


 Ligia Cunha Marques <sup>1</sup>  
 Gabriela Pimenta Silva<sup>1</sup>  
 Dangelia Pinheiro Paiva<sup>1</sup>  
 Mirella Rocha Rodrigues <sup>1</sup>  
 Antonio Augusto Ferreira  
Carioca<sup>1</sup>  
 Lia Silveira Adriano<sup>1</sup>

<sup>1</sup> Universidade de Fortaleza ,  
Curso de Nutrição, Centro de  
Ciência da Saúde. Fortaleza, CE,  
Brasil.

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(Universidade de Fortaleza)

**Correspondence**  
Lia Silveira Adriano  
liasilveira0404@gmail.com

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 Letícia Ferreira Tavares

## ***Assessment of good practices and safety protocols during the Covid-19 pandemic in food and nutrition units***

### **Avaliação de boas práticas e de protocolos de segurança durante a pandemia de Covid-19 em unidades de alimentação e nutrição**

#### **Abstract**

**Introduction:** The food service sector is relevant to the national socioeconomic backdrop. It was crucial during the coronavirus pandemic. Hence the importance of evaluating the biosafety of employees working in food and nutrition units (UANs). **Objective:** This original article aimed to analyze good practices and safety protocols during the COVID-19 pandemic in UANs **Methods:** This cross-sectional study was conducted in two cities in Ceará, Brazil, from 2020 to 2021, in 13 UANs (8 commercial and 5 institutional) and evaluated 149 adult employees. Data were collected using questionnaires on characterization and adherence to health protocols and staff conduct. **Results:** The main nonconformities identified were regarding using personal protective equipment (PPE), changing gloves at each change of activity, properly using masks, performing hand hygiene before and after touching the mask, sanitizing fresh food, marking minimum distances, adopting the mandatory use of sanitizing mats, and disseminating visual communication resources on preventive measures. Institutional UANs were more compliant than commercial ones in the items correct use of PPE ( $p=0.003$ ), sanitizing the raw material and equipment inspection sector ( $p=0.006$ ), hand hygiene ( $p=0.006$ ), and efficient sanitizing of fresh food ( $p=0.005$ ). **Conclusions:** The noncompliance was of concern in the coronavirus pandemic context, especially in commercial UANs, and may pose a risk to the health of workers and diners.

**Keywords:** Food Services. Occupational Health. Coronavirus.

#### **Resumo**

**Introdução:** O setor de *food services* tem grande relevância no cenário socioeconômico nacional e, durante a pandemia do coronavírus, foi considerado essencial, daí a importância de avaliar a biossegurança dos colaboradores atuantes em unidades de alimentação e nutrição (UAN). **Objetivo:** Este artigo original teve como objetivo analisar as boas práticas e os protocolos de segurança durante a pandemia de Covid-19 em UANs. **Métodos:** Estudo transversal realizado em duas cidades no Ceará/Brasil entre 2020 e 2021, em 13 UANs (8 comerciais e 5 institucionais). Foram avaliados 149

colaboradores adultos. A coleta de dados foi realizada por meio da aplicação de questionários sobre caracterização e adesão aos protocolos sanitários e condutas de colaboradores. **Resultados:** As principais não conformidades identificadas foram uso de equipamentos de proteção individual (EPI), troca de luvas a cada mudança de atividade, utilização correta da máscara, lavagem de mãos antes e depois de tocar na máscara, higienização dos alimentos *in natura*, demarcações de distanciamento mínimo, uso obrigatório de tapetes sanitizantes e a propagação de recursos de comunicação visual sobre medidas preventivas. UANs institucionais apresentaram maiores percentuais de conformidade em relação às comerciais nos itens uso correto de EPI ( $p = 0,003$ ); higienização do setor de inspeção de matérias-primas e equipamentos ( $p = 0,006$ ); higienização das mãos ( $p = 0,006$ ); e higienização eficiente dos alimentos *in natura* ( $p = 0,005$ ). **Conclusões:** As não conformidades encontradas foram preocupantes no contexto da pandemia do coronavírus, principalmente nas UANs comerciais, podendo representar risco para a saúde de trabalhadores e comensais.

**Palavras-chave:** Serviços de Alimentação. Saúde Ocupacional. Coronavírus.

## INTRODUCTION

A new type of coronavirus called SARS-CoV-2 was discovered in Wuhan, China, in late 2019. Different studies have investigated its origin. The most widely accepted theory by the scientific community is that the virus originated in bats and possibly passed through an intermediate host before infecting humans.<sup>1,2</sup>

The virus was highly transmissible through physical events that generated aerosols, touch, and even contact with contaminated surfaces and objects<sup>3</sup> and, thus, spread rapidly worldwide.<sup>4</sup>

Given the pandemic context, society and, especially, companies needed to adapt to the new reality. In the early stages of the pandemic, many food services operated as essential services, and food handlers performed their work activities before the vaccine was developed and applied on a large scale.<sup>5,6</sup> Therefore, it was crucial to disseminate protocols to inform about infection prevention measures, which needed to be adopted by several sectors, including the food industry, to promote the population's health.<sup>7</sup>

Information or regulations for implementing biosafety protocols in Food and Nutrition Units (UANs) were developed and published, such as the "Sector Protocol N° 6/2020" and "Decree N° 33.608/2020", published by the Government of the State of Ceará;<sup>7,8</sup> "Manual of Good Practices for the Work of Nutritionists and Nutrition and Dietetic Technicians During the New Coronavirus (Covid-19) Pandemic", made available by the Federal Council of Nutritionists in 2020;<sup>9</sup> "Resolution N° 216/2004",<sup>10</sup> and "Technical Note N° 47/2020/SEI/GIALI/GGFIS/DIRE4/ANVISA", published by the National Health Surveillance Agency.<sup>11</sup>

Besides social distancing and the use of masks, other measures recommended in the materials above were employee training; provision of (liquid or gel) sanitizing devices in strategic locations in the environment; packaging of food in strategic packaging; provision of utensils intended for eating, individualized and adequately sanitized.<sup>9</sup> Therefore, food services should restructure to operate during the pandemic to follow the new safety measures, enabling the adaptation of working conditions and promoting hygiene and health control throughout the food production chain.<sup>12</sup>

The food service market encompasses meals prepared outside the home. It has significantly grown in recent years, which may be related to changes in lifestyle, the job market, the rise of delivery services, and the constant adaptation of food services to population demand. The number of food sector workers is growing, and the Brazilian food and beverage market, which gathers 37.2 thousand companies, directly generates 1.72 million registered jobs.<sup>13</sup>

Despite the sector's significant representation, several studies indicate that it is expected to find unfavorable working conditions in food services, such as poor facilities, staff shortages, excessive workload, inadequate leadership, exposure to noise, and high temperatures.<sup>14,15</sup> Moreover, these workers endure high physical and psychological stress levels.<sup>16</sup> This exposure has impacted health, including inadequate dietary practices and impaired quality of life.<sup>17</sup>

The Covid-19 pandemic also affected the mental health of these workers, who faced the fear of being infected or infecting others, adding to an already intense work routine to meet the demands of employers and patients.<sup>6</sup> This backdrop also generated anxiety and anguish in management among nutrition professionals.<sup>5</sup>

Thus, considering the relevance of the food service sector in the national socioeconomic setting and the role that the sector played during the pandemic-driven restrictions, it is essential to know the hygienic-sanitary conditions of food handling and the working conditions to which workers were exposed to keep a close eye on these workers. After all, while essential during the pandemic and continuing to be so, they are often neglected in terms of working conditions. Given the above, this article analyzed good practices and

safety protocols during the Covid-19 pandemic in food and nutrition units. The study hypothesizes that the employees' working and health conditions were inadequate during the pandemic..

## MATERIAL AND METHODS

This cross-sectional study was conducted in Fortaleza and Aquiraz, Ceará, Brazil, from December 2020 to May 2021, with a sample of 13 UANs selected by convenience – eight commercial and five institutional – in which 149 employees were evaluated. The Research Ethics Committee of the University of Fortaleza approved the work under CAAE 40665620.9.0000.5052.

All employees of these 13 UANs who were working on data collection days were invited to join in the research, and those who agreed to participate signed the Informed Consent Form (ICF). The mean age of the employees was 34.8 (11.9) years; 55.7% were men, and 43.6% had completed high school. Trained Nutrition students collected data. Initially, a questionnaire to characterize the UAN was applied through an interview with the unit manager, investigating the following items: “company management method”; “menu standard”; “company operating time”; “opening hours”; “types of meals offered (breakfast, snack, lunch, and dinner)”; “number of employees”; “availability of personal protective equipment (PPE)” and “availability or lack of an Occupational Health Medical Control Program (PCMSO)”.

Next, two data collection instruments were applied. One of them, containing 23 items, collected information through direct observation and aimed to determine whether the company's structure was per Covid-19 safety protocols (Box 1). The other form contained 15 items and was applied through direct observation to assess employee conduct (Box 2).

**Chart 1.** Instrument for assessing the adequacy of Covid-19 prevention protocols in food services

RECOMMENDATION TO BE OBSERVED	SITUATION
Q1. Monitor all employees daily for symptoms of Covid-19 at the start of the work shift and interview employees and those with whom they live or have frequent contact regarding symptoms.	( ) C ( ) NC
Q2. Encourage employees to immediately notify their supervisors if they have a fever or respiratory symptoms. Isolation measures should be taken as soon as possible.	( ) C ( ) NC
Q3. In case of suspicion or confirmation of an employee being infected with Covid-19, the company must reinforce cleaning areas where the employee was active and passed through.	( ) C ( ) NC
Q4. Minimum distance demarcations.	( ) C ( ) NC
Q5. Availability of 70% alcohol or other sanitizers.	( ) C ( ) NC
Q6. Prioritize contactless payment system.	( ) C ( ) NC
Q7. Routine cleaning and sanitation of employees, outsourced workers, equipment, and materials frequently touched several times a day using a cleaning schedule for the sectors with adequate coordination.	( ) C ( ) NC
Q8. Strengthen Occupational Safety precautions regarding the use of alcohol or other flammable substances near environments with heat, such as stoves, ovens, and any others that may cause flames in general, if any.	( ) C ( ) NC

**Chart 1.** Instrument for assessing the adequacy of Covid-19 prevention protocols in food services

RECOMMENDATION TO BE OBSERVED	SITUATION
Q9. Mandatory use or provision of shoe cleaner and sanitizer, mat, or towel moistened with 2% sodium hypochlorite for cleaning and disinfecting shoes at the establishment's entrance.	( ) C ( ) NC
Q10. Sanitize all products received from suppliers and where they will be stored.	( ) C ( ) NC
Q11. Prohibit access for people who are not wearing masks.	( ) C ( ) NC
Q12. Adopt work regimens or working hours for employees to preserve social distancing within the establishment.	( ) C ( ) NC
Q13. Implement training booklets for workers on personal hygiene, contamination prevention measures, and workers' rights and duties.	( ) C ( ) NC
Q14. Install physical barriers such as acrylic screens or other washable material between workstations when work environment readaptation is unfeasible.	( ) C ( ) NC
Q15. Provide places for proper hand hygiene with a sink, water, liquid soap, paper towels, and foot-operated trash cans with lids and ensure access to hygiene points provided with cleaning and disinfection materials, such as alcohol solutions, sodium hypochlorite solution, and other sanitizers, for personal use in sufficient quantity throughout the work shift.	( ) C ( ) NC
Q16. Prohibit the consumption of food and drinks other than in a place prepared and designated for this purpose. Establish different and alternating meal shifts inside or outside the company to minimize crowds.	( ) C ( ) NC
Q17. Not prioritize self-service activities in cafeterias, if any, and implement services for individual portions served at the table or in the "tray" format, where users cannot access food and are served by properly equipped and sanitized professionals under good food manufacturing practices.	( ) C ( ) NC
Q18. Adapt processes to eliminate the practice of sharing equipment and work materials. If any material or equipment needs to be shared, they must be disinfected with alcohol-based preparations, 2% sodium hypochlorite solution, or other sanitizers.	( ) C ( ) NC
Q19. Make it mandatory to use individual containers for water consumption and avoiding contact between personal water containers, taps, and other drinking water supply devices.	( ) C ( ) NC
Q20. Provide specific visual communication resources throughout the establishment, such as educational posters with information on proper hand hygiene, cough etiquette, and respiratory hygiene (covering mouth or nose when coughing or sneezing with the inside of one's elbow and, when using tissues, discarding them in the appropriate bin and implementing hand hygiene) and other prevention measures recommended by the Ministry of Health.	( ) C ( ) NC
Q21. Frequent cleaning and disinfection of countertops, chairs, door handles, bathrooms, and other surfaces with a chlorine solution (1% sodium hypochlorite).	( ) C ( ) NC
Q22. Remove objects from meal tables that could be potential vehicles of contamination, such as placemats, advertising displays, napkin holders, cruet sets, and ornaments.	( ) C ( ) NC
Q23. The equipment to display prepared food in the consumption area must have protective barriers to prevent contamination from proximity or action by the user/client and other sources.	( ) C ( ) NC

**Source:** Prepared by the authors.

C: Compliance. NC: Noncompliance.

Chart 2. Instrument for assessing the adequacy of Covid-19 prevention protocols for employees

RECOMMENDATION TO BE OBSERVED	SITUATION
Q1. Carefully sanitize hands when arriving at work, delivering merchandise, before and after touching the face to rub the eyes, touch the mouth, sneezing, coughing, blowing or scratching the nose, handling raw food, cell phones, money, door handles, trash, and personal objects, going to the bathroom, after any interruption in work and whenever necessary.	( ) C ( ) NC
Q2. Keep nails short and not wear any jewelry.	( ) C ( ) NC
Q3. Correct use of PPE.	( ) C ( ) NC
Q4. Stock, use, and disposal of PPE and hygiene materials with easy access.	( ) C ( ) NC
Q5. PPE must be disposed of in suitable plastic bags and placed in an appropriate storage area.	( ) C ( ) NC
Q6. Perform daily cleaning of non-disposable PPE.	( ) C ( ) NC
Q7. Use a long uniform for exclusive use at work.	( ) C ( ) NC
Q8. When used, gloves must be changed with each procedure change.	( ) C ( ) NC
Q9. Use protective gloves to receive used utensils, handling waste, and cleaning environments and surfaces.	( ) C ( ) NC
Q10. Use protective masks.	( ) C ( ) NC
Q11. Correct use of a protective mask.	( ) C ( ) NC
Q12. Wash hands before and after touching the protective mask.	( ) C ( ) NC
Q13. Properly clean the primary packaging of raw materials and ingredients before preparing food.	( ) C ( ) NC
Q14. Fresh foods, such as fruits, vegetables, and greens, must be washed, one by one or leaf by leaf, in drinking water, disinfected by immersion in a 200-chlorine solution for 15 minutes (or as recommended by the chemical product manufacturer) and rinsed in water.	( ) C ( ) NC
Q15. After each receipt, clean the raw material inspection sector and its furniture and equipment (benches, scales, platforms, and the like).	( ) C ( ) NC

**Source:** Prepared by the authors.

C: Compliance. NC: Noncompliance. PPE: Personal Protective Equipment.

The data collection forms were prepared by the research technical team (two PhDs in Public Health and two undergraduate students) through the compilation of five documents: "Sector Protocol N° 6/2020" and "Decree N° 33.608/2020", published by the Government of the State of Ceará;<sup>7,8</sup> "Manual of Good Practices for the Work of Nutritionists and Nutrition and Dietetic Technicians During the New Coronavirus (Covid-19) Pandemic", made available by the Federal Council of Nutritionists, 2020;<sup>9</sup> "Resolution N° 216/2004"<sup>10</sup> and "Technical Note N° 47/2020/SEI/GIALI/GGFIS/DIRE4/ANVISA",<sup>11</sup> published by the National Health Surveillance Agency. The training of the evaluators and a pre-test with 10 collaborators were performed after preparing the forms, and adjustments were made to facilitate their application.

Data were tabulated in Excel 2013 software and presented in absolute and relative frequencies. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software. The suitability of commercial and institutional UANs could be compared using the chi-square test or Fisher's exact test.  $P < 0.05$  was considered significant

## RESULTS

All companies operated under self-management. Regarding the menu standard, most companies had an intermediate standard menu (84.62%), and 15.38% had a luxury menu. These companies had been operating for an average of 17.92 (12.39) years. Opening hours ranged from 5 to 24 hours a day, besides offering several meals, such as breakfast, snacks, lunch, and dinner. The average number of employees per company was 14.46 (7.93), ranging from 3 to 31. All UANs had PPE, and most (92.31%) had an Occupational Health Medical Control Program (PCMSO).

Table 1 shows the companies' compliance with coronavirus safety measures. Most of the items analyzed had a satisfactory response. The items that reached 100% compliance were daily monitoring of Covid-19 symptoms, encouraging immediate communication to those responsible in case of symptoms, and providing 70% alcohol

**Table 1.** Description of the adequacy of UANs regarding Covid-19 prevention protocols. Fortaleza and Aquiraz, Ceará, Brazil. 2021.

ITEMS ANALYZED	Institutional (n = 5)		Commercial (n = 8)		Total (n = 13)		p*
	C n(%)	NC n(%)	C n(%)	NC n(%)	C n(%)	NC n(%)	
Q1- Daily symptom monitoring	5 (100)	0 (0.0)	8 (100)	0 (0.0)	13 (100)	0 (0.0)	1.000
Q2- Immediate communication of symptoms	5 (100)	0 (0.0)	8 (100)	0 (0.0)	13 (100)	0 (0.0)	1.000
Q3- Clean areas that had contact with the infected employee	5 (100)	0 (0.0)	7 (87.5)	1 (12.5)	12 (92.3)	1 (7.7)	1.000
Q4- Minimum distance demarcations	1 (20.0)	4 (80)	3 (37.5)	5 (62.5)	4 (30.8)	9 (69.2)	1.000
Q5- Availability of 70% alcohol	5 (100)	0 (0.0)	8 (100)	0 (0.0)	13 (100)	0 (0.0)	1.000
Q6- Contactless payment system	4 (80)	1 (20.0)	1 (12.5)	7 (87.5)	5 (38.5)	8 (61.5)	0.032
Q7- Employee hygiene and cleaning routine	5 (100)	0 (0.0)	7 (87.5)	1 (12.5)	12 (92.3)	1 (7.7)	1.000
Q8- Strengthen occupational safety precautions	4 (80.0)	1 (20.0)	8 (100)	0 (0.0)	12 (92.3)	1 (7.7)	0.385
Q9- Mandatory use and provision of sanitizing mats	2 (40.0)	3 (60.0)	4 (50.0)	4 (50.0)	6 (46.2)	7 (53.8)	1.000
Q10- Product sanitation upon receipt	5 (100)	0 (0.0)	7 (87.5)	1 (12.5)	12 (92.3)	1 (7.7)	1.000
Q11- Prohibit access of people without protective masks	4 (80.0)	1 (20.0)	8 (100)	0 (0.0)	12 (92.3)	1 (7.7)	0.385
Q12- Adjust work regimens	2 (40.0)	3 (60.0)	6 (75.0)	2 (25.0)	8 (61.5)	5 (38.5)	0.293
Q13- Worker training manuals	2 (40.0)	3 (60.0)	4 (50.0)	4 (50.0)	6 (46.2)	7 (53.8)	1.000
Q14- Re-adapt the work environment	2 (50.0)	2 (50.0)	2 (28.6)	5 (71.4)	4 (36.4)	7 (63.6)	0.576
Q15- Places for proper hand hygiene	4 (80.0)	1 (20.0)	8 (100)	0 (0.0)	12 (92.3)	1 (7.7)	0.385
Q16- Consumption of food and drinks in an appropriate place	2 (40.0)	3 (60.0)	7 (87.5)	1 (12.5)	9 (69.2)	4 (30.8)	0.217
Q17- Non-prioritization of self-service distribution	2 (66.7)	1 (33.3)	4 (50.0)	4 (50.0)	6 (54.5)	5 (45.5)	1.000
Q18- Adequacy regarding sharing work equipment	5 (100)	0 (0.0)	5 (71.4)	2 (28.6)	10 (83.3)	2 (16.7)	0.470
Q19- Individual containers for water consumption	4 (100)	0 (0.0)	7 (87.5)	1 (12.5)	11 (91.7)	1 (8.3)	1.000
Q20- Specific visual communication resources	0 (0.0)	5 (100)	1 (12.5)	7 (87.5)	1 (7.7)	12 (92.3)	1.000
Q21- Frequent cleaning and disinfection of countertops, chairs, and bathrooms	4 (80.0)	1 (20.0)	7 (87.5)	1 (12.5)	11 (84.6)	2 (15.4)	1.000
Q22- Remove contaminated vehicles from meal tables	4 (100)	0 (0.0)	5 (62.5)	3 (37.5)	9 (75.0)	3 (25.0)	0.491
Q23- Protective barriers for ready-to-eat food	2 (50.0)	2 (50.0)	4 (50.0)	4 (50.0)	6 (50.0)	6 (50.0)	1.000

Results are expressed in absolute and relative values.

\*Chi-square test or Fisher's exact test. C: Compliance. NC: Noncompliance.

However, a high rate of non-compliance was observed in requirements such as the provision of specific visual communication resources (92.3%), minimum distance markings (69.2%), readjusting the work environment (63.6%); prioritizing contactless payment systems (61.5%); mandatory use and provision of sanitizing mats (53.8%); implementing worker training manuals (53.8%); and provision of barriers on equipment displaying prepared food in the consumption area (50%).

For most items analyzed, the proportion of compliance and noncompliance was similar between commercial and institutional UANs ( $p > 0.05$ ), except for the aspect "prioritize contactless payment system", whose adequacy was higher in institutional UANs ( $p = 0.032$ ).

The results regarding the evaluation of procedures and behavioral attitudes of employees are shown in Table 2.

**Table 2.** Covid-19 prevention measures used by employees. Fortaleza and Aquiraz, Ceará, Brazil. 2021.

ITEMS ANALYZED	Institutional UANs employees (n = 54)		Commercial UANs employees (n = 95)		Total (n = 149)		p*
	C n(%)	NC n(%)	C n(%)	NC n(%)	C n(%)	NC n(%)	
Q1- Hand hygiene	52 (96.3)	2 (3.7)	76 (80.0)	19 (20.0)	128 (85.9)	21 (14.1)	0.006
Q2- Nail adaptation	49 (90.7)	5 (9.3)	74 (78.7)	20 (21.3)	123 (83.1)	25 (16.9)	0.070
Q3- Proper PPE use	47 (88.7)	6 (11.3)	62 (66.0)	32 (34.0)	109 (74.1)	38 (25.9)	0.003
Q4- Stock, use, and disposal of PPE	45 (84.9)	8 (15.1)	76 (80.9)	18 (19.1)	121 (82.3)	26 (17.7)	0.655
Q5- PPE disposal	43 (82.7)	9 (17.3)	83 (88.3)	11 (11.7)	126 (86.3)	20 (13.7)	0.451
Q6- Daily sanitization of non-disposable PPE	38 (80.9)	9 (19.1)	82 (87.2)	12 (12.8)	120 (85.1)	21 (14.9)	0.326
Q7- Uniform use	46 (95.8)	2 (4.2)	81 (85.3)	14 (14.7)	127 (88.8)	16 (11.2)	0.089
Q8- Change gloves with each change of activity	31 (72.1)	12 (27.9)	70 (74.5)	24 (25.5)	101 (73.7)	36 (26.3)	0.835
Q9- Use gloves to receive utensils	37 (92.5)	3 (7.5)	76 (80.9)	18 (19.1)	113 (84.3)	21 (15.7)	0.120
Q10- Use protective masks	51 (94.4)	3 (5.6)	80 (85.1)	14 (14.9)	131 (88.5)	17 (11.5)	0.111
Q11- Correct use of protective mask	34 (63.0)	20 (37.0)	56 (58.9)	39 (41.1)	90 (60.4)	59 (39.6)	0.728
Q12- Hand hygiene before and after touching the protective mask	31 (58.5)	22 (41.5)	67 (70.5)	28 (29.5)	98 (66.2)	50 (33.8)	0.151
Q13- Clean primary packaging	43 (91.5)	4 (8.5)	80 (85.1)	14 (14.9)	123 (87.2)	18 (12.8)	0.423
Q14- Fresh food hygiene	46 (100)	0 (0.0)	81 (86.2)	13 (13.8)	127 (90.7)	13 (9.3)	0.005
Q15- Clean the raw material and equipment inspection sector	47 (97.9)	1 (2.1)	77 (81.9)	17 (18.1)	124 (87.3)	18 (12.7)	0.006

Results are expressed in absolute and relative values.

\*Chi-square test or Fisher's exact test. C: Compliance. NC: Noncompliance. PPE: Personal Protective Equipment.

Analyzing the items, in general, the items with the highest percentages of compliance were hygiene of fresh foods (90.7%), use of uniform (88.8%), and use of protective mask (88.5%). In contrast, the main noncomplying items were correct use of a protective mask (39.6%), washing hands before and after touching the protective mask (33.8%), and changing gloves at each change of activity (26.3%).

We observed significant divergences between commercial and institutional UANs ( $p < 0.05$ ) for some items analyzed. The items with the highest percentage of compliance in institutional UANs were hand hygiene



( $p=0.006$ ), correct use of personal protective equipment (PPE) ( $p=0.003$ ), fresh food hygiene ( $p=0.005$ ), and cleaning the raw material and equipment inspection sector ( $p=0.006$ ).

## DISCUSSION

The study assessed working conditions in institutional and commercial UANs in the Covid-19 pandemic. It showed troubling results in terms of issues such as the provision of specific visual communication resources, minimum distance markings, re-adapting the work environment, prioritizing contactless payment system, mandatory use and provision of sanitizing mats; implementing worker training manuals, provision of barriers on equipment displaying prepared food in the consumption area; correct use of protective masks; washing hands before and after touching the protective mask and changing gloves with each change of activity.

We found few studies evaluating these aspects in the pandemic in Brazil.<sup>18,19</sup> The results indicated a high percentage of good food handling practices and structural requirements violations among 40 food services in downtown São Paulo (Brazil). The percentage of Covid-19 health protocol violations was moderate in most establishments.<sup>18</sup>

Although SARS-CoV-2 is not transmitted through food, the pandemic has reinforced the need for good food-handling practices. However, this has been insufficient to reduce foodborne diseases (FBD) during the pandemic. A study comparing FBD records before and after the pandemic found no significant difference in the number of notifications in the periods evaluated. However, it pointed to a migration of the place of occurrence, with a significant increase in notifications from hospitals and health units and a reduction in notifications of social events.<sup>19</sup>

In Ethiopia, a survey conducted in 423 food establishments with 845 food handlers found a prevalence of 51.2% (confidence interval - 95% CI = 47.8-54.6%) in inadequate hygiene practices. Food hygiene practices were significantly associated with at least one supervisor (adjusted odds ratio – OR = 2.26; 95% CI = 1.41; 3.62); availability of PPE, such as mask and glove (adjusted OR = 2.67; 95% CI = 1.75; 4.08); running water (adjusted OR = 2.73; 95% CI = 1.84; 4.06) and separate changing room (adjusted OR = 2.69; 95% CI = 1.84; 3.93).<sup>20</sup> One of the relevant aspects both in the pandemic context and in food safety was efficient hand hygiene at the correct frequency, as several microorganisms on the skin can affect the quality of the food and harm the end consumer's health.<sup>21</sup> It is troubling to know that this was one of the main non-compliances and disparities in this research.

In 2016, a study was published in five different establishments to determine whether employees' hand hygiene was effective. It revealed that the number of microorganisms on the hands of food handlers exceeded the maximum acceptable limit in all units, indicating that hygiene was not being performed correctly.<sup>22</sup> Another study found that employees did not wash their hands per the recommended standard and did not sanitize them when changing tasks or leaving an area with a high potential for contamination, such as the meat area.<sup>23</sup>

Another troubling fact in our research was the inadequate use of personal protective equipment. Other studies had already identified inadequate use of PPE in UANs outside the pandemic context. Research conducted in UANs with an internship agreement with the Federal University of the Southern Frontier (Realeza Campus) indicated negligent use of mandatory PPE. Some cases are justified because the company does not provide the equipment, or the available equipment is worn out. However, the leading cause is employees' lack of knowledge and training.<sup>24</sup>

Corroborating the results presented, another study at an institutional UAN in Juiz de Fora, Brazil, indicated that many handlers understand the importance of using PPE but do not know how and when to use it,<sup>25</sup> which is of concern since the mandatory and adequate application of personal protective equipment aims to minimize the risks of health problems and accident rates in the workplace, ensuring greater worker safety.<sup>26</sup>

The results of changing gloves at each change of activity and the correct use of a protective mask can be compared to those obtained in the same article that evaluates an institutional UAN in Juiz de Fora, which found the main reasons for not adhering to the adequate use of these two materials in the study with 120 handlers. Regarding good practices, this equipment is not mandatory in all functions and is dispensable in some sectors. However, for employees who performed specific activities requiring this equipment, the main justifications for not using it effectively were forgetfulness, discomfort, or claiming that it would harm their function.<sup>25</sup>

Proper use of protective masks has been essential in combating the virus spread. An outbreak of 10 Covid-19 cases among food and nutrition department employees occurred before the institution implemented universal mask use and physical spacing between employees as part of its Covid-19 pandemic protocol. The pandemic has highlighted the importance of early recognition of potential occupational exposure risks, prompt investigation of outbreaks, and implementation of safety controls.<sup>27</sup>

Regarding the item “proper cleaning of fruit and vegetables”, an article conducted in a military UAN in São Paulo, Brazil, identified that 20% of 12 employees did not clean fruit and vegetables, and all the participants applied the incorrect dilution of the sanitizing product to clean these foods. These numbers corroborate the results obtained in the present study, and it is crucial to seek ways to correct this noncompliance, given that improper cleaning of fruit and vegetables affects the quality and safety of the food offered.<sup>28</sup>

Regarding the main noncompliance found in the companies’ structures, we should underscore that they are also of concern since it was vital to demarcate the workspace respecting the safety distance of one meter to avoid possible crowds, a preventive method for the spread of infection, in the context of the pandemic. Furthermore, sanitizing mats have been widely recommended because they retain dirt, reduce contamination under shoes, and prevent the virus from taking hold in the environment. Finally, safety protocols reinforce the relevance of raising employees’ awareness of preventive measures daily to ensure greater safety in the workplace.<sup>7-11</sup>

A survey conducted in Palmeira das Missões, in Rio Grande do Sul, Brazil, comparing institutional and commercial UANs found that 53.8% of the sample consisted of seven commercial restaurants. Evaluating good handling practices, the overall mean adequacy rate obtained was 47.9% in these units.<sup>29</sup> Another study conducted in nine institutional UANs in Belo Horizonte, Brazil, found that 88.9% of the units were at a satisfactory level of adequacy (between 75% and 100%).<sup>30</sup> These data corroborate the results obtained in the present study, which identified a higher level of compliance in institutional UANs.

One study limitation was the small number of companies and employees in the sample, which prevented extrapolation of the findings. Also, there were no validated instruments when the research was developed, so the forms were built based on published technical standards. However, their validity and reliability were not tested. This fact brings limitations regarding the accuracy of the results and the replication of the instruments used, considering that the validation process allows an instrument to measure what it is intended to gauge correctly, and reliability allows a result to be replicated consistently over time and in

different contexts.<sup>31</sup> However, we emphasize that the evaluators were adequately trained, and the instruments underwent a pre-test

## CONCLUSION

Although the results were satisfactory, the noncompliance identified in the analyzed UANs was of concern, especially in the coronavirus pandemic, and could pose a risk to the health of workers and diners. We observed that institutional UANs performed better and achieved higher compliance rates than commercial UANs.

The sector must adapt quickly to the pandemic, rigorously improving controls and adopting rapid corrective measures for noncompliance. Furthermore, the protocols developed should be followed and used today, as they improve quality processes and provide greater safety and health for workers and diners..

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**Colaboradores**

Marques LC e Silva GP participaram na idealização do desenho do estudo, na coleta, análise e interpretação dos dados e na redação do estudo; Paiva DP e Rodrigues MR participaram na coleta, análise e interpretação dos dados; Carioca AAF participou na redação do estudo, na revisão final e aprovação do manuscrito para submissão; Adriano LS participou na idealização do desenho do estudo, na coleta, análise e interpretação dos dados, na redação do estudo e na revisão final e aprovação do manuscrito para submissão.

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