

## **Influence of Environmental and Political Determinants on Food Choices in a Sample of Portuguese Population**

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## ABSTRACT

**Background:** There is an increasing concern regarding the impacts of food choices on the environment. Therefore, in order to plan actions to promote more sustainable diets it is crucial to understand the influence of environmental and political determinants on people's food choices.

**Objective:** This work aimed at studying the extent to which environmental and political determinants influence people's food choices in a sample of the Portuguese population.

**Methods:** It was undertaken a descriptive cross-sectional study on a non-probabilistic sample of 1314 participants living in the Centre of Portugal. The questionnaires were applied after informed consent only to adults (aged 18 or over) and the data were collected from January and December 2017 among the Portuguese population.

**Results:** The participants' food choices were, in general, influenced by environmental and political determinants ( $0.77 \pm 0.53$ , in a scale from -2 to +2). It was also observed that the elderly, men and the participants who had a university degree were more influenced by these determinants. These findings were similar for those who lived in urban areas, the retired, the participants who had a professional activity or studies in agriculture areas and those who were responsible for buying their own food. Furthermore, there were found significant differences between age groups, genders and the levels of education. There were also observed significant differences between the different living environments, professional status, regarding the areas of work or studies and also between the participants who were responsible for buying their one food and the ones who were not. These findings are very important, because highlight the complicity of people's food choices and are determinant for the development of strategies that can improve people's eating habits.

**Conclusion:** This paper fulfils an identified need to study the environmental and political determinants underlying the Portuguese food choices.

**Keywords:** Diet, eating, environmental and political determinants, food choices, survey, sustainable diets.

## 1. INTRODUCTION

The determinants underlying food choices have been a theme of interest in many scientific reports. Among the main determinants that influence dietary choices are environmental, socioeconomic, cultural, political, cognitive and affective factors, as well as hunger and sensory perceptions [1,2]. Moreover, according to Crockett and Wallendorf [3], people increasingly express their political ideals, which is reflected in their acts of consumption. Food choices have an impact on the environment in several ways, such as climate change, land, water and energy use, as well as in biodiversity [4]. Moreover, all these factors may have major, and negative, consequences for human wellbeing [5]. In a world facing numerous environmental and political challenges, consumers are becoming more concerned about animal welfare, economic efficiency, child labour, local communities and the environmental sustainability of their diets [6–8]. In a French study by Mathé [9] it was found that the number of consumers concerned by environmental degradation, worker's rights and animal welfare increased from 7% to 20% between 1995 and 2007.

Nowadays, the food system all over the world is unsustainable, being extremely fragile to any climatic, socioeconomic, political or financial crisis [10]. Food production is responsible for approximately 30% of global greenhouse gas (GHG) emissions, as well as for 70-80% of all human withdrawals and it is a significant cause of water pollution [11–13]. On the other hand, there is an inequality in food supply, characterized by food excesses in developed countries and insufficient food intake in undeveloped countries [11,13,14]. Food waste is another concern of today's society, because every year about one third of the world food production is wasted, which corresponds to 1.3 billion tons per year [15]. In Europe, approximately 88 million tons of food are wasted annually. Food waste occurs along the entire food chain, and it is estimated that a large proportion is from family origin (47 million tons per year) [16]. Therefore, it is crucial the adoption of more sustainable diets. According to the Food and Agriculture Organization (FAO), sustainable diets correspond to diets with low environmental impacts that contribute to food and nutritional security, as well as to a healthy life for both present and future generations. These diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair, nutritionally adequate, safe and healthy, while optimizing natural and human resources [10]. In this context, it is of the utmost urgency the development of effective policies that can increase people's awareness about the environmental impacts of their diets. For that purpose, it is essential to do more research about people's behaviour towards political and environmental friendly food choices.

This study is included in the multinational project entitled "Psycho-social motivations associated with food choices and eating practices (EATMOT)" which aims to perform a research about some

85 psychic and social motivations that determine people’s dietary practices in relation to their food  
86 choices or eating habits.

87 The main goal of this study was to evaluate in what extent the participants’ food choices were  
88 influenced by environmental and political determinants. Since social and demographic characteristics  
89 are important factors for dietary patterns, it was also analysed how some sociodemographic factors  
90 and participants’ food regimen influenced the environmental and political determinants underlying  
91 food choices.

## 93 2. MATERIALS AND METHODS

### 94 2.1. Instrument

95 The questionnaire that was used for this study was based on a review of other existing instruments  
96 [17–23] and included some questions destined to the characterization of the sample, as well as a set of  
97 questions intended to access in what way participants’ food choices were influenced by environmental  
98 and political determinants. Hence, the participants were asked to indicate their extent of agreement  
99 towards the statements showed in Table 1, measured on a 5-point Likert scale varying from 1 to 5: 1  
100 (totally disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) and 5 (strongly agree) [24].

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102 **Table 1.** Statements used to access environmental and political determinants.

<b>Environmental and political determinants</b>	
1.	It is important to me that the food I eat is prepared/packed in an environmental friendly way.
2.	When I cook I have in mind the quantities to avoid food waste.
3.	It is important to me that the food I eat comes from my own country.
4.	I prefer to eat food that has been produced in a way that animals' rights have been respected.
5.	I choose foods that have been produced in countries where human rights are not violated.
6.	I avoid going to restaurants that do not have a recovery policy of food surplus.
7.	I prefer to buy foods that comply with policies of minimal usage of packaging.

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## **2.2. Data collection**

The data collection occurred between January and December 2017 among a sample of 1314 participants living in a Centre region of Portugal. Only adults (aged 18 or over) were included in the study, and their participation was voluntary and after informed consent. It was guaranteed the confidentiality of the answers and all ethical issues were followed when designing and applying the questionnaire, which was approved by the Ethical Committee with reference n° 04/2017.

## **2.3. Statistical Analysis**

In order to evaluate in what way the participants' food choices were influenced by environmental and political determinants, first of all it was necessary to calculate an average of the scores obtained for all the items included in Table 1. For this purpose, it was necessary to reformulate the scale to allow the calculation of an average score without the influence of the score attributed to the mean point of the Likert scale (3 = neither agree nor disagree). Therefore, the items were recoded into a new scale ranging from -2 and +2, by subtracting the value 3 from all previous scores, so that 1 became -2, 5 became +2, 3 became zero and so on. In this way, when computing the sum, the effect of those who had no opinion was not considered. The new scale was defined with the following interpretation, having in mind a uniform and plausible interval range: [-2.0 ; -1.5[ - food choices not at all influenced by environmental and political determinants; [-1.5 ; -0.5[ - food choices not influenced by environmental and political determinants; [-0.5 ; 0.5[ - food choices slightly influenced by environmental and political determinants; [0.5 ; 1.5[ - food choices influenced by environmental and political determinants; [1.5 ; 2.0] - food choices strongly influenced by environmental and political determinants. Then, it was calculated an average of the scores obtained for all the items included in this section of the questionnaire.

For the treatment of the data, basic descriptive statistic tools were used, complemented with parametric tests, namely the Student's t-test for the comparison of means between two groups and one-way ANOVA for the comparison of means between three or more groups. In ANOVA's case, in order to assess the differences between groups it was used the post-hoc Tukey HSD test, also known as the Tukey's HSD (Honestly Significant Difference) test. This statistical test is used to identify which means are significantly different from each other, and consists in a single-step multiple comparison procedure, coupled to ANOVA. In this test the difference between means is evaluated to see whether or not it is greater than the standard error [25–27]. All data analysis was made using the SPSS program, version 25 from IBM, Inc. and in all tests the level of significance considered was 5%.

## 2.4. Sample Characterization

The sociodemographical characteristics of the respondents in the sample are outlined in Table 2. This study included 1314 participants living in Portugal, from which 67.0% were women and 33.0% were men. The age varied between 18 and 84 years, being on average  $37.4 \pm 14.7$  years for the whole sample. The average age of the female participants was lower than that of the male participants ( $35.8 \pm 14.1$  and  $40.5 \pm 15.4$  years, respectively). The variable age was classified into categories according to: young adults, from 18 to 30 years, accounting for 40.5%; average adults, from 31 to 50 years, representing 38.1%; senior adults, from 51 to 64 years, corresponding to 17.3%; elderly, 65 or more years, representing 4.2%.

The majority of the participants had a high level of education (56.6% with a university degree), while 43.2% had completed secondary school and just a minor portion (0.2%) had the lowest level of education (primary school) as their terminal education.

Regarding the living environment, 76.7% lived in urban areas, 6.9% in suburban surroundings and 16.4% in rural areas.

As for the civil state, 49.8% of the participants were married or lived as a marital couple, 40.2% were single, 5.6% were divorced or separated and 4.4% were widowed.

Table 2 also shows that most of the participants (60.4%) were employed, 29.1% were students and only a few of them corresponded to the other professional status. It was further observed that the majority of the participants (66.2%) did not have a professional activity or studies related to any of the areas suggested in the questionnaire (nutrition, food, agriculture, sport, psychology, or other health areas). Most of the participants indicated that they were responsible for buying their own food (93.0%), against only 7.0% that answered that they were not.

**Table 2.** Sociodemographical characterization of the sample at study.

<b>Sociodemographic data</b>		<b>Frequency (N)</b>	<b>Percentage (%)</b>
Age	18y ≤ age ≤ 30y	532	40.5
	31y ≤ age ≤ 50y	500	38.1
	51y ≤ age ≤ 64y	227	17.3
	Age ≥ 65y	55	4.2
Gender	Women	881	67.0
	Men	433	33.0
Highest Level of Education	Primary School	2	0.2
	Secondary School	568	43.2
	University Degree	744	56.6
Living environment	Rural	215	16.4
	Urban	1008	76.7
	Suburban	91	6.9
Civil State	Single	528	40.2
	Married/Living Together	654	49.8
	Divorced/Separated	74	5.6
	Widow	58	4.4
Professional status	Employed	793	60.4
	Unemployed	31	2.4
	Student	382	29.1
	Retired	41	3.1
	Working student	67	5.1
Area of studies/profession	Nutrition	36	2.8
	Food	90	6.9
	Agriculture	42	3.2
	Sport	54	4.2
	Psychology	29	2.2
	Health	187	14.4
	Other	858	66.2
<b>Total Number of Participants</b>		<b>1314</b>	<b>100.0</b>

Table 3 presents the participants' specific food regimen and the results showed that the majority of them (86.0%) did not follow any specific food regimen, being this percentage higher for men (93.3%) when compared to women (82.4%). On the other hand, a higher percentage of the female participants, 9.2%, followed a food regimen based on a caloric restriction, when compared to the male participants, 3.2%.

**Table 3.** Participants' specific food regimen, according to gender.

Specific Food Regimen	Global	Women	Men
	%	%	%
Raw foodism	0.0	0.0	0.0
Fruitarianism	0.2	0.2	0.2
Vegetarianism	3.4	4.3	1.4
Veganism	0.5	0.7	0.0
Flexitarianism	1.1	1.5	0.5
Caloric restriction	7.2	9.2	3.2
Religious restriction	0.5	0.5	0.5
Other	1.1	1.3	0.9
None	86.0	82.4	93.3

### 3. RESULTS AND DISCUSSION

#### 3.1. Environmental and political determinants for food choices

Table 4 presents the results for the participants' opinions about some environmental and political issues and as it can be observed 58.5% of the respondents indicated that for them it is important that the food they eat is prepared/packed in an environmental friendly way. Besides, more than a half of the participants, 55.2%, agreed that they prefer to buy food that complies with policies of minimal usage of packaging. Regarding the importance of avoiding food waste, 52.3% of the respondents answered that they try to have in mind food quantities when they cook. However, when they were asked if they avoided restaurants that do not have a recovery of food surplus policy, a significant percentage of the participants neither agreed nor disagreed with that statement (44.8%). As for the importance of eating foods from their own country, 46.0% of the respondents agreed with that fact. Furthermore, it was also observed that participants' opinions were more divided regarding the ethical concerns about animals' and humans' rights. In fact, previous research suggested that there is a relatively high awareness among the population that food production has an impact on climate change,

184 but less than 20% of the people know how to change their diet into one that is more sustainable [28].  
185 In a more recent study by Hoek et al. [12], it was found that, in general, there is a low level of awareness  
186 and understanding about the impact of foods on the environment.

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**Table 4.** Participants' opinions about some environmental and political issues.

Statements about environmental and political issues	Scale <sup>1</sup>				
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
1. It is important to me that the food I eat is prepared/packed in an environmental friendly way	0.8	3.7	14.9	58.5	22.2
2. When I cook I have in mind the quantities to avoid food waste	0.5	1.5	5.7	52.3	39.9
3. It is important to me that the food I eat comes from my own country	1.5	6.8	19.8	46.0	25.9
4. I prefer to eat food that has been produced in a way that animals' rights have been respected	2.4	2.6	19.0	38.2	37.8
5. I choose foods that have been produced in countries where human rights are not violated	5.1	17.5	53.8	15.8	7.7
6. I avoid going to restaurants that do not have a recovery policy of food surplus	2.5	10.3	44.8	33.2	9.2
7. I prefer to buy foods that comply with policies of minimal usage of packaging	1.3	4.1	24.1	55.2	15.2

<sup>1</sup>Scale: 1 (totally disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree) and 5 (strongly agree)

### 3.1.1. Individual and professional characteristics

For the sample at study, the mean score obtained for the influence of environmental and political determinants on participants' food choices was equal to  $0.77 \pm 0.53$ , meaning that, in general, participants' food choices were influenced by those determinants.

Table 5 presents the results for the relations between sociodemographical characteristics and the influence of *environmental and political determinants*, and as it can be observed for elderly the mean score was  $1.07 \pm 0.40$ , for senior adults was  $0.91 \pm 0.47$ , for average adults the value was equal to  $0.90 \pm 0.48$  and with a lowest score came the group of young adults ( $0.56 \pm 0.54$ ), meaning that, in general, the food choices of the participants were influenced by environmental and political determinants. The results of the ANOVA test showed that there was a significant difference among

age groups. This tendency was in agreement with the results of the study performed by Sautron et al. [29], where it was found that environmental and political concerns tend to increase with age.

Regarding gender, it was found that both men and women were influenced by environmental and political issues when making their food choices, with a higher mean score for men ( $0.81 \pm 0.50$ ) when compared to women ( $0.76 \pm 0.55$ ). In this case, there were also found significant differences between genders. These findings are not in accordance to the ones obtained in previous studies, where it was observed that women tended to be more thoughtful about food and health issues and they seem to have more moral and ecological doubts about eating certain foods than men [30–33]. However, the findings of the mentioned studies were not so recent as our work, and because in the latest years a higher awareness for ecological issues has arisen, maybe the differences between genders concerning diet ecological aspects were faded.

According to scientific evidences, it is often observed that individuals with higher education levels tend to be more environmentally friendly [34]. The results of this study corroborate those findings, being the participants who had a university degree the ones that obtained a higher mean score for the influence of environmental and political determinants ( $0.87 \pm 0.50$ ). However, for all levels of education the results showed that participants' food choices were influenced by environmental and political determinants (mean values between 0.5 and 1.5). According to the results of the ANOVA test, it was observed that the differences between the levels of education were significant. More specifically, the mean values of the participants who had a university degree and primary school as their terminal education were statistically different from the mean values of the participants who had secondary school as their terminal education. In previous research it was also found that the level of education influences behaviour directly and indirectly by raising environmental concerns [35]. In fact, education provides relevant prior information that consumers can use in their shopping decisions, and facilitates the search as well as the acquisition of information about the environmental impact of their food choices and decisions [36].

Concerning the living environment, with a higher mean score came the participants who lived in urban areas ( $0.86 \pm 0.48$ ), followed by the participants who lived in suburban areas ( $0.51 \pm 0.62$ ) and finally the ones who lived in rural areas ( $0.48 \pm 0.55$ ), meaning that the food choices of the participants who lived in urban and suburban areas were influenced by environmental and political determinants, but the food choices of the participants who lived in rural areas were only slightly influenced by those determinants. Furthermore, were also found significant differences among the participants who lived in different areas.

The results of the ANOVA test also showed significant differences among the different professional status, being the participants that were retired the ones that obtained a higher mean score ( $0.99 \pm 0.36$ ) and the participants that were students the ones obtaining the lowest value ( $0.51 \pm 0.55$ ). However, since the mean values were between 0.5 and 1.5, independently of the professional status, participants' food choices were influenced by environmental and political determinants. Furthermore, it was also analysed the relation between the professional activity or areas of study and the environmental and political determinants underlying participants' food choices. As it was expected, were found significant differences among the different work or studies areas. The highest mean value achieved was for the participants that had a professional activity or studies related to agriculture ( $0.85 \pm 0.57$ ), and the lowest mean score was for those who had a professional activity or studies related to nutrition ( $0.45 \pm 0.62$ ). With the exception of the participants who had a professional activity or studies in a nutrition-related area, for all the other cases, participants' food choices were influenced by political and environmental determinants. For those who had a professional activity or studies related to nutrition, the data revealed that their food choices were only slightly influenced by environmental and political determinants. Previous studies suggested that women, the young, those more educated, with higher income, liberal or left leaning, urban residents and those well informed about environmental issues, tend to be more environmentalists [37–40]. On the contrary, in other studies it was found that sociodemographic factors had a weak or even contradictory influence, not only on pro-environmental behaviour, but also on the characteristics of sustainable consumers [41–44].

The results of the Student's t-test showed that there were significant differences between the participants who were responsible for buying their own food and those who were not, being the participants who were responsible the ones that obtained a highest mean score ( $0.81 \pm 0.51$ ), meaning that the food choices of these participants were influenced by environmental and political determinants. For the participants that were not responsible for buying their own food, the results revealed that their food choices were only slightly influenced by environmental and political determinants ( $0.31 \pm 0.55$ ).

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**Table 5.** Relations between some sociodemographical factors and the *environmental and political determinants* (scale from -2 = food choices not at all influenced by environmental and political determinants to +2 = food choices strongly influenced by environmental and political determinants).

Variable		Mean $\pm$ SD	<i>p-value</i>
Age group	18y $\leq$ age $\leq$ 30y	0.56 $\pm$ 0.54a	0.001 <sup>1</sup>
	31y $\leq$ age $\leq$ 50y	0.90 $\pm$ 0.48b	
	51y $\leq$ age $\leq$ 64y	0.91 $\pm$ 0.47b	
	Age $\geq$ 65y	1.07 $\pm$ 0.40c	
Gender	Women	0.76 $\pm$ 0.55	0.047 <sup>2</sup>
	Men	0.81 $\pm$ 0.50	
Level of Education	Primary School	0.86 $\pm$ 0.20a	0.000 <sup>1</sup>
	Secondary School	0.64 $\pm$ 0.54b	
	University	0.87 $\pm$ 0.50a	
Living Environment	Rural	0.48 $\pm$ 0.55a	0.000 <sup>1</sup>
	Urban	0.86 $\pm$ 0.48b	
	Suburban	0.51 $\pm$ 0.62a	
Professional status	Employed	0.89 $\pm$ 0.48bc	0.000 <sup>1</sup>
	Unemployed	0.65 $\pm$ 0.49a	
	Student	0.51 $\pm$ 0.55a	
	Retired	0.99 $\pm$ 0.36c	
	Working student	0.75 $\pm$ 0.58ab	
Work or studies related areas	Nutrition	0.45 $\pm$ 0.62a	0.000 <sup>1</sup>
	Food	0.70 $\pm$ 0.48ab	
	Agriculture	0.85 $\pm$ 0.57b	
	Sport	0.52 $\pm$ 0.53a	
	Psychology	0.50 $\pm$ 0.71a	
	Health	0.63 $\pm$ 0.56ab	
	Others	0.86 $\pm$ 0.50b	
Is responsible for buying the food	Yes	0.81 $\pm$ 0.51	0.000 <sup>2</sup>
	No	0.31 $\pm$ 0.55	

<sup>1</sup>ANOVA for comparison of 3 or more groups (Level of significance 5%).Mean values with the same letter are not statistically different (p<0.05).

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<sup>2</sup>Student's t-test for independent samples for comparison of 2 groups (Level of significance 5%).

### 3.1.2. *Eating practices*

The adoption of a particular dietary regimen involves a particular way of being or experiencing the world and there are many variants in dietary restriction and in motivations for adopting such diets [45]. Table 6 presents the relations between participants' specific food regimen and the environmental and political determinants, and as it can be observed the highest mean score achieved was for the participants who were flexitarians ( $0.94 \pm 0.50$ ), followed by the participants that were vegetarians ( $0.82 \pm 0.61$ ) and the lowest mean score was for those who followed a frutarianism regimen ( $0.33 \pm 0.84$ ). Surprisingly, the mean score obtained for vegan's participants was equal to  $0.58 \pm 0.34$ , lower than the mean value of the participants that did not follow any specific food regimen ( $0.78 \pm 0.53$ ). However, no significant differences were found among the different food regimens. Nevertheless, with the exception of the participants that followed frutarianism and other specific food regimens, in the other cases, participants' food choices were influenced by environmental and political determinants (mean values between 0.5 and 1.5). In the specific case of the fruitarians and the participants that adopted other special dietary regimens, the results showed that their food choices were only slightly influenced by environmental and political determinants (mean values between -0.5 and 0.5). According to previous studies, vegetarianism is beneficial to health, the environment, farm animals and world hunger [46–48]. In fact, the major motivations for people becoming vegetarians are concerns for health and for animal welfare [45]. When compared to omnivorous, vegans and vegetarians usually have higher engagement of empathy related brain areas while observing negative scenes of both humans and animals [49], which often translates into greater concerns about harm and fairness, loyalty, authority, respect, purity and sanctity [50]. In another study, it was found that flexitarians tended to be more concerned about animal welfare than omnivorous, but less concerned than vegetarians [51].

Table 6. Relations between participants' specific food regimen and the *environmental and political determinants* (scale from -2 = food choices not at all influenced by environmental and political determinants to +2 = food choices strongly influenced by environmental and political determinants).

Variable		Mean $\pm$ SD	<i>p-value</i>
Specific food regimen	Raw foodism	----- <sup>2</sup>	0.104 <sup>1</sup>
	Frutarianism	0.33 $\pm$ 0.84	
	Vegetarianism	0.82 $\pm$ 0.61	
	Veganism	0.58 $\pm$ 0.34	
	Flexitarianism	0.94 $\pm$ 0.50	
	Caloric restriction	0.72 $\pm$ 0.45	
	Religion restrictions	0.50 $\pm$ 0.34	
	Other	0.49 $\pm$ 0.52	
	No special regimen	0.78 $\pm$ 0.53	

<sup>1</sup>ANOVA for comparison of 3 or more groups (Level of significance 5%).

<sup>2</sup>There were no occurrences.

#### 4. CONCLUSION

From this study it can be concluded that, in general, the participants' food choices were influenced by environmental and political determinants. The exceptions were the participants who lived in rural areas, those who had a professional activity or studies related to nutrition, the frutarians and also the participants who followed other specific food regimens that were not mentioned in the questionnaire. For these participants, their food choices were only slightly influenced by environmental and political determinants.

Overall, the results of this study confirmed that sociodemographical characteristics influence the participants concerns with environmental and political determinants, which is reflected in their food choices. There were found significant differences in the extent to which environmental and political determinants influence participants' food choices regarding age group, gender, civil state, level of education, living environment, professional status, area of studies or work and the fact that the participants were responsible for buying their own food or not. On the other hand, there were no significant differences among the participants that had different food regimens. According to the individual's and professional characteristics, the highest mean scores achieved were for the seniors, retired, men, who had a university degree, who lived in an urban area, those that were responsible for buying their own food and also for the participants that had a professional activity or studies related to

agriculture. Concerning the specific food regimen, flexitarians showed to be more influenced by environmental and political determinants than the participants who followed other specific food regimes. Nevertheless, there were no mean scores equal or higher than 1.5, which means that in none of the cases the participants' food choices were strongly influenced by environmental and political determinants.

The findings of this study are very important, because they allow to characterize in what extent Portuguese people's food choices are influenced by environmental and political determinants. This knowledge is crucial to promote and implement policies, as well as approaches, that may contribute to more sustainable food choices.

The main limitation of this study is related to the fact that some of the statements included in the questionnaire measured concerns and not attitudes, and therefore did not allow, at this stage, to verify if the participants' concerns about environmental and political issues actually translate into environmentally friendly food behaviours.

## 5. DECLARATION OF INTEREST

The authors have no conflict of interest to declare.

## 6. ACKNOWLEDGMENT

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