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**O IMPACTO DAS ESCOLHAS ALIMENTARES NA PROTECÇÃO DOS DIREITOS HUMANOS E DOS ANIMAIS E NA SUSTENTABILIDADE AMBIENTAL**

**THE IMPACT OF FOOD CHOICES ON HUMAN AND ANIMAL RIGHTS PROTECTION AND ENVIRONMENTAL SUSTAINABILITY**

**EL IMPACTO DE LAS ELECCIONES ALIMENTARIAS EN LA PROTECCIÓN DE LOS DERECHOS HUMANOS Y DE LOS ANIMALES Y LA SOSTENIBILIDAD AMBIENTAL**

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## RESUMO

**Introdução:** As escolhas alimentares das pessoas são da maior importância para regulamentar os mercados e a cadeia alimentar com vista à meta global de sustentabilidade.

**Objetivos:** O objetivo deste trabalho foi avaliar em que medida alguns aspetos ligados à sustentabilidade na cadeia alimentar influenciam as escolhas alimentares das pessoas, especificamente nos domínios de embalagem, excedentes, transporte e bem-estar humano ou animal.

**Métodos:** Trata-se de um estudo transversal envolvendo 3183 pessoas de Portugal, Itália, Lituânia e Roménia, que participaram neste estudo por questionário entre janeiro e junho de 2018.

**Resultados:** As pessoas tendem a condicionar as suas escolhas alimentares com vista a contribuir para uma cadeia alimentar mais sustentável, com respeito pelo meio ambiente, pelos seres humanos e pelos animais. As áreas em que esse comportamento é mais forte incluem evitar o desperdício de alimentos em casa (80% dos participantes), preferência por alimentos locais (60%), cultivo sustentável, preparação ou embalagem de alimentos (66%). O respeito pelos direitos dos animais é muito importante para 62% dos participantes, mas o respeito pelos direitos humanos é uma preocupação de apenas 32%. Os resultados dos testes estatísticos indicaram que a idade, a educação, o país, a área profissional e o tipo de dieta influenciaram significativamente as escolhas das pessoas em relação à sustentabilidade da cadeia alimentar.

**Conclusões:** Embora os resultados sejam indicativos de que as pessoas começam a condicionar os seus comportamentos alimentares também de acordo com questões de sustentabilidade, também é verdade que ainda há trabalho a ser feito, uma vez que a adoção dessas escolhas sustentáveis ainda é limitada.

**Palavras-chave:** cadeia alimentar; embalagem de alimentos; alimentos sustentáveis; resíduos; bem-estar

## ABSTRACT

**Introduction:** People's food choices are of the utmost importance to regulate markets and the food chain towards the global goal of sustainability.

**Objectives:** The objective of this work was to evaluate to what extent some aspects linked to sustainability in the food chain influence people's food choices, specifically in the domains of packaging, food surplus, transportation and human or animal welfare.

**Methods:** This is a cross-sectional study involving 3183 people from Portugal, Italy, Lithuania and Romania, who participated in this questionnaire survey between January and June 2018.

**Results:** People tend to condition their food choices in view of contributing for a more sustainable food chain with respect for environment, humans and animals. The areas in which this behaviour is stronger include avoiding food waste at home (80% of participants), preference for local foods (60%), sustainable food growing, preparation or packaging (66%). The respect for animal rights is very important for 62% of the participants, but the respect for Human rights is a concern for just 32%. The results of statistical tests indicated that age, education, country, professional area and type of diet all significantly influenced people's choices regarding the sustainability of the food chain.

**Conclusions:** Although the results are indicative that people start to condition their eating behaviours also according to sustainability issues, it is a fact that there is still work to be done, since the adoption of these sustainable choices is still in a limited extent.

**Keywords:** food-chain; food package; sustainable food; waste; welfare

## RESUMEN

**Introducción:** Las elecciones alimentarias de las personas son de suma importancia para regular los mercados y la cadena alimentaria hacia el objetivo global de sostenibilidad.

**Objetivos:** El objetivo de este trabajo fue evaluar en qué medida algunos aspectos vinculados a la sostenibilidad en la cadena alimentaria influyen en las elecciones alimentarias de las personas, específicamente en los dominios de embalaje, excedente de alimentos, transporte y bienestar humano o animal.

**Métodos:** Este es un estudio transversal que incluyó a 3183 personas de Portugal, Italia, Lituania y Rumania, que participaron en esta encuesta entre enero y junio de 2018.

**Resultados:** las personas tienden a condicionar sus elecciones alimentarias con el fin de contribuir a una cadena alimentaria más sostenible con respeto por el medio ambiente, los humanos y los animales. Las áreas en las que este comportamiento es más fuerte incluyen evitar el desperdicio de alimentos en el hogar (80% de los participantes), la preferencia por los alimentos locales (60%), el cultivo sostenible de alimentos, la preparación o el envasado (66%). El respeto por los derechos de los animales es muy importante para el 62% de los participantes, pero el respeto por los derechos humanos solo preocupa al 32%. Los resultados de



las pruebas estadísticas indicaron que la edad, la educación, el país, el área profesional y el tipo de dieta influyeron significativamente en las elecciones de las personas con respecto a la sostenibilidad de la cadena alimentaria.

**Conclusiones:** Aunque los resultados son indicativos de que las personas comienzan a condicionar sus conductas alimentarias también de acuerdo con los problemas de sostenibilidad, es un hecho que todavía hay trabajo por hacer, ya que la adopción de estas opciones sostenibles aún es limitada.

**Palabras clave:** cadena alimentaria; cadena alimentaria; alimentos sostenibles; residuos; bienestar

## INTRODUCTION

Sustainability policies go back to the 80's last century and rely on three fundamental pillars, which are environment, economy and society. Hence achieving sustainability has to be interpreted as working on these three fronts, some harder than other to understand and modulate, like for example the social dimension. In the case of food chain, from primary production up to the final disposal of leftovers and package, food must be produced, transformed, stored, transported, displayed (in supermarkets in case of refrigerated products), handled and disposed in sustainable ways. The social facet of this challenge, a sustainable food chain, can include attributes such as food availability, safety, quality and adequacy, ethical trading, worker welfare, animal welfare, rural livelihoods, decent wages, trust or equity (Sharpe and Barling, 2019).

Presently, organizations attribute increasing importance to the concept of sustainability, implementing concrete measures, either as a way to improve the company's image to the general public, or also for direct economic advantages while at the same time improving environmental performance and minimizing the possible harmful impacts. Seventeen Sustainable Development Goals (SDGs) have been established in the domain of food waste management (Thamagasorn and Pharino, 2019). Among those, Target 12.3 aims to reduce food losses by 2030 and diminish the per capita global food waste to half (FAO, 2018). This, no doubt has launched challenges that have projected food waste as primary targets at international level. According to Garcia-Garcia et al. (2015) every year one third of the food produced globally is never consumed and ends up as waste ( $\approx$  1.3 billion tons/year). In the catering industry or services this is also a reality, with the same proportion of food (1/3) being disposed of as waste, as a consequence of overproduction in order to avoid running out (IME, 2013). The sustainability issues linked to food waste are varied and go beyond the loss of valuable caloric content. In fact, they include aspects like the depletion of soil fertility, the loss of water and energy required for the production, transformation, storage and handling of foods, as well as the increasing governmental annual global costs of solid waste management (CGIAR, 2012). This is expected to almost double from 2010 to 2025 (WB, 2012). Agri-food systems refer to the activities and socio-technical governance that frame the processes involved in food production, manufacture, retailed and consumption. The factors that influence food production include internal supply chain aspects like growing mode (conventional agriculture *versus* organic farming or fisheries *versus* aquaculture, are some examples), use of resources and land quality, as well as a set of external factors like production intensification, globalization, climate change, scarceness of natural resources and need to guarantee the future demands (Godfray and Garnett, 2014; Hubeau et al., 2017; Rees et al., 2019).

The way people perceive sustainable food concepts and how consumers shape their behaviours as a function, or not, of those perceptions is greatly important to assess reliable information and create opportunities for implementing global policies of sustainability in the food supply chain. Hence, the aim of the present study, as a part of the international project EATMOT, was to evaluate to what extent some aspects linked to sustainability in the food chain influence people's attitudes towards food choices, specifically in the domains of packaging, food surplus, transportation and human and animal welfare.

## 1. METHODS

### 1.1. Instrument

The EATMOT study was carried out by means of a questionnaire, which was designed to collect information about the sociodemographic characteristics of the participants, their habits regarding food and eating practices, and their eating motivations on six different dimensions: health, emotions, environment and politics, price and convenience, society and culture, marketing and commercials. However, to this particular study only the items from the scale for environmental and political motivations were considered. All items were measured on a 5-point Likert scale: 1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree and 5 - strongly agree. The questionnaire was approved by the Ethical Committee of Health School of Viseu with Reference nº 04/2017, before application.

### 1.2. Data collection

This is a cross-sectional study involving 3183 participants, adult citizens, recruited voluntarily to answer the questionnaire, in the four countries participating in the study: Portugal, Italy, Lithuania and Romania. The data collection occurred between January and June 2018, and all ethical procedures were followed when designing the study and applying the questionnaire.

### 1.3. Statistical analysis

For the treatment of data, basic descriptive statistics was used (frequencies, mean, standard deviation) complemented with statistical tests: T-test for independent samples to compare between 2 groups and ANOVA to compare between three or more groups. In all cases the level of significance considered was 5% and the software used was SPSS version 25 (IBM, United States).

## 2. RESULTS AND DISCUSSION

### 2.1. Sample characterisation

The study included 3183 participants, from which 68.6% were female and 31.4% were male. The age distribution was as follows: 39,3% young adults (18 – 30 years), 39.7% average adults (31 – 50 years), 17.1% senior adults (51 – 65 years) and 3.9% elderly (over 65 years). Most participants had a university level of education, 60.7%, while 35.9% had completed secondary school and a minority, 3.4%, had primary school as the highest level of education completed. The distribution by country was 41.3% from Portugal, 25.8% from Romania, 17.0% from Italy and 15.9% from Lithuania, and attempted to represent different regions of Europe, respectively, the Iberian Peninsula, central Europe, Mediterranean Europe and northern Europe.

### 2.2. Eating habits

Eating habits are the result of the individual food choices that one individual brings repeat in everyday life (Köster, 2009). Because the eating habits can be associated with different food choices, this was also an issue addressed in the questionnaire, for which the participants were asked about their dietary pattern. Hence it was observed that only 24.1% of the participants followed a special diet. Regarding the dietary regimen, most participants indicated they practiced caloric restriction (45.1%), in second place came vegetarianism (15.2%) and third flexitarianism (14.3%), as the most representative (Figure 1). Caloric restriction is a very common practice, used for many different purposes, including the weight control to fight obesity and the harmful health consequences associated with this civilizational disease. Overweight and obesity are nutrition-related problems that have been assuming a preoccupying dimension in the last decades, and for which greatly contribute the economic and nutritional changes associated with modern life styles (Gil-Rojas et al., 2019). The economic impact of obesity is a world problem, and is felt in two areas: on one side the increase in health expenditure while on the other there is a loss of productivity due to inability to work. Obesity has been identified as a major risk factor for a huge number of morbidities, most of which are related to significant endocrine and metabolic disorders (Lehnert et al., 2013). Nevertheless, the practice of caloric restriction has been associated with other health improving functions, namely, anti-cancer (Lu et al., 2019), intestinal health (Fabersani et al., 2018), age retardation (Bi et al., 2018), neuroprotection (Yao et al., 2019), fighting skin ageing (Forni et al., 2017) or reprogramming hepatic functions (Rhoads et al., 2018), to name a few.

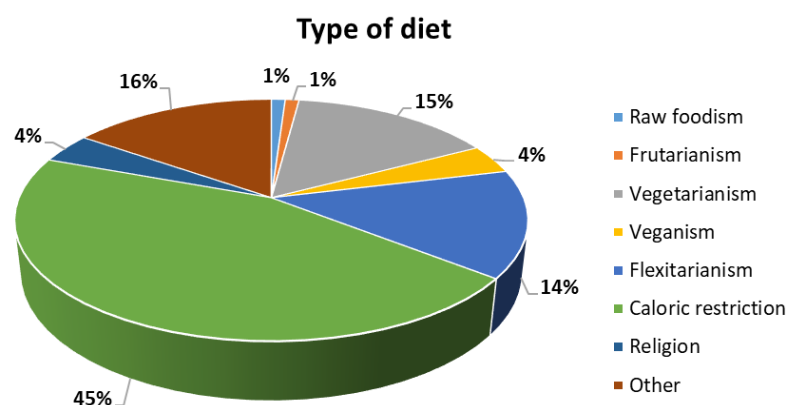


Figure 1 – Type of diet followed by the participants who admitted having a special diet regimen.



Vegetarianism, the second most expressive dietary pattern adopted by the participants, corresponds to a diet based on the consumption of plant foods. Its practice is based on rejecting eating any kind of animal, with or without the consumption of dairy products and eggs. Vegetarianism can be adopted for different reasons, one of the principal being respect for animal life. This type of diet has long gathered attention from nutritional science and philosophy, with a more recent approach devoted also to psychological aspects linked to eating behaviour (Rosenfeld, 2018). Vegetarianism may be adopted in all stages of life, including pregnancy or childhood. Nevertheless, it has some potential nutritional risks. Presently, the search for healthier feeding choices combined with an increased concern about ecology and sustainability, is rapidly increasing. Reducing the consumption of meat and meat-derived products, while at the same time choosing organic farming products is gaining supporters all over the world, with benefits for human health (Pistollato et al., 2015; Simões-Wüst et al., 2017).

Flexitarianism is a regimen that is more flexible as compared to vegetarianism, which highlights an increased intake of plant-based food, but without completely eliminating meat. Its main focus is on adding new foods to the diet as opposed to excluding any, which can be extremely beneficial for health. These plant-based foods include lentils, beans, peas, nuts and seeds, all excellent sources of protein. Many factors of different nature, biological, physiological, psychological and socio-cultural, are known to play a role in affecting food choices and should be considered in order to promote healthier plant based-diets (Clicerì et al., 2018; Köster, 2009).

### 2.3. Food choices towards sustainability and welfare

The items used to assess the food choices of the participants regarding sustainability aspects were: 1. I prefer foods with minimal packaging; 2. I prefer restaurants that recover food surplus; 3. I prefer food from my country; 4. When I cook I avoid food waste; 5. I prefer foods prepared/packed in a sustainable way. The items used to measure the concerns about human or animal welfare were: 1. I choose foods produced with respect for animal rights and 2. I choose foods produced with respect for Human rights. All these were measured in a 5-point scale, going from 1= totally disagree to 5 = totally agree.

Figure 2 shows that 66% of the participants prefer foods which comply with environmental friendly policies, either regarding the primary production and transformation but also the concerns about the package. Nevertheless, the number of participants who admitted choosing foods with minimal packaging was still low (26%). Presently, the use of resources is not in line with the goal of sustainability. Sustainable development of the food sector is a primary concern, and frequently reports on the media show the imminent threat that climate change poses to our society and ultimately survival of the diverse species on Earth, including Humans (Schmidt et al., 2013). The impact of climate change is foreseen as worrying and very pessimistic. Agricultural and food production, including animal breeding, accounts for a particularly high share of that negative impact, and for this also contributes the food consumption. Hence, consumer behaviours are key factors to achieve a sustainable food chain (Aschemann-Witzel et al., 2019). The results in Figure 2 also show that while a great majority avoids food waste at home (80%), the same concern about food waste is mitigated when it comes to the food surplus in restaurants, with only about 30% admitting to condition their choice of a restaurant based on its policy of food surplus. This indicates that possibly the concerns to avoid waste at home is more about the economic impact rather than the worries for sustainability. Nevertheless, it is observed that a growing number of environmentally conscious consumers are effectively trying to change their behaviour, although their contributions are still modest when it comes to the urgent global need (Alfredsson et al., 2018).

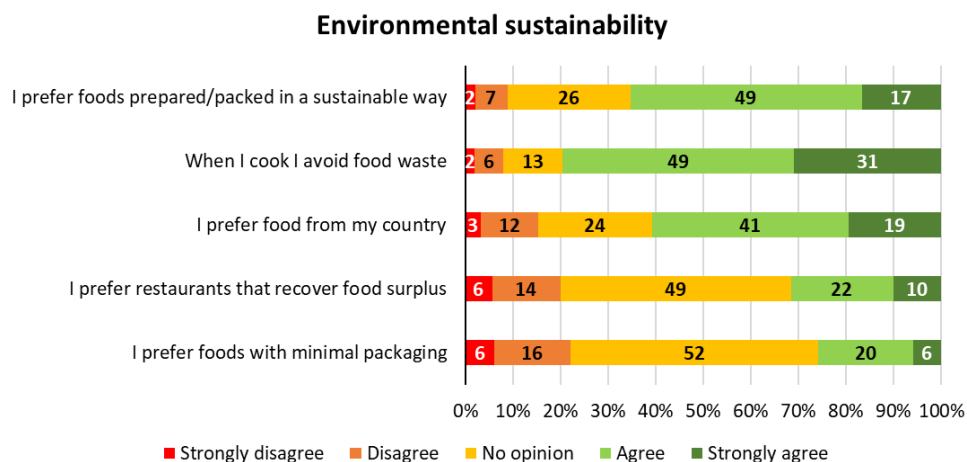
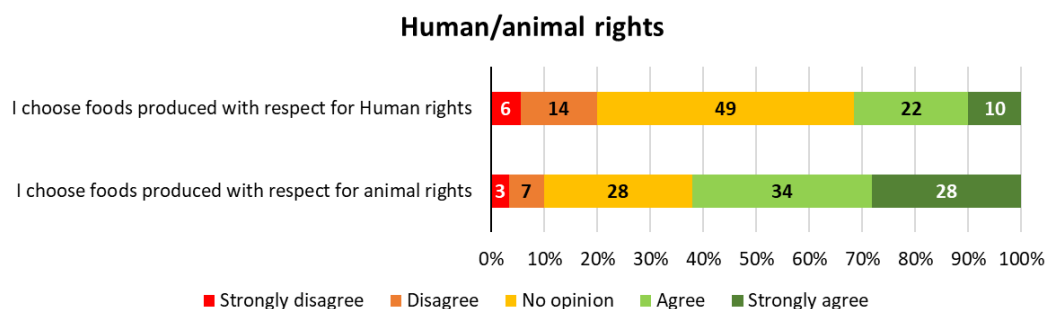


Figure 2 – Food choices related to environmental sustainability.

Packaging represents one of the highest environmental impacts in food productions, including the contributions of materials production, processing and disposal, most especially when it comes to plastics with an increasing long life (Licciardello, 2017). Nevertheless, this sector has evolved tremendously in the past years, with incredible advancement in the domain of biodegradable packaging materials, driven by the increasing demand for high-quality, safe food and by the growing concern towards environmental issues. The contribution of food packaging for the global sustainability of food production chains is therefore controversial (Licciardello, 2017). In the present study, it was observed that more than half of the participants (52%) did not express any opinion with regards to preference by foods with minimal packaging.

Figure 3 presents the results obtained when it comes to respect for Human and animal rights, and they show that while there is a very expressive concern about the animal rights (62%), when it comes to Human rights the percentage is way smaller (only 32%). Meat and animal products, like milk or eggs, are important components of people's diets and the livestock sector is pivotal to food systems, because it plays a major role in food safety and nutrition. In the domain of animal behaviour and welfare, six policy areas are highlighted: (1) Development of humane, sustainable food security strategies; (2) Promotion of humane, sustainable livestock systems; (3) Reduction of livestock reliance on human-edible arable crops, especially cereals; (4) Development of specific food and livestock policies to assist vulnerable sectors of the population; (5) Sustainable diets; and (6) Development of markets for humane, sustainable livestock production (Appleby and Mitchell, 2018). The consumers highly value animal welfare, as other sustainability issues like as organic, animal-friendly, healthy or local (Akaichi et al., 2019). Regarding the respect for Human rights, this has been a subject on top of priorities in many countries who are trying to implement fair trade. One of the most controversial areas is undoubtedly the cocoa plantations using child slavery. Fair trade endeavours to actively connect producers and consumers by creating a transnational moral economy, based on economic, political and psychological objectives. There has been a growing demand for marketing of fair trade foods, as required by consumers with moral standards. Nevertheless, much is still to accomplish on this domain (Goodman, 2004).



**Figure 3** – Food choices related to respect for Human and animal rights.

#### 2.4. Variables influencing food choices

From the obtained results, two other variables were created: FC-ES (Food choice compliance with environmental sustainability) and FC-HAR (Food choice compliance with Human and animal rights). The first was calculated as a mean value of the 5 items described earlier and the last as a mean of the corresponding items as well. Hence, each of these created variables also refers to the same 5-point scale, going from 1 (totally not compliant) to 5 (totally compliant), and in which the central point 3 corresponds to neutral. These two variables were tested for possible differences against different sociodemographic variables and also dietary patterns. Table 1 shows the results obtained for those statistical tests to variables FC-ES and FC-HAR. Highlighting the principal results, one can see that for most cases, the food choices were significantly different between groups, with exceptions for variable sex in both cases, i.e., FC-ES and FC-HAR, and also in the case of FC-HAR considering variable special diet. These results indicate that factors such as age, education, professional area, country and also dietary patterns influence how people opt to choose their food.

Regarding the food choice compliance with environmental sustainability (FC-ES), this is seen to increase with age, i.e., as people grow old they become more conscious of the sustainability issues and adapt their behaviour towards that goal. Also education was seen to positively influence people's food choices to better adapt sustainability, so that higher levels of education produce choices more compliant with a sustainable diet. The differences between countries indicate that Portuguese participants tended to more sustainable food choices while Lithuanian participants were those with the lowest concerns, with a mean value very much close to the middle point (3, corresponding to indifference). Regarding the influence of professional area, the highest values indicative of higher concerns with environment and sustainability were found for participants from agriculture and psychology areas. In the first it is somewhat expected, since farmers deal with the land directly and have to make choices themselves as to



use conventional or organic farming, for example. Regarding the type of diet, the highest values for FC-ES were found for people practising vegetarianism, followed by vegans and flexitarians.

**Table 2** – Influence of sociodemographic and behavioural factors on food choice.

		Variable FC-ES		Variable FC-HAR	
		Mean	p-value	Mean	p-value
Age (Test: ANOVA)	Young adults: 18 ≤ years ≤ 30	3.36	0.000	3.35	0.000
	Average adults: 31 ≤ years ≤ 50	3.65		3.52	
	Senior adults: 51 ≤ years ≤ 65	3.77		3.56	
	Elderly: years ≥ 66	3.82		3.66	
Sex (Test: T for ind. samples)	Female	3.56	0.669	3.48	0.112
	Male	3.57		3.43	
Education level (Test: ANOVA)	Basic school	3.44	0.000	3.56	0.381
	Secondary school	3.50		3.45	
	University	3.60		3.47	
Country (Test: ANOVA)	Portugal	3.86	0.000	3.55	0.000
	Italy	3.58		3.75	
	Lithuania	3.08		3.25	
	Romania	3.38		3.28	
Professional area (Test: ANOVA)	Nutrition	3.43	0.000	3.44	0.000
	Food	3.35		3.47	
	Agriculture	3.59		3.64	
	Sport	3.35		3.34	
	Psychology	3.54		3.52	
	Health	3.40		3.31	
	Others	3.69		3.52	
Special Diet (Test: T for ind. samples)	Yes	3.49	0.001	3.44	0.324
	No	3.58		3.48	
Type of Diet (Test: ANOVA)	Raw foodism	3.28	0.000	3.25	0.000
	Frutarianism	3.23		3.19	
	Vegetarianism	3.80		3.56	
	Veganism	3.58		3.15	
	Flexitarianism	3.52		3.61	
	Caloric restriction	3.46		3.49	
	Religion	3.36		2.92	
	Other	3.30		3.23	

As for the food choice compliance with Human and animal rights (FC-HAR), the same trend observed previously for age was also found in this case, i.e., people tend to pay more attention to Human and animal rights as they grow older. Regarding the level of education, the results indicated that people with basic school were those more concerned with welfare. With respect to country, the participants from Italy were those with the highest value while the lowest was for Romania. Nevertheless, in all cases the values are over three, indicating that these issues do condition people’s food choices, even if in a limited extent. The results for the influence of professional area on the food choices are similar, with agriculture and psychology presenting higher values for both variables (FC-ES and FC-HAR). Finally, when it comes to the influence of the dietary pattern, surprisingly the results put in first place the flexitarians instead of the vegetarians or vegans, which is strange given that flexitarians do eat meat. Still, when the

necessary measures to ensure animal welfare during growing, transportation and death are followed, the resulting meat products are compliant with respect for animal rights.

## CONCLUSIONS

This work showed that people tend to condition their food choices in view of contributing for a more sustainable food chain with respect for environment, humans and animals. The areas in which this behaviour is stronger include avoiding food waste at home, preference for local foods, sustainable food growing, preparation or packaging. The respect for animal rights is very important for a significant number of people, while in the case of Human rights still some awareness is needed to better influence people's choices. From the studied influential variables, the results of statistical tests indicated that age, education, country, professional area and type of diet all significantly influenced people's choices regarding the sustainability of the food chain.

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