never/almost never	0 (0.0) (0.0)	(0.00 - 0.20) (0 - 0.49)	968 (13.0) (100)	(12.20 - 13.74) (99.51 - 100)	
< 1 time per week	0 (0.0) (0.0)	(0.00 - 0.20) (0 - 0.24)	1953 (26.1) (100)	(25.14 - 27.14) (99.76 - 100)	
1 - 2 timer per week	0 (0.0) (0.0)	(0.00 - 0.20) (0 - 0.11)	4553 (60.9) (100)	(59.80 - 62.02) (99.89 - 100)	
3 - 4 per week but not daily	2014 (84.3) (100)	(82.80 - 85.76) (99.76 - 100)	0 (0.0) (0.0)	(0.00 - 0.06) (0 - 0.24)	
Daily	374 (15.7) (100)	(14.24 - 17.20) (98.73 - 100)	0 (0.0) (0.0)	(0.00 - 0.06) (0 - 1.26)	
Meat (chicken, beef, pork, lamb)					<0.001 <0.001
Never/almost never	220 (9.2) (52.4)	(8.10 - 10.46) (47.49 - 57.23)	200 (2.7) (47.6)	(2.33 - 3.07) (42.77 - 52.51)	
< 1 time per week	74 (3.1) (26.1)	(2.46 - 3.90) (21.21 - 31.75)	209 (2.8) (73.9)	(2.44 - 3.20) (68.25 - 78.79)	
1 - 2 timer per week	374 (15.7) (19.0)	(14.24 - 17.20) (17.30 - 20.81)	1595 (21.3) (81.0)	(20.42 - 22.29) (79.19 - 82.70)	
3 - 4 per week but not daily	1185 (49.6) (22.8)	(47.60 - 51.65) (21.68 - 23.98)	4010 (53.7) (77.2)	(52.51 - 54.79) (76.02 - 78.32)	
Daily	535 (22.4) (26.8)	(20.76 - 24.14) (24.89 - 28.83)	1460 (19.5) (73.2)	(18.64 - 20.46) (71.17 - 75.11)	
Hamburgers, hot dogs kebabs					<0.001 <0.001
Never/almost never	873 (36.6) (28.1)	(34.63 - 38.53) (26.57 - 29.77)	2229 (29.8) (71.9)	(28.79 - 30.88) (70.23 - 73.43)	
< 1 time per week	958 (40.1) (23.1)	(38.15 - 42.12) (21.84 - 24.43)	3187 (42.6) (76.9)	(41.52 - 43.77) (75.57 - 78.16)	
1 - 2 timer per week	470 (19.7) (20.9)	(18.12 - 21.35) (19.26 - 22.67)	1777 (23.8) (79.1)	(22.82 - 24.76) (77.33 - 80.74)	
3 - 4 per week but not daily	75 (3.1) (22.6)	(2.49 - 3.94) (18.28 - 27.55)	257 (3.4) (77.4)	(3.04 - 3.88) (72.45 - 81.72)	
Daily	12 (0.5) (33.3)	(0.27 - 0.90) (19.10 - 51.05)	24 (0.3) (66.6)	(0.21 - 0.48) (48.95 - 80.90)	
Eggs					<0.001 <0.001
Never/almost never	113 (4.7) (21.6)	(3.93 - 5.68) (18.17 - 25.39)	411 (5.5) (78.4)	(4.99 - 6.05) (74.61 - 81.83)	
< 1 time per week	314 (13.1) (19.3)	(11.83 - 14.58) (17.40 - 21.29)	1315 (17.6) (80.7)	(16.74 - 18.48) (78.71 - 82.60)	
1 - 2 timer per week	1155 (48.4) (22.2)	(46.34 - 50.39) (21.12 - 23.40)	4038 (54.0) (77.8)	(52.89 - 55.16) (76.60 - 78.88)	
3 - 4 per week but not daily	691 (28.9) (31.1)	(27.13 - 30.81) (29.16 - 33.05)	1533 (20.5) (68.9)	(19.60 - 21.45) (66.95 - 70.84)	
Daily	115 (4.8) (39.4)	(4.01 - 5.77) (33.79 - 45.26)	177 (2.4) (60.6)	(2.04 - 2.74) (54.74 - 66.21)	
Fish					<0.001 <0.001
Never/almost never	320 (13.4) (27.2)	(12.07 - 14.85) (24.66 - 29.82)	858 (11.5) (72.8)	(10.77 - 12.23) (70.18 - 75.34)	
< 1 time per week	354 (14.8) (18.5)	(13.44 - 16.33) (16.82 - 20.36)	1557 (20.8) (81.5)	(19.92 - 21.77) (79.64 - 82.18)	
1 - 2 timer per week	911 (38.1) (20.7)	(36.20 - 40.14) (19.51 - 21.92)	3492 (46.7) (79.3)	(45.59 - 47.86) (78.08 - 80.49)	
3 - 4 per week but not daily	697 (29.2) (32.6)	(27.38 - 31.06) (30.65 - 34.67)	1439 (19.3) (67.4)	(18.37 - 20.17) (65.33 - 69.35)	
Daily	106 (4.4) (45.3)	(3.66 - 5.36) (38.84 - 51.91)	128 (1.7) (54.7)	(1.44 - 2.04) (48.09 - 61.16)	
Processed meats					<0.001 <0.001
Never/almost never	416 (17.4)	(15.93 - 19.02)	964 (12.9)	(12.15 - 13.68)	

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	(30.1)	(27.75 - 32.66)	(69.9)	(67.34 - 72.25)	
< 1 time per week	308 (12.9)	(11.59 - 14.32)	1500 (20.1)	(19.17 - 20.99)	
	(17.0)	(15.35 - 18.87)	(83.0)	(81.13 - 84.65)	
1 - 2 timer per week	654 (27.4)	(25.62 - 29.23)	2164 (29.0)	(27.93 - 29.99)	
	(23.2)	(21.67 - 24.82)	(76.8)	(75.18 - 78.33)	
3 - 4 per week but not daily	594 (24.9)	(23.16 - 26.67)	1935 (25.9)	(24.90 - 26.90)	
	(23.5)	(21.56 - 25.20)	(76.5)	(74.80 - 78.14)	
Daily	416 (17.4)	(15.93 - 19.02)	911 (12.2)	(11.46 - 12.96)	
	(31.3)	(28.87 - 33.03)	(68.7)	(66.07 - 71.13)	
Dairy					<0.001 <0.001
Never/almost never	93 (3.9)	(3.17 - 4.77)	160 (2.1)	(1.83 - 2.50)	
	(36.8)	(30.87 - 43.06)	(63.2)	(56.94 - 69.13)	
< 1 time per week	79 (3.3)	(2.64 - 4.13)	245 (3.3)	(2.89 - 3.71)	
	(24.4)	(19.88 - 29.50)	(75.6)	(70.50 - 80.12)	
1 - 2 timer per week	198 (8.3)	(7.23 - 9.49)	640 (8.6)	(7.94 - 9.22)	
	(23.6)	(20.82 - 26.68)	(76.4)	(73.32 - 79.18)	
3 - 4 per week but not daily	355 (14.9)	(13.48 - 16.37)	1274 (17.0)	(16.20 - 17.92)	
	(21.8)	(19.83 - 23.89)	(78.2)	(76.11 - 80.17)	
Daily	1663 (69.6)	(67.74 - 71.47)	5155 (69.0)	(67.90 - 70.02)	
	(24.4)	(23.38 - 25.43)	(75.6)	(74.57 - 76.62)	
Pizza					<0.001 <0.001
Never/almost never	532 (22.3)	(20.63 - 24.01)	1484 (19.9)	(18.96 - 20.78)	
	(26.4)	(24.49 - 28.38)	(73.6)	(71.62 - 75.51)	
< 1 time per week	1121 (46.9)	(44.93 - 48.97)	3764 (50.4)	(49.22 - 51.50)	
	(22.9)	(21.78 - 24.16)	(77.1)	(75.84 - 78.22)	
1 - 2 timer per week	537 (22.5)	(20.84 - 24.23)	1884 (25.2)	(24.23 - 26.21)	
	(22.2)	(20.55 - 23.90)	(77.8)	(76.10 - 79.45)	
3 - 4 per week but not daily	130 (5.4)	(4.58 - 6.45)	270 (3.6)	(3.21 - 4.07)	
	(32.5)	(27.98 - 37.37)	(67.5)	(62.63 - 72.02)	
Daily	68 (2.8)	(2.23 - 3.62)	72 (1.0)	(0.76 - 1.22)	
	(48.6)	(40.10 - 57.13)	(51.4)	(42.87 - 59.90)	
Sweets (biscuits, cookies, pastries, jams etc.)					0.05 0.049
Never/almost never	277 (11.6)	(10.36 - 12.97)	814 (10.9)	(10.20 - 11.62)	
	(25.4)	(22.85 - 28.10)	(74.6)	(71.90 - 77.15)	
< 1 time per week	465 (19.5)	(17.91 - 21.13)	1330 (17.8)	(16.94 - 18.68)	
	(25.9)	(23.90 - 28.01)	(74.1)	(71.99 - 76.10)	
1 - 2 timer per week	587 (24.6)	(22.88 - 26.37)	1765 (23.6)	(22.66 - 24.60)	
	(25.0)	(23.23 - 26.77)	(75.0)	(73.23 - 76.77)	
3 - 4 per week but not daily	570 (23.9)	(22.18 - 25.64)	1975 (26.4)	(25.43 - 27.44)	
	(22.4)	(20.80 - 24.08)	(77.6)	(75.92 - 79.20)	
Daily	489 (20.5)	(18.89 - 22.16)	1590 (21.3)	(20.35 - 22.22)	
	(23.5)	(21.72 - 25.42)	(76.5)	(74.58 - 78.28)	
Sugary drinks					0.031 0.027
Never/almost never	884 (37.0)	(35.08 - 38.99)	2506 (33.5)	(32.46 - 34.61)	
	(26.1)	(24.61 - 27.60)	(73.9)	(72.40 - 75.39)	
< 1 time per week	585 (24.5)	(22.79 - 26.28)	1885 (25.2)	(24.24 - 26.22)	
	(23.7)	(22.03 - 25.42)	(76.3)	(74.58 - 77.97)	
1 - 2 timer per week	490 (20.5)	(18.93 - 22.21)	1638 (21.9)	(20.99 - 22.87)	
	(23.0)	(21.26 - 24.89)	(77.0)	(75.11 - 78.74)	
3 - 4 per week but not daily	248 (10.4)	(9.20 - 11.70)	862 (11.5)	(10.82 - 12.28)	
	(22.3)	(19.95 - 24.93)	(77.7)	(75.07 - 80.05)	
Daily	181 (7.6)	(6.56 - 8.73)	583 (7.8)	(7.21 - 8.44)	
	(23.7)	(20.75 - 26.90)	(76.3)	(73.10 - 74.25)	
Juices and milkshakes					<0.001 <0.001
Never/almost never	452 (18.9)	(17.39 - 20.57)	1504 (20.1)	(19.22 - 21.05)	
	(23.1)	(21.27 - 25.05)	(76.9)	(74.95 - 78.73)	
< 1 time per week	367 (15.4)	(13.96 - 16.89)	1335 (17.9)	(17.00 - 18.75)	
	(21.6)	(19.65 - 23.61)	(78.4)	(76.39 - 80.35)	
1 - 2 timer per week	427 (17.9)	(16.38 - 19.49)	1504 (20.1)	(19.22 - 21.05)	
	(22.1)	(20.29 - 24.04)	(77.9)	(75.96 - 79.71)	
3 - 4 per week but not daily	531 (22.2)	(20.59 - 23.97)	1569 (21.0)	(20.08 - 21.94)	
	(25.3)	(23.45 - 27.21)	(74.7)	(72.79 - 76.55)	
Daily	611 (25.6)	(23.86 - 27.40)	1562 (20.9)	(19.98 - 21.84)	
	(28.1)	(26.24 - 30.07)	(71.9)	(69.93 - 73.76)	

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Fresh fuit					<0.001 <0.001
Never/almost never	138 (5.8) (14.7)	(4.89 - 6.81) (12.50 - 17.13)	803 (10.7) (85.3)	(10.06 - 11.47) (82.87 - 87.50)	
< 1 time per week	177 (7.4) (16.7)	(6.41 - 8.55) (14.57 - 19.17)	880 (11.8) (83.3)	(11.06 - 12.53) (80.83 - 85.43)	
1 - 2 timer per week	309 (12.9) (18.6)	(11.63 - 14.37) (16.82 - 20.63)	1348 (18.0) (81.4)	(17.17 - 18.93) (79.37 - 83.18)	
3 - 4 per week but not daily	575 (24.1) (24.9)	(22.38 - 25.86) (23.19 - 26.76)	1731 (23.2) (75.1)	(22.21 - 24.14) (73.24 - 76.81)	
Daily	1189 (49.8) (30.5)	(47.77 - 51.82) (29.04 - 31.96)	2712 (36.3) (69.5)	(35.20 - 37.39) (68.04 - 70.96)	
Pasta, rice, potatoes					<0.001 <0.001
Never/almost never	12 (0.5) (20.0)	(0.27 - 0.90) (11.19 - 32.70)	48 (0.6) (80.0)	(0.48 - 0.86) (67.30 - 88.81)	
< 1 time per week	67 (2.8) (17.2)	(2.20 - 3.57) (13.68 - 21.46)	322 (4.3) (82.8)	(3.86 - 4.80) (78.57 - 86.32)	
1 - 2 timer per week	541 (22.7) (18.4)	(21.00 - 24.40) (17.02 - 19.85)	2400 (32.1) (81.6)	(31.06 - 33.18) (80.15 - 82.98)	
3 - 4 per week but not daily	1221 (51.1) (25.1)	(49.10 - 53.15) (23.84 - 26.30)	3653 (48.9) (74.9)	(47.74 - 50.02) (73.70 - 76.16)	
Daily	547 (22.9) (34.2)	(21.24 - 24.66) (31.91 - 36.62)	1051 (14.1) (65.8)	(13.28 - 14.88) (63.37 - 68.09)	
Bread and grains					<0.001 <0.001
Never/almost never	54 (2.3) (20.4)	(1.72 - 2.96) (15.79 - 25.84)	211 (2.8) (79.6)	(2.46 - 3.23) (74.16 - 84.20)	
< 1 time per week	120 (5.0) (19.5)	(4.20 - 5.99) (16.50 - 22.92)	495 (6.6) (80.5)	(6.07 - 7.22) (77.08 - 83.50)	
1 - 2 timer per week	196 (8.2) (19.2)	(7.15 - 9.40) (16.85 - 21.78)	825 (11.0) (80.8)	(10.34 - 11.78) (78.22 - 83.15)	
3 - 4 per week but not daily	464 (19.4) (23.2)	(17.87 - 21.09) (21.39 - 25.14)	1535 (20.5) (76.8)	(19.63 - 21.48) (74.86 - 78.61)	
Daily	1554 (65.1) (26.1)	(63.12 - 66.98) (24.96 - 27.20)	4408 (59.0) (73.9)	(57.85 - 60.10) (72.80 - 75.04)	
Vegetables					<0.001 <0.001
Never/almost never	41 (1.7) (6.1)	(1.25 - 2.34) (4.48 - 8.28)	629 (8.4) (93.9)	(7.80 - 9.07) (91.72 - 95.52)	
< 1 time per week	93 (3.9) (8.6)	(3.17 - 4.77) (7.07 - 10.52)	983 (13.2) (91.4)	(12.40 - 13.94) (89.48 - 92.93)	
1 - 2 timer per week	323 (13.5) (12.6)	(12.19 - 14.98) (11.37 - 13.98)	2237 (29.9) (87.4)	(28.90 - 30.98) (86.02 - 88.63)	
3 - 4 per week but not daily	957 (40.1) (32.3)	(38.11 - 42.08) (30.63 - 34.03)	2005 (26.8) (67.7)	(25.83 - 27.85) (65.97 - 69.37)	
Daily	974 (40.8) (37.5)	(38.81 - 42.79) (35.69 - 39.44)	1620 (21.7) (62.5)	(20.75 - 22.63) (60.55 - 64.31)	

[a] p-value obtained through the Chi-square test for percentages in both column and rows.