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Federal University of Alfenas, Brazil
Madhavi Sripathi,
K L University, India

*CORRESPONDENCE

Carmen Costa
✉ carmen_costa_@hotmail.com

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Impact of a health and sustainability menu option on consumer perception of Food Service in Portugal

Carmen Costa^{1,2*}, Claudia Viegas³ and Ada Rocha²

¹Innovation Department, Technical Institute of Human Nutrition, Porto, Portugal, ²GreenUPorto - Sustainable Agrifood Production Research Centre/Inov4Agro, Faculty of Nutrition and Food Sciences, University of Porto, Porto, Portugal, ³School of Health Technology, Polytechnic University of Lisbon, Lisbon, Portugal

Introduction: Food Service aims to provide nutritionally balanced, safe and increasingly sustainable meals for specific population groups. In recent years, the sector has faced growing challenges driven by changing consumer expectations, public health priorities and sustainability demands, particularly regarding menu composition and dietary patterns.

Objective: To evaluate the association between the implementation of a health and sustainability menu option (flexitarian menu) and consumers' perceptions of Food Service in Portugal.

Methods: A quasi-experimental repeated cross-sectional study was conducted among adult consumers attending a Food Service unit in Portugal. Consumer perceptions were assessed using paper-based questionnaires administered to three independent samples before implementation of the intervention and 3 and 9 months afterwards. The questionnaires evaluated perceptions of Food Service products, services, companies and overall sector performance. Descriptive and inferential statistical analyses were performed.

Results: Overall, the implementation of the flexitarian menu option was associated with generally favorable trends in consumer perceptions over time. After 9 months, more favorable evaluations were observed for perceived product quality, innovation, adequacy of meals to consumers' needs and expectations, and organizational attributes related to environmental and social responsibility. Although only limited statistically significant differences were identified, overall consumer evaluations of Food Service became progressively more favorable following implementation.

Conclusions/Originality: This study provides real-world evidence suggesting that the sustained implementation of a health and sustainability menu option may be associated with more favorable consumer perceptions of Food Service. The findings contribute to the emerging evidence supporting menu-based sustainability interventions as a feasible strategy for promoting healthier and more sustainable institutional food environments.

KEYWORDS

consumer perception, flexitarianism, Food Service, Portugal, sustainable diets

1 Introduction

Diet is widely recognized as one of the most influential determinants of human health, playing a central role not only in disease prevention but also in health promotion and quality of life (WHO, 2022). Beyond its biological function, food fulfills social, cultural, economic and psychological roles, reflecting broader societal dynamics and evolving consumption patterns (SNRC, 2026a; Clodoveo et al., 2021). In contemporary societies, food consumption increasingly occurs outside the domestic environment, positioning food service systems as key actors within the food system (Nichifor et al., 2025).

Food Service represents a specific segment of out-of-home food provision, supplying meals to defined populations in settings such as workplaces, educational institutions, healthcare facilities and social care organizations (Nichifor et al., 2025; Velasco and Molina, 2020; INE, 2007). Unlike commercial Food Service, contract catering operates under contractual, financial and regulatory constraints, fulfilling a recognized social and public health mission, particularly through the provision of nutritionally adequate, safe, and affordable meals (SNRC, 2026b; Marcotrigiano et al., 2023a). Importantly, consumer autonomy in food choice within Food Service is often limited, as menus are pre-defined and adapted to institutional contexts, which amplifies the responsibility of menu planning in shaping dietary intake (Marcotrigiano et al., 2023a).

Historically, Food Service emerged as a response to industrialization and the need to support worker productivity and public welfare through organized meal provision (Kumar et al., 2013; WBCSD, 2025). Over time, its role expanded significantly, particularly in education, healthcare and social care sectors, where meals are now recognized as integral components of health promotion, disease prevention, and recovery (Rosario and Walton, 2019; Gregório et al., 2021). Today, Food Service serves diverse population groups across all stages of the life course, giving it considerable potential to influence dietary behaviors at scale, influencing public health outcomes (Marcotrigiano et al., 2023b; Czarniecka-Skubina et al., 2020; FoodServiceEurope, 2026).

In recent decades, however, Food Service has faced increasing challenges arising from changing consumer expectations, evolving dietary patterns and heightened awareness of sustainability issues (Marcotrigiano et al., 2023b; Kraemer and Gracia-Arnaiz, 2015; Fitzgerald et al., 2020). Consumers are no longer focused solely on price and convenience but increasingly value nutritional quality, variety, transparency, ethical sourcing and environmental responsibility (Schubert et al., 2023; Euromonitor International, 2023; Costa et al., 2023; Boumphrey and Brehmer, 2017). These expectations are reinforced by global megatrends, including the pursuit of healthy lifestyles, ethical consumption, personalisation and sustainability, which are reshaping food systems worldwide (Boumphrey and Brehmer, 2017; Kuhn and Margellos, 2022).

Among these trends, the shift toward more plant-based and sustainable dietary patterns has gained prominence. Excessive consumption of animal-based foods, especially red and processed meat, is associated with adverse health outcomes and significant environmental impacts (Derbyshire, 2017; Raphaely and Marinova, 2012; APN, 2017; Antoniuk et al., 2022; Graça et al., 2019). As a result, dietary approaches that promote reduced meat consumption

without complete exclusion have gained traction. Flexitarianism, defined as a predominantly plant-based dietary pattern that allows moderate and occasional consumption of animal products, has emerged as a pragmatic and socially acceptable response to these concerns (Derbyshire, 2017; Kessler, 1998; Garnett et al., 2019; Magkos et al., 2020).

Flexitarian diets combine health and sustainability benefits, aligning with international dietary guidelines and frameworks such as sustainable diets promoted by the FAO and the planetary health diet proposed by the EAT-Lancet Commission (Food and Agriculture Organization of the United Nations and World Health Organization 2019, Beal et al., 2023; Stubbendorff et al., 2025; EAT-Lancet Commission, 2026). Evidence suggests that flexitarian patterns are associated with improved nutritional quality, reduced risk of chronic disease and lower environmental footprints, while maintaining cultural flexibility and consumer acceptance (Derbyshire, 2017; Raphaely and Marinova, 2012; Magkos et al., 2020; Clarys et al., 2014; Boscardin et al., 2023; EAT-Lancet, 2019; Marchioni et al., 2021; Flail, 2011). Importantly, flexitarianism does not rely on strict dietary exclusion, making it particularly suitable for institutional food environments such as Food Service, where inclusivity and feasibility are critical (Magkos et al., 2020, Food and Agriculture Organization of the United Nations and World Health Organization 2019).

Despite its theoretical relevance, the integration of flexitarian principles into Food Service menus remains uneven, often constrained by operational complexity, cost concerns and uncertainty regarding consumer acceptance (Marchioni et al., 2021; Euromonitor International, 2022). Therefore, consumer perception plays a decisive role in determining whether such menu innovations are viable and sustainable within Food Service systems. Previous research highlights that perceived meal quality, variety and alignment with consumer expectations strongly influence satisfaction and acceptance in food services (Nichifor et al., 2025; Proença et al., 2005; El-Said and Fathy, 2015).

From a theoretical perspective, consumer responses to menu innovations may be understood through consumer evaluation frameworks, which propose that perceptions and subsequent acceptance are influenced by the extent to which a product or service meets prior expectations while delivering perceived value (Zeithaml, 1988). In particular, the Expectation-Confirmation Theory suggests that consumer satisfaction arises from the comparison between prior expectations and actual experiences, whereas Consumer Perceived Value Theory emphasizes that consumers evaluate products and services according to the balance between perceived benefits and perceived costs (Bhattacharjee, 2001; Sweeney and Soutar, 2001). These theoretical perspectives continue to underpin recent research on consumer responses to sustainability-oriented food service practices, where perceived value and satisfaction are recognized as key determinants of consumer evaluations and behavioral intentions (Jun and Yoon, 2024). Within Food Service, where consumers have relatively limited freedom of choice, these frameworks provide a useful basis for understanding how introducing a flexitarian menu option may influence perceptions of meal quality, innovation, organizational responsibility and overall service satisfaction. Negative preconceptions regarding Food Service meals, often

associated with limited variety or lower sensory quality, can further hinder innovation uptake (Kumar et al., 2013; Czarniecka-Skubina et al., 2020; Kwun et al., 2013; Tikkanen, 2011; Haroun et al., 2011; Czarniecka-Skubina et al., 2019).

In this context, menu design becomes a strategic solution for addressing both health and sustainability goals and consumer satisfaction in Food Service. Introducing flexitarian menu options has the potential not only to improve the nutritional and environmental profile of meals but also to reshape consumer perceptions of Food Service as innovative, responsible and future-oriented (Garnett et al., 2019; Tetra Pak, 2023; Drogo, 2023). Although previous studies have examined consumer acceptance of plant-based diets, sustainable dietary patterns and menu-based interventions, relatively few have evaluated how the sustained implementation of a flexitarian menu option influences broader perceptions of Food Service, including perceptions of meal quality, service quality and organizational image, under real-world conditions and over time, particularly within healthcare settings (Nichifor et al., 2025; Marcotrigiano et al., 2023a; Garnett et al., 2019). However, empirical evidence on the impact of implementing health and sustainability menu options on consumer perception within real-world Food Service settings remains limited, particularly in the Portuguese context.

The conceptual framework guiding the present study is presented in Figure 1. It integrates the theoretical perspectives discussed above and illustrates the hypothesized relationships between the implementation of a flexitarian menu option and the dimensions of consumer perception evaluated in this study.

This study aims to evaluate the impact of implementing health and sustainability menu options on consumers' perception of Food Service in Portugal. Specifically, the study addresses the following research question: *Is the implementation of a health and sustainability menu associated with changes in consumers' perceptions of Food Service over time?* Based on the existing literature, it was hypothesized that the introduction of a health and sustainability menu would be associated with more favorable consumer perceptions regarding product and service quality and Food Service companies. By analyzing consumer perceptions before and after the introduction of a flexitarian menu option in a Food Service setting, this study seeks to assess changes in perceived quality, adequacy, innovation and overall evaluation of Food Service. Given the quasi-experimental design adopted, the study aims to explore associations between the menu intervention and consumer perceptions rather than establishing causal relationships. The outcome may contribute to providing empirical evidence to support menu-based strategies as effective tools for promoting healthier and more sustainable eating patterns within institutional food systems.

2 Methods

2.1 Study design

This study adopted a quasi-experimental repeated cross-sectional design aimed at evaluating the association between the implementation of a health and sustainability menu option and

consumers' perceptions of Food Service in Portugal. The research was conducted in a real-world Food Service setting, allowing the assessment of consumer perceptions before and after the introduction of a menu-based intervention focused on healthier and more sustainable food choices. Given the pragmatic nature of the intervention, which was implemented as part of routine Food Service practice, no control group was included. Consumer perceptions were assessed using three independent cross-sectional samples collected at different time points rather than by following the same individuals over time. This design enabled the evaluation of temporal changes in consumer perceptions while reflecting routine operational conditions within Food Service.

2.2 Intervention

The intervention consisted of introducing a flexitarian menu option as one of the daily meal choices offered by the Food Service unit. This option was designed to align with principles of healthy and sustainable eating, incorporating fresh, seasonal, regional and, where possible, organic products, with an emphasis on plant-based ingredients and a reduced reliance on animal-based foods. The flexitarian option excluded red meat and processed products, prioritized unsaturated fats, limited added sugars, and adhered to recommended plate proportions, namely 50% vegetables and similar foods, 25% cereals and tubers, and 25% protein sources such as eggs, fish or white meat (APN, 2017; EAT-Lancet, 2019; Marchioni et al., 2021).

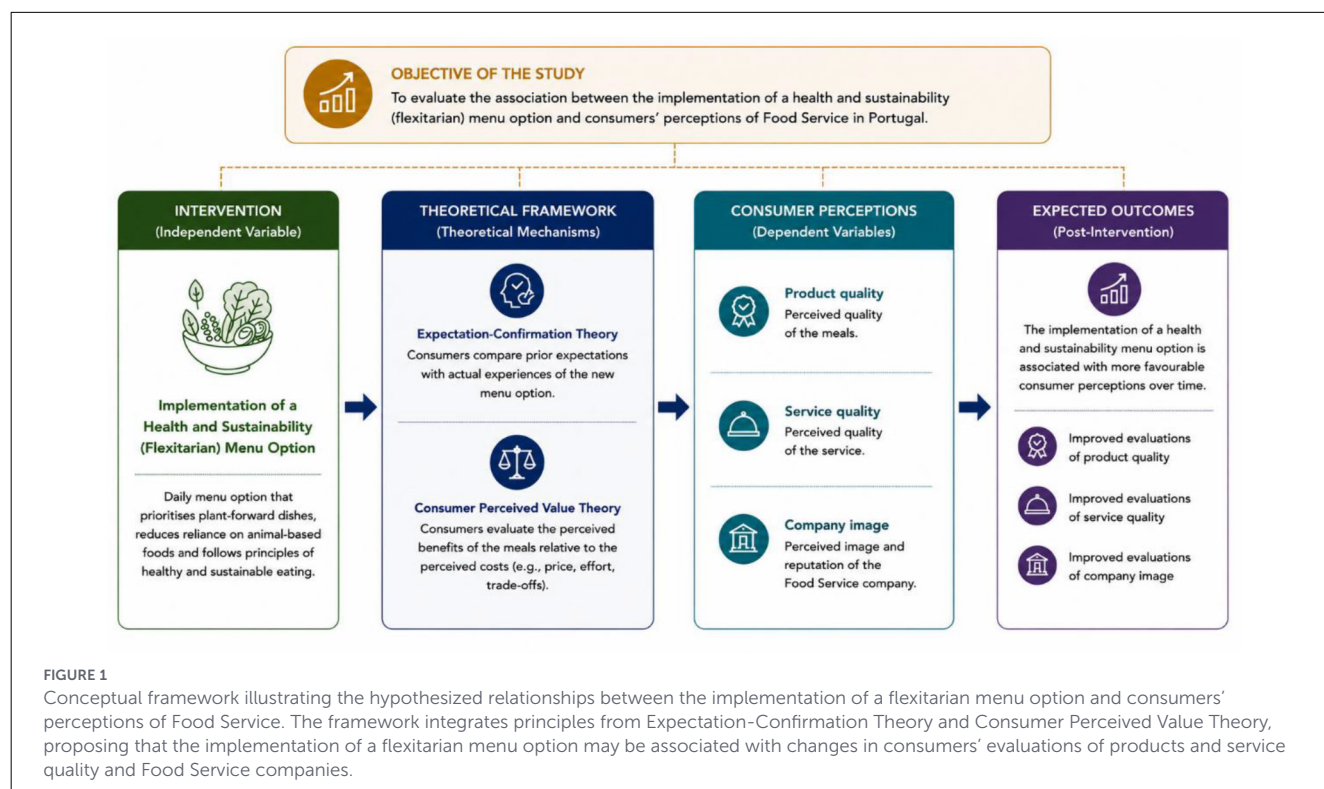
The development and implementation of the menu involved a prior needs assessment, nutritional and sustainability evaluation criteria, staff training, logistical adjustments and a communication campaign to inform consumers about the characteristics and benefits of the new option (APN, 2017; Garnett et al., 2019). The intervention was incorporated into the routine menu cycle of the Food Service unit without altering other organizational aspects of service delivery. Consequently, any observed changes in consumer perceptions were evaluated under routine operating conditions, thereby increasing the ecological validity of the study.

2.3 Participants and setting

The study population consisted of adult consumers (≥ 18 years) attending a selected Food Service unit in a healthcare institution in Portugal. This setting was selected because it serves a heterogeneous population, including healthcare professionals, administrative staff and external users, providing an appropriate environment for evaluating consumer perceptions of Food Service.

Participation was voluntary, and no exclusion criteria were applied other than the minimum age requirement. All eligible consumers attending the Food Service unit during each data collection period were invited to participate. Because the study evaluated a real-world intervention within a single institutional setting, no *a priori* sample size calculation was performed.

The three survey waves consisted of independent cross-sectional samples of consumers attending the Food Service unit at the time of data collection. Participants were not



individually followed throughout the study. Prior analyses confirmed the comparability of the three samples regarding key sociodemographic characteristics, supporting comparisons across the different assessment moments.

2.4 Questionnaire and data collection

Data was collected using structured questionnaires administered at three distinct time points: before the implementation of the flexitarian menu option (baseline), 3 months after implementation, and 9 months after implementation. This approach enabled the analysis of both short-term and medium-term changes in consumer perception.

The questionnaire was developed and refined during an earlier phase of the broader research project (Reis and Dias, 2017). An initial version of the instrument was administered to a convenience sample of Food Service consumers to evaluate item clarity and relevance, leading to minor wording improvements before its final application. For the present study, the questionnaire was adapted to the intervention by removing items that were not relevant to the evaluation objectives while maintaining the overall structure and measurement approach of the original instrument. Because the adaptations were limited to the exclusion of non-applicable items, no additional psychometric validation of the adapted version was undertaken.

Consumer perceptions were assessed using five-point Likert-type scales, ranging from less favorable to more favorable evaluations.

All questionnaires were administered in paper format and distributed in person at the Food Service unit on a single day at each data collection point. To ensure data integrity and traceability,

questionnaires were sequentially numbered, distributed and collected on-site by the research team. Unanswered items were coded as “Do not know/No answer.” Face-to-face administration ensured that all questionnaires were completed under comparable conditions while minimizing missing data. Throughout the data collection process, anonymity and confidentiality were strictly guaranteed.

2.5 Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS®) version 28.0 (IBM Corp., Armonk, NY, USA) for Windows® and Microsoft® Excel® for Microsoft 365 (Microsoft Corporation, Redmond, WA, USA).

Descriptive statistics were used to characterize the sample and summarize consumer perceptions, including absolute and relative frequencies, means and standard deviations.

Sample equivalence across the three survey waves was assessed before conducting comparative analyses. Statistical analysis included descriptive statistics (absolute and relative frequencies, means, and corresponding standard deviations) and inferential statistics. Inferential analyses were performed using the Chi-square test of independence and the Kruskal–Wallis test. When the assumptions required for the application of the Chi-square test were not met, the Chi-square test with Monte Carlo simulation was used. Differences between groups were examined using adjusted standardized residuals. Statistical significance was established at $\alpha \leq 0.05$.

Given the quasi-experimental nature of the study and the absence of a control group, the findings should be interpreted as

TABLE 1 Sample size and response rates across the three survey waves.

Survey wave	Population (N)	Sample (n)	Response rate (%)
Before implementation	300	107	35.7
3 months after implementation	300	130	43.3
9 months after implementation	300	79	26.3

Response rate = number of completed questionnaires divided by the estimated number of eligible adult consumers attending the Food Service Unit during each survey wave.

TABLE 2 Sociodemographic characteristics of the three independent samples.

Variable	Before implementation (n = 107)		3 months after implementation (n = 130)		9 months after implementation (n = 79)	
	n	%	n	%	n	%
Sex						
Female	64	59.8	88	67.7	47	59.5
Male	42	39.3	42	32.3	29	36.7
Do not know/No answer	1	0.9	0	0.0	3	3.8
Marital status						
Single	55	51.4	59	45.4	36	45.6
Married/Cohabiting	48	44.9	61	46.9	41	51.9
Divorced/Separated	3	2.8	6	4.6	2	2.5
Do not know/No answer	1	0.9	4	3.1	0	0.0
Educational level						
None	0	0.0	0	0.0	0	0.0
Primary education (1st cycle)	0	0.0	0	0.0	0	0.0
Secondary and post-secondary education	9	8.5	13	10.0	14	17.8
Bachelor's degree (including former intermediate degrees)	51	47.7	46	35.4	27	34.2
Master's degree, doctorate, postgraduate degree/MBA	47	44.0	71	54.6	38	48.2
Do not know/No answer	0	0.0	0	0.0	0	0.0
Household size (including the respondent)						
1	7	6.5	13	10.0	13	16.5
2	18	16.8	33	25.4	15	19.0
3	29	27.1	34	26.2	22	27.9
4	40	37.4	34	26.2	23	29.1
5	9	8.4	8	6.2	4	5.1
More than 5	3	2.8	4	3.1	1	1.3
Do not know/No answer	1	0.9	4	3.1	1	1.3

Data are presented as number of participants (n) and relative frequency (%). MBA = Master of Business Administration.

associations between the intervention and changes in consumer perceptions rather than evidence of causal relationships.

2.6 Ethical considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All participants

received written information regarding the objectives of the study and voluntarily provided informed consent before completing the questionnaire. Participation was entirely voluntary, and respondents could decline participation at any time without consequences.

Data were collected anonymously and processed confidentially in compliance with the applicable European and Portuguese data protection legislation (European Parliament, Council of the European Union, 2016; Assembleia da República, 2019a,b). No

personally identifiable information was collected, and all analyses were performed using anonymised data.

3 Results and discussion

3.1 Sample characterization

The study sample consisted of adult consumers attending a Food Service unit in a healthcare institution, surveyed at three different moments: before implementation of the flexitarian menu option ($n = 107$), 3 months after implementation ($n = 130$), and 9 months after implementation ($n = 79$). These participants constituted three independent cross-sectional samples rather than a cohort followed over time. The corresponding response rates were 35.7%, 43.3%, and 26.3%, respectively. Although these rates are consistent with participation levels commonly reported in voluntary surveys conducted in Food Service settings (Czarniecka-Skubina et al., 2020, 2019; Reis and Dias, 2017; Barbosa et al., 2019), particularly the lower response rate at 9 months should be considered when interpreting the findings because of the potential for self-selection and non-response bias (Table 1).

Across all three data collection moments, the sample was predominantly composed of female consumers, individuals with higher education qualifications (mainly bachelor's and master's degrees), and respondents living in households with three to four members (Table 2). Most participants were either married/living in a civil partnership or single. Given that the Food Service unit was located within a healthcare institution, the high educational level observed was expected and aligns with previous studies on Food Service consumers in similar contexts (Czarniecka-Skubina et al., 2020, 2019). Nevertheless, this sociodemographic profile may limit the extent to which the findings can be generalized to Food Service populations with different educational or occupational characteristics.

The three samples were equivalent regarding gender, educational level, marital status and household composition ($p > 0.05$), indicating comparability across the evaluation periods and supporting between-wave comparisons (Table 3). However, the absence of statistically significant sociodemographic differences should not be interpreted as evidence that the samples were identical, particularly because individual participants were not followed across the three assessment moments.

Participants reported extensive experience with Food Service, with the majority indicating more than 10 years of use and many reporting attendance on four or five days per week across all three assessment moments (Table 4). This long-term exposure to Food Service suggests that respondents were familiar with the routine characteristics of the service and may therefore have been able to evaluate changes in menu offerings and service attributes from an informed perspective. High levels of familiarity with Food Services have been associated with more consistent and informed evaluations of service attributes, including food quality, variety and alignment with personal expectations (Kumar et al., 2013; Reis and Dias, 2017).

TABLE 3 Comparison of sociodemographic characteristics across the three independent samples.

Variable	<i>p</i> -Value
Sex	0.469
Female	
Male	
Education level	0.086
<Higher education	
Bachelor's degree	
>Master's degree	
Marital status	0.788
Single	
Married/Cohabiting	
Divorced/Separated	
Household size (including the respondent)	0.075
Up to 2 members	
More than 2 members	

Overall satisfaction with the Food Service remained relatively stable and generally favorable throughout the study period (Figure 2). This already positive baseline assessment is relevant because it may have reduced the scope for substantial improvement, creating a possible ceiling effect in some satisfaction-related measures. Accordingly, subsequent favorable changes should be interpreted as descriptive patterns associated with the period following implementation. Similar findings have been reported in other Food Service contexts, where incremental improvements in menu composition and service attributes were associated with more favorable consumer evaluations despite already satisfactory service levels (Barbosa et al., 2019; Rojas Alfonso, 2019).

3.2 Evolution of consumer perception of food service products

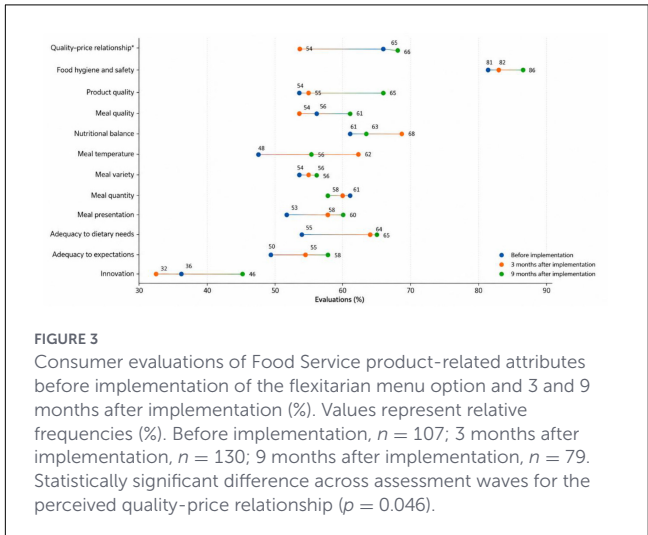
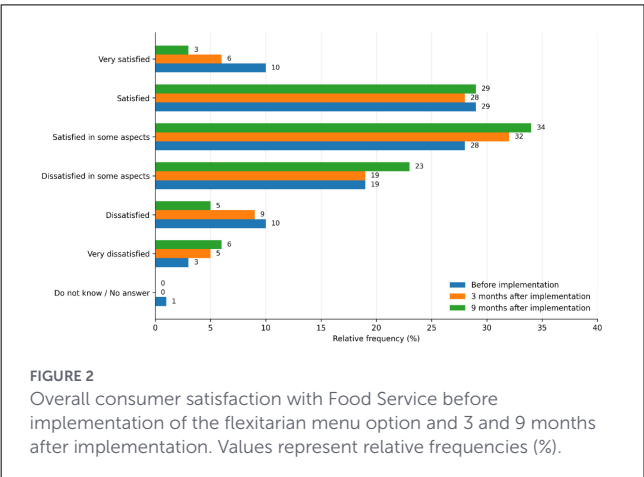
The introduction of a flexitarian menu option was designed to improve the nutritional sustainability profile of meals offered in Food Service while responding to consumers expressed expectations regarding freshness, nutritional balance and environmental responsibility. To explore potential changes in consumer perceptions following the intervention, evaluations of Food Service products and meals were compared across the three assessment moments (Figure 3).

When comparing the three evaluation moments, statistically significant differences were identified only for the perceived quality-price relationship of products ($p = 0.046$), with higher ratings observed before implementation compared to 3 months after. This temporary decrease may reflect an initial adjustment in consumers' perceptions of product value following the introduction of a new menu option. Alternatively, it may be associated with natural variation between the independent samples evaluated at each assessment moment, given the repeated cross-sectional design

TABLE 4 Participants' experience with Food Service across the three survey waves.

Variable	Before implementation (<i>n</i> = 107)		3 months after implementation (<i>n</i> = 130)		9 months after implementation (<i>n</i> = 79)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Length of Food Service use (years)						
Occasional	2	1.9	6	4.6	1	1.3
Less than 1	0	0.0	1	0.8	2	2.5
1–5	6	5.6	11	8.5	6	7.6
5–10	13	12.2	15	11.5	14	17.7
10–20	39	36.5	36	27.7	23	29.1
More than 20	46	43.0	61	46.9	32	40.5
Do not know/No answer	1	0.9	0	0.0	1	1.3
Frequency of Food Service use (days/week)						
Occasional	13	12.2	22	16.9	9	11.4
1	6	5.6	5	3.9	4	5.1
2	12	11.2	13	10.0	5	6.3
3	24	22.4	26	20.0	19	24.1
4	24	22.4	17	13.1	15	19.0
5	26	24.3	43	33.1	26	32.9
6–7	0	0.0	2	1.5	1	1.3
Do not know/No answer	2	1.9	2	1.5	0	0.0

Data are presented as number of participants (*n*) and relative frequency (%).



of the study. However, this perception didn't worsen further at 9 months, suggesting that consumers' evaluations stabilized over time following the initial implementation period.

Before the implementation of the flexitarian option, the highest-rated product-related parameters were hygiene and food safety (81%), quality–price relationship (65%), nutritional balance of meals (63%) and portion size (61%; [Figure 3](#)). These findings are consistent with previous studies identifying food safety and hygiene as primary determinants of consumer trust and acceptance in Food Services ([Nichifor et al., 2025](#); [Nunes et al., 2020](#)).

Following implementation, additional parameters achieved high appreciation levels, namely perceived product quality (65%) and adequacy of products and/or meals to consumers' dietary needs (65%). This pattern may indicate that, following the implementation of the flexitarian menu option, consumers perceived Food Service meals as better aligned with their nutritional requirements and health-related expectations ([Derbyshire, 2017](#); [Magkos et al., 2020](#)). However, given the quasi-experimental repeated cross-sectional design adopted, these findings should

be interpreted as associations rather than evidence of a direct causal effect.

The parameters showing the most pronounced improvements in perception over time included product quality (+11%), innovation in products and/or meals (+10%), adequacy of meals to dietary needs (+9%) and to consumer expectations (+9%), meal temperature (+8%), meal presentation (+7%), hygiene and food safety (+5%) and overall meal quality (+5%; Figure 3). Although only the perceived quality-price relationship showed statistically significant differences across the three assessment moments, the remaining parameters demonstrated consistent favorable descriptive trends. These findings suggest that the implementation of the flexitarian menu option may have been accompanied by broader positive evaluations of the meal offering, extending beyond the specific menu option itself. Nevertheless, these descriptive improvements should be interpreted cautiously, as they were not consistently supported by statistically significant differences.

Notably, no improvements were observed in perceived nutritional balance, meal variety or portion size. This may be explained by the fact that the flexitarian option was implemented as one menu choice among others, rather than as a comprehensive reform of the entire menu structure. Consequently, consumers may have continued to evaluate these attributes based on the overall Food Service offer rather than on the flexitarian option alone, thereby reducing the likelihood of detecting substantial changes in these dimensions.

Innovation in products and meals remained the lowest-rated parameter across all assessment moments, despite showing a positive trend after 9 months (from 36 to 46% of favorable evaluations). This persistent perception aligns with evidence suggesting that Food Service is often viewed as conservative and slow to innovate, particularly when compared to commercial Food Service settings (Kumar et al., 2013; El-Said and Fathy, 2015). Nonetheless, the observed improvement indicates a gradual increase in favorable evaluations of innovation following implementation and may reflect increasing consumer openness to healthier and more sustainability-oriented food concepts, especially among individuals with higher educational levels and health awareness (Tetra Pak, 2023; Drogo, 2023; Unit C-LBR, 2020; Velhinho, 2017). From the perspective of Expectation-Confirmation Theory and Consumer Perceived Value Theory, this gradual improvement may also reflect an increasing alignment between consumers' initial expectations and their actual experience with the new menu option, together with a greater perception of value associated with healthier and more sustainable meal choices (Bhattacharjee, 2001; Sweeney and Soutar, 2001).

Overall, the findings suggest that the implementation of a flexitarian menu option was associated with favorable trends in consumers' evaluations of several product-related dimensions, particularly perceived product quality, innovation and adequacy to consumers' needs and expectations. Although statistically significant differences were limited, the consistency of these descriptive patterns over time indicates that healthier and more sustainable menu options may represent a promising strategy for enhancing consumers' perceptions of Food Service. From an operational perspective, even modest improvements in consumers' evaluations may be meaningful for Food Service managers, as they can facilitate the acceptance of healthier

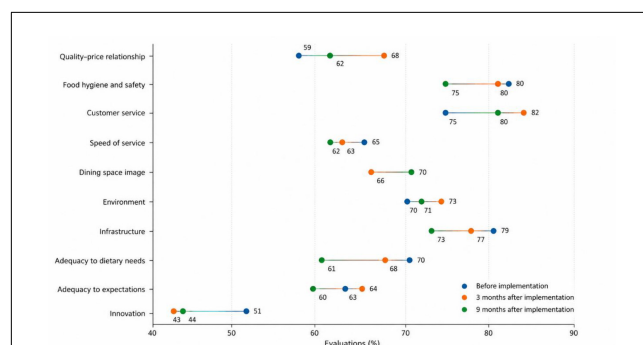


FIGURE 4

Consumer evaluations of Food Service service-related attributes before implementation of the flexitarian menu option and 3 and 9 months after implementation (%). Values represent relative frequencies (%). Before implementation, $n = 107$; 3 months after implementation, $n = 130$; 9 months after implementation, $n = 79$. No statistically significant differences were observed across assessment waves.

and more sustainable menu initiatives without compromising overall consumer satisfaction. Nevertheless, further studies using controlled designs and larger samples are needed to determine the extent to which these observed changes can be directly attributed to the intervention.

3.3 Consumer perception of food service services

The implementation of a flexitarian menu option was primarily focused on modifying the meal offer rather than the operational aspects of Food Service delivery. Nevertheless, changes in menu composition may also be associated with consumers' broader evaluations of the service through mechanisms such as perceived organizational commitment to health, sustainability and responsiveness to consumer needs. To explore this potential indirect association, consumer evaluations of service-related parameters were compared before implementation and at 3 and 9 months after implementation (Figure 4).

Across all three assessment moments, the highest-rated service-related parameters remained consistent: hygiene and food safety of the service (approximately 80%), adequacy and condition of infrastructures (around 77%), and staff service quality, including professionalism and responsiveness (approximately 75%). These results reinforce the central role of hygiene, physical environment and interpersonal service quality in shaping consumer satisfaction in Food Service contexts (Nichifor et al., 2025; Rosario and Walton, 2019; Barbosa et al., 2019). The stability of these highly rated dimensions throughout the study also suggests that the intervention was implemented without adversely affecting core aspects of service delivery.

The parameter with the lowest appreciation levels throughout the study was innovation in the service, both before and after the implementation of the flexitarian option. Despite a slight improvement over time, this dimension continued to receive comparatively lower ratings, reflecting a persistent

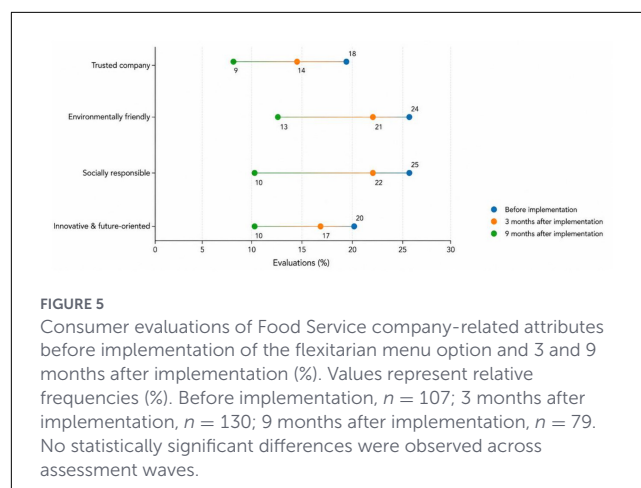
perception of limited-service innovation within Food Service. This finding aligns with previous research highlighting consumers' expectations regarding service innovation, including new service-line concepts, digital solutions for meal booking and ordering (e.g., mobile applications) and diversified payment methods (Czarniecka-Skubina et al., 2020, 2019). The discrepancy between these articulated expectations and the low innovation scores observed suggests that these consumer-driven innovation expectations have not yet been fully translated into perceived changes in service delivery. This interpretation is also consistent with previous studies describing structural constraints in Food Service, such as standardized operational procedures, contractual obligations, and cost control requirements, which may limit the implementation of visible and consumer-oriented service innovations (Kumar et al., 2013; El-Said and Fathy, 2015).

Among all service-related parameters, only staff service quality showed a noticeable positive trend, increasing by approximately 5% following implementation. Although this change was not statistically significant, it may reflect organizational changes that accompanied the introduction of the flexitarian menu option, including staff training, enhanced communication with consumers and greater engagement with the objectives of the intervention. Previous research suggests that staff competence, communication and consumer interaction are important determinants of service evaluations, particularly in institutional settings where consumers have relatively limited freedom of choice (Rojas Alfonso, 2019; Abreu et al., 2019; Research Markets, 2025). Nevertheless, because these organizational changes occurred alongside the menu intervention, their individual contribution cannot be distinguished within the present study.

No significant improvements were observed in parameters such as service speed, environment conditions, space image or the perceived quality–price relationship of the service. This finding is consistent with the scope of the intervention, which was designed to modify the meal offer rather than service logistics, infrastructure or pricing strategies. Importantly, the absence of unfavorable changes across these dimensions suggests that implementing the flexitarian menu option was not associated with deterioration in perceived service quality or operational performance.

Regarding the adequacy of the service to consumers' dietary needs and expectations, slight positive trends were observed over time, although without statistically significant differences. These trends may reflect a gradual adjustment in consumers' evaluations following the introduction of a menu option that addressed emerging interests in healthier and more sustainable eating (Derbyshire, 2017; Magkos et al., 2020). From the perspective of Expectation-Confirmation Theory and Consumer Perceived Value Theory, these descriptive trends may indicate that the intervention progressively aligned the meal offer with consumers' expectations and perceived value, even though these changes were not sufficiently large to produce statistically significant differences (Bhattacharjee, 2001; Sweeney and Soutar, 2001).

Overall, the findings suggest that the implementation of the flexitarian menu option was associated with only modest changes in service-related perceptions, which is consistent with the fact that the intervention primarily targeted menu composition rather than service organization. Although statistically significant differences were not observed for most service-related



parameters, the generally favorable and stable evaluations indicate that introducing the flexitarian option was compatible with maintaining high levels of perceived service quality. From an operational perspective, these findings suggest that healthier and more sustainable menu initiatives can be implemented without compromising consumers' evaluations of Food Service. Future studies incorporating control groups or broader organizational interventions should further investigate whether combining menu innovation with service redesign produces more pronounced changes in consumer perceptions.

3.4 Consumer perception of food service companies

Beyond the evaluation of products and services, consumers' perceptions of Food Service companies as organizations plays a relevant role in shaping trust, acceptance and overall satisfaction. In addition to influencing evaluations of the meal offer itself, the implementation of a flexitarian menu option may also be associated with broader organizational perceptions by signaling a commitment to health, sustainability and consumer responsiveness. The evaluation of these organizational dimensions is presented in Figure 5.

Across all assessment moments, trustworthiness emerged as the most positively rated organizational, with favorable evaluations consistently around 60%. This stability suggests that trust represents a relatively well-established perception among consumers with extensive experience in Food Service, as observed in the present study, where most respondents reported more than 10 years of regular use of these services. These findings are consistent with previous research indicating that trust in Food Service organizations is primarily built through the consistent delivery of safe meals, reliable service and organizational credibility rather than through isolated menu innovations (Nichifor et al., 2025; Nunes et al., 2020).

In contrast, the most notable descriptive changes over time were observed in attributes associated with sustainability and future-oriented positioning. Following the implementation of the flexitarian menu option, favorable evaluations of Food

Service companies as environmentally friendly increased by approximately 9%, while perceptions of social responsibility showed a similar improvement. Although these changes were not statistically significant, they suggest that the implementation of the flexitarian menu option may have been associated with a stronger perception of organizational commitment to environmental sustainability and social responsibility. Such an interpretation is consistent with previous studies reporting that visible sustainability initiatives can reinforce consumers' evaluations of organizational responsibility and alignment with emerging societal concerns related to sustainable food systems and public health (Boumphrey and Brehmer, 2017; Derbyshire, 2017; Marchioni et al., 2021).

A moderate positive trend was also observed in consumers' perceptions of Food Service companies as innovative and future-oriented, with favorable evaluations increasing by approximately 5% after implementation. Although innovation remained the lowest-rated organizational attribute throughout the study, this descriptive improvement may indicate that introducing a structured flexitarian menu option contributed to a more progressive organizational image from the consumers' perspective. Nevertheless, given the quasi-experimental repeated cross-sectional design adopted, these findings should be interpreted as associations rather than evidence of a direct effect of the intervention. This interpretation is particularly relevant in a sector frequently characterized by operational standardization, contractual constraints and cost-control requirements, which may limit consumers' perceptions of organizational innovation (Kumar et al., 2013; El-Said and Fathy, 2015).

Despite these favorable trends, a considerable proportion of respondents continued to select the “do not know/no answer” option when evaluating environmental responsibility, social responsibility and innovation-related attributes. This finding suggests that, although the intervention may have increased the visibility of sustainability-related initiatives, these organizational dimensions remained less familiar to many consumers than more tangible aspects such as food quality or service performance. Previous studies indicate that sustainability initiatives are more likely to strengthen corporate image when supported by clear, transparent and continuous communication strategies (Euromonitor International, 2022; Edemundo et al., 2022). Consequently, the observed proportion of uncertain responses may reflect limited awareness of the broader organizational objectives underpinning the intervention rather than unfavorable evaluations of the initiative itself.

From the perspective of Expectation-Confirmation Theory and Consumer Perceived Value Theory, these descriptive improvements may reflect a gradual alignment between consumers' expectations regarding healthier and more sustainable Food Service and their experience following the implementation of the flexitarian menu option (Bhattacharjee, 2001; Sweeney and Soutar, 2001). As consumers perceived greater organizational commitment to sustainability, they may also have attributed greater value to the Food Service company beyond the functional characteristics of the meals themselves.

Overall, the findings suggest that the implementation of a health and sustainability menu option was associated with favorable trends in consumers' perceptions of Food Service

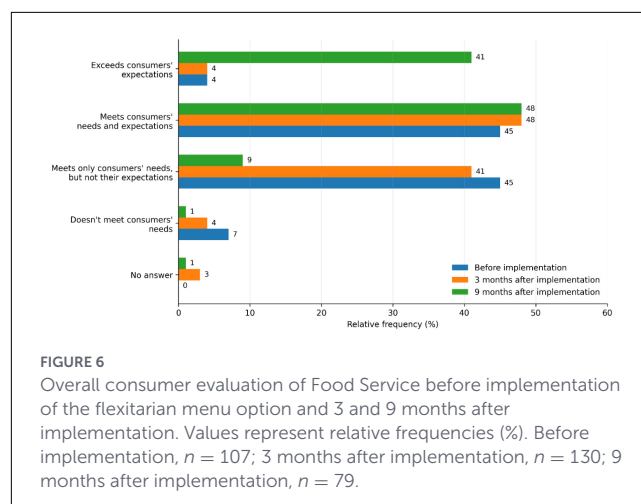


FIGURE 6

Overall consumer evaluation of Food Service before implementation of the flexitarian menu option and 3 and 9 months after implementation. Values represent relative frequencies (%). Before implementation, $n = 107$; 3 months after implementation, $n = 130$; 9 months after implementation, $n = 79$.

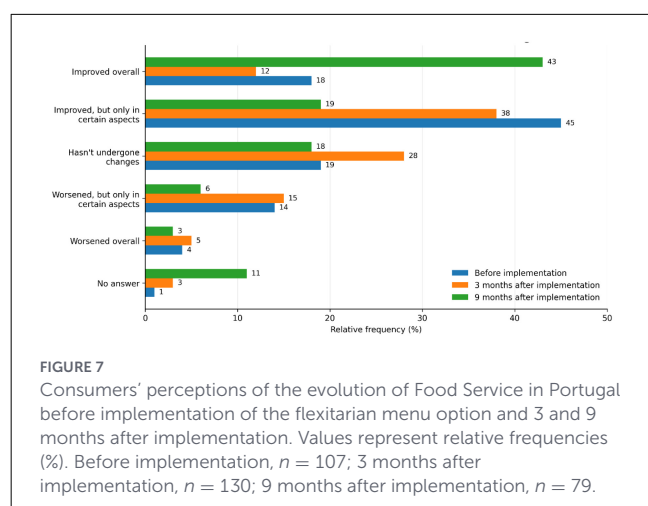
companies, particularly regarding environmental responsibility, social responsibility and organizational innovation. Although the magnitude of these changes was modest and largely descriptive, they indicate that menu-based sustainability initiatives may extend beyond evaluations of individual meals and become associated with broader perceptions of organizational identity. From a managerial perspective, these findings highlight that visible menu innovations may represent an opportunity to reinforce corporate image and organizational positioning. However, further studies using controlled designs are needed to determine the extent to which these organizational perceptions can be directly attributed to sustainability-oriented menu interventions.

3.5 Overall consumer perspective of food service and perceived sector evolution

The overall perception of Food Service reflects the cumulative experience of consumers across products, services and organizational performance. Before the implementation of the flexitarian menu option, consumer opinions regarding Food Service in general were divided. Approximately 45% of respondents considered that Food Service satisfied their basic needs but did not meet their expectations, while a similar proportion believed that Food Service satisfied both needs and expectations (Figure 6). This distribution highlights a structural challenge within the sector, where operational adequacy does not necessarily translate into perceived added value or differentiation.

Three months after implementation, perceptions remained relatively stable, with consumers still divided between these two positions. This finding suggests that short-term exposure to the intervention was not associated with substantial changes in overall consumer perceptions. Behavioral and perceptual changes in Food Service settings often require repeated exposure and time to become established, particularly among consumers with long-standing consumption habits (Garnett et al., 2019; Reis and Dias, 2017).

In contrast, 9 months after the implementation of the flexitarian menu option, a more favorable pattern of responses was observed. Only 9% of respondents continued to believe that Food Service



merely satisfied basic needs without meeting expectations, while 48% considered that Food Service satisfied both needs and expectations, and 41% reported that Food Service exceeded their expectations (Figure 6). These descriptive changes suggest that the continued availability of the flexitarian menu option may have been associated with a progressively more favorable overall perception of Food Service. However, given the quasi-experimental repeated cross-sectional design and the absence of a control group, these findings should be interpreted as associations rather than evidence of a cumulative causal effect.

A similar pattern was observed when consumers were asked to evaluate the evolution of Food Service in Portugal over time. Before implementation, 45% of respondents believed that Food Service had improved only in certain aspects, while 19% perceived no meaningful evolution (Figure 7). After 9 months, 43% of consumers considered that Food Service had improved in general, whereas only 18% continued to believe that improvements had occurred only in specific aspects. Although these changes were descriptive, they may indicate that the intervention coincided with a more optimistic perception of the sector's capacity to evolve in response to emerging consumer expectations related to health and sustainability.

These findings are consistent with previous studies indicating that improvements in service quality, food offerings, and alignment with consumer expectations are associated with more favorable evaluations of Food Service and greater consumer satisfaction (Barbosa et al., 2019; Rojas Alfonso, 2019). From the perspective of Expectation-Confirmation Theory and Consumer Perceived Value Theory, the observed trends may reflect a gradual alignment between consumers' expectations and their experiences following the implementation of the flexitarian menu option, thereby contributing to more favorable evaluations of the Food Service offer (Bhattacharjee, 2001; Sweeney and Soutar, 2001). Nevertheless, because organizational perceptions are shaped by multiple factors, the observed changes cannot be attributed exclusively to the menu intervention.

From a practical perspective, these findings suggest that introducing healthier and more sustainable menu options may represent an accessible strategy for Food Service providers

seeking to strengthen consumers' overall evaluations without requiring major structural or operational changes. Although the observed improvements were generally modest and only limited statistically significant differences were identified throughout the study, the consistency of favorable descriptive trends across multiple dimensions indicates that sustainability-oriented menu innovations may contribute to a more positive perception of Food Service over time. Further research using controlled study designs and larger samples is warranted to confirm these associations and to determine the extent to which they can be directly attributed to the intervention.

4 Conclusion

This study examined the association between the implementation of a health and sustainability menu option and consumers' perceptions of Food Service in a real-world healthcare setting. The findings indicate that implementing this type of menu innovation was associated with generally favorable trends in several dimensions of consumer perception, namely in consumers' evaluations of products, services or organizational image, particularly regarding perceived product quality, innovation, adequacy of meals to consumers' needs and expectations, and the overall evaluation of Food Service, thus supporting the operational feasibility of such interventions within routine Food Service practice.

From a practical perspective, the results suggest that introducing flexitarian menu options may represent a feasible strategy for Food Service providers seeking to respond to evolving consumer expectations while promoting healthier and more sustainable eating patterns.

Although only limited statistically significant differences were identified, the consistency of these descriptive trends after 9 months suggests that sustained exposure to healthier and more sustainable menu options may be associated with progressively more favorable consumer evaluations.

The findings also indicate that menu-based sustainability initiatives alone are unlikely to transform consumers' overall perceptions of Food Service. Rather, they should be considered as one component of a broader organizational strategy that integrates menu innovation, staff engagement, effective communication and continuous commitment to health and sustainability. Such an integrated approach is likely to strengthen the visibility and acceptance of sustainability initiatives within Food Service settings.

Several limitations should be considered when interpreting these findings. The quasi-experimental repeated cross-sectional design, the absence of a control group, the use of independent samples at each assessment moment, the relatively low response rates, and the reliance on self-reported perceptions limit causal inference and the generalisability of the results. In addition, the study was conducted in a single healthcare institution, which may limit the transferability of the findings to other Food Service contexts.

Future research should evaluate similar interventions using controlled study designs, larger and more diverse samples, and multiple institutional settings. Further studies should also

investigate whether combining menu innovation with broader organizational and communication strategies produces greater improvements in consumer perceptions and contributes to the long-term adoption of healthier and more sustainable Food Service practices.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

CC: Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Data curation, Investigation, Conceptualization. CV: Supervision, Writing – review & editing, Validation. AR: Supervision, Writing – review & editing, Validation.

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References

- Abreu, E. S., Spinelli, M. G. N., and Saladino, R. S. (2019). *Gestão de unidades de alimentação e nutrição: um modo de fazer*. São Paulo: Editora Metha.
- Antoniak, M. A., Szymkowiak, A., and Pepliński, B. (2022). The source of protein or its value? Consumer perception regarding the importance of meat(-like) product attributes. *Appl. Sci.* 12:4128. doi: 10.3390/app12094128
- APN (2017). *Alimentar o futuro: uma reflexão sobre sustentabilidade alimentar* [Internet]. Porto: Associação Portuguesa de Nutrição. Available online at: https://www.apn.org.pt/documentos/ebooks/E-BOOK_SUSTENTABILIDADE_.pdf (Accessed December 30, 2025).
- Assembleia da República (2019a). *Lei n.º 58/2019 Assegura a execução, na ordem jurídica nacional, do Regulamento (UE) 2016/679 do Parlamento e do Conselho, de 27 de abril de 2016, relativo à proteção das pessoas singulares no que diz respeito ao tratamento de dados pessoais e à livre circulação desses dados*. Lisboa: Diário da República. Série I: 3–40.
- Assembleia da República (2019b). *Lei n.º 59/2019 Aprova as regras relativas ao tratamento de dados pessoais para efeitos de prevenção, deteção, investigação ou repressão de infrações penais ou de execução de sanções penais, transpondo a Diretiva (UE) 2016/680 do Parlamento Europeu e do Conselho, de 27 de abril de 2016*. Lisboa: Diário da República. Série I: 41–68.
- Barbosa, M. V., Rocha, T. G., Da Silva, T. M., Tonini, K. A. D., and Costa da Silva, T. T. (2019). Descritores da qualidade do serviço de restaurantes universitários com foco na percepção dos clientes. *Demetra*. 14:e33193. doi: 10.12957/demetra.2019.33193
- Beal, T., Ortenzi, F., and Fanzo, J. (2023). Estimated micronutrient shortfalls of the EAT-Lancet planetary health diet. *Lancet Planet Health* 7, e233–e237. doi: 10.1016/S2542-5196(23)00006-2
- Bhattacharjee, A. (2001). Understanding information systems continuance: an expectation-confirmation model. *MIS Q.* 25, 351–370. doi: 10.2307/3250921
- Boscardin, M., Dorr, A. C., Breitenbach, R., and Brandão, J. B. (2023). O que influencia os flexitarianos a reduzir o consumo de carne no Brasil? *Estud. Av.* 37, 243–60. doi: 10.1590/s0103-4014.2023.37109.015
- Boumphrey, S., and Brehmer, Z. (2017). *Megatrend Analysis: Putting the Consumer at the Heart of Business* [Market research]. Euromonitor International. Available online at: <https://bluesymre.files.wordpress.com/2019/04/wp-megatrendanalysis.pdf> (Accessed December 30, 2025).
- Clarys, P., Deliens, T., Huybrechts, I., Deriemaeker, P., Vanaelst, B., De Keyser, W., et al. (2014). Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet. *Nutrients* 6, 1318–1332. doi: 10.3390/nu6031318
- Clodoveo, M. L., Muraglia, M., Fino, V., Curci, F., Fracchiolla, G., Corbo, F. F. R., et al. (2021). Overview on innovative packaging methods aimed to increase the shelf-life of cook-chill foods. *Foods* 10:2086. doi: 10.3390/foods10092086
- Costa, A. I., Farias, A. R., Lopes, C., Torres, D., Simão, C., Rei, M., et al. (2023). *Como comemos o que comemos, um retrato do consumo de refeições em Portugal*. Lisboa: Fundação Francisco Manuel dos Santos.
- Czarnecka-Skubina, E., Górska-Warzewicz, H., Laskowski, W., and Jeznach, M. (2019). Consumer choices and service quality in the university canteens in Warsaw, Poland. *Int. J. Environ. Res. Public Health* 16:3699. doi: 10.3390/ijerph16193699
- Czarnecka-Skubina, E., Górska-Warzewicz, H., and Trafialek, J. (2020). Attitudes and consumer behavior toward foods offered in staff canteens. *Int. J. Environ. Res. Public Health* 17:6239. doi: 10.3390/ijerph17176239
- Derbyshire, E. J. (2017). Flexitarian diets and health: a review of the evidence-based literature. *Front. Nutr.* 3:55. doi: 10.3389/fnut.2016.00055
- Drogo, R. (2023). *Investigating consumer perception of sustainable purchase: Examining correlations between food habits and innovation* [Dissertação de Mestrado]. Lisboa: ISCTE Business School.
- EAT-Lancet (2019). *Relatório Sumário da Comissão EAT-Lancet - Dietas Saudáveis A Partir De Sistemas Alimentares Sustentáveis. Alimento, Planeta, Saúde*. [Internet]. EAT-Lancet Commission on Healthy Diets From Sustainable Food Systems. Available online at: https://eatforum.org/wp-content/uploads/2025/09/EAT-Lancet_Commission_Summary_Report_Portuguese.pdf (Accessed January 10, 2023).

- EAT-Lancet Commission (2026). *The planetary health diet: a global reference diet for sustainable food systems* [Internet]. EAT-Lancet Commission. Available online at: <https://eatforum.org/eat-lancet/the-planetary-health-diet/> (Accessed August 25, 2025).
- Edemundo, A. S., Pinto, E., Baltazar, A. L., Fialho, S., and Lima, J. (2022). Sustentabilidade alimentar em alimentação coletiva e restauração: percepção dos nutricionistas. *Acta Port. Nutr.* 31, 44–49. doi: 10.21011/apn.2022.3107
- El-Said, O. A., and Fathy, E. A. (2015). Assessing university students' satisfaction with on-campus cafeteria services. *Tour. Manag. Perspect.* 16, 318–324. doi: 10.1016/j.tmp.2015.09.006
- Euromonitor International (2022). *10 principais tendências globais de consumo 2022* [Market research]. Euromonitor International (Portuguese).
- Euromonitor International (2023). *Convenience Megatrend: Understanding the Impact* [Website]. London: Euromonitor International; cop. Available online at: <https://www.euromonitor.com/article/understanding-the-convenience-megatrend-and-its-impact> (Accessed March 12, 2025).
- European Parliament, Council of the European Union (2016). *Regulamento (UE) N° 679/2016 do Parlamento Europeu e do Conselho da União Europeia, Relativo à proteção das pessoas singulares no que diz respeito ao tratamento de dados pessoais e à livre circulação desses dados e que revoga a Diretiva 95/46/CE (Regulamento Geral sobre a Proteção de Dados)*. Bruxelas: Jornal Oficial da União Europeia, 1–88.
- Fitzgerald, S., Buckley, L., Perry, I. J., and Geaney, F. (2020). The impact of a complex workplace dietary intervention on Irish employees' off-duty dietary intakes. *Health Promot. Int.* 35, 544–554. doi: 10.1093/heapro/daz051
- Flail, G. J. (2011). Why 'Flexitarian' was a word of the year: carno-phallogocentrism and the lexicon of vegetable-based diets. *Int. J. Human. Soc. Sci.* 1, 83–92. Available online at: https://ijhss.thebripi.org/journals/Vol_1_No_12_September_2011/12.pdf
- Food and Agriculture Organization of the United Nations and World Health Organization (2019). *Sustainable Healthy Diets – Guiding Principles*. Rome: FAO and WHO. Available online at: <https://openknowledge.fao.org/server/api/core/bitstreams/03bf9cde-6189-4d84-8371-e9b939311283f/content> (Accessed December 30, 2025).
- FoodServiceEurope (2026). *FoodServiceEurope - European Industry Overview* [Website]. Belgium: FoodServiceEurope. Available online at: <http://www.foodserviceeurope.org/en/european-industry-overview> (Accessed August 10, 2025).
- Garnett, E. E., Balmford, A., Sandbrook, C., Pilling, M. A., and Marteau, T. M. (2019). Impact of increasing vegetarian availability on meal selection and sales in cafeterias. *Proc. Natl. Acad. Sci.* 116, 20923–20929. doi: 10.1073/pnas.1907207116
- Graça, J., Truninger, M., Junqueira, L., and Schmidt, L. (2019). Consumption orientations may support (or hinder) transitions to more plant-based diets. *Appetite* 140, 19–26. doi: 10.1016/j.appet.2019.04.027
- Gregório, M., Graça, P., Santos, L., Mourato, A., Albuquerque, M., Pratas, J., et al. (2021). *Manual de Dietas Hospitalares. Programa Nacional para a Promoção da Alimentação Saudável, Direção-Geral da Saúde*. Available online at: <https://www.dgs.pt/documentos-e-publicacoes/manual-de-dietas-hospitalares-2021-pdf.aspx> (Accessed December 30, 2025).
- Haroun, D., Harper, C., Wood, L., and Nelson, M. (2011). The impact of the food-based and nutrient-based standards on lunchtime food and drink provision and consumption in primary schools in England. *Public Health Nutr.* 14, 209–218. doi: 10.1017/S1368980010002132
- INE (2007). *Instituto Nacional de Estatística - Classificação Portuguesa das Atividades Económicas Rev.3*. Lisboa: INE. Available online at: https://www.ine.pt/ine_novidades/semin/cae/CAE_REV_3.pdf (Accessed December 30, 2025).
- Jun, K., and Yoon, B. (2024). Consumer perspectives on restaurant sustainability: an S-O-R model approach to affective and cognitive states. *J. Foodservice Bus. Res.* doi: 10.1080/15378020.2024.2396687
- Kessler, J. (1998). Flexitarian fare. *Atlanta Journal-Constitution*
- Kraemer, F., and Gracia-Arnaiz, M. (2015). Alimentarse o nutrirse en un comedor social en España: reflexiones sobre la comensalidad. *Demetra*. 10, 455–466. doi: 10.12957/demetra.2015.16173
- Kuhn, B., and Margellos, D. (2022). *Global perspectives on megatrends: The Future as Seen by Analysts and Researchers from Different World Regions*. Cham: Springer. doi: 10.24216/9783838215631
- Kumar, R., Kathiravan, T., Rajamanickam, R., and Nadasabapathi, S. (2013). Institutional foods development perspectives review. *Food Nutr. Sci.* 4, 873–878. doi: 10.4236/fns.2013.49114
- Kwun, D. J.-W., Ellyn, E., and Choi, Y. (2013). Campus foodservice attributes and their effects on customer satisfaction, image, and word-of-mouth. *J. Foodservice Bus. Res.* 16, 276–297. doi: 10.1080/15378020.2013.810534
- Magkos, F., Tetens, I., Bügel, S. G., Felby, C., Schacht, S. R., Hill, J. O., et al. (2020). A perspective on the transition to plant-based diets: a diet change may attenuate climate change, but can it also attenuate obesity and chronic disease risk? *Adv. Nutr.* 11, 1–9. doi: 10.1093/advances/nmz090
- Marchioni, D. M., Carvalho, A. M., and Villar, B. S. (2021). Dietas sustentáveis e sistemas alimentares: novos desafios da nutrição em saúde pública. *Revista USP*. 1, 61–76. doi: 10.11606/issn.2316-9036.i128p61-76
- Marcotrigiano, V., Stingi, G. D., Nugnes, P. T., Mancano, S., Lagreca, V. M., Tarricone, T., et al. (2023a). Food service activities and official controls: dietary promotion, sustainability and future perspectives. *Healthcare* 11:1347. doi: 10.3390/healthcare11091347
- Marcotrigiano, V., Stingi, G. D., Nugnes, P. T., Mancano, S., Lagreca, V. M., Tarricone, T., et al. (2023b). Collective catering activities and official controls: dietary promotion, sustainability and future perspectives. *Healthcare* 11:1347. doi: 10.3390/healthcare11091347
- Nichifor, B., Zait, L., and Timiras, L. (2025). Drivers, barriers, and innovations in sustainable food consumption: A systematic literature review. *Sustainability* 17:2233. doi: 10.3390/su17052233
- Nunes, A., Morgado, C., Fernandes, A., Guerra, M. M., and Brandão, C. (2020). "Perception of the determinants of quality and food safety by catering clients in a restaurant in the Torres Novas Region," in *INCReASe 2019* (Cham: Springer), 223–232. doi: 10.1007/978-3-030-30938-1_18
- Pronça, R. P. C., Sousa, A. A., Veiros, M. B., and Hering, B. (2005). *Qualidade nutricional e sensorial na produção de refeições*. Florianópolis: EdUFSC.
- Raphaely, T., and Marinova, D. (2012). Flexitarianism: traditional diets as social innovation for sustainability. *Visão Glob. Rev.* 15, 403–422.
- Reis, F., and Dias, S. (2017). Outsourcing and consumer satisfaction in food services: case study of the school of dance and the school of music of the national conservatory. *R-LEGO – Rev. Lusófona de Econ. Gest. Organ.* 6, 75–98. doi: 10.60543/r-lego.v0i6.6247
- Research and Markets (2025). *Europe Online Food Delivery Market Analysis Report 2025-2033: Cloud Kitchen Boom and Restaurant-Delivery Platform Collaborations Accelerate Expansion* [Website]. Research and Markets; cop. (atualizado em: 2025 Mai 16). Available online at: <https://www.globenewswire.com/news-release/2025/05/16/3082898/0/en/Europe-Online-Food-Delivery-Market-Analysis-Report-2025-2033-Cloud-Kitchen-Boom-and-Restaurant-Delivery-Platform-Collaborations-Accelerate-Expansion.html> (Accessed March 30, 2025).
- Rojas Alfonso, C. G. (2019). *Avaliação da qualidade de serviço e recomendações de melhorias na área de restauração* [Dissertação de Mestrado]. Lisboa: ISCTE-Instituto Universitário de Lisboa.
- Rosario, V., and Walton, K. (2019). "Hospital Food Service," in *Handbook of Eating and Drinking*. Cham: Springer Nature Switzerland. doi: 10.1007/978-3-319-75388-1_74-1
- Schubert, M. N., Tonin, J., and Schneider, S. (2023). *Desafios e tendências da alimentação contemporânea: consumo, mercados e ação pública*. Porto Alegre: Editora da UFRGS.
- SNRC (2026a). *Le Syndical National de la Restauration Collective - Réglementation* [Website]. Paris: SNRC. Available online at: <https://www.snrc.fr/nutrition-et-surete-alimentaire/reglementation/> (Accessed July 27, 2022).
- SNRC (2026b). *Le Syndical National de la Restauration Collective - FAQ* [Website]. Paris: SNRC. Available online at: <https://www.snrc.fr/le-snrc/faq-snrc/> (Accessed July 27, 2022).
- Stubbendorff, A., Janzi, S., Jukkola, J., Morency, M., Zhang, S., Borné, Y., et al. (2025). Mini-review of the EAT-Lancet planetary health diet and its role in cardiometabolic disease prevention. *Metabolism* 172:156373. doi: 10.1016/j.metabol.2025.156373
- Sweeney, J. C., and Soutar, G. N. (2001). Consumer perceived value: the development of a multiple item scale. *J. Retail.* 77, 203–220. doi: 10.1016/S0022-4359(01)00041-0
- Tetra Pak (2023). *Tetra Pak Index 2023: The Future of Health and Nutrition*. Tetra Pak International S.A. Available online at: <https://indd.adobe.com/view/847105ae-1d66-4c7f-8e4f-6b69211c8c2b> (Accessed December 30, 2025).
- Tikkanen, I. (2011). Nutritionally balanced school meal model for a comprehensive school. *Br. Food J.* 113, 222–233. doi: 10.1108/0007070111105312
- Unit C-LBR (2020). *Estudo da Sociedade Portuguesa - Felicidade, bem-estar, rendimento, poupança, consumo e hábitos alimentares saudáveis* (novembro, 2019). Lisboa: Observatório da Sociedade Portuguesa. Available online at: <https://clsbe.lisboa.ucp.pt/osp-estudo-14-nov19-food-habits> (Accessed December 30, 2025).
- Velasco, J. C., and Molina, V. B. C. (2020). Condições de trabalho, saúde e segurança dos colaboradores das unidades de alimentação e nutrição. *Rev. Multidiscip. Saúde* 3, 16–31.
- Velinho, A. R. G. (2017). *Desigualdades sociais no consumo alimentar: um estudo transversal em adultos portugueses* [Dissertação de Mestrado]. Lisboa: Universidade Nova de Lisboa.
- WBCSD (2025) *Transforming Menus, Transforming Diets: The Power of Procurement for Health and Sustainability* [Internet]. Geneva: World Business Council for Sustainable Development; cop. Available online at: <https://www.wbcd.org/news/transforming-menus-transforming-diets-the-power-of-procurement-for-health-and-sustainability/> (Accessed December 30, 2025).
- WHO (2022). *Food Safety* [Website]. Geneva: World Health Organization; cop. Available online at: <https://www.who.int/news-room/fact-sheets/detail/food-safety> (Accessed December 20, 2024).
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *J. Market.* 52, 2–22. doi: 10.1177/002224298805200302