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CONHECIMENTO SOBRE O CONSUMO DE FRUTAS E VEGETAIS: COMPARAÇÃO ENTRE CONSUMIDORES PORTUGUESES E FRANCESES

KNOWLEDGE ABOUT CONSUMPTION OF FRUITS AND VEGETABLES: COMPARISON BETWEEN PORTUGUESE AND FRENCH CONSUMERS

CONOCIMIENTO SOBRE EL CONSUMO DE FRUTAS Y VERDURAS: COMPARACIÓN ENTRE CONSUMIDORES PORTUGUESES Y FRANCESES

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RESUMO

Introdução: O consumo regular de frutas e legumes nas dosagens recomendadas é incentivado como forma de alcançar um bom estado de saúde para combater doenças crónicas, doenças neurodegenerativas e cancro. No entanto, nos atuais sistemas alimentares industrializados, existe uma tendência para consumir menores quantidades destes alimentos, resultando em problemas e encargos complexos de saúde pública.
Objetivo: Investigar o nível de conhecimento sobre o efeito do consumo de frutas e hortícolas na saúde humana numa amostra de participantes franceses e portugueses.
Métodos: Foi realizado um inquérito por questionário do tipo transversal de conveniência em ambos os países, em 2020-2021. O questionário foi preparado e traduzido e os dados foram recolhidos online. O questionário continha onze itens a responder numa escala Likert de discordância/concordância de 5 pontos, que variava de 1 (discordo totalmente) a 5 (concordo totalmente). Um total de 640 participantes responderam ao questionário, dos quais 383 eram franceses e 257 portugueses.
Resultados: Os resultados mostraram que uma fração significativa dos participantes (60,3%) está informada sobre os efeitos do consumo de vegetais e frutas no combate ao cancro, diabetes, hipertensão arterial ou doenças cardiovasculares. Além disso, a maioria dos participantes (77,2%) sabe que estes alimentos são ricos em micronutrientes, como vitaminas e minerais, ou compostos bioativos benéficos para o bom funcionamento do organismo humano. Ainda assim, um número considerável necessita de melhorar os seus conhecimentos, pois isso é mais evidente entre os participantes portugueses do que entre os franceses (33,8% de participantes desinformados em Portugal comparado com 15,5% em França).
Conclusão: O conhecimento dos participantes é insuficiente, pelo que são necessárias mais ações para aumentar o conhecimento como forma de estimular o consumo real de frutas e legumes, de modo a ir ao encontro das diretrizes de uma alimentação saudável.

Palavras-chave: hábitos alimentares; consumo de fruta; consumo de hortícolas; alimentação saudável; diferenças entre países

ABSTRACT

Introduction: Regular consumption of fruits and vegetables in the recommended dosages is encouraged as a way to achieve a good health status to fight against chronic diseases, neurodegenerative diseases, and cancer. However, in the present industrialized food systems, there is a trend to consume lower amounts of these foods, resulting in complex public health issues and burdens.
Objective: To investigate the level of knowledge about the effect of the consumption of fruits and vegetables on human health for a sample of French and Portuguese participants.
Methods: A questionnaire, a cross-sectional, convenient type of survey was carried out in both countries, in 2020-2021. The questionnaire was prepared, translated, and data were collected online. The questionnaire contained eleven items to be responded to on a 5-point Likert scale of disagreement/agreement, varying from 1 (totally disagree) to 5 (totally agree). A total of 640 participants answered the questionnaire, of which 383 were French and 257 were Portuguese.
Results: The results showed that a significant fraction of the participants (60,3%) are informed about the effects of consuming vegetables and fruits in fighting cancer, diabetes, high blood pressure, or cardiovascular diseases. Additionally, most of the participants (77,2%) know that these foods are rich in micronutrients like vitamins and minerals or bioactive compounds beneficial to the proper functioning of the human body. Still, a considerable number need to improve their knowledge, as this is more evident among the Portuguese participants than among the French (33,8% of uninformed in Portugal compared to 15,5% in France).
Conclusion: The participants' knowledge is insufficient, so more actions are needed to increase knowledge as a way to encourage the real consumption of fruits and vegetables, in order to meet the guidelines for a healthy diet.

Keywords: dietary habits; fruit consumption; vegetable consumption; healthy diet; country differences

RESUMEN

Introducción: Se fomenta el consumo regular de frutas y verduras en las dosis recomendadas como forma de lograr un buen estado de salud para luchar contra las enfermedades crónicas, las enfermedades neurodegenerativas y el cáncer. Sin embargo, en los sistemas alimentarios industrializados actuales, existe una tendencia a consumir cantidades menores de estos alimentos, lo que da lugar a problemas y cargas complejas para la salud pública.
Objetivo: Investigar el nivel de conocimiento sobre el efecto del consumo de frutas y verduras en la salud humana en una muestra de participantes franceses y portugueses.
Métodos: Se realizó una encuesta transversal de tipo cuestionario en ambos países, en 2020-2021. El cuestionario contenía once preguntas que debían responderse en una escala Likert de 5 puntos de desacuerdo/acuerdo, que variaba de 1 (totalmente en desacuerdo) a 5 (totalmente de acuerdo). Un total de 640 participantes respondieron el cuestionario, de los cuales 383 eran de origen francés y 257 de origen portugués.
Resultados: Los resultados mostraron que una parte importante de los participantes (60,3%) está informada sobre los efectos del consumo de verduras y frutas en la lucha contra el cáncer, la diabetes, la hipertensión arterial o las enfermedades cardiovasculares. Además, la mayoría de los participantes (77,2%) sabe que estos alimentos son ricos en micronutrientes como vitaminas y minerales o compuestos bioactivos beneficiosos para el buen funcionamiento del cuerpo humano. Sin embargo, un número considerable necesita mejorar sus conocimientos, ya que esto es más evidente entre los participantes portugueses que entre los franceses (33,8% de desinformados en Portugal frente al 15,5% en Francia).
Conclusión: El conocimiento de los participantes es insuficiente, por lo que se necesitan más acciones para aumentar el conocimiento como forma de incentivar el consumo real de frutas y verduras, con el fin de cumplir con las pautas de una alimentación saludable.

Palabras Clave: hábitos alimentários; consumo de frutas; consumo de verduras; dieta saludable; diferencias entre países

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INTRODUCTION

According to the WHO (World Health Organization, 2023), approximately 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption. WHO recommends for a healthy diet, a minimum intake of 400 grams/day of fruit and vegetables for an average adult (aged 18+ years). Different studies conclude that higher vegetable and fruit intake is associated with lower mortality (Keller et al., 2012; Wakasugi et al., 2023; Wang et al., 2021).

It is commonly known and scientifically proven that high fruit and vegetable consumption is associated with a healthy diet and reduces the risk of cardiovascular diseases and cancer. Several studies have demonstrated that fruits and vegetables, especially some of their components, like carotenoids and phenolic compounds, have a role in fighting different cancer typologies, for example, colorectal, lung, and breast, among others (Cianciosi et al., 2018; Enriquez-Ochoa et al., 2020; Gao et al., 2022; Kusmita et al., 2022; Rahaiee et al., 2020; Varghese et al., 2023; Wei et al., 2022; Zhao et al., 2023).

Fruits and vegetables have a particularly low caloric density while contributing to the supply of important nutrients such as vitamins, minerals, dietary fiber, and bioactive compounds (Ruiz-López & García-Villanova Ruiz, 2023). These foods are particularly rich in dietary fiber, and this has a very relevant role in the human body (Yalçın et al., 2020).

Frequent consumption of high-energy foods, such as processed foods that are high in fats and sugars, promotes obesity compared to low-energy foods, such as fruits and vegetables (Chen et al., 2022; Dominguez et al., 2023).

Many studies demonstrated that high consumption of fruits and vegetables positively contributes to human health, diminishing the incidence of chronic diseases such as diabetes, hypertension, cholesterol, cardiovascular diseases or cancer (Arif et al., 2022; Keller et al., 2012; Li et al., 2023; Wakasugi et al., 2023; Zhao et al., 2023); however, the consumption of some vegetables can cause adverse effects in people with gastrointestinal problems (Hon & Gupta, 2021; Kennedy et al., 2017), and others have a high Glicemic index with other types of risk association.

Although in most European countries, the average consumption of fruits and vegetables exceeds 400g/day per person, in many countries these minimum consumption limits are not reached (Our World in Data, 2023). In 2020, most of the South American, African, and some Asian Countries had an average intake of vegetables under 250g/day per person, which is below the National and World Health Organization (WHO) recommendations (between 200-250g per day). Additionally, apart from the South American continent, similar results were found for fruit intake (Our World in Data, 2023).

The objective of this study was to investigate consumers' knowledge about why and in what conditions the consumption of fruits and vegetables can have a positive impact on human health, compared for two European Countries (Portugal and France).

1. METHODS

A questionnaire, a cross-sectional, convenient type of survey, was carried out in France and Portugal in 2020 and 2021.
The questionnaire was prepared for this topic, translated into these two languages, and applied online.
The research was approved by the Ethics Committee of the Polytechnic of Viseu with reference No. 10/SUB/2020.

Instrument

The instrument developed for this study was designed to collect data about consumption habits and knowledge regarding fruits and vegetables. Eleven statements were used to measure the level of agreement of the participants, using a five-point Likert scale as follows: 0 = Totally disagree, 1 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Totally agree. Most of the items corresponded to true facts, but three were false, as indicated below:

1. Fruits and vegetables are foods poor in vitamins and minerals that are important to the good functioning of the human body (False).
2. The regular consumption of vegetables and fruits results in higher and better longevity;
3. By consuming fruits and vegetables on a daily basis, your body cells will be protected (False);
4. Vegetables and fruits are low-calorie foods and can contribute to a healthy weight reduction.
5. Green leaves, beans, broccoli, cabbage, cauliflower, and vegetables with a yellow-orange coloration, like carrots, are more effective in the reduction of cancer incidence;
6. Some vegetables, such as spinach or cabbage, are rich in iron and can help cure anemia;
7. Neither vegetables nor fruits contain sugars (False);
8. Both vegetables and fruits constitute a good source of dietary fiber;
9. Some vegetables and legumes can be irritating to the intestine.
10. The regular consumption of vegetables and fruits can protect against type 2 diabetes, cardiovascular diseases, hypertension, and cancer.
11. A high ingestion of fruits and vegetables can reduce obesity, cholesterol, and lower blood pressure.

Data collection

The data collection took place between September and December 2020 in Portugal and between April and May 2021 in France. The invitation to participate was made through email and social networks, following all ethical principles for data collection, such as anonymity of responses and the right to deny participation in the study. The final number of responses obtained was 640 answered questionnaires, of which 383 were from French participants, and 257 were from Portuguese participants.

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Sample characterisation
The distribution of the participants by country was 59.8% French and 40.2% Portuguese. Most participants were female (68.9%) against 31.1% of males. The age ranged from 18 to 83, with a prevalence of young adults (67.0% were between 18 and 25 years), and most students were frequenting the university (64.9% of the participants were students).

2. RESULTS AND DISCUSSION

The items used to assess knowledge about fruit and vegetable consumption indicated that, in generic terms, nearly half of the participants (varying from 39.3% to 77.2% %, depending on the question) showed sufficient knowledge about the various issues related to the consumption of vegetables and fruits, and these results will be discussed in detail further ahead. Knowledge is associated with the participants' literacy, most of whom attended higher education. Studies demonstrate that university-level education is associated with food literacy (Guiné et al., 2023a, 2023b).
Fruits and vegetables are essential foods as part of a healthy diet since they have a particularly low caloric density while contributing to the supply of important nutrients such as vitamins, minerals, dietary fiber, and bioactive compounds (Ruiz-López & García-Villanova Ruiz, 2023). Fruits and vegetables are particularly rich in dietary fiber, and this has a very relevant role in the human body (Yalçın et al., 2020). This evidence appears to be of knowledge for most of the participants, with 48.7% of total agreement among the French participants and 28.1% among the Portuguese. Once again, the level of knowledge of the French was higher than the Portuguese (Figure 1(a)).
Figure 1(b) presents the results for statements related to the richness of iron and its role in treating anemia. The participants in both countries showed similar knowledge, with about half showing agreement or total agreement. Although the iron contents in foods of vegetable origin are lower compared with red meat, and some of it is unavailable for absorption (due to bioavailability issues), it is important the ingest fruits and vegetables rich in iron, like supplementary sources (Hossain et al., 2021; Van Elswyk et al., 2021).

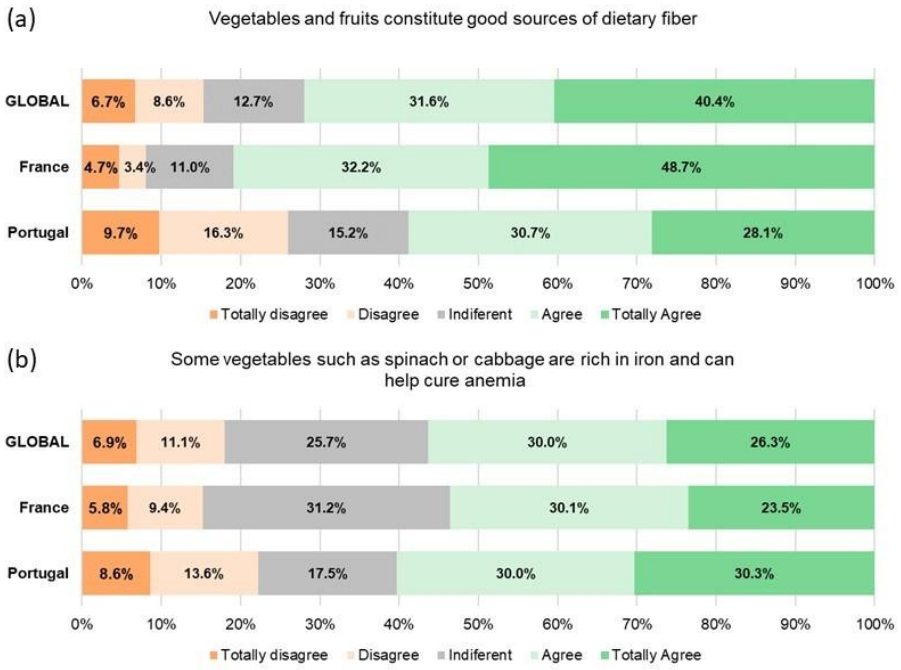

Figure 1 – Results for statements about nutrients in fruits and vegetables.

Fruits and vegetables are very rich in bioactive compounds, such as phenolic compounds with antioxidant activity, that fight free radicals, thus protecting the cells against aging and oxidation (Kolap et al., 2022; Pfukwa et al., 2022; You et al., 2021). The graph in Figure 2(a) indicates the answers to the question about the effect of consuming fruits and vegetables on increasing longevity. In this case, since the statement is true, a high percentage of answers for options of Agree or Totally Agree are indicative of good knowledge. Interestingly, the results in the global sample and for the two countries were very similar, with a high fraction (73.3%) of the participants being aware of the role of fruits and vegetables in helping to increase life expectancy and improve healthy aging.
The replacement of calorie-dense and fat-rich foods with fruits and vegetables is recommended for a healthy loss of body fat. Overweight and obesity occur predominantly due to an imbalance between calorie intake and the daily requirement of nutrients, resulting in excessive fat accumulation in white adipose tissue. This imbalance results from excessive calorie consumption allied to low physical activity (Chen et al., 2022; Dominguez et al., 2023). Obesity is an intricate disorder caused by a multiplicity of factors, among which one of the relevant components relates to genetics and another is associated with epigenetics and heterogeneity, including behavioral and

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environmental factors (Kadkhoda et al., 2020). Figure 2(b) presents the results for the statement about the role of fruits and vegetables as foods that help control or lose weight, especially body fat. Again, the results were quite similar for the participants regardless of the country, with more than 50% expressing agreement or total agreement with the item. Still, the French participants had a higher percentage of agreement (34.3%) when compared with the Portuguese (26.0%).
Figures 2(c) and 2(d) relate both to the effect of fruits and vegetables in diminishing the incidence of chronic diseases and lowering blood levels of sugar or cholesterol, for example. The results of Figure 2(c) indicate that participants from both countries showed a similar trend to agree that an adequate ingestion of fruits and vegetables can reduce obesity, cholesterol, and blood pressure. Vegetables and fruits have been demonstrated to have all these beneficial effects on human health, as many scientific reports confirm (Arif et al., 2022; Keller et al., 2012; Li et al., 2023; Wakasugi et al., 2023; Zhao et al., 2023).

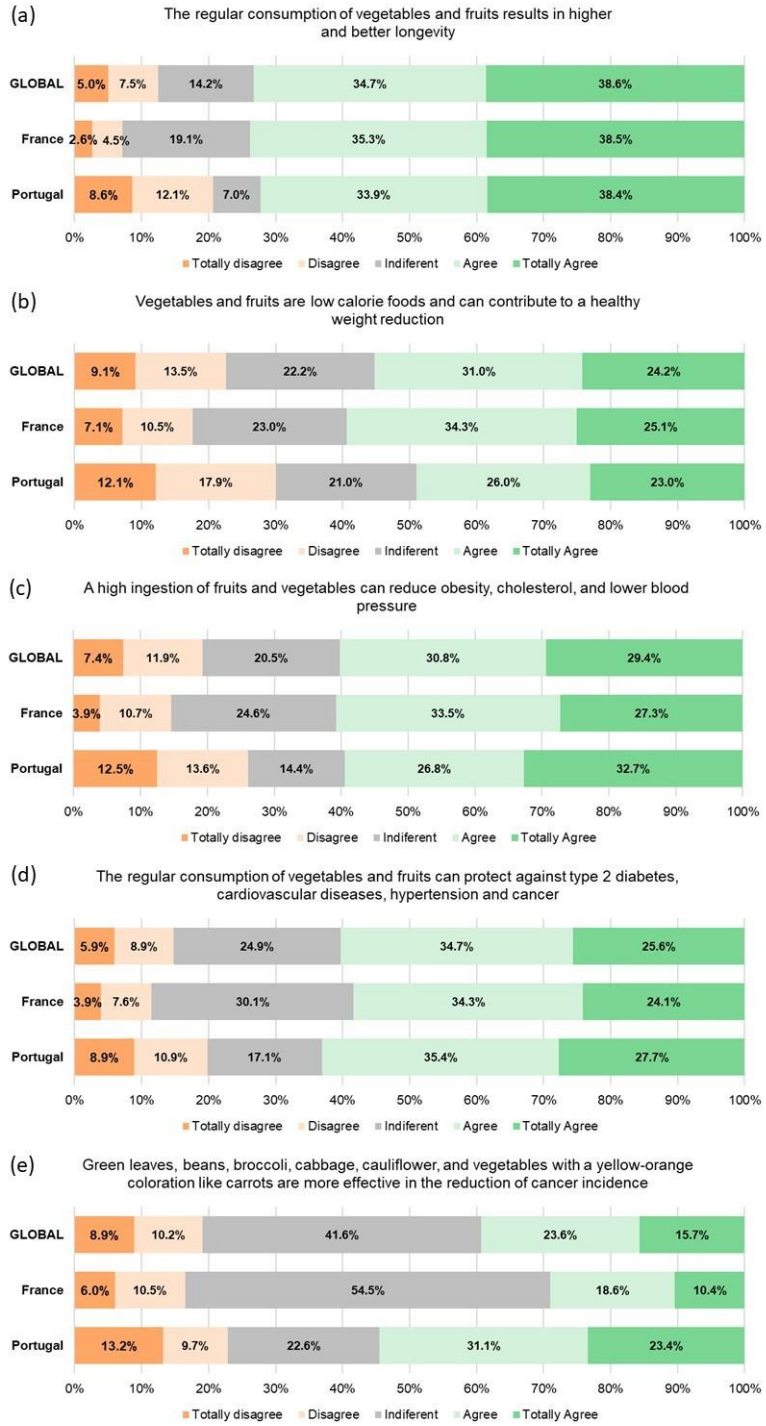

Figure 2 – Results for statements about beneficial health effects of fruits and vegetables.

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The results in Figure 2(d) suggest that most people in both countries agree (34.3% and 35.4%, for French and Portuguese) or totally agree (24.1% and 27.7%, respectively) that the ingestion of fruits and vegetables is a way to reduce the incidence of diseases like diabetes, hypertension, cardiovascular diseases, or cancer. Nevertheless, a considerable number of French participants were not able to manifest an opinion (30.1%). Many studies have demonstrated the role of fruits and vegetables, especially some of their components, for example, the carotenoids and phenolic compounds, in fighting cancer types like colorectal, lung, and breast, among others (Cianciosi et al., 2018; Enriquez-Ochoa et al., 2020; Gao et al., 2022; Kusmita et al., 2022; Rahaiee et al., 2020; Varghese et al., 2023; Wei et al., 2022). The results shown in Figure 2(e) reveal that there is a very high percentage of participants from France who did not know about the potential of fruits and vegetables as cancer protective (54.3% replied neither agree nor disagree). The percentage of participants who replied that option among the Portuguese was much lower (22.6%).

Some vegetables can cause adverse effects in the intestine if consumed by people with gastrointestinal problems. One example is soy, which is not well tolerated by some people, including children (Hon & Gupta, 2021; Kennedy et al., 2017). In regard to this aspect, the number of participants who were not informed enough to make a choice was high, 34.8% of the French participants and 26.8% of the Portuguese (Figure 3). Still, the number of positive responses was higher for the French (32.3% agreed and 13. Totally agreed against 26.5% and 10.9%, respectively, for the Portuguese.

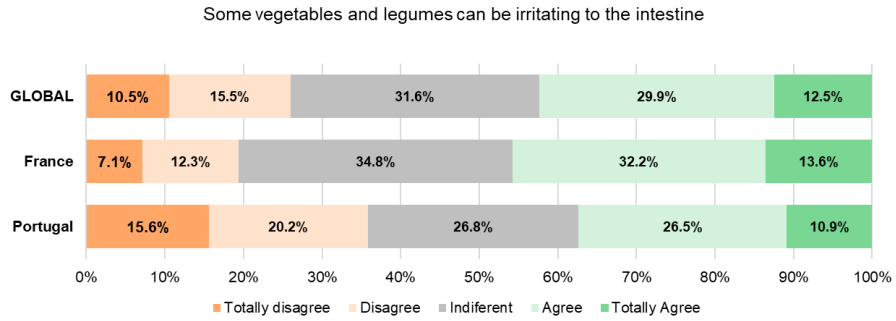

Figure 3 – Results for statements about possible negative effects of fruits and vegetables.

Figure 4(a) shows the results obtained for statements about the importance and benefits of consuming vegetables and fruits rich in micronutrients such as minerals and vitamins, with relevance for the good functioning of the human body. This question was one of three that were given to the participants in reversed order, i.e., as a false statement, on purpose to evaluate how the participants would rate the statement in the given scale of agreement. Considering the global sample, more than half (62.6%) manifested a total disagreement, thus confirming their correct belief that vegetables and fruits are rich in vitamins and minerals of dietary relevance. The consumption of vegetables and fruits is important for the body as a source of vitamins, minerals, and fiber, and contributes to achieving a healthy diet (Ruiz-López & García-Villanova Ruiz, 2023; Sultanbawa & Sivakumar, 2022). The results in Figure 4(a) further show that the frequency of participants who manifested a total disagreement was much higher among the French (72.5%) than the Portuguese (47.9%), revealing a higher knowledge in France as compared to Portugal.

Figure 4(b) shows the results for the statement about the role of regular consumption of vegetables and fruits in protecting human cells. As previously mentioned, these foods are rich in bioactive substances with protective capacity, not only antioxidant effects, but also with other protective roles. A review by Sarkar et al. (2019) evidences the role of selected fruits and vegetables in modulating adipogenesis and angiogenesis. Also, studies have demonstrated the role of fruits and vegetables in fighting age-related cognitive loss, dementia, Alzheimer's, and other neurodegenerative diseases (Fatima et al., 2023; Miller et al., 2017; Román et al., 2019). The obtained results (Figure 4(b)) indicate that a significant number of participants are against the statement, which was false, thus revealing that they have good knowledge about the cell-protecting role of components present in fruits and vegetables.

Fruits are rich in sugars, such as fructose, and the amount is highly variable among fruits. Also, vegetables such as carrots or beets contain sugars, from which sucrose is extracted industrially (Bhosale, 2017; Kubola et al., 2011; Shanmugavelan et al., 2013). Figure 4(c) shows that most participants were against the false statement, particularly those from France, thus revealing a higher knowledge than the Portuguese about this topic.

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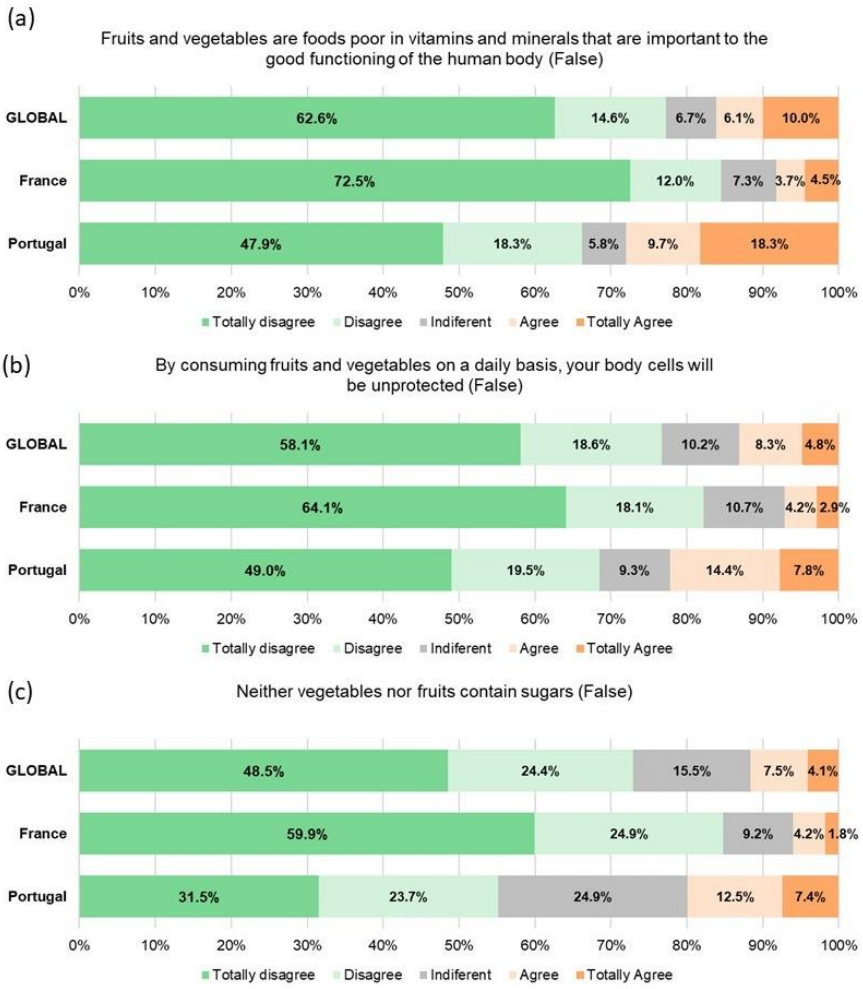

Figure 4 – Results for statements that were presented to the respondents as false.

CONCLUSION

The results of this work showed that participants from Portugal and France are relatively well aware of certain benefits of consuming vegetables and fruits as a part of a healthy diet, which help prevent and even treat a number of chronic diseases. Still, there are some aspects about which the participants are not very well informed.

When comparing the results from participants from France with those of participants from Portugal, in some questions, a similar trend was observed, while for others, the participants from France revealed a higher level of knowledge when compared with the Portuguese. Even though the results obtained are encouraging, there is still a high number of participants, nearly half, who have wrong perceptions or do not wish to express their opinions. Based on this data, it is still important to intensify actions in both countries to increase knowledge as a way to incentivize a higher consumption of fruits and vegetables instead of calorie-dense foods rich in saturated fats that are harmful to health.

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AUTHORS' CONTRIBUTION

Conceptualization, R.G.; data curation, R.G.; formal analysis, R.G. and S.F.; funding acquisition, R.G. and C.C.; investigation, R.G.; methodology, R.G.; project administration, R.G.; resources, R.G.; supervision, R.G.; validation, R.G.; visualization, R.G.; writing-original draft, S.F., J.G., E.L., M.J.L. and R.G.; writing-review and editing, R.G., S.F. and C.A.C.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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