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Original Article

An exploratory study about healthcare professionals and students food consumption during the COVID-19 pandemic

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SUMMARY

Background & Aims: It is foreseeable that behaviors will be modified in the pandemic, including food consumption, which can influence the quality of the diet. And it is already known that a healthy diet influences the immune system, as cells depend on vitamins and minerals to function properly. Therefore, the objective is to verify the food consumption of health professionals and students in the context of the COVID-19 pandemic in Rio de Janeiro.

Methods: Cross-sectional, observational and descriptive study. Students and health professionals were invited to participate in the study through electronic media dissemination. Data were collected through a self-completed online questionnaire. The questionnaire contained questions about personal and socioeconomic characteristics, whether you have already been infected with COVID-19, questions about sleep, mood, supplement use and food consumption, with questions from the Brazilian Ministry of Health mini-questionnaire, as well as a question about change, in the context of the pandemic, food consumption according to the level of processing (in natura, minimally processed, processed and ultra-processed). For each question analyzed, comparisons between non-cases and prevalent cases of COVID-19 were presented.

Results: A total of 362 participants were evaluated, with a predominance of females (82.60%), aged between 18 and 40 years. A higher percentage of participants, regardless of COVID-19

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prevalence, reported consuming healthy foods the day before compared to unhealthy foods. On the other hand, when asked about the increase in the frequency and/or amount of food intake according to the level of processing, an increase in the consumption of processed and ultra-processed foods was especially observed. Another important finding of our study was the participants' perception of a change in mood and sleep, and that this change may have led to changes in food consumption. Finally, we highlighted the regular use of supplements during the COVID-19 pandemic by more than half of the participants.

Conclusions: Although a higher percentage of participants, regardless of the prevalence of COVID-19, reported consumption of healthy foods in the previous day, when asked about the increase in food consumption, in the context of the pandemic, according to the level of processing, there was an increase especially by the majority of processed and ultra-processed food participants.

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Introduction

The Coronavirus Disease – 2019 (COVID-19) pandemic started in December 2019. In January, the new coronavirus (SARS-CoV-2), the etiological agent of severe acute respiratory syndrome, causing the enormous morbidity and mortality that devastated the world was identified. The first case in Brazil occurred on February 26, 2020, and in March, the World Health Organization (WHO) declared a pandemic. To control the new coronavirus in Brazil, the government began to adopt measures similar to those also recommended in other countries, including social distancing, partial or total closure of commercial and industrial establishments, closing of schools, recommendations to leave the house only if really necessary, in addition to the use of masks and hand washing [1–3].

Public health systems around the world are making extreme efforts to address the COVID-19 pandemic. Despite this, the number of cases until 03/20/2022 in the world reached more than 468 million confirmed cases and more than 6 million deaths. With 34,350,639 cases and more than 683,233 deaths in Brazil alone until August 2022 [3]. Such pandemic control measures may have contributed to a change in the eating pattern of Brazilians. With more families staying at home, people are preparing their own meals more often, which contributes to healthier eating [4]. Additionally, there has been a growing interest in foods with immunity-boosting properties, which may include fruits and vegetables [5,6].

On the other hand, the Brazilian Research Network on Food and Nutrition Sovereignty and Security (Rede Pennsan) showed, in the National Survey on Food Insecurity in the Context of the Covid-19 Pandemic in Brazil, report that the increase in unemployment and the increase in the price of healthy foods during the pandemic, such as rice and beans, worsened food insecurity. Additionally, 19 million Brazilians went hungry and more than half of the households in the country faced some degree of food insecurity at the end of the year 2020 [7,8].

Many workers, including health professionals and health students, also had to deal with the new forms of work and study modalities, which may also have contributed to the change in dietary patterns [9–11]. In addition to the stress of the new scenario, health professionals directly providing healthcare to COVID-19 patients had to deal daily with stressful conditions, such as patients' high lethality, lack of personal protective equipment and work overload [12,13]. There is an increasing number of studies pointing to the relationship between this new work reality and health problems (10,11), but studies regarding the relationship with nutritional aspects are still scarce. Therefore, there is an opportunity to explore the relationship between the food consumption of health professionals and other lifestyle and professional aspects in the context of the COVID-19 pandemic.

The aim of the present study was to explore the changes in food consumption and lifestyle of health students and health professionals in the context of the COVID-19 pandemic.

Materials and methods

Data were collected with an electronic questionnaire developed in the RedCap application (Research Electronic Data Capture) as a web survey. Before disclosure, tests were carried out to analyze data entry and filling time. The questionnaire took an average of 10 minutes to complete, and was divided into two parts, data from the first part were collected for this research, containing socio-demographic information, eating behavior, lifestyle and COVID-19 infection. Soon after, it was published on social media (websites, instagram, facebook, whatsapp) with no access restriction, where participation was voluntary and the inclusion criteria used were: being 18 years of age or older and being a student or health professional working in the state of Rio de Janeiro, and have an electronic device with internet access capable of accessing the link.

Participants completed the Free and Informed Consent Form (FICT). All responses were guaranteed anonymity, without any identification of the participants. This study was approved by the Research Ethics Committee (CEP) of INI/Fiocruz, CAEE 44640721.5.0000.52 62, being conducted in accordance with this protocol and Good Clinical Practices (GCP), No. 4,701,688, issued on May 10, 2021.

After agreeing and signing the electronic consent form, the application directed the participants to complete the questionnaire (the clinical and sociodemographic form and food consumption form). The inclusion of participants and data collection took place from May 23 to September 30, 2021, therefore, collection took place during the pandemic, starting twelve months after the start of the pandemic and ending 20 months before the end of the pandemic.

The section on food consumption in the context of the pandemic asked about changes in food consumption according to its processing (in natura, minimally processed, processed and ultra-processed) throughout the pandemic, and questions from the Ministry of Health mini-questionnaire [14], addressing issues on the previous day's consumption of healthy foods (beans, fresh fruits, vegetables and/or vegetables) and unhealthy foods (hamburgers and/or sausages, sweetened beverages, instant noodles and/or packaged snacks, stuffed biscuits and/or treats), and which meals are eaten daily (breakfast, morning snack, lunch, afternoon snack, dinner and supper).

Another section of the questionnaire referred to questions about lifestyle, being asked about changes in mood and sleep in the context of the pandemic, and the perception of the participants if these changes influenced the diet. Participants were also asked about the use of dietary supplements during the pandemic period, and whether or not they were prescribed by a health professional. In addition, participants were asked if they had been infected with COVID-19, those who answered "yes" were considered prevalent cases.

Data were analyzed using the R statistical program, only data from complete questionnaires were analyzed, and replicates were excluded. Percentages were made for each item of the questionnaire, stratifying into two groups: non-cases and COVID-19 prevalent cases.

Results

There were 614 access to the survey link, 450 completed the consent form and 362 completed the food consumption form and were analyzed (Figure 2). There is a predominance of females, aged between 18 and 40 years (Figure 1). More than half of the participants had completed college education, where the majority were nutrition professionals, followed by nursing and medicine. Regarding family income, the largest strata was the one from 3 to 6 minimum wages (Table 1).

The percentage of participants who answered the question taken from the Brazilian Ministry of Health mini-questionnaire, regarding healthy and unhealthy foods consumption the day before showed similarities among the COVID-19 prevalent cases and non cases. However, there was a higher percentage of participants who responded that they had consumed healthy food the day before compared to unhealthy food (Figure 3).

Regarding the question, also from the Ministry of Health's mini-questionnaire, about having meals (breakfast, morning snack, lunch, afternoon snack, dinner and supper) throughout the day, there was

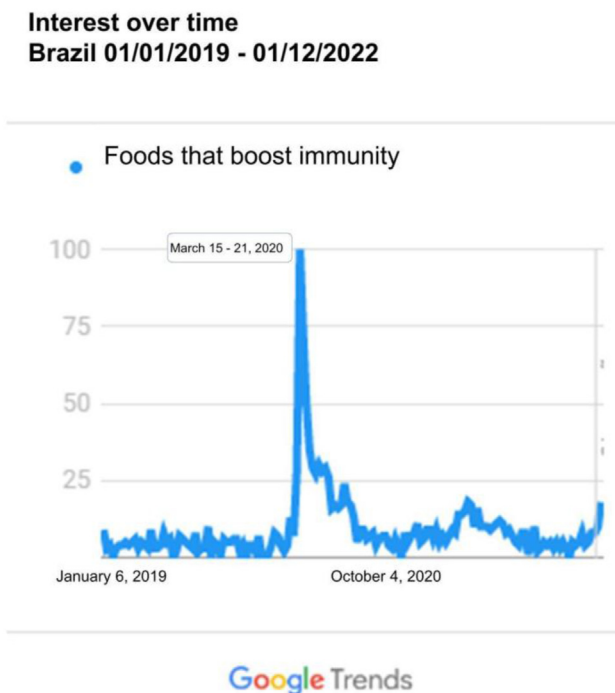


Figure 1. Interest over time in foods that boost immunity. Data from google trends Brazil.

similarity in the answers of non-cases and prevalent cases of COVID-19. With a higher percentage of participants who responded having breakfast, afternoon snack, lunch and dinner in relation to the morning snack and supper. In addition, the afternoon snack seems to be a less frequent habit when compared to lunch and dinner (Figure 4).

Regarding the perception of an increase in the frequency or amount of food intake according to their degree of processing throughout the pandemic, there is a similarity across groups in the percentage of respondents about consumption of each food category. The highest increase occurred with the ultra-processed foods (Figure 5).

More than half of the participants made regular use of supplements during the pandemic (Figure 6). The supplement use was mainly prescribed by health professionals followed by self-medication. However, one must consider that the self medication among health professionals may have different considerations when compared to general population (Figure 7).

There was slightly higher poor sleep quality, daytime sleepiness among COVID-19 prevalent cases. Additionally, there was a slightly lower hours of sleep median during weekdays and weekends among COVID-19 prevalent cases. However, non-COVID-19 cases reported more frequently that when they sleep they feel rested. Also, insomnia and the impact of sleeping changes over food consumption were slightly less frequent among COVID-19 prevalent cases (Table 2).

In both groups, most of participants reported a change in mood and an impact of the mood in food consumption during the pandemic period. Additionally, these changes were slightly more frequently among COVID-19 prevalent cases (Table 3).

Discussion

The main findings of this study to be discussed were: a) the prevalence of COVID-19 in the population studied was 35% (126 participants); b) the pandemic context provided greater food consumption

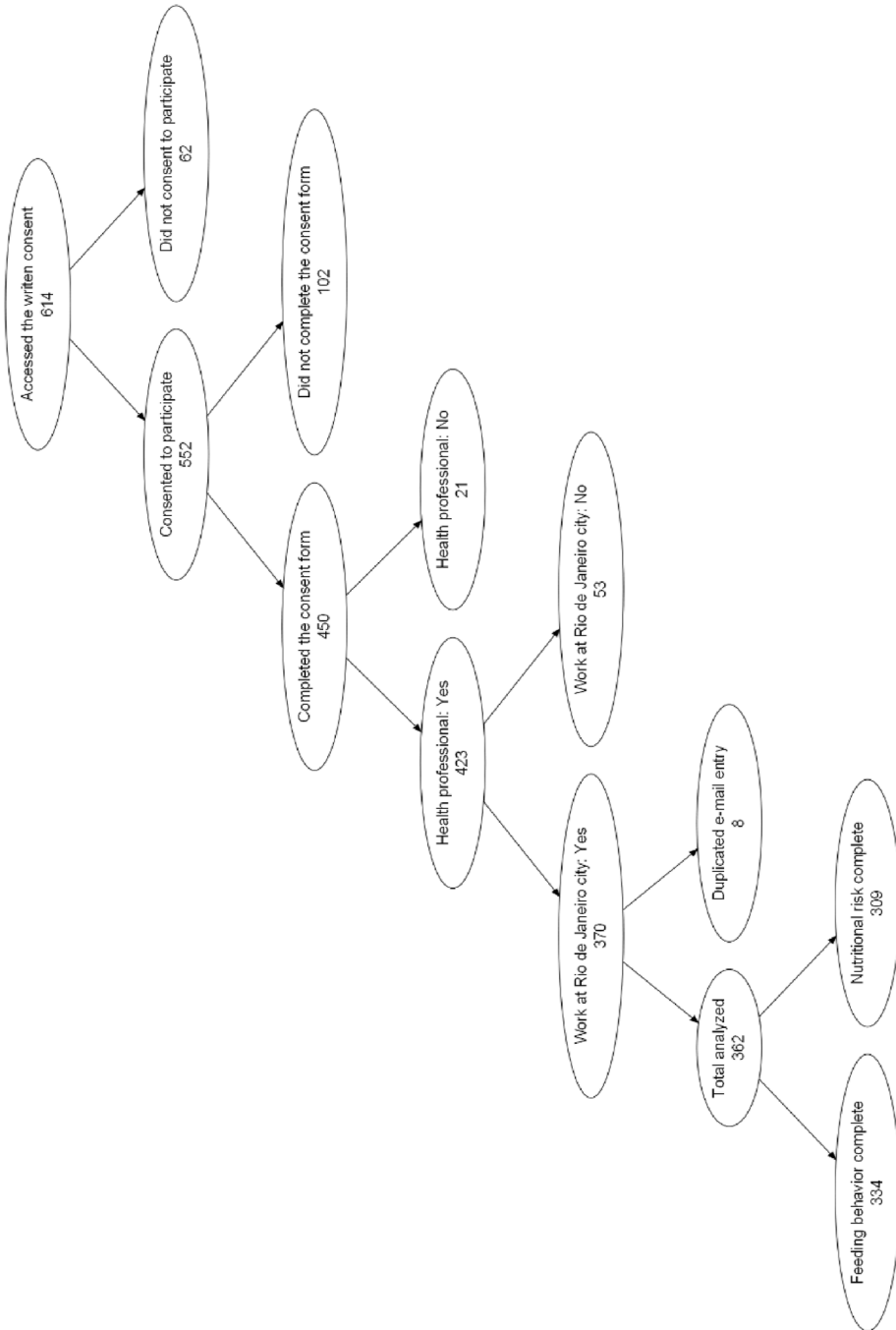


Figure 2. Flowchart.

Table 1

Sociodemographic data of health professionals and students working in the state of Rio de Janeiro, in the context of the COVID-19 Pandemic, stratified by COVID-19 prevalent case status

COVID-19 prevalent case	No	Yes	NA	Total
Variables	207	126	29	362
Gender				
Female	182 (87.92)	108 (85.71)	9 (31.03)	299 (82.60)
Male	20 (9.66)	16 (12.70)	2 (6.90)	38 (10.50)
NA	5 (2.42)	2 (1.59)	18 (62.07)	25 (6.91)
Age				
(18.30)	80 (38.65)	50 (39.68)	18 (62.07)	148 (40.88)
(30.40)	55 (26.57)	34 (26.98)	5 (17.24)	94 (25.97)
(40.50)	32 (15.46)	27 (21.43)	2 (6.90)	61 (16.85)
(50.60)	28 (13.53)	11 (8.73)	2 (6.90)	41 (11.33)
(60.70)	8 (3.86)	2 (1.59)	1 (3.45)	11 (3.04)
(70.80)	2 (0.97)	0 (0.00)	0 (0.00)	2 (0.55)
NA	2 (0.97)	2 (1.59)	1 (3.45)	5 (1.38)
Complete				
education	151 (72.95)	94 (74.60)	6 (20.69)	251 (69.34)
Incomplete	43 (20.77)	24 (19.05)	4 (13.79)	71 (19.61)
Complete technician	12 (5.80)	7 (5.56)	0 (0.00)	19 (5.25)
Incomplete technician	1 (0.48)	1 (0.79)	2 (6.90)	4 (1.10)
NA	0 (0.00)	0 (0.00)	17 (58.62)	17 (4.70)
Color or race:				
Yellow	2 (0.97)	2 (1.59)	0 (0.00)	4 (1.10)
White	128 (61.84)	69 (54.76)	7 (24.14)	204 (56.35)
Brown	53 (25.60)	32 (25.40)	3 (10.34)	88 (24.31)
Black	24 (11.59)	22 (17.46)	1 (3.45)	47 (12.98)
NA	0 (0.00)	1 (0.79)	18 (62.07)	19 (5.25)
Family income:				
> 25 minimum wages	7 (3.38)	4 (3.17)	1 (3.45)	12 (3.31)
10 to 15 minimum wages	31 (14.98)	10 (7.94)	1 (3.45)	42 (11.60)
15 to 25 minimum wages	24 (11.59)	7 (5.56)	0 (0.00)	31 (8.56)
2 to 3 minimum wages	28 (13.53)	18 (14.29)	2 (6.90)	48 (13.26)
3 to 6 minimum wages	60 (28.99)	38 (30.16)	2 (6.90)	100 (27.62)
6 to 10 minimum wages	30 (14.49)	29 (23.02)	1 (3.45)	60 (16.57)
Up to 2 minimum wages	26 (12.56)	18 (14.29)	3 (10.34)	47 (12.98)
NA	1 (0.48)	2 (1.59)	19 (65.52)	22 (6.08)
Training				
Social worker	2 (0.97)	3 (2.38)	0 (0.00)	5 (1.38)
Audiologist	0 (0.00)	1 (0.79)	0 (0.00)	1 (0.28)
Biologist	9 (4.35)	3 (2.38)	0 (0.00)	12 (3.31)
Biomedical	9 (4.35)	1 (0.79)	0 (0.00)	10 (2.76)
Dentist	3 (1.45)	0 (0.00)	0 (0.00)	3 (0.83)
Physical Educator	2 (0.97)	4 (3.17)	0 (0.00)	6 (1.66)
Nurse	17 (8.21)	27 (21.43)	2 (6.90)	46 (12.71)
Beautician	1 (0.48)	0 (0.00)	0 (0.00)	1 (0.28)
Pharmacist	8 (3.86)	6 (4.76)	0 (0.00)	14 (3.87)
Physical Therapist	12 (5.80)	7 (5.56)	0 (0.00)	19 (5.25)
Speech Therapist	6 (2.90)	0 (0.00)	0 (0.00)	6 (1.66)
Physician	21 (10.14)	16 (12.70)	1 (3.45)	38 (10.50)
Veterinarian	3 (1.45)	0 (0.00)	0 (0.00)	3 (0.83)
Nutritionist	78 (37.68)	39 (30.95)	5 (17.24)	122 (33.70)
Others	6 (2.90)	0 (0.00)	0 (0.00)	6 (1.66)
Psychoanalyst	1 (0.48)	1 (0.79)	0 (0.00)	2 (0.55)
Psychologist	10 (4.83)	4 (3.17)	0 (0.00)	14 (3.87)
Clinical Analysis Technician	1 (0.48)	2 (1.59)	0 (0.00)	3 (0.83)
Nursing Technician	12 (5.80)	8 (6.35)	2 (6.90)	22 (6.08)
Radiology Technician	1 (0.48)	0 (0.00)	0 (0.00)	1 (0.28)
NA	4 (1.93)	4 (3.17)	19 (65.52)	27 (7.46)

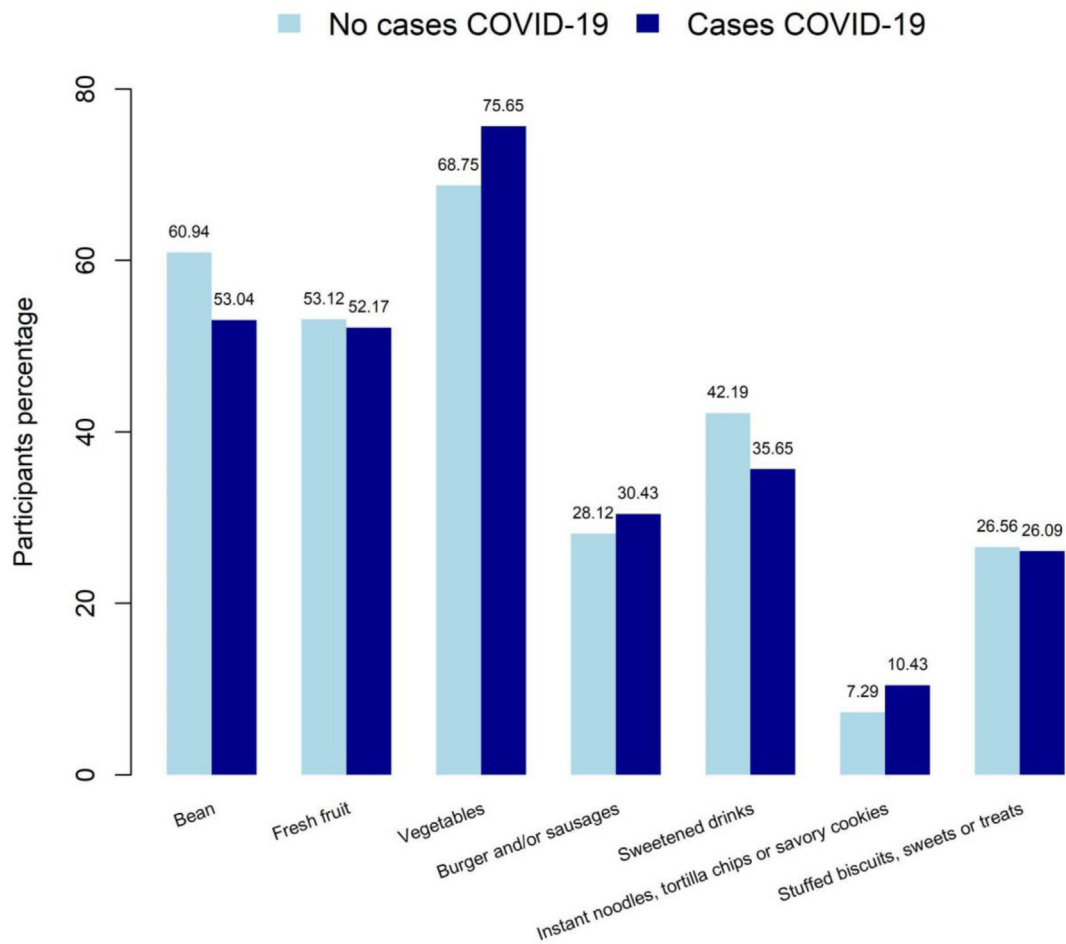


Figure 3. Healthy (beans, fresh fruits, vegetables and/or greens) and unhealthy foods (hamburgers and/or sausages, sugary drinks, instant noodles and/or packaged snacks, stuffed cookies and/or treats) consumption in the previous day by health professionals and students working in the state of Rio de Janeiro in the context of the COVID-19 pandemic, stratified by COVID-19 prevalent case status.

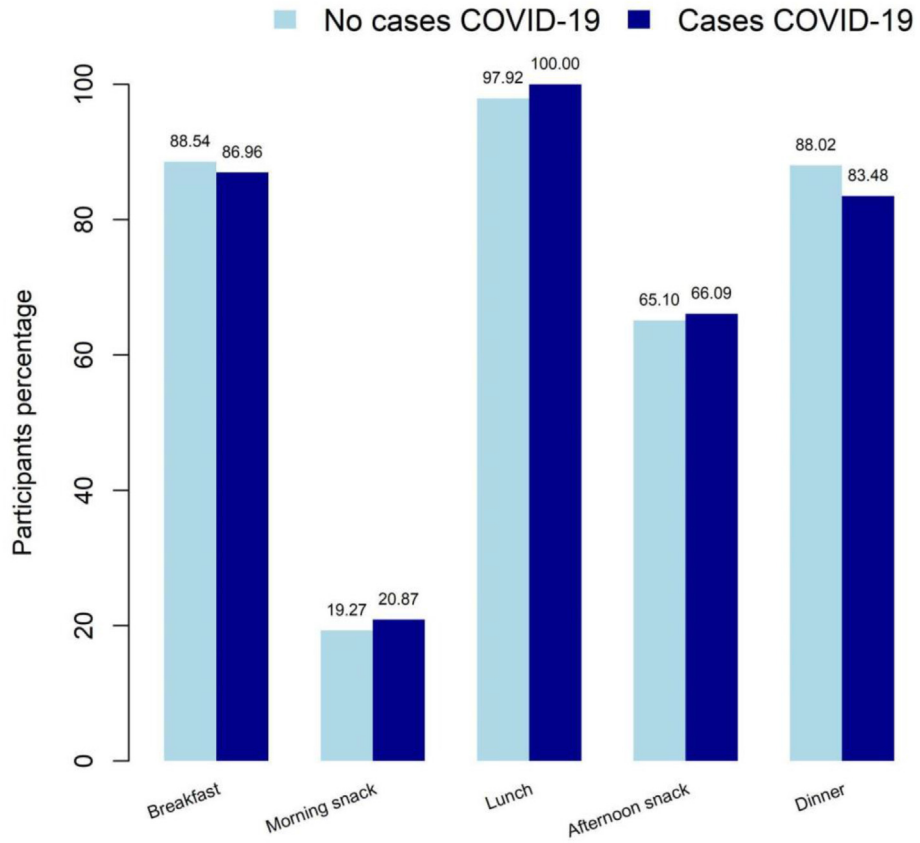


Figure 4. Meals eaten throughout the day by health professionals and students working in the state of Rio de Janeiro in the context of the COVID-19 pandemic, stratified by COVID-19 prevalent case status.

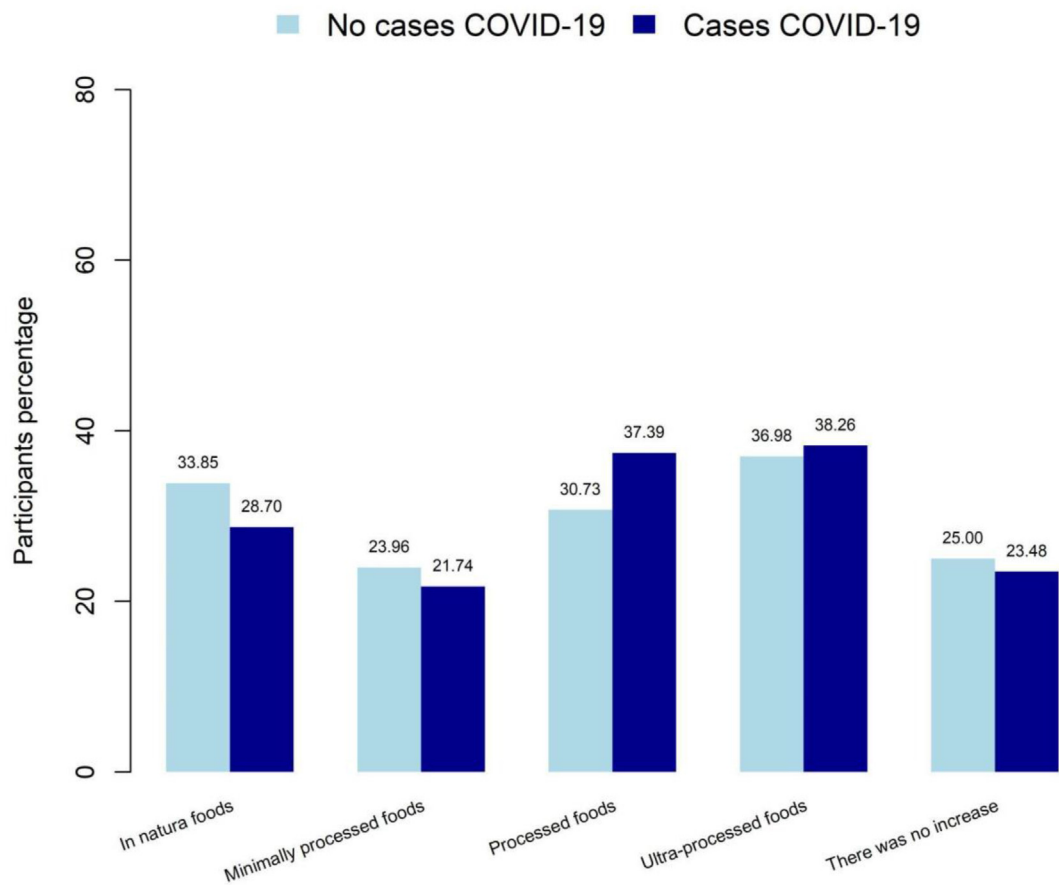


Figure 5. Increase in the frequency of food consumption by health professionals and students working in the state of Rio de Janeiro, according to the level of food processing (in natura, minimally processed, processed, ultra-processed), in the context of COVID-19 pandemic, stratified by COVID-19 prevalent case status.

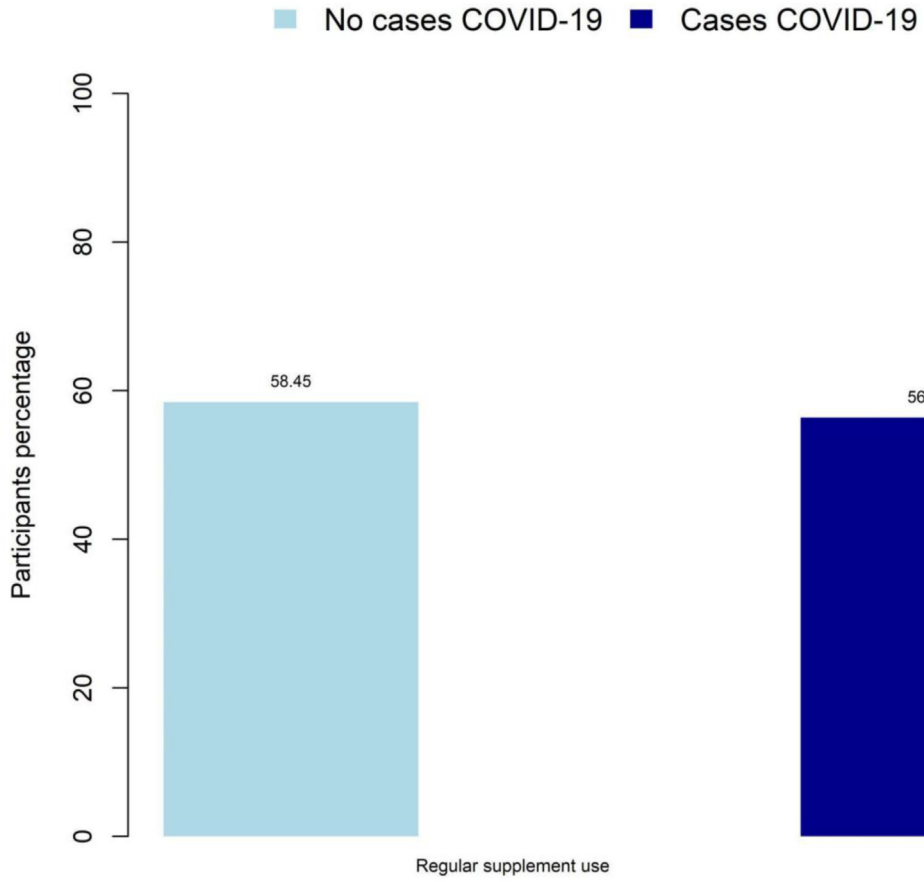


Figure 6. Regular use of supplements (example: Centrum, Lavitan, Vitamin A to Z, vitamin D) by health professionals and students working in the state of Rio de Janeiro, in the context of the COVID-19 Pandemic, stratified by COVID-19 prevalent case status.

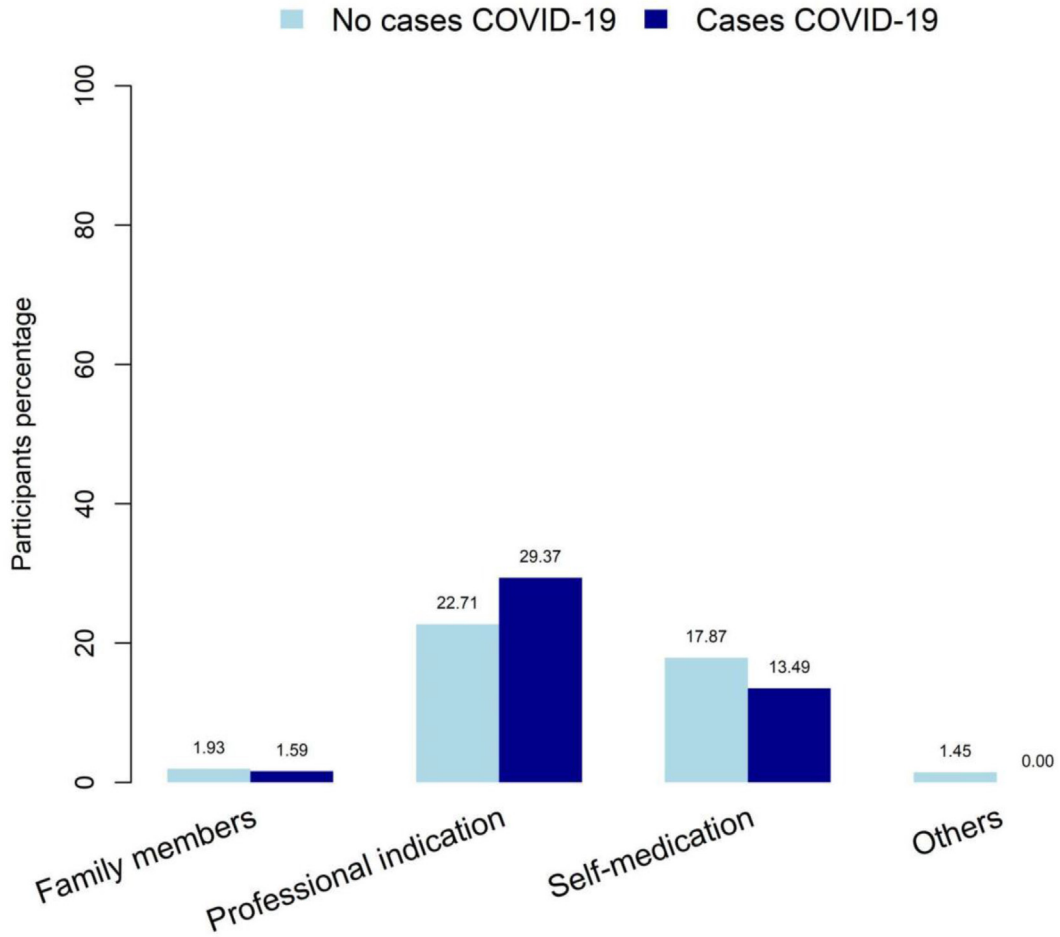


Figure 7. Supplement indication for health professionals and students working in the state of Rio de Janeiro who made regular use of supplements during the pandemic, stratified by the prevalence of COVID-19.

Table 2

Sleep quality in health professionals and students working in the state of Rio de Janeiro, in the context of the COVID-19 Pandemic, stratified by COVID-19 prevalent case status

COVID-19 prevalent case	No	Yes	NA	Total
Total	207	126	29	362
Hours of sleep per night in the last week				
median (IQR)	7.00 (6.00–7.00)	6.00 (6.00–7.00)	6.50 (6.25–6.75)	6.25 (6.00–7.00)
NA	2 (0.97)	1 (0.79)	27 (93.10)	30 (8.29)
Hours of sleep per night last weekend?				
median (IQR)	8.00 (7.00–8.00)	7.00 (6.00–8.00)	7.00 (6.50–7.50)	8.00 (6.00–8.00)
NA	3 (1.45)	2 (1.59)	27 (93.10)	32 (8.84)
Difficulty sleeping				
Yes	102 (49.28)	60 (47.62)	1 (3.45)	163 (45.03)
No	105 (50.72)	66 (52.38)	28 (96.55)	199 (54.97)
NA	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Drowsiness				
Yes	67 (32.37)	(37.30)	1 (3.45)	115 (31.77)
No	140 (67.63)	79 (62.70)	28 (96.55)	247 (68.23)
NA	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Insomnia				
Yes	58 (28.02)	29 (23.02)	1 (3.45)	88 (24.31)
No	149 (71.98)	97 (76.98)	28 (96.55)	274 (75.69)
NA	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Poor sleep quality				
Yes	101 (48.79)	73 (57.94)	2 (6.90)	176 (48.62)
No	106 (51.21)	53 (42.06)	27 (93.10)	186 (51.38)
NA	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Good sleep quality				
Yes	36 (17.39)	14 (11.11)	0 (0.00)	50 (13.81)
No	171 (82.61)	112 (88.89)	29 (100.00)	312 (86.19)
NA	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Impact of sleep change on food consumption enter				
No	84 (40.58)	40 (31.75)	1 (3.45)	125 (34.53)
Yes	87 (42.03)	71 (56.35)	1 (3.45)	159 (43.92)
NA	36 (17.39)	15 (11.90)	27 (93.10)	78 (21.55)

at all levels of processing; c) the context of pandemic promoted changes in sleep quality and mood regardless of illness by COVID-19.

The prevalence of COVID-19 in the population studied was 35% (126 participants), but these data may reflect only the prevalence among symptomatic people, as the tests were carried out in Brazil at that time almost exclusively on people with symptoms. [15,16]. Health professionals are particularly susceptible to infection, through direct contact with infected patients, inappropriate use of personal protective equipment, among others [17,18].

The consumption of food primarily at home has been listed in the literature as a marker of health, a context imposed by the pandemic as commercial establishments were at first closed for presential

Table 3

Mood change in health professionals and students working in the state of Rio de Janeiro, in the context of the COVID-19 Pandemic, stratified by COVID-19 prevalent case status

COVID-19 prevalent case	No	Yes	NA	Total
Total	207	126	29	362
Change of mood in the pandemic				
No	38 (18.36)	16 (12.70)	1 (3.45)	55 (15.19)
Yes	168 (81.16)	109 (86.51)	1 (3.45)	278 (76.80)
NA	1 (0.48)	1 (0.79)	27 (93.10)	29 (8.01)
Has the impact of the change in mood changed your food consumption?				
No	34 (16.43)	18 (14.29)	0 (0.00)	52 (14.36)
Yes	130 (62.80)	89 (70.63)	1 (3.45)	220 (60.77)
NA	43 (20.77)	19 (15.08)	28 (96.55)	90 (24.86)

services [19,20]. And it is also important to consider the greater concern of the world population with the consumption of foods rich in nutrients with immunological claims. It is possible to observe this finding on Google Trends Brazil, where the search for “foods that increase immunity” grew 100% in the period from December, 2019 to January, 2020 [21]. This corroborates our findings, where the highest percentage of participants reported the consumption of healthy foods compared to unhealthy foods when asked about the previous day's food. Another factor that may have contributed to this result was the consumption of breakfast, lunch, dinner and afternoon snack in the vast majority of participants. Regular consumption of meals is recommended by the Ministry of Health for healthy eating and prevention of chronic diseases [22,23].

In the study by Enriquez-Martinez et al. [24] the Ibero-American countries with the healthiest dietary pattern and that presented the highest proportion of positive changes in eating habits and lifestyle during the beginning of the COVID-19 pandemic were Argentina and Brazil.

On the other hand, when participants were asked about the increase in consumption of healthy and unhealthy foods over the course of the pandemic, both groups studied reported that they increased consumption of all food categories (in natura, minimally processed, processed and ultra-processed), in particular the frequency or amount of consumption of processed and ultra-processed foods. This eating behavior with an increase in all levels of food processing, that is, both healthy and unhealthy, may be related to issues such as those listed by Barros et al. [25] and Brooks et al. [26], who report an increase in anxiety in the population during the pandemic period, especially among health professionals, as reported by Silva-Costa et al. [27]. And it is already known that this condition can cause changes in food and even lead to binge eating [28–32].

The ConVid Behavior Research [33], evaluated the changes that occurred in the lives of Brazilians after the arrival of the coronavirus pandemic in the country. In general, similar findings to those found in our study were also observed, with an increase in consumption of processed and ultra-processed foods, and a lower consumption of healthy foods such as fruits, beans and vegetables.

Similar findings with the European population [34] also corroborates our findings, showing an increase in the consumption of vegetables, sugary foods and snacks, when they evaluated a cohort of adult patients with type 2 diabetes mellitus (DM2). Another study that also evaluated food consumption in the context of the pandemic found an increase in the consumption of healthy eating markers (vegetables, fruits and legumes), but none of these studies addressed health professionals [35].

We did not find studies on the eating behavior of health professionals throughout the pandemic, which makes our results extremely important to compose the impact of the pandemic on this population.

There was a high frequency of perception that the change in sleep was related to the change in food consumption, which may also explain the increase in food consumption in all food categories. Poor sleep quality is associated with changes in anorectic and orexigenic hormones, and such changes can result in increased hunger leading to higher food intake [36–38].

Another important finding of our study was the perception of the participants, in both groups, of a change in mood in the context of the pandemic, and that this change may have led to changes in eating behavior. The perception of mood alteration coincides with the increase in nurses' job stress related to higher levels of reflection about the pandemic, job demand, job impact, seeing colleagues crying at work, non-work-related concerns, and fear of becoming infected [39]. Although the study was carried out with nurses, health professionals in general had to deal with the same changes reported in the study. The relationship between negative eating behavior and negative mood states is well reported in the literature [40–42].

With the lack of treatment for COVID-19 at the beginning of the pandemic and the increase in fake news, the population sought unproven methods of treatment, including self-medication. This issue was observed in our study, even in the case of students and health professionals. The regular use of supplementation was reported by all participants, which raises the issue of self-medication described by the Brazilian Medical Association, as a known and worrying prerogative not only among health professionals, but in the population as a whole [43–45]. The study by Andrade et al. [4] corroborates our findings too, where 84.75% of the university students questioned affirmed the use of medicines and vitamins during the pandemic without a prescription from a qualified professional, the study also

reports that many participants declared to believe in the effectiveness of supplements and medicines without of scientific proof.

Conclusion

Our study concluded that the two groups studied, non-cases and prevalent cases of COVID-19, showed similarity in frequencies of responses to all eating behavior questions. Where we have seen an increase in the consumption of foods of all degrees of processing throughout the COVID-19 pandemic. This perception may be related to poor sleep quality and mood changes also reported in this study. However, it is not possible to affirm a causal relationship, nor to say which element could be the strong determinant of these changes in perception. However, when asked about consumption on the previous day, the largest percentage of participants answered a consumption of healthy foods in relation to unhealthy foods. One of the issues to be considered is the already documented relationship of increased anxiety in this pandemic period, which may have contributed to increases in food consumption at all levels of processing.

Finally, we highlight regular use of supplements during the COVID-19 pandemic by more than half of participants, both in the prevalent COVID-19 case group and in the non-COVID-19 case group. The indication was made mainly by health professionals followed by self-medication, given that the population studied consisted primarily of health professionals and, therefore, professionals.

Author contributions

Pinto, Lucia de Mello Coutinho Pinto – Conceptualization, Methodology, Analysis, Research, Writing - Original Draft.

Martins, Rejane de Oliveira Research, Methodology.

Brasil, Pedro Emmanuel Alvarenga Americano do - Conceptualization, Writing - Review and Editing, Methodology, Formal Analysis, Project Management, Supervision.

Bacelo, Adriana Costa Conceptualization, Writing - Review and Editing, Methodology, Project Management, Supervision.

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Declaration of competing interest

The authors declare no conflict of interest.

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