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This study corresponds to part of the results of Monique da Silva Monção's master's thesis, "Efeito do confinamento da COVID-19 sobre hábitos alimentares, segurança alimentar e nutricional e adesão às orientações dietéticas em pacientes com doenças infecciosas acompanhadas através de uma estratégia de atendimento não presencial" ("Effect of COVID-19 confinement on eating habits, food and nutritional security, and adherence to dietary guidelines in patients with infectious diseases monitored through a non-face-to-face care strategy"), defended on December 1, 2022, at the National Institute of Infectology (INI/Fiocruz)

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Eating habits, food insecurity and perceived stress during the COVID-19 pandemic

Hábitos alimentares, insegurança alimentar e estresse percebido durante a pandemia de Covid-19

Abstract

Introduction: Restrictive measures during the COVID-19 pandemic directly impacted on the population's eating habits. **Objective:** To evaluate changes in eating habits, access to food and perceived stress during COVID-19 confinement, reported by patients returning to nutritional outpatient follow-up in a public reference unit in the treatment of infectious diseases in Rio de Janeiro. **Methods:** Cross-sectional study, with 75 patients over 18 years of age, from July to December 2020. We collected sociodemographic data, eating habits during confinement, and applied validated questionnaires to assess healthy and unhealthy food intake markers (*Sistema de Vigilância Alimentar e Nutricional* form), food insecurity (short version of Brazilian Food Insecurity Scale), and Perceived Stress Scale. Statistical Package for Social Sciences (SPSS®) version 16.0 (IBM Corp, Armonk, NY) was used for data analysis. Variables were described as median and interquartile range (IQR), and absolute numbers and frequencies, and association between them was investigated by Pearson's chi-square test. P values < 0.05 showed statistically significant tests. Institution's Ethics Committee approved the study and all participants signed an informed consent. **Results:** During confinement, most patients changed their eating habits (68%) and felt that they "used food to cope with stress and anxiety" (53.3%), despite this, healthy food had the highest frequency of consumption. Almost half of participants (46.7%) were in food insecurity situation. The majority (61.9%) were categorized as moderate stress. Food insecurity was more frequent among people with low household income (p=0.004), people living with HIV (p=0.024), people who changed food purchase routine (p=0.008), people with worsening eating habits (p=0.009), and people with moderate/high stress (p=0.004). **Conclusions:** COVID-19 confinement interfered negatively in patient's eating habits and perceived stress. Although negative feelings were reported by most patients, and the majority presented moderate stress, healthy food intake markers had the highest frequency of consumption.

Keywords: Eating Habits. Communicable Diseases. Stress. Psychological Food Insecurity

Resumo

Introdução: Medidas restritivas durante a pandemia de Covid-19 impactaram diretamente os hábitos alimentares da população. **Objetivo:** Avaliar mudanças nos hábitos alimentares, acesso a alimentos e estresse percebido durante confinamento da pandemia de Covid-19, relatados por pacientes retornando ao acompanhamento ambulatorial em uma unidade de referência para o tratamento de doenças infecciosas no Rio de Janeiro. **Métodos:** Estudo seccional com 75 pacientes com 18 anos ou mais, de julho a dezembro de 2020. Foram coletados dados sociodemográficos, hábitos alimentares no período de confinamento, e aplicados questionários validados para avaliar marcadores de consumo alimentar saudável e não saudável (Sistema de Vigilância Alimentar e Nutricional), insegurança alimentar (versão curta da Escala Brasileira de Insegurança Alimentar) e Escala de Estresse Percebido. Para a análise dos dados, foi utilizado o programa *Statistical Package for Social Sciences* (SPSS®) versão 16.0 (IBM Corp, Armonk, NY). Variáveis foram descritas como mediana e intervalo interquartil (IIQ), números absolutos e frequências, e a associação entre elas foi investigada pelo teste de qui-quadrado de Pearson. O nível de significância adotado foi de $P < 0,05$. O estudo foi aprovado pelo Comitê de Ética da instituição e todos os participantes assinaram termo de consentimento. **Resultados:** Durante o confinamento, a maioria dos pacientes referiu mudanças nos hábitos alimentares (68%) e sentiu que “descontou na comida o estresse e ansiedade” (53,3%); apesar disso, os marcadores de alimentação saudável apresentaram a maior frequência de consumo. Quase metade dos participantes (46,7%) estava em situação de insegurança alimentar. A maioria (61,9%) apresentou estresse moderado. Insegurança alimentar foi mais frequente entre pessoas com baixa renda ($p=0,004$), pessoas vivendo com HIV ($p=0,024$), pessoas que alteraram sua rotina de compras de alimentos ($p=0,008$), pessoas com piora dos hábitos alimentares ($p=0,009$) e aqueles com estresse moderado/alto ($p=0,004$). **Conclusões:** O período de confinamento da Covid-19 interferiu negativamente nos hábitos alimentares e estresse percebido dos pacientes. Embora a maioria dos pacientes tenha relatado sentimentos negativos e apresentado estresse moderado, marcadores de alimentação saudável tiveram maior frequência de consumo.

Palavras-chave: Hábitos Alimentares. Doenças Transmissíveis. Estresse Psicológico. Insegurança Alimentar.

INTRODUCTION

The World Health Organization has declared coronavirus disease 2019 (COVID-19) a global pandemic on March 11, 2020.¹ Strict social distancing was recommended to prevent the spread of COVID-19, especially for risk groups. These restrictive measures directly impacted on the population's eating habits, as they made access to food purchases more difficult. Nutrinet Brazil Cohort study observed an unfavorable pattern of dietary changes among people with less schooling, reflecting Brazilian social inequalities.² Furthermore, strict social distancing confinement can lead to psychological effects that influence food choices, increasing food intake, snacks intake and number of meals.³ As confinement was prolonged, stress and anxiety symptoms increased⁴ and interrupted outpatient follow-up and impaired adherence to nutritional counseling, necessary for better control of metabolic comorbidities.

These social distancing protocols also had a negative impact on food production system, mainly vegetables and fruits, with workforce reduction, increased delivery time and operating costs, leading to decreased consumption of these foods and increased consumption of ultra-processed foods by the population.⁵

At the end of 2020, 19.1 million people lived with hunger in Brazil. In 2022, food insecurity became even more present among Brazilian families: 33.1 million people who didn't have anything to eat and/or didn't know when their next meal would be.^{6,7}

Social distance, fear of contamination and unemployment caused several repercussions on mental health, such as stress, poor sleep quality, changes in food consumption and mood, anxiety and depression.⁸ Especially in low- and middle-income countries, the most vulnerable people have been disproportionately affected.⁵

In addition to the negative effects of the pandemic, the vulnerable condition of people with infectious diseases can deteriorate situation of food insecurity. Particularly, people living with HIV reported skipping meals during quarantine or described challenges to buying food in this period. Food insecurity has potential negative effects on non-adherence to antiretroviral, treatment interruptions and disruption to clinic visits.⁹

Given the relationship between food insecurity, stress symptoms and changes in eating habits during pandemic, in this article, we describe these interrelated factors during COVID-19 confinement period, reported by patients returning to nutritional outpatient follow-up in a reference unit in the treatment of infectious diseases in Rio de Janeiro.

MATERIAL AND METHODS

Study design

This is a cross-sectional study conducted at the nutrition outpatient clinic at a public reference unit in the treatment of infectious diseases in Rio de Janeiro. Ethics Committee approved the study (IRB n. 4.082.614/2020), and all participants signed an informed consent, in a paper format, prior to enrollment in this study.

Participants

Patients with infectious diseases, aged ≥ 18 years (adults and elderly), returning to nutritional outpatient follow-up, from July to December 2020, were invited to participate in the study. No calculation was performed

to estimate the sample size. Of the 375 patients scheduled in the study period, 175 with infectious diseases were considered eligible. Of these, 78 attended the consultation, 2 refused and 1 presented incomplete data, resulting in 75 participants being effectively included in the study.

Participants received informed consent information before interviews. Consultations were carried out respecting current health recommendations to avoid contamination by COVID-19.

Data Collection

In a nutritional consultation, we collected sociodemographic data, eating habits during confinement period, and applied questionnaires to assess food insecurity, food intake markers and perceived stress, in an interview format.

Sociodemographic data were age, sex, race/skin color (white, mixed, or black –according to the Brazilian Institute of Geography and Statistics) marital status (single, marriage, divorced, widowed), education (primary education or less, secondary education, and tertiary education or more), employment situation (formal work, retired, unemployed, housewives, students), household income, and receiving government aid. Household income was represented in minimum wages (R\$ 1,100 in 2021, Brazilian Central Bank), and were grouped into five categories (<1; 1 to < 2; 2 to < 4; 4 to < 10; ≥ 10). Patients were asked whether they received any government aid, such as “Bolsa Familia” Programme (government conditional continuous cash transfer program for families with per capita monthly income < US\$25), the Organic Law of Social Assistance “BPC/LOAS” (continuous cash benefit for people with disabilities) or “emergency aid” (financial benefit for vulnerable people during COVID-19 pandemic).

To evaluate food intake markers, we used *Sistema de Vigilância Alimentar e Nutricional (SISVAN)* form of food intake markers, which determines food intake on the previous day, focusing on exposure to ultra-processed foods.^{10,11} The form consists of the following questions: i) eating practices of having meals while watching television and/or using a computer and/or cell phone; ii) meals eaten throughout the day (breakfast, morning snack, lunch, afternoon snack, dinner, and supper); iii) foods/food groups intake on the previous day: beans; fresh fruits (excluding fruit juice); greens and/or vegetables (excluding potatoes, manioc, cassava, and yams); hamburger and/or sausage; sugar-sweetened beverages; instant noodles, packaged snacks or crackers; and stuffed cookies, sweets or treats. Answer options are “yes”, “no”, or “don't know”. Beans, fresh fruits and greens and/or vegetables are considered “healthy food intake markers”, and the other categories (ultra-processed foods) “unhealthy food intake markers”.

In addition, participants were asked about eating habits during confinement period (first 5 to 10 months of the pandemic): “During confinement, have you changed your eating habits?”; “Have you changed your food purchase routine?”; “Have you increased or reduced frequency of cooking?”; “Have you changed your habit of eating in restaurants/bars?”; “Do you think your eating habits have improved/worsened/no change during confinement?”.

Food insecurity was measured using the validated short form version of Brazilian Food Insecurity Scale (*Escala Brasileira de Insegurança Alimentar, EBIA*).¹² The five items referred to the past three months and were as follows: 1) “Were you worried that the food in your home would end before you could buy, receive or produce more food?”; 2) “Did the food end before you had money to buy more?”; 3) “Did you run out of money and could not have a healthy and varied diet?”;

4) "Did you or an adult in your home reduce the amount of food in your meals, or skip meals, because there was not enough money to buy food?"; 5) "Did you eat less than you thought you should because there was not enough money to buy food?". One affirmative answer is enough to identify that the individual is in food insecurity situation.

In addition to open-ended questions about negative feelings experienced during confinement period, we used the Perceived Stress Scale (PSS) validated to Brazilian population,¹³ to measure the degree to which situations in one's life are appraised as stressful. The instrument consists of 14 questions, response options range from 0 to 4 (0 = never; 1 = almost never; 2 = sometimes; 3 = fairly often; 4 = always) with a total score ranging from 0 to 56 points, with higher scores indicating greater perceived stress. The score result was categorized into low stress (0-18 points), moderate stress (19-37 points) and high stress (38-56 points),¹⁴ and to verify the association between perceived stress and food insecurity, we grouped the categories of moderate and high stress.

Data Analysis

The normality of quantitative variables was rejected by the Shapiro-Wilk normality test, and they were described as median and interquartile range (IQR). Categorical variables were described as absolute numbers and frequencies, and association between them was investigated by Pearson's chi-square test. P values < 0.05 showed statistically significant tests.

To perform association analyses between food insecurity, some variables were categorized into two groups: age (\geq or <60 years), race/skin color (mixed and black or white), education (secondary/tertiary or primary), household income (\leq or > 2 minimum wages), clinical (living with HIV or not; have metabolic comorbidity or not), behavioral (\geq 3 or < 3 negative feelings; changed food purchase or not; worsening or improving/no change eating habits; eating at least 1 or no healthy food; eating at least 1 or no unhealthy food).

For the data analysis, the Statistical Package for Social Sciences (SPSS®) version 16.0 (IBM Corp, Armonk, NY) was used.

RESULTS

Median age of participants was 58 years (IQR = 12), most of whom were female, mixed or black, and had primary education. Most participants (57.3%) were not formally working, and among those who declared income (n=44), 86.4% had a monthly household income of up to 4 minimum wages. Sixteen patients were receiving government aid ("emergency aid": n=12; "BPC/LOAS": n=2; "Bolsa Familia": n=2). People living with HIV/Aids (PLHA) were the majority (54.7%), and 89.3% had at least one comorbidity, with hypertension (58.2%), dyslipidemia (53.7%) and diabetes mellitus (37.3%) being the most frequent (Table 1).

Table 1. Sociodemographic and clinical characteristics of patients with infectious diseases attended in a nutritional consultation at a Reference Center in Rio de Janeiro, Brazil, 2020-2021 (n=75).

Variables	Absolute number (n)	Frequencies (%)
<i>Age (years)</i>		
< 60 years	41	54.7
≥60 years	34	45.3
<i>Sex</i>		
Female	43	57.3
Male	32	42.7
<i>Race/skin color</i>		
White	28	37.3
Mixed	30	40,0
Black	17	22.7
<i>Marital status</i>		
Single	28	37.3
Marriage	29	38.7
Divorced	8	10.7
Widowed	10	13.3
<i>Education</i>		
Primary education or less	42	56.0
Secondary education	23	30.7
Tertiary education or more	10	13.3
<i>Employment situation</i>		
Formal work	28	37.3
Retired	20	26.7
Unemployed	17	22.7
Housewives	9	12.0
Students	1	1.3

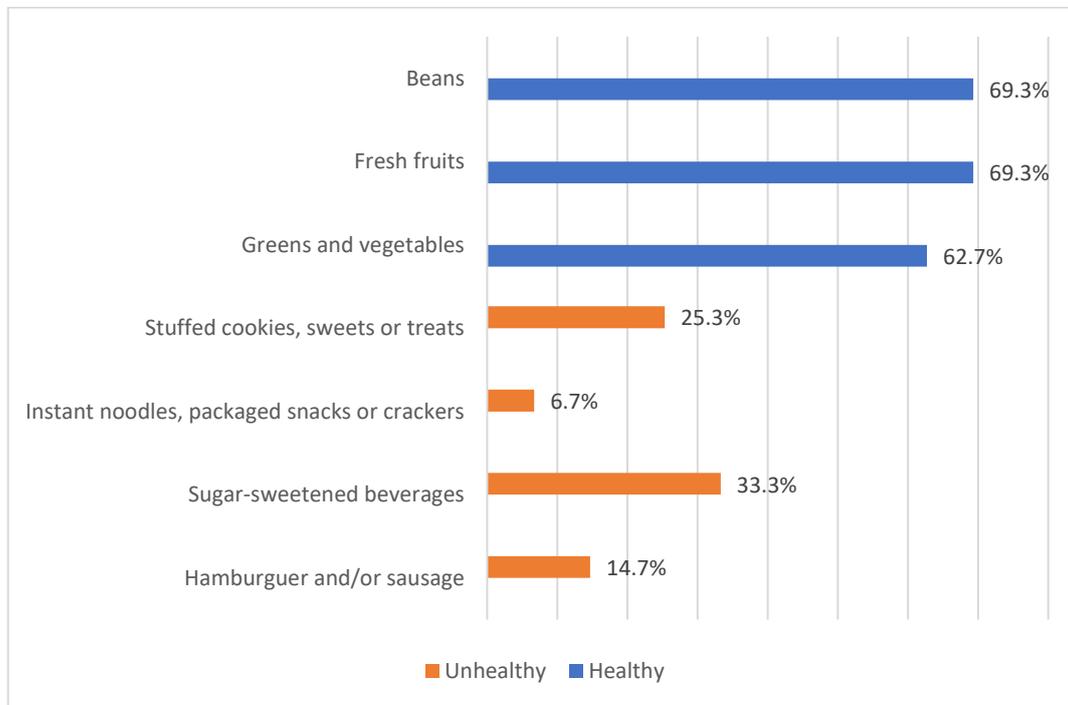
Table 1. Sociodemographic and clinical characteristics of patients with infectious diseases attended in a nutritional consultation at a Reference Center in Rio de Janeiro, Brazil, 2020-2021 (n=75).

Variables	Absolute number (n)	Frequencies (%)
<i>Household income (MW; n=44)</i>		
< 1	10	13.3
≥ 1 to< 2	12	16.0
≥ 2 to< 4	16	21.3
≥4 to<10	5	6.7
≥10	1	1.3
<i>Receiving governmental aid (n=44)</i>		
Yes	16	21.3
No	28	37.3
<i>Infectious disease at on set</i>		
HIV	41	54.7
Chagas Disease	22	29.3
HTLV	6	8.0
Tuberculosis	3	4.0
Leishmaniasis	1	1.3
Paracoccidioidomycosis	1	1.3
Hepatitis C	1	1.3
<i>Comorbidities (n=68)</i>		
Hypertension	39	58.2
Dyslipidemia	36	53.7
Diabetes mellitus	25	37.3
Hypothyroidism	9	13.2
Nephropathy	8	11.8
Heart disease	7	10.3
Hepaticsteatosis	3	4.4
Goutyarthrititis	2	2.9

HIV: *HumanImmunodeficiency Virus*; HTLV: Human T lymphotropicvirus. MW: minimum wage(R\$ 1100 in 2021, Brazilian Central Bank).

According to SISVAN form of food intake markers on the previous day, healthy food intake markers had the highest frequency of consumption compared to unhealthy food intake markers (Figure 1).

Figure 1. Proportion of Healthy and Unhealth Food Intake Markers of Patients with Infectious Diseases Attended in a Nutritional Consultation at a Reference Center in Rio de Janeiro, Brazil, 2020-2021 (n=75).



During confinement, 68% of patients changed their eating habits, the most cited being: modification in the food purchase routine (49.3%), increased frequency of cooking (36%), and 34.7% reported that they had the habit of eating in restaurants/bars, but due to confinement, no longer did so. Twenty-one patients (28%) reported an improvement of eating habits during confinement; 38.7% reported worsening; and 33.3% thought there was no change. Regardless of the pandemic, 66.7% of patients reported the habit of watching TV, using a computer or cell phone while eating. Most patients (53.3%) felt that they “used food to cope with stress and anxiety”, and 72% reported at least 3 negative feelings experienced during confinement. The feelings most reported by patients were worry (78.7%), anxiety (66.7%), fear (62.7%), sadness (58.7%) and anger (20%).

Almost half of the participants (46.7%) were in food insecurity situation. There was more food insecurity in people with low household income (p=0.004), people living with HIV (p=0.024), people who changed food purchase routine (p=0.008), and people with worsening eating habits (p=0.009) during confinement (Table 2).

Table 2. Association of sociodemographic, clinical and behavioral variables with food insecurity of patients with infectious diseases attended in a nutritional consultation at a reference center in Rio de Janeiro, Brazil, 2020-2021 (n=75).

Food insecurity [¥]			
Variables	No (N=40) n (%)	Yes (N=35) n (%)	<i>p</i> [*]
SOCIODEMOGRAPHIC			
Aged ≥ 60 years (n=34)	20 (50.0)	14 (40.0)	<i>0.385</i>
Aged < 60 years (n=41)	20 (50.0)	21 (60.0)	
Male (n=32)	19 (47.5)	13 (37.1)	<i>0.366</i>
Female (n=43)	21 (52.5)	22 (62.9)	
Mixed and black (n=47)	23 (57.5)	24 (68.6)	<i>0.323</i>
White (n=28)	17 (42.5)	11 (31.4)	
Secondary/Tertiary education (n=33)	15 (37.5)	18 (51.4)	<i>0.225</i>
Primary education (n=42)	25 (62.5)	17 (48.6)	
Household income ≤ 2 MW (n=22)	6 (30.0) [‡]	16 (66.7) [€]	<i>0.004</i>
Household income >2 MW (n=22)	14 (70.0) [‡]	8 (33.3) [€]	
CLINICAL			
Living with HIV (n=41)	17 (42.5)	24 (68.6)	<i>0.024</i>
Not HIV (n=34)	23 (57.5)	11 (31.4)	
Have metabolic comorbidity (n=65)	35 (87.5)	30 (85.7)	<i>0.820</i>
No metabolic comorbidity (n=10)	5 (12.5)	5 (14.3)	
BEHAVIORAL			
Had ≥ 3 negative feelings (n=54)	25 (62.5)	29 (82.9)	<i>0.050</i>
Had < 3 negative feelings (n=21)	15 (37.5)	6 (17.1)	
Moderate/high stress	17 (54.8)	27 (84.4)	<i>0.004</i>
Low stress	14 (45.2)	5 (15.6)	
Changed food purchase routine (n=37)	14 (35.0)	23 (65.7)	<i>0.008</i>
Not changed (n=38)	26 (65.0)	12 (34.3)	
Worsening eating habits (n=29)	10 (25.0)	19 (54.3)	<i>0.009</i>
Improving or no change (n=46)	30 (75.0)	16 (45.7)	
At least 1 healthy food [†] (n=71)	38 (95.0)	33 (94.3)	<i>0.891</i>
No healthy food [†] (n=4)	2 (5.0)	2 (5.7)	
At least 1 unhealthy food [†] (n=41)	20 (50.0)	21 (60.0)	<i>0.385</i>
No unhealthy food [†] (n=34)	20 (50.0)	14 (40.0)	

*Values in italic bold indicate *p*value < 0.05 at Pearson's chi-square test. MW: minimum wage (R\$ 1100 in 2021, Brazilian Central Bank). [¥] Brazilian Food Insecurity Scale (≥ 1 affirmative answer = food insecurity). [†] SISVAN Form of food intake markers. [‡] N=20; [€] N=24.

Sixty-three participants completed the Perceived Stress Scale (PSS), with a median score of 33 (IQR = 19) (Table 3). The majority (61.90%) were categorized as moderate stress, 30.16% as low stress, and 7.94% as high stress. There was more food insecurity in people with moderate/high stress (84.4%) than in those with low stress (15.6%) (Table 3).

Table 3. Perceived Stress Scale score of patients with infectious diseases attended in a nutritional consultation at a Reference Center in Rio de Janeiro, Brazil, 2020-2021 (n=63).

Question	In the last month, how often have you ...	Median	Minimum/ Maximum
1	... been upset because of something that happened unexpectedly?	2	0/4
2	... felt that you were unable to control the important things in your life?	2	0/4
3	... felt nervous and stressed?	2	0/4
4	... felt confident about your ability to handle your personal problems?	1	0/4
5	... felt that you are coping well with important changes in your life?	1	0/4
6	... felt confident in your ability to solve personal problems?	0	0/4
7	... felt that things are happening according to your will?	2	0/4
8	... felt like you couldn't handle all the things you have to do?	2	0/4
9	... been able to control irritations in your life?	1	0/4
10	... felt that you were on top of things?	2	0/4
11	... been angered because of things that happened that were outside of your control?	2	0/4
12	... found yourself thinking about things you have to do?	4	0/4
13	... been able to control how you spend your time?	0	0/4
14	... felt that difficulties were piling up so high that you could not overcome them?	2	0/4

DISCUSSION

This study describes changes in eating habits, food insecurity and perceived stress during COVID-19 confinement, reported by patients returning to nutritional outpatient follow-up, and the main findings were: i) most participants changed their eating habit and food purchase routine during confinement period; ii) food insecurity was more frequent in those with low household income, living with HIV, and those who changed food purchase routine; iii) worry, anxiety, fear and sadness were reported by most patients; iv) most participants presented moderate stress; and v) despite all, healthy food intake markers had the highest frequency of consumption.

Among the changes in eating habits during confinement, the most cited were replacing the habit of eating in restaurants/bars with the habit of cooking, and increasing food intake due to the presence of negative feelings. During consultation at the nutrition outpatient clinic, participants reported financial difficulties, the majority were not in formal employment and had a low income, and almost half were in food insecurity situation.

During the COVID-19 pandemic, food insecurity has increased in middle-income countries in Latin America, including Brazil.¹⁵ In late 2020, 55.2% of the Brazilian households faced food insecurity at different levels and 9% lived with severe food insecurity.⁶ In early 2022, these prevalences increased to 58.7% and 15.5%, respectively.⁷ Income transfer programs aim to reduce inequality and poverty, but food insecurity situation is not always reversed, due to the exhausting and extreme condition of social vulnerability.¹⁶

Data from national surveys show that food security was negatively impacted by rising food prices during the pandemic. In 2022, basic food basket consumed, on average, 55% of the minimum wage in Brazil.¹⁷ It is expected that, in such periods, households adopt survival strategies to overcome difficulties, reducing food intake and selecting cheaper and less nutritious food. Furthermore, financial and food crises most likely affect the same population strata, such as minorities, the poor, vulnerable families¹⁵ and people with infectious diseases, especially those living with HIV.

As expected, we found that food insecurity was more frequent among people with low household income and people living with HIV. Epidemiologic evidence shows that food insecurity is remarkably high in people living with HIV,^{18,19} leading to poor health outcomes and poor antiretroviral adherence,²⁰ and increasing the risk of depression.¹⁸

Changes in the prices of minimally processed food relative to ultra-processed food seem to reflect the impact of the COVID-19 pandemic on the global economy.²¹ However, despite the changes in eating routine, food insecurity and reduced purchasing power, we observed that even in the pandemic, patients had a satisfactory consumption of healthy food, such as beans, fruits and vegetables, and relatively low intake of ultra-processed products. Our findings were aligned with Nutrinet Brazil Cohort study,² which included participants from all states of the Federation through a digital platform, comparing food questionnaires before and during the pandemic period, and showed that consumption of healthy food intake markers had a modest but statistically significant increase for all participants, in most sociodemographic strata.

We can suggest some factors that contributed to the highest frequency of consumption of healthy food: the habit of cooking at home, the reduced consumption of food and meals in restaurants/bars, and the knowledge about healthy eating, acquired in previous nutrition consultations. Most patients had at least one comorbidity and were in nutritional outpatient follow-up to control body weight and to ensure adequate eating behavior, which are essential to reduce the risk of health issues and improve the nutritional and metabolic profile.²²

Although patients consumed more healthy foods than ultra-processed products, approximately one third had the perception of “worsening eating habits” during confinement, and most of them felt that they “used food to cope with stress and anxiety”, citing “changing routine” and “limited financial resources” as the main limitations to an adequate eating behavior. Other Brazilian cross-sectional studies carried out remotely describe similar results. Miura & Wichoski²³ interviewed through an online questionnaire, 55 individuals aged 18 to 30, and found that almost 70% of young people fully believed that the quality of food could help improve the anxiety caused in this period.²³ Liboredo et al.³ interviewed 1,300 Brazilians from the five regions of Brazil, aged 18 or older, in the second half of 2020, and showed an increase in the number of daily meals and snack

intake due to stress, anxiety and other negative feelings. Eating habits were independently associated with perceived stress of Brazilian during quarantine.³

Worry, anxiety, fear and sadness were the feelings reported by most patients in our study, and 60% were categorized as having a moderate level of stress. Liboredo et al.³ found a median score corresponding to the moderate stress category, using the reduced version of perceived stress scale (10 questions). Similarly, Vale et al.²⁴ carried out an online survey and included almost 1,000 participants aged 18 or older from different regions of Brazil, and found that most participants had general perceived stress scores ranging from moderate (59%) to high (32%).

A high level of stress negatively affects eating behavior and is associated with food intake disorders, connoting a pattern of distraction described as a lack of eating awareness, which has a direct relationship with obesity.²⁵ As levels of perceived stress increase, the level of food awareness decreases and individuals with high PSS scores also experience weight gain.²⁶

We described a greater proportion of food insecurity among people with moderate/high stress. Vale et al.²⁴ found that individuals with low socioeconomic conditions had higher levels of perceived stress. In contrast, Meller et al.²⁷ analyzed data from 1,600 adults included in two population-based studies conducted between 2019 and 2021 in Southern Brazil, and found no association between perceived stress and food insecurity after the pandemic. But, worldwide, COVID-19 pandemic was negatively associated with the mental health of low-income adults, in the United States,²⁸ India, Iran, Indonesia, Bangladesh, Nepal, Pakistan, and Ukraine.²⁹ Changes in food purchase routine are directly affected by food insecurity, and could explain the association with patient's perception of worsening eating habits during confinement period.

The major limitations of our study are: i) the study design, which does not allow inferences to other groups of patients; ii) the sample size was not sufficient to carry out analyzes with adjustment for confounders, such as in regression models; and iii) different evaluation periods of questionnaires (SISVAN: day before; PSS: previous month; food insecurity: previous 3 months) may interfere with the interpretation of data. As strengths, we evaluated patients from a reference center for the treatment of infectious diseases, and used only questionnaires validated to Brazilian population. Our results were important to define strategies to improve dietary guidance during quarantine, and can help design future studies.

CONCLUSION

COVID-19 confinement period interfered negatively in patient's eating habits and perceived stress. Food insecurity was more frequent in those with low household income, living with HIV. Although negative feelings were reported by most patients and the majority presented moderate stress, healthy food intake markers had the highest frequency of consumption.

These descriptive study of patients attended in a reference center for infectious diseases, part of the Brazilian health system – Sistema Único de Saúde (free, universal and public) – was important for understanding the socioeconomic conditions and eating habits that interfered with adherence to dietary guidance during the pandemic.

These findings support the importance of adopting integrated and participatory public policies, capable of facing all the dimensions that emerged and were amplified by the pandemic: psychosocial, economic, cultural, environmental and political impacts.

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Contributors

Monção MS, Brito PD, and Valete CM participated in the conception and design; Monção MS, Oliveira RVC, Cormack JA, Brito PD, and Valete CM participated in the data analysis; Monção MS, Oliveira RVC, Almeida CF, Silva PS, Brito PD, and Valete CM participated in the interpretation of the results and critical review of the manuscript. All authors participated in the review and approval of the final version.

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