

HOW COVID-19 PANDEMIC CONTINGENCY MEASURES IMPACTED ON ENVIRONMENTAL PRACTICES IN FOOD SERVICE

IMPACTO DAS MEDIDAS DE CONTINGÊNCIA ADOTADAS DURANTE A COVID-19 NO SETOR DA ALIMENTAÇÃO COLETIVA E RESTAURAÇÃO

A.O.
ARTIGO ORIGINAL

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ABSTRACT

INTRODUCTION: Food Service units achieved importance and responsibility in feeding the population. In addition to its socioeconomic impact, the Food Service industry has a strong environmental impact and for several years, changes have been made to produce meals complying with sustainability. Concerns have addressed energy efficiency of equipment, use of reusable material, purchase of local products, less use of processed and packaged goods, proper selection and disposal of solid waste and use of strategies to avoid food waste.

OBJECTIVES: This study aimed to assess the impact of the implementation of the contingency measures for the COVID-19 pandemic on the environmental practices of food services throughout the Portuguese territory.

METHODOLOGY: The sample was obtained by convenience, requesting food service companies to fulfil a questionnaire with multiple choice and open questions.

RESULTS: A sample of 139 participants was obtained. Results show a decrease in the number of meals served, accompanied by a great increase in the use of disposable items, such as plates, paper towels, bags, packages as well as individual packaging for cutlery, bread and fruit, and individual protective equipment and hygiene products (face masks, face shields and hand-sanitiser).

CONCLUSIONS: This study highlights the severe setback that the contingency measures for COVID-19 represent for the food service sector. Policymakers should evaluate the adopted practices that are still in place and keep the ones that may be proven to be efficient and positive and abandon or relieve the unnecessary ones. Other measures such as the reinforcement of hygiene procedures, should be kept to ensure food and environment safety and consumer confidence in food service establishments.

KEYWORDS

COVID-19, Environment, Food service, SGD, Sustainability

RESUMO

INTRODUÇÃO: O setor da Alimentação Coletiva assumiu importância crescente e responsabilidade na ingestão alimentar da população. Além do impacto socioeconómico o setor da Alimentação Coletiva tem um forte impacto ambiental o que levou a que nos últimos anos tenham sido feitas diversas modificações no sentido de produzir refeições de forma mais sustentável. As preocupações têm-se centrado na eficiência dos equipamentos, uso de materiais reutilizáveis, compra de produtos locais, redução da utilização de alimentos processados e com múltiplas embalagens, separação ecológica de resíduos e estratégias de redução do desperdício alimentar.

OBJETIVOS: Este estudo tem como objetivo avaliar o impacto da implementação das medidas de contingência para a pandemia do Covid 19 nas práticas ambientais dos serviços de Alimentação Coletiva no território português.

METODOLOGIA: A amostra foi obtida por conveniência através de contacto com serviços de Alimentação Coletiva a solicitar o preenchimento de um questionário incluindo perguntas de escolha múltipla e respostas abertas.

RESULTADOS: Obteve-se uma amostra de 139 participantes. Os resultados evidenciam uma diminuição do número de refeições servidas, acompanhada por um aumento substancial da quantidade de materiais descartáveis, tais como pratos, toalhas de papel, sacos, embalagens, tais como embalagens individuais para talheres, pão e fruta e material de proteção individual e produtos de higiene (máscaras faciais, viseiras e desinfetante das mãos).

CONCLUSÕES: Este estudo evidencia um retrocesso severo no setor de Alimentação Coletiva como resultado da implementação das medidas de contingência para o Covid 19. Os decisores políticos devem avaliar as medidas adotadas que ainda estão em vigor, manter as que se justificam e se mostraram eficazes e positivas e abandonar ou aliviar as desnecessárias. Outras medidas como o reforço dos procedimentos higio sanitários devem ser mantidos para garantir a segurança alimentar e ambiental e a confiança do consumidor nos estabelecimentos de Alimentação Coletiva.

PALAVRAS-CHAVE

COVID-19, Ambiente, Alimentação Coletiva e Restauração, ODS, Sustentabilidade

INTRODUCTION

One of the greatest challenges of the 21st century is to comply with a growing world population, considering the planet's limited resources. To meet current and future food needs, it is necessary not only to increase food production but also to improve food management, since one-third of the food produced is wasted throughout the food supply chain, while many people are still starving (1, 2). Aiming at sustainable development at a global level, in 2015, the United Nations General Assembly established 17 goals to be achieved by 2030 by all member states, which include the elimination of poverty and hunger, the reduction of inequalities and responsible production and consumption (3). Framed within this "sustainable development" policy, it is urgent to adopt practices that do not cause irreversible damage to the ecosystem and that do not compromise the survival of future generations (4, 5).

Considering the growing trend of food consumption outside the home, Food Service units (FSU) achieved importance and responsibility in feeding the population (6). In addition to its socio-economic impact, the Food Service industry has a strong environmental impact (6–9). The large-scale production of meals implies a high use of resources, such as water, energy, materials, and equipment (7, 8). Water is used for cleaning and sanitization, both of food, facilities, and cooking tools and appliances, as well as for the preparation of various culinary preparations (7). Energy is essential for equipment operation, the lighting of workspaces and the preservation of food and meals, namely maintenance of the cold chain and/or of the distribution temperature (7). As an aggravating factor, waste is generated throughout the various steps of food production, including selection, preparation, distribution, and consumption (leftovers and plate waste) (7, 8). The Food Service Business is responsible for around 26% of the total food waste, corresponding to 244 million tonnes, with economic costs and environmental (use of resources and emission of greenhouse gases) consequences (10, 11).

In recent years, there has been a growing concern regarding sustainability. In the Food Service area, several recommendations were produced to make the production of meals more sustainable, particularly towards a greater concern with maintenance and energy efficiency of equipment, use of reusable material, purchase of local products, less use of processed and packaged goods, proper selection and disposal of solid waste and use of strategies to avoid food waste (12–15). Although research shows that this industry is still below the desired level, there has been, growing recognition of the relevance of this issue and an effort by food service units to comply with sustainability guidelines (8, 9, 16–20). However, at the end of 2019, with the emergence of the Covid-19 pandemic, this effort was affected by the contingency measures imposed to stop the spread of the virus. Covid-19 is an infectious disease caused by SARS-CoV-2, which was first identified on 31 December 2019 in Wuhan, China. On March 2nd, 2020, the first case of infection was identified in Portugal, and a State of National Emergency was decreed under the terms of the Presidential Decree n°14-A/2020 of March 18, which was subsequently renewed. On the 11th of the same month, the disease had already been declared a pandemic by the World Health Organisation (21). According to the current scientific evidence, contamination by coronavirus happens by direct contact with an infected person or by indirect contact through surfaces or objects, where it can remain for at least 48 hours (22). Thus, preventive measures focus on social distancing, rules of respiratory etiquette, personal hygiene and hygiene of facilities and equipment. Some of the recommendations of the Directorate-General for Health consist of frequent hand hygiene using paper towels for drying, frequent sanitation of surfaces and equipment with single-use and disposable cleaning material and use of disposable personal protective equipment (masks, gloves, gowns and others) (22).

In the specific context of the FSU, the provision of cutlery and paper napkins in individual bags, the use of disposable paper towels, the supply of individual portions of bread and spices, as well as bottled water, were recommended (23). These measures are, in many cases, a setback and an obstacle to the implementation of more sustainable practices, some of which may be associated with a higher risk of contamination. On the other hand, they imply greater consumption of natural resources and materials, which entail environmental and economic costs (3).

Thus, the present study aimed to assess the impact of the implementation of the contingency measures for the Covid-19 pandemic on the environmental practices of food services throughout the Portuguese territory.

METHODOLOGY

Target Population and Sample

This study was aimed at all public and private food service units in Portugal. The sample was obtained by convenience, contacting food service companies, private institutions of social solidarity, municipalities, professional associations, social action services and colleagues active in this sector. These contacts were made through email, after compiling a database on these institutions in Portugal.

Data Collection Instrument

A questionnaire was developed, consisting of multiple choice and open questions, divided into two parts: a) characterization of the Food Service unit (14 items); b) impact of the implementation of contingency measures for the Covid-19 pandemic (35 items). Participants were fully informed of the objective of the study and consented to participate. The questionnaire was distributed through an online link sent by email.

Data Analysis

Statistical analysis was performed using R software version 4.0.3 considering a 5% significant level. The exploratory analysis included the calculation of mean, standard deviation, median, percentiles, percentages, and plots. The differences between meals served before and after the pandemic were calculated using the Mann-Whitney test, after analysis of variables normality.

This study was approved by the Ethical Committee of the Faculty of Food Science and Nutrition of the University of Porto. By the General Regulation on Data Protection (RGPD), the data collected is confidential and anonymous and, will be stored for a maximum period of 5 years, after which it will be deleted.

RESULTS

The sample is mostly from the North of the country similarly distributed between the Centre (27.9%) and the South (22.8%). Most of the respondents are from the private sector (59.3%), outsourced, and mainly from social institutions (46.8%) followed by the academic sector (29.8%). The majority of the FSU have a nutritionist (62%), and in around half (34.7%) this is the FSU manager. The predominant type of service is cook and serve and lunch is the most produced meal (Table 1).

Table 2 shows a decrease in the number of meals served. A significant difference was found for all types of meals ($p < 0.05$). Lunch is the meal where this decrease was higher, especially in the academic and business sectors (Table 3), since due to the pandemic, some FSU were temporarily closed.

There was a big increase in the frequency of hygiene activities on the other hand external auditing was the activity that suffered a higher impact with a decrease of 31.1%. Maintenance of equipment was the least affected activity (Table 4).

The use of disposable items, such as plates, paper towels, bags, packages and tray towels was adopted by 47.5% of FSU, as well as individual packaging for cutlery, bread and fruit (Table 5). Other items, such as soup, main course, salad and desserts were also provided individually packed.

There was a big increase in the use of individual protective equipment and hygiene products, especially face shields (1900%), disposable masks (2400%) and hand sanitiser (1133%). These results are highlighted in Table 6.

Table 1

Characteristics of the studied sample

| | <i>n</i> (N= 139) | % |
|---|----------------------|------|
| Country Area | | |
| North | 66 | 48.5 |
| Center | 38 | 27.9 |
| South | 31 | 22.8 |
| Islands | 1 | 0.7 |
| Type of institution | | |
| Private | 83 | 59.3 |
| Public | 57 | 40.7 |
| Activity sector | | |
| Academic | 42 | 29.8 |
| Health care | 8 | 5.7 |
| Business | 5 | 3.6 |
| Social | 66 | 46.8 |
| Hospitality | 8 | 5.7 |
| Others | 12 | 8.5 |
| Management type | | |
| Outsourcing | 80 | 58 |
| Self-management | 58 | 42 |
| Area of education of FSU manager | | |
| Nutrition | 33 | 34.7 |
| Education | 7 | 7.4 |
| Management | 6 | 6.3 |
| Food Production | 6 | 6.3 |
| Other | 41 | 43 |
| Nutritionist within the FSU | | |
| Yes | 83 | 62.9 |
| No | 49 | 37.1 |
| Type of service | | |
| Local | 119 | 93.7 |
| Transported | 8 | 6.3 |
| Meals served | | |
| Breakfast | 72 | 51 |
| Lunch | 127 | 90 |
| Dinner | 88 | 62.4 |
| Afternoon snack | 77 | 54.6 |

Table 2

Number of employees, clients and average meals served

| | MIN | 1Q | MEDIAN | 3Q | MAX | MEAN |
|---------------------------------------|-----|----|--------|-----|-------|------|
| Number of employees | 2 | 12 | 33 | 61 | 3500 | 94 |
| Number of clients | 18 | 81 | 200 | 500 | 14000 | 721 |
| Average number of meals served | | | | | | |
| Breakfast | | | | | | |
| Before the pandemic | 1 | 30 | 50 | 100 | 1300 | 111 |
| After the pandemic | 0 | 26 | 43 | 99 | 1000 | 103 |
| Lunch | | | | | | |
| Before the pandemic | 2 | 84 | 240 | 450 | 14000 | 594 |
| After the pandemic | 0 | 55 | 150 | 363 | 14000 | 502 |
| Afternoon Snack | | | | | | |
| Before the pandemic | 1 | 33 | 74 | 158 | 1300 | 150 |
| After the pandemic | 0 | 30 | 59 | 150 | 1000 | 133 |
| Dinner | | | | | | |
| Before the pandemic | 2 | 32 | 58 | 120 | 1300 | 141 |
| After the pandemic | 0 | 30 | 50 | 96 | 1148 | 124 |

Table 3

Number average meals served

| SECTOR | AVERAGE NUMBER OF MEALS SERVED | MIN | 1Q | MEDIAN | 3Q | MAX | MEAN |
|--------------------------------------|--------------------------------|-----|-----|--------|-----|-------|------|
| Academic and business private | Lunch | | | | | | |
| | Before the pandemic | 40 | 243 | 450 | 900 | 14000 | 1069 |
| | After the pandemic | 0 | 108 | 208 | 505 | 14000 | 853 |
| Social and health | Lunch | | | | | | |
| | Before the pandemic | 2 | 56 | 125 | 250 | 2850 | 252 |
| | After the pandemic | 3 | 45 | 110 | 235 | 3150 | 236 |

Table 4

Impact of COVID19 in the frequency of activities

| ACTIVITIES | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> |
|--|----------|------|----------|------|----------|------|----------|
| Hygiene activities | 6 | 5.0 | 21 | 17.4 | 94 | 77.7 | 121 |
| Donations of leftovers to institutions | 8 | 21.1 | 23 | 60.5 | 7 | 18.4 | 38 |
| Reception of donated goods | 10 | 15.9 | 41.0 | 65.1 | 12.0 | 19.0 | 63 |
| Equipment maintenance | 8 | 7.1 | 82 | 72.6 | 23 | 20.4 | 113 |
| External auditing | 33 | 30.8 | 64 | 59.8 | 10 | 9.4 | 107 |

Table 5

Percentage of food units that adopt the use of individual packages or disposable items

| ITEMS | <i>n</i> | % |
|--|----------|------|
| Cutlery | 69 | 48.9 |
| Bread | 53 | 37.6 |
| Fruit | 39 | 27.7 |
| Water | 18 | 12.8 |
| Seasonings | 30 | 21.3 |
| Disposable plates | 49 | 34.8 |
| Paper towels | 18 | 12.8 |
| Disposable items (bags, packages, tray towels) | 67 | 47.5 |

Table 6

Percentual increase and decrease in the use of disposable items

| ITEMS | % increase | % decrease |
|--------------------------|------------|------------|
| Disposable gowns | 334 | - |
| Disposable gloves | 156 | - |
| Shoe protection | 694 | - |
| Hygiene products | 185 | - |
| Face shields | 1900 | - |
| Disposable masks | 2400 | - |
| Disposable meal packages | 191 | - |
| Hand sanitizer | 1133 | - |
| Surface sanitizer | 325 | - |
| Alcohol | 320 | - |
| Paper towels | - | 26 |
| Paper napkins | - | 77 |
| Disposable glasses | - | 70 |

DISCUSSION OF THE RESULTS

In the last decades, the food service sector has been growing and evolving, adopting measures and good practices to reduce food waste and increase sustainability (24). The COVID-19 pandemic determined profound changes that affected individual and social behaviour. One of the main consequences of confinement was the reduction of the number of meals served, affecting mostly the private business sector and schools, when compared to the social and healthcare sectors. This fact caused an increase in homemade and/or takeaway meals, the last option impacting the number of packages and disposable items (25). Additionally, several economic and social consequences were observed due to the loss of consumers in the food service sector. The observed increase in unemployment and layoff determined higher levels of food insecurity affecting the three pillars of sustainability. In Portugal, the food service and hospitality sectors were most affected - 36% of the companies were temporarily closed and 2% were permanently closed (26). The company's turnover was also reduced by 96% (26). A study developed in Romania revealed a less severe impact with only 7.14% of restaurants closed during the lockdown and 53.57% restricting activity and operating based on online orders and 39.29% operating exclusively on online orders (27). The pandemic's social and economic impact is one of the well-known effects, compromising families' access to food and healthcare (28, 29).

Despite some of these changes that may have positive outcomes, namely traffic reduction, travelling, and industrial activity followed by less consumption and pollution, the Portuguese Health Directorate enforced some recommendations with a severe impact on sustainability (30). Some of these measures were related to the use of face masks, gloves, protective gowns, and face shields. As stated in our study, the use of disposable face masks increased by 2400%, face shields by 1900% times, disposable gowns by 334% and gloves by 156%. There was also a 694% increase in shoe protection, 1133% in hand sanitiser and 325% in surfaces sanitiser and 320% in alcohol. These results indicate that despite several safety procedures were already implemented in the food service sector, significant increases were observed, due to the adoption of additional measures and/or increased frequency causing more use of disposable items. Several authors have highlighted the impact of individual protective equipment, namely face masks, gloves and disinfectant use on waste and the environment (31, 32), face masks being the most improperly disposed of item (33). The authors refer that both the plastic waste from households and increased biomedical waste impact the environment and compromise human health in the future (31).

Other measures determined by the Portuguese Health Directorate referred to the mandatory cleaning of tables, chairs and food trays after each use. This may explain the increased use of hygiene products (185%) as well as the increase in hygiene activities (78%). Researchers from Romania also reported sanitary changes imposed by law (27). The hygiene procedures are relevant for consumers to feel secure while continuing to consume meals from restaurants during the pandemic (34–36). Other researchers have found that the hygiene practices implemented during the pandemic, increase the employees' perception and behaviour frequency of these procedures, namely hand washing and cleaning and disinfecting of kitchen items (37). Reinforcement of safety procedures during the Covid-19 pandemic also highlighted and strengthened the already implemented food safety procedures in the food service business (36).

Nevertheless, a decrease in paper towels (26%) and napkins (77%), as well as disposable glasses (70%), was observed, which is most likely related to the decrease in the number of meals served.

Subsequent recommendations from the Health Directorate on the measures were the use of individual packages as observed in our study the main increase was observed in cutlery (49%) followed by bread, fruit and water. The impact of plastics on the environment is well known and studied (38) and there has been an effort to change towards paper or other materials for packaging. In Portugal, after transposing a European Directive, this recommendation has become mandatory by law (39). Nevertheless, researchers have studied the impact of these new materials, stating that although they represent an alternative, argue whether a change is enough, or if consumption of these types of single-use items should be eliminated (40). If reducing this usage was a need and a reality before the pandemic, these recommendations for individual packaging after the pandemic may have greatly increased environmental impact.

Limitations

The main limitation of this study is the fact that maybe due to the extent of the questionnaire, and despite many reinforces in dissemination, it was not possible to retrieve a representative sample, coupled with a low response rate, especially in the last questions that refer to the volume expenditure on disposable items. Due to lack of data, it was not possible to calculate the increase or reduction of hygiene activities and disposable items associated with the number of meals served, which is also a limitation, once they are related. Nevertheless, there was a global decrease in meals served with a high percentage of units where hygiene activities and the use of disposable items were maintained or increased.

CONCLUSIONS

In the last decades, a remarkable effort of the food service sector was observed to comply with sustainable development goals, aiming to achieve a more sustainable process, namely by the use of more efficient equipment, use of recyclable items, acquisition of local, low processed and packaged products, control of food waste and strict control of residues destination. This study observed a great impact on the implementation of the contingency measures for the COVID-19 pandemic. The observed changes, highlighted by this study raise concerns about the need to keep these measures, some of them were adopted due to fear of the unknown, and its consequences on an ongoing successful process, that took a severe setback. Policymakers should evaluate the adopted practices that are still in place and keep the ones that may prove to be efficient and positive and abandon or relieve the unnecessary ones. Other measures such as hygiene procedures, should be kept to ensure food and environment safety and consumer confidence in food service establishments.

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CONFLICTS OF INTEREST

None of the authors reported a conflict of interest.

AUTHORS' CONTRIBUTIONS

AR, CV: Research design, collection and processing of data and writing of the article.

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