UNIVERSIDADE FEDERAL DE MINAS GERAIS
Faculdade de Farmácia
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Tamires Cássia de Melo Souza

# HÁBITOS ALIMENTARES, ESTILO DE VIDA E COMPORTAMENTO ALIMENTAR DURANTE A PANDEMIA DE COVID-19 EM INDIVÍDUOS BRASILEIROS

Belo Horizonte
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Orientadora: Profa. Dra. Lucilene Rezende Anastácio

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**FOLHA DE APROVAÇÃO**

**HÁBITOS ALIMENTARES, ESTILO DE VIDA E COMPORTAMENTO ALIMENTAR DURANTE A PANDEMIA DE COVID-19 EM INDIVÍDUOS BRASILEIROS**

**TAMIRES CÁSSIA DE MELO SOUZA**

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Profa. Dra. Ilka Afonso Reis - UFMG
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*Ao Breno e ao Antônio*

*(que chegou no meio de tudo e me trouxe um novo propósito).*

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“

MAIS DO QUE QUALQUER OUTRA COISA, É A APRECIAÇÃO CRIATIVA QUE FAZ O INDIVÍDUO SENTIR QUE VALE A PENA VIVER.

D. WINNICOTT
LIVRO: O BRINCAR E A REALIDADE

”

# RESUMO

Em março de 2020, a Organização Mundial da Saúde declarou a pandemia pelo novo coronavírus. Em decorrência da rápida disseminação do vírus e, até a consolidação de métodos de tratamento e imunização, indicou-se o isolamento e distanciamento sociais como principal medida de enfrentamento à COVID-19 que afetaram de forma substancial o modo de viver das pessoas. Com isso, o objetivo do presente trabalho foi verificar modificações nos hábitos diários, estilo de vida, hábitos alimentares e comportamento alimentar de adultos brasileiros no contexto da pandemia de COVID-19. Trata-se de estudo observacional com indivíduos de 18 anos ou mais, realizado e forma *online* por meio de questionário semiestruturado elaborado no aplicativo de gerenciamento de pesquisas Google *Forms*. A análise estatística foi realizada por meio dos softwares estatísticos R (RCore Team) e *Statistical Package for Social Sciences* (SPSS Inc., Chicago, IL, EUA) versão 21.0 e consistiu na aplicação de testes de comparação das variáveis entre os tempos investigados, além de modelos de regressão. A primeira fase do estudo ocorreu de agosto a setembro de 2020, durante a primeira onda. Neste momento, os voluntários foram orientados a responder sobre os hábitos no período anterior à pandemia (T0 - dados referentes ao período prévio à pandemia) e no momento que estavam vivenciando durante a pandemia (T1). A segunda fase do estudo (T2) ocorreu de maio a junho de 2021, durante a segunda onda. As variáveis coletadas foram divididas em três grupos de perguntas: variáveis socioeconômicas; hábitos diários e estilo de vida; hábitos alimentares, comportamento alimentar (descontrole alimentar, comer emocional e restrição cognitiva) e estresse percebido. Na primeira onda, foram obtidas 1.368 respostas ao questionário e os participantes apresentaram mediana de 31 (24 – 39) anos, sendo 80,0% da amostra composta por mulheres. Já na segunda onda, a amostra final foi de 464 indivíduos, com idade mediana de 32 (24 - 40) anos, em que as mulheres correspondiam a 82,8% dos participantes. Os resultados revelaram que na primeira onda, foram verificadas mudanças nos hábitos diários, hábitos alimentares e estilo de vida (quando comparado com o período prévio à pandemia). Houve aumento de 3,5 horas/dia no uso de telas e dispositivos, aumento no número de tabagistas que fumavam mais de 11 cigarros ao dia e na frequência semanal do consumo de bebidas alcoólicas (com redução do número de pessoas que não bebiam). Por outro lado, houve redução na quantidade de bebida alcóolica ingerida por ocasião de consumo. Foi observada redução na realização das refeições diurnas e aumento na realização de refeições noturnas. A frequência de consumo (vezes por semana) de refeições instantâneas e *fast food* aumentou, enquanto o consumo de frutas e hortaliças diminuiu. A prática de exercício físico reduziu de forma significativa (de 120 para 80 min/semana) e o sedentarismo esteve presente em 76,7% da amostra. Os fatores independentemente associados ao sedentarismo foram: ter sobrepeso; maior diferença entre o peso atual relatado e o peso anterior à pandemia; ser do sexo feminino; menor consumo de refeições caseiras; maior frequência de consumo de bebidas alcoólicas; maior frequência de consumo de produtos de panificação, alimentos embutidos e doces durante a pandemia; e pontuação mais alta de estresse percebido. O consumo de *Comfort Food* foi de 54,0% dentre os voluntários, sendo os "doces" a categoria mais frequentemente mencionada para ambos os sexos. Ao realizar a análise longitudinal, foi possível perceber que a prática de exercício físico, aumentou, retornando à linha de base (120 min/semana) na segunda onda. A quantidade de bebida alcóolica ingerida por ocasião de consumo aumentou do T1 para o T2. Houve redução no consumo de refeições instantâneas, *fast food* e doces da primeira para a segunda onda. O consumo de leguminosas, leite e derivados, produtos de panificação e carnes foi maior no T2. Não foi possível observar diferença estatisticamente significante para as variáveis de comportamento alimentar entre a primeira e segunda onda. Já para o estresse percebido, foi possível observar os maiores escores ocorreram na segunda onda. Para o descontrole alimentar, os fatores relacionados aos maiores escores foram: hábito de beliscar, presença de *Comfort Food* e de *Craving*, peso e consumo de bebida alcoólica. Os maiores escores de comer emocional estiveram associados à presença de *Comfort Food*, ao peso e ao hábito de beliscar. Para a restrição cognitiva, os escores mais elevados se relacionaram com o peso e com o tempo de prática de exercício físico. Os fatores relacionados aos maiores escores de estresse percebido foram o peso e a qualidade de sono. Ao discutir as mudanças referentes aos hábitos alimentares durante a pandemia, deve-se levar em consideração o contexto individual somado à visão da coletividade. Entende-se que os estudos que avaliam as escolhas neste período são importantes para delinear um ponto de partida na compreensão da realidade e do que se pode esperar nos anos que se seguem após o contexto mais grave da pandemia. Entretanto, em conjunto a estes estudos e desfechos, deve-se considerar as questões que estão extrínsecas às decisões totalmente conscientes (como o comportamento alimentar) e ao contexto (ambiental, político e social).



Palavras-chave: COVID-19; quarentena; comportamento alimentar; hábitos; estilo de vida.

# ABSTRACT

In March 2020, the World Health Organization declared the new coronavirus a pandemic. Due to the rapid spread of the virus and, until the consolidation of treatment and immunization methods, social isolation and distancing were indicated as the main measure to combat COVID-19, which substantially affected people's way of living. Therefore, the objective of this work was to verify changes in the daily habits, lifestyle, eating habits and eating behavior of Brazilian adults in the context of the COVID-19 pandemic. This is an observational study with individuals aged 18 or over, carried out online using a semi-structured questionnaire prepared using the Google Forms research management application. Statistical analysis was performed using the statistical software R (RCore Team) and Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 21.0 and consisted of applying tests to compare variables between the times investigated, in addition of regression models. The first phase of the study took place from August to September 2020, during the first wave. At this point, the volunteers were instructed to respond about their habits in the period before the pandemic (T0 - data referring to the period before the pandemic) and at the time they were experiencing during the pandemic (T1). The second phase of the study (T2) took place from May to June 2021, during the second wave. The variables collected were divided into three groups of questions: socioeconomic variables; daily habits and lifestyle; eating habits, eating behavior (eating disorder, emotional eating and cognitive restriction) and perceived stress. In the first wave, 1,368 responses to the questionnaire were obtained and the participants had a median age of 31 (24 – 39) years, with 80.0% of the sample being women. In the second wave, the final sample consisted of 464 individuals, with a median age of 32 (24 - 40) years, with women accounting for 82.8% of the participants. The results revealed that in the first wave, changes were seen in daily habits, eating habits and lifestyle (when compared to the period before the pandemic). There was an increase of 3.5 hours/day in the use of screens and devices, an increase in the number of smokers who smoked more than 11 cigarettes a day and in the weekly frequency of alcohol consumption (with a reduction in the number of people who did not drink). On the other hand, there was a reduction in the amount of alcoholic beverages consumed per occasion. A reduction in daytime meals and an increase in nighttime meals was observed. The frequency of consumption (times per week) of instant meals and fast food increased, while the consumption of fruits and vegetables decreased. The practice of physical exercise was significantly reduced (from 120 to 80 min/week) and a sedentary lifestyle was present in 76.7% of the sample. The factors independently associated with a sedentary lifestyle were: being overweight; greater difference between reported current weight and pre-pandemic weight; be female; lower consumption of homemade meals; greater frequency of alcohol consumption; greater frequency of consumption of bakery products, processed foods and sweets during the pandemic; and higher perceived stress scores. Comfort Food consumption was 54.0% among volunteers, with “sweets” being the most frequently mentioned category for both sexes. When carrying out the longitudinal analysis, it was possible to notice that the practice of physical exercise increased, returning to the baseline (120 min/week) in the second wave. The amount of alcohol consumed per occasion increased from T1 to T2. There was a reduction in the consumption of instant meals, fast food and sweets from the first to the second wave. The consumption of legumes, milk and dairy products, bakery products and meat was higher in T2. It was not possible to observe a statistically significant difference for the eating behavior variables between the first and second wave. As for perceived stress, it was possible to observe that the highest scores occurred in the second wave. For lack of eating control, the factors related to the highest scores were: snacking habit, presence of Comfort Food and Craving, weight and alcohol consumption. The highest emotional eating scores were associated with the presence of Comfort Food, weight and the habit of snacking. For cognitive restriction, the highest scores were related to weight and time spent practicing physical exercise. The factors related to the highest perceived stress scores were weight and sleep quality. When discussing changes regarding eating habits during the pandemic, the individual context must be taken into account in addition to the collective vision. It is understood that studies that evaluate choices during this period are important to outline a starting point in understanding reality and what can be expected in the years that follow after the most serious context of the pandemic. However, in conjunction with these studies and outcomes, issues that are extrinsic to fully conscious decisions (such as eating behavior) and the context (environmental, political and social) must be considered.



Keywords: COVID-19; Quarantine; eating behavior; habits; Lifestyle.

**LISTA DE ILUSTRAÇÕES**

**CAPÍTULO 2**



**CAPÍTULO 3**

**LISTA DE ABREVIATURAS OU SIGLAS**

CART - *Classification and Regression Trees*

CE - Comer Emocional

DA - Descontrole Alimentar

EP – Estresse Percebido

ESPII - Emergência de Saúde Pública de Importância Internacional

ESPIN - Emergência de Saúde Pública de Importância Nacional

IPAQ - Questionário Internacional de Atividade Física

OMS - Organização Mundial da Saúde

PSS-10 - *Perceptual Stress Scale*

RC- Restrição Cognitiva

SISVAN - Sistema de Vigilância Alimentar e Nutricional

TFEQ-R21 - *Three-Factor Eating Questionnaire*

**SUMÁRIO**

# CAPÍTULO 1

## CONTEXTUALIZAÇÃO

# 1 CONTEXTUALIZAÇÃO

## 1.1 Revisão bibliográfica

### 1.1.1 Pandemia por COVID-19 e adoção de medidas de enfrentamento

Ao final de dezembro de 2019, as autoridades chinesas realizaram comunicado de alerta sobre um grupo de infecções pulmonares decorrentes de fatores etiológicos desconhecidos (BURKI, 2020). Posteriormente, as infecções foram atribuídas ao SARS-CoV-2, popularmente conhecido como o "novo coronavírus" - parte de uma família de vírus comuns em várias espécies animais, em que sua infecção culmina em quadro agudo de doença respiratória denominada COVID-19 (BURKI, 2020).

A disseminação do vírus ocorreu de maneira muito rápida e, em 30 de janeiro de 2020, a situação mundial foi estabelecida como Emergência de Saúde Pública de Importância Internacional (ESPII) (WHO, 2020a). A ESPII é, de acordo com o Regulamento Sanitário Internacional (WHO, 2005), o mais alto nível de alerta da Organização Mundial da Saúde (OMS), com grande potencial de constituir risco de saúde pública para outros países devido a disseminação internacional de doenças. Este alerta exige resposta global imediata e coordenada (WHO, 2005).

A partir da mobilização da OMS, os países iniciaram as ações para estabelecer planos de estratégia e manejo da grave situação e, no Brasil, as medidas de enfrentamento tiveram início a partir da Portaria nº 188, de 3 de fevereiro de 2020, que declarou de Emergência em Saúde Pública de Importância Nacional (ESPIN) (MINISTÉRIO DA SAÚDE, 2020). Foram propostas inúmeras medidas de segurança, dentre elas: uso obrigatório de máscaras de proteção individual; realização compulsória de exames médicos e laboratoriais; isolamento e quarentena (BRASIL, 2020b).

Para fins de melhor entendimento, a definição adotada para o termo "isolamento" foi "separação de pessoas doentes ou contaminadas, ou de bagagens, meios de transporte, mercadorias ou encomendas postais afetadas, de outros, de maneira a evitar a contaminação ou a propagação do coronavírus" (BRASIL, 2020b). Já "quarentena", ficou definida como:

> restrição de atividades ou separação de pessoas suspeitas de contaminação das pessoas que não estejam doentes, ou de bagagens, contêineres, animais, meios de transporte

> ou mercadorias suspeitos de contaminação, de maneira a evitar a possível contaminação ou a propagação do coronavírus. (BRASIL, 2020b)

"*Lockdown*" foi o termo utilizado para representar o bloqueio total (medida mais severa e generalizada) quando as medidas de isolamento social e de quarentena não se mostravam suficientes – passível de multa em caso de descumprimento (MELLAN *et al*., 2020).

O primeiro caso de COVID-19 no Brasil foi confirmado em 26 de fevereiro de 2020, na cidade de São Paulo (OPAS/OMS, 2020) e, em março de 2020, a OMS declarou pandemia (OPAS/OMS, 2022). Desde então, foi possível observar impactos importantes nos aspectos sociais, econômicos, políticos e culturais em todo o mundo (GERN; MÖSLE, 2020; XIONG *et al.*, 2020).

Em meados de novembro de 2023, o número de casos confirmados de COVID-19 já ultrapassava 770 milhões e mais de 6,9 milhões de mortes haviam sido registradas – sendo mais de 705 mil apenas no Brasil (WHO, 2023a). O início das campanhas de vacinação foi discrepante quanto às metas de cobertura vacinal (Ministério da Saúde, 2021) e, até a consolidação de métodos de tratamento e imunização, indicou-se a manutenção das medidas de segurança para o enfrentamento (CNS, 2022). Nesse sentido, o distanciamento físico e social foi altamente recomendado pelas autoridades, por se caracterizarem como os meios mais eficazes para minimizar a disseminação do novo coronavírus (AQUINO *et al.*, 2020; CHU *et al.*, 2020). Entretanto, estudos realizados em diversos países (ARORA; GREY, 2020; BRACALE; VACCARO, 2020; DI RENZO *et al.*, 2020; INGRAM; MACIEJEWSKI; HAND, 2020; KHANDEWAL, 2020; PELLEGRINI *et al.*, 2020; RUIZ-ROSO *et al.*, 2020; SIDOR; RZYMSKI, 2020) já permitiram observar que a implementação dessas medidas se mostrou capaz de impactar inúmeros aspectos biopsicossociais dos indivíduos (CARVALHO *et al.*, 2020).

Todas as incertezas frente a situação vivenciada, as constantes modificações na forma de enfrentamento da pandemia e a adoção das medidas de segurança, contribuíram para as mudanças repentinas nos hábitos e estilo de vida, nas escolhas alimentares e na forma de realização de atividades rotineiras (AMMAR *et al.*, 2020; BARKLEY *et al.*, 2020; BOURDAS; ZACHARAKIS, 2020; BRACALE; VACCARO, 2020; DI RENZO *et al.*, 2020; GALLÈ *et al.*, 2020; HADDAD *et al.*, 2020; SIDOR; RZYMSKI, 2020). Nesta seção, serão abordados os achados referentes às variáveis que fizeram parte do questionário utilizado para a coleta dos dados centrais do presente trabalho (ANEXO A), sendo elas: uso de telas; consumo de bebida alcoólica; tabagismo; prática de exercício físico; hábitos alimentares; comportamento alimentar e estresse percebido durante a pandemia de COVID-19 no contexto mundial.

### 1.1.2 Uso de telas durante a pandemia por COVID-19

O aumento no uso de telas e dispositivos já era algo a se esperar diante das medidas adotadas para o enfrentamento da pandemia de COVID-19, visto que, para muitos, estas implicaram na realização do trabalho/estudo de forma remota e na necessidade de se manter restrito ao lar (PANDYA; LODHA, 2021). Não obstante, os meios tecnológicos se tornaram a principal via de trocas e convívio social, além de propiciar o acesso a jogos e outras formas de distração, em um momento considerado incerto e amedrontador (SULTANA *et al.*, 2020). Tal aumento foi observado em diversas populações em estudos realizados no decorrer do primeiro semestre de 2020, como no Canadá, em que houve aumento de 64,7% no tempo livre que era dedicado ao uso celulares, televisão ou qualquer outro dispositivo eletrônico (WOODRUFF; COYNE; ST-PIERRE, 2021). No Irã, 43,9% de uma amostra de 20.697 adolescentes descreveu que durante o período de *lockdown*, as atividades favoritas envolviam jogos em celulares e computadores, além de assistir televisão (RANJBAR *et al.*, 2021).

Em estudo realizado durante a pandemia com 1.897 brasileiros adultos, 68,2% da amostra reportou estar assistindo mais televisão, enquanto 88,1% relatou estar utilizando celulares por mais tempo e 73,4% informaram ficar mais tempo em frente ao computador (TEBAR *et al.*, 2021). A ConVid – Pesquisa de Comportamentos, que abrangeu aproximadamente 40mil indivíduos brasileiros, relatou aumento de quase 3h no uso de telas e dispositivos no período da pandemia (SILVA *et al*., 2021).

As preocupações acerca do uso excessivo de telas e dispositivos durante a pandemia estão atreladas a inúmeros fatores relacionados à saúde, como a associação com piores escolhas alimentares (DELFINO *et al.*, 2018; HUO *et al.*, 2022; NEDJAR-GUERRE *et al.*, 2023; ROCHA *et al.*, 2021), com doenças oftalmológicas (NAJAFZADEH *et al.*, 2023; SULTANA *et al.*, 2020) e até mesmo com sintomas depressivos, já observados em estudo longitudinal, realizado em quatro momentos distintos (set/2019, jul/2020, dez/2020 e mar/2021) (ADACHI *et al.*, 2021). Nesse sentido, metanálise publicada por Li *et. al* (2022) com 18 estudos de coorte e 241.398 participantes, avaliou a associação entre tempo de tela e risco de depressão. Os achados demonstraram que o tempo de utilização de telas superior a 1h/dia foi considerado fator relacionado ao maior risco de depressão e, ao comparar homens e mulheres, o público mais afetado era o do sexo feminino (LI *et al.*, 2022).

Nesse contexto, estudo realizado apenas com mulheres observou a associação entre o tempo gasto no Instagram® com sintomas depressivos, autoestima e desordens alimentares e, além disso, identificou que a relação entre esses fatores é totalmente mediada pela tendência

de comparação social (STEFANA *et al.*, 2022). Esse achado é similar a outros estudos que também problematizam a exposição excessiva a determinados padrões que, quando inalcançados, provocam maior desconforto e angústia, associados ao sentimento de não pertencimento (FAGUNDES; MAROT; NATIVIDADE, 2020; SANTOS; PEREIRA, 2022). No contexto pandêmico, o uso adicto de telas e dispositivos (em especial, redes sociais) foi fator preditivo para sintomas relacionados à depressão e ansiedade social (MEIRELES; FERREIRA COUTO; BAPTISTA, 2022).

### 1.1.3 Consumo de bebida alcoólica e tabagismo durante a pandemia por COVID-19

Especula-se que o consumo de bebida alcoólica e o hábito de fumar, no cenário da pandemia, estiveram associados à tentativa de combater o estresse e auxiliar no enfrentamento de possíveis emoções negativas resultantes do distanciamento físico e social (ARORA; GREY, 2020), por promoverem sensações - mesmo que momentâneas - de bem estar e alívio (FIDLER; WEST, 2009; LAWLESS *et al.*, 2015). Além disso, maiores níveis de estresse percebido estiveram associados ao aumento do consumo de bebida alcoólica, enquanto a resiliência foi fator moderador, contribuindo para minimizar os comportamentos alterados de ingestão (TUDEHOPE *et al.*, 2022). O aumento do consumo de bebida alcoólica durante os primeiros meses da pandemia foi observado no Reino Unido (INGRAM; MACIEJEWSKI; HAND, 2020), nos Estados Unidos (SUFFOLETTO; RAM; CHUNG, 2020) e no Brasil, por estudo realizado com 45.161 indivíduos que reportou aumento de 17,6% no consumo de bebida alcoólica durante o período de isolamento, sem diferença entre os sexos (MALTA *et al*., 2020).

As modificações no consumo de bebidas alcoólicas não ocorreram somente no âmbito das quantidades ingeridas, mas também em relação ao tipo de bebida. Estudo ecológico realizado nos primeiros nove meses da pandemia, em dez estados dos Estados Unidos, demonstrou que houve aumento no consumo de bebidas destiladas, quando comparado com o consumo de cerveja e vinho (PYTELL *et al.*, 2022). O aumento na ingestão de bebidas de maior teor alcoólico é um alerta, visto que tal modificação pode gerar maior dependência e agravar a carga de doença de uma população (PYTELL *et al.*, 2022).

É pertinente ressaltar que o consumo excessivo de álcool já é explorado como parte de um conjunto de hábitos - como sedentarismo e piores escolhas alimentares - que predispõem a pior qualidade de vida (OKORO *et al.*, 2004). Além disso, a associação entre consumo de álcool e saúde mental também foi investigada durante a pandemia de COVID-19 e foi possível

observar que as pessoas que mantiveram os hábitos moderados de consumo, sem alterações bruscas, tiveram menor risco de desenvolver transtornos relacionados à saúde mental (YUE *et al.*, 2023). Em contrapartida, o consumo excessivo de álcool esteve associado a maiores chances de transtornos de saúde mental, destacando a necessidade de intervenção direcionada aos indivíduos que vivenciaram esta exposição no período das medidas de restrições (YUE *et al.*, 2023).

Para o tabagismo, a tendência do aumento foi semelhante (ĐOGAŠ *et al.*, 2020; YAN *et al.*, 2020). Em inquérito virtual realizado com 45.160 indivíduos brasileiros foi observada prevalência de fumantes de 12,0% e, destes, 34,0% relataram aumento do consumo de cigarros (MALTA *et al.*, 2021). Neste mesmo estudo, foi verificado que o aumento do hábito de fumar esteve associado com sintomas de ansiedade, depressão, tristeza, angústia pelo sentimento de estar isolado de familiares e também pela piora da qualidade do sono (MALTA *et al.*, 2021). Estudo realizado nos Estados Unidos também observou aumento no consumo diário de cigarros, em especial nos grupos de tabagistas que já consumiam quantidade acima de 11 cigarros ao dia, mesmo antes da pandemia do novo coronavírus (CHEN *et al.*, 2021). Ainda, revisão sistemática recente também apontou que as medidas de restrição impactaram no aumento do uso de *vapes* (cigarros eletrônicos) durante a pandemia (BAKALOUDI *et al.*, 2023). A preocupação com a piora deste hábito se dá tanto pelo maior risco para a progressão da COVID-19 em fumantes, quanto pelo maior risco de disseminação da doença e é necessário que intervenções sejam implementadas para conscientização e cessação do tabagismo (ARAÚJO, 2020; SEYEDALINAGHI *et al.*, 2023).

### 1.1.4 Prática de exercício físico durante a pandemia por COVID-19

Durante a pandemia, muito se falou sobre a adoção de hábitos que pudessem contribuir para a manutenção da qualidade de vida durante as medidas de distanciamento físico e muitas pesquisas tem explorado os possíveis efeitos protetores da prática de exercício físico nesse contexto (JANDA; MIHALČIN; ŠŤASTNÁ, 2021; LADDU *et al.*, 2020; PECORA *et al.*, 2020). As autoridades reforçaram a recomendação de praticar pelo menos 150-300 minutos de exercício físico moderado por semana (WHO, 2020b) e sugeriram que isso poderia contribuir para a otimização da resposta imunológica, recuperação da função física e melhora da síndrome pós-COVID (CHEN *et al.*, 2020; SIMPSON; KATSANIS, 2020; YANG *et al.*, 2022, 2020).

Há também evidências de que a prática de exercícios físicos contribui para a melhor resposta vacinal contra o SarS-Cov-2 (GUALANO *et al.*, 2022).

Em contraponto, o que pode ser verificado nos estudos observacionais realizados durante os períodos de distanciamento é que o sedentarismo se consolidou de forma preocupante durante a pandemia de COVID-19 (WILKE *et al.*, 2020), ou pelo menos na sua fase inicial. Estudo realizado no Brasil demonstrou que em uma amostra de 1.613 adultos, 79,4% relatou ter reduzido ou interrompido a prática de exercício físico na primeira onda da pandemia (MARTINEZ *et al.*, 2020). A mudança negativa em relação à prática de exercício físico também foi relatada por australianos (STANTON *et al.*, 2020); espanhóis (SÁNCHEZ-SÁNCHEZ *et al.*, 2020); chineses (WANG *et al.*, 2020); adultos do oeste asiático, norte da África, continente Europeu e outros países (AMMAR *et al.*, 2020).

É necessário ressaltar que o acesso ao exercício físico – especialmente no início da pandemia – não era favorável (INGRAM; MACIEJEWSKI; HAND, 2020), visto que as medidas de segurança adotadas interromperam o funcionamento de academias, centros de treinamento, parques e centros recreativos e, sem dúvidas, a falta equipamentos e orientações profissionais são fatores desestimuladores e impeditivos à prática de atividades (GÓRNICKA *et al.*, 2020).

Outro ponto a ser observado é que na primeira fase da pandemia, quando comparadas aos homens, as mulheres tiveram mais probabilidade de serem sedentárias (NIENHUIS; LESSER, 2020) e de relatarem mais fatores dificultadores para a prática de exercício físico (NIENHUIS; LESSER, 2020). O estudo ELSA-Brasil constatou que no período da pandemia, as mulheres no contexto de teletrabalho realizaram em média 4h/semana a mais de trabalhos domésticos quando comparadas com os homens nas mesmas circunstâncias (ELSA-BRASIL, 2021). Mesmo em estudos realizados antes da pandemia, já se discutia a tendência de mulheres serem fisicamente menos ativas que os homens e relatarem maior número de barreiras para a prática de exercícios – como a falta de prazer e restrições de tempo, por exemplo (GUTHOLD *et al.*, 2018; HICKEY; MASON, 2017; MORENO; JOHNSTON, 2014). As medidas de prevenção de contágio da COVID-19, como o isolamento social, trabalhar de forma remota e o fechamento de escolas e creches aumentaram as responsabilidades com tarefas domésticas e de cuidado infantil, as quais são potencialmente assumidas por mulheres (ABREU DE OLIVEIRA; MARQUES DE QUEIROZ; DINIZ, 2020; MENDES, 2020; MONTICELLI, 2021). Como consequência, o aumento das responsabilidades durante a pandemia pode ter impactado nos comportamentos de promoção da saúde representando mais barreiras para a realização de exercício físico entre as mulheres.

A maioria dos estudos avaliou apenas a fase inicial da pandemia (primeiro semestre de 2020), mas alguns poucos estudos trouxeram uma perspectiva longitudinal acerca do comportamento dos indivíduos após a mitigação das medidas de restrição. Nesse contexto, pesquisa com população tailandesa revelou que, dentre indivíduos que haviam reduzido os níveis de exercício físico no início da pandemia (2020), 37,4% já haviam retomado alguns hábitos na fase mais tardia (2021) (KATEWONGSA *et al.*, 2023). Já no Reino Unido, estudo que acompanhou 1.947 adultos no período de 23 de abril de 2020 a 30 de janeiro de 2021, reportou que a redução na prática de exercício físico que ocorreu durante a primeira fase das medidas rigorosas de isolamento e se manteve até o final do estudo, no início de 2021 (HAILEY *et al.*, 2022).

### 1.1.5 Hábitos alimentares durante a pandemia por COVID-19

Mudanças nos hábitos alimentares ao redor do mundo têm sido observadas em pesquisas desenvolvidas desde o início da pandemia e os motivos especulados para essas alterações envolvem inúmeros fatores, como: a tentativa de enfrentamento do medo e do tédio; busca por conforto; mitigação da ansiedade; aumento das taxas de desemprego e insegurança alimentar, dentro outros (NEIRA *et al.*, 2021; RODRIGUEZ-LEYVA; PIERCE, 2021). Tais mudanças refletiram a possibilidade de aumento de risco para inúmeras condições, como: menores níveis de qualidade de vida (GARCÍA-DE-MIGUEL *et al.*, 2022); ganho de peso associado ao agravo de doenças crônicas (KHAN; SMITH, 2020; NOUR; ALTINTAŞ, 2023); sintomas de ansiedade e depressão (OLIVEIRA, 2021).

De maneira geral, os estudos apresentaram tendência global na redução do consumo de alimentos *in natura*, enquanto o consumo de alimentos ultraprocessados aumentou significativamente (BARREA *et al.*, 2020; EFTIMOV *et al.*, 2020; RODRÍGUEZ-PÉREZ *et al.*, 2020). É fato que situações atípicas vivenciadas pelas populações podem, por elas mesmas, promover modificações nos hábitos alimentares dos indivíduos, conforme discutido em uma revisão escrita por Hunter, Gerritsen e Egli (2023) que reuniu mais de 50 estudos publicados no intervalo de 2000-2020. Nessa revisão, evidenciou-se que situações crises (de nível coletivo ou individual), desastres e pandemias podem deflagrar modificações importantes na alimentação devido a inúmeros fatores, como rupturas em sistemas alimentares, modificações bruscas de rotina, insegurança alimentar e acesso aos alimentos (HUNTER; GERRITSEN; EGLI, 2023). No Brasil, pesquisa realizada pela Rede Brasileira de Pesquisa em Soberania e

Segurança Alimentar e Nutricional durante o período da pandemia, relatou que em 2022, apenas 4 em cada 10 domicílios brasileiros estavam em situação de segurança alimentar, enquanto os demais algum nível de insegurança. Por isso, ainda que investigar objetivamente a ocorrência de mudanças em hábitos alimentares seja necessário para a compreensão desse fenômeno, é essencial também observar essas alterações de forma aprofundada, subjetiva e sob a perspectiva da coletividade, pois, em diversas situações, os motivos por trás das "escolhas alimentares" podem ser exatamente a falta de opção (SIPIONI *et al.*, 2020).

### 1.1.6 Práticas alimentares, comportamento alimentar e estresse percebido durante a pandemia por COVID-19

Nas últimas décadas, o interesse pelos fatores que originam as escolhas e hábitos alimentares aumentou de forma significativa e este interesse pode ter sido motivado pela também crescente discussão acerca da alimentação saudável como pilar essencial à saúde (SILVA; PAIS-RIBEIRO; CARDOSO, 2008). Ainda, este crescente debate também pode ter sido alavancado pela ineficácia das intervenções para prevenção e tratamento das doenças que, por sua vez, perpassam por fatores alimentares e nutricionais – como a obesidade, por exemplo (RODRIGUES; RODRIGUES, 2023).

Para além do ato – simples – de comer e de seus mecanismos fisiológicos, é importante entender sobre os inúmeros fatores que interferem no que se come e de que forma se come – nas motivações e nas decisões conscientes e inconscientes acerca da alimentação (SILVA; PAIS-RIBEIRO; CARDOSO, 2008). Desta forma, um dos caminhos possíveis é pautar a reflexão com base nos aspectos individuais (psicológicos, motivacionais), bem como coletivos (sociais e culturais) (CROSSLEY; KHAN, 2001). Neste âmbito, destaca-se o comportamento alimentar, definido por Garcia (1997) como sendo o conjunto de fatores envolvidos nas condutas alimentares, incluindo as questões sociais, culturais, afetivas e psicológicas dos indivíduos (GARCIA, 1997).

Para além das mudanças relacionadas aos hábitos e escolhas alimentares, a pandemia de COVID-19 pode também ter impactado no comportamento alimentar (DE ARO; PEREIRA; BERNARDO, 2021). Para investigação do comportamento alimentar destaca-se a ferramenta *"Three-Factor Eating Questionnaire"* (TFEQ-R21). Sua versão brasileira foi validada por Natacci e Júnior (2011) e avalia o comportamento alimentar com base em três fatores, incluindo: descontrole alimentar (perda do autocontrole e consumo exagerado de

alimentos, com ou sem a presença de fome ou necessidade orgânica); comer emocional (quando o humor e as emoções podem influenciam na escolha dos alimentos); e restrição cognitiva (imposições de obrigações e proibições alimentares realizadas pelo próprio indivíduo, com intenção de reduzir a ingestão energética – para manter ou perder peso) (NATACCI; FERREIRA JÚNIOR, 2011).

Diante disso, estudos realizados no contexto atípico e atual imposto pelas medidas de enfrentamento ao novo coronavírus, demonstraram que as mudanças no comportamento alimentar estiveram associadas a: maior angústia decorrente da insegurança alimentar durante a pandemia (KEENAN *et al.*, 2021); trabalhar na linha de frente da COVID-19 (LIBOREDO *et al.*, 2021); mudanças na forma de trabalhar/estudar (LIBOREDO *et al.*, 2021), além de variáveis associadas ao estilo de vida e situação socioeconômica, dentre inúmeros outros fatores como alteração no ambiente alimentar doméstico, mudança do padrão dos lanches e refeições e da reestruturação da rotina familiar (KEENAN *et al.*, 2021; LIBOREDO *et al.*, 2021; TROFHOLZ *et al.*, 2020). Agentes estressores também já se mostraram possíveis interferentes às variáveis de comportamento alimentar, como no estudo de Liboredo *et al*. (2021), em que o estresse percebido esteve independentemente associado aos maiores escores do comer emocional (OR=1.080; 1.052-1.108) (LIBOREDO *et al.*, 2021).

O estresse percebido – percepção acerca de eventos adversos vivenciados em um determinado período de tempo – é medido por meio de uma escala que permite investigar o grau no qual os indivíduos percebem as situações como estressantes (DI BERNARDI LUFT *et al.*, 2007) e no contexto da pandemia tem sido utilizado para auxiliar no entendimento mais aprofundado dos impactos psicossociais que tem sido experienciados (GAMONAL-LIMCAOCO *et al.*, 2021). Estudos realizados durante as restrições impostas pela COVID-19 encontraram maiores escores de estresse percebido em mulheres (ADAMSON *et al.*, 2020; GAMONAL-LIMCAOCO *et al.*, 2021), em indivíduos mais jovens e pessoas que precisaram alterar a sua forma de trabalho durante o isolamento (LIBOREDO *et al.*, 2021).

## 1.2 Justificativa

Diante das inúmeras reconfigurações sociais provenientes das medidas de distanciamento/isolamento social impostas pela pandemia de COVID-19 e da certeza de que situações de crise naturalmente modificam hábitos e o contexto de vida dos indivíduos (BITTENCOURT, 2020; HUNTER; GERRITSEN; EGLI, 2023), o estudo acerca das

mudanças ocorridas durante este período e suas implicações é essencial. No Brasil, estudos que avaliam essas mudanças ainda são incipientes, mas já demonstram alterações nos hábitos alimentares de adolescentes (RUIZ-ROSO et al., 2020), piora na qualidade de vida de adultos (MALTA et al., 2020), bem como nos padrões alimentares em regiões subdesenvolvidas do país (STEELE et al., 2020). Com isso, torna-se necessário realizar novos estudos sobre o estilo de vida, hábitos e comportamento alimentar no período da pandemia no Brasil, para entender os impactos na qualidade de vida dos indivíduos e subsidiar a implementação de novas intervenções e estratégias de saúde.

## 1.2 Objetivos

Os objetivos estabelecidos para o presente trabalho estão descritos a seguir e foram respondidos em forma de artigo nos capítulos que se seguem. A tese completa responde ao objetivo geral. Os artigos contidos no Capítulo 2, respondem, respectivamente aos objetivos específicos I, II e III. O Capítulo 3 é direcionado aos objetivos específicos IV e V. O Capítulo 4 foi elaborado como resposta ao objetivo específico de número VI.

### 1.2.1 Objetivo geral

Verificar modificações nos hábitos diários, estilo de vida, hábitos alimentares e comportamento alimentar de adultos brasileiros no contexto da pandemia de COVID-19.

### 1.2.2 Objetivos específicos

I. Avaliar mudanças nos hábitos diários, hábitos alimentares e estilo de vida de adultos brasileiros na primeira fase da pandemia de COVID-19;
II. Descrever a prevalência do sedentarismo e fatores associados a esse comportamento durante a pandemia de COVID-19 em indivíduos brasileiros;
III. Identificar o consumo de *Comfort Food* e seus fatores associados durante a pandemia de COVID-19 em indivíduos brasileiros;
IV. Verificar mudanças nos hábitos diários, estilo de vida e hábitos alimentares de adultos brasileiros antes e em dois momentos durante a pandemia de COVID-19;
V. Verificar modificações e fatores associados ao comportamento alimentar e estresse percebido de adultos brasileiros em dois momentos durante a pandemia de COVID-19;
VI. Propor reflexão acerca das motivações por trás das mudanças de hábitos alimentares em situações de crise como a da pandemia por COVID-19 no Brasil.

## 1.3 Métodos

### 1.3.1 Delineamento do estudo, instrumento e procedimentos para a coleta dos dados

O presente trabalho reporta os dados referentes ao estudo observacional do tipo longitudinal prospectivo que investigou hábitos diários, estilo de vida, hábitos alimentares, comportamento alimentar e estresse percebido de brasileiros durante a pandemia de COVID-19. A pesquisa *online* foi realizada por meio da aplicação de questionário semiestruturado elaborado no aplicativo de gerenciamento de pesquisas *Google Forms*® (ANEXO A). O conteúdo do questionário teve como base pesquisas prévias realizadas no período da pandemia (DI RENZO *et al.*, 2020; SCARMOZZINO; VISIOLI, 2020; SIDOR; RZYMSKI, 2020). A técnica de amostragem utilizada foi a amostra de conveniência e o link do questionário foi divulgado por meio de e-mails, reportagens, sites das universidades e mídias sociais (Facebook, Instagram, LinkedIn e WhatsApp). Os voluntários acessavam o questionário pelo telefone celular, computador ou qualquer outro dispositivo com conexão à Internet. O tempo despendido para o preenchimento completo do questionário era de aproximadamente 15 minutos e, caso desejassem, os voluntários poderiam abandonar a pesquisa em qualquer fase da participação.

Os critérios de inclusão abrangiam residentes de qualquer região do Brasil, maiores de 18 anos, que assinaram o termo de consentimento. Mulheres grávidas, pessoas que não atingiam a maioridade e aquelas que abandonaram o preenchimento antes de completar o questionário, foram excluídas do estudo. O projeto foi aprovado pelo Comitê de Ética e Pesquisa da Universidade Federal de Viçosa (protocolo de número 35516720.5.0000.5153) (ANEXO B) e todas as etapas propostas cumpriram as diretrizes fornecidas pela Declaração de Helsinque.

A primeira fase do estudo ocorreu nos meses de agosto a setembro de 2020 - aproximadamente 5 meses após a implementação da quarentena. Neste momento, os voluntários foram orientados a responder sobre os hábitos no período anterior à pandemia (T0 - dados retrospectivos) e no momento que estavam vivenciando durante a pandemia (T1). No Brasil, as medidas implementadas durante esse período incluíram a suspensão de atividades não essenciais (fechamento de restaurantes, bares, shoppings e ginásios) e suspensão de aulas presenciais em escolas e universidades, com implementação de ensino remoto emergencial (BRASIL, 2020a, 2020b). Para este estudo, definiu-se o período pré-pandêmico como sendo de

janeiro a março de 2020. A segunda fase do estudo (T2) ocorreu de maio a junho de 2021 - aproximadamente dez meses após a primeira fase da pesquisa.

### 1.3.2 Variáveis coletadas

As variáveis coletadas foram divididas basicamente em três grupos de perguntas. O primeiro grupo consistia em, em que os voluntários eram questionados sobre: gênero (feminino, masculino e outros); idade (em anos); escolaridade (ensino fundamental completo; ensino médio incompleto; ensino médio completo; graduação incompleta; graduação completa; pós-graduação incompleta; pós-graduação completa); renda mensal (R$); distanciamento físico/social (total; parcial; nenhum); situação ocupacional (desempregado(a); aposentado(a); trabalhando/estudando de forma totalmente remota; trabalhando/estudando de forma parcialmente remota; trabalhando/estudando não remotamente; outros) e sobre o local de residência (cidade/estado).

O segundo grupo abrangia questões referentes aos hábitos diários e estilo de vida, em que os participantes foram questionados sobre tempo de sono (horas), hábito de fumar, consumo de álcool (dose por ocasião e frequência semanal), tempo de tela (horas/dia) - smartphones, computador, tablet, TV).

Por fim, foram abordados os hábitos alimentares, comportamento alimentar e estresse percebido. Os hábitos alimentares avaliados incluíram: número de refeições realizadas antes e durante a pandemia; quantidade de alimentos consumidos, hábito de beliscar entre as refeições, uso de *delivery* e hábitos de cozinhar em casa. Além disso, foi aplicado o Questionário de Frequência Alimentar - adaptado do questionário proposto pelo Sistema de Vigilância Alimentar e Nutricional (SISVAN) (SISVAN, 2015). Para avaliação do comportamento alimentar, foi utilizada a versão traduzida e validada do TFEQ-R21 (NATACCI; FERREIRA JÚNIOR, 2011). O estresse percebido foi avaliado por uma versão de 10 itens da *Perceptual Stress Scale* (PSS) validada para a população brasileira (REIS; HINO; RODRIGUEZ AÑEZ, 2010).

Nos próximos capítulos, as variáveis serão descritas de maneira detalhada, bem como a escolha dos métodos estatísticos para atender a cada objetivo proposto.

# CAPÍTULO 2

## ESTUDOS PROVENIENTES DA ANÁLISE TRANSVERSAL DOS DADOS

## APRESENTAÇÃO

O presente capítulo reúne todos os trabalhos (em ordem de publicação) referentes à primeira fase desta pesquisa, que aconteceu no período de agosto e setembro de 2020. Nesta fase, mais de 1.300 indivíduos responderam ao questionário *on-line* e os resultados encontram-se compilados na Figura 1.


**Figura 1 – Principais resultados da primeira fase da pesquisa "Hábitos e comportamento alimentar durante a pandemia de COVID-19 no Brasil"**

**Fonte: autoria própria.**

## TÍTULO:

LIFESTYLE AND EATING HABITS BEFORE AND DURING COVID-19 QUARANTINE IN BRAZIL

## AUTORES:

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# Lifestyle and eating habits before and during COVID-19 quarantine in Brazil

Tamires CM Souza[1], Lívya A Oliveira[2], Marina M Daniel[3], Lívia G Ferreira[3], Ceres M Della Lucia[2], Juliana C Liboredo[4] and Lucilene R Anastácio[1,*]

[1]Department of Food Science, Faculty of Pharmacy, Universidade Federal de Minas Gerais, Av. Pres. Antônio Carlos, 6627, Pampulha, Belo Horizonte, MG 31270-901, Brazil: [2]Department of Nutrition and Health, Universidade Federal de Viçosa, Viçosa, MG, Brazil: [3]Department of Nutrition, Universidade Federal de Lavras, Lavras, MG, Brazil: [4]Department of Food, Universidade Federal de Ouro Preto, Ouro Preto, MG, Brazil

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**Abstract**

*Objective:* To assess changes in daily habits, food choices and lifestyle of adult Brazilians before and during the COVID-19 pandemic.

*Design:* This observational study was carried out with Brazilian adults through an online questionnaire 5 months after the social distance measures implementation. The McNemar, McNemar–Bowker and Wilcoxon tests were used to investigate differences before and during the COVID pandemic period, adopting the statistical significance of $P < 0{\cdot}05$.

*Setting:* Brazil.

*Participants:* Totally, 1368 volunteers aged 18+ years.

*Results:* The volunteers reported a lower frequency of breakfast, morning and lunch snacks ($P < 0{\cdot}05$) and a higher frequency of evening snacks and other meal categories during the pandemic period ($P < 0{\cdot}05$). The results showed an increase in the consumption of bakery products, instant meals and fast food, while the consumption of vegetables and fruits decreased ($P < 0{\cdot}005$). There was a significant increase in the frequency of consumption of alcoholic beverages ($P < 0{\cdot}001$), but a reduction in the dose ($P < 0{\cdot}001$), increased frequency of smoking ($P = 0{\cdot}007$), an increase in sleep and screen time in hours and decrease in physical activity ($P < 0{\cdot}001$).

*Conclusions:* It was possible to observe an increase in screen time, hours of sleep, smoking and drinking frequency. On the other hand, there was a reduction in the dose of alcoholic beverages but also in the practice of physical activity. Eating habits also changed, reducing the performance of daytime meals and increasing the performance of nighttime meals. The frequency of consumption of instant meals and fast food has increased, while consumption of fruits and vegetables has decreased.

**Keywords**
Coronavirus
SARS-CoV-2
Food choices
Alcohol use
Smoking
Lockdown

At the end of December 2019, the Chinese authorities informed on the cluster of lung infections due to unknown aetiological factors, later identified as a consequence of transmission of the new coronavirus (SARS-CoV-2)[1]. SARS-CoV-2 is part of a family of viruses common in numerous animal species, and its infection culminates in an acute respiratory disease named COVID-19, which can be asymptomatic or take on a serious clinical condition[1].

The WHO declared a Public Health Emergency of International Importance in January 2020. According to the terms of International Health Regulations, this situation represents the highest level of alert provided by WHO. This alert prompted countries to take different security measures to minimise transmission, but despite initial efforts, in March 2020, COVID-19 was declared a pandemic by WHO[2]. At the beginning of May, more than 150 million cases had already been confirmed, and the number of deaths by COVID-19 was over 3·2 million, with Brazil being one of the countries with the most dramatic situation in the world: more than 15 million cases, exceeding 420 thousand deaths[3].

The transmission of the SARS-CoV-2 occurs mainly via respiratory droplets quickly, through close contact with

*Corresponding author: Email lucilene.rezende@gmail.com

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contaminated people, and one of the main ways found to stop the spread of the new coronavirus was to establish physical and social distancing measures, in addition to other safety measures, such as washing hands frequently, sanitise places of common use, wearing protective masks and interrupt the offer of services not classified as essential[2]. Among all, quarantine promoted physical distancing, considered the most effective way to prevent infection by SARS-CoV-2.

Studies carried out in different populations have already identified that the security measures adopted to face the new coronavirus, as the lockdown and home quarantine, promoted a lot of changes[4] and interfered in habits and lifestyle, including increased alcohol consumption and smoking frequency[5], reduced physical activity[6] and changes in dietary patterns and food purchases[7–9]. However, studies that evaluate these changes in the Brazilian population are incipient, but already show small changes in the eating habits of adolescents[10], worsening in the quality of life of adults[11] and a possible trend of worse eating patterns in underdeveloped regions of the country[12].

Thus, further research on the behaviours before and during lockdown measures adopted in Brazil is necessary, so that it is possible to carry out necessary interventions to minimise harmful effects in terms of health and quality of life in general. Therefore, the aim of this research was to assess changes in daily habits, food choices and lifestyle of adult Brazilians before and during the COVID-19 pandemic.

## Methods

### *Study design and participants*

This is an observational study conducted with the Brazilian population, in which data related to daily habits (variables related to time and form of work and time of sleep), lifestyle (screen time, smoking and drinking habits and physical activity) and eating habits were collected during the COVID-19 pandemic. The survey was conducted with Brazilian volunteers, 18 years old or older, who agreed to participate and answered an online questionnaire. Pregnant women were excluded from the sample (Fig. 1). The study was conducted according to the Declaration of Helsinki[13] and was approved by the institutional Research Ethics Committee.

### *Data collection*

The online questionnaire was created on the Google Forms® search management application and was enabled for responses during 27 d from August to September 2020 – approximately 5 months after the implementation of quarantine. In Brazil, the lockdown measures implemented during that period included (1) suspension of nonessential activities (closing of restaurants, bars, shopping malls and gyms); (2) suspension of schools and universities' activities and implementation of emergency remote education and (3) an incentive to adhere to social and physical distance measures, among other issues addressed in Federal Law No. 13 979, 6 February 2020[14]. For this study, we defined the pre-pandemic period as before January 2020. Information about the survey and the link to access the questionnaire were publicised on the university's websites and social media. The volunteers could access the questionnaire through any device that had access to the internet, and the response time was around 15 min. When accessing the link, volunteers were directed to the consent form and had the option of consenting to participate or not. Access to the form was given to those who accepted it and, after providing their contact information, the volunteers received by email a copy of the properly signed consent form.

All responses were documented anonymously and saved only when the volunteers selected the 'Submit' button. Thus, participants were able to stop their participation in the study at any stage before the submission of the answers. The complete survey was sent to the final database and downloaded as a Microsoft Excel archive.

### *Variables*

The collected variables were divided into three groups of questions. The first group consisted of personal and daily habits, such as age, gender, educational level, personal income, composition of the household, the practice of quarantine, current occupation and perception about the working time during COVID-19 pandemic. The subsequent groups of questions consisted of collecting self-reported lifestyle and eating habits variables before and during the pandemic.

Concerning lifestyle, questions about frequency and dose of alcoholic beverage consumption, smoking, physical activity and sleep time were collected. The habit of drinking alcoholic beverages was investigated using frequency data (nondrinkers: rarely, once a week, 2–3 times/week, 4–6 times/ week and every day) and ingested dose. The smoking habit was investigated through categories divided into units/d. Screen time (smartphones, computer, tablet and TV) before and during the pandemic was assessed by hours, distributed as follows: <4 h/d, 5–8 h/d, 9–12 h/d, 13–16 h/d and >16 h/d. The frequency of physical activity was assessed based on six categories: 0 min/week, <90 min/week, 91–150 min/week, 151–210 min/week, 211–270 min/week and >271 min/week. Self-reported data were used to assess bedtime and wake up, and the difference between times before and during the pandemic was calculated.

To investigate eating habits, questions related to the number of meals were carried out, and an FFQ was applied. For the frequency questionnaire, the categories were

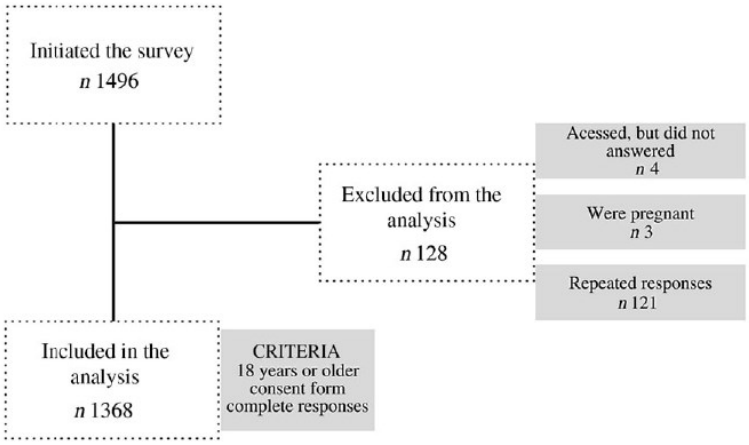


**Fig. 1** Study recruitment

(1) fresh fruits and legumes (beans, soybeans, lentils and chickpeas); (2) cereals (rice, corn and oats); (3) bakery products, meat, milk and dairy; (4) vegetables (not considering potatoes, manioc/cassava and yams); (5) instant meals and snacks (noodles, packaged snacks or crackers); (6) sweetened drinks (soda, canned or powdered juice, canned coconut water, guarana/blackcurrant syrup and sugared fruit juice); (7) candies (chocolates, pies, gum, caramel and gelatin); (8) hamburgers and canned products (ham, bologna, salami and sausage) and (9) fast food (pizza and sandwiches). For each food category, participants had the options of the frequency of consumption: never, rarely, once a week, 2 to 3 time/week, 4 to 6 time/week and once a day and more than once a day.

### *Statistical analysis*

Data were evaluated using the Statistical Package for Social Science version 22.0 (SPSS Inc.). The Kolmogorov–Smirnov test was applied, and all variables showed a non-parametric distribution. Thus, data were presented in tables and figures, with frequency values (absolute number and percentage), as well as median and interquartile range. McNemar and McNemar–Bowker tests (Bonferroni adjusted) were used to investigate the differences in categorical variables before and during the COVID-19 pandemic period. Wilcoxon test was applied for the comparisons between numerical variables. Lifestyle habits were categorised according to the quartiles that represented the worst outcome, being: frequency of alcohol consumption equal to or greater than once a week (last quartile); dose of alcoholic beverages equal to or greater than 2·5 (last quartile); screen time equal to or greater than 10·5 h (last quartile); physical activity equal to zero minutes a week (first quartile) and hours of sleep equal to or less than 7 h (first quartile). Smoking habits were analysed among those that did not smoke and the ones that did. Based on this categorization, univariate and multivariate logistic regression models were obtained by the enter method. All the covariates with $P < 0{\cdot}20$ on univariable analysis (see online supplemental data) were entered in the initial model. The fit of the models was tested by the Hosmer and Lemeshow test ($P > 0{\cdot}05$). The statistical significance was determined as $P < 0{\cdot}05$.

## Results

A total of 1496 participants answered the questionnaire, and after data validation, 1368 respondents were included in the study. The median age of participants was 31·0 (24·0–39·0) years, and the sample was composed mainly of females (80·0 %), people with a complete degree (36·2 %), living with their parents (38·3 %) and practicing quarantine totally (57·2 %) or partially (39·8 %) (Table 1). Volunteers from different Brazilian regions attended the study, but most respondents (89·6 %) reside in the south-east region.

There were significant differences between the periods before and during the COVID-19 pandemic, considering the frequency of alcohol consumption, smoking habits, screen time, physical activity and sleeping time (Table 2). These results indicated an increase in the frequency of consumption of alcoholic beverages, but a reduction in the dose, an increase in the frequency of smoking, but no significant difference in the number of cigarettes smoked per day, an increase in sleep and screen time in hours and a reduction in physical activity in terms of frequency and weekly minutes.

Table 3 contains all factors independently associated with: consumption of alcoholic beverages equivalent to once a week or more and more than 2·5 doses or more per occasion, smoking habit, screen time per day of 10·5 h or more, do not practice any time of physical activity and sleep 7 h or less per night.

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**Table 1** Participants' general characteristics (*n* 1368)

| Variable | Median (Q1 – Q3) frequencies (%) | *n* |
|---|---|---|
| Gender | | |
| Female | 80·0 | 1094 |
| Male | 19·7 | 269 |
| No answer | 0·3 | 5 |
| Age | | |
| Years | 31·0 | 24·0–39·0 |
| Education level | | |
| Complete primary education | 0·1 | 2 |
| Incomplete high school | 0·3 | 5 |
| Complete high school | 5·1 | 70 |
| Incomplete graduation | 28·4 | 389 |
| Complete graduation | 19·4 | 266 |
| Incomplete postgraduate studies | 10·4 | 141 |
| Complete postgraduate studies | 36·3 | 495 |
| Per capita income | | |
| US$ | 347·46 | 78·37–352·68 |
| Composition of people living in the same household during COVID-19 pandemic | | |
| Alone | 8·0 | 110 |
| With friends, brothers and other | 11·1 | 152 |
| With husband/wife | 17·4 | 238 |
| With husband/wife and children/with children | 25·2 | 344 |
| With parents | 38·3 | 524 |
| Social isolation during COVID-19 pandemic | | |
| Total | 57·2 | 783 |
| Partial | 39·8 | 544 |
| No | 3·0 | 41 |
| Occupational situation during COVID-19 pandemic | | |
| Unemployed | 7·3 | 100 |
| Retired | 3·3 | 45 |
| Work/study remotely full time | 40·6 | 555 |
| Work/study remotely part-time | 30·1 | 412 |
| Work/study unchanged, not remotely | 11·0 | 150 |
| Other | 7·7 | 106 |
| Perception of working time during the pandemic (including housework) | | |
| Increased | 65·9 | 902 |
| Decreased | 12·8 | 175 |
| Remained the same | 21·3 | 291 |

Consumption of meals changed significantly between the previous period and during the period of the pandemic, except dinner and afternoon snack (Fig. 2). The volunteers reported a lower frequency of breakfast, morning snack and lunch and a higher frequency of evening snack and other meals categories during the pandemic period.

Significant differences were observed between frequency of food consumption before and during COVID-19 pandemic, such as fresh fruits, legumes, bakery products, meat, vegetables, instant meals and snacks, candies, canned products and fast food (Fig. 3). The results of this study showed a significant increase in the consumption of bakery products, instant meals and fast food, while the consumption of vegetables and fruits decreased.

## Discussion

This study was dedicated to investigate the changes in daily habits, food choices and lifestyle of adult Brazilians before and during the COVID-19 pandemic. Our main results demonstrated that there was an increase in the screen time, in the hours of sleep, in the habit of smoking and in the frequency of alcoholic beverage ingestion. In addition, eating habits have also changed, and it was possible to observe a significant increase in the consumption of bakery products, instant meals and fast food, while the consumption of vegetables and fruits decreased. Also, the quartiles that represent the worst outcomes of each lifestyle habits evaluated were associated with several factors, including age, gender, per capita income, family composition, arrangement of work adopted during the pandemic period, eating habits, among other variables of lifestyle.

Physical and social distancing is one of the main security measures to combat the spread of the new coronavirus and is highly recommended by health authorities[2]. However, studies carried out with populations in other countries have shown that such measures can drastically affect life habits[5,7–9]. Our results demonstrate that only 3·0 % of our sample reported not to be fulfilling physical and social distancing at the study time. Therefore, we are confident that the data allowed us to observe the outcomes of interest. The study by Malta *et al.*[11] also carried out with the Brazilian population also reported a similar result, in which <2 % of the participants were not in quarantine. Our sample was composed mainly of women, which has become common in research investigating eating habits during the pandemic. In other studies carried out in different countries and populations, with people in different clinical conditions and ages, women have represented more than half of the volunteers[5,8,15–18].

The frequency of alcoholic beverage intake has increased significantly during the pandemic in our sample. The increase in drinking frequency can be associated with an attempt to combat stress, boredom and possible negative emotions resulting from physical and social isolation[19]. Despite the increased frequency of alcoholic beverages, the dose of consumption has significantly decreased. The decrease in the alcohol consumption/occasion differs from that of most studies that assess lifestyle and COVID-19 have consistently demonstrated[5,20,21]. Along with the ban on the operation of bars and the holding of parties in Brazil, one of the possible explanations for the occurrence of these divergences is the fact that our sample is composed mainly of women. Although alcohol consumption has been growing significantly among women in the last decade, men still have a higher prevalence of excessive alcohol consumption[22]. The consumption of 2·5 doses or more of alcoholic beverages per occasion was also associated with the male gender in the present study (OR = 1·392). Also, the motivations for drinking alcohol may differ according to gender: men are more likely to

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**Table 2** Lifestyle habits before and during the COVID-19 pandemic

| Variable | | | Before | | During | |
|---|---|---|---|---|---|---|
| Frequency of alcoholic beverage | | | *n* 1323 | | *n* 1323 | |
| Median (Q1 – Q3) | Frequency/week | 0·5 | 0·00–1·00 | 0·5 | 0·00–1·00 | |
| *P* value | | | 0·022 (Wilcoxon test) | | | |
| Frequency % (*n*) | Nondrinkers | 26·3 % | 348 | 29·8 % | 395 | |
| | Rarely | 27·6 % | 366 | 29·2 % | 386 | |
| | Once a week | 23·1 % | 305 | 16·9 % | 224 | |
| | 2–3 times/week | 20·9 % | 277 | 18·4 % | 243 | |
| | 4–6 times/week | 1·6 % | 22 | 4·9 % | 65 | |
| | Every day | 0·5 % | 5 | 0·8 % | 10 | |
| *P* value | | | <0·0001(McNemar–Bowker test: 96·38) | | | |
| Dose of alcoholic beverage | | | *n* 1354 | | *n* 1354 | |
| Median (Q1 – Q3) | Dose per occasion | 2·5 | 0·00–2·5 | 1·0 | 0·00–2·5 | |
| *P* value | | | <0·0001(Wilcoxon test) | | | |
| Frequency % (*n*) | None | 26·7 % | 362 | 30·2 % | 408 | |
| | One dose | 21·3 % | 288 | 25·9 % | 351 | |
| | 2–3 doses | 22·2 % | 395 | 26·3 % | 356 | |
| | 4–5 doses | 11·3 % | 154 | 9·3 % | 126 | |
| | ≥6 doses | 11·5 % | 155 | 8·3 % | 113 | |
| *P* value | | | <0·0001(McNemar–Bowker test: 77·551) | | | |
| Cigarette | | | *n* 1324 | | *n* 1324 | |
| Median (Q1 – Q3) | Units/d | 0·00 | 0·00–0·00 | 0·00 | 0·00–0·00 | |
| *P* value | | | 0·227(Wilcoxon test) | | | |
| Frequency % (*n*) | Nonsmokers | 94·8 % | 1255 | 95·1 % | 1259 | |
| | <10 cigarettes/d | 4·2 % | 57 | 3·1 % | 41 | |
| | 11–20 cigarettes/d | 0·8 % | 10 | 1·2 % | 16 | |
| | 21–30 cigarettes/d | 0·1 % | 1 | 0·4 % | 5 | |
| | ≥31 cigarettes/d | 0·1 % | 1 | 0·2 % | 3 | |
| *P* value | | | 0·007 (McNemar–Bowker test: 19·364) | | | |
| Screen time | | | *n* 1311 | | *n* 1311 | |
| Median (Q1 – Q3) | h/d | 6·50 | 3·00–6·50 | 10·00 | 6·50–10·50 | |
| *P* value | | | <0·0001(Wilcoxon test) | | | |
| Frequency % (*n*) | <4 h/d | 43·6 % | 572 | 13·6 % | 177 | |
| | 5–8 h/d | 37·9 % | 496 | 30·9 % | 406 | |
| | 9–12 h/d | 15·4 % | 202 | 6·5 % | 86 | |
| | 13–16 h/d | 2·5 % | 33 | 42·1 % | 551 | |
| | >16 h/d | 0·6 % | 8 | 6·9 % | 91 | |
| *P* value | | | <0·0001(McNemar–Bowker test: 804·910) | | | |
| Physical activity | | | *n* 1347 | | *n* 1347 | |
| Median (Q1 – Q3) | Min/week | 120·00 | 0·00–180·00 | 80·00 | 0·00–120·00 | |
| *P* value | | | <0·0001(Wilcoxon test) | | | |
| Frequency % (*n*) | Sedentary | 27·4 % | 369 | 38·7 % | 521 | |
| | <90 min/week | 16·4 % | 221 | 21·8 % | 294 | |
| | 91–150 min/week | 20·9 % | 282 | 16·2 % | 218 | |
| | 161–210 min/week | 14·6 % | 197 | 10·9 % | 147 | |
| | 211–270 min/week | 8·5 % | 113 | 5·7 % | 77 | |
| | >270 min/week | 12·2 % | 165 | 6·7 % | 90 | |
| *P* value | | | <0·0001(McNemar–Bowker test: 137·508) | | | |
| Sleep time | | | *n* 1352 | | *n* 1352 | |
| Median (Q1 – Q3) | Hours | 8:00 | 7:00–8:30 | 8:00 | 7:00–9:00 | |
| | Time to sleep (h) | 10:00 PM | 11:00 PM–4:00 AM | 9:30 PM | 11:00 PM–1:00 AM | |
| | Time to wake up (h) | 6:30 AM | 6:00 AM–9:00 AM | 7:30 AM | 6:50 AM–9:00 AM | |
| *P* value | | | <0·0001(Wilcoxon test) | | | |

The number of volunteers differed between variables since not all people answered questions before and after.

drink when exposed to stress, while women prefer to drink in relaxation and entertainment situations[22]. In addition to our sample being composed mainly of women, more than a quarter of the interviewees reported living at home with children. Recent research has shown that women avoid consuming excessive doses of alcoholic beverages in this family composition, while men do not change this specific habit[23]. Interestingly, our data showed that living with children was a predictive factor for the consumption of alcoholic beverages once a week or more in our sample (OR = 1·521). However, living with parents was inversely associated with consuming, per occasion, 2·5 doses of alcohol or more (OR = 0·765).

Although the number of nonsmokers in our sample exceeds 90 %, our results showed that during the pandemic, the number of nonsmokers decreased. While the number of cigarettes/d increased in the categories of eleven units or more, despite the recommendations of the health authorities, who issued a warning that smoking is associated with an increase in the severity of the disease and death in hospitalised COVID-19 patients and advised that all support should be given to encourage the

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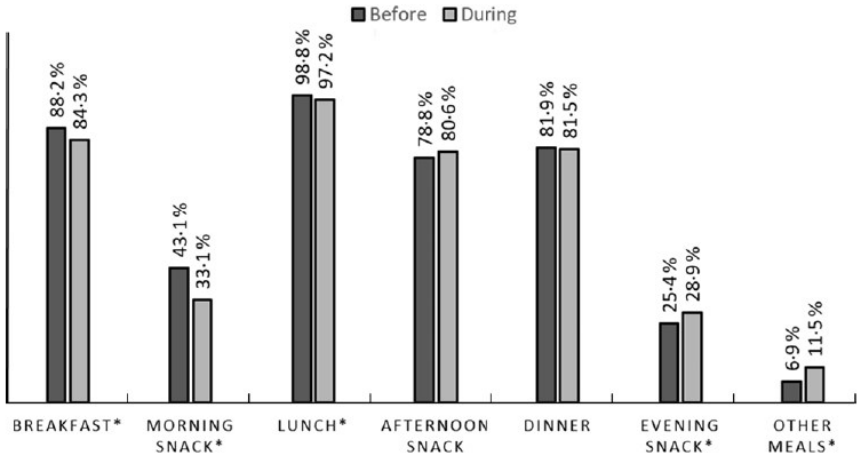


**Fig. 2** Comparisons between meals made by participants before and during the COVID-19 pandemic (*n* 1368). *McNemar test, respectively: $P < 0{\cdot}001$; $P < 0{\cdot}001$; $P = 0{\cdot}002$; $P = 0{\cdot}003$; $P < 0{\cdot}001$

interruption of this habit[24]. Researchers have already shown that one of the reported reasons for smoking in unpleasant situations is that cigarettes seem to cause a momentary feeling of relief[25,26]. Other studies also observed an increase in the number of cigarettes during the pandemic period[27,28]. However, an Italian survey observed a decrease in smoking habits[8]. We hypothesised that due to the atypical content of the present moment, individuals who may have previously dropped the addiction may have faced the need to resume the use of cigarettes during the lockdown, and this habit was associated with the consumption of 2·5 doses or more of alcoholic beverages per occasion (OR = 1·328) and inversely associated having intermediate meals like morning snack (OR = 0·256) and afternoon snack (0·520), in addition to consuming fresh fruits more often (OR = 0·933) and sweetened drinks less often (OR = 1·112). Previous data reported that people who quit addictions are more prone to relapses and fluctuations in atypical and high-pressure periods[29,30].

Another change observed was the increase in screen time, including television, computers, tablets and cell phones. More than half of our respondents reported an increase in working time during the pandemic – including housework. Most of the studied population reported being working/studying remotely full or part-time, and this reflects directly on screen time since people were led to adapt to a way of working called 'intelligent', in which the obligations are fulfilled remotely and, for the most part, online[29]. Besides working or study remotely (OR = 1·953), other factors were inversely associated with 10·5 h or more of screen time during the pandemic, like being older (OR = 0·965), working or studying without changes (OR = 0·553), increased time spent on work (including household chores) (OR = 0·552) and practicing physical exercise (OR = 0·998).

Undoubtedly, the use of devices during quarantine is an important tool for communication, as they can act as facilitators and can alleviate moments of loneliness. However, in some populations, when in excess, this behaviour negatively interfered in food choices, being associated with worse food choices, including higher consumption of ultra-processed foods[31] and high consumption of snacks, fried foods and sweets[32]. Unfortunately, the increase in screen time has been a reality in other populations during the pandemic, having already been demonstrated in Canadians[33] and Iranians[34] and were related to the increase in sedentary lifestyle.

The findings related to the reduction in the practice of physical activity in the present study was already expected, and they are in line with current research. Many studies carried out during pandemic found changes in behaviours related to physical activity, such as 12 % increased sitting time among individuals in Italy[35]; 78 % reduction in the time of physical exercise of the Iranian population[36], 79 % among Brazilians[37] and more than 60 % in an analysis carried out in fourteen countries, compared with the period before the pandemic[38]. These changes are justified by the difficulty of exercising since, among security measures, gyms, training and recreation centres and parks are closed. Additionally, the lack of necessary equipment and professional guidance are also impediments to the practice of physical activity at home[39].

Physical activity can play an important role in immune function, reducing the risk of developing and worsening chronic non-communicable diseases and obesity – risk factors for SARS-CoV-2 infection[6,40]. Considering this, WHO has launched a guide with tips on how to include physical activity in the daily routine[41]. The guide provides exercise suggestions with reference images and reinforces the recommendation that individuals practice at least 150–300

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**Table 3** Independent factors associated with the lifestyle habits during the pandemic period in Brazil by multiple logistic regression analysis

| | OR | 95 % CI | *P* value |
|---|---|---|---|
| Frequency of alcohol consumption* (≥ once a week – last quartile) | | | |
| Variables (64·0 % of prediction; Hosmer and Lemeshow test = 0·246) | | | |
| †Per capita income (R$) | 1·000 | 1·000, 1·000 | 0·001 |
| Living with children | 1·521 | 1·159, 1·996 | 0·002 |
| Educational level (post-graduate) | 1·599 | 1·245, 2·053 | <0·001 |
| Smoking during pandemic (cigarettes/d) | 1·077 | 1·035, 1·120 | <0·001 |
| Frequency of instant meals and snacks consumption | 0·949 | 0·903, 0·998 | 0·041 |
| Physical activity during pandemic (min/week) | 1·002 | 1·000, 1·003 | 0·022 |
| Working or studying without alterations | 2·004 | 1·399, 2·870 | <0·001 |
| Constant | 0·317 | | <0·001 |
| Dose of alcoholic beverage consumption* (≥ 2·5 doses per occasion – last quartile) | | | |
| Variables (62·6 % of prediction; Hosmer and Lemeshow test: 0·200) | | | |
| Gender (male) | 1·392 | 1·050, 1·846 | 0·022 |
| Living with parents | 0·765 | 0·606, 0·967 | 0·025 |
| Working or studying without alterations | 1·820 | 1·274, 2·602 | 0·001 |
| Smoking during pandemic (cigarettes/d) | 1·105 | 1·055, 1·157 | <0·001 |
| Physical activity during pandemic (min/week) | 1·003 | 1·001, 1·004 | <0·001 |
| Frequency of fresh fruits consumption | 0·953 | 0·923, 0·985 | 0·005 |
| Constant | 1·037 | | 0·834 |
| Smoking habit (yes) | | | |
| Variables (92·2 % of prediction; Hosmer and Lemeshow test: 0·347) | | | |
| Age (years) | 1·076 | 1·057, 1·096 | <0·001 |
| ‡Per capita income (R$) | 1·000 | 1·000, 1·000 | 0·006 |
| Educational level (post-graduate) | 0·563 | 0·348, 0·909 | 0·019 |
| Dose of alcoholic beverage during pandemic (dose per occasion) | 1·328 | 1·194, 1·478 | <0·001 |
| Daily breakfast during pandemic | 0·256 | 0·156, 0·418 | <0·001 |
| Daily afternoon snack during pandemic | 0·520 | 0·323, 0·837 | 0·007 |
| Frequency of fresh fruits consumption (times/week) | 0·933 | 0·875, 0·995 | 0·033 |
| Frequency of sweetened drinks consumption (times/week) | 1·112 | 1·048, 1·181 | <0·001 |
| Constant | 0·029 | | <0·001 |
| Screen time (≥ 10·5 h/d – last quartile) | | | |
| Variables (64·7 % of prediction; Hosmer and Lemeshow test: 0·264) | | | |
| Age (years) | 0·965 | 0·955, 0·976 | <0·001 |
| Remotely full/part-time work or study | 1·953 | 1·427, 2·673 | <0·001 |
| Working or studying without alterations | 0·553 | 0·345, 0·888 | 0·014 |
| Increase in time spent at work (including household chores) | 0·552 | 0·430, 0·707 | <0·001 |
| Sleep time during pandemic (h/d) | 0·859 | 0·785, 0·939 | 0·001 |
| Physical activity during pandemic (min/week) | 0·998 | 0·997, 1·000 | 0·008 |
| Daily breakfast during pandemic | 0·596 | 0·429, 0·829 | 0·002 |
| Constant | 15·294 | | <0·001 |
| Physical activity (0 min/week – first quartile) | | | |
| Variables (67·6 % of prediction; Hosmer and Lemeshow test: 0·175) | | | |
| Gender (female) | 1·615 | 1·181, 2·209 | 0·003 |
| §Per capita income (R$) | 1·000 | 1·000, 1·000 | 0·038 |
| Living with children | 1·478 | 1·128, 1·937 | 0·005 |
| Remotely full/part-time work or study | 0·610 | 0·471, 0·790 | <0·001 |
| Dose of alcoholic beverage during pandemic (dose per occasion) | 0·856 | 0·800, 0·915 | <0·001 |
| Sleep time during pandemic (h/d) | 0·881 | 0·805, 0·964 | 0·006 |
| Daily afternoon snack during pandemic | 0·632 | 0·465, 0·859 | 0·003 |
| Frequency of bakery products consumption (times/week) | 1·104 | 1·060, 1·150 | <0·001 |
| Frequency of fresh fruits consumption (times/week) | 0·858 | 0·827, 0·889 | <0·001 |
| Frequency of meat consumption (times/week) | 1·053 | 1·011, 1·096 | 0·013 |
| Frequency of sweetened drinks consumption (times/week) | 1·043 | 1·005, 1·082 | 0·027 |
| Constant | 2·527 | | 0·039 |
| Sleep time (≤7 h/d – first quartile) | | | |
| Variables (74·0 % of prediction; Hosmer and Lemeshow test: 0·278) | | | |
| Gender (male) | 1·632 | 1·195, 2·227 | 0·002 |
| Living with children | 1·433 | 1·056, 1·944 | 0·021 |
| Education level (graduation) | 1·366 | 1·043, 1·790 | 0·024 |
| Increase in time spent at work (including household chores) | 0·509 | 0·378, 0·684 | <0·001 |
| Screen time during pandemic (h/d) | 1·056 | 1·022, 1·090 | 0·001 |
| Frequency of alcoholic beverage during pandemic (times/week) | 0·900 | 0·814, 0·996 | 0·041 |
| Daily afternoon snack during pandemic | 0·591 | 0·433, 0·806 | 0·001 |
| Daily evening snack during pandemic | 1·505 | 1·143, 1·982 | 0·004 |
| Constant | 0·383 | | <0·001 |

*The frequency and dose of alcoholic beverages are highly correlated habits in the evaluated population ($r = 0.806$; $P < 0.001$), and, therefore, they were causing multicollinearity and interfering in the adjustments of their respective models. Therefore, the dose of alcoholic beverages was not included as a predictor of frequency of alcoholic beverage and vice versa.
†OR = 1.000095; IC = 1.000041, 1.000149.
‡OR = 0.999819; IC = 0.999690, 0.999949.
§OR = 0.999942; IC = 0.999886, 0.999997.

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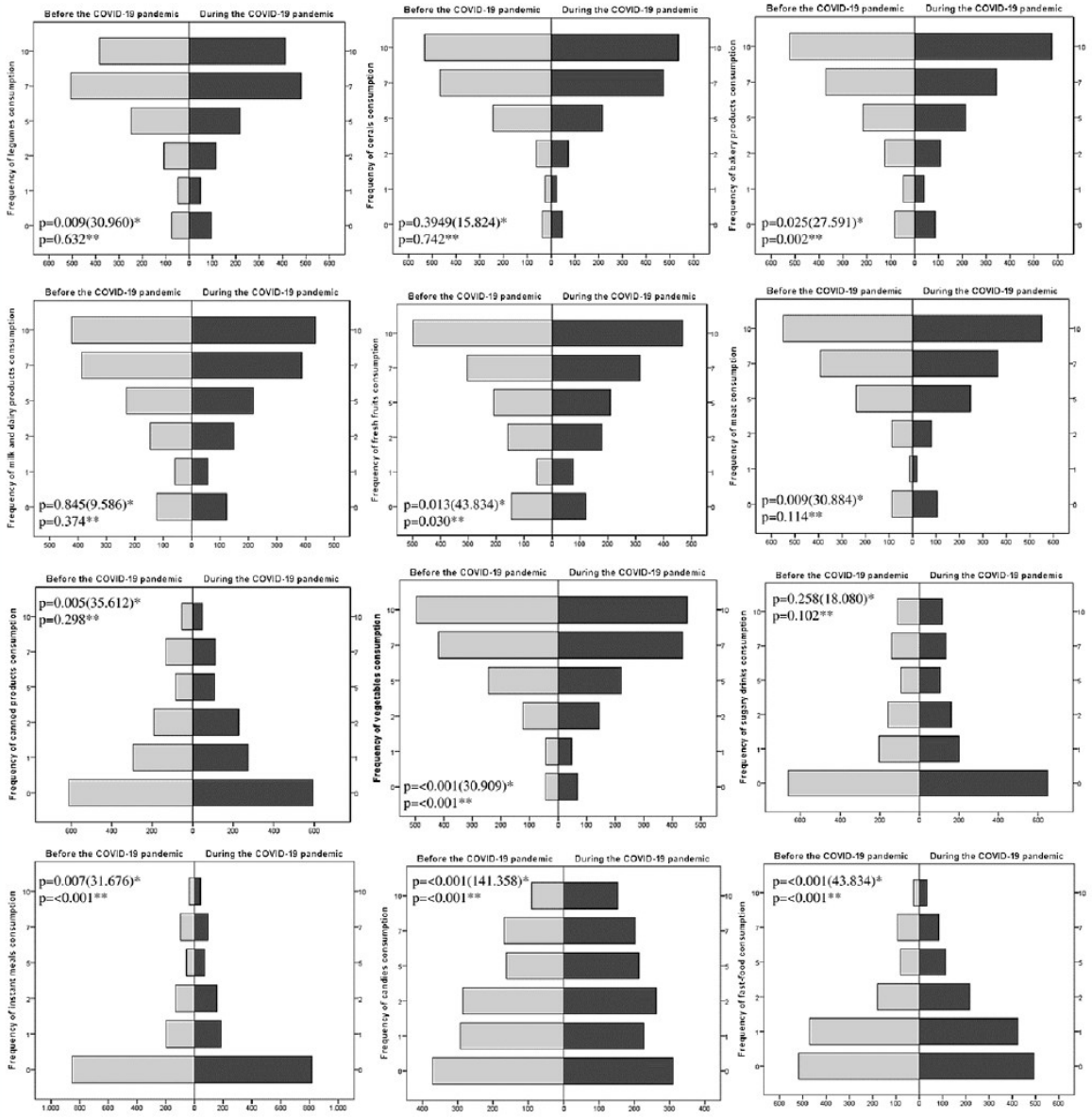


**Fig. 3** Frequency of food consumption before and during the COVID-19 pandemic (*n* 1368). *McNemar–Bowker Test. **Wilcoxon

min/week of light/moderate physical activity or 75–150 min/week of vigorous physical activity[42]. In addition to these benefits, physical activity can also interfere with eating habits[43] and, in our sample, the higher consumption of bakery products (OR = 1·104), meats (OR = 1·053), sweetened drinks (OR = 1·043) and the lower consumption of fresh fruits (OR = 0·858) were factors independently associated with not practicing physical activity.

An effort has also been made to encourage better eating habits in the quarantine period[44], and in this study, some changes in eating habits have been noticeable. It was observed that some people stopped having breakfast, morning snack and lunch, while they increased the performance of evening snacks and additional meals. Although there is no evidence regarding the adequate number of meals, there is a discussion that the distribution of energy and nutrients between 4 and 5 meals can have a positive effect on health, since the fractionation of meals brings relief from digestive and metabolic overload caused by higher energy density meals, in addition to contributing to the fulfillment of the recommendations of the food and nutrient groups[45]. In our sample, people who

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reported consuming breakfast daily were less likely to smoke (OR = 0·256), as were those who had an afternoon snack (OR = 0·520). In addition, having breakfast was also inversely associated with the last quartile of screen time (OR = 0·596), while the consumption of afternoon snacks was more usual in those volunteers who practice some minutes of physical activity (OR = 0·632) and in those who sleep more than 7 h a night (OR = 0·591; $P = 0·001$).

Besides the reported changes in the number of meals, our volunteers also showed an increase in hours of sleep during the pandemic, and men were more likely to sleep 7 h or less (OR = 1·632). Sleeping more can justify the reduction in daytime meals and an increase in night time meals; on the other hand, meals close to bedtime can cause nighttime awakenings and worsen sleep quality and routine[46]. In our sample, consuming an evening snack was a factor independently associated with the first quartile of sleep time (OR = 1·505; $P = 0·004$).

Although only 3·9 % of volunteers related to skipping breakfast during the pandemic period, meta-analysis studies have shown that skipping breakfast is associated with a significantly increased risk of heart disease and overweight and obesity[47,48]. Breakfast skippers also had significantly worse indicators of quality of life than those who ate that meal, worse quality of the diet in general and worse perceptions of general health, social functioning, emotional role and mental health[49,50]. The decrease in the consumption of morning snacks and lunch was also observed by a small percentage of the volunteers. These habits have been associated with the increase in the frequency of evening snacks that can induce worse food choices, being associated with a lower inclusion of fruits and vegetables in the diet and outcomes of higher BMI, obesogenic dietary index and a higher percentage of time eating absently[51,52].

Regarding the food choices reported by the volunteers, the results of the FFQ were very consistent in showing a worsening of the eating pattern, in which there is a decrease in consumption of fruits and vegetables and an increase in the consumption of candies and fast-food. Fruits and vegetables are rich sources of nutrients and bioactive compounds[53], while candies and fast food are usually composed of ultra-processed and energy-dense foods with a high content of sugar, saturated and trans fats and poor in most micronutrients, fibres and proteins, and it is associated with greater risks of chronic diseases with an increased risk of overweight/obesity and metabolic syndrome[54,55].

Negative changes in the food consumption profile were found in studies carried out with Brazilians[11,12] and other populations during the quarantine period[29,56,57]. These changes also include low consumption of fruits and vegetables associated with increased consumption of sweets, and high consumption of snacks rich in energies, with low nutritional value[5,9]. Such findings have branded a global concern that has highlighted the need to create strategies that contribute to individuals' health and well-being and the maintenance of healthy habits that can be harmed by security measures adopted to face the pandemic[4–8,18,19,27,39,58].

These results bring a perspective and a base on the changes in the habits of the Brazilian population and agree with much of what has been observed in other populations[59]. In the literature, in addition to the changes observed in the perspective of worsening lifestyle habits[59] – as a worsening of the eating pattern, increased consumption of alcoholic beverages, increased sedentary lifestyle – attention has grown over the consequences of the pandemic on psychological and mental health aspects[17,60–62].

Although this study is on a high number of Brazilian individuals during quarantine outbreak pandemic for COVID-19, it has some limitations that deserve a discussion. The main limitation of this study is the use of a self-reported online questionnaire, which can lead to incorrect data filling and allow the participation of only people with internet access. Also, people were asked about a time before the pandemic, and very specific life/dietary issues, and some of them could not remember, or their answers may only reflect their impressions and notions on how the pandemic is affecting them. A strength of our study is the application of the questionnaire 5 months after the start of the pandemic, period of high adhesion of restrictive measures of social isolation in Brazil, being possible to notice the changes that occurred during this period.

In conclusion, the isolation measures adopted in Brazil caused changes in the daily lives of individuals, reflecting an increase in hours worked, screen time, hours of sleep, smoking and drinking frequency. On the other hand, there was a reduction in the dose of alcoholic beverages but also in the practice of physical activity. Eating habits also changed, reducing the performance of daytime meals and increasing the performance of nighttime meals. The frequency of consumption of instant meals and fast food has increased, while consumption of fruits and vegetables has decreased. Studying the repercussions of the pandemic on all these aspects is extremely important. Future studies should deepen this theme to support creating and implementing appropriate health promotion strategies in the current public health emergency.

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L.G.F., L.A.O., L.R.A., M.M.D. and T.C.M.S. participated in the analyses, interpretation of data and writing of the article. All authors carried out the critical review and approved the final version of the paper. *Ethics of human subject participation:* This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving research study participants were approved by the Research Ethics Committee of the Federal University of Viçosa, Minas Gerais, Brazil, protocol number 35516720.5.0000.5153. Written informed consent was obtained from all subjects/patients.

## Supplementary material

For supplementary material accompanying this paper visit https://doi.org/10.1017/S136898002100255X

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## TÍTULO:

IS "STAY-AT-HOME" SYNONYMOUS OF INACTIVITY? FACTORS RELATED TO SEDENTARY LIFESTYLE IN A BRAZILIAN SAMPLE DURING COVID-19 INITIAL QUARANTINE

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# Is "stay-at-home" synonymous of inactivity? Factors related to sedentary lifestyle in a Brazilian sample during COVID-19 initial quarantine

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Tamires Cássia de Melo Souza
*Department of Food Science, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil*

Lívya Alves Oliveira
*Department of Nutrition and Health, Universidade Federal de Vicosa, Vicosa, Brazil*

Juliana Costa Liboredo
*Department of Food, Universidade Federal de Ouro Preto, Ouro Preto, Brazil*

Ceres Mattos Della Lucia
*Department of Nutrition and Health, Universidade Federal de Vicosa, Vicosa, Brazil*

Lívia Garcia Ferreira and Marina Martins Daniel
*Department of Nutrition, Universidade Federal de Lavras, Lavras, Brazil, and*

Lucilene Rezende Anastácio
*Department of Food Science, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil*

## Abstract

**Purpose** – The purpose of this study is to describe the prevalence of a sedentary lifestyle (<150 min of physical exercise/week) and associated factors of this behavior in Brazil.

**Design/methodology/approach** – An observational study was conducted through an online questionnaire in August–September 2020 (5.5 months after the beginning of the pandemic in the country). Socioeconomic, lifestyle, anthropometric, dietary and perceived stress data were evaluated as possible related factors to a sedentary lifestyle through multiple logistic regression analysis.

**Findings** – A total of 1,347 individuals were evaluated (median of 31 years old, 80.1% women), of whom 76.7% were considered sedentary. Associated factors to a sedentary lifestyle were being overweight; a greater difference between current weight and prepandemic weight; female sex; lower percentage of home-cooked meals; greater increase in the frequency of consumption of alcoholic beverages; higher frequency of consumption of cereals, sausages and sweets during the pandemic; and higher score of perceived stress.

The authors are very grateful to the volunteers who participated in this study. All authors contribute substantially throughout the process of conception and design of the study. All authors carried out the critical review and approval of the final version of the paper. The authors declare no conflicts of interest.

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**Originality/value** – To the best of the authors' knowledge, no studies have aimed to reveal the associated factors to a sedentary lifestyle during the COVID-19 pandemic in Brazil. Protective factors against a sedentary lifestyle were eating breakfast, being a student, living with parents, a higher frequency of fruit consumption, a higher rate of alcohol consumption and a higher cognitive restriction of food intake during the pandemic. Most of the study participants were sedentary, especially women. A sedentary lifestyle was associated with worse lifestyle/eating habits and stress. Such findings encourage an interdisciplinary approach because habits and lifestyle have numerous interferences.

**Keywords** Stress, Physical activity, Coronavirus, Eating habits, Lifestyle habits

**Paper type** Research paper

## Introduction

The new coronavirus pandemic declared by the World Health Organization (WHO) in March 2020 has significantly impacted social, economic, political and cultural life worldwide (Gern and Mösle, 2020; Khandelwal, 2020; Xiong *et al.*, 2020). This major public health problem occurred due to the rapid spread of the virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is responsible for triggering the acute respiratory disease called coronavirus disease 2019 (COVID-19) (Burki, 2020). By the beginning of 2023, more than 6.8 million people had died from COVID-19 (with more than 690,000, only in Brazil) (WHO, 2022), and although already active in many countries, vaccination campaigns are still discrepant (WHO, 2020a). Until treatment and immunization methods are consolidated, safety measures are recommended, such as strong hand hygiene, wearing of masks, cleaning of common environments, interruption of the supply of nonessential services and maintenance of social and physical distancing (Zanke *et al.*, 2020).

Since the adoption of these safety measures, sudden changes in lifestyle and in how individuals perform routine activities have been observed (Ammar *et al.*, 2020; di Renzo *et al.*, 2020). Studies conducted in several countries have shown a worsening of health-related aspects, such as increased consumption of alcoholic beverages and cigarettes, higher consumption of ultraprocessed foods, weight gain and higher rates of sedentary lifestyle (Barkley *et al.*, 2020; Bourdas and Zacharakis, 2020; Bracale and Vaccaro, 2020; Gallè *et al.*, 2020; Sidor and Rzymski, 2020; Souza *et al.*, 2021). While people's habits and quality of life have worsened during the pandemic, there have been an ever-growing number of studies speculating on the protective effects of physical exercise and better eating patterns in the context of COVID-19 (Janda *et al.*, 2021; Laddu *et al.*, 2020; Pecora *et al.*, 2020). Regarding the practice of physical exercise, authorities reinforce the recommendation to engage in at least 150–300 min of moderate activity (World Health Organization, 2020) and suggest that this may contribute to the optimization of the immune response against the threat of COVID-19 (Chen *et al.*, 2020; Simpson and Katsanis, 2020; Yang *et al.*, 2020).

In addition to the possible beneficial effects against the current pandemic, physical exercise is already linked to numerous benefits, such as contributions to mental health, protection against chronic diseases and improvement in overall quality of life (Warburton and Bredin, 2017). Thus, the objective of the present study is to identify the prevalence of sedentary lifestyle during the pandemic and the factors independently associated with this behavior in a sample of the Brazilian population.

## Methods

### *Study design*

This is a study conducted to obtain data from the Brazilian population on the prevalence of sedentary lifestyle and its independently associated factors during the COVID-19 pandemic

in Brazil. An online survey was applied from August 14 to September 9, 2020, approximately 5–5.5 months after the beginning of the social distancing measures in Brazil, a period in which many Brazilian cities decreed the closure of schools and commerce in general.

Individuals residing in Brazil were invited to participate in the study. For this survey, individuals aged 18 years or older were included, and only pregnant women were excluded from the final analysis. The study followed the Declaration of Helsinki and was approved by the Research Ethics Committee of the University.

*Instrument and data collection procedure*

A semistructured questionnaire was created in the Google Forms Platform®, and the link was shared through emails, university websites and social networks. The form took approximately 15 min to fill in. The first part of the survey was the consent form, and the responses of the participants were anonymous. The questionnaire was applied in a single moment, and the volunteers should answer the questions referring to the pandemic period (August and September) and the moment before the pandemic (retrospective data referring to January to March).

The physical exercise habit was recorded by a closed-ended questionnaire, in which the volunteers were asked how long they performed physical exercises during the pandemic period: did not exercise, exercised for less than 90 min, exercised from 91 to 150 min, exercised 151 to 210 min, exercised from 211 to 270 min and exercised for more than 270 min per week. From these categories, individuals were classified as sedentary if they performed less than 150 min of physical exercise/week (WHO, 2020b).

The variables were divided into six categories: socioeconomic status, lifestyle, eating habits, anthropometric data, eating behavior and perceived. The socioeconomic data included questions about state of residence; sex; age; per capita income; composition of the household; educational level; current occupation; change in working time during the pandemic, including domestic activities; way of working or studying during the pandemic period (remotely full time, remotely part-time or not remotely/not changed); and social isolation.

Regarding lifestyle, the participants were also asked about sleep time and quality, smoking habit, alcohol consumption and screen time before and during the pandemic, and the differences between the periods were calculated.

The eating habits included meals taken before and during the pandemic, as well as the difference in the number of meals, amount of food, snacking between meals, use of food delivery services and cooking at home. These habits were categorized as increases, decreases or neither compared to before the pandemic. A food frequency questionnaire (adapted from the questionnaire proposed by Food and Nutritional Surveillance System) (SISVAN, 2015) related to the period before and during the pandemic was also conducted. Anthropometric data consisted of current weight, weight before the pandemic (in kilograms) and height (in meters). The body mass index was also calculated. From these data, the weight difference was calculated and then dichotomized into weight gain, weight loss or neither.

The eating behavior and perceived stress among participants in the COVID-19 pandemic period in Brazil were also evaluated. Eating behavior was evaluated using the Brazilian version of the Three-Factor Eating Questionnaire (TFEQ-R21), translated into Portuguese and validated by Natacci and Ferreira Júnior (2011). Perceived stress was measured by the 10-item version of the Perceptual Stress Scale validated for the Brazilian population (Reis *et al.*, 2010).

*Data analysis*

Data were analyzed using the Statistical Package for Social Sciences® software (SPSS® Inc., Chicago, IL, USA) version 21.0. By the Kolmogorov–Smirnov test, none of the variables had a normal distribution ($p < 0.05$), so the data are presented as the median and interquartile range. To evaluate the factors associated with a sedentary lifestyle, univariate (Supplementary Table) and multivariate logistic regression models were obtained by the backward conditional method. The prevalence of sedentary lifestyle before and after the pandemic was analyzed with the McNemar test. The fit of the models was tested by the Hosmer–Lemeshow test ($p > 0.05$). The significance level adopted was 0.05.

## Results

A total of 1,496 responses were computed; however, 149 were excluded (121 were repeated responses; 21 subjects did not fill in their weight data; 4 subjects submitted but did not answer the questionnaire; and 3 women were pregnant). Thus, 1,347 responses were input into the logistic regression analysis. The respondents had a median age of 31 (24–39) years, and 80.1% were women. The characterization of the participants in this study is detailed in a preview publication (Souza *et al.*, 2021). Table 1 contains the general characterization of the participants according to gender for the variables that were part of the multivariate logistic regression model, and among the information presented, it is possible to notice that the number and percentage of sedentary women was 78.0% and men was 71.5% (Table 1).

Among the respondents, 76.7% were considered sedentary during the pandemic period. This value was 64.6% before the pandemic (McNemar–Bowker test = 137.508; $p < 0.001$). In the prepandemic period, the median time devoted to exercise was 120 (0–180) min/week, while during the pandemic, the median was 80 (0–120) min ($p < 0.001$).

The factors associated with a sedentary lifestyle in the univariate logistic regression can be observed in the Supplementary material. The independent variables associated with a sedentary lifestyle during the COVID-19 pandemic in Brazil by multivariate logistic regression analysis are given in Table 2.

## Discussion

The majority of respondents were sedentary during the pandemic period (76.7%) according to the minimum weekly physical activity recommended by the WHO (WHO, 2020b). Although most of these individuals were also sedentary before the pandemic (64.6%), the increase in the percentage of sedentary individuals was statistically significant. In a study also conducted in Brazil, 79.4% of the 1,613 participating adults reported a large impact of COVID-19 containment measures on their daily physical activities (Martinez *et al.*, 2020). In a study carried out with a Brazilian sample of hypertensive elderly people, it was already possible to conclude that the initial phase of pandemic promoted negative behavioral changes, including lower levels of physical activity (Browne *et al.*, 2020). Also in Brazil, a study carried out with university students reported a 21% increase in sedentary behavior (Ribeiro *et al.*, 2022). Negative changes have also been reported in Australia (Stanton *et al.*, 2020), Spain (Sánchez-Sánchez *et al.*, 2020), China (Wang *et al.*, 2020), West Asia, North Africa, the European continent and other countries (Ammar *et al.*, 2020). Among 3,533 Italian respondents aged 12–86 years, the percentage of individuals who did not exercise before the pandemic remained the same during the lockdown (38.5% vs 37.8%, respectively) (di Renzo *et al.*, 2020).

Sedentary lifestyle levels during lockdown are high in much of the world (Barkley *et al.*, 2020; Bourdas and Zacharakis, 2020; Gallè *et al.*, 2020; Sidor and Rzymski, 2020). In Canada, however, approximately two-thirds of 4,524 adults interviewed at the end of March and

| Variables | Frequencies (%)/median (Q1–Q3) Sedentary individuals (1,033) | Physically active individuals (314) |
|---|---|---|
| *Gender* | | |
| Female | 78.0% | 22.0% |
| Male | 71.5% | 28.5% |
| *Living with parents during the pandemic* | | |
| Yes | 72.5% | 27.5% |
| No | 79.3% | 20.7% |
| *Student* | | |
| Yes | 71.7% | 28.3% |
| No | 80.9% | 19.1% |
| *Overweight (BMI) during the pandemic* | | |
| Yes | 80.7% | 19.3% |
| No | 73.3% | 26.7% |
| Weight difference (actual − prior pandemic) (kg) | 2.0 (0.0–4.0) | 2.0 (−2.0 to 2.0) |
| *Difference of frequency of alcoholic beverage (actual − prior pandemic)* | | |
| Increased frequency | 79.1% | 20.9% |
| Reduced frequency or unchanged | 76.2% | 23.8% |
| Dose of alcoholic beverage during the pandemic | 1.0 (0.0–2.5) | 2.5 (1.0–2.5) |
| *Morning snack during the pandemic* | | |
| Yes | 71.5% | 79.3% |
| No | 28.5% | 20.7% |
| *Reduced homemade meals during the pandemic* | | |
| Yes | 94.9% | 75.5% |
| No | 5.1% | 24.5% |
| Frequency of cereals consumption during the pandemic | 7.0 (7.0–10.0) | 7.0 (5.0–10.0) |
| Frequency of fresh fruits consumption during the pandemic | 7.0 (2.0–10.0) | 7.0 (5.0–10.0) |
| Frequency of hamburgers and canned products consumption during the pandemic | 1.0 (0.0–2.0) | 0.0 (0.0–1.0) |
| Frequency of sweets consumption during the pandemic | 2.0 (1.0–7.0) | 1.5 (0.0–5.0) |
| Cognitive restraint (score) | 14.0 (11.0–16.0) | 16.0 (13.0–18.0) |
| Perceived stress (score) | 23.0 (19.0–28.0) | 22.0 (16.75–26.0) |

**Source:** The authors

**Table 1.** General characteristics of individuals according to the variables of the multivariate logistic regression model ($n$ = 1,347)

April 2020 reported exercising outside the home, and more than half reported exercising at home, although this study did not stratify individuals into sedentary or not (Colley *et al.*, 2020). Many factors may have contributed to this global drop in physical exercise, such as confinement at home or the home office and the consequent increase in screen hours (Souza *et al.*, 2021); the closing of gyms, other physical training sites, parks and public leisure places as a strategy to contain the spread of SARS-CoV-2 (Zanke *et al.*, 2020); and the lack of motivation (Robinson *et al.*, 2021). Another important point to address is that restrictive measures were not standardized around the world, and the way in which each location dealt with restrictions may have been decisive for the improvement, maintenance or worsening of physical activity levels.

This study provides preliminary data from Brazil on changes in the prevalence of sedentary lifestyle and associated factors during the lockdown caused by the pandemic.

**Table 2.**
Independent factors associated with a sedentary lifestyle during the COVID-19 pandemic in Brazil by multiple logistic regression analysis ($n$ = 1,347)

| Variables | OR (95% CI) | $p$-value |
|---|---|---|
| Sex (female) | 1.407 (1.040, 1.904) | 0.017 |
| Living with parents | 0.701 (0.504, 0.973) | 0.034 |
| Being a student | 0.599 (0.465, 0.773) | 0.001 |
| Excess weight (current BMI $\geq$ 25 kg/m$^2$) | 1.517 (1.106, 2.082) | 0.010 |
| Weight difference (current − before the pandemic) (kg) | 1.096 (1.052, 1.142) | <0.001 |
| Difference in frequency of alcohol consumption (current − before the pandemic) (times/week) | 1.323 (1.139, 1.537) | <0.001 |
| Dose of alcoholic beverage (mL/week) | 0.819 (0.757, 0.886) | <0.001 |
| Eating a morning snack during the pandemic | 0.578 (0.427, 0.728) | <0.001 |
| Less preparation of meals at home | 5.405 (1.801, 16.129) | 0.003 |
| Cereal intake (times/week) | 1.086 (1.038, 1.136) | <0.001 |
| Fruit intake (times/week) | 0.896 (0.856, 0.938) | <0.001 |
| Ingestion of sausages (times/week) | 1.084 (1.011, 1.163) | 0.024 |
| Intake of sweets (times/week) | 1.054 (1.002, 1.109) | 0.041 |
| Cognitive restriction (score) | 0.978 (0.971, 0.985) | <0.001 |
| Perceived stress (score) | 1.032 (1.009, 1.055) | <0.001 |

**Note:** BMI = Body mass index
**Source:** The authors

Among the associated independent factors, women were 40.7% more likely to be sedentary than men. Prepandemic studies have shown that women tend to be less physically active than men and that they have a greater number of barriers to exercise, such as lack of pleasure and time constraints (Guthold *et al.*, 2018; Hickey and Mason, 2017; Moreno and Johnston, 2014). In addition, in the context of the COVID-19 pandemic, Nienhuis and Lesser (2020) observed that women were significantly less physically active than men and reported more barriers and fewer facilitators for physical activity. In China, females have had a high prevalence of taking few daily steps during the pandemic (Wang *et al.*, 2020). In Canada, in contrast, there was a higher prevalence of women than men exercising inside and outside the home during the months of March and April 2020 (Colley *et al.*, 2020). The measures to prevent the spread of COVID-19, such as social isolation, remote work, and closing schools and day-care centers, increased the responsibilities for housework and childcare, which are most likely taken over by women. As a consequence, the increased responsibilities during the pandemic may have reduced health-promoting behaviors and erected more barriers to physical activity among females (Gomes *et al.*, 2022; Souza *et al.*, 2021).

In the present study, being a student and living with one's parents were factors independently associated with a lower chance of a sedentary lifestyle. In contrast, a study conducted with 2,028 people in Bangladesh revealed that being a student and living with family were factors associated with physical inactivity and sedentary behaviors during the pandemic (Rahman *et al.*, 2020). Among Italian undergraduate students, 48.6% ($n$ = 1,032) reported decreased physical activity (Gallè *et al.*, 2020). In Brazil, studies conducted before the pandemic observed a sedentary lifestyle among university students, including undergraduate students in health care (Santos *et al.*, 2014; Takenaka *et al.*, 2016). One explanation for this is that the commitments and new social relationships promoted by academic life make students more vulnerable to health-risk behaviors, such as having less time for physical activity (Da Silva Pires *et al.*, 2013). However, during the period of this study, academic activities in Brazil were suspended, some institutions interrupted activities

and others began to operate remotely. This new academic scenario and the convenience of living with one's parents during the pandemic may have contributed to the increase in the time available for physical activity by students.

Several eating habits were associated with a sedentary lifestyle in the present study. The higher frequency of intake of cereals (rice, corn, oats), sausages (hamburger, ham, mortadella, salami, sausage) and sweets (chocolate, candies, pies, lollipops, chewing gums, caramel, gelatin) increased the likelihood of a sedentary lifestyle in the evaluated population. Reducing the preparation of meals at home also increased the probability of a sedentary lifestyle by 5.4 times. In turn, a higher frequency of fruit intake and eating a morning snack were factors associated with a lower prevalence of a sedentary lifestyle. Prepandemic studies (Eslami *et al.*, 2020; McCarthy, 2014) and studies conducted during the pandemic (Ammar *et al.*, 2020; di Renzo *et al.*, 2020) have shown that individuals who exercise have a better dietary pattern than sedentary individuals, while sedentary behavior is correlated with worse eating habits, especially during the quarantine period due to the imposed social isolation measures (Ruiz-Roso *et al.*, 2020). The hypothesis that "dieting," especially with diets involving restriction of "unhealthy" foods, was also in effect cannot be discarded. In this sense, it is not surprising that higher cognitive restriction scores were independently associated with a lower probability of a sedentary lifestyle in the sample studied. Cognitive restriction refers to food choices to achieve a low energy intake (Lowe and Timko, 2004). Intentional dietary restrictions, extreme diets and the habit of skipping meals seem to act as compensatory behaviors that are present in individuals with eating disorders (Kontić *et al.*, 2010). Thus, such behaviors are used to avoid guilt linked to weight change, among other developments considered unacceptable by the individual (Martin *et al.*, 2020).

In the context of obligations and prohibitions, we found that a higher frequency of alcohol consumption was associated with a higher chance of a sedentary lifestyle, while the consumption of higher doses of alcohol was negatively associated with a sedentary lifestyle. It is relevant to note that frequent alcohol consumption is already included in the set of habits – such as sedentary lifestyle and worse food choices – that predispose people to a worse quality of life (Okoro *et al.*, 2004). Surprisingly, the consumption of large amounts of alcohol has been positively correlated with greater adherence to vigorous exercise, and the discussion that permeates this association also emerges from the compensatory behaviors often adopted by physically active individuals (French *et al.*, 2009; Giles and Brennan, 2014; Leasure *et al.*, 2015). The foregoing is based on the assumption that physical exercise is also sometimes used as a tool to repair the harm done by momentary inappropriate behaviors – such as excessive drinking or consuming unhealthy foods – which often trigger the feeling of guilt or lack of control in people who have health-related concerns (Giles and Brennan, 2014). This phenomenon has been termed "drunkorexia," which was initially widely applied in the descriptions of dietary restrictions associated with the consumption of alcoholic beverages in women (Chambers, 2008) and later was also used to encompass the practice of physical exercise and other healthy habits to compensate for excessive drinking in both sexes (Barry and Ms, 2012).

In fact, excessive alcohol consumption, inadequate eating habits, increased sedentary time and decreased volume and intensity of physical activity may have contributed to weight gain during the pandemic (Mattioli *et al.*, 2020). Studies in different countries have observed weight gain as a result of lockdown-related changes in people's routines (Sidor and Rzymski, 2020; Zachary *et al.*, 2020). This is worrisome because excess weight is related to comorbidities that are risk factors for COVID-19 and contributes to the worsening of the disease (Petrilli *et al.*, 2020). To reduce these consequences, the WHO has recommended people engage in physical activity at home (World Health Organization, 2020). Physical

exercise reduces the risk of obesity, improves the response to infections by viruses such as SARS-CoV-2 (Gallè *et al.*, 2020; Górnicka *et al.*, 2020) and contributes to mental health. If a sedentary lifestyle contributes to excess weight, overweight and obesity may contribute to the reduction in physical activity and the increase in sedentary behaviors. In the present study, the comparison of the prepandemic and pandemic weights showed that, for each extra kilogram of weight gained during the pandemic, the probability of a sedentary lifestyle increased by 9.6%, and the probability of being overweight during the pandemic increased by 51.7%. This can be explained by the fact that excess weight has a negative effect on many aspects of quality of life and worsens physical fitness and functional capacity (Orsi *et al.*, 2008).

Higher scores of perceived stress were associated with a higher chance of a sedentary lifestyle. A Canadian study conducted during the COVID-19 pandemic found that individuals who exercised outside the home and limited their screen time were more likely to have better self-perceived overall and mental health (Colley *et al.*, 2020). Another study that evaluated the effect of sedentary behavior on mental health in 244 Korean university students showed that stress, anxiety and depression significantly increased with the increase in daily sitting time (Lee and Kim, 2019). The same occurred for individuals aged $\geq$ 50 years from low-income countries, in which perceived stress score increased with the increase in sedentariness (Ashdown-Franks *et al.*, 2018). Stress and sedentariness are reciprocally related because stress hinders the efforts of individuals to be physically active and sedentary individuals are deprived of the anxiolytic and antidepressant effects of exercise (Stults-Kolehmainen and Sinha, 2014).

To our knowledge, no studies have aimed to reveal the associated factors to a sedentary lifestyle during the COVID-19 pandemic in Brazil for the general population. This study has some limitations that should be discussed. The type of physical exercise was not measured, and it was not possible to discriminate between mild, moderate and vigorous physical activities. The nature of the cross-sectional design also leads to limitations regarding the potential prediction of factors associated with a sedentary lifestyle. Most of the respondents in this study were women and lived in the southeastern region of the country, so this population may not be representative of the Brazilian population. In addition, the measured prepandemic period does not have a definitive beginning or duration. Last, all data were self-reported and may have suffered bias of memory and social desirability. However, studying the associations between the sedentary lifestyle and variables related to lifestyle and eating habits is extremely necessary to build new hypotheses and new perspectives on this atypical moment that has been experienced worldwide. Based on these studies, it is possible to begin to understand the behaviors that can be harmful to the population and to structure new ways of coping.

In conclusion, this study showed that most of the participants were sedentary during the data collection. A sedentary lifestyle was associated with female sex, worse eating habits, higher frequency and lower dose of alcohol consumption, and stress. Higher scores of cognitive restriction, some eating habits (such as eating more fruit and eating a morning snack), being a student and living with parents during the pandemic were protective factors negatively associated with sedentary lifestyle. This study may be useful for understanding people's physical exercise habits during the quarantine caused by COVID-19 with the aim of promoting strategies that reduce the sedentariness of the population, especially if new isolation measures are necessary due to new waves of infection by SARS-CoV-2.

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**Supplementary material**

The supplementary material for this article can be found online.

**Corresponding author**

Lucilene Rezende Anastácio can be contacted at: lucilene.rezende@gmail.com

## TÍTULO:

COVID-19 PANDEMIC AND COMFORT FOOD CONSUMPTION BASED ON GENDER IN A BRAZILIAN SAMPLE: WHICH VARIABLES ARE RELATED TO THIS BEHAVIOR?

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# COVID-19 pandemic and comfort food consumption based on gender in a Brazilian sample: which variables are related to this behavior?

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Tamires Cássia de Melo Souza and Lucilene Rezende Anastácio.
*Department of Food Science, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil*

Lívya Alves Oliveira
*Department of Nutrition and Health, Universidade Federal de Viçosa, Viçosa, Brazil*

Marina Martins Daniel
*Department of Nutrition, Universidade Federal de Lavras, Lavras, Brazil*

Fernanda Rodrigues de Oliveira Penaforte
*Department of Nutrition, Universidade Federal do Triangulo Mineiro, Uberaba, Brazil*

Juliana Costa Liboredo
*Department of Food, Universidade Federal de Ouro Preto, Ouro Preto, Brazil*

Ceres Mattos Della Lucia
*Department of Nutrition and Health, Universidade Federal de Viçosa, Viçosa, Brazil, and*

Lívia Garcia Ferreira
*Department of Nutrition, Universidade Federal de Lavras, Lavras, Brazil*

## Abstract

**Purpose** – This study aims to identify comfort food (CF) consumption and its associated factors during the pandemic period. The study also involves an online survey conducted five months after the quarantine started in Brazil.

**Design/methodology/approach** – Data on lifestyle, eating habits and anthropometric data were collected before and during the pandemic, and the differences in these habits were analyzed. Univariate and multivariate logistic regression models were performed to identify predictors of CF consumption by gender.

The authors are very grateful to the volunteers who participated in this study. All authors contribute substantially throughout the process of conception and design of the study. All authors carried out the critical review and approval of the final version of the paper. The authors declare no conflicts of interest.

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**Findings** – A total of 1,363 individuals were included in the sample, with a median age of 31 years old, of whom 80.3% were women. Since individuals were free to respond about the food consumed without predetermined categories, it was possible to carry out a faithful assessment of the occurrence of this behavior. At the same time, allowing the subjectivity and symbolism inherent to the concept of CF to be embraced. CF consumption was present for 54%, with "sweets" being the most mentioned group by both genders. The factors associated with CF consumption in women during the pandemic were increased snacking, increased bread, candies and alcoholic beverage intake, increased time spent at work, worsened sleep quality, reduced meals, perceived stress (PS), emotional eating (EE), age and increased frequency of meat intake. In men, the predictors for CF consumption were remote full-time work/study, PS, EE and early waking time. For both genders, CF consumption during the pandemic period was associated with PS and EE.

**Originality/value** – This study provides an important overview of the possible contributions of the pandemic on behaviors and food choices related to the consumption of CF in Brazilians. This information is valuable to support further studies to investigate and treat the impacts of the pandemic on lifestyle, eating habits and behavior, mental health and other factors in the postpandemic period.

**Keywords** Lockdown, Eating behavior, Eating habits, Quarantine, Coronavirus

**Paper type** Research paper

## Introduction

The disease caused by the new coronavirus (COVID-19), characterized by the World Health Organization as a pandemic, is a worldwide public health emergency (WHO, 2020), with records of more than 657 million confirmed cases and more than 6.6 million deaths worldwide as of January 2023 (WHO, 2022). In Brazil, the first case of the disease was identified in February 2020, and by the end of June 2021, the country had more than 18.4 million cases and more than 510 thousand deaths from the disease (WHO, 2022).

Due to COVID-19's high contagion rates, hygiene measures, such as wearing masks and regular hand washing, and mainly, the physical and social distance were adopted to prevent its transmission (Adhikari *et al.*, 2020; Wiersinga *et al.*, 2020). However, the restrictions and changes in the subjects' daily lives experienced during the pandemic have imposed significant changes in lifestyle and significantly affected psychological well-being (Ammar *et al.*, 2020b; Dubey *et al.*, 2020; Talevi *et al.*, 2020) and eating practices (di Renzo *et al.*, 2020; Sidor and Rzymski, 2020).

Eating behavior are closely related to social organization and culture (Haddad *et al.*, 2020), and the confinement imposed by the pandemic has reconfigured people's relationships with eating and food (Haddad *et al.*, 2020; Pung *et al.*, 2021). Considering that eating is a broad and complex act and goes far beyond nutrition, it is understood that choices and eating habits can be influenced by intrinsic and extrinsic factors to the individual (Moura, 2022). In the pandemic, high levels of anxiety, stress and depression have been reported –which can exacerbate triggers related to choices, disorders and eating habits (Pimentel, 2021).

From this perspective, beyond the biological role, food as a source of pleasure, connection, comfort and emotional relief is enhanced, which is symbolized by comfort food (CF). CF refer to foods whose consumption evokes psychological and emotional pleasure and comfort (Wansink *et al.*, 2003), with an important symbolic role in family, childhood or homemade food (Gimenes-Minasse, 2016) permeated by feelings of belonging, connection and security. In this sense, faced with negative emotions and situations, people can make food choices that promote comfort and pleasure as a resource for relaxation and coping with emotions (Leigh Gibson, 2006; Zellner *et al.*, 2006). Emotions have been seen in studies as precursors to nutritionally unbalanced eating behaviors, thus, showing individuals' search for comforting foods during this period (di Renzo *et al.*, 2020).

Much has been said about changes in eating behavior in different countries and a subsequent weight gain during the pandemic (Ammar *et al.*, 2020a; di Renzo *et al.*, 2020; Sidor and Rzymski, 2020; Zachary *et al.*, 2020). Some changes observed include an increase or a reduction in healthy food and increase of homemade recipes consumption in Italy (di Renzo *et al.*, 2020), an increase of food consumption and snacking in Poland with Poland (Sidor and Rzymski, 2020), an increase in eating in response to sight, smell and stress and snacking after dinner in the USA (Zachary *et al.*, 2020) and an increase of eating out of control, snacks between meals and number of main meals (Ammar *et al.*, 2020a). These findings corroborate the suggestion that increased time spent indoors can lead to additional or extra food, which is accompanied by emotional eating (EE), lack or reduction of physical activity and insufficient sleep (Ismail *et al.*, 2021; Zachary *et al.*, 2020). However, to be able to suggest more effective clinical and collective approaches, it is necessary to study not only the outcomes but also the motivations behind the choices that have been made during this period, especially considering the complexity of the issue. Furthermore, the COVID-19 pandemic also affects the food security which changed access to food, especially in low-income countries (Erokhin and Gao, 2020).

All these changes in lifestyle, in the way of working, as well as the reconfiguration of social relations due to COVID-19, may have interfered with food choices and CF consumption. Specifically, in Brazil, data regarding the motivations behind food choices and their associated factors have not yet been published in the context of the pandemic. Based on these considerations, this study aimed to identify the consumption of CF during the pandemic period and the factors independently associated with this behavior in men and women.

## Methods

### *Study design and subjects*

This observational study used convenience sampling with Brazilians aged 18+ years who answered an online questionnaire available on GoogleForms® from Aug–Sep 2020 (~5.5 months after implementing the social distancing measures). The questionnaire was created based on previous research carried out in other countries during the pandemic period (di Renzo *et al.*, 2020; Scarmozzino and Visioli, 2020; Sidor and Rzymski, 2020). To test it, the research group and a convenience sample of approximately 30 people responded in advance. Feedback regarding filling time, platform errors and the possibility of inadequate interpretation of the questions were considered and corrections were made. Then, the questionnaire was released to the public and the research began. The volunteers were recruited through social media and websites. This study was approved by the Ethics and Research Committee of the Universidade Federal de Viçosa (protocol number 35516720.5.0000.5153). Individuals who sent incomplete questionnaires, women who were pregnant and repeated responses were excluded. Convenience sampling was obtained.

### *Measures*

CF consumption was identified by an affirmative response to the question of whether participants consumed food with the objective of emotional comfort during the COVID-19 pandemic, since there is no specific questionnaire in the Portuguese language to assess such behavior. The type of food used for emotional comfort was also asked, and all reported foods were categorized by three researchers into 12 groups — according to the composition of each food and preparation – to allow direct comparison between genders. These categories are detailed in Figure 1, with all foods and preparations with their descriptions.

NFS

**SWEETS**

- Chocolate;
- Traditional Brazilian sweets - brigadeiro (condensed milk and chocolate); açaí (usually consumed with toppings such as powdered milk, honey, nuts, granola); goiabada (made with guava); doce de leite (slow cooking of milk and sugar); rapadura (made from sugar cane);
- Ice cream;
- Marshmallow;
- Candies;
- Sugar.

**CAKES, COOKIES AND BREADS**

- Cake with and without icing;
- Pão de queijo (made with starch and cheese);
- Crackers;
- Homemade cookies, traditional or filled;
- Sweet and savory breads.

**FAST FOOD**

- Pizza;
- Hamburger;
- French fries;
- Hot dog.

**COMPLETE MEALS**

- Traditional Brazilian dishes - feijoada (beans with different cuts of meat - mainly pork); tropeiro beans (beans, manioc flour and meat); tapioca (hydrated and cooked starch stuffed with chicken and vegetables);
- Pasta (spaghetti; lasagna; cappelletti);
- Rice with meat;
- Seafood (shrimp; fish) with vegetables;
- Japanese food.

**NONALCOHOLIC DRINKS**

- Coffee - traditional; sweetened or not; with or without cream;
- Chocolate milk - with chocolate or cocoa powder, with added sugar;
- Tea - chamomile, mint, black tea or mate tea;
- Soda - Pepsi®; Coke®; Antártica®.

**SNACKS**

- Small savory snacks (cheese balls; chicken drumstick; bulgar wheat; coated sausage);
- Popcorn.

**FRESH FOOD**

- Fruits - mentioned in general; passion fruit; banana or apple.
- Vegetables - mentioned in general.

**INSTANT MEALS AND CANNED PRODUCTS**

- Instant noodles;
- Canned peas and corn.

**NUTS, SEEDS AND CEREALS**

- Brazil nuts;
- Almonds;
- Rolled oats;
- Peanut;
- Oatmeal - sweetened and with the addition of fruits or cinnamon.

**ALCOHOLIC BEVERAGE**

- Wine and beer.

**DAIRY**

- Milk; various types of cheese.

**OTHERS**

- Phrases like: "food that reminds me of my mother", "warm food", among others.

**Source:** Authors' own creation

**Figure 1.**
Full description of all foods mentioned as comfort food and their respective categories for comparison between men and women

To maintain the possibility of identifying subjective responses and individual choices, without inducing participants to respond in a particular manner, it was decided to not classify foods before applying the questionnaire so that individuals were not limited to associating CF with predetermined foods. Socioeconomic data including age, income, education level, profession, home residents, current occupation and perceptions about working time during the pandemic (perception of less, unaltered or more time spent in work, including domestic activities), and alterations in the way of working or studying (remotely partial and/or full time or no alterations) were analyzed. The three-factor eating questionnaire-R21 (TFEQ-R21), validated in Portuguese (Natacci and Ferreira Júnior, 2011), was used to collect data on eating behavior patterns: cognitive restriction (CR), EE and uncontrolled eating (UE). Perceived stress (PS) was assessed by a 10-item version of the PS scale validated for the Brazilian population (Reis *et al.*, 2010).

The lifestyle, eating habits and anthropometric data, before (retrospective data) and during (when answering the questionnaire) the pandemic were collected and the difference of these habits were analyzed. Positive differences ($>+0.1$) and negative ($<-0.1$) were classified as increased or reduced habits, respectively. Anthropometric data included self-reported weight and height, and body mass index calculation. Lifestyle included: number of hours of sleep per day, bedtime and wake-up hours, sleep quality, minutes of physical activity per week, number of cigarettes per day, frequency of alcoholic beverages per week, dose of drink per occasion of consumption and screen time in hours per day.

Eating habits included the type and number of meals consumed, amount of food intake, snacking, use of food delivery services, habit of cooking at home and food frequency (times a week). The food frequency questionnaire was applied with questions about food groups including legumes, cereals, bakery products, milk and dairy, fresh fruits, meat, hamburgers or canned products, vegetables (except potatoes, cassava and yams), sugary drinks, instant meals and snacks, candies and fast food. The frequency of consumption of the food groups was set to 0 for those who reported never consuming such food, 0.5 for those who reported rarely, 1 for once a week, 2.5 for two to three times a week, 5 for four to six times a week, 7 for once a day and 10 for more than once a day.

*Statistical analyses*

Data were analyzed using the SPSS 21.0. Variables collected in relation to the presence or not of CF and food craving were tested using Mann–Whitney or QuiSquare tests (Table 1). The predictors of CF by gender were analyzed by univariate and multivariate logistic regression models (those with $p < 0.20$ in the univariate analysis; Table 2). The model was obtained by the forward conditional method (the one with the greatest percentage of explanation; Table 3). The fit of the models was tested by the Hosmer–Lemeshow test. Multicollinearity was tested using variance inflation factor (VIF) $> 10$ inside the linear regression function of SPSS. The variable with the greatest OR in the univariate analysis was chosen if multicollinearity was identified. The descriptions of variables that remained in the final models are presented as medians and interquartile intervals (since they were not normally distributed by the Kolmogorov–Smirnov test) or as frequencies and absolute numbers. The statistical significance was 5%.

## Results

*Respondents*

The final sample consisted of 1,363 individuals, of whom 80.3% were female and 19.7% were male, living mainly in the southeastern region of Brazil (89.6%), with a median age of

| Variables | Comfort food | |
|---|---|---|
| | No | Yes |
| *Age (years)* | 33.0 (26.0–44.0) | 29.0 (23.0–37.0) |
| *Gender* | | |
| Female | 40.4 (442) | 59.6 (652)** |
| Male | 67.3 (181) | 32.7 (88) |
| *Perception of increased time spent at work (including household chores)* | | |
| No | 55.8 (260) | 44.2 (206) |
| Yes | 40.6 (366) | 59.4 (536) ** |
| *Work or study with alterations* | | |
| No | 52.7 (79) | 47.3 (71) |
| Yes | 44.9 (547) | 55.1 (671) |
| *Full-time work or study* | | |
| No | 49.9 (406) | 39.6 (220) |
| Yes | 39.6 (220) | 60.4 (335)** |
| *Greater using of delivery during pandemic* | | |
| No | 52.2 (358) | 47.5 (324) |
| Yes | 39.1 (268) | 60.9 (418) * |
| *Greater snacking during pandemic* | | |
| No | 59.8 (397) | 40.2 (267) |
| Yes | 32.5 (229) | 67.5 (475)** |
| *Greater use of delivery during pandemic* | | |
| No | 52.5 (358) | 47.5 (324) |
| Yes | 39.1 (268) | 60.9 (418)** |
| *Screen time during pandemic (hours)* | 6.5 (6.5–10.5) | 10.5 (6.5–14.0)** |
| *Alcoholic beverages intake during pandemic (frequency)* | 0.5 (0.0–1.4) | 0.5 (0.0–1.0)* |
| *Uncontrolled eating (score)* | 22.2 (11.1–37.0) | 37.0 (22.2–51.9)** |
| *Emotional eating (score)* | 16.7 (5.6–38.9) | 55.6 (27.8–72.2)** |
| *Cognitive restraint (score)* | 44.4 (22.2–61.1) | 44.4 (22.2–61.1)* |
| *Perceptive stress (score)* | 21.0 (16.0–25.0) | 25.0 (20.8–29.0)** |

**Notes:** Qui-Square or Mann–Whitney *U* test; *$p < 0.05$; **$p < 0.01$
**Source:** Authors' own creation

**Table 1.** Socioeconomic and lifestyle habits in relation to the presence or not of comfort food during the pandemic period in Brazil

31 (24–39) years. CF consumption, was observed in 54.3% (740) of the total volunteers, including 59.6% women and 32.7% men (Table 1).

*Food category*

More than 60 foods were mentioned as CF by the participants. Food categories reported as CF for men and women are shown in Figure 2. The most mentioned category for both genders was "sweets"; however, for women, the second most cited category was "cakes, cookies and bread," while for men, it was "fast food," which was the only category that showed a statistically significant difference between genders. Some volunteers who reported the consumption of CF did not provide a list of specific foods; these were included in the category "others" and mentioned the following phrases: "homemade foods," "foods that resemble some moment," "food made by relatives," "food that reminds me of my mother" and finally, "warm food."

**Table 2.**
Socioeconomic data, eating behavior, stress, lifestyle, anthropometric data and eating habits associated with comfort food consumption in females and males during the pandemic period in Brazil by univariate logistic regression analyses

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| *Socioeconomic data* | | | | | | |
| *Age (years)* | *0.968* | *0.958–0.979* | *<0.001* | *0.969* | *0.946–0.991* | *0.007* |
| *Income (R$)* | 1.000 | 1.000–1.000 | 0.621 | *1.000* | *1.000–1.000* | *0.027* |
| *Per capita income (R$)* | 1.000 | 1.000–1.000 | 0.196 | 1.000 | 1.000–1.000 | 0.816 |
| *Home residents* | | | | | | |
| Living with children | 0.820 | 0.624–1.079 | 0.157 | 0.539 | 0.279–1.044 | 0.067 |
| Living with parents | 1.132 | 0.882–1.453 | 0.330 | *2.255* | *1.341–3.793* | *0.002* |
| *Education level* | | | | | | |
| College or less | 1.310 | 0.777–2.209 | 0.310 | 2.192 | 0.608–7.903 | 0.230 |
| Graduate | 0.981 | 0.770–1.251 | 0.880 | 0.897 | 0.537–1.499 | 0.679 |
| Postgraduation | 0.962 | 0.756–1.225 | 0.755 | 0.955 | 0.567–1.608 | 0.862 |
| Health-related graduation course | 0.866 | 0.679–1.103 | 0.244 | 0.645 | 0.372–1.117 | 0.118 |
| Nutrition graduation course | 0.991 | 0.770–1.275 | 0.942 | 0.831 | 0.389–1.777 | 0.634 |
| *Profession* | | | | | | |
| Student | *1.527* | *1.195–1.950* | *<0.001* | 1.584 | 0.948–2.644 | 0.079 |
| Healthcare worker | 1.160 | 0.870–1.549 | 0.312 | 1.721 | 0.613–4.827 | 0.302 |
| Professor | 1.213 | 0.885–1.661 | 0.229 | 1.050 | 0.525–2.099 | 0.890 |
| COVID-19 frontline worker | 1.031 | 0.634–1.674 | 0.903 | 0.503 | 0.105–2.420 | 0.391 |
| *Labor situation* | | | | | | |
| Remote full-time work or study | *1.427* | *1.113–1.830* | *0.005* | *2.303* | *1.369–3.874* | *0.002* |
| Remote full/part-time work or study | *1.639* | *1.260–2.113* | *<0.001* | *1.846* | *1.019–3.344* | *0.043* |
| Working or studying during pandemic period without alterations | 0.735 | 0.503–1.074 | 0.112 | 0.625 | 0.256–1.523 | 0.301 |
| *Time spent at work (including household chores)* | | | | | | |
| The same | | | <0.001 | | | 0.028 |
| Reduced | 1.553 | 0.997–2.418 | 0.051 | 1.129 | 0.482–2.645 | 0.779 |
| Increased | *1.963* | *1.447–2.663* | *<0.001* | *2.159* | *1.145–2.663* | *<0.001* |

(*continued*)

Table 2.

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| *Social isolation* | | | | | | |
| Total | | | 0.567 | | | 0.924 |
| Partial | 0.879 | 0.686–1.125 | 0.879 | 0.794 | 0.541–1.599 | 0.794 |
| No | 1.073 | 0.462–2.490 | 0.870 | 0.731 | 0.276–2.468 | 0.731 |
| *Eating behavior and stress* | | | | | | |
| Uncontrolled eating | *1.033* | *1.026–1.040* | *<0.001* | *1.027* | *1.014–1.040* | *<0.001* |
| Cognitive restraint | 1.003 | 0.998–1.008 | 0.279 | 1.009 | 0.997–1.021 | 0.137 |
| Emotional eating | *1.038* | *1.032–1.044* | *<0.001* | *1.040* | *1.028–1.052* | *<0.001* |
| Perceived stress | *1.105* | *1.062–1.151* | *<0.001* | *1.105* | *1.082–1.128* | *<0.001* |
| *Lifestyle data* | | | | | | |
| *Screen time (min)* | | | | | | |
| Prior to pandemic | 1.044 | 1.000–1.091 | 0.051 | *1.116* | *1.033–1.206* | *0.005* |
| During pandemic | *1.090* | *1.056–1.125* | *<0.001* | *1.153* | *1.077–1.234* | *<0.001* |
| Difference* (time) | *1.092* | *1.051–1.135* | *<0.001* | *1.114* | *1.029–1.206* | *0.007* |
| Increased time | 1.080 | 0.839–1.390 | 0.550 | 0.848 | 0.501–1.436 | 0.540 |
| Reduced time | 0.968 | 0.366–2.562 | 0.948 | 0.877 | 0.221–3.477 | 0.852 |
| *Alcoholic beverages* | | | | | | |
| Frequency prior to pandemic | 1.103 | 0.977–1.245 | 0.112 | 0.980 | 0.804–1.196 | 0.845 |
| Frequency during pandemic | 1.114 | 1.009–1.229 | 0.032 | 0.940 | 0.791–1.118 | 0.485 |
| Difference* (frequency) | 1.072 | 0.952–1.207 | 0.252 | 0.920 | 0.732–1.155 | 0.471 |
| Increased frequency | *1.966* | *1.409–2.744* | *<0.001* | 1.128 | 0.557–2.286 | 0.738 |
| Reduced frequency | *1.542* | *1.111–2.139* | *0.010* | 1.682 | 0.921–3.071 | 0.091 |
| Dose prior to pandemic | *1.136* | *1.064–1.212* | *<0.001* | 0.975 | 0.861–1.104 | 0.692 |
| Dose during pandemic | *1.120* | *1.043–1.202* | *0.002* | 0.988 | 0.873–1.118 | 0.846 |
| Increased dose | *1.513* | *1.107–2.067* | *0.009* | *1.871* | *1.006–3.480* | *0.048* |
| Reduced dose | 1.174 | 0.795–1.733 | 0.420 | 1.803 | 0.883–3.683 | 0.106 |
| *Cigarettes* | | | | | | |
| Number prior to pandemic | 0.997 | 0.946–1.051 | 0.908 | 0.987 | 0.916–1.063 | 0.723 |
| Number during pandemic | 0.982 | 0.939–1.028 | 0.440 | 1.009 | 0.956–1.065 | 0.752 |

(*continued*)

Table 2.

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| Difference* | 0.918 | 0.810–1.041 | 0.182 | 1.044 | 0.947–1.151 | 0.388 |
| Increased number | 0.543 | 0.145–2.033 | 0.364 | 1.580 | 0.346–7.221 | 0.555 |
| Reduced number | 2.051 | 0.213–19.783 | 0.534 | 4.235 | 0.379–47.358 | 0.241 |
| *Sleep* | | | | | | |
| Time to sleep prior to pandemic | 0.999 | 0.999–0.999 | 0.314 | 0.999 | 0.999–0.999 | 0.848 |
| Time to sleep during pandemic | 0.999 | 0.999–0.999 | 0.080 | 0.999 | 0.999–0.999 | 0.105 |
| Sleeping time prior to pandemic (hours) | 1.032 | 0.937–1.137 | 0.522 | 0.978 | 0.794–1.204 | 0.831 |
| Time to wake up prior to pandemic | 0.999 | 0.999–0.999 | 0.389 | 0.999 | 0.999–0.999 | 0.055 |
| Time to wake up during pandemic | 0.999 | 0.999–0.999 | 0.481 | *0.999* | *0.999–0.999* | *0.009* |
| Sleeping time prior to pandemic (hours) | 0.977 | 0.893–1.070 | 0.619 | 0.825 | 0.893–1.070 | 0.619 |
| Sleep time difference* (hours) | 0.956 | 0.879–1.041 | 0.305 | 0.868 | 0.719–1.048 | 0.142 |
| Increased sleep hours | 1.125 | 0.880–1.437 | 0.347 | 0.824 | 0.488–1.389 | 0.467 |
| Reduced sleep hours | *1.542* | *1.182–2.012* | *0.001* | *1.779* | *1.025–3.088* | *0.041* |
| Improved sleep quality | 1.249 | 0.858–1.819 | 0.246 | 0.994 | 0.505–1.957 | 0.246 |
| Worsened sleep quality | *2.567* | *1.997–3.300* | *<0.001* | *2.641* | *1.565–4.455* | *<0.001* |
| *Physical activity* | | | | | | |
| Minutes prior to pandemic | 1.000 | 0.999–1.002 | 0.723 | 1.002 | 1.000–1.002 | 0.087 |
| Minutes during pandemic | *0.998* | *0.997–1.000* | *0.026* | 0.998 | 0.996–1.001 | 0.211 |
| Difference* | *0.999* | *0.997–1.000* | *0.022* | *0.996* | *0.994–0.999* | *0.004* |
| Increased physical activity | 1.142 | 0.846–1.542 | 0.386 | *0.463* | *0.231–0.928* | *0.030* |
| Reduced physical activity | *1.414* | *1.106–1.807* | *0.006* | *2.200* | *1.309–3.689* | *<0.001* |
| *Anthropometric data* | | | | | | |
| BMI prior to pandemic (kg/m$^2$) | *1.042* | *1.014–1.070* | *0.003* | 0.967 | 0.910–1.027 | 0.273 |
| Excessive weight prior to pandemic | *1.407* | *1.078–1.835* | *0.012* | 0.901 | 0.540–1.504 | 0.690 |
| Actual BMI (kg/m$^2$) | *1.062* | *1.034–1.092* | *<0.001* | 0.928 | 0.948–1.060 | 0.928 |
| Weight difference* (kg) | *1.114* | *1.074–1.155* | *<0.001* | *1.102* | *1.040–1.168* | *0.001* |
| Weight gain during pandemic | *2.140* | *1.672–2.739* | *<0.001* | *2.723* | *1.575–4.707* | *<0.001* |
| Weight loss during pandemic | *0.695* | *0.525–0.919* | *0.011* | *0.508* | *0.275–0.939* | *0.031* |

(*continued*)

Table 2.

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| *Dietary intake* | | | | | | |
| *Meals* | | | | | | |
| Breakfast prior to pandemic | *0.579* | *0.381–0.881* | *0.011* | 0.859 | 0.439–1.681 | 0.656 |
| Breakfast during pandemic | 0.732 | 0.515–1.040 | 0.081 | 0.758 | 0.406–1.417 | 0.385 |
| Morning snack prior to pandemic | 1.113 | 0.873–1.419 | 0.386 | 0.829 | 0.480–1.432 | 0.501 |
| Morning snack during pandemic | 0.889 | 0.688–1.147 | 0.365 | 1.097 | 0.636–1.892 | 0.739 |
| Lunch prior to pandemic | 0.841 | 0.245–2.892 | 0.784 | 0.725 | 0.119–4.418 | 0.727 |
| Lunch during pandemic | 1.389 | 0.664–2.907 | 0.383 | 4.023 | 0.495–32.682 | 0.193 |
| Afternoon snack prior to pandemic | 0.970 | 0.714–1.318 | 0.845 | 0.962 | 0.546–1.695 | 0.893 |
| Afternoon snack during pandemic | 1.080 | 0.790–1.475 | 0.631 | 1.507 | 0.808–2.812 | 0.197 |
| Dinner prior to pandemic | 1.306 | 0.958–1.780 | 0.091 | 1.085 | 0.554–2.124 | 0.812 |
| Dinner during pandemic | *1.394* | *1.025–1.896* | *0.034* | 0.931 | 0.486–1.784 | 0.830 |
| Evening snack prior to pandemic | 1.002 | 0.759–1.324 | 0.988 | 1.069 | 0.602–1.900 | 0.820 |
| Evening snack during pandemic | 1.286 | 0.982–1.683 | 0.068 | 1.370 | 0.783–2.397 | 0.271 |
| Other meals prior to pandemic | 1.093 | 0.660–1.809 | 0.730 | 1.519 | 0.620–3.721 | 0.361 |
| Other meals during pandemic | *1.848* | *1.219–2.802* | *0.004* | 0.935 | 0.435–2.006 | 0.862 |
| *Number of meals* | | | | | | |
| Prior to pandemic | 1.007 | 0.891–1.139 | 0.909 | 0.932 | 0.743–1.170 | 0.546 |
| During pandemic | 1.099 | 0.985–1.227 | 0.092 | 1.098 | 0.881–1.368 | 0.407 |
| Increased number | *1.943* | *1.433–2.633* | *<0.001* | 1.343 | 0.733–2.459 | 0.340 |
| Reduced number | *1.152* | *1.152–2.012* | *0.003* | 1.136 | 0.631–2.040 | 0.671 |
| Increased food intake | *2.899* | *2.255–3.727* | *<0.001* | *2.388* | *1.393–4.092* | *0.002* |
| Reduced food intake | *0.685* | *0.493–0.951* | *0.024* | 0.636 | 0.313–1.293 | 0.211 |
| Increased snacking | *3.657* | *2.835–4.719* | *<0.001* | *1.824* | *1.088–3.056* | *0.023* |
| Reduced snacking | 0.799 | 0.515–1.238 | 0.315 | 1.031 | 0.401–2.653 | 0.950 |
| Increased use of food delivery service | *1.834* | *1.436–2.343* | *<0.001* | *1.801* | *1.070–3.031* | *0.027* |
| Reduced use of food delivery service | 1.094 | 0.770–1.553 | 0.617 | 1.570 | 0.731–3.370 | 0.247 |
| Increased homemade meals | *1.639* | *1.267–2.120* | *<0.001* | 1.392 | 0.808–2.396 | 0.233 |
| Reduced homemade meals | 1.314 | 0.773–2.234 | 0.312 | 1.251 | 0.440–3.561 | 0.674 |

(*continued*)

Table 2.

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| *Legumes (frequency)* | | | | | | |
| Prior to pandemic | 0.977 | 0.939–1.017 | 0.260 | 1.023 | 0.934–1.122 | 0.621 |
| During pandemic | 0.976 | 0.940–1.014 | 0.210 | 1.019 | 0.934–1.111 | 0.678 |
| Difference* | 0.997 | 0.943–1.053 | 0.903 | 1.007 | 0.888–1.143 | 0.909 |
| Increased consumption | *1.602* | *1.141–2.250* | *0.007* | 1.752 | 0.843–3.640 | 0.133 |
| Reduced consumption | *0.624* | *0.444–0.877* | *0.007* | 0.571 | 0.275–1.186 | 0.133 |
| *Cereal* | | | | | | |
| Prior to pandemic | 0.978 | 0.935–1.023 | 0.323 | 0.937 | 0.854–1.029 | 0.175 |
| During pandemic | 0.969 | 0.928–1.012 | 0.161 | 0.999 | 0.906–1.101 | 0.982 |
| Difference* | 0.988 | 0.928–1.052 | 0.706 | 1.115 | 0.982–1.265 | 0.093 |
| Increased consumption | *1.872* | *1.265–2.769* | *0.002* | *2.846* | *1.358–5.964* | *0.006* |
| Reduced consumption | *1.735* | *1.174–2.564* | *<0.001* | 0.917 | 0.399–2.106 | 0.838 |
| *Bread, cake and cookies* | | | | | | |
| Prior to pandemic | 0.982 | 0.946–1.020 | 0.349 | 1.007 | 0.932–1.087 | 0.864 |
| During pandemic | 1.031 | 0.993–1.070 | 0.112 | 1.024 | 0.948–1.106 | 0.551 |
| Difference* | *1.084* | *1.030–1.141* | *0.002* | 1.048 | 0.928–1.183 | 0.451 |
| Increased consumption | *2.447* | *1.774–3.375* | *<0.001* | *2.050* | *1.069–3.934* | *0.031* |
| Reduced consumption | 1.185 | 0.842–1.669 | 0.330 | 1.253 | 0.599–2.622 | 0.550 |
| *Milk and dairy* | | | | | | |
| Prior to pandemic | 1.001 | 0.965–1.037 | 0.973 | *1.084* | *1.004–1.170* | *0.040* |
| During pandemic | 1.013 | 0.977–1.050 | 0.484 | *1.084* | *1.005–1.170* | *0.038* |
| Difference* | 1.033 | 0.976–1.094 | 0.263 | 1.009 | 0.897–1.134 | 0.885 |
| Increased consumption | *1.689* | *1.193–2.393* | *0.003* | 1.036 | 0.550–1.952 | 0.914 |
| Reduced consumption | 1.292 | 0.919–1.817 | 0.140 | 0.881 | 0.400–1.941 | 0.753 |
| *Fruits* | | | | | | |
| Prior to pandemic | 0.969 | 0.936–1.003 | 0.969 | 1.021 | 0.952–1.096 | 0.556 |
| During pandemic | *0.957* | *0.925–0.991* | *0.014* | 0.987 | 0.919–1.060 | 0.720 |
| Difference* | 0.970 | 0.921–1.021 | 0.247 | 0.921 | 0.817–1.038 | 0.179 |

(*continued*)

Table 2.

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | Female | | | Male | | |
| | OR | CI (95%) | *p*-Value | OR | CI (95%) | *p*-Value |
| Increased consumption | 1.250 | 0.888–1.760 | 0.201 | 0.992 | 0.492–1.988 | 0.981 |
| Reduced consumption | *1.630* | *1.179–2.253* | *0.003* | *1.956* | *1.024–3.735* | *0.042* |
| *Meat* | | | | | | |
| Prior to pandemic | *0.954* | *0.917–0.993* | *0.021* | 0.979 | 0.989–1.067 | 0.625 |
| During pandemic | *0.944* | *0.909–0.982* | *0.004* | 0.975 | 0.899–1.059 | 0.551 |
| Difference* | 0.963 | 0.989–1.032 | 0.284 | 0.992 | 0.857–1.148 | 0.915 |
| Increased consumption | 1.466 | 0.975–2.203 | 0.066 | 0.906 | 0.378–2.172 | 0.824 |
| Reduced consumption | *2.057* | *1.370–3.089* | *0.001* | 1.225 | 0.612–2.451 | 0.566 |
| *Sausage* | | | | | | |
| Prior to pandemic | 1.036 | 0.990–1.083 | 0.128 | 1.001 | 0.911–1.099 | 0.988 |
| During pandemic | *1.071* | *1.021–1.124* | *0.005* | *1.125* | *1.022–1.237* | *0.016* |
| Difference* | 1.059 | 0.996–1.126 | 0.068 | *1.125* | *1.056–1.398* | *0.006* |
| Increased consumption | *3.133* | *2.105–4.665* | *<0.001* | *2.050* | *1.069–3.934* | *0.031* |
| Reduced consumption | 1.186 | 0.823–1.709 | 0.361 | *0.432* | *0.191–0.979* | *0.044* |
| *Vegetables* | | | | | | |
| Prior to pandemic | 0.970 | 0.931–1.011 | 0.146 | 1.062 | 0.974–1.158 | 0.171 |
| During pandemic | *0.946* | *0.909–0.984* | *0.006* | 1.069 | 0.985–1.161 | 0.112 |
| Difference* | 0.963 | 0.915–1.014 | 0.155 | 1.016 | 0.913–1.132 | 0.765 |
| Increased consumption | 1.264 | 0.898–1.779 | 0.179 | 1.505 | 0.787–2.877 | 0.217 |
| Reduced consumption | *1.768* | *1.304–2.398* | *<0.001* | 0.947 | 0.523–1.717 | 0.858 |
| *Sugary drinks* | | | | | | |
| Prior to pandemic | 1.010 | 0.973–1.050 | 0.593 | 1.011 | 0.936–1.092 | 0.774 |
| During pandemic | *1.056* | *1.016–1.098* | *0.006* | 1.066 | 0.990–1.148 | 0.090 |
| Difference* | *1.098* | *1.034–1.166* | *0.002* | *1.174* | *1.023–1.348* | *0.022* |
| Increased consumption | *2.527* | *1.733–3.685* | *<0.001* | *2.192* | *1.086–4.428* | *0.029* |
| Reduced consumption | 0.958 | 0.653–1.406 | 0.827 | 0.749 | 0.355–1.579 | 0.447 |

(*continued*)

| Variables | Comfort food consumption | | | | | |
|---|---|---|---|---|---|---|
| | OR | Female CI (95%) | *p*-Value | OR | Male CI (95%) | *p*-Value |
| *Ultra-processed food* | | | | | | |
| Prior to pandemic | 1.015 | 0.965–1.067 | 0.569 | 1.086 | 0.981–1.202 | 0.111 |
| During pandemic | *1.063* | *1.011–1.117* | *0.017* | *1.131* | *1.022–1.251* | *0.018* |
| Difference* | *1.106* | *1.029–1.189* | *0.006* | 1.132 | 0.961–1.332 | 0.137 |
| Increased consumption | *2.755* | *1.862–4.076* | *<0.001* | 1.825 | 0.855–3.898 | 0.120 |
| Reduced consumption | 1.047 | 0.686–1.598 | 0.830 | 0.762 | 0.323–1.796 | 0.534 |
| *Candies* | | | | | | |
| Prior to pandemic | *1.076* | *1.032–1.122* | *0.001* | 1.027 | 0.946–1.115 | 0.523 |
| During pandemic | *1.173* | *1.127–1.221* | *<0.001* | *1.124* | *1.040–1.214* | *0.003* |
| Difference* | *1.177* | *1.116–1.241* | *<0.001* | *1.174* | *1.048–1.316* | *0.006* |
| Increased consumption | *2.977* | *2.255–3.930* | *<0.001* | *2.503* | *1.419–4.416* | *0.002* |
| Reduced consumption | 0.941 | 0.660–1.344 | 0.740 | 0.679 | 0.304–1.519 | 0.346 |
| *Fast foods* | | | | | | |
| Prior to pandemic | *1.064* | *1.006–1.125* | *0.029* | 1.105 | 0.990–1.233 | 0.075 |
| During pandemic | *1.081* | *1.024–1.142* | *0.005* | *1.142* | *1.031–1.265* | *0.011* |
| Difference* | 1.048 | 0.979–1.122 | 0.176 | 1.117 | 0.961–1.298 | 0.148 |
| Increased consumption | *1.868* | *1.333–2.617* | *<0.001* | *2.476* | *1.323–4.635* | *0.005* |
| Reduced consumption | 1.119 | 0.759–1.651 | 0.571 | 1.441 | 0.694–2.992 | 0.326 |

**Note:** *Difference in relation to the frequency between period of pandemic and period prior pandemic
**Source:** Authors' own creation

**Table 2.**

**Table 3.**
Independent factors associated with comfort food by gender during pandemic period in Brazil by multiple logistic regression analyses

| Variable | Comfort food consumption | | | | |
|---|---|---|---|---|---|
| *Female (76.4% of prediction; Hosmer–Lemeshow test = 0.903)* | YES | NO | OR | CI | *p*-Value |
| Increased snacking during pandemic | 64.6% | 33.3% | 1.993 | 1.459–2.722 | 0.010 |
| Increased bread intake during pandemic (frequency) | 27.8% | 13.6% | 1.821 | 1.236–2.682 | 0.002 |
| Increased time spent at work (including household chores) | 73.2% | 62.0% | 1.712 | 1.241–2.362 | 0.001 |
| Worsened sleep quality | 56.4% | 33.5% | 1.670 | 1.230–2.268 | 0.001 |
| Reduced number of meals | 30.5% | 22.4% | 1.578 | 1.117–2.227 | 0.010 |
| Candy intake during pandemic (times in week) | 5.0 (1.0–7.0) | 1.0 (0.0–5.0) | 1.121 | 1.068–1.176 | <0.001 |
| Increased alcoholic beverages during pandemic (dose) | 23.0% | 16.5% | 1.111 | 1.020–1.211 | 0.016 |
| Perceived stress (score) | 25.0 (21.0–29.0) | 21.0 (17.0–26.0) | 1.039 | 1.013–1.066 | 0.004 |
| Emotional eating (score) | 40.7 (22.2–54.6) | 22.2 (11.1–37.9) | 1.029 | 1.022–1.035 | <0.001 |
| Age (years) | 30.0 (23.0–37.7) | 34.0 (26.0–43.2) | 0.977 | 0.964–0.991 | 0.001 |
| Meat intake during pandemic (frequency) | 7.0 (5.0–10.0) | 7.0 (5.0–10.0) | 0.910 | 0.867–0.955 | <0.001 |
| Constant | | | 0.152 | | <0.001 |
| *Male (77.3% of prediction; Hosmer–Lemeshow test = 0.663)* | | | | | |
| Remote full-time work or study | 54.5% | 34.3% | 2.754 | 1.472–5.151 | 0.002 |
| Perceived stress | 25.0 (20.0–29.0) | 20.0 (14.0–24.0) | 1.078 | 1.029–1.128 | 0.001 |
| Emotional eating | 31.4 (22.2–51.8) | 22.2 (11.1–37.1) | 1.039 | 1.026–1.052 | <0.001 |
| Time to wake up | 7:00 (6:30–8:30) | 8:00 (7:00–9:00) | 0.999 | 0.999–0.999 | 0.001 |
| Constant | | | 0.266 | | 0.134 |

**Source:** Authors' own creation


**Note:** *p < 0.05 (Chi-square test)
**Source:** Authors' own creation

**Figure 2.**
Food categories reported as comfort food for both genders

*Factors affecting comfort food choice*

Lower age, remote full and/or part-time work or study, increased time spent on work (including household chores), UE, EE and PS were associated with CF in both women and men in the univariate analyses ($p < 0.05$ for all; Table 2). Among the variables related to lifestyle, anthropometric data and eating habits, the following were associated with CF consumption in both (women and men) in univariate analyses ($p < 0.05$ for all): increased screen time, increased alcoholic beverage dose, reduced sleep hours, worsened sleep quality, reduced physical activity, increased weight, increased food intake, increased snacking and use of food delivery systems, increased consumption of cereal, bread, cake and cookies, sausage, sugary drinks, candies and fast food and increased consumption of ultra-processed foods (Table 2). After multivariate analyses, only EE and PS were associated with CF consumption in both genders ($p < 0.05$). Eating habits were more frequently associated with CF consumption in women, while work schedules and waking time were associated with CF consumption in men (Table 3). In Table 3, it is also possible to observe the frequency of each factor independently associated with the presence of CF, according to gender.

## Discussion

The findings demonstrated that more than half of the people reported the consumption of CF during the period of social distancing due to COVID-19 in Brazil. The study has an innovative character, since few studies have evaluated CF consumption around the world during the pandemic period and, in Brazil, to the best of our knowledge, it is the first paper that focused on this research field. Scarmozzino and Visioli (2020) classified some foods such as chocolate, ice-cream, desserts and salty snacks as CF and evaluated the increased consumption of these specific categories in the Italian population during the pandemic period. It was observed that 42.5% reported having increased consumption of these foods, and when asked about the reasons for this, 42.7% said they consumed them due to greater stress, anxiety and boredom during quarantine (Scarmozzino and Visioli, 2020). Our findings are similar, as 54.3% of respondents reported the presence of CF during the pandemic period.

Since individuals were free to respond about the food consumed without predetermined categories, it was possible to carry out a faithful assessment of the occurrence of this behavior. At the same time, allow the subjectivity and symbolism inherent to the concept of CF to be embraced. This was illustrated by the phrases of some participants, such as "foods that remind me of a moment" or "food that reminds me of my mother." This subjectivity related to the foods chosen as CF reflects much about the concept of this behavior, including the search for pleasure and psychological and emotional comfort (Wansink *et al.*, 2003), justified by the atypical moment and context of tribulations experienced during the pandemic (Bhattacharjee and Acharya, 2020) and was manifested mainly by women, despite being strongly present in both genders (Hammarberg *et al.*, 2020).

For both genders, the highest scores of PS represented a prediction for the consumption of CF. The state of stress most often causes changes in food intake, which may lead to the consumption of high-fat-like fast food and highly palatable foods, such as sweets (Weltens *et al.*, 2014), and these food choices were observed in our study. It is important to emphasize that security measures, in particular the social distancing adopted to manage the COVID-19 pandemic, has had an intense impact on the daily lives of individuals (Tintori *et al.*, 2020), which could trigger feelings of fear and anxiety, in addition to physical and emotional reactions directly linked to stress levels (Saha *et al.*, 2020). Previous surveys carried out around the world have already demonstrated the contribution of numerous factors in the increase in stress levels during the pandemic, among which concerns related to the economic situation, health and exhaustion stand out (Kämpfen *et al.*, 2020; Lu *et al.*, 2020). These are, in fact, concerns pertinent to the moment and may reflect the vulnerability of different populations in regard to work. In Brazil, unemployment rates increased significantly during the pandemic, reaching more than 7 million people according to the Brazilian Institute of Geography and Statistics (IBGE, 2020).

In addition to unemployment itself, the form of work has also undergone enormous transformations, where people needed to adapt to fulfill their obligations remotely, restricted to their home and dependent on the screen in most cases (Barrea *et al.*, 2020). Our sample seems to follow this work trend since for men, working and studying remotely full time was one of the predictors for CF consumption. However, in a study that aimed to investigate the relationships among screen time-based sedentary behavior, eating self-regulatory skills and weight status among 186 private university students, the authors found that respondents spent most of the time on the internet for non-study purposes (148 ± 77.7 min; Tan *et al.*, 2022). In our study, for women, the increase in screen use occurred with the perception of an increase in working time, including household chores. As work became heavier and more intense during the pandemic period, the most common recreational activities became rarer due to the interruption of services considered nonessential (Arora and Grey, 2020).

As a result, people who previously performed most activities outside their home, including meeting with family and friends and going to bars and restaurants, were forced to seek new forms of entertainment and relaxation. This can further increase feelings of anguish, anxiety, fear and emotional overload and, consequently, promote chronic exposure to higher cortisol levels (Leigh Gibson, 2006). Consequently, there is greater activation of the brain reward system that leads the individual to overconsume foods with high palatability. When experiencing positive emotions from the choice, individuals tend to associate the memory of the taste with the reward sensations (Adam and Epel, 2007). Situations of extreme stress can also lead individuals to choose foods that promote relief from aversive feelings, contribute to the recovery of good memories, and refer to loved ones without

necessarily being triggered by an exclusively physiological process (Leigh Gibson, 2006; Locher *et al.*, 2005). Based on this discussion, it is possible to say that the influence of stress on CF consumption can occur for both physiological and psychological reasons. In the context of the pandemic, it can be inferred that the symbolic and affective aspects related to eating were enhanced, emphasizing the role of food as a source of pleasure and relief and as a form of connection, approximation and belonging in an attempt to rescue the feeling of being surrounded by friends, family and loved ones.

Stress levels can be related to increased scores of EE, which were also found as a predictor for the consumption of CF in our sample. EE is described as the tendency to overeat in response to atypical situations and negative emotions, such as anxiety, irritability and sadness, among other feelings (Arnow *et al.*, 1995) and has been shown to be related to more palatable food choices with the feeling of immediate pleasure and to CF consumption (van Strien *et al.*, 2019).

However, EE is also considered a condition that is sometimes unconscious and inadequate to provide a permanent improvement in negative emotions and that can cause weight gain and worsening in general aspects of health (Geliebter and Aversa, 2003). The relationship between consumption of more palatable foods in the behavior of EE, as well as the consumption of CF in our sample, was shown to be present since almost 80.0% of the foods mentioned were distributed in three main categories:

(1) "sweets";

(2) "cakes, cookies and breads;" and

(3) "fast food."

These findings can be explained by the fact that carbohydrate-rich foods, such as sweets and breads, and high-fat foods are recognized as CF because they have the effect of increasing the production of serotonin, which acts on people's mood and is used as a means of relieving stress as seen in previous studies by Bruta *et al.* (2021), Salazar-Fernández *et al.* (2021) and Spence (2017). Due to the scenario of social isolation being a negative experience that triggers stress, depression and boredom in individuals (Barrea *et al.*, 2020), these types of food may be preferable as a form of comfort.

The univariate analyses also reinforced the pattern of choosing foods considered more palatable, that is, rich in fats and carbohydrates, since the reduction in fresh foods such as fruits and vegetables was associated with a lower chance of CF consumption, while increases in sweetened drink, instant food and ultra-processed food consumption increased the chance of this behavior occurring in both genders.

This type of dietary pattern was even more prominent for the women in our sample and remained significant in the multivariate analysis. It was observed that the reduction in the number of meals and the increase in the habit of snacking were predictors for the consumption of CF in women. This led to the impression that women who consumed CF could be skipping the main and substantial meals and, with that, they would be more inclined to snack more frequently. This idea is part of the definition of the "meal" as a food episode motivated by hunger and as a response to a metabolic pattern, while the "snack" is known as a food episode not triggered by hunger but by a non-physiological stimulus (Marmonier *et al.*, 2002). This factor has been discussed in recent years based on studies that point out that when eating meals, people tend to make more conscious choices based on responses to hunger and satiety, while the habit of snacking can favor the worsening of eating patterns associated with irregular feeding events, as well as impulsive and immediate choices (Bellisle, 2014).

Changes in routines and the number of meals, when compared with the habits that preceded social distancing, were also accompanied by changes in food choices. In this context, one of the findings of the present study was the association of increased meat consumption with a reduced chance of CF consumption in women. Meats are foods with great satiety power (Veldhorst *et al.*, 2008), and although it is still a controversial topic in the literature, a previous study reported an association of meat consumption with positive emotional responses (Ashurst *et al.*, 2018). This study found, in a sample of young people, that those who consumed meat more frequently also experienced positive emotions more often than those who consumed less (Ashurst *et al.*, 2018). This could explain the lower demand for food to obtain pleasure and comfort in those women who have eaten meat more times/week in the present study, since this variable had a "protective" impact against CF consumption.

On the other hand, the increase in the intake of sweets and breads were predictors for the consumption of CF in women. In other populations, there were also significant increases in the consumption of sugars and breads during the COVID-19 pandemic (Błaszczyk-Bębenek *et al.*, 2020; di Renzo *et al.*, 2020). It is believed that the greatest demand for these foods occurs with the aim of obtaining immediate pleasure or from the feeling of deserving (Arora and Grey, 2020), in which the individual seeks a reward after a challenging or exhausting situation – such as a moment of stress or a difficult day at work (Pool *et al.*, 2015). This can occur due to the dopaminergic effect linked to this type of food (Ahmed *et al.*, 2013) but also with the simple fact that these foods are also part of the categories most mentioned as CF in our sample. From a more subjective perspective, it has already been observed that the search for ingredients used in the preparation of breads and desserts has grown significantly in some regions at the time of the pandemic (Bracale and Vaccaro, 2020). From one perspective, this demonstrates that in addition to the act of eating, the act of preparing food and enjoying these moments at home can also offer a comforting feeling. In our sample, this element was observed with nonspecific responses for the chosen food, in which the individuals answered that they were looking for homemade food or any food that resembled something or someone.

In addition to changes in habits and food choices, variables related to lifestyle were also associated with the consumption of CF in both genders in our sample. For men, the variable related to sleep patterns was the time to wake up, in which waking up later was inversely associated with the consumption of CF. We are not aware of any study that has identified waking time independently acting as a predictor of some behavior; however, this leads to the thought that performing all activities and daily needs at home may have favored a more flexible schedule, with the possibility of better distributing the time spent on each task. Being restricted to the home environment can be harmful in many respects, as mentioned, but it can also minimize concerns and stress related to traffic, reduced meal times and possible problematic interactions with bosses who share the same working space, among other factors (Staller and Randler, 2020).

In the context of the women in the sample, the worsening in sleep quality increased the chance of consuming CF. Sleep is an important regulator of emotion, so poor sleep quality is associated with worsening mental health as well as lifestyle and habits (Garbarino and Nobili, 2014; Avvenuti *et al.*, 2021). Thus, inadequate sleep increases stress levels and, consequently, contributes to harmful behaviors and food choices (Jamie *et al.*, 2017; Leenaars *et al.*, 2016). It is related to less control over the number of meals and worse eating patterns, in which there is a greater propensity to choose foods rich in calories, fats and sugar, and less consumption of fresh foods such as fruits and vegetables (Chaput, 2014). In fact, in research carried out in Italy, the authors observed worse sleep quality between participants

that increased purchase of CF and better sleep quality among those that increased purchase of fresh foods during the COVID-19 pandemic (Bruno *et al.*, 2022).

Younger age was also on the list of predictors for consumption of CF in women. The discussion about the relation of women with food has been permeated by factors that include several speculations and the influence of hormonal fluctuations throughout the menstrual cycle (Dye and Blundell, 1997; Kuga *et al.*, 1999; Eckel, 2011; Hirschberg, 2012). Older studies had previously found that food preferences are not uniform throughout the menstrual cycle and that predictions of eating sweets and foods rich in fat can increase, especially in the luteal phase (Johnson *et al.*, 1994; Rock, 1996). Although the literature is still scarce in this field of study, some studies have confirmed these preferences (Dos Santos *et al.*, 2011) and add the possibility that the food choices made in that period are guided not only by taste but also by emotional factors in a search for comfort and relief (Klump *et al.*, 2013). Although these repercussions are related to reproductive age, such symptoms are more frequently reported in younger women (Klump *et al.*, 2013; Orra and Ferraz, 2019).

Another factor inherent to the consumption of CF in women was the increase in the consumption of alcoholic beverages. Although the consumption of alcoholic beverages by women has grown significantly in recent decades from 6% a 27% (Wilsnack *et al.*, 2017), and the results are compatible with other studies carried out during the pandemic (Sidor and Rzymski, 2020; Suffoletto *et al.*, 2020), in the present context, this relationship with CF may be more associated with an attempt to appease feelings of boredom, stress and even the exhaustion related to household chores that often fall on women.

Similar results were found with foods mentioned as CF and perhaps the same motivations were observed for men and women, since the presence of this behavior reflects the intention of obtaining pleasure and emotional/psychological comfort (Wansink *et al.*, 2003). This is a long-standing discussion but remains very subjective and may be related to the roles played in society, concerns and the economic situation, among several other factors (Beardsworth *et al.*, 2002; Spence, 2017).

This study provides an important overview of the possible contributions of the pandemic on behaviors and food choices related to the consumption of CF in the Brazilian population. Understanding the possible predictors behind changes in habits and behavior is something that significantly contributes to adherence to broad and interdisciplinary approaches related to health. Our main limitation is that self-reported questionnaires can lead to incorrect data collection, as they depend entirely on the volunteers' memory and interpretation. In addition, the identification of CF consumption was performed through a single question, since there is no validated questionnaire in Portuguese for this purpose. However, these biases were minimized in the construction of the questionnaire so that it was easy to understand. The greatest potential strength of the study was the fact that it was carried out at a time when the changes resulting from the pandemic could already be noticed and when more than 80% of the volunteers reported that they were fully complying with social distancing guidelines.

In conclusion, the consumption of CF during the pandemic period was observed in 54.3% of the sample and was independently associated with PS and EE in both genders. In addition, for men, full-time work and remote study and the time to wake up were also independently associated factors. For women, the independently associated factors included changes in eating patterns (intake of sweets, meat and bread, habit of snacking and number of meals), working time, sleep quality, alcohol consumption and age. This information is valuable to support further studies to investigate and treat the impacts of the pandemic on

lifestyle, eating habits and behavior, mental health and other factors in the postpandemic period.

Furthermore, preventive strategies can be taken since de CF behavior, along with sedentary lifestyle, can be a predictor of several health problems (Kandiah *et al.*, 2006; Tomiyama *et al.*, 2011; Tryon *et al.*, 2013).

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**Corresponding author**
Lívia Garcia Ferreira can be contacted at: livia.ferreira@ufla.br

# CAPÍTULO 3

## ESTUDOS PROVENIENTES DA ANÁLISE LONGITUDINAL DOS DADOS

## APRESENTAÇÃO

O presente capítulo é fruto da análise longitudinal dos dados da pesquisa. O primeiro deles, intitulado *"Daily Habits of Brazilians at Different Moments of the COVID-19 Pandemic"* foi publicado no periódico *Nutrients* e contou com a colaboração de pesquisadoras estrangeiras que conduziram um dos primeiros trabalhos sobre a mudança de hábitos durante a pandemia de COVID-19. O segundo artigo aborda os constructos do comportamento alimentar e estresse percebido no contexto da pandemia e ainda não foi submetido para publicação.

TÍTULO:

DAILY HABITS OF BRAZILIANS AT DIFFERENT MOMENTS OF THE COVID-19 PANDEMIC

AUTORES:

REVISTA E ANO DE PUBLICAÇÃO:

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# Daily Habits of Brazilians at Different Moments of the COVID-19 Pandemic

**Tamires Cássia de Melo Souza [1], Juliana Costa Liboredo [2], Lívia Garcia Ferreira [3], Marina Martins Daniel [3], Laura Di Renzo [4], Francesca Pivari [5] and Lucilene Rezende Anastácio [1,*]**

[1] Department of Food Science, Faculty of Pharmacy, Universidade Federal de Minas Gerais, Belo Horizonte 31270-901, Brazil
[2] Department of Food, Universidade Federal de Ouro Preto, Ouro Preto 35400-000, Brazil
[3] Department of Nutrition, Universidade Federal de Lavras, Lavras 37200-000, Brazil
[4] Section of Clinical Nutrition and Nutrigenomic, Department of Biomedicine and Prevention, University of Tor Vergata, 00133 Rome, Italy
[5] Department of Health Sciences, University of Milan, 20142 Milan, Italy
* Correspondence: lucilene.rezende@gmail.com; Tel.: +55-031-3409-6917; Fax: +55-031-3409-6910

**Abstract:** Background: The COVID 19 pandemic impacted the health and well-being of different populations around the world. The aim of this study is to investigate the changes in the daily habits of Brazilians before and during two moments of the COVID-19 pandemic. Methods: A longitudinal study in which an online questionnaire (sleeping time, alcohol consumption, smoking, use of screen devices, physical activity, and dietary patterns) was applied at three moments. Results: The frequency of alcohol consumption, smoking, and sleep hours did not change significantly at different times. For the number of alcoholic beverages, there was a reduction in consumption from T0 to T1 and an increase from T1 to T2. There was a significant increase in hours of screen device use from T0 to T1, remaining high at T2. Finally, the level of physical activity in minutes reduced from T0 to T1, returning to base levels at T2. As for eating habits, there was an increase in the frequency of consumption of instant meals, fast food, and sweets at the first moment, with a significant reduction at the second moment. The consumption of legumes, milk and dairy products, bakery products, and meats was higher at T2. Conclusions: Some habits returned to or approached T0 levels. However, other habits remained unchanged, such as screen time and frequency of consumption of some food groups, throughout the last evaluation.

**Keywords:** coronavirus; food; physical activity; well-being; screen use



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## 1. Introduction

The COVID-19 pandemic began in March 2020 [1], and in the middle of November 2022, more than 630 million cases worldwide had been reported—35 million in Brazil. Additionally, more than 6.3 million deaths had occurred, and Brazil ranked second, with more than 689 thousand deaths [2]. Due to the high transmission rate characteristic of the new coronavirus (SARS-CoV-2), numerous safety measures have been established to minimize the damage and exposure of the population, with recommendations for the use of protective masks, suspension of various activities, personal hygiene, and mainly, social distancing and isolation measures [3,4].

Staying at home was strongly suggested in several places around the world in order to contain virus transmission [5]. This significantly affected the health and well-being of several populations around the world, promoting changes in their dietary patterns [6–8], eating behaviors [9–11], physical exercise practice [12–16], mental health, and many other aspects such as sleeping quality, mood, and body weight [17–22].

In Brazil, studies have already demonstrated changes in the eating habits of adolescents [10], worsening quality of life for adults [15], worsening eating patterns in underdeveloped regions of the country [23], changes in the self-perception of the health of

adult individuals [24], and high prevalence of psychiatric disorders and binge eating [25]. However, most studies carried out in Brazil and around the world showed a perspective on the changes observed at the beginning of the implementation of the lock-down decrees and distancing/isolation measures—more or less restricted according to each region—and so far, few have presented data collected at two or more moments, covering the periods of the flexibility of preventive measures [26–30].

The changes in daily habits occurring after the COVID-19 pandemic have been attributed to numerous factors [31]. Initially, the difficulty in accessing food was blamed on: The restriction of free movement to certain places of purchase; the closing of canteens and restaurants; the reduction in purchasing power due to the increase in unemployment rates; the change in the way of working, and consequently, the readjustment of daily habits; behavioral changes, fears, apprehensions and even the passing sensation of "vacation"; and economic changes and food insecurity [32–35]. Subsequently, changes in diet were also associated with the difficulty of changing habits acquired in the first phase of the lockdown [5]. Changing eating habits may have resulted in important changes in the nutritional status and overall health of the population [36]. Studies have also speculated about the possibility of a significant increase in chronic and nutritional diseases [37].

Therefore, it is essential to observe the context of the eating habits and lifestyle of the population during the COVID-19 pandemic, especially considering the different periods (including the gradual return of activities, the progress of vaccination campaigns, and changes in the economic and social scenarios). Such investigation can help to understand the implications of so many changes in the daily lives of individuals and support the implementation of new interventions and health strategies. Thus, the objective of the present study was to verify changes in Brazilian adults' daily habits, lifestyle, and eating habits before and at two moments during the COVID-19 pandemic.

## 2. Materials and Methods

### *2.1. Study Design and Participants*

This was a longitudinal observational study of data related to the daily habits of Brazilians during the COVID-19 pandemic. It included 464 individuals residing in any region of Brazil, over 18 years of age, who agreed to participate and answer the online questionnaire (Figure 1). The project was approved by the Ethics and Research Committee of the Universidade Federal de Viçosa (protocol number 35516720.5.0000.5153). All the proposed steps followed the guidelines provided by the Declaration of Helsinki [38].

The study's first phase occurred from August to September 2020—approximately five months after the implementation of social isolation measures in the country. The volunteers were instructed to answer questions about their habits in the period before the pandemic (T0—retrospective data) and during the pandemic up until that time (T1). In Brazil, the measures implemented during that period included the suspension of non-essential activities (closing of restaurants, bars, malls, and gyms) and suspension of in-person classes at schools and universities, with the implementation of emergency online teaching [39–41]. For this study, the pre-pandemic period was defined as being from January to March 2020. The second phase of the study (T2) took place from May to June 2021—approximately ten months after the first phase of the research. The epidemiological scenario of the pandemic in Brazil at T1 and T2 can be seen in Figure 2.

### *2.2. Data Collection Questionnaire and Procedure*

The semi-structured online questionnaire was based on other studies that had already been carried out during the pandemic [42,43] and were created on the Google Forms® platform (Google Corp Inc., EUA, Menlo Park, CA, USA). The questionnaire link was spread through emails, reports, university websites, and social media (Facebook, Instagram, LinkedIn, and WhatsApp) using the snowball sampling technique [44]. The questionnaire was accessible via cell phone, computer, or any other device with an Internet connection. Filling out the form took about 15 min.

The first part of the research included the consent form. Participant responses were anonymous, and they could stop participating in the study at any stage before submitting the answers.

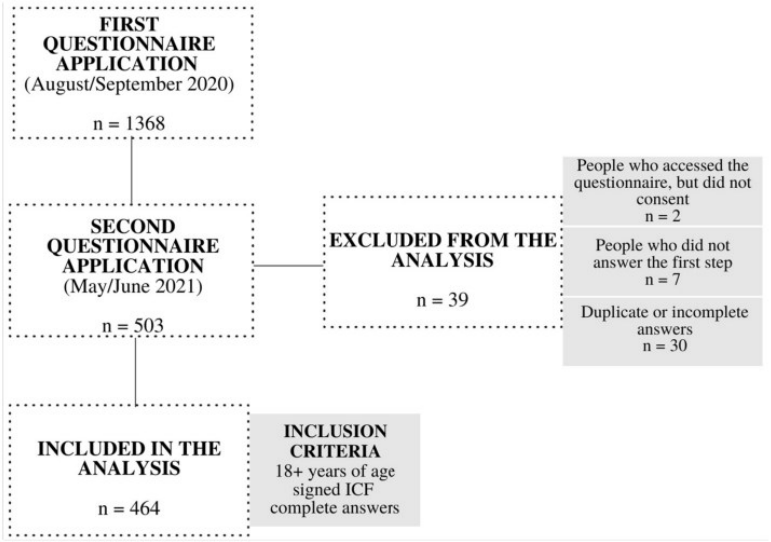



**Figure 1.** Recruitment of the research volunteers.

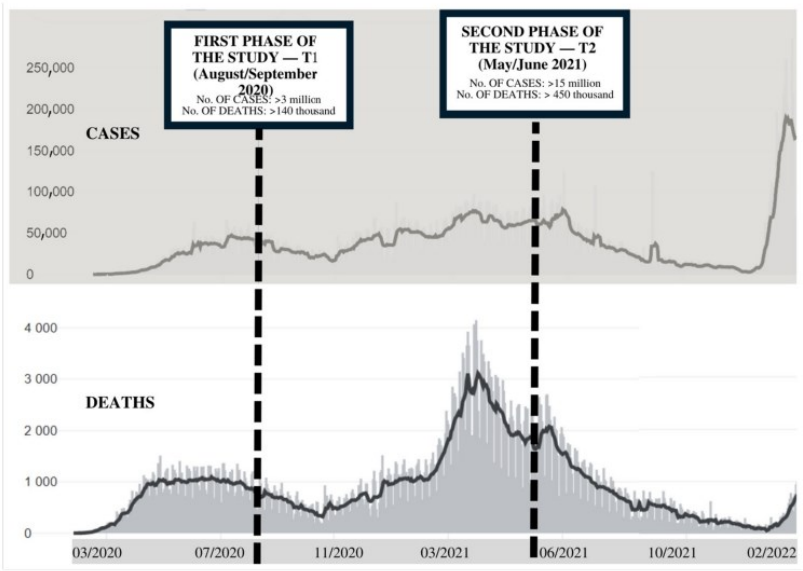



**Figure 2.** Research phases according to the epidemiological scenario of the COVID-19 pandemic in Brazil.

### *2.3. Variables*

The variables collected were divided into three groups of simple and multiple-choice questions (Figure 3). The first group consisted of questions about gender (female, male, and others); age (in years); schooling (complete middle school, incomplete high school, complete high school, incomplete undergraduate degree, complete undergraduate degree, incomplete graduate degree, complete graduate degree); monthly per capita income

(R$); physical/social distancing (full; partial; none); occupational status (unemployed; retired; working/studying thoroughly remotely; working/studying partially remotely; working/studying in person; others) and place of residence (city/state). Volunteers answered these questions at T1 and T2. The second group addressed daily habits and lifestyle questions, and the third group contained questions about eating habits, as described below.

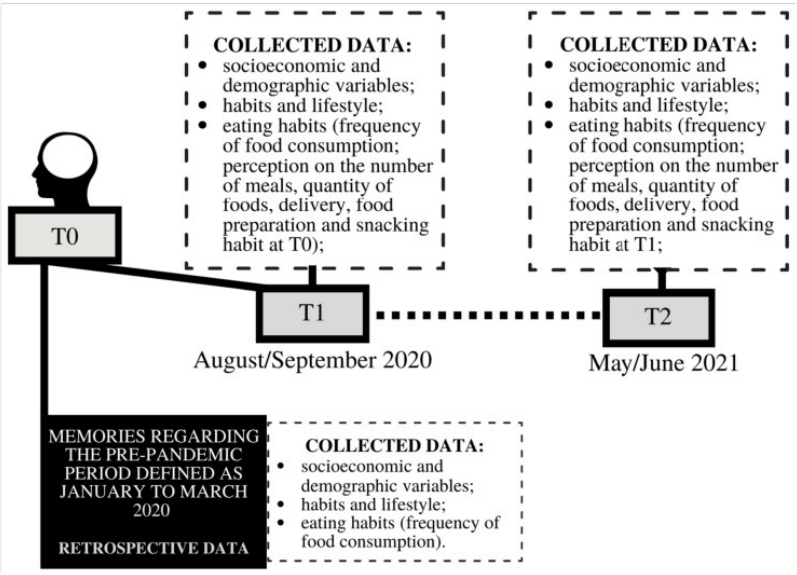



**Figure 3.** Detailing the periods and variables collected in each research phase.

### *2.4. Daily Habits*

Regarding daily habits and lifestyle, participants were asked about sleeping time (hours), smoking habits, alcohol consumption (weekly and the number of standard drinks per occasion), screen time, such as the use of smartphones, computers, tablets, and TV (hours/day), and physical activity (minutes/week) at T0, T1, and T2. The frequency of consumption of alcoholic beverages was divided into six categories: Does not consume; rarely consumes; consumes once a week; consumes 2 to 3 times/week; consumes from 4 to 6 times/week and consumes every day (categorized, respectively, as 0; 0.5 times; 1 time; 2.5 times; 5 times and seven times). Smoking was verified and divided into five categories: does not smoke, smokes up to 10 cigarettes a day; smokes 11 to 20 cigarettes a day; smokes from 21 to 30 cigarettes a day, and smokes more than 30 cigarettes a day (categorized, respectively, as 0; 10; 15; 25 and 32 cigarettes/day). Screen time was divided into five categories: up to 4 h; from 5 to 8 h; from 9 to 12 h; from 13 to 16 h, and longer than 17 h (later categorized, respectively, as 3 h; 6.5 h; to 10.5 h; 14.5 h and 17 h). The practice of physical activity was divided into six categories: Does not practice; practices for less than 90 min; practices from 91 to 150 min; practices from 151 to 210 min; practices from 211 to 270 min and practices for more than 270 min per week.

### *2.5. Eating Habits*

The eating habits evaluated included: The number of meals eaten at T0, T1, and T2 (breakfast, morning snack, lunch, afternoon snack, dinner, supper, and other meals); increase, reduction, or maintenance of the amount of food consumed, the habit of snacking between meals, use of delivery services and practices of cooking at home. In addition, the Food Frequency Questionnaire was applied at T0, T1, and T2. This questionnaire was adapted from the model proposed by the Food and Nutrition Surveillance System (SISVAN) [45] for the following groups: legumes; cereals; bakery products; milk and dairy

products; fruits; meats; processed meats; vegetables; sugary drinks; instant meals; sweets and fast food. The frequency of consumption of food groups was reported as follows: Never, rarely, once a week, 2 to 3 times/week, 4 to 6 times/week, earlier, and more than once a day.

### *2.6. Data Analysis*

Data were analyzed using the Statistical Package for Social Sciences® software (SPSS® Inc., Chicago, IL, USA) version 21.0. By using the Kolmogorov-Smirnov test, it was detected that the data did not have a normal distribution. Therefore, the results were presented as a median associated with the interquartile range and in frequencies. The Friedman test with Bonferroni correction was used to compare paired samples of numerical variables (T0, T1, and T2), while the Cochran's Q test with Bonferroni correction was used for categorical variables. The McNemar test was used to compare the categorical variables at two different times (T1 and T2), and the Wilcoxon test was used to compare the numerical variables referring to the values obtained by the differences between T1 and T0 (ΔT1T0) and between T2 and T1 (ΔT2T1). The data were presented in tables, graphs, and figures. The significance level adopted was 5%.

## 3. Results

This research included 464 volunteers who participated in the two phases of data collection (Figure 1), and 80.4% (373) were from the southeastern region of Brazil, with a median age of 24 (32–40) years. Of the participants, 95.7% (444) had completed their undergraduate and graduate studies or were still studying to obtain such degrees. More than half of the sample consisted of professors and students, 19.6% (91) and 40.7% (189), respectively. Most of the sample was women, corresponding to 82.8% ($n$ = 384) of the participants. There was less social distancing and changes in the occupational situation (more people studying/working in person) between T2 and T1 (Table 1).

**Table 1.** General characteristics of the volunteers who participated in the first and second phases of the research.

| Variable | T1<br>Median (Q1–Q3)<br>% (*n*) | T2<br>Median (Q1–Q3)<br>% (*n*) | *p*-Value |
|---|---|---|---|
| Gender | | | |
| Female | 82.8% (384) | 82.8% (384) | - |
| Male | 17.2% (80) | 17.2% (80) | |
| Age (years) | 24.0 (32.0–40.0) | 24.0 (32.0–40.0) | - |
| Schooling | | | |
| Complete middle school | 0.2% (1) | 0.2% (1) | |
| Incomplete high school | 3.7% (17) | 3.7% (17) | |
| Complete high school | 0.4% (2) | 0.4% (2) | - |
| Incomplete undergraduate degree | 19.8% (92) | 19.8% (92) | |
| Complete undergraduate degree | 23.3% (108) | 23.3% (108) | |
| Incomplete graduate degree | 41.6% (193) | 41.6% (193) | |
| Complete graduate degree | 11.0% (51) | 11.0% (51) | |

**Table 1.** *Cont.*

| Variable | T1<br>Median (Q1–Q3)<br>% (*n*) | T2<br>Median (Q1–Q3)<br>% (*n*) | *p*-Value |
|---|---|---|---|
| Monthly per capita income (R$) | 4.702.5<br>(3.657.5–7.837.5) | 4.702.5<br>(2.612.5–7.837.5) | 0.779 [1] |
| Social distancing | | | |
| Total | 60.3% (280) | 45.5% (211) | <0.001 [2] |
| Partial | 36.6% (170) | 48.1% (223) | (44.982) |
| None | 3.0% (14) | 6.5% (30) | |
| Occupational status | | | |
| Unemployed | 7.8% (36) | 6.3% (29) | |
| Retired | 3.4% (16) | 3.9% (18) | <0.001 [2] |
| Working/studying fully remotely | 44.8% (208) | 44.4% (206) | (40.503) |
| Working/studying partially remotely | 27.8% (129) | 22.8% (106) | |
| Working/studying in person | 10.6% (49) | 20.0% (93) | |
| Others | 5.6% (26) | 2.6% (12) | |

[1] Wilcoxon test; [2] McNemar-Bowker Test.

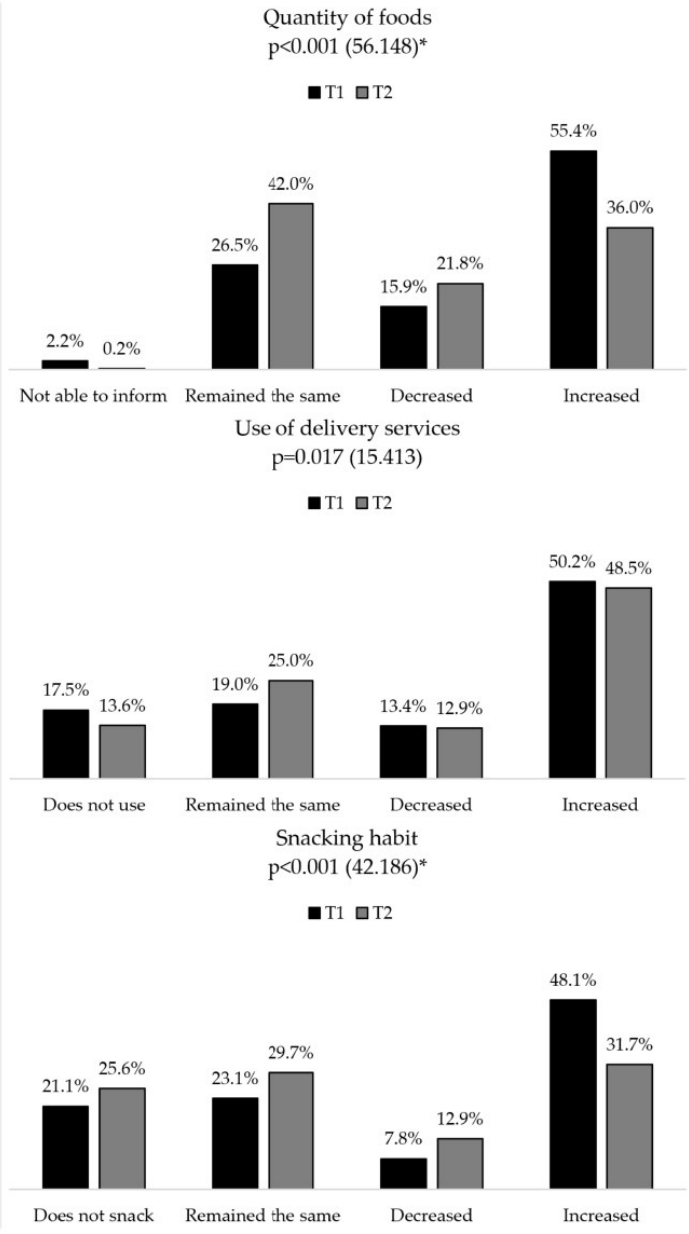
Regarding daily habits and lifestyle, when comparing the three moments (T0; T1 and T2), it was possible to observe significant changes in the time spent in front of screens and devices ($p < 0.001$), in the number of drinks of alcoholic beverages per occasion. ($p = 0.007$), and in the weekly practice of physical exercise ($p < 0.001$) (Table 2). The median screen time increased from 6.5 h (3.0–6.5 h) at T0 to 10.5 h (6.5–14.5 h) at T1 and remained unchanged at T2. As for the number of drinks of alcoholic beverage, it was possible to notice a difference between all the times evaluated, with a decrease from T0 to T1 and an increase from T1 to T2. Finally, the practice of physical exercise was reduced by more than 30% in the first phase, returning to the baseline in the second phase.

**Table 2.** Daily habits before and during the COVID-19 pandemic.

| Variable<br>Median (Q1–Q3) | T0 | T1 | T2 | *p*-Value |
|---|---|---|---|---|
| Screen time (hours/day) | 6.50 [a]<br>(3.00–6.50) | 10.50 [b]<br>(6.50–14.50) | 10.50 [b]<br>(6.50–10.50) | <0.001 [1] |
| Frequency of alcoholic beverage intake (times/week) | 0.50<br>(0.00–1.00) | 0.50<br>(0.00–2.50) | 0.50<br>(0.00–1.00) | 0.216 [1] |
| Number of standard drinks of alcoholic beverage (drinks/ocasion) | 2.50 [a]<br>(0.00–2.50) | 1.00 [b]<br>(0.00–2.50) | 1.75 [c]<br>(0.00–2.50) | 0.007 [1] |
| Cigarette (number/days) | 0.00<br>(0.00–0.00) | 0.00<br>(0.00–0.00) | 0.00<br>(0.00–0.00) | 0.687 [1] |
| Sleeping time (hours/day) | 8:00<br>(7:00–9:00) | 8:00<br>(7:00–9:00) | 8:00<br>(7:00–8:30) | 0.067 [1] |
| Physical activity (minutes/week) | 120 [a]<br>(80–180) | 80 [b]<br>(0–120) | 120 [a]<br>(0–180) | <0.001 [1] |

[1] Friedman test with Bonferroni correction (different letters indicate significant changes).

Among the variables related to eating habits, 55.4% (257) of the volunteers reported having increased the amount of food consumed from T0 to T1, while this increase was reported by 36.0% (167) of participants from T1 to T2. Regarding the habit of using delivery services, the increase occurred for 50.2% (233) of the volunteers at T1 and for 48.5% (225) at T2. The habit of snacking increased for 48.1% (223) of participants at T1, and for 31.7% (147) at T2. The increase in home meal preparation was reported to be 66.2% (307) of the sample at T1, and by 41.6% (193) at T2. The reduction of the amount of food ingested, of snacking and meal preparation was significant when comparing T1 with T2 ($p < 0.001$), as shown in Figure 4.

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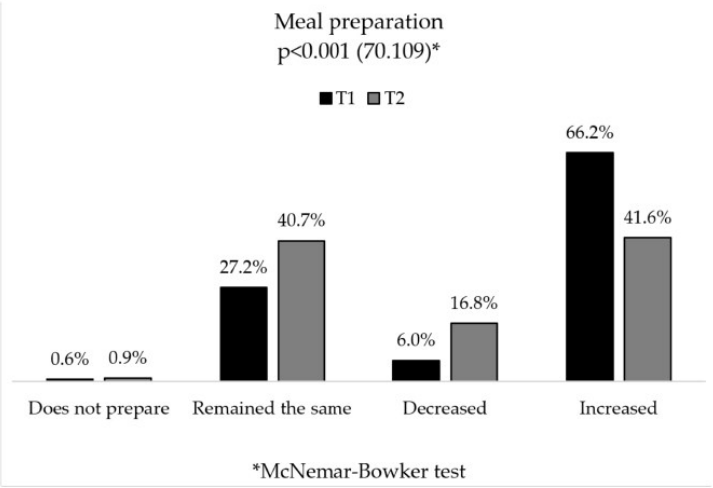



**Figure 4.** Changes regarding the amount of food ingested, use of delivery services, habit of snacking and meal preparation in the first and second phases of the research. *: $p < 0.001$.

Data referring to meals eaten in the period before the pandemic (T0) and at both moments during the pandemic (T1 and T2) demonstrated that the number of people having a morning snack and other non-traditional meals increased at T1. At T2, the number of people having a morning snack increased again while it decreased for other meals. These changes were statistically significant ($p < 0.001$ and $p = 0.015$, respectively), whereas there were no significant changes regarding the other meals—breakfast, lunch, afternoon snack, dinner and supper—when comparing the three moments (Figure 5).

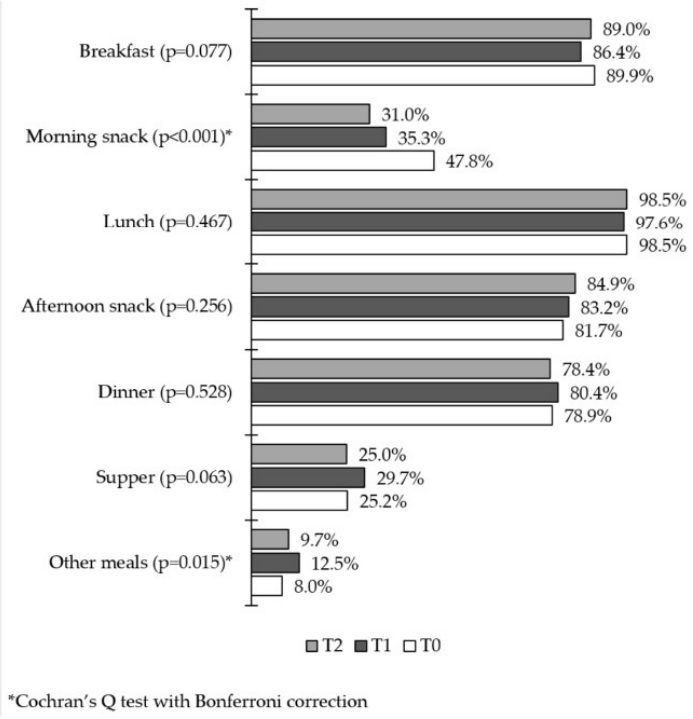
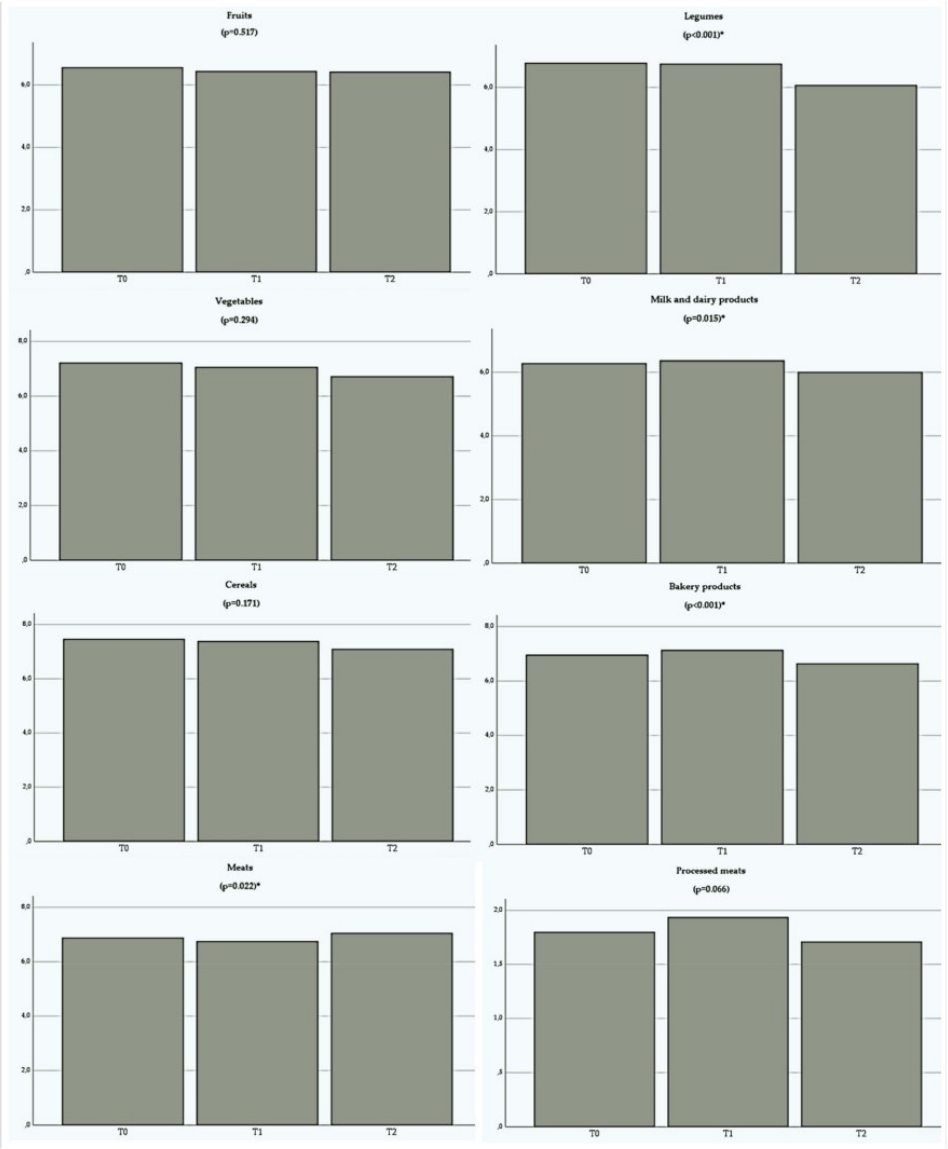



**Figure 5.** Daily meals in the first and second phases of the research.

By evaluating the frequency of food consumption, significant differences were observed in the legume group, milk and dairy products, meats, fast food, instant meals, sweets and bakery products (Figure 6). For the legume group, consumption remained similar between T0 and T1, with a significant reduction from T1 to T2 ($p < 0.001$). Consumption of milk and dairy products and bakery products also followed this tendency, that is, consumption of such products remained the same in the first phase of the research, and a decrease was observed in the second phase ($p = 0.015$ and $p = 0.001$, respectively). The frequency of meat intake remained constant from T0 to T1, showing an increase from T1 to T2 ($p = 0.022$). For the fast food and candy group, there was an increase in the first observation phase and a reduction in the second ($p = 0.011$ and $p < 0.001$, respectively). The consumption of instant meals increased from T0 to T1 and remained the same from T1 to T2 ($p < 0.001$).

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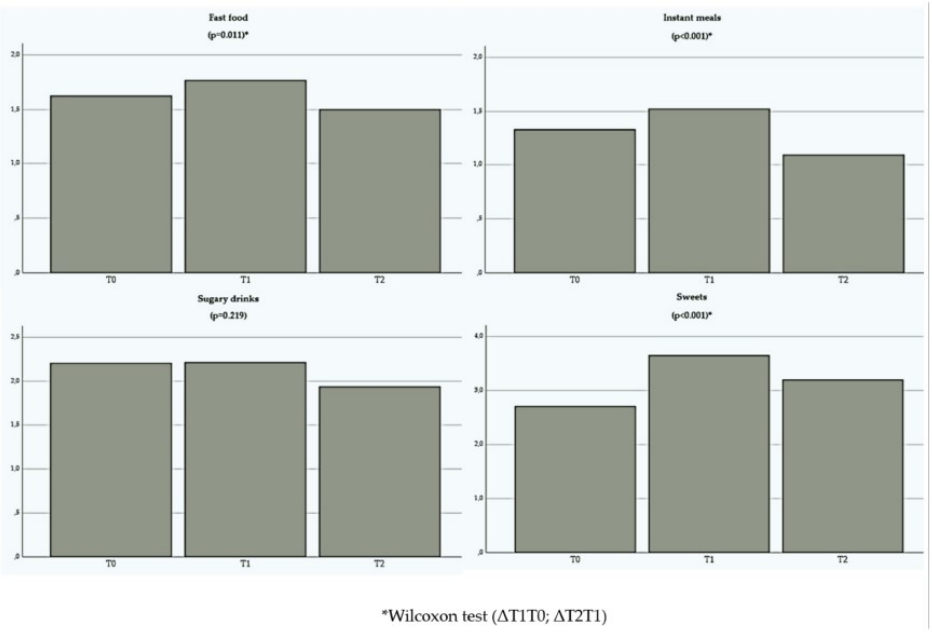


**Figure 6.** Frequency of Food Consumption reported by volunteers in the first and second phases of the research.

## 4. Discussion

The research was carried out at two moments. The first questionnaire application took place approximately five months after the start of the social distancing measures in Brazil (August/September 2020). In this period, the scenario was considered to be a public calamity according to Legislative Decree No. 6 of 20 March 2020 and the recommendations included the interruption of services classified as non-essential—activities not necessary to guarantee the survival, health, supply and security of Brazilian citizens [46]. In the second phase of the survey (May/June 2021), numerous activities were already being resumed, such as gyms, bars and restaurants. Moreover, there was a hybrid return to schools in different regions, and resumption of several in-person activities and work. In this last phase, vaccination campaigns were at the very beginning and still uneven. Approximately only 12.0% of the Brazilian population had completed the vaccination protocol initially proposed at that time [47].

In Brazil, the context was different in the two phases of the application of the research. Initially, compliance with the physical and social distancing measures reflected concern about the epidemiological scenario and agreement with what was being implemented [48]. However, at the second moment of the research, the population was already exerting more pressure on the government to return to activities that were previously prohibited [49]—a pressure reinforced by political speeches that disagreed with the maintenance of restrictive measures [11]. The relaxation of restrictions affected some general characteristics of the participants of this study, evidencing significant changes in the practice of social distancing and the occupational situation/form of work during the COVID-19 pandemic. At T1, 60.3% of the volunteers reported to be fully compliant with the established measures. At the same time, at T2, that number dropped to 45.5%, showing an increase in the number of people who were partially complying with or were not adopting any type of social distancing ($p < 0.001$). A similar finding was observed in a study carried out with Brazilian adults, which showed an 11.1% reduction in participant compliance with the strictest physical/social distancing measures from the first phase (July 2020) to the second (February 2021) [28]. Regarding the occupational situation, the present study showed a reduction

in the number of people working remotely and an increase in partially remote or entirely in-person work ($p < 0.001$).

The gradual return to in-person activities was accompanied by changes in the daily habits of the population. It was possible to notice that the practice of physical activity presented a significant decrease of more than 30.0% of the weekly exercise minutes at T1. Surveys worldwide have shown a similar pattern after social distancing measures began. For instance, almost 80.0% of a sample composed of 1613 adult Brazilians [50] and 48.9% of a sample consisting of 1491 Australian adults [51] reported negative impacts on physical exercise as a result of the COVID-19 pandemic [50]. There was also an average reduction of 40 min per week among the Middle Eastern population [52] and worsening or maintenance of sedentary levels in different locations [7,12,43,53,54]. Despite the reduction at T1 found in the present study, there was a significant increase in the practice of physical exercise at T2, where the median returned to baseline—from 80 min/week (0–120) to 120 min/week (0–180) ($p < 0.001$). It is worth mentioning that, even so, the weekly time spent exercising was below the new levels recommended by WHO (150 to 300 min per week of light to moderate physical activity) [53].

The time spent using screens and devices also changed at T1 compared to T2, with a median increase of 4 h daily. Nonetheless, at T2, even with the gradual return of in-person activities, screen time was still elevated and unchanged, remaining at the median of 10.5 h (6.5–10.5 h) daily. While almost 45.0% of the sample continued working/studying thoroughly remotely, it is speculated that screen use goes beyond professional reasons. In a study carried out with 725 Brazilians, 71.3% of the sample reported having increased the use of screens and devices to access media and the Internet, while 73.6% of the volunteers stated that online interactions promoted a sense of well-being [54]. These devices expand communication possibilities and have numerous attractive features, but, at the same time, when excessively used in the daily life of individuals, they can bring risks. Moreover, reducing the time spent in front of screens can be challenging after becoming a habit [55], especially in this sample, where 60.3% of the volunteers were teachers and students carrying out the activities remotely/online.

Some studies performed during the pandemic and in other situations have already shown that the increase in screen time has also been accompanied by changes concerning food and lifestyle, such as increased consumption of alcohol and smoking. However, the present study showed a significant reduction in the number of standard drinks of alcoholic beverages consumed in the first phase of observation (from T0 to T1), decreasing from 2.5 (0.00–2.50) drinks to 1.0 (0.00–2.50) drinks per occasion of consumption. There was also a significant change in the second phase, and the median consumption was 1.75 drinks (0.00–2.50)—still below the baseline. A possible explanation for the difference observed in the consumption of standard drinks of alcoholic beverages—since its frequency did not change—is that, at T1, safety measures included closing bars and restaurants, suspension of events, and restriction of the sale of alcoholic beverages in numerous contexts/environments. Although the offer of these services had already been resumed at T2, 45.5% of the volunteers still complied with total distancing, while 48.1% partially adhered to such measures. Furthermore, in many cultures, the intake of alcoholic beverages is a behavior directly linked to the context of socialization [56] and contact deprivation due to the pandemic may have contributed to the outcome found in the present study.

Some eating habits also vary due to the context experienced, such as several meals eaten, the amount of food ingested, the habit of snacking, and meal preparation. The reduction observed in the number of people having a morning snack and other meals, besides the most common ones, in the habit of snacking and in the preparation of meals can be justified by the gradual return of activities, as well as the resumption of the routine to something closer to "normal"—since there was a significant difference in the variables related to the way the volunteers worked. In the first phase of the study (T1), there were still many uncertainties regarding the COVID-19 pandemic, and the epidemiological and informative bulletins were still not able to clarify all doubts concerning the best forms of

treatment, and deadlines for maintaining distancing measures, among other questions that bothered the population [57].

Therefore, people were looking for ways to adapt to the new routine, and the unpredictability of the duration and unfolding of the pandemic contributed to the idea that decisions regarding daily habits were also temporary and had exclusively immediate effects [58,59]. Thus, many food choices may have been made for different reasons, either to seek comfort due to stress, fear, or worries [6] or simply because of the feeling of "free time/vacation" that being confined could cause in some [60]. At T2, information about COVID-19 was more consistent, and the situation was no longer as unpredictable as before, including the return of previously suspended activities [57], which may have contributed to the resumption of eating habits. This pattern of changes was observed even in the results referring to the frequency of food consumption. There was a significant increase in the consumption of instant meals, fast food, and sweets from T0 to T1, but a substantial reduction from T1 to T2, returning weekly frequency to baseline. For the legume group, milk and dairy products, and bakery products, consumption remained constant in the first phase, significantly reducing in the second. For the meats, an increase in T2 was observed.

While it is possible to observe slight changes in eating habits in general, it is essential to search for and understand more complex factors that can significantly interfere with how individuals deal with food in the pandemic context, such as eating behavior and perceived stress. For instance, previous research has revealed that almost 50.0% of the sample assessed showed craving behavior (or food craving), especially for sweets, in the first phase of the study, and this was associated with numerous factors, such as socioeconomic status, lifestyle, eating habits and eating behavior [61].

The results found in the present study represented a situation contrary to what was observed in the first phase of this research [8], in which the general deterioration of the habits and lifestyle of the evaluated individuals was very clearly perceived. Nowadays, some habits have returned or come very close to the baseline findings, such as physical exercise levels and consumption frequency of ultra-processed foods (sweets and instant meals) and high-calorie foods (fast food). This tendency seems to accompany the idea that the initial and adverse effects of the pandemic on habits and quality of life can evolve positively, even if slowly, with the new perspectives of a routine closer to "normal" [30,62].

It is important to emphasize that the present study has limitations that should be discussed. The fact that the questionnaire was answered using a device with an Internet connection may have affected the scope of the research, as well as the loss of more than 60% of the initial sample from T1 to T2. The final sample was composed primarily of people who have attained higher levels of education and have elevated per capita income, and thus, it is not representative of all Brazilians. Therefore, it is essential to note that this work does not reflect the impacts of food insecurity afflicting the country, especially in the context of the pandemic and dismantling of public policies for social protection [35,63]. Furthermore, a study carried out with 16,440 Brazilian individuals showed that the perception of people on social isolation during the COVID-19 pandemic varies according to income and education [64].

Nonetheless, this research also has strengths, such as the fact that it was one of the pioneers in observing changes in the habits and lifestyle of the population during the COVID-19 pandemic in Brazil. The data allow us to understand that many changes have taken place and that a close look at these changes will be necessary. Other research that supports strategies to face new Public Health problems is also required.

Until now, it has been possible to conclude that daily habits and lifestyle, such as the frequency of alcohol consumption, smoking, and hours of sleep, did not show significant changes at the evaluated moments. The consumption of alcoholic beverages decreased from T0 to T1 and increased from T1 to T2. There was a significant increase in screen and device usage time from T0 to T1, which remained elevated at T2, even with the gradual return to in-person activities. Finally, the practice of physical activity reduced from T0 to T1 and returned to baseline from T1 to T2.

As for eating habits, there was a significant increase in the consumption of instant meals, fast food, and sweets at first, with a substantial reduction at the second moment. For legumes, milk and dairy products, bakery products, and meats, an increase in T2 was observed. Regarding meals, there was a reduction in the number of people having a morning snack at all observed moments, while there was an increase from T0 to T1 and a decrease at T2 concerning other non-traditional meals.

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## TÍTULO:

COMPORTAMENTO ALIMENTAR E ESTRESSE PERCEBIDO EM INDIVÍDUOS BRASILEIROS DURANTE DOIS MOMENTOS DA PANDEMIA POR COVID-19: ANÁLISE LONGITUDINAL E FATORES ASSOCIADOS

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# COMPORTAMENTO ALIMENTAR E ESTRESSE PERCEBIDO EM INDIVÍDUOS BRASILEIROS DURANTE DOIS MOMENTOS DA PANDEMIA POR COVID-19: ANÁLISE LONGITUDINAL E FATORES ASSOCIADOS

Tamires Cássia de Melo Souza[1]; Josmar Mazucheli[2]; Juliana Costa Liboredo[3]; Lívia Garcia Ferreira[4]; Marina Martins Daniel[4]; Lucilene Rezende Anastácio[1]

[1]Departamento de Ciência de Alimentos da Universidade Federal de Minas Gerais; [2]Departamento de Estatística da Universidade Estadual de Maringá; [3]Departamento de Alimentos da Universidade Federal de Ouro Preto; [4]Departamento de Nutrição da Universidade Federal de Lavras.

## Resumo

Situações de crise podem desencadear alterações consideráveis no comportamento alimentar e, com o advento da pandemia por COVID-19 vivenciada nos últimos três anos, estudos já se dedicaram a descrever diversas modificações no contexto da alimentação. Embora exista vasta literatura acerca das escolhas alimentares e possíveis impactos da pandemia nos hábitos de vida, ainda são escassos os estudos que busquem entendimento e reflexão sobre o comportamento alimentar e estresse percebido – principalmente de forma longitudinal. Por isso, o objetivo do presente trabalho foi verificar modificações e fatores associados ao comportamento alimentar (descontrole alimentar, comer emocional e restrição cognitiva) e estresse percebido de adultos brasileiros em dois momentos durante a pandemia por COVID-19. Trata-se de estudo observacional, longitudinal, realizado com 464 indivíduos brasileiros em dois momentos durante a pandemia por COVID-19. Os dados foram coletados por meio de questionário *online* semiestruturado, aplicado em dois momentos: agosto a setembro de 2020 (T1); maio a junho de 2021 (T2). Para as comparações dos escores das variáveis de comportamento alimentar e de estresse percebido observadas no T1 e no T2, utilizou-se o Estimador de Quantil Harrell-Davis. Os fatores associados aos maiores escores de cada comportamento em T1 e T2, foram investigados por *Machine Learning*, pelo método de *Classification and Regression Trees* (CART). Foi possível observar diferença estatisticamente significante entre T1 e T2 apenas para a variável de estresse percebido. Para o descontrole alimentar, os fatores relacionados aos maiores escores foram: hábito de beliscar, presença de *Comfort Food* e de *Craving*, peso e consumo de bebida alcoólica. Os maiores escores de comer emocional estiveram associados à presença de *Comfort Food*, ao peso e ao hábito de beliscar. Para a restrição cognitiva, os escores mais elevados se relacionaram com o peso e com o tempo de prática de exercício físico. Os fatores relacionados aos maiores escores de estresse percebido foram o peso e a qualidade de sono. Em conclusão, o comportamento alimentar dos indivíduos que participaram do estudo não foi modificado ao longo de nove meses da pandemia por COVID-19, entretanto, o estresse percebido aumentou durante o período. Fatores associados ao comportamento alimentar incluem hábitos de beliscar, presença de *Comfort Food* e *Craving*, além de consumo de bebida alcoólica, peso, prática de exercício físico e qualidade do sono. O presente trabalho propõe uma reflexão importante em relação às inúmeras questões que podem desencadear comportamentos alimentares disfuncionais e maiores níveis de estresse. Os resultados encontrados podem contribuir para o melhor entendimento sobre o comportamento alimentar e o estresse percebido em situações de crise, no contexto do perfil de indivíduos estudados.

**Palavras-chave:** covid-19; estresse; comer emocional; restrição cognitiva; descontrole alimentar.

# 1. INTRODUÇÃO

Situações de crise podem desencadear alterações consideráveis no comportamento alimentar (HUNTER; GERRITSEN; EGLI, 2023) e, com o advento da pandemia vivenciada nos últimos três anos, estudos já se dedicaram a descrever diversas modificações no contexto da alimentação, como: menor consumo de frutas e hortaliças; maior consumo de *fast food* e alimentos ultraprocessados; inclusão de uma ou mais refeições no dia; maior preparo de alimentos em casa (BARREA *et al.*, 2020; EFTIMOV *et al.*, 2020; RODRÍGUEZ-PÉREZ *et al.*, 2020).

Ainda, algumas pesquisas relacionaram as mudanças na maneira das pessoas se alimentarem neste período com: estarem diretamente envolvidas no enfrentamento da pandemia, trabalhando na linha de frente contra a COVID-19 (LIBOREDO *et al.*, 2021); maior angústia decorrente da insegurança alimentar durante a pandemia (KEENAN *et al.*, 2021); mudanças na forma de trabalhar/estudar (LIBOREDO *et al.*, 2021); estresse e emoções negativas resultantes do distanciamento físico e social (ARORA; GREY, 2020). Embora exista vasta literatura acerca das escolhas alimentares e possíveis impactos da pandemia nos hábitos de vida, ainda são escassos os estudos que busquem entendimento e reflexão sobre o comportamento alimentar e estresse percebido – principalmente de forma longitudinal. Por isso, o objetivo do presente trabalho é verificar modificações e fatores associados ao comportamento alimentar e estresse percebido de adultos brasileiros em dois momentos durante a pandemia de COVID-19.

# 2. MÉTODOS

## 2.1 Desenho do estudo, instrumento e procedimentos para a coleta de dados

Estudo observacional, longitudinal, realizado com indivíduos brasileiros durante a pandemia por COVID-19, para investigação do comportamento alimentar, hábitos alimentares e diários, bem como o estilo de vida. Os dados foram coletados por meio de questionário *online* semiestruturado – baseado em estudos prévios (DI RENZO *et al.*, 2020; SCARMOZZINO; VISIOLI, 2020; SIDOR; RZYMSKI, 2020) – em dois momentos, sendo: agosto a setembro de 2020 (T1); maio a junho de 2021 (T2) (FIGURA 1).

A técnica de amostragem utilizada foi a “bola de neve” (BALTAR; BRUNET, 2012), com a divulgação da pesquisa em e-mails, reportagens, sites das universidades e mídias sociais (Facebook, Instagram, LinkedIn e WhatsApp). Os participantes podiam acessar o questionário por qualquer dispositivo com conexão à internet - telefone celular, computador, tablet, etc. A primeira parte da pesquisa incluiu o termo de consentimento e apenas aqueles que aceitaram participar tiveram acesso ao questionário. A conclusão do questionário levava cerca de 15 minutos, as respostas eram anônimas e os participantes poderiam interromper a participação no estudo em qualquer fase antes do envio das respostas.

Foram incluídos indivíduos residentes de qualquer região do Brasil, maiores de 18 anos, que concordaram em participar e responder o questionário *online*. Foram excluídos os indivíduos que se recusaram a participar da pesquisa, os que responderam de forma incompleta e as mulheres grávidas. O projeto foi aprovado pelo Comitê de Ética e Pesquisa da Universidade Federal de Viçosa (protocolo de número 35516720.5.0000.5153) (ANEXO B) e todas as etapas propostas cumpriram as diretrizes fornecidas pela Declaração de Helsinque.

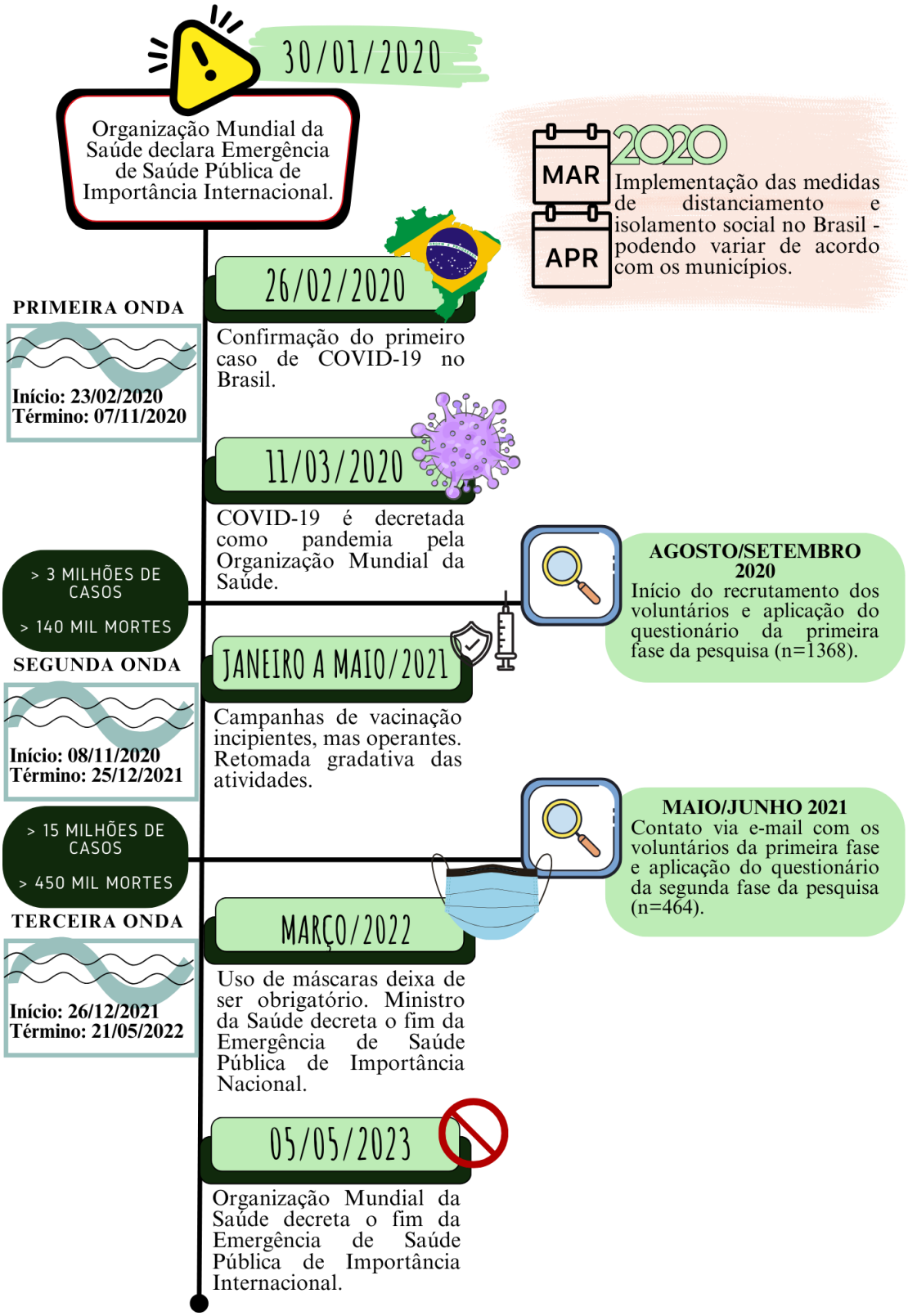



**Figura 1 – Linha do tempo com os marcos da pandemia por COVID-19 e etapas da pesquisa**

**Fonte: autoria própria.**

## 2.2 Variáveis coletadas

### *2.2.1 Variáveis socioeconômicas e demográficas*

Os participantes iniciavam o questionário respondendo sobre: gênero (feminino, masculino e outros); idade (em anos); escolaridade (ensino fundamental completo; ensino médio incompleto; ensino médio completo; graduação incompleta; graduação completa; pós-graduação incompleta; pós-graduação completa); renda mensal (R$) – posteriormente utilizada para cálculo da renda *per capita*; situação ocupacional (desempregado(a); aposentado(a); trabalhando/estudando de forma totalmente remota; trabalhando/estudando de forma parcialmente remota; trabalhando/estudando não remotamente; outros); local de residência (cidade/estado) e composição da residência (morando com quem e quantas pessoas). Além disso, os voluntários eram questionados se estavam praticando o distanciamento físico/social (total; parcial; nenhum) e se trabalhavam na linha de frente de enfretamento à COVID-19.

### *2.2.2 Comportamento alimentar e estresse percebido*

O comportamento alimentar foi avaliado por meio da versão brasileira do *Three-Factor Eating Questionnaire* (TFEQ-R21) traduzido para o português e validado por Natacci e Ferreira Júnior (NATACCI; FERREIRA JÚNIOR, 2011). O TFEQ-R21 avalia o comportamento alimentar com base em três fatores, incluindo o descontrole alimentar (DA), o comer emocional (CE) e a restrição cognitiva (RC) (NATACCI; FERREIRA JÚNIOR, 2011), por meio de 21 questões (formato de resposta de 4 pontos para os itens 1 a 20 e escala numérica de 8 pontos para a questão 21). Para este questionário, todas as respostas recebem pontuação entre 1 e 4. Antes de calcular as pontuações, as perguntas de 1 a 16 devem ser codificadas inversamente e o item 21 deve ser registrado da seguinte forma: os escores de 1–2 como 1; 3–4 como 2; 5– 6 como 3 e 7–8 como 4. A escala de RC é composta pelos itens 1, 5, 11, 17, 18 e 21. A escala de DA é composta pelos itens 3, 6, 8, 9, 12, 13, 15, 19 e 20. A escala de CE é composta pelos itens 2, 4, 7, 10, 14 e 16. A média de cada um deve ser calculada e transformada em escala de 0 a 100 pontos conforme recomendado na instrução de pontuação (NATACCI; FERREIRA JÚNIOR, 2011).

O estresse percebido (EP) foi avaliado por uma versão de 10 itens da *Perceptual Stress Scale* (PSS) validada para a população brasileira (REIS; HINO; RODRIGUEZ AÑEZ, 2010). A PSS-10 é composta por 10 itens respondidos por meio de uma escala de cinco pontos (nunca; quase nunca; às vezes; frequentemente; e sempre) considerando os últimos 30 dias. Os itens 4, 5, 7 e 8 são positivos e por esta razão devem ter a pontuação invertida (0 = 4; 1 = 3; 2 = 2; 3 = 1 e 4 = 0). Após a inversão, todos os itens devem ser somados. O escore (0 – 44), obtido com a soma de todos os itens, é utilizado como a medida de estresse percebido (REIS; HINO; RODRIGUEZ AÑEZ, 2010).

### *2.2.3 Dados antropométricos, hábitos alimentares, hábitos diários e estilo de vida*

Os participantes foram questionados sobre sua altura (m) e o peso atual (kg). Os hábitos relacionados à alimentação incluíram: hábito de beliscar entre as refeições, uso de *delivery* e hábito de cozinhar em casa (aumento, manutenção e redução). Ainda, foi abordada a ocorrência do consumo de *Comfort Food* – alimentos cujo consumo evoca prazer e conforto psicológico e emocional (Wansink; Cheney; Chan, 2003) – e *Craving* – forte desejo de comer um alimento específico (Boswell; Kober, 2016). Para isso, as perguntas incluídas no questionário foram, respectivamente: “neste momento da pandemia, você está comendo algum alimento ou preparação com intuito de ter conforto emocional?”; e “neste momento da pandemia, você tem tido desejo intenso de consumir algum alimento específico?”.

Quanto aos hábitos de vida, os participantes também foram questionados sobre: qualidade de sono (melhora; manutenção; e piora); tempo de tela (horas/dia) - smartphones, computador, tablet, TV; tabagismo (presença ou ausência); consumo de álcool. A frequência de consumo de bebidas alcoólicas foi dividida em 6 categorias: não consome; consome raramente; consome 1x/semana; consome 2 a 3x/semana; consome de 4 a 6x/semana e consome todos os dias (categorizada, respectivamente, em: 0; 0,5 vez; 1 vez; 2,5 vezes; 5 vezes e 7 vezes). Posteriormente, a dose e a frequência de consumo de álcool foram multiplicadas para estimativa da quantidade ingerida de bebida alcoólica por semana.

O tempo de tela foi dividido em cinco categorias: até 4 horas; de 5 a 8 horas; de 9 a 12 horas; de 13 a 16 horas e maior que 17 horas (posteriormente categorizado em, respectivamente: 3 horas; 6,5 horas; 10,5 horas; 14,5 horas e 17 horas). A prática de exercício físico foi investigada por meio de questionário fechado, dividido em seis categorias que variavam de 0 a 270 (ou mais) min/semana.

## 2.3 Análise dos dados

Para as comparações dos escores das variáveis de comportamento alimentar (DA, CE e RC) e de EP observadas no T1 e no T2, foi utilizada a proposta discutida em Wilcox e Erceg-Hurn (2012), denominada Estimador de Quantil Harrell-Davis (WILCOX *et al.*, 2013). Neste teste, a comparação de dois grupos dependentes é realizada a partir da análise de agrupamentos nas distribuições marginais (percentis 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80% e 90%).

Os perfis relacionados aos maiores escores de cada comportamento em T1 e T2 foram investigados por meio de Regressão por Árvores (os *scripts* se encontram no ANEXO C), algoritmo de *Machine Learning*, nomeado como *Classification and Regression Trees* (CART), proposto por Breiman *el al*. (1984) (BREIMAN *et al.*, 1984). O algoritmo CART efetua partições na amostra com base nas covariáveis de maior importância/interferência/interação para a variável desfecho – criando grupos mais homogêneos. O algoritmo começa na raiz da árvore e efetua uma divisão, criando dois subconjuntos no próximo nível da árvore – as partições realizadas pelo algoritmo são binárias, sucessivas e baseadas em diferentes preditores. O procedimento é repetido da mesma maneira nos níveis seguintes até que as partições sejam cessadas naturalmente. Os subconjuntos criados pelas divisões são chamados de nós. Os subconjuntos que não são divididos são chamados de nós terminais. Com isso, partindo do modelo criado é possível observar: as representações dos valores ajustados para a variável desfecho; os fatores associados à variável desfecho (que motivam as partições); o número de indivíduos que compõe cada grupo. Para o presente trabalho, o algoritmo aplicado permitiu a observação dos perfis de voluntários que apresentavam maiores e menores escores para as variáveis de comportamento alimentar e estresse percebido, nos dois tempos de investigação.

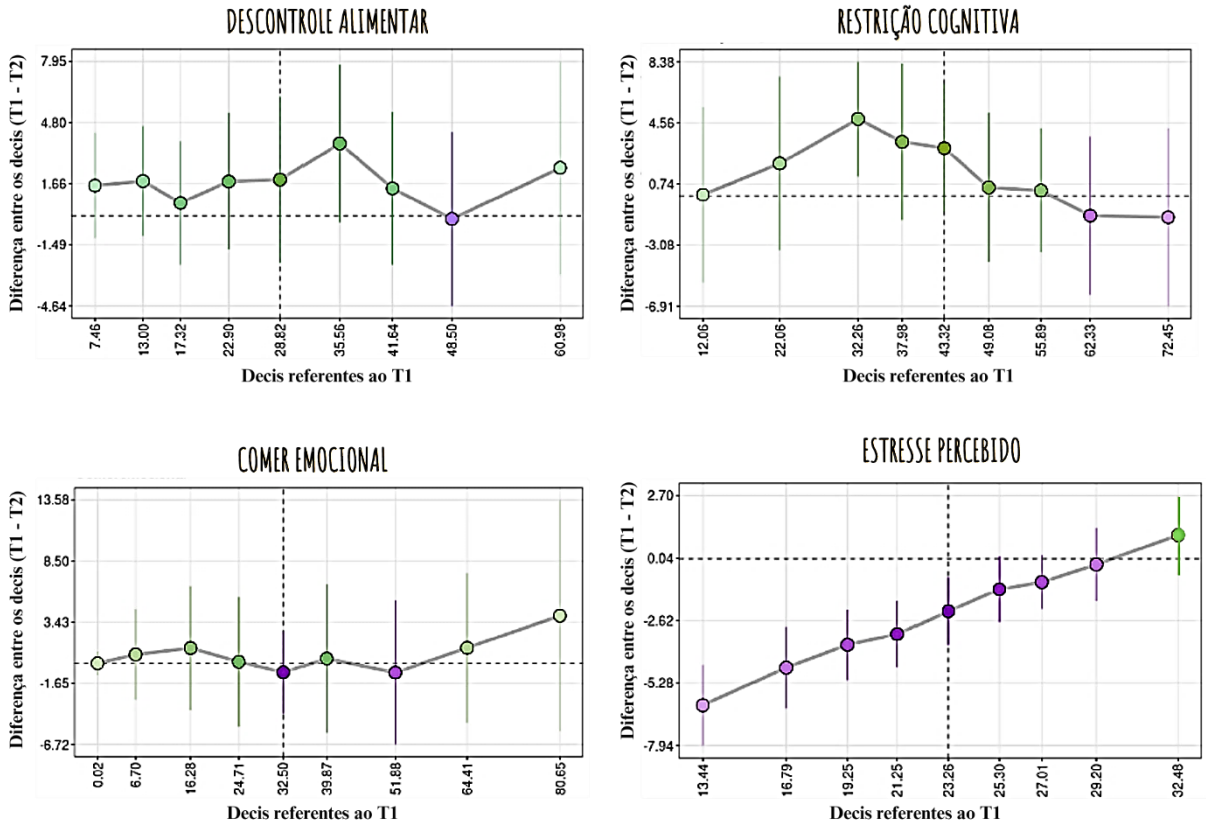
Todos os dados foram analisados por meio dos softwares estatísticos R Studio (RCore Team) e *Statistical Package for Social Sciences*® (SPSS® Inc., Chicago, IL, EUA) versão 21.0.

## 3 RESULTADOS

O presente estudo contou com 464 voluntários, sendo 82,8% (n=384) da amostra composta por mulheres. Destes, 60,3% (280) cumpriam distanciamento social total no T1, enquanto no T2, o percentual foi 45,5% (211). A idade mediana foi de 32 (24 - 40) anos e 95,7% (444) da amostra apresentava Graduação e Pós-Graduação completas ou em andamento. As características gerais dos participantes podem ser encontradas em detalhes em Souza *et. al*. (2022) (SOUZA *et al.*, 2022).

A análise que comparou os escores do T1 e T2 demonstrou que, para as variáveis de DA, CE e RC, não houve diferença estatisticamente significante entre os quantis temporais – vide intervalos de confiança de 95% (FIGURA 2). Já para o EP, é possível observar que inicialmente a diferença estimada entre o T1 e T2 tende a ser grande e negativa no quantil 10, diminuindo de forma progressiva até atingir o quantil 80 (FIGURA 2). Esse fato evidencia que os escores em T2 se tornam mais semelhantes aos escores em T1 à medida que o quantil aumenta. É importante notar que a partir do quantil 50 as diferenças tornam-se não significativas. Isso demonstra que no T2 os menores escores de EP foram significativamente superiores do que os menores escores relatados no T1, apresentando aumento de quase 50,0% no ponto da maior diferença observada (quantil 10). Os valores encontrados para cada quantil também podem ser observados no material suplementar (APÊNDICE 2).

**Figura 2 – Comparação dos quantis dos escores de comportamento alimentar e estresse percebido no T1 e T2**

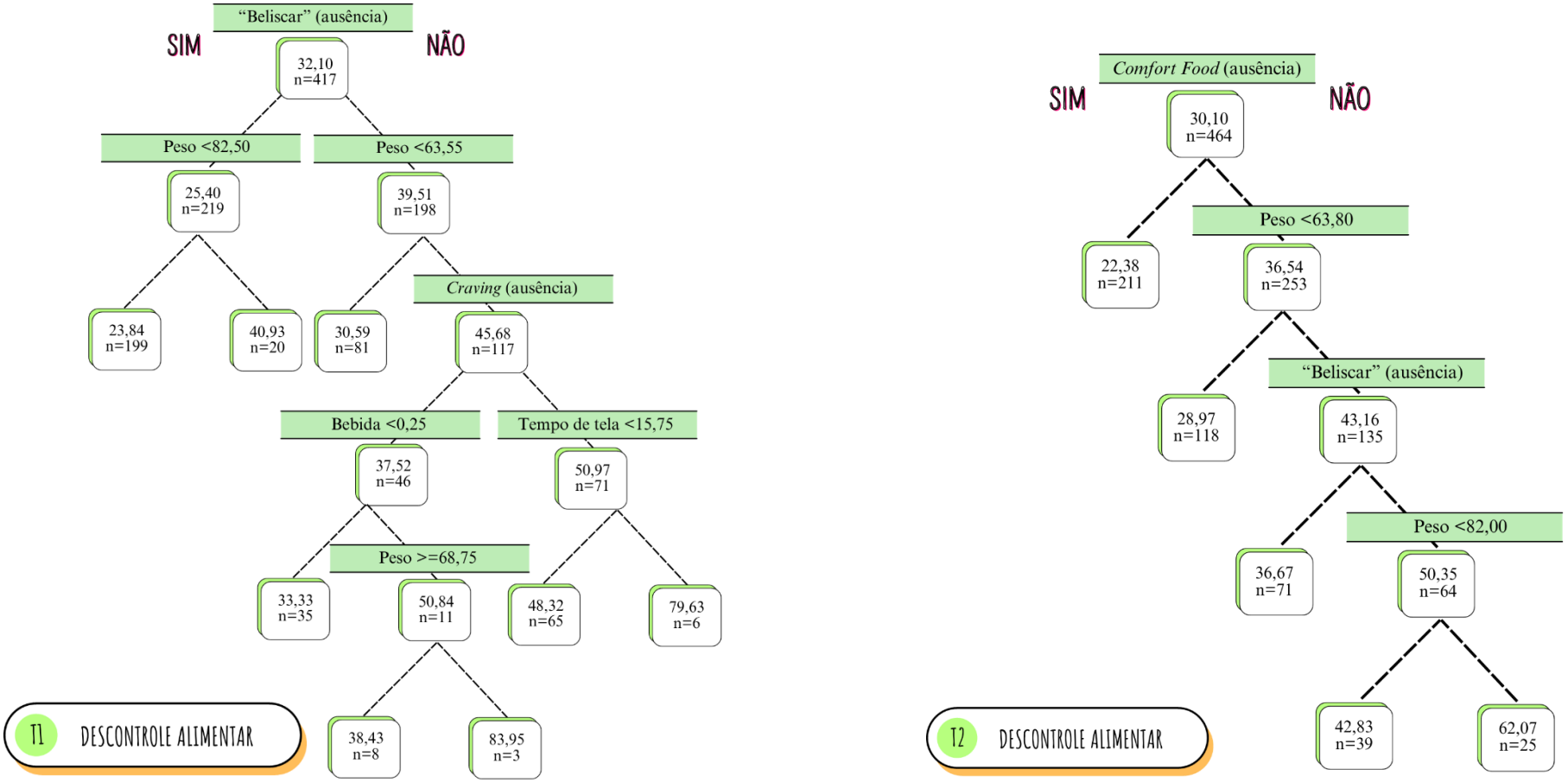



**Teste utilizado: Estimador de Quantil Harrell-Davis.**

Nas figuras, os círculos são coloridos em roxo e verde para representar diferenças negativas e positivas, respectivamente, entre os escores obtidos em T1 (agosto a setembro de 2020) e T2 (maio a junho de 2021). As linhas verticais acima e abaixo dos círculos representam os intervalos de confiança de 95%.

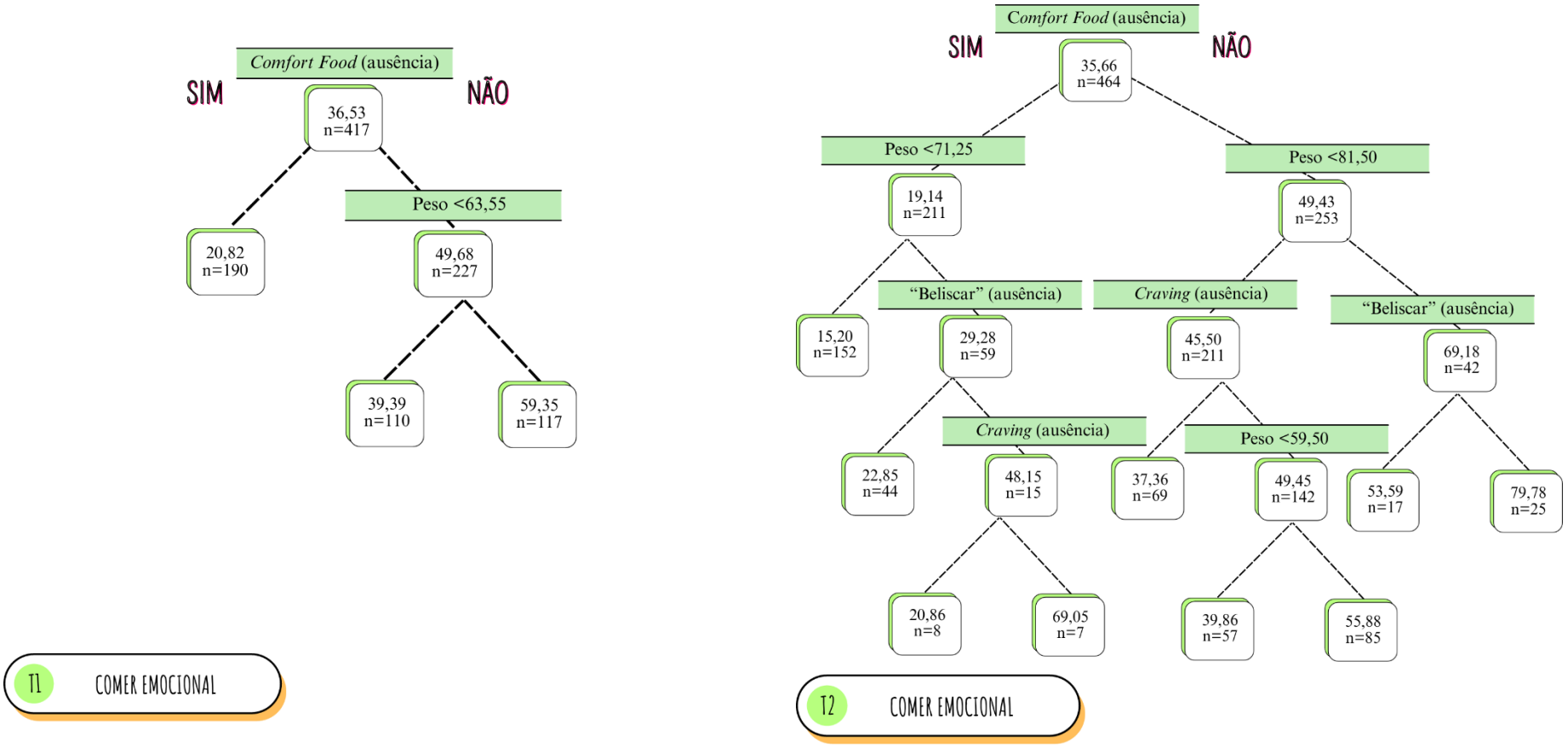
Os perfis relacionados aos maiores escores de DA, CE, RC e EP nos T1 e T2 foram apresentados e detalhados nas Figuras 3, 4, 5 e 6, respectivamente. Para o DA, o perfil dos participantes que apresentavam os maiores escores foram: hábito de beliscar, presença de C*omfort Food* e de *Craving*, peso e consumo de bebida alcoólica. Os maiores escores de CE estiveram associados à presença de *Comfort Food*, ao peso e ao hábito de beliscar. Para a RC, os escores mais elevados se relacionaram com o peso e com o tempo de prática de exercício físico. Os fatores relacionados aos maiores escores de EP foram o peso e a qualidade de sono.

**Figura 3 – Árvores de regressão referentes ao Descontrole Alimentar no T1 e T2**



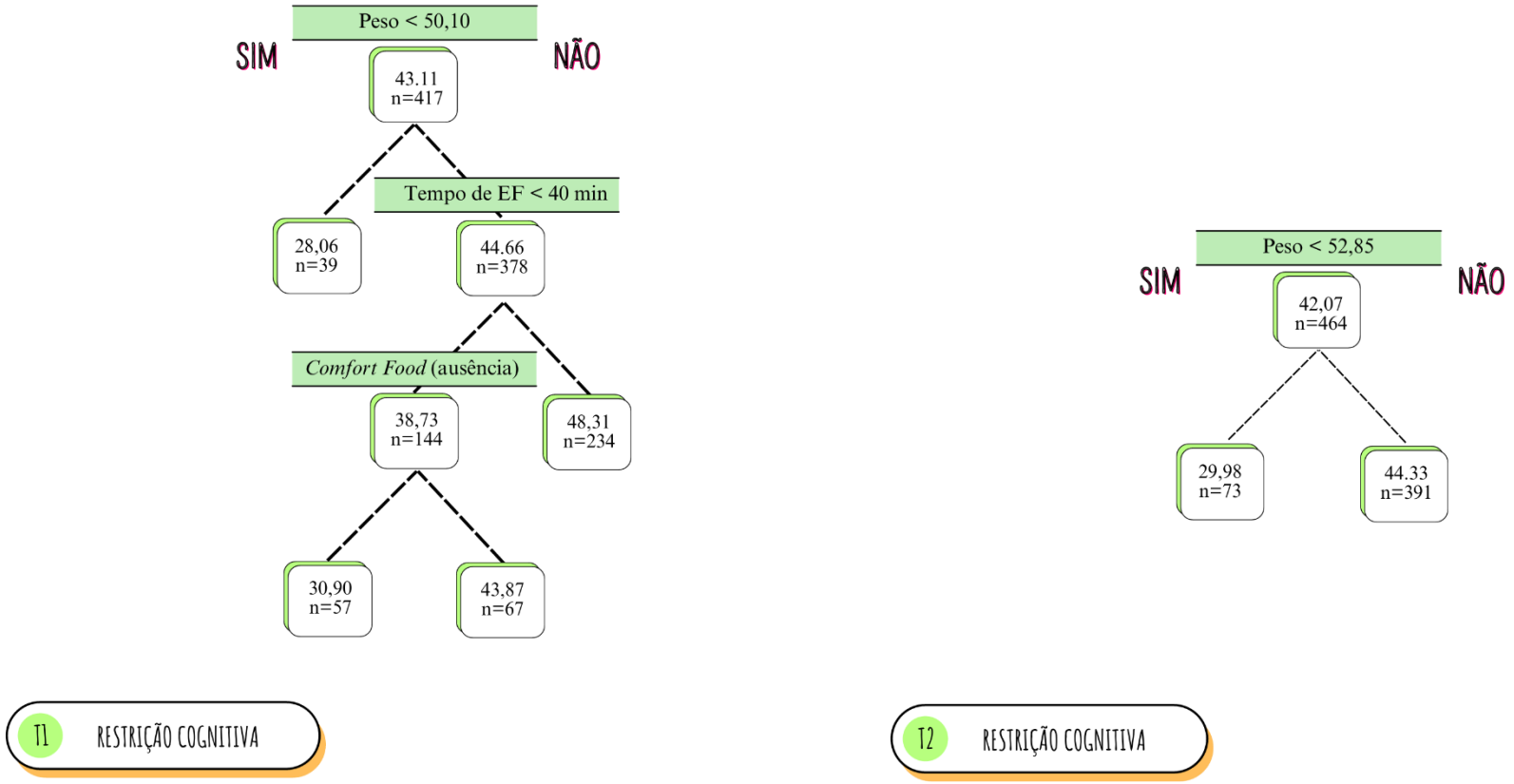

**T1 →** A média geral para o Descontrole Alimentar na amostra foi de 32,10. A ausência do beliscar promoveu a primeira divisão. Voluntários que não beliscavam e tinham peso <82,50kg apresentaram os menores escores (23,84). Os voluntários que tinham o hábito de beliscar, peso >63,55kg e <68,75kg, não relatavam *Craving* e tinham escore de bebida alcoólica >0,25 apresentaram os maiores escores de Descontrole Alimentar (83,95). **T2 →** A média geral para o Descontrole Alimentar na amostra foi de 30,10. A ausência de *Comfort Food* promoveu a primeira divisão e os voluntários que não relataram este comportamento apresentaram os menores escores (22,38). Os voluntários que tinham peso >82,00kg e que relatavam o hábito de beliscar apresentaram os maiores escores (62,07).

**Figura 4 – Árvores de regressão referentes ao Comer Emocional no T1 e T2**



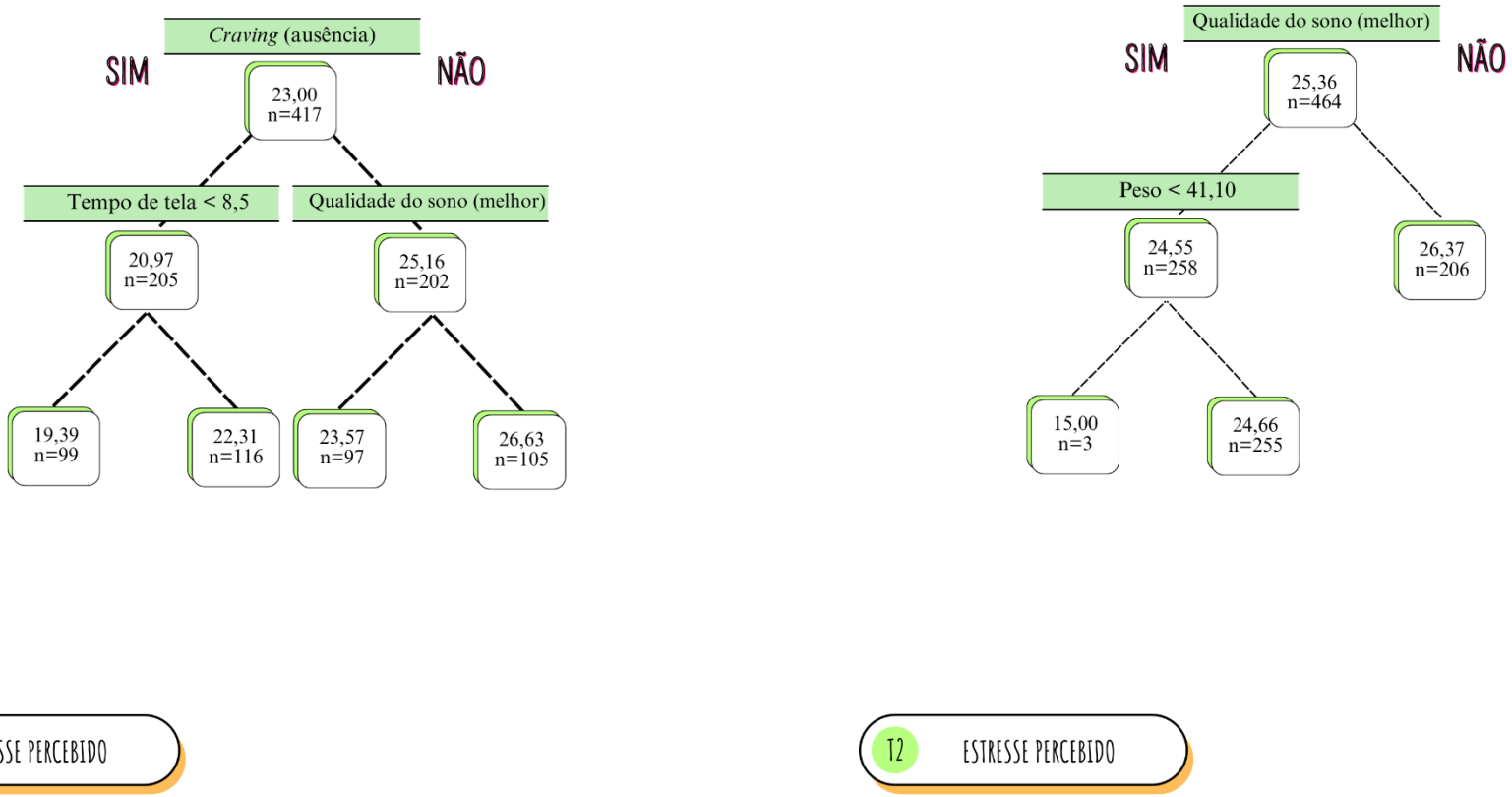

**T1** → A média geral para o Comer Emocional na amostra foi de 36,53. A ausência de *Comfort Food* promoveu a primeira divisão e os voluntários que relatavam a ausência desse comportamento apresentaram os menores escores (20,82). Os voluntários que tinham relatavam *Comfort Food* e peso acima de 63,55kg apresentaram os maiores escores (59,35). **T2** → A média geral para o Comer Emocional na amostra foi de 35,66. A ausência de *Comfort Food* e o peso <71,25kg estiveram relacionados aos menores escores (15,20). A presença de *Comfort Food*, peso >81,50kg e presença do comportamento de beliscar foram os fatores relacionados aos maiores escores (79,78).

**Figura 5 – Árvores de regressão referentes à Restrição Cognitiva no T1 e T2**




**T1** → A média geral para a Restrição Cognitiva na amostra foi de 43,10. O peso de 50,10kg promoveu a primeira divisão e os voluntários que relatavam peso abaixo desse valor apresentaram os menores escores (28,06). Os voluntários que tinham peso acima de 50,10kg e praticavam mais que 40min de exercício físico (EF) por semana apresentaram os maiores escores (48,31). **T2** → A média geral para a Restrição Cognitiva na amostra foi de 42,07. O peso de 52,85 promoveu a única partição e os voluntários com peso acima desse valor apresentaram os menores escores (29,98), enquanto os que tinham peso acima desse valor apresentaram os maiores escores (44,33).

**Figura 6 – Árvores de regressão referentes Estresse Percebido no T1 e T2**




**T1** → A média geral para o Estresse Percebido na amostra foi de 23,00. A ausência de *Craving* promoveu a primeira divisão e os voluntários que, além disso, também relatavam tempo de tela menor que 8,5h ao dia, apresentaram os menores escores (19,39). Os voluntários que tinham relatavam a presença de *Craving* e piora ou manutenção da qualidade de sono, apresentaram os maiores escores (19,39). **T2** → A média geral para o Estresse Percebido na amostra foi de 25,36. A qualidade de sono promoveu a primeira partição. Os voluntários que relatavam melhora na qualidade de sono e peso <41,10kg apresentaram os menores escores (15,00). Os voluntários que relataram a piora ou manutenção na qualidade do sono apresentaram os maiores escores (26,37).

## 4 DISCUSSÃO

O intuito desse trabalho foi investigar o comportamento alimentar – por meio das dimensões de DA, CE e RC – e EP em dois momentos distintos durante a pandemia de COVID-19 no Brasil. Não houve mudança significante nos escores de comportamento alimentar durante o período observado, mas para o EP foi demonstrado aumento do T1 para o T2. Literatura prévia já demonstrou que os constructos do comportamento alimentar podem se manter inalterados em diferentes situações, como: intervenção cirúrgica (*sleeve* gástrico) (WONG *et al.*, 2022) e até mesmo no contexto da pandemia (RAMÍREZ-CONTRERAS; ZERÓN-RUGERIO; IZQUIERDO-PULIDO, 2022). No presente estudo, mesmo com o aumento dos escores de EP, o comportamento alimentar se manteve perene considerando os dois períodos da pandemia observados. Isso não significa, necessariamente, que eles não tenham se modificado considerando o período anterior ao de emergência em saúde pública. Neste sentido, Bicer e colaboradores (2021) em estudo com 2.955 participantes da Turquia, de 18 a 65 anos, demonstraram que escores de RC caíram e os de DA e CE aumentaram de forma significativa de março a maio de 2020, em relação ao período pré-pandêmico, especialmente nas mulheres (BICER *et al*., 2021).

Em relação ao quantil 50 das variáveis de comportamento alimentar no T1 e T2, a RC apresentou os maiores escores (T1: 43,32; T2:40,34), seguida do CE (T1: 32,50; T2: 33,22) e, por fim, do DA (T1: 28,82; T2: 26,95). Os escores encontrados no presente trabalho foram semelhantes ao estudo publicado recentemente com 229 indivíduos brasileiros idosos, com idade média de 66,5 anos que, durante a pandemia, relataram os valores de 43,7 para RC, e de 25,2 para o DA, mas superiores aos encontrados para o CE (25,2) (GARCIA CARLINI *et al.*, 2023). Já Bicer e colaboradores (2021) reportaram maiores pontuações para todos os comportamentos alimentares durante o início do período de lockdown na Turquia [DA (58,1±34,2); CE (38,3±30,9) e RC (49,4±24,4)].

Os escores de EP foram estatisticamente significantes e, no quantil 50, os valores encontrados foram de 23,26 no T1 e 25,48 no T2. Estudos realizados no Brasil durante o mesmo período encontraram valores de 20,7 (REGINA PEREIRA *et al.*, 2022), 22,3 (BRUN *et al.*, 2022) e 24,1 (DA SILVA BARRETO *et al.*, 2021) para o EP em diferentes públicos e, na presente amostra, mais de 60,0% das pessoas apresentaram valores superiores a esses.

Ao trazer à luz as questões que envolvem alimentação e estresse, é importante ressaltar que ao ser submetido a uma situação atípica, desconfortante, permeada por medos e ansiedades, o indivíduo pode naturalmente alterar sua maneira de se alimentar (YAU;

POTENZA, 2014). A total compreensão da interferência de estímulos estressores nos comportamentos relacionados à alimentação ainda é caminho a ser desbravado, mas alguns estudos já discutem tal relação. O estresse parece alterar a ingestão geral de alimentos a depender da gravidade do fator estressor, podendo resultar em possíveis alterações alimentares, como: alimentação excessiva e preferência por alimentos mais ricos em energia e nutrientes (TORRES; NOWSON, 2007); redução da ingestão de alimentos de maneira abrupta e inconsciente (BARRINGTON *et al*., 2014), o que também pode repercutir em desarranjos nos hábitos e comportamento alimentar.

No que tange ao aumento do consumo de alimentos hiperpalatáveis e hipercalóricos, as adaptações neurobiológicas ao estresse fazem parte da teoria construída para explicar esta relação (YAU; POTENZA, 2014). A ideia é que o estresse pode afetar o sistema dopaminérgico e outras regiões cerebrais envolvidas nos circuitos de estresse/motivação, desejo de comer e sensação de prazer e, com isso, pode potencializar sinergicamente a sensibilidade à recompensa, à preferência alimentar e o desejo e a busca por alimentos hiperpalatáveis (YAU; POTENZA, 2014). Sendo assim, a demanda por alimentos específicos pode aumentar durante uma situação desafiadora ou desgastante, partindo do sentimento de merecimento ou com o objetivo de obter prazer imediato (AHMED; IVASHKIV, 2000; AHMED; GUILLEM; VANDAELE, 2013; POOL *et al.*, 2015).

Durante o primeiro ano da pandemia foi possível contabilizar mais de 10.000 mortes em um único dia no mundo e isso – associado à precariedade de informações acerca da nova doença – provocava medos, incertezas, receios indescritíveis e elevados níveis de estresse (ADAMSON *et al.*, 2020). O medo de se infectar, de adquirir formas graves da doença e de vir à óbito era real (LIMA et al., 2020), sobretudo com o Brasil registrando mais de 3.500 mortes por dia em março de 2021. Por isso, é compreensível que durante este período estudos tenham encontrado elevados níveis de estresse (HORTA et al., 2022) e também o aumento do consumo de alimentos hiperpalatáveis (ARORA; GREY, 2020; BŁASZCZYK-BĘBENEK *et al.*, 2020; DI RENZO *et al.*, 2020; SOUZA *et al.*, 2021), como doces, farináceos e *fast food*, além de alimentos que pudessem propiciar algum conforto, sensação de segurança e carregados de simbolismos – “comida que me lembre da minha mãe”, “comida morna”, “comida que me lembre algum momento especial” – como mencionado por participantes de estudo que avaliou o consumo de *Comfort Food* durante a pandemia (SOUZA *et al.*, 2023a). Não à toa, relatos de presença de *Comfort Food* e *Craving* foram fatores relacionados aos escores mais elevados de DA (T1 e T2), CE (T1 e T2), RC (T1) e EP (T1).

Além de todas as questões relacionadas à alimentação e às sensações que o período pandêmico desencadeou, as restrições impostas também interferiram na forma com que os indivíduos desempenhavam as atividades e hábitos diários. No presente estudo, o maior consumo de bebida alcoólica (dose por ocasião de uso e frequência semanal) e a maior prática de exercício físico (>40min/semana) estiveram relacionadas com os maiores escores de DA e de RC no T1, respectivamente. Nesse contexto, desde 2008 cunhou-se o termo "*Drunkorexia*" para representar a relação da ingestão excessiva de bebida alcoólica com comportamentos inapropriados para se evitar o ganho de peso (CHAMBERS, 2008). Observou-se que em conjunto com a ingestão de quantidades elevadas de bebida alcoólica, os indivíduos realizavam restrições alimentares excessivas e praticavam mais exercício físico como mecanismo compensatório para ingestão de calorias – e as mulheres eram mais propensas a este comportamento (AZZI *et al.*, 2021; GORRELL *et al.*, 2019; SIMONS *et al.*, 2021). Não obstante, a relação entre restrições alimentares conscientes, interferência nos mecanismos de fome/saciedade e falta de controle ao se alimentar tem sido discutida há pelo menos 45 anos (HERMAN; MACK, 1975).

Dentre a piora observada nos hábitos diários no período da pandemia, a qualidade do sono também foi prejudicada, de acordo com estudo realizado com 45.161 indivíduos brasileiros em que quase metade da amostra relatou início ou agravo de problemas de sono (DE AZEVEDO BARROS *et al.*, 2020). Na presente amostra, a piora ou manutenção da qualidade do sono esteve relacionada com os maiores níveis de EP no T1 e T2. Este foi um achado esperado, visto que a relação entre estresse e queixas relacionadas ao sono foram documentadas no decorrer da pandemia (CARVALHO; RIBEIRO; SILVEIRA, 2023; PRADO *et al.*, 2020; SCHUCK *et al.*, 2020; SENA DE LUCENA *et al.*, 2021). Essa relação é fundamentada no fato de que o estresse pode atuar como fator impeditivo do sono (ALWHAIBI; AL ALOOLA, 2023; BARROS *et al.*, 2019), bem como pela importância do sono como regulador das emoções e como precursor da qualidade de vida (MÜLLER; GUIMARÃES, 2007).

Ainda que o tempo de tela não tenha se relacionado com os maiores escores de nenhum comportamento investigado no presente estudo, esteve associado a escores bem elevados para o DA e o EP no T1. É válido discutir esta variável como um fator associado de forma negativa com estes comportamentos, visto que, pelas circunstâncias, o tempo de tela aumentou de forma muito expressiva durante a pandemia (RANJBAR *et al.*, 2021; SOUZA *et al.*, 2021; WOODRUFF; COYNE; ST-PIERRE, 2021) – já que foi um importante meio de trabalho/estudo, comunicação e até mesmo lazer, por um longo período (PANDYA; LODHA, 2021). Além de interferir na qualidade do sono e em outras variáveis de qualidade de vida

(BARBOSA NEVES *et al.*, 2023; FIGUEREDO *et al.*, 2023; SANTOS *et al.*, 2022), a exposição excessiva à tela e o consumo frequente de conteúdos de redes sociais já foi documentada como fator de risco para sintomas depressivos, autoestima e desordens alimentares (STEFANA *et al.*, 2022).

No que tange a relação "uso de telas/comportamento alimentar/peso", estudo qualitativo buscou compreender as repercussões de postagens com conteúdo *fitness* na percepção dos sujeitos acerca de questões corporais e alimentares, no contexto da pandemia pela COVID-19 no Brasil (PEDRAL; MARTINS; PENAFORTE, 2020). Os achados demonstraram que existe uma tendência à exaltação do corpo magro e uma interposição entre realização pessoal e desejo de modificação do próprio corpo – atribuindo o "sucesso" de alcançar o corpo "padrão" apenas à um esforço individual (PEDRAL; MARTINS; PENAFORTE, 2020). Essa convenção social que se criou acerca do peso ideal, da preocupação com a qualidade de vida e dos objetivos estéticos pode ser muito nociva e precursora de um estigma capaz de agravar vários aspectos de saúde da população (RODRÍGUEZ; PÉREZ; ORTIZ, 2023).

O peso esteve associado a praticamente todos os comportamentos investigados no presente trabalho – exceto no T1 do EP. Ainda que o excesso de peso seja considerado problema de saúde pública, é extremamente necessário que o manejo a essa questão seja feito de forma a minimizar a exaltação à magreza e os preconceitos atrelados ao corpo gordo (FLAUZINO *et al.*, 2023; RODRÍGUEZ; PÉREZ; ORTIZ, 2023). Estudos apontam uma relação das experiências estigmatizantes com respostas exacerbadas ao estresse, podendo desencadear repercussões emocionais, comportamentais e fisiológicas desajustadas – incluindo mecanismos metabólicos compensatórios, restrições alimentares disfuncionais e transtornos de alimentação (FLAUZINO *et al.*, 2023; HAYWARD; VARTANIAN; PINKUS, 2018; INCOLLINGO RODRIGUEZ; HELDRETH; TOMIYAMA, 2016; JACKSON; KIRSCHBAUM; STEPTOE, 2016). Sendo assim, reforçar o estigma de peso pode agravar essa questão de saúde – elevando riscos de comorbidade e mortalidade (POTTER *et al.*, 2015; SUTIN *et al.*, 2014).

Acredita-se que a maior potencialidade deste estudo é trazer uma investigação longitudinal do comportamento alimentar e estresse percebido durante a pandemia por COVID-19 no Brasil. Ainda que muitos trabalhos tenham abordado comportamento alimentar e estresse no período da pandemia, a maioria se limitou a estudar apenas um momento (fase inicial). Além disso, investigar as modificações entre o T1 e T2 por meio das distribuições marginais enriqueceu a compreensão da amostra. A regressão por meio de árvores possibilitou uma visão completa e a formação de grupos mais homogêneos e menos dispersos. Como limitações, temos

principalmente: amostragem não probabilística, que reuniu pessoas com características muito semelhantes (inseridas no meio acadêmico), sendo que 32,8% eram ligados ao curso de nutrição e 51,9% eram profissionais da saúde (sem diferença estatística entre os grupos quanto aos comportamentos e estresse percebido, quando estratificados com base nessas características – dados não mostrados); a perda amostral do T1 para o T2; o fato de não termos rastreado/excluído voluntários com transtornos alimentares; maior parte da amostra composta por mulheres. Entretanto, a variável "gênero" não entrou nos modelos de regressão, demonstrando que, para esta população, não foi fator interferente.

Em conclusão, não houve diferença no comportamento alimentar do T1 para o T2 nos indivíduos que participaram do estudo, entretanto, o estresse percebido aumentou durante o período. Foi possível observar que fatores relacionados ao dia a dia dos indivíduos (como prática de exercício físico, consumo de bebida alcoólica, qualidade do sono e uso excessivo de telas e dispositivos) estiveram associados ao perfil de voluntários que apresentavam maiores escores de DA, CE, RC e EP. Contextos relacionados à alimentação (como *Comfort Food*, *Craving* e hábito de beliscar) naturalmente podem agravar o quadro de comportamento alimentar. No contexto do peso, entende-se como um marcador de alerta para a necessidade de se aprofundar nas ferramentas utilizadas para o manejo das questões de saúde, bem como o estigma social atrelado à percepção da imagem corporal – do ciclo de compensação entre restrições exageradas e piores escores de comportamento alimentar. Por fim, os resultados encontrados podem contribuir para a abordagem integral do indivíduo nos aspectos de saúde e das modificações dos hábitos alimentares e comportamento alimentar.

# CAPÍTULO 4

# CONSIDERAÇÕES FINAIS

## TÍTULO:

SÃO MAIS AS VOZES QUE AS NOZES? UMA REFLEXÃO SOBRE AS ESCOLHAS ALIMENTARES NA PANDEMIA

## AUTORES:


## REVISTA E ANO DE PUBLICAÇÃO:

ARTIGO DE OPINIÃO AINDA NÃO SUBMETIDO À PUBLICAÇÃO

# SÃO MAIS AS VOZES QUE AS NOZES? UMA REFLEXÃO SOBRE AS ESCOLHAS ALIMENTARES NA PANDEMIA

Tamires Cássia de Melo Souza; Lucilene Rezende Anastácio

## Resumo

No decorrer do período de pandemia por COVID-19, inúmeros estudos foram dedicados à observação das consequências das medidas de controle e da pandemia em si na saúde geral das pessoas. No que tange à alimentação, pesquisas ao redor do mundo remontam as diversas modificações nos hábitos alimentares e comportamento alimentar ocorridas desde então. Sem dúvidas, os estudos que avaliam as escolhas neste período são importantes para delinear um ponto de partida na compreensão da realidade e do que se pode esperar nos anos que se seguem após o contexto mais grave da pandemia. Entretanto, em conjunto a estes estudos e desfechos, deve-se considerar as questões que estão extrínsecas às decisões totalmente conscientes (como o comportamento alimentar) e ao contexto (ambiental, político e social).

**Palavras-chave:** COVID-19; comportamento alimentar; insegurança alimentar; hábitos alimentares; alimentação.

## 1 INTRODUÇÃO

Já se passaram mais de três anos desde o início da pandemia causada pelo novo coronavírus (SARS-CoV-2) (WHO, 2020). Desde o dia cinco de maio de 2023 a situação de saúde já não caracteriza mais uma Emergência de Saúde Pública de Importância Internacional (PHEIC) – *status* mantido desde janeiro de 2020 – mas a COVID-19 ainda é tida como pandemia, devido a sua transmissão sustentada a nível global (WHO, 2023b). No decorrer deste período, inúmeros estudos foram dedicados à observação das consequências das medidas de controle e da pandemia em si na saúde geral das pessoas. No que tange à alimentação, pesquisas ao redor do mundo remontam as diversas modificações nos hábitos alimentares e comportamento alimentar ocorridas desde então (GONZÁLEZ-MONROY *et al.*, 2021a; HERLE *et al.*, 2021; JOHNSON *et al.*, 2023).

Em uma rápida pesquisa realizada em site especializado em publicações científicas[1] mais de 2.500 artigos sobre o tema foram encontrados. Dentre esses estudos, podemos citar achados diversos a depender da fase da pandemia, do público estudado (variações de idade, renda, classe social) e do tipo de estudo realizado. Entretanto, dentre os resultados observados, a implementação das medidas de distanciamento e isolamento social abarcaram muitas alterações no contexto alimentar das populações, como por exemplo: aumento no número de

[1] PubMed. Termos pesquisados: "eating habits AND pandemic" (1.373 resultados); "eating behavior AND pandemic" (1.342 resultados). Data da pesquisa: 02 de outubro de 2023.

refeições realizadas no dia; maior consumo de alimentos doces e ultraprocessados; menor consumo de alimentos in natura, como frutas e hortaliças; aumento no consumo de bebidas alcoólicas; aumento no número de refeições realizadas no lar (delivery ou preparações caseiras), dentre outras (ANDRADE *et al.*, 2023; GONZÁLEZ-MONROY *et al.*, 2021b). Ainda, as modificações atreladas ao comportamento alimentar dos indivíduos foram associadas ao fato de trabalhar na linha de frente da COVID-19 (LIBOREDO *et al*., 2021); ao fato de trabalhar/estudar de forma remota (LIBOREDO *et al*., 2021), além alteração no ambiente alimentar doméstico, mudança do padrão dos lanches e refeições e da reestruturação da rotina familiar (KEENAN *et al.*, 2021; LIBOREDO *et al.*, 2021; TROFHOLZ *et al.*, 2020).

Entretanto, a maioria dos estudos realizados no Brasil e ao redor do mundo mostram uma perspectiva referente às mudanças observadas no início da implementação dos decretos de lockdown, distanciamento/isolamento - mais ou menos restritos de acordo com cada região e, até o momento, poucos apresentaram dados coletados em duas ou mais ocasiões, abrangendo os períodos de flexibilização das medidas preventivas, demonstrando que alguns dos hábitos alimentares adquiridos na primeira fase da pandemia (primeiro semestre de 2020) foram levemente – porém significativamente – descontinuados no decorrer dos meses (a partir do segundo semestre de 2020) (CASO *et al.*, 2022; DE ARO; PEREIRA; BERNARDO, 2021; KEENAN *et al.*, 2021; LIBOREDO *et al.*, 2021; ROGERS *et al.*, 2021; SOUZA *et al.*, 2022).

Em estudo realizado por nosso grupo de pesquisa com indivíduos brasileiros, achados que comparavam a alimentação antes e durante a pandemia (agosto e setembro de 2020) incluíram: realização de menor número de refeições diurnas e maior número de refeições noturnas; menor consumo de frutas e hortaliças e maior consumo de farináceos e *fast food* (SOUZA *et al*., 2021). Dentre os participantes, 54,0% relataram o consumo de algum alimento ou preparação com a intenção de obter conforto emocional foi relatado por (SOUZA *et al.*, 2023a). A ocorrência do comportamento conhecido como *Craving* (intenso de consumir algum alimento específico) acometeu 46,0% dos voluntários e os fatores associados a esse achado incluíram a piora da qualidade do sono, o hábito de beliscar e variáveis relacionadas ao comportamento alimentar (descontrole alimentar e comer emocional) (OLIVEIRA *et al.*, 2022). Nessa mesma amostra, o ganho de peso esteve associado ao aumento no consumo de bebida alcoólica, ao consumo de *fast food* e ao aumento do hábito de beliscar (DANIEL *et al.*, 2022). Outro fator que esteve relacionado com as mudanças na alimentação foi o sedentarismo, com prevalência de 76,7%, demonstrando associação com a maior frequência de consumo de cereais, embutidos e doces durante a pandemia (SOUZA *et al.*, 2023b). Ainda, quando o questionário foi reaplicado em um segundo momento (maio e junho de 2021), foi possível

observar redução no consumo de fast food e aumento no consumo de alimentos *in natura*, além da redução na realização de refeições "não tradicionais" (SOUZA, *et al.*, 2022).

Sem dúvidas, o estudo acerca de estilo de vida, hábitos alimentares e comportamento alimentar na pandemia de COVID-19 é essencial para a compreensão do cenário atual, para o entendimento sobre as implicações das mudanças no dia a dia dos indivíduos e também para subsidiar a implementação de novas intervenções e estratégias de saúde. Entretanto, para além dessas mudanças, é importante entender que, em situações de crises (de saúde, econômicas e ambientais), as coletividades estão sujeitas a interferências diversas às próprias decisões e, por isso, o presente texto versará sobre um tópico que se relaciona indiretamente – mas de maneira decisiva – com o comportamento, hábitos e escolhas alimentares durante a pandemia.

## 2 FORMAS DE ENFRENTAMENTO À PANDEMIA – MEDIDAS ADOTADAS, POSICIONAMENTO DOS LÍDERES E POLÍTICAS PÚBLICAS

No contexto do aparecimento do novo coronavírus, apesar de representar uma crise global de saúde pública, cada país – e cada líder – adotou a estratégia que julgou mais conveniente para lidar com a pandemia. Ainda que o posicionamento dos líderes dos países ao redor do mundo não tenha representado a única ferramenta para o enfrentamento da pandemia por COVID-19, há de ser reconhecido que as posturas adotadas, entrevistas concedidas e discursos realizados, contribuíram para o curso das circunstâncias emergências e suas consequências (PERNISA JÚNIOR, 2021). A repercussão dos discursos e autoridade exercida pelos líderes tem grande alcance e isso é inegável. Estudo que se dedicou a investigar a disseminação de informações acerca do novo coronavírus ao redor do mundo quando promovida por gestores estatais, utilizou a ferramenta Google Trends® (que utiliza uma escala de 0 a 100, em que 100 representa o máximo de interesse de pesquisa) para investigar o crescimento da busca por termos utilizados por líderes em seus pronunciamentos (LISBOA *et al.*, 2020). Os termos "*Chinese Virus*"[2], "*Milano non si ferma*"[3] e "*Hidroxicloroquina*"[4], por

[2] Vírus Chinês - termo adotado e proferido por Donald Trump para se referir à doença de maneira xenófoba e vexatória.
[3] Milão não para - utilizado por Guiseppe Sala para defender a manutenção das atividades, enquanto a OMS prezava pelo oposto.
[4] Quando Jair Bolsonaro defendeu, mesmo sem comprovação científica, a utilização do medicamento no contexto da COVID-19.

exemplo, alcançaram 100 pontos na escala de interesse nos dias seguintes à menção pelos respectivos líderes, demonstrando o poder da influência (LISBOA *et al.*, 2020).

No Brasil, a postura do então presidente à época simbolizou o tratamento sanitário inadequado do governo federal em relação às questões relacionadas à pandemia – que era constantemente subestimada (LISBOA *et al.*, 2020; PEDRO ORO; ALVES, 2020). A falta de tratativa adequada e condizente com orientações científicas e protocolos sanitários recomendados mundialmente, associados ao alinhamento do presidente com os principais líderes evangélicos de tendência conservadora do país, agravaram o contexto social e econômico (PEDRO ORO; ALVES, 2020). O desmantelamento de políticas públicas de proteção social, a falta de celeridade para a adoção de medidas de distribuição de renda e o cenário inegável de inequidade social no Brasil foram escancarados (PEDRO ORO; ALVES, 2020; SIPIONI *et al.*, 2020).

Em 2022, o 2º Inquérito Nacional sobre Insegurança Alimentar no Contexto da Pandemia da COVID-19 no Brasil (realizado pela Rede Brasileira de Pesquisa em Soberania e Segurança Alimentar e Nutricional) revelou que apenas 4 em cada 10 domicílios brasileiros estavam em situação de segurança alimentar. Os demais apresentavam algum nível de insegurança e esses números já haviam crescido de forma significante ao comparar com a fase inicial da pandemia. Este mesmo estudo demonstrou que os determinantes da insegurança alimentar na pandemia incluíam: ser mulher; ser pessoa de raça/cor da pele preta; estar em um lar com crianças e estar desempregado.

Ainda que esses resultados tenham sido revelados de forma quase imediata à realização da pesquisa, sabe-se que o Brasil já passava por um desmonte de políticas de proteção social e, portanto, os desafios da pandemia apenas intensificaram o cenário catastrófico de insegurança alimentar.

## 3 CONSIDERAÇÕES FINAIS

Ao discutir as mudanças referentes aos hábitos alimentares durante a pandemia, deve-se levar em consideração o contexto individual somado à visão da coletividade. Entende-se que os estudos que avaliam as escolhas neste período são importantes para delinear um ponto de partida na compreensão da realidade e do que se pode esperar nos anos que se seguem após o contexto mais grave da pandemia. Entretanto, em conjunto a estes estudos e desfechos, deve-

se considerar as questões que estão extrínsecas às decisões totalmente conscientes (como o comportamento alimentar) e ao contexto (ambiental, político e social).

Dessa forma, pode-se realizar inferências adequadas às atuais necessidades de uma população, reforçando a abrangência de programas que incidam e garantam consumo alimentar adequado e educação nutricional efetiva para todos. Os próximos passos para a melhoria do contexto de alimentação no Brasil devem ser pautados nas diferentes dimensões da Segurança Alimentar e Nutricional (disponibilidade, adequação, acesso físico, econômico e estabilidade) e devem ser tomados de forma urgente. Ainda, é importante ressaltar que as intervenções com motivação simplista de modificar hábitos alimentares devem ser substituídas pelo reconhecimento de que, por trás das escolhas relacionadas à alimentação, estão inúmeras motivações (e a saúde, por si só, não é o único fator). Para galgar o caminho da melhora da saúde de forma geral, deve-se promover a manutenção de investigações epidemiológicas e nutricionais, a implementação de programas assistenciais pertinentes ao momento atual e a realização de educação nutricional, associados ao trabalho intersetorial do dos profissionais de saúde.


**CONCLUSÃO DA TESE**

O presente trabalho verificou modificações nos hábitos diários, estilo de vida, hábitos alimentares e comportamento alimentar de adultos brasileiros no contexto da pandemia de COVID-19. O questionário foi aplicado em dois momentos, sendo: agosto/setembro 2020 (T0 e T1); maio/junho 2021 (T2). Os produtos dessa pesquisa resultaram nesta Tese, que é a junção dos dados analisados de inicialmente de maneira transversal e, posteriormente, longitudinal.

Na primeira fase da pesquisa, foram verificadas mudanças nos hábitos diários, hábitos alimentares e estilo de vida (do T0 para o T1). Foi possível observar aumento no uso de telas e dispositivos (horas/dia), horas de sono (horas/dia), tabagismo (cigarros/dia) e frequência do consumo de bebidas alcoólicas (vezes/semana). Por outro lado, houve redução na quantidade de bebida alcoólica por ocasião de consumo. Os resultados relacionados aos hábitos alimentares indicaram redução na realização das refeições diurnas e aumento na realização de refeições noturnas. A frequência de consumo de refeições instantâneas e f*ast food* aumentou, enquanto o consumo de frutas e hortaliças diminuiu.

A prática de exercícios reduziu de forma significativa e o sedentarismo (<150 min/semana) esteve presente em 76,7% da amostra. Os fatores independentemente associados ao sedentarismo foram: ter sobrepeso; maior diferença entre o peso atual relatado e o peso anterior à pandemia; ser do sexo feminino; menor consumo de refeições caseiras; maior frequência de consumo de bebidas alcoólicas; maior frequência de consumo de produtos de panificação, alimentos embutidos e doces durante a pandemia; e pontuação mais alta de estresse percebido.

O consumo de *Comfort Food* foi de 54,0% dentre os voluntários, sendo os “doces” a categoria mais frequentemente mencionada para ambos os sexos. Para as mulheres, os fatores independentemente associados ao consumo de *Comfort Food* foram: aumento do hábito de “beliscar”; aumento na frequência de consumo de produtos de panificação, doces e bebidas alcoólicas; aumento do tempo de trabalho (incluindo tarefas domésticas); piora da qualidade do sono, redução no número de refeições; maiores escores de estresse percebido e comer emocional; idade e aumento na frequência de consumo de carnes. Para os homens, os fatores foram: trabalhar/estudar de forma remota em tempo integral; maiores escores de estresse percebido e comer emocional; acordar cedo.

Ao realizar a análise longitudinal, foi possível perceber que alguns hábitos mudaram de forma significativa do T1 para o T2. A prática de exercício físico (que antes havia diminuído), regressou à linha de base. A dose de bebida alcóolica por ocasião de consumo

aumentou do T1 para o T2. Quanto aos hábitos alimentares, houve redução no consumo de refeições instantâneas, *fast food* e doces do T1 para o T2. O consumo de leguminosas, leite e derivados, produtos de panificação e carnes foi maior no T2.

Para as variáveis de comportamento alimentar, não foi possível observar diferença estatisticamente significante entre T1 e T2. Já o estresse percebido foi maior no T2. Os fatores associados ao comportamento alimentar incluíram hábitos de beliscar, presença de *Comfort Food* e *Craving*, além de consumo de bebida alcoólica, peso, prática de exercício físico e qualidade do sono. Os fatores relacionados aos maiores escores de estresse percebido foram o peso e a qualidade de sono.

Os estudos que avaliam as escolhas neste período são importantes para delinear um ponto de partida na compreensão da realidade e do que se pode esperar nos anos que se seguem após o contexto mais grave da pandemia. Entretanto, em conjunto a estes estudos e desfechos, deve-se considerar as questões que estão extrínsecas às decisões totalmente conscientes (como o comportamento alimentar) e ao contexto (ambiental, político e social).

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## APÊNDICE 1 - Divulgação dos dados preliminares da pesquisa em veículos midiáticos

Hábitos alimentares e estilo de vida durante a pandemia - **Record TV** https://youtu.be/xujpjwXXH7s?t=1148

Sedentarismo e má alimentação crescem na pandemia - **Record Minas** https://www.youtube.com/watch?v=Uh_jOjO-zVU

Pesquisa detalha piora no estilo de vida durante isolamento social no Brasil - **Assessoria de Imprensa UFMG** https://ufmg.br/comunicacao/assessoria-de-imprensa/release/pesquisa-detalha-piora-no-estilo-de-vida-durante-isolamento-social-no-brasil

Pesquisa aponta piora no estilo de vida dos brasileiros durante o isolamento social - **Rádio CBN** https://cbn.globoradio.globo.com/media/audio/355396/pesquisa-aponta-piora-no-estilo-de-vida-dos-brasil.htm

Hábitos alimentares e estilo de vida durante a pandemia - **Rádio BandNews** https://www.youtube.com/watch?v=OwBtRTvoMTw

Pesquisa aponta piora no estilo de vida dos brasileiros durante a pandemia - **Diário do Comércio** https://diariodocomercio.com.br/negocios/pesquisa-aponta-piora-no-estilo-de-vida-do-brasileiro-durante-a-pandemia/

Brasileiros passaram mais de 10 horas por dia na frente de telas na pandemia - **Estadão** https://link.estadao.com.br/noticias/cultura-digital,brasileiros-passaram-mais-de-10-horas-por-dia-na-frente-de-telas-na-pandemia,70003869284

Estilo de vida dos brasileiros piorou na pandemia - **Rádio Nacional** https://radios.ebc.com.br/tarde-nacional/2021/10/estilo-de-vida-dos-brasileiros-piorou-na-pandemia

Pesquisa demonstra que estilo de vida do brasileiro piorou durante a pandemia - **Rádio UFMG Educativa** https://soundcloud.com/radioufmgeducativa/conexoes-tamires-souza-estilo-vida-pandemia-20-de-outubro/s-oU8YKsNSZHD?si=d512e17831c2499887ec31e6e89dccb2

Pandemia piora estilo de vida do brasileiro, aponta pesquisa - **O Tempo** https://www.otempo.com.br/cidades/pandemia-piora-estilo-de-vida-do-brasileiro-aponta-pesquisa-1.2554329

Pesquisa mineira aponta que brasileiros mudaram para pior hábitos na pandemia - **Hoje em Dia** https://www.hojeemdia.com.br/horizontes/sa%C3%BAde/pesquisa-mineira-aponta-que-brasileiros-mudaram-para-pior-h%C3%A1bitos-na-pandemia-1.859841

Mudança de hábitos da pandemia expõe piora na qualidade de vida dos brasileiros - **CNN Brasil** https://www.cnnbrasil.com.br/saude/podcast-e-tem-mais-mudanca-de-habitos-da-pandemia-expoe-piora-na-qualidade-de-vida-dos-brasileiros/

## APÊNDICE 2 – Material suplementar referente ao Capítulo 3

**TABELA 1 - Comparação dos quantis dos escores de comportamento alimentar e estresse percebido no T1 e T2**

| QUANTIL | ESCORE EM T1 | ESCORE EM T2 | DIFERENÇA ENTRE OS TEMPOS (T1-T2) | IC (95%) |
|---|---|---|---|---|
| *DESCONROLE ALIMENTAR* | | | | |
| 0.10 | 7.46 | 5.90 | 1.55 | -1.15; 4.26 |
| 0.20 | 13.00 | 11.21 | 1.79 | -1.03; 4.61 |
| 0.30 | 17.32 | 16.66 | 0.66 | -2.52; 3.84 |
| 0.40 | 22.90 | 21.13 | 1.77 | -1.74; 5.28 |
| 0.50 | 28.82 | 26.95 | 1.86 | -2.41; 6.14 |
| 0.60 | 35.56 | 31.83 | 3.72 | -0.33; 7.78 |
| 0.70 | 41.64 | 40.22 | 1.41 | -2.52; 5.34 |
| 0.80 | 48.50 | 48.66 | -0.16 | -4.64; 4.31 |
| 0.90 | 60.98 | 58.52 | 2.46 | -3.03; 7.95 |
| *RESTRIÇÃO COGNITIVA* | | | | |
| 0.10 | 12.06 | 11.99 | 0.06 | -5.41; 5.54 |
| 0.20 | 22.06 | 20.04 | 2.01 | -3.41; 7.44 |
| 0.30 | 32.26 | 27.46 | 4.79 | 1.21; 8.38 |
| 0.40 | 37.98 | 34.61 | 3.37 | -1.51; 8.26 |
| 0.50 | 43.32 | 40.34 | 2.98 | -1.02; 6.98 |
| 0.60 | 49.08 | 48.56 | 0.52 | -4.13; 5.18 |
| 0.70 | 55.89 | 55.56 | 0.33 | -3.54; 4.20 |
| 0.80 | 62.33 | 63.57 | -1.25 | -6.20; 3.70 |
| 0.90 | 72.45 | 73.80 | -1.35 | -6.91; 4.21 |
| *COMER EMOCIONAL* | | | | |
| 0.10 | 0.02 | 0.00 | 0.02 | -0.94; 0.97 |
| 0.20 | 6.70 | 5.96 | 0.74 | -3.01; 4.50 |
| 0.30 | 16.28 | 15.01 | 1.27 | -3.87; 6.41 |
| 0.40 | 24.71 | 24.57 | 0.14 | -5.22; 5.51 |
| 0.50 | 32.50 | 33.22 | -0.72 | -4.11; 2.67 |
| 0.60 | 39.87 | 39.46 | 0.41 | -5.75; 6.57 |
| 0.70 | 51.88 | 52.63 | -0.75 | -6.72; 5.23 |
| 0.80 | 64.41 | 63.12 | 1.29 | -4.92; 7.50 |
| 0.90 | 80.65 | 76.68 | 3.97 | -5.64; 13.58 |
| *ESTRESSE PERCEBIDO* | | | | |
| 0.10 | 13.44 | 19.66 | -6.22 | **-7.94; -4.51** |
| 0.20 | 16.79 | 21.41 | -4.62 | **-6.35; -2.89** |
| 0.30 | 19.25 | 22.91 | -3.66 | **-5.15; -2.16** |
| 0.40 | 21.25 | 24.45 | -3.20 | **-4.60; -1.80** |
| 0.50 | 23.26 | 25.48 | -2.22 | **-3.67; -0.78** |
| 0.60 | 25.30 | 26.59 | -1.29 | -2.68; 0.10 |
| 0.70 | 27.01 | 27.99 | -0.98 | -2.13; 0.17 |
| 0.80 | 29.20 | 29.44 | -0.24 | -1.80; 1.33 |
| 0.90 | 32.48 | 31.46 | 1.02 | -0.66; 2.70 |

**Teste utilizado: Estimador de Quantil Harrell-Davis.**
Quando o Intervalo de Confiança contém o número 0, significa que não houve diferença estatisticamente significante.

**ANEXO A – Questionário utilizado na coleta**

# Hábitos e comportamento alimentar durante a pandemia de COVID-19

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Prezado (a) senhor (a),

Você foi convidado para participar da pesquisa intitulada "Hábitos e comportamento alimentar durante a pandemia de COVID-19 no Brasil". O estudo tem como objetivo avaliar as mudanças nos hábitos e no comportamento alimentar da população brasileira com a pandemia de COVID-19. Os resultados encontrados poderão ser utilizados para orientar estratégias para reduzir os problemas relacionados aos hábitos e comportamento alimentar durante a pandemia.

A sua participação consiste em preencher um questionário utilizando computador, tablet ou celular com acesso à internet. O preenchimento levará, no máximo, 15 minutos. O (a) Sr (a) não terá nenhuma despesa ou prejuízo e não receberá nenhum pagamento pela sua participação. Os riscos de participar do estudo são mínimos, como o de se sentir constrangido ao responder as perguntas. Porém, durante o preenchimento do questionário não será solicitado o fornecimento do seu nome ou de documentos que possam identificá-lo. Você poderá interromper o preenchimento do questionário a qualquer momento antes de enviá-lo. Além disso, você poderá retirar o seu consentimento de participação no estudo a qualquer momento, sem nenhum prejuízo.

Este estudo apresenta como benefícios o delineamento do perfil dos voluntários com relação a seus hábitos alimentares durante a pandemia do novo coronavírus; a identificação de fatores associados aos comportamentos alimentares de alimentação emocional; descontrole alimentar e restrição cognitiva de brasileiros e a contribuição com estudos na área de Nutrição e Saúde sobre o comportamentos alimentar do brasileiro durante a pandemia e possíveis estratégias de ação.

As informações obtidas neste estudo são confidenciais e serão armazenadas sem o nome dos participantes no drive da pesquisa por um período de 5 (cinco) anos após o término da pesquisa, e depois desse tempo serão destruídos. As respostas serão analisadas em conjunto com a de outros participantes e serão usadas apenas para fins da pesquisa e publicados (sendo os resultados favoráveis ou não) em revistas especializadas e congressos.

Para participar deste estudo o Sr.(a) não terá nenhum custo, nem receberá qualquer vantagem financeira. Apesar disso, diante de eventuais danos decorrentes da pesquisa, o Sr.(a) tem assegurado o direito à indenização. O Sr.(a) tem garantida plena liberdade de retirar seu consentimento, em qualquer fase da pesquisa, sem necessidade de comunicado prévio. Os resultados da pesquisa estarão à sua disposição quando finalizada.

Os pesquisadores tratarão a sua identidade com padrões profissionais de sigilo e confidencialidade, atendendo à legislação brasileira, em especial, à Resolução 466/2012 do Conselho Nacional de Saúde, e utilizarão as informações somente para fins acadêmicos e científicos.

Em caso de dúvida sobre aspectos éticos da pesquisa o Sr.(a) poderá entrar em contato com o Comitê de Ética em Pesquisa com Seres Humanos (CEP) da Universidade Federal de Viçosa pelo e-mail: cep@ufv.br, telefone: (31) 3612-2316 ou no endereço: Av. PH Rolfs - Campus Universitário. Edifício Arthur Bernardes, piso inferior.
Este termo de consentimento será disponibilizado em duas vias originais, sendo que uma será arquivada pelo pesquisador responsável, no Departamento de Nutrição e Saúde e a outra será enviada ao Sr.(a).
Para esclarecimento de dúvidas ou outras considerações sobre a pesquisa, você poderá entrar em contato conosco pelos contatos listados no fim da página.

Pesquisadora principal:
Ceres Mattos Della Lúcia (Universidade Federal de Viçosa). E-mail: cmdellalucia@ufv.br

Outras pesquisadoras envolvidas:
Juliana Costa Liboredo. E-mail: juliana.liboredo@ufop.edu.br
Lívia Garcia Ferreira (Universidade Federal de Lavras). E-mail: livia.ferreira@ufla.br
Lucilene Rezende Anastácio (Universidade Federal de Minas Gerais). E-mail: lucilenerezende@ufmg.br
Lívya Alves Oliveira (Universidade Federal de Viçosa). E-mail: livyaalvesoliveira@gmail.com
Marina Martins Daniel (Universidade Federal de Lavras). E-mail: marina.daniel@estudante.ufla.br
Tamires Cássia de Melo Souza (Universidade Federal de Minas Gerais). E-mail: tamirescmsouza@gmail.com

Obs.: a sua via do Termo de Consentimento pode ser acessada pelo link https://drive.google.com/drive/folders/1DfrWSAxmqtc4rp3KADzf_83D1YaL0MDq?usp=sharing

*Obrigatório

1. Você aceita participar do estudo? *

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não

Dados do participante

2. E-mail:lucilene.rezende@gmail.com *

3. Gênero *

*Marcar apenas uma oval.*

- ◯ Feminino
- ◯ Masculino
- ◯ Outro

4. Você está grávida? *

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não
- ◯ Não se aplica

5. Idade *

6. Renda familiar *

*Marcar apenas uma oval.*

- ◯ Menos de 1 salário mínimo (menos de R$ 1.045,00)
- ◯ De 1 a 2 salários mínimos (R$ 1.045,00 – R$2.090,00)
- ◯ De 2 a 3 salários mínimos (R$ 2.090,00 – R$3.135,00)
- ◯ De 3 a 4 salários mínimos (R$ 3.135,00 – R$4.180,00)
- ◯ De 4 a 5 salários mínimos (R$ 4.180,00 – R$5.225,00)
- ◯ De 5 a 10 salários mínimos (R$ 5.225,00 – R$10.450,00)
- ◯ De 10 a 15 salários mínimos (R$ 10.450,00 – R$15.675,00)
- ◯ Mais de 15 salários mínimos (mais de R$ 15.675,00)

7. Quantas pessoas estão morando na sua casa nesse momento da pandemia (contando com você)? *

*Marcar apenas uma oval.*

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ mais de 5

8. Neste momento da pandemia, você está morando *

*Marcar apenas uma oval.*

- ◯ sozinho (a)
- ◯ com marido/esposa/companheiro(a)
- ◯ com marido/esposa e filhos
- ◯ com filhos
- ◯ com pais
- ◯ com irmãos
- ◯ com amigos
- ◯ outros

9. Você está praticando o isolamento social neste momento da pandemia? *

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não
- ◯ Parcialmente

Ocupação

10. Você está atuando na linha de frente contra a COVID-19? *

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não

11. Qual é a sua situação ocupacional neste momento da pandemia? *

*Marcar apenas uma oval.*

- ◯ Trabalho/estudo remotamente em tempo integral
- ◯ Trabalho/estudo remotamente em tempo parcial
- ◯ Trabalho/estudo sem alterações, não remotamente
- ◯ Estou desempregado
- ◯ Sou aposentado
- ◯ Outro

12. Levando em consideração os últimos 06 (seis) meses, você sente que o seu tempo de trabalho (incluindo trabalho doméstico e cuidado com familiares) *

*Marcar apenas uma oval.*

- ◯ Aumentou
- ◯ Diminuiu
- ◯ Manteve

## Informações sobre altura e peso

13. Informe sua altura *

Use ponto no lugar da vírgula (Exemplo.: 1.66)

_____

14. Quanto você acha que está pesando atualmente? *

_____

15. Levando em consideração os últimos 06 (seis) meses, o seu peso corporal *

*Marcar apenas uma oval.*

- ◯ aumentou muito
- ◯ aumentou um pouco
- ◯ aumentou, mas depois diminuiu
- ◯ diminuiu um pouco
- ◯ diminuiu muito
- ◯ diminuiu, mas depois aumentou
- ◯ não mudou *Pular para a pergunta 17*
- ◯ não sei informar *Pular para a pergunta 17*

16. Se houve alteração no seu peso, foi de forma intencional?

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não

## Hábitos de vida

17. Informe seu tempo gasto por dia em frente a equipamentos como celular, computador, tablet e TV

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| Até 4 horas | ☐ |
| 5 a 8 horas | ☐ |
| 9 a 12 horas | ☐ |
| 13 a 16 horas | ☐ |
| mais de 16 horas | ☐ |

18. Qual a sua frequência de consumo de bebida alcoólica?

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| não bebo bebida alcoólica | ☐ |
| raramente | ☐ |
| 1 vez por semana | ☐ |
| 2 a 3 vezes por semana | ☐ |
| 4 a 6 vezes por semana | ☐ |
| todos os dias | ☐ |

19. Qual é a quantidade de bebida alcoólica que você consome por ocasião?
Considere 1 dose = 1 lata de cerveja, 1 taça de vinho, 40mL de bebida destilada.

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| não bebo bebida alcoólica | ☐ |
| 1 dose | ☐ |
| 2 a 3 doses | ☐ |
| 4 a 5 doses | ☐ |
| mais de 5 doses | ☐ |

20. Qual é a quantidade de cigarros fumados por dia

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| não fumo | ☐ |
| ex-fumante | ☐ |
| 10 cigarros ou menos | ☐ |
| 11 a 20 cigarros | ☐ |
| 21 a 30 cigarros | ☐ |
| 31 ou mais cigarros | ☐ |

21. Neste momento da pandemia informe o horário que você dorme *

*Exemplo: 08h30*

22. Neste momento da pandemia informe o horário que você acorda *

*Exemplo: 08h30*

23. Levando em consideração os últimos 06 (seis) meses, houve alteração na qualidade do seu sono? *

*Marcar apenas uma oval.*

- ◯ Sim. Piorou
- ◯ Sim. Melhorou
- ◯ Não alterou

24. Informe o tempo gasto com a prática de atividade física

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| Não pratico | ☐ |
| Menos de 90 minutos/semana | ☐ |
| De 91 a 150 minutos/semana | ☐ |
| De 151 a 210 minutos/semana | ☐ |
| De 211 a 270 minutos/semana | ☐ |
| Mais de 270 minutos/semana | ☐ |

Atividade física

As questões que se apresentam, referem-se ao tempo que despende na atividade física numa semana. Incluindo questões de atividade que faz no trabalho, para se deslocar de um lado para outro, atividades referentes à casa e atividades que exercem no seu tempo livre.

**ATIVIDADE FÍSICA VIGOROSA - refere-se a atividades que requerem muito esforço físico e tornam a respiração muito mais intensa que o normal. ATIVIDADE FÍSICA MODERADA - refere-se a atividades que requerem esforço físico moderado e torna a respiração um pouco mais intensa que o normal**

**Ao responder às questões considere apenas as atividades físicas que realize durante pelo menos 10 minutos seguidos**

25. Habitualmente, por SEMANA, quantos dias faz atividade física vigorosa como levantar e/ou transportar objetos pesados, cavar, ginástica aeróbica ou andar de bicicleta a uma velocidade acelerada? Em dias por semana: *

*Marcar apenas uma oval.*

- ◯ 1 dia/semana
- ◯ 2 dias/semana
- ◯ 3 dias/semana
- ◯ 4 dias/semana
- ◯ 5 dias/semana
- ◯ 6 dias/semana
- ◯ Todos os dias
- ◯ Nenhum

26. Se pratica atividade física vigorosa pelo menos 1x/semana: quanto tempo costuma fazer atividade física vigorosa por dia? Em minutos:

27. Normalmente por SEMANA, quantos dias faz atividade física moderada como levantar e/ou transportar objetos leves, andar de bicicleta a uma velocidade moderada ou jogar tênis (Não inclui o andar/caminhar). Dias por semana: *

*Marcar apenas uma oval.*

- 1 dia/semana
- 2 dias/semana
- 3 dias/semana
- 4 dias/semana
- 5 dias/semana
- 6 dias/semana
- Todos os dias
- Nenhum

28. Se pratica atividade física moderada pelo menos 1x na semana: Quanto tempo costuma fazer atividade física moderada por dia? Em minutos:

29. Habitualmente, por SEMANA quantos dias caminha durante pelo menos 10 minutos seguidos? Inclua caminhadas para o trabalho e para casa, para se deslocar de um lado para outro e qualquer outra caminhada que possa fazer somente para recreação, desporto ou lazer: *

*Marcar apenas uma oval.*

- 1 dia/semana
- 2 dias/semana
- 3 dias/semana
- 4 dias/semana
- 5 dias/semana
- 6 dias/semana
- Todos os dias
- Nenhum

30. Se pratica caminhada pelo menos 1x na semana: Quanto tempo costuma caminhar por dia? Em minutos

**As últimas questões referem-se ao tempo que está sentado diariamente no trabalho, em casa, no percurso para o trabalho e durante os tempos livres. Incluindo o tempo em que está sentado numa secretaria, visitar amigos, ler ou sentado/deitado assistindo televisão.**

31. Quanto tempo costuma estar sentado em um dia de SEMANA. Em horas/minutos: *

32. Quanto tempo costuma estar sentado em um dia de fim de semana. Em horas/minutos *

Alimentação

33. Marque quais refeições você faz ao longo do dia

*Marque todas que se aplicam.*

| | Neste momento da pandemia |
|---|---|
| café da manhã | ☐ |
| lanche da manhã | ☐ |
| almoço | ☐ |
| lanche da tarde | ☐ |
| jantar | ☐ |
| ceia | ☐ |
| outra | ☐ |

34. Levando em consideração os últimos 06 (seis) meses, a quantidade de alimentos consumidos *

*Marcar apenas uma oval.*

- ◯ aumentou muito
- ◯ aumentou um pouco
- ◯ permaneceu o mesmo
- ◯ diminuiu um pouco
- ◯ diminuiu muito
- ◯ não sei informar

35. Levando em consideração os últimos 06 (seis) meses, o hábito de "beliscar" os alimentos entre as refeições *

*Marcar apenas uma oval.*

- ◯ aumentou muito
- ◯ aumentou um pouco
- ◯ permaneceu o mesmo
- ◯ diminuiu um pouco
- ◯ diminuiu muito
- ◯ não sei informar
- ◯ não belisco

36. Levando em consideração os últimos 06 (seis) meses, a frequência de uso de serviços de delivery de alimentos *

*Marcar apenas uma oval.*

- aumentou muito
- aumentou um pouco
- permaneceu o mesmo
- diminuiu um pouco
- diminuiu muito
- não sei informar
- não peço delivery

37. Levando em consideração os últimos 06 (seis) meses, o preparo de refeições em casa *

*Marcar apenas uma oval.*

- aumentou muito
- aumentou um pouco
- permaneceu o mesmo
- diminuiu um pouco
- diminuiu muito
- não sei informar
- não cozinho

38. Neste momento da pandemia, você está comendo algum alimento ou preparação com intuito de ter conforto emocional? *

*Marcar apenas uma oval.*

- Sim *Pular para a pergunta 39*
- Não *Pular para a pergunta 40*

Qual ou quais alimentos você está comendo para ter conforto emocional?

39. *

Neste momento da pandemia, você tem tido desejo intenso de consumir algum alimento específico?

40. *

*Marcar apenas uma oval.*

- Sim *Pular para a pergunta 41*
- Não *Pular para a pergunta 42*

Qual ou quais alimentos você tem desejo intenso de consumir?

41. *

Hábitos alimentares

42. Informe a frequência de consumo dos alimentos abaixo NESTE MOMENTO DA PANDEMIA *

Coloque o seu celular na horizontal ou arraste a tela do seu celular para a direita para que você possa ver todas as colunas.

*Marcar apenas uma oval por linha.*

| | Mais de 1vez/dia | 1 vez/dia | 4 a 6 vezes/semana | 2 a 3 vezes/semana | 1 vez/semana | Rarame |
|---|---|---|---|---|---|---|
| Leguminosas (feijão, soja, lentilha, grão de bico) | | | | | | |
| Cereais (arroz, milho, aveia) | | | | | | |
| Pães, biscoitos, bolos | | | | | | |
| Leite e derivados | | | | | | |
| Frutas frescas | | | | | | |
| Carnes, peixes, frango e ovos | | | | | | |
| Hambúrguer e/ou embutidos (presunto, mortadela, salame, linguiça, salsicha) | | | | | | |
| Verduras e/ou legumes (não considerar batata, mandioca, aipim, macaxeira, cará e inhame) | | | | | | |
| Bebidas adoçadas (refrigerante, suco de caixinha ou em pó, água de coco de caixinha, xarope de guaraná/groselha, suco de fruta com açúcar) | | | | | | |
| Macarrão instantâneo, salgadinhos de pacote ou biscoitos salgados | | | | | | |
| Chocolates, doces, tortas ou guloseimas (balas, pirulitos, chiclete, caramelo, gelatina) | | | | | | |
| Pizza, sanduíche, salgados | | | | | | |

Hábitos alimentares e sensação de fome

**Esta seção contém declarações e perguntas sobre hábitos alimentares e sensação de fome. Leia cuidadosamente cada declaração e responda marcando a alternativa que melhor se aplica a você.**

Coloque o celular na horizontal ou arraste a tela do seu celular para a direita para que você possa ver todas as colunas.

43. *

*Marcar apenas uma oval por linha.*

| | Totalmente verdade | Verdade, na maioria das vezes | Falso, na maioria das vezes | Totalmente falso |
|---|---|---|---|---|
| 1. Eu deliberadamente consumo pequenas porções para controlar meu peso. | | | | |
| 2. Eu começo a comer quando me sinto ansioso. | | | | |
| 3. Às vezes, quando começo a comer, parece-me que não conseguirei parar. | | | | |
| 4. Quando me sinto triste, frequentemente como demais. | | | | |
| 5. Eu não como alguns alimentos porque eles me engordam. | | | | |
| 6. Estar com alguém que está comendo, me dá frequentemente vontade de comer também. | | | | |
| 7. Quando me sinto tenso ou estressado, frequentemente sinto que preciso comer. | | | | |
| 8. Frequentemente sinto tanta fome que meu estômago parece um poço sem fundo. | | | | |
| 9. Eu sempre estou com tanta fome, que me é difícil parar de comer antes de terminar toda a comida que está no prato. | | | | |
| 10. Quando me sinto solitário (a), me consolo comendo. | | | | |
| 11. Eu conscientemente me controlo nas refeições para evitar ganhar peso. | | | | |
| 12. Quando sinto o cheiro de um bife grelhado ou de um pedaço suculento de carne, acho muito difícil evitar de comer, mesmo que eu tenha terminado de comer há muito pouco tempo. | | | | |
| 13. Estou sempre com fome o bastante para comer a qualquer hora. | | | | |
| 14. Se eu me sinto nervoso(a), tento me | | | | |

| | | | | |
|---|---|---|---|---|
| acalmar comendo. | | | | |
| 15. Quando vejo algo que me parece muito delicioso, eu frequentemente fico com tanta fome que tenho que comer imediatamente. | | | | |
| 16. Quando eu me sinto depressivo (a), eu quero comer | | | | |

44. 17. O quanto frequentemente você evita "estocar" (ou se aprovisionar de) comidas tentadoras? *

*Marcar apenas uma oval.*

- Quase nunca
- Raramente
- Frequentemente
- Quase sempre

45. 18. O quanto você estaria disposto(a) a fazer um esforço para comer menos do que deseja? *

*Marcar apenas uma oval.*

- Não estou disposto(a)
- Estou um pouco disposto(a)
- Estou relativamente bem disposto(a)
- Estou muito disposto(a)

46. 19. Você comete excessos alimentares, mesmo quando não está com fome? *

*Marcar apenas uma oval.*

- Nunca
- Raramente
- Às vezes
- Pelo menos 1 vez por semana

47. 20. Com qual frequência você fica com fome? *

*Marcar apenas uma oval.*

- Somente nos horários das refeições
- Às vezes entre as refeições
- Frequentemente entre as refeições
- Quase sempre

48. 21. Em uma escala de 1 a 8, onde 1 significa nenhuma restrição alimentar, e 8 significa restrição total, qual número você daria para si mesmo? *

*Marcar apenas uma oval.*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
|---|---|---|---|---|---|---|---|---|---|
| Comer tudo o que quiser e sempre que quiser | | | | | | | | | Limitar constantemente a ingestão alimentar, n |

Sentimentos e pensamentos

Arraste a tela do seu celular para a direita para que você possa ver todas as colunas.

49. As questões nesta escala perguntam a respeito dos seus sentimentos e pensamentos durantes os últimos 30 dias (último mês). Em cada questão indique a frequência com que você se sentiu ou pensou a respeito da situação.

Coloque o celular na horizontal ou arraste a tela do seu celular para a direita para que você possa ver todas as colunas.

*Marcar apenas uma oval por linha.*

| | Nunca | Quase nunca | Às vezes | Pouco frequente | Muito frequente |
|---|---|---|---|---|---|
| Com que frequência você ficou aborrecido por causa de algo que aconteceu? | | | | | |
| Com que frequência você sentiu que foi incapaz de controlar coisas importantes na sua vida? | | | | | |
| Com que frequência você esteve nervoso ou estressado? | | | | | |
| Com que frequência você esteve confiante em sua capacidade de lidar com seus problemas pessoais? | | | | | |
| Com que frequência você sentiu que as coisas aconteceram da maneira que você esperava? | | | | | |
| Com que frequência você achou que não conseguiria lidar com todas as coisas que tinha por fazer? | | | | | |
| Com que frequência você foi capaz de controlar irritações na sua vida? | | | | | |
| Com que frequência você sentiu que todos os aspectos de sua vida estavam sob controle? | | | | | |
| Com que frequência você esteve bravo por causa de coisas que estiveram fora de seu controle? | | | | | |
| Com que frequência você sentiu que os problemas acumularam tanto que você não conseguiria resolvê-los? | | | | | |

Hábitos alimentares e COVID-19

50. Você teve COVID-19? *

*Marcar apenas uma oval.*

- ◯ Sim
- ◯ Não

**Se você teve COVID-19, responda as perguntas a seguir:**

51. Quando isso aocnteceu? (mês e ano)

_____

52. Em relação aos sintomas

*Marque todas que se aplicam.*

- ☐ Assintomático (não apresentou sintomas)
- ☐ Foi sintomático (apresentou sintomas)
- ☐ Teve internação
- ☐ Internação em Terapia Intensiva

53. Se foi sintomático, quais sintomas apresentou?

_____

_____

_____

_____

_____

**ANEXO B – Parecer consubstanciado do Comitê de Ética em Pesquisa**

UNIVERSIDADE FEDERAL DE VIÇOSA - UFV

## PARECER CONSUBSTANCIADO DO CEP

**DADOS DO PROJETO DE PESQUISA**

**Título da Pesquisa:** Hábitos e comportamento alimentar durante a pandemia de COVID-19 no Brasil
**Pesquisador:** Ceres Mattos Della Lucia
**Área Temática:**
**Versão:** 2
**CAAE:** 35516720.5.0000.5153
**Instituição Proponente:** Departamento de Nutrição e Saúde
**Patrocinador Principal:** Financiamento Próprio

**DADOS DO PARECER**

**Número do Parecer:** 4.214.234

**Apresentação do Projeto:**
O presente protocolo foi enquadrado como pertencente à Grande 4. Ciências da Saúde
Conforme resumo apresentado no formulário online da Plataforma: Apesar de ter efeito importante no controle da disseminação do novo coronavírus, o isolamento social pode levar a alterações no cotidiano e na alimentação da população. Alguns estudos evidenciaram a mudança de hábitos e o impacto da quarentena no peso corporal em alguns países europeus, e na população Brasileira, no entanto, o comportamento alimentar e o impacto do mesmo na alteração de hábitos e alimentares e peso corporal, são desconhecidos. O objetivo deste trabalho é avaliar as mudanças nos hábitos e no comportamento alimentar de brasileiros com a pandemia de COVID-19 e fatores associados. Trata-se de um estudo observacional, realizado por meio da aplicação de um questionário online que será divulgado para a população brasileira por meio de e-mail e redes sociais institucionais e privadas e ficará disponível para preenchimento durante 15 dias. Serão incluídos no estudo indivíduos com idade igual ou superior a 18 anos, de ambos os sexos, de todas as regiões do Brasil. O questionário é composto por perguntas sobre mudanças ocorridas no peso; hábitos (trabalho; sono; exercício físico; tempo de tela; tabagismo; consumo de bebidas alcoólicas; utilização de serviços de delivery de alimentos; número de refeições realizadas; frequência de consumo de grupos de alimentos), comportamento alimentar, por meio do Three Eating Factor Questionarie 21 (TFEQ-R21) e estresse percebido por meio da Escala de Estresse Percebido (EPS-10). Os dados serão analisados utilizando-se o pacote estatístico SPSS na versão 16.0. O nível de

significância será fixado em 5% (p<0,05).

**Objetivo da Pesquisa:**
De acordo com os(as) pesquisadores(as),

Objetivo primário: Avaliar mudanças nos hábitos e no comportamento alimentar de brasileiros durante a pandemia de COVID-19 e fatores associados.

Objetivos secundários:
-Identificar mudanças em hábitos gerais e alimentares de brasileiros advindas com a pandemia de COVID-19;
- Verificar a existência de fatores associados às mudanças ocorridas em hábitos gerais e alimentares de brasileiros na pandemia de COVID-19;
- Avaliar os escores referentes aos comportamentos alimentares de alimentação emocional; descontrole alimentar e restrição cognitiva de brasileiros na pandemia de COVID-19;
-Identificar fatores associados aos comportamentos alimentares de alimentação emocional; descontrole alimentar e restrição cognitiva de brasileiros na pandemia de COVID-19;
- Verificar mudanças no peso corporal de brasileiros durante a pandemia de COVID-19;
- Avaliar associação entre o estresse percebido, hábito e comportamento alimentar durante a pandemia de COVID-19.

**Avaliação dos Riscos e Benefícios:**
Os pesquisadores apresentam no Formulário on line e TCLE os seguintes Riscos e formas de minimizá-los: Os riscos de participar do estudo são mínimos, como o de se sentir constrangido ao responder as perguntas. Porém, durante o preenchimento do questionário não será solicitado o fornecimento do seu nome ou de documentos que possam identificá-lo. Você poderá interromper o preenchimento do questionário a qualquer momento antes de enviá-lo ou deixar de responder alguma pergunta do questionário. Além disso, você poderá retirar o seu consentimento de participação no estudo a qualquer momento, sem nenhum prejuízo.
Os pesquisadores apresentam no Formulário on-line os seguintes Benefícios: Os resultados encontrados poderão ser utilizados para orientar estratégias para reduzir os problemas relacionados ao hábitos e comportamento alimentar durante a pandemia.

Avaliação: os benefícios diretos e/ou diretos devem estar claramente descritos da mesma maneira no Formulário on-line e TCLE, segundo a Resolução 466/2012.

**Comentários e Considerações sobre a Pesquisa:**

Os pesquisadores propõem avaliar se a pandemia por COVID-19 acarretou mudanças nos hábitos e comportamentos alimentares de brasileiros na pandemia de COVID-19. Alguns fatores podem estar mais associados às mudanças encontradas, como sexo feminino; maior nível de estresse e menor renda. Para tal, sujeitos serão incluídos no estudo indivíduos com idade igual ou superior a 18 anos, de ambos os sexos. Serão excluídos os questionários incompletos. A amostra deste estudo será de conveniência. Instrumento de avaliação das mudanças no peso; de hábitos e comportamento alimentar; e de estresse percebido. O questionário é composto por perguntas sobre mudanças ocorridas no peso; hábitos (trabalho; sono; exercício físico; tempo de tela; tabagismo; consumo de bebidas alcoólicas; utilização de serviços de delivery de alimentos; número de refeições realizadas; frequência de consumo de grupos de alimentos), comportamento alimentar, por meio do Three Eating Factor Questionarie 21 (TFEQ-R21) e estresse percebido por meio da Escala de Estresse Percebido (EPS-10) (APENDICE B).O TFEQ-R21 é um questionário traduzido e validado para o português, é composto por 21 itens, com 4 opções de resposta para as questões de 1 a 20 e a questão 21 é avaliada em uma escala likert de 8 pontos. O TFEQ-R21 avalia 3 tipos de comportamento alimentar: restrição cognitiva (RC), alimentação emocional (AE) e descontrole alimentar (DA). A escala de RC aborda 6 itens e avalia a proibição alimentar para forma de reduzir o peso/alterar formato corporal; a escala de AE possui 6 itens e mede a propensão para comer exageradamente em resposta a estados emocionais negativos (solidão, ansiedade, depressão, etc) e o DA verifica a tendência a perder o controle alimentar na presença de fome ou de outros estímulos. Não existem pontos de corte para os padrões alimentares avaliados pelo TFEQ-R21, e a orientação é que sua avaliação seja feita associada à outras variáveis de interesse (NATACCI; JÚNIOR, 2011).A Escala de Estresse Percebido (EPS-10) é validada no Brasil e em outros países como Estados Unidos, Japão e Espanha e demonstrou confiabilidade, apresentando qualidades psicométricas adequadas, além de poder ser utilizado em diferentes grupos etários, desde adolescentes até idosos (Brunori et al., 2015).A partir da soma das pontuações obtidas é realizado o cálculo do escore da EPS-10 que varia de zero a 40 pontos, sendo que quanto maior o escore obtido, maior o nível de estresse percebido. A EPS- 10 é composta por dez questões que podem ser respondidas com as opções: 0=nunca; 1=quase nunca; 2=às vezes; 3=quase sempre; 4=sempre. Para as perguntas com implicações negativas, a pontuação é somada de forma direta,

já para as questões com implicações positivas a pontuação é somada de forma invertida. Para avaliação do estresse percebido, os indivíduos serão categorizados por de níveis de estresse a partir dos quartis amostrais (Luft et al., 2007). Os participantes poderão interromper o preenchimento do questionário a qualquer momento antes do envio, pois as respostas serão salvas somente se o respondente clicar no botão "Enviar".Análise dos dadosOs dados numéricos serão apresentados na forma de média e desvio-padrão ou mediana, mínimo e máximo, segundo a distribuição dos dados (teste de Kolmogorov-Smirnof). Dados categóricos serão apresentados sob a forma de números absolutos e percentuais. . Fatores associados às mudanças encontradas serão obtidos por análise univariada (teste de correlação de Pearson ou Spearman; teste t de Student ou Mann-Whitney) e multivariada (regressão linear múltipla; método stepwise backward com inclusão de variáveis com $p<0.2$ da análise univariada). Aspectos Éticos: A pesquisa respeitará as orientações expressas na Resolução MS 466/2012 (BRASIL, 2012) na elaboração do seu protocolo e na obtenção do Termo de Consentimento Livre e Esclarecido. A aplicação do questionário será iniciada apenas após aprovação do Comitê de Ética em Pesquisa com Seres Humanos da Universidade Federal de Viçosa.

**Considerações sobre os Termos de apresentação obrigatória:**
O pesquisador apresentou:

1- PB
2- Cronograma
3- Folha de rosto
4- Apêndice
5- Orçamento
6- Projeto
7- TCLE

Considerações: Os documentos apresentados estão adequados ao que preconiza a resolução 466/2012.

**Recomendações:**

Quando da coleta de dados, o TCLE deve ser elaborado em duas vias, rubricado em todas as suas páginas e assinado, ao seu término, pelo convidado a participar da pesquisa ou responsável legal, bem como pelo pesquisador responsável, ou pessoa(s) por ele delegada(s), devendo todas as assinaturas constar na mesma folha.

Não é necessário apresentar os TCLEs assinados ao CEP/UFV. Uma via deve ser mantida em arquivo pelo pesquisador e a outra é do participante da pesquisa.

**Conclusões ou Pendências e Lista de Inadequações:**

Aprovado

**Considerações Finais a critério do CEP:**

Ao término da pesquisa é necessário apresentar, via notificação, o Relatório Final (modelo disponível no site www.cep.ufv.br). Após ser emitido o Parecer Consubstanciado de aprovação do Relatório Final, deve ser encaminhado, via notificação, o Comunicado de Término dos Estudos para encerramento de todo o protocolo na Plataforma Brasil.

Projeto aprovado autorizando o início da coleta de dados com os seres humanos a partir da data de emissão deste parecer.

**Este parecer foi elaborado baseado nos documentos abaixo relacionados:**

| Tipo Documento | Arquivo | Postagem | Autor | Situação |
|---|---|---|---|---|
| Informações Básicas do Projeto | PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1599382.pdf | 28/07/2020 16:20:27 | | Aceito |
| Outros | Carta_Resposta_CEP.doc | 28/07/2020 16:19:59 | Ceres Mattos Della Lucia | Aceito |
| Projeto Detalhado / Brochura Investigador | Projeto_Modificado.docx | 28/07/2020 16:19:30 | Ceres Mattos Della Lucia | Aceito |
| TCLE / Termos de Assentimento / Justificativa de Ausência | TCLE_Modificado.docx | 28/07/2020 16:19:19 | Ceres Mattos Della Lucia | Aceito |
| Folha de Rosto | folhaDeRosto.pdf | 22/07/2020 10:59:40 | Ceres Mattos Della Lucia | Aceito |
| Outros | APENDICEB_Questionario.pdf | 21/07/2020 17:26:03 | Ceres Mattos Della Lucia | Aceito |
| Projeto Detalhado | Projeto.docx | 21/07/2020 | Ceres Mattos Della | Aceito |

| | | | | |
|---|---|---|---|---|
| / Brochura Investigador | Projeto.docx | 17:24:50 | Lucia | Aceito |
| TCLE / Termos de Assentimento / Justificativa de Ausência | TCLE.docx | 21/07/2020 17:24:42 | Ceres Mattos Della Lucia | Aceito |
| Orçamento | Orcamento.docx | 21/07/2020 17:21:25 | Ceres Mattos Della Lucia | Aceito |
| Cronograma | Cronograma.docx | 21/07/2020 17:20:49 | Ceres Mattos Della Lucia | Aceito |

**Situação do Parecer:**
Aprovado

**Necessita Apreciação da CONEP:**
Não

VICOSA, 14 de Agosto de 2020

**Assinado por:**
**LUIZ ISMAEL PEREIRA**
**(Coordenador(a))**

## ANEXO C – Scripts das Árvores de Regressão (R Studio)

```
#setwd('/home/jmazucheli/Dropbox/tamiresufmg/')
graphics.off()
library(quantreg)
library(rogme)
library(dplyr)
library(tidyverse)
library(WRS2)
library(ggplot2)
library(knitr)
library(pandoc)
library(table1)
library(ggExtra)
library(kableExtra)
library(rpart)
library(rpart.plot)
################################################################################
dados         <-  openxlsx::read.xlsx("dados_3.xlsx", sheet = "BANCO")[,-c(1)];
names(dados)  <-  tolower(iconv(names(dados),to="ASCII//TRANSLIT"))
dados$t2_peso <-  as.numeric(dados$t2_peso)
dados$t3_peso <-  as.numeric(dados$t3_peso)
nomes <- c("t2_isolamento",         "t3_isolamento",
           "t2_linhadefrente",      "t3_linhadefrente",
           "t2_cigarro",            "t3_cigarro",
           "t2_qualisono",          "t3_qualisono",
           "t2_tempoaf",            "t3_tempoaf",
           "t2_beliscar",           "t3_beliscar",
           "t2_delivery",           "t3_delivery",
           "t2_preparoref",         "t3_preparoref",
           "t2_comfortfood",        "t3_comfortfood",
           "t2_craving",            "t3_craving",
           "t3_tevecovid", "genero")

dados         <-  dados %>% mutate_at(nomes, factor)

tempo2        <-  dados %>% select(starts_with("t2_"))
tempo3        <-  dados %>% select(starts_with("t3_"))

################################################################################
desc2         <-  tempo2 %>% select(-c("t2_restricaocognitiva", "t2_comeremocional", "t2_estresse
desc3         <-  tempo3 %>% select(-c("t3_restricaocognitiva", "t3_comeremocional", "t3_estresse

rest2         <-  tempo2 %>% select(-c("t2_descontrolealim", "t2_comeremocional", "t2_estressepe
rest3         <-  tempo3 %>% select(-c("t3_descontrolealim", "t3_comeremocional", "t3_estressepe

come2         <-  tempo2 %>% select(-c("t2_descontrolealim", "t2_restricaocognitiva", "t2_estress
come3         <-  tempo3 %>% select(-c("t3_descontrolealim", "t3_restricaocognitiva", "t3_estress

estr2         <-  tempo2 %>% select(-c("t2_descontrolealim", "t2_restricaocognitiva", "t2_comeren
estr3         <-  tempo3 %>% select(-c("t3_descontrolealim", "t3_restricaocognitiva", "t3_comeren
################################################################################
set.seed(123)
fit     <- rpart(t2_descontrolealim ~ ., data = desc2, control = rpart.control(minsplit = 10, cp
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t2_descontrolealim.pdf")
  prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
################################################################################
set.seed(123)
fit     <- rpart(t3_descontrolealim ~ ., data = desc3, control = rpart.control(minsplit = 10, cp
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t3_descontrolealim.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
################################################################################
set.seed(123)
fit     <- rpart(t2_restricaocognitiva ~ ., data = rest2, control = rpart.control(minsplit = 10,
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t2_restricaocognitiva.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
```

```
#############################################################################
fit     <- rpart(t3_restricaocognitiva ~ ., data = rest3, control = rpart.control(minsplit = 10,
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t3_restricaocognitiva.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
#############################################################################
fit     <- rpart(t2_comeremocional ~ ., data = come2, control = rpart.control(minsplit = 10, cp =
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t2_comeremocional.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
#############################################################################
fit     <- rpart(t3_comeremocional ~., data = come3, control = rpart.control(minsplit = 10, cp =
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t3_comeremocional.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
#############################################################################
fit     <- rpart(t2_estressepercebido ~., data = estr2, control = rpart.control(minsplit = 10, cp
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t2_estressepercebido.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
#############################################################################
fit     <- rpart(t3_estressepercebido ~., data = estr3, control = rpart.control(minsplit = 10, cp
b       <- fit$cptable[which.min(fit$cptable[, "xerror"]), "CP"]
bos.t3  <- prune(fit, cp = b)
pdf("t3_estressepercebido.pdf")
prp(bos.t3,type = 1, extra = 1, digits = 4, under = T)
graphics.off()
```

## ANEXO D – Demais artigos provenientes da pesquisa

frontiers in Nutrition

BRIEF RESEARCH REPORT
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# Incidence and Associated Factors of Weight Gain During the Covid-19 Pandemic

*Marina Martins Daniel*[1], *Juliana Costa Liboredo*[2], *Lucilene Rezende Anastácio*[3], *Tamires Cássia de Melo Souza*[3], *Lívya Alves Oliveira*[4], *Ceres Mattos Della Lucia*[4] *and Lívia Garcia Ferreira*[1]*

[1] Graduate Program in Nutrition and Health, Department of Nutrition, Universidade Federal de Lavras, Lavras, Brazil, [2] Department of Food, Universidade Federal de Ouro Preto, Ouro Preto, Brazil, [3] Graduate Program in Food Science, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, [4] Graduate Program in Nutrition Science, Department of Nutrition and Health, Universidade Federal de Viçosa, Viçosa, Brazil

**Introduction and Aims:** The behavioral changes that arose from quarantine due to the COVID-19 pandemic may have impacted the weight of people. This study aims to investigate the incidence and predictors of weight gain during the quarantine period.

**Methods:** An online survey was performed five months after the social distance measures implementation. Participants recorded their current and usual weight before lockdown. A multivariate logistic regression model was performed.

**Results:** Data on 1334 participants were evaluated (33.6y, 79.8% females), and 58.8% have gained weight (3.0 kg; 0.1 to 30.0 kg). Predictors of weight gain were increased food intake (OR = 5.40); snacking (OR = 2.86); fast food (OR = 1.11); canned products (OR = 1.08); and in physical activity (OR = 0.99) concerning the period before the pandemic; also time spent at work, including household chores (OR = 1.58); evening snack (OR = 1.54); higher frequency of alcoholic beverage intake (OR = 1.59) and dose of alcoholic beverage (OR = 1.11); uncontrolled eating (OR = 1.01), and vegetable intake (OR = 0.92) during the quarantine and physical activity before pandemic period (OR = 0.99).

**Conclusion:** Most participants have gained weight during the pandemic because of working changes, lifestyle, eating habits changes, and uncontrolled eating behavior. These results can be useful to encourage changes during future quarantine periods to prevent weight gain.

**Keywords: SARS-CoV-2, coronavirus, social distance, quarantine, obesity**

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***Reviewed by:***
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*Sapienza University of Rome, Italy*
*Anna Vittoria Mattioli,*
*University of Modena and Reggio Emilia, Italy*

***Correspondence:**
*Lívia Garcia Ferreira*
*livia.ferreira@ufla.br*

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## INTRODUCTION

The infection of the SARS-CoV-2 virus has already killed over 540.000 people in Brazil (1). Until there is an effective vaccine or treatment, social distancing and self-hygiene are the most effective measures against the spread of the SARS-CoV-2 virus. However, social changes occurring from quarantine impact lifestyle, eating habits (2), and promote sedentary behaviors, such as exposure

to screens, teleworking, and the closing of sports spaces and gyms, causing a reduction in energy expenditure (3). These changes in the social environments and changes in the dietary pattern may have contributed to an increase in body weight in the population (4). Some people may adopt an unhealthy diet during the quarantine period, leading to substantial weight gain and, possibly, an increase in the incidence of obesity-related comorbidities (5). Weight gain during quarantine has been described in previous studies (2–7).

Obesity has been pointed out as an important risk factor for aggravation and mortality for COVID-19, especially in younger individuals (8). The impact of obesity on pulmonary function includes decreased expiratory reserve volume, functional capacity, respiratory system compliance (9). Furthermore, obese individuals also have more cardiovascular diseases and type 2 diabetes mellitus, both of which are risk factors for COVID-19 severity and mortality (10).

Based on the latest nationwide surveys carried out during a non-pandemic context, Brazil is already in a situation of high prevalence of obesity (26.8%) and overweight (61.7%) (11). In the current context, changes in the habits of the population during the COVID-19 pandemic (2) are already observable. That way, it is necessary to study the factors associated with weight changes, so that it shall be possible to significantly intervene in the potential future impacts to the health of the population. As far as we know, there are data on how the quarantine period affected eating behavior and weight gain (12), and physical activity (13) among a Brazilian sample. However, there is no more comprehensive data on predictors of weight gain. Thus, the study aimed to investigate the incidence and predictors of weight gain concerning socioeconomic factors, employment status, and social isolation caused by the pandemic, eating behavior, stress, eating habits, and lifestyle during the quarantine period in Brazil.

## MATERIALS AND METHODS

A cross-sectional online survey created on the Google Form platform® was performed from August 14th to September 9th, 2020., 5 months after the social distance measures implementation. Initially, the researchers shared the link via emails, university websites, and social media (Facebook, Instagram, LinkedIn, and WhatsApp). Participants were also asked to share the link with acquaintances, family, and friends to participate in the research. The entire form took approximately 15 min to complete.

The inclusion criteria were being a resident in Brazil and being 18 years old or older. Pregnant women, incomplete questionnaires, repeated answers were excluded. The study was conducted according to the Declaration of Helsinki. The Research Ethics Committee approved the study (Protocol number 35516720.5.0000.5153). A consent form for participation was sent, where participants could declare their consent or not participate in the research. In the end, the consent form was automatically generated and sent by email to the participants. A pilot study was carried out with about 30 respondents.

To investigate the weight gain, participants recorded their usual weight before the implementation of prophylactic measures of social isolation in Brazil (around March 2020) and their current weight in kilograms. The weight gain was obtained by the difference between the volunteers' current weight and their weight prior to the pandemic. When that difference was positive ($> +0.1$), volunteers were classified as having weight gain. They also recorded their height in meters. Body mass index (BMI) before and during the pandemic period was calculated and participants were classified as underweight (BMI $<18.5$ kg/m$^2$); normal (BMI: 18.5–24.9 kg/m$^2$), overweight (BMI: 25.0–29.9 kg/m$^2$), and obese (BMI: $>30.0$ kg/m$^2$) (14). Intention, or otherwise, to change the weight was also collected.

Socioeconomic data (age, gender, home state, per capita income, education level, home residents); labor situation and social isolation occurred by the pandemic; eating behaviors (assessed by Three-Factor Eating Questionnaire) (15); perceived stress (assessed by Perceived Stress Scale) (16); eating habits (meals, food intake, snacking, food delivery, cooking at home, food frequency) (17); and lifestyle (sleep, physical activity, smoke, alcohol, screen time) prior and/or during the COVID-19 pandemic were investigated as predictors of weight gain, according to Liboredo et al. (18).

Data were analyzed using the software Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) version 21.0. Data was demonstrated as median, interquartile interval (Kolmogorov-Smirnov test; $p < 0.05$) or by frequency and absolute numbers. To evaluate the predictors of weight gain, a multivariate logistic regression model was performed. The selection of variables to enter the model was obtained by Spearman correlation ($p < 0.05$). The model was obtained by the backward conditional method. The fit of the models was tested by the Hosmer Lemeshow test ($p > 0.05$). The level of significance adopted was 0.05.

## RESULTS

There were initially 1,496 answers, but 162 answers were excluded, resulting in 1,334 individuals enrolled in this study. Participants were 31 (24–40) years old the majority were women (79.8%) from the Southeast region of Brazil (89.4%).

The median self-reported weight difference (current - before the pandemic) was + 1.34 kg (ranging from −19.0 to + 30.0 kg; interquartile range: −0.7 to + 3.0 kg), 25.0 and 11.5% of volunteers were overweight and obese, respectively before the pandemic, and these percentages increased to 27.7 and 14.0% during quarantine ($p < 0.001$,Mc Necmar test). Weight gain occurred in 58.8% of participants during the period (median 3.0 kg, varying from 0.1 to 30 kg; interquartile interval: 2.0 to 5.0 kg). The self-reported weight and BMI before the pandemic period were similar among individuals who gained and did not gain weight. Most participants who reported weight gain (77.4%; $n = 681$) stated that it was not intentional. However, 25.4% of participants thought

**TABLE 1 |** Weight and body mass index characteristics among the volunteers who gained weight or not during the pandemic period.

| Characteristics** | Weight gain | | *p*-value |
|---|---|---|---|
| | No (41.2%; *n* = 549) | Yes (58.8%; *n*= 785) | |
| Weight before the pandemic period (kg) | 64.0 (57.0–77.0) | 64.0 (56.0–75.0) | 0.275 |
| Weight during the pandemic period (kg) | 63.0 (65.0–75.0) | 68.0 (60.0–80.0) | <0.001 |
| Weight difference (kg) | −1.5 (−3.0–0.0) | 3.0 (2.0–5.0) | <0.001 |
| BMI before the pandemic period (kg/m$^2$) | 23.6 (21.1–27.2) | 23.4 (21.3–26.6) | 0.635 |
| BMI during the pandemic period (kg/m$^2$) | 22.9 (20.6–26.3) | 24.7 (22.2–28.2) | <0.001 |
| BMI difference (kg/m$^2$) | −0.5 (−1.1–0.0) | 1.1 (0.7–1.7) | <0.001 |
| **BMI classification before the pandemic period*** | | | |
| Underweight (%) | 4.4 (24) | 4.8 (38) | |
| Normal (%) | 56.3 (309) | 60.6 (476) | 0.336 |
| Overweight (%) | 27.3 (150) | 23.4 (184) | |
| Obesity (%) | 12.0 (66) | 11.1 (87) | |
| **BMI classification during pandemic period*** | | | |
| Underweight (%) | 6.7 (37) | 2.0 (16) | |
| Normal (%) | 60.1 (330) | 50.3 (395) | <0.001 |
| Overweight (%) | 24.0 (132) | 30.2 (237) | |
| Obesity (%) | 9.1 (50) | 17.5 (137) | |

*Qui-Square or **Mann-Whitney test; BMI, body mass index.

they lost weight (median of −2.7 kg, ranging from −19.0 to −0.2 kg; interquartile range: −4.0 to −2.0 kg). The self-reported weight and BMI characteristics are described in **Table 1**.

There was no association between socioeconomic data and weight gain ($p > 0.05$). However, the perception of time spent in work, social isolation, perceived stress, changes in eating habits, performing the evening snack, uncontrolled and emotional eating during the quarantine were associated with weight gain in univariate analyses ($p < 0.05$) (**Table 2**). Also, changes in food intake frequency (cereal, bread, fruit, meat, canned products, vegetables, sugary drinks, instant meals, and snacks, candies, and fast food) occurring during pandemic were associated with weight gain in univariate analyses ($p < 0.05$) (**Supplementary Figure 1**).

Lifestyle changes during quarantine related to weight gain can be seen in **Figure 1**. Reduced physical activity time, worse sleep quality, and increased dose and frequency of alcoholic beverages were more frequent in individuals who have weight gain ($p < 0.05$ for all).

Predictors of weight gain during the pandemic period can be seen in **Table 3**. Increased food intake, snacking, evening snack, time spent at work (including household chores), frequency and dose of alcoholic beverage, fast food, and canned product intake about the period before the pandemic period, and uncontrolled eating increased the chance of weight gain. However, increased physical activity and vegetable intake reduced the chance of weight gain during the quarantine.

## DISCUSSION

Our study revealed that most survey participants (58.8%) reported weight gain during the COVID-19 quarantine outbreak in Brazil. Other studies reported weight gain in 48.6% among the Italian population (2), 30% in Poland (6), and 22.0% in participants from different nationalities (7). Moreover, in this study, the prevalence of overweight and obesity before and during the pandemic increase significantly. Before the pandemic period, about 2/3 of the Brazilian population was already overweight and obese (11).

These data are worrying since obesity has emerged as an important risk factor for aggravation and mortality for COVID-19 (8). In our study, data were collected 5 months after the decree of social distancing in Brazil. The choice of the period was necessary so that the data collected would reflect changes made after adaptation to the new living conditions. Thus, it is possible to better check the predictors of risk and protection of weight gain during this pandemic scenario.

It is worth mentioning that studies in the literature show that women are more prone to weight gain than men (19), even during the pandemic period (20). Despite this, our study did not observe this scenario since gender was not an independent factor associated with weight gain.

Eating behaviors are relevant influences on food choices and BMI (9). Our findings revealed that increased uncontrolled eating behavior was a predictor of weight gain. Considering the scores, for each point added on the scale of uncontrolled eating, the chance of gaining weight during the pandemic increased by 1%, and this means that the more points, the greater the chance. This behavior is associated with excessive food consumption (21), and

**TABLE 2 |** Socioeconomic data, labor situation, social isolation, perceived stress, eating habits and behavior among the volunteers who gained weight or not during the pandemic period in univariate analyses.

| Characteristics | Weight gain | | *p*-value |
|---|---|---|---|
| | No (41.2%; *n* = 549) | Yes) (58.8%; *n* = 785) | |
| **Socioeconomic** | | | |
| **Gender* (%, *n*)** | | | |
| Female | 40.6 (432) | 59.4 (633) | 0.403 |
| Male | 43.4 (115) | 56.6 (150) | |
| **Age** (years)** | 31.0 (24.0–40.0) | 31.0 (24.0–39.0) | 0.586 |
| **Per capita income** (U$)** | 348.6 (154.9–697.1) | 325.3 (154.9–697.15) | 0.273 |
| **Home residentes* (%, *n*)** | | | |
| Living with parents | 37.2 (204) | 38.3 (301) | 0.688 |
| Living with children | 23.0 (126) | 27.1 (213) | 0.085 |
| **Education level* (%, *n*)** | | | |
| Graduate or above | 41.7 (369) | 58.3 (515) | 0.596 |
| Undergraduate or below | 40.2 (180) | 59.8 (268) | |
| **Labor situation* (%, *n*)** | | | |
| **Perception of time spent in work (household chores)* (%, *n*)** | | | |
| Increased | 60.1 (330) | 69.6 (546) | <0.001 |
| The same + reduced | 30.4 (219) | 39.9 (319) | |
| **Working schedule* (%, *n*)** | | | |
| Full-time work or study at home | 38.6 (212) | 41.5 (326) | 0.307 |
| Full/part-time work or study at home | 68.5 (376) | 72.1 (566) | 0.160 |
| Same situation before pandemic period | 11.8 (65) | 10.6 (83) | 0.480 |
| **COVID-19 frontline worker* (%, *n*)** | 5.5(30) | 6.5 (51) | 0.485 |
| **Social isolation* (%, *n*)** | | | |
| Total /Partial | 54.1 (297) | 60.9% (478) | 0.015 |
| **Perceived stress** (score)** | 24.0 (19.0–28.0) | 22.0 (17.0–27.0) | <0.001 |
| **Eating habits**** | | | |
| Number of meals | 15.3 (84) | 28.7 (225) | <0.001 |
| Increased food intake (%, *n*) | 31.7 (174) | 77.5 (608) | <0.001 |
| Increased snacking (%, *n*) | 30.2 (166) | 66.1 (519) | <0.001 |
| Increased food delivery (%, *n*) | 44.6 (245) | 54.4 (427) | <0.001 |
| Increased homemade meals (%, *n*) | 63.9 (351) | 69.7 (547) | 0.028 |
| **Consumption of meals* (%, *n*)** | | | |
| Breakfast | 84.7 (465) | 83.7 (657) | 0.648 |
| Morning snack | 33.0 (181) | 33.0 (259) | 1.000 |
| Lunch | 97.1 (533) | 97.3 (764) | 0.866 |
| Afternoon snack | 78.7 (432) | 82.3 (646) | 0.105 |
| Dinner | 79.4 (436) | 82.7 (649) | 0.135 |
| Evening snack | 24.0 (132) | 32.4 (254) | 0.001 |
| **Eating behavior** (score)** | | | |
| Uncontrolled eating | 25.9 (11.1–40.7) | 37.0 (22.2–51.8) | <0.001 |
| Emotional eating | 27.2 (5.5–50.0) | 44.4 (16.7–66.7) | <0.001 |
| Cognitive restraint | 44.4 (27.8–61.1) | 44.4 (27.8–61.1) | 0.525 |

**Qui-Square or* ***Mann-Whitney test.*

it may be a cause and a consequence of being overweight. During the pandemic, uncontrolled eating behavior may be related to the feeling of boredom generated by social isolation, where individuals were forced to stay indoors for an extended period. In this way, overeating may be a way to avoid monotony (2).

Social isolation is related to increased food consumption and the development of obesity (22). In the present study, increased food intake was related to 77.5% of participants who reported weight gain. Additionally, 66.1% of individuals who gained weight indicated increased snacking which is

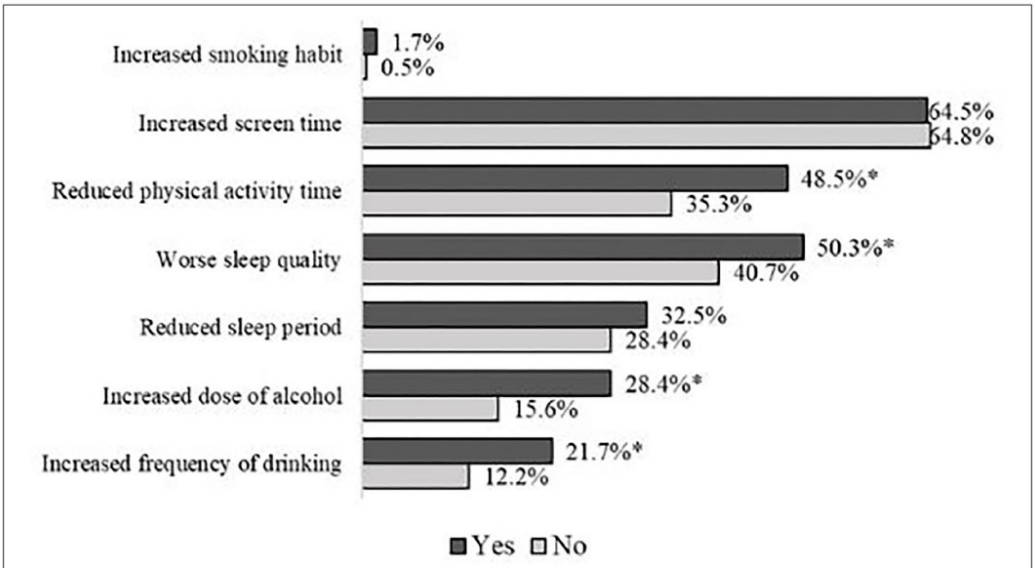


**FIGURE 1 |** Lifestyle changes among the volunteers who gained weight or not during the pandemic period in univariate analyses. Qui-square test *$p < 0.05$.

**TABLE 3 |** Weight gain predictors among Brazilians during pandemic period in multivariate analyses.

| **Predictors of weight gain (Prediction of 72.4% of cases; Hosmer Lemeshow = 0.07)** | **OR** | **IC 95%** | | ***p*-value** |
|---|---|---|---|---|
| **Increased the chance of weight gain** | | | | |
| Increased food intake | 5.405 | 3.690 | 7.874 | <0.001 |
| Increased snacking | 2.860 | 2.189 | 3.737 | <0.001 |
| Increased frequency of alcoholic beverage intake | 1.589 | 1.087 | 2.322 | 0.017 |
| Increased perception of time spent at work (including household chores) | 1.581 | 1.511 | 2.063 | 0.001 |
| Eneving snack during the pandemic period | 1.538 | 1.150 | 2.056 | 0.004 |
| Increased dose of alcoholic beverage intake (per week) | 1.109 | 1.028 | 1.195 | 0.007 |
| Increased fast food intake frequency in relation to the period prior pandemic (times/week) | 1.107 | 1.024 | 1.197 | 0.011 |
| Increased frequency incanned products intake in relation to the period prior pandemic (times/week) | 1.077 | 1.005 | 1.155 | 0.037 |
| Uncontrolled Eating (score) | 1.010 | 1.004 | 1.017 | 0.003 |
| **Reduced the chance of weight gain** | | | | |
| Physical activity before pandemic period (min/week) | 0.997 | 0.995 | 0.998 | <0.001 |
| Increased in physical activity in relation to the period prior to the pandemic (min) | 0.997 | 0.995 | 0.998 | <0.001 |
| Increased in vegetables intake frequency in relation to the period prior to the pandemic (times/week) | 0.923 | 0.872 | 0.977 | 0.006 |
| **Constant** | 0.291 | | | 0.271 |

associated with an increase in fat mass and fat percentage (23). These changes in dietary patterns were also observed by Sidor and Rzymski (6) during the COVID-19 lockdown. Unlimited access to food during the quarantine may cause a perturbation of time-restricted feeding (6), which is known to support robust metabolic cycles and has a protective role in dysmetabolism and obesity (24). Sisto et al. (25) also demonstrated a relationship between symptoms of anxiety and depression with the consumption of snacks, increased hunger, and impulsive eating, since suffering negatively impacts dietary treatments (25). The state of being depressed or the worsening of this condition are precursors for weight gain and recovery (26).

On the other hand, Barcin-Güzeldere and Devrim-Lanpir (27) suggested that the stress transmitted by the COVID-19 pandemic can cause a reduction in appetite since some will want to increase the consumption of certain foods as a way to ward off emotions. Others do the opposite, that is, reducing their consumption.

The COVID-19 pandemic has brought challenges, as it unequally affects mental health in women and men since women seem to be more impacted by the quarantine, and depression, anxiety, and stress can intensify. There is a dangerous association between COVID-19 infection, depression, and cardiovascular disease (28). It is also worth noting how cardiovascular diseases are associated with deaths from COVID-19. Social distance can minimize disease infestation; however, the restrictions imposed by pandemics may directly influence lifestyle (29).

The association between perceived stress and detected weight gain may be related to the predominant gender of the sample, composed of about 80% females. Torres and Nowson (30) showed the relationship between impulsive eating when facing a stressful situation and obesity only in females. The authors also explained that women tend to use food as a means of dealing with stress, while men seek to consume alcohol or tobacco (30).

One eating occasion also had a significant result in this study: evening snack was a predictor for weight gain during the COVID-19 pandemic. This result agrees with previous research that showed an association between a higher frequency of snacking at night and an increased risk of developing obesity, especially in overweight individuals (31).

Furthermore, unhealthy eating habits may contribute to weight gain. In the multiple logistic regression analyses, increased intake of fast food and canned products were associated with a greater chance of weight gain (10.7 and 7.7%, respectively), while the increase in the frequency of vegetable consumption during the pandemic period reduced the likelihood of weight gain by 7.7%. Likewise, worsening of the eating pattern was observed in studies carried out with other populations during the COVID-19 pandemic (32). The association between fast food and canned products consumption and weight gain has been observed in previous studies (33). Fast food products are high in fat, sugars, and energy density, and they are often served in large portion sizes; also, canned products are among the ultra-processed foods that provide more calories (34). An increase in the consumption of these foods during the COVID-19 pandemic may be related to a tendency to experience at home some socialization habits that are traditionally external, such as meeting with friends, enjoying an aperitif, and eating out (35). On the other hand, foods of plant origin have numerous nutrients in a low amount of calories, which make them ideal for preventing overweight and obesity (34).

Regarding lifestyle habits, alcohol intake increased the chance for weight gain during quarantine time, and extended stays at home could also directly affect alcohol consumption. The increase in the frequency (58.9% greater chance) and the dose of alcohol (10.9% greater chance) intake affected the chance of weight gain in the present study. Alcohol is the most consumed substance by different populations, and its excessive consumption is related to weight gain among individuals (36). This possible association can be explained by variation on the frequency and amount consumed, if there is excessive consumption of calories, whether it exceeds the daily caloric needs of individuals. These factors can possibly lead to weight gain (36). The increase in the frequency of consumption of alcohol may be related to the attempt to combat stress and other negative emotions caused by social isolation (6).

On the other hand, physical activity before quarantine and the increase in practice during the pandemic reduced the chance for increasing body weight in the present study. This leads us to consider that maintaining an active lifestyle during a period of social isolation is crucial (37). In addition, physical exercise improves immune function, increasing the response to virus infections, such as SARS-CoV-2 (38). This is a fascinating result since most participants are female, and according to the literature, women tend to be less active than men (28).

Increased perception of work time during the pandemic also raised the chance of weight gain by 58.1%. As a consequence of social isolation, changes in the work modality of a large part of the population were necessary, with the "smart" work mode being implemented (39). As a result of this adaptation, it was observed that the working time increased (40). With the expanded demand for working at home, individuals are remaining sat for more hours daily, consequently increasing sedentary behavior, as has been seen in other populations during quarantine for COVID−19 (41).

Although this study provides insight into how epidemic-related social isolation can affect weight gain, some limitations also need to be considered. First, anthropometric data was not measured directly but self-reported. However, this approach is commonly used in several studies during the pandemic period (2, 6). Also, the sample may not be representative because most responses were female participants, and hence the results may be more linked to this audience.

The main strengths of this study were that it was carried out with the Brazilian population and that the data were collected 5 months after the ruling of social isolation in Brazil, which made it possible to assess changes in weight after a period of adaptation to a relatively rigorous quarantine in the country. Furthermore, our study provides important results that may be used to establish strategies for weight control in possible situations of future social isolation. Thus, this study allows for more comprehensive data on predictors of weight gain in such population.

The quarantine period affected the population's lifestyle and eating habits, and these, in turn, caused a direct impact on their weight gain in Brazil. Most participants reported weight gain during the pandemic. Food intake, snacking, time spent at work, including household chores, and intake of fast food and canned products increased compared to the period before the pandemic. Evening snacks, higher frequency and dose of alcoholic beverage intake, and uncontrolled eating increased the chance of weight gain. On the other hand, physical activity before the pandemic period as well as increased physical activity and

vegetable intake during the quarantine reduced the chance for increasing body weight.

## DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee of the Federal University of Vicosa, Minas Gerais, Brazil. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

LA, LF, JL, and CD: equally contributed to the conception and design of the research. LA, LF, JL, CD, and LO: contributed to the acquisition of the data. LA and LF: contributed to the statistical analysis. MD, JL, TS, LA, and LF: contributed to the interpretation of the data. MD and JL: drafted the manuscript. All authors critically revised the manuscript, agree to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fnut.2022.818632/full#supplementary-material

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# Food Craving and Its Associated Factors during COVID-19 Outbreak in Brazil

Lívya Alves Oliveira[a], Ceres Mattos Della Lucia[a], Fabiane Aparecida Canaan Rezende[b], Lívia Garcia Ferreira[c], Lucilene Rezende Anastácio[d], Tamires Cássia de Melo Souza[d], Marina Martins Daniel[c], and Juliana Costa Liboredo[e]

[a]Federal University of Viçosa; [b]University of Porto; [c]Federal University of Lavras; [d]Federal University of Minas Gerais; [e]Federal University of Ouro Preto

**ABSTRACT**

**Background:** Social distancing used as a measure to contain the spread of SARS-CoV-2, led to a series of changes in eating behavior, including food craving.
**Purpose:** We aimed to evaluate food craving and its associated factors among women and men during the COVID-19 pandemic.
**Methods:** An online questionnaire was conducted, containing data about food craving and possible associated factors.
**Results:** 1363 individuals were included in the survey. Food craving was shown in 46.0% of the respondents. Among women, increased or reduced weight, working/studying during the pandemic without changes, increased snacking, worsened sleep quality, uncontrolled eating were some factors associated with food craving. For men, some factors associated were having a morning snack, living with parents, reduced sleep hours, and emotional eating.
**Discussion:** Factors associated with food craving varied between men and women, being more present among women. These differences can be related to hormonal differences, way of working, daily tasks, and food preferences.
**Translation to Health Education Practice**: Our findings may be used to develop guidelines for maintaining healthy eating habits in pandemic situations. In addition, the study showcases the need for health educators to consider the qualitative and quantitative aspects of nutrition, which can interfere with increased food cravings.

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## Background

In December 2019, an outbreak of pneumonia of unknown origin began in Hubei province, China, with observed symptoms of coughing, difficulty breathing, weakness, malaise, muscle pain, and changes in taste and smell.[1,2] The virus that caused the disease was later identified as SARS-CoV-2, which to date has infected more than 235 million people and has made 4.814.745 fatal victims worldwide.[3]

Due to the global pandemic, public health recommendations and government measures were adopted worldwide. These resulted in many restrictions and obstacles to daily living, like facial masks and social distancing.[4] Although social distancing and other strict measures are necessary to stem the transmission of SARS-CoV-2, they can dramatically change the daily habits of individuals, including their relationship with food.[5] That leads to irregular eating habits and frequent snacking, increasing caloric intake with worse nutritional quality. The fear and anxiety can also cause changes in eating patterns,[6] and stress experienced by many people around the world during COVID-19 outbreak.[7]

Stress and social isolation may contribute to the onset of food craving (FC) during the pandemic period.[8] FC is a strong desire to eat a specific food, like those high in fat, carbohydrates, and energy[9] and it can occur regardless of hunger.[10,11] Furthermore, FC is associated with overeating and binge eating.[12,13] Thus, it is clinically important because since individuals who report tonic food cravings display higher caloric intake than those who report rarely experiencing food craving,[14] this behavior may contribute to obesity[15] and as a consequence chronic diseases,[16] which is a public health concern,[17] mainly as a risk factor for more severe complications of COVID-19.[18]

## Purpose

Some studies have already investigated changes in eating behavior during the COVID-19 pandemic, although little is known about the impact of the pandemic and social isolation on food craving behavior. Furthermore, to the best of our knowledge, no studies have specifically

**CONTACT** Juliana Costa Liboredo juliana.liboredo@ufop.edu.br Department of Food, Federal University of Ouro Preto, Ouro Preto, Brazil 35400-000

examined this aspect in the Brazilian population in the context of the pandemic. Thus, this study aimed to evaluate the FC behavior and its associated factors (socio-demographic, lifestyle, dietary intake, anthropometric data, eating behavior, and perceived stress) among men and women during the COVID-19 pandemic in Brazil. Given that food craving is strongly associated with increased food intake and weight gain, its investigation is key to understanding obesity, and may inform prevention and treatment approaches.

## Methods

### Study design

A cross-sectional study was performed to obtain data about FC behavior and associated factors in the Brazilian population during the COVID-19 pandemic. An online survey was carried out between August 14th and September 9th, 2020, during which time the imposition of social distancing was rigid in Brazil. The study was conducted according to the Declaration of Helsinki. The protocol was approved by the Research Ethics Committee of the Federal University of Viçosa, Minas Gerais, Brazil (Protocol number 35516720.5.0000.5153). The inclusion criteria in the research were to live in Brazil and be over 18 years old. Participants who did not report gender and pregnant women were excluded.

### Data collection

The online questionnaire was conducted on the Google Form Platform® and its link was disseminated in Brazil through e-mails, university sites, and social networks. The questionnaire was answered by members of the research group to be tested, to evaluate the completion time, and the clarity of the questions. The form was answered anonymously, and it took about 15 minutes to complete. The participants were first introduced to the consent form and only those who chose to accept to participate in the research could access the following questions. A pilot study was carried out with about 30 respondents to verify the adequacy and the response time of the question.

FC was assessed by asking participants about an intense desire for a specific food during the pandemic period. This matter was adapted from the question "Have you had a strong desire to eat a certain type of food over the last three months?" proposed by Weingarten and Elston.[19] An affirmative response identified the presence of FC to the question. Then, the participants who answered "yes" in the previous question were asked about the kind of food implicated.

The assessment of factors associated with FC was performed by gender. The investigated variables were divided into socio-demographic, lifestyle, dietary intake, anthropometric data, eating behavior, and perceived stress (PS).

Socio-demographic data included home state, age, per capita income, the composition of home residents, education level (graduate or above, or undergraduate, and course), current occupation, working schedule during the pandemic (perception of less, the same or more working hours, including domestic activities), labor situation (remotely or not) and social isolation (total, partial or not).

Questions about lifestyle habits during the periods before (retrospective self-report) and during the pandemic were asked, and the differences were calculated. This session included questions about the amount of time dedicated to physical activity per week, quality of sleep, time spent sleeping, use of cigarettes, frequency, and level of alcohol consumption, screen time (including time spent using the computer, smartphones, tablets, and TV). Individuals who did not do physical activity received, as a reference category, the value of 0; for those who did for less than 90 minutes per week, per week, the value was set at 80 minutes; at 120 for 91 to 150 minutes per week; 180 for 151 to 210 minutes per week, at 240 for 211 to 270 minutes per week, and 280 for more than 270 minutes per week. For those who do not smoke, the reference value was 0; for those who reported smoking 10 cigarettes or fewer a day, it was established at 10; 11 to 20 cigarettes at 15; 21 to 30 cigarettes at 25, and 31 or more cigarettes at 32.

Concerning eating habits, participants were asked which meals they consumed before and during the pandemic, the amount of food, the habit of eating between meals (snacking), the use of delivery services, and the habit of cooking at home. To assess consumption and eating habits, all the questions in the questionnaire referred to behaviors before (retrospective self-report) and during the pandemic. Differences, increases, and decreases were calculated for each variable based on these data. A food frequency questionnaire based on the Food and Nutritional Surveillance System (SISVAN)[20] protocol was used to access information about food intake, with the following groups: legume (beans, soybeans, lentils, and chickpeas), cereal (rice, corn, and oats), bakery products (bread, cakes, and cookies), milk and dairy, fruit, meat, hamburger or canned products (hamburger, bologna, salami, and sausage), vegetables (except potatoes, cassava, and yams), sugary drinks (soft drink, canned or powdered juice, canned coconut water, guarana/blackcurrant syrup,

and fruit juice with sugar), instant foods and snacks (instant noodles, packaged snacks, or crackers), candies (chocolate, pies, lollipops, gum, caramel, and jelly), and fast-food (pizza, sandwiches, and finger food). The volunteers filled in information about the time before and during the COVID-19 pandemic for groups of foods, and the differences were calculated. The frequency of consumption for each of the food groups was set to 0 for those who reported "never"; 0.5 for those who reported "rarely"; 1 for those who answered "once a week"; 2.5 for "2 to 3 times a week"; 5 for "4 to 6 times a week"; 7 for "once a day," and 10 for "more than once a day." This protocol was developed by the Ministry of Health to assess the nutritional status of the population seeking care in primary healthcare.

Anthropometric data were self-reported by the participants, asking about height, weight before the pandemic, how much they thought they weighed during the quarantine, their perception of the weight change, and whether they occurred intentionally. From the reported data, weight difference, loss, weight gain and body mass index (BMI) were calculated. On the reliability of the BMI measurement, numerous studies indicate that self-reported weight and height measurements are valid, with results that indicate moderate to high agreement between self-reported and measured anthropometric data in men and women in different sociodemographic groups.[21–23] In Brazil and in other countries around the world, such as the USA, self-reported weight and height have been used in important population surveys, such as VIGITEL[24] and NHANES.[25]

To evaluate the participants' eating behavior, the Three-Factor Eating Questionnaire (TFEQ-R21), proposed by Stunkard and Messick,[26] translated and validated for the Brazilian population by Natacci and Junior[27] was used. Responses to each of the 21 questions from TFEQ were given a score between 1 and 4. The mean was calculated and transformed into a scale from 0 to 100 points as recommended in the score instruction.[26] The analyses considered the median score of all domains: cognitive restraint, uncontrolled eating, and emotional eating.

The PS was measured using the Perceived Stress Scale (PSS), composed of ten items, translated into Brazilian Portuguese, and validated in Brazilian adults by Reis et al.[28]

To carry out this study, we used instruments (food frequency questionnaire based on the SISVAN, TFEQ and Perceived Stress Scale) that originally propose a retrospective assessment. Likewise, many studies carried out in different countries on the impact of the pandemic on dietary habits, eating behavior and perceived stress were retrospective.[29]

Retrospective studies have some disadvantages, such as incomplete information; limited control in obtaining the sample and the fact that they depend on the informants' memory. Despite this, large population studies are retrospective, such as Surveillance System for Risk and Protective Factors for Chronic Illnesses Using a Telephone Survey (VIGITEL) carried out annually by the Ministry of Health to monitor risk factors for the main chronic diseases in Brazil.[24] That is because retrospective assessments are cheap, simple, fast and useful for common and long-lasting problems.

### *Data analysis*

Data were analyzed using the Statistical Package for Social Sciences® program (SPSS9®, Inc., Chicago, IL, USA) version 17.0 and were shown as frequency and absolute numbers or the median and interquartile interval. All numerical data had a non-parametric distribution (Kolmogorov-Smirnov test; $p < .05$). Variables collected about the genders were tested using the Mann-Whitney or Chi-Square test. Univariate and multivariate logistic regression models were obtained by gender to examine the independently associated factors to FC. All the covariates with $p < .05$ on univariable analysis were entered in the initial model. The conditional forward method was used to retain covariates with $p < .05$ in the final model. The Hosmer Lemeshow test checked the fit of the models.

## Results

Initially, 1496 responses were computed, 133 were excluded (four individuals agreed to participate but did not answer the questionnaire; three women were pregnant; there were 121 repeated responses, and five individuals did not include their gender), thus leaving 1363 individuals included in the survey. Most respondents were from the Southeast region of Brazil (89.6%) and female (80.3%), had a complete degree (65.9%), and 49.6% had a degree in a health course. The median age and the income of the sample were 31.0 (18.0–87.0) years and US$ 334.6 (15.9–3059.0). The FC was present in 46.2% (n = 630) of the respondents during the quarantine. Prevalence of FC was higher in women (50.0%; n = 547) than in men (30.9%; n = 83) ($p < .001$). In general (except for chocolate), sweets were the most craved foods in both genders (36.0% of women and 31.1% of men). The second most mentioned food by women (21.6%) and men (19.8%) was chocolate, followed by fast foods, like pizza and hamburgers. Foods such as bread, cakes, cookies, meat, Japanese food, fried foods, and pasta were also craved. Furthermore, other

craved items (savory snacks, alcoholic beverages, soft drinks, sandwiches, milk and dairy, fruits, vegetables, legumes, popcorn, cereals, nuts, coffee, and others) were reported by less than 2% of participants and were grouped in the category "other foods" (Figure 1).

Variables associated with FC by univariate analyses in men and women are depicted in the supplementary material. Variables independently associated with FC during the pandemic for genders can be seen in Table 1. Among women, increased frequency of consumption of sweets, bakery products, snacking during the day and vegetable intake; the reduced frequency of consumption of processed products and sleep hours; the weight gain; working or studying during the pandemic without changes; weight loss; worsened sleep quality; the difference in canned products consumption and uncontrolled eating was positively and independently associated with FC. Increased milk and dairy products consumption were negatively and independently associated with FC.

For the male gender, variables positively and independently associated with FC were having a morning snack, living with parents, increased the frequency of home meals, reduced sleep hours, increased frequency of eating sweets, increased fast food intake before the pandemic, emotional eating, and physical activity before the pandemic. Eating other meals during the day, and decreasing working time were negatively and independently associated with FC.

## Discussion

The present study evaluated FC in the Brazilian population during the COVID-19 pandemic. Our findings revealed that this behavior was reported by 46.2% of the participants. To date, data on FC in the context of the pandemic is scarce, which made comparisons difficult. In a study performed in Spain and Greece, increased FC in the pandemic context compared to the previous period was evaluated. The authors observed that 44.7% and 55.4% of respondents reported increased FC, respectively.[30]

According to the literature, FC is a relatively common behavior.[31] Some theories have been proposed as the cause of FC. For example, it has been suggested that cravings are due to energy or specific nutrient requirements, psychoactive compounds in the food,[32] food deprivation,[33] and food-related cues.[13] Furthermore, it has been suggested that stress may induce FC,[34] especially during social isolation caused by the pandemics.[8]

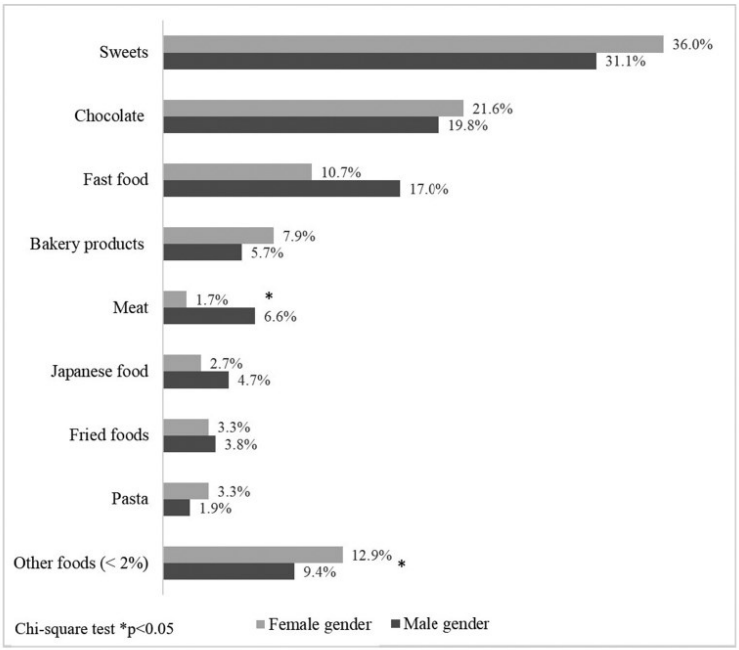


**Figure 1.** Prevalence of foods related to food craving behaviors during the pandemic period in women and men living in Brazil.

**Table 1.** Variables independently associated with food craving during the pandemic period in women and men living in Brazil, according to the multivariate logistic regression model.

| Variable | OR | IC 95% | p value |
|---|---|---|---|
| **Female (69.7% of prediction; Hosmer Lemeshow test = 0.170)** | | | |
| Gained weight | 2.363 | 1.536–3.635 | <0.001 |
| Increased sweets intake (frequency) | 2.285 | 1.682–3.106 | <0.001 |
| Reduced instant meals and snacks intake (frequency) | 1.894 | 1.136–3.158 | 0.014 |
| Working or studying during the pandemic period without alterations | 1.810 | 1.136–2.882 | 0.012 |
| Increased bakery products intake | 1.788 | 1.235–2.588 | 0.002 |
| Lost weight | 1.771 | 1.107–2.831 | 0.017 |
| Increased snacking | 1.704 | 1.254–2.316 | 0.001 |
| Reduced sleep hours | 1.576 | 1.156–2.148 | 0.004 |
| Worsened in sleep quality | 1.522 | 1.141–2.029 | 0.004 |
| Increased legume intake (frequency) | 1.482 | 1.010–2.173 | 0.044 |
| Sausage intake difference (frequency) | 1.100 | 1.019–1.188 | 0.014 |
| Uncontrolled eating (score) | 1.021 | 1.014–1.029 | <0,001 |
| Increased milk and dairy products intake | 0.623 | 0.414–0.939 | 0.024 |
| Constant | 0.052 | | <0.001 |
| **Male (80.6% of prediction; Hosmer Lemeshow test = 0.068)** | | | |
| Morning snack | 3.405 | 1.508–7.689 | 0.003 |
| Living with parents | 2.658 | 1.277–5.533 | 0.009 |
| Increased homemade meals | 2.554 | 1.142–5.715 | 0.022 |
| Reduced sleep hours | 2.499 | 1.167–5.351 | 0.018 |
| Increased sweets intake (frequency) | 2.466 | 1.152–5.276 | 0.009 |
| Instant meals and snacks intake before pandemic (frequency) | 1.212 | 1.036–1.418 | 0.016 |
| Emotional eating (score) | 1.035 | 1.020–1.050 | <0.001 |
| Physical activity before pandemic (time) | 1.004 | 1.000–1.007 | 0.036 |
| Other meals intake during the pandemic | 0.341 | 0.118–0.989 | 0.048 |
| Reduced time spent at work (including household chores) | 0.071 | 0.017–0.301 | <0.001 |
| Constant | 0.024 | | <0.001 |

Evidence suggests that high stress levels may alter eating behaviors and affect brain reward/motivation pathways involved in wanting and seeking highly palatable foods, thus increasing FC.[35] In the present study, PS was associated with FC in univariate analyses; however, the same did not occur in the multiple logistic regression analyses. Nevertheless, in this analysis, potentially stressful variables were associated with the FC, such as working and studying without changes during the period (not remotely) and worsened sleep quality by women. Previous studies found the role of stress in FC. Jastreboff et al.[36] found that stress potentiates FC in obese individuals compared to lean individuals. Macedo and Diez-Garcia[34] observed that stressed women are more prone to craving sweet foods.

Working or studying without alterations during the pandemic period (not remotely) also increased the chance of FC by 81% among women. A possible explanation for this may be that working outside the home during the pandemic represents greater exposure to COVID-19. In addition, as a consequence of the pandemic, domestic activities such as watching their children and facilitating homeschooling increased their responsibilities.[37] Domestic activities, in turn, tend to be performed mainly by women. Thus, this stressful scenario may have contributed to our result. When assessing the score of PS between women who had changed and those who had no changes at work or study, a significant difference was observed (23.0;19.0–28.0 vs. 22.0;19.0–26.0 p = .029) (data not shown). However, this difference did not occur in men (p = 0,627) (data not shown), which suggested that the association between food craving and way of work is due to the emotional burden promoted by the impacts of the pandemic, mainly among women.

Concerning gender, our findings revealed that FC was significantly more frequent in women (50.0%) than in men (30.9%). In a study performed during COVID-19 lockdown in Spain with Type 2 Diabetes Mellitus patients, women also reported more FC than men.[8] These results are according to previous studies that found a higher prevalence of FC in women than men.[13,38,39] Furthermore, the gender differences provide different experiences of FC and varied responses to them, since the kind of foods craved, the intensity and frequency of craving, and the ability or tendency to regulate the craving seems to be different in men and women.[14]

Possible justifications for this may be related to hormonal differences between women and men. Monthly, throughout the menstrual cycle, women experience fluctuations in the levels of sex hormones; these variations influence the desire and reactivity to food stimuli,[40,41] while men do not experience changes in this aspect. These hormones are relevant modulators of food consumption since they interact with neurotransmitters and gastrointestinal systems.[42,43] Differences in food consumption over the menstrual cycle due to fluctuations in sex hormones are well described in the literature.[44–

[46]Sweet craving also occurs mainly in women with premenstrual syndrome,[47] larger hip circumference, altered body composition, and stress.[35]

Food craved includes mainly highly processed, palatable foods that contain high levels of refined carbohydrates, sugar, and/or fat,[19] mainly in Western societies.[12] In the present study, most respondents related craving for sweet foods (56.7%). Increased craving, mainly for sweet foods, was also observed among the Spanish (29.0%) and Greek (29.3%) populations during the pandemic.[24] Studies show that men and women tend to desire different types of food, while men report more cravings for savory foods (meat, fish, eggs), while women report more cravings for sweet foods, especially chocolate.[19,48,49] Strong desire for or difficulty resisting sweet-tasting food is known as sweet craving.[19]

In a study performed with 300 Brazilian students before the pandemic, the sweet craving was identified in 42.3% of participants, more prevalent in women (48.4%) than in men (25.9%).[39] Another study performed with 453 adults from all regions of Brazil observed a significant association between the specific craving for sweet food and female respondents.[50] The authors found that chocolate was the most desired food item among women, while the desire for bread was more frequent among men.[50] More frequent and intense craving for chocolate was also reported by women in comparison with men in the study performed by Hormes et al.[51] Likewise, cravings for sweets and chocolate were more prevalent among women (35.9% and 21.6%, respectively) than in men (31.1% and 19,8%, respectively) in the present study. As in the study by Camilleri et al,[49] women presented higher scores on emotional eating, contributing to a craving for sweets and chocolate. This eating behavior has been associated with consuming foods with higher energy density, rich in sugars and fats, with stronger associations in women. Carbohydrates increase the serum levels of serotonin, which is related to feelings of pleasure and modulation of various aspects of mood.[47]

Higher scores of uncontrolled eating and cognitive restraint behaviors were also observed in women. Similar results were also observed by Löffler et al.[52] and Verzijl et al.,[53] but other studies found no difference in all subscales for eating behavior between women and men.[54,55] It has been suggested that FC has emerged as a significant indirect association between restrained eating and emotional eating and uncontrolled eating.[53] In the present study, according to multivariate analyses, uncontrolled eating behavior was independently associated with FC only among women, while emotional eating was associated with FC only among men. Uncontrolled eating is a loss of control during food intake.[56] In contrast, emotional eating represents the tendency to overeat during uncomfortable moods, anxiety, or constant depression. Emotional eating occurs to reduce emotional distress.[56]

The association between the frequency of food consumption and FC was also assessed in the present study. Women and men with increased intake frequency of sweets had 2.28 and 2.46 higher chances of FC, respectively. In addition, increased consumption of baked products (OR = 1.78) and different consumption of sausage (OR = 1.1) increased the chance of FC in women, while increased intake of instant meals and snacks before the pandemic increased the chance of FC by 21% in men. These results may be related to the fact that regular intake of a particular energy-dense food results in reduced responsiveness of the brain reward-region specifically to that food. This suggests that sensory aspects of eating and reward learning may reinforce the search for this food.[57] Consequently, this may promote more frequent craving episodes and increased risk for future weight gain.[39,58]

On the other hand, reduced instant meals and snack intake increased the chance of FC in women by 89%. Some authors have suggested that deprivation may accentuate cravings, which means that restricting specific foods may be associated with increased cravings for the restricted foods.[33,59]

Another food group associated with FC was legumes. Increased legume intake increased the chance of FC by 48.2%. No studies which evaluated the effect of legumes on craving were found. Kristensen et al.[60] observed that a protein meal based on legumes (beans and peas) induced higher satiety ratings and lower energy intake compared to a high-protein meal based on animal sources. Additionally, the authors suggested that the high-protein vegetable meal had a higher fiber content than the high-protein animal meal. This may have induced an increased satiety feeling. In contrast, other studies found no difference between appetite, hunger, or energy intake after protein meal based on animal and vegetable sources consumption.[61,62]

The increased consumption of milk and dairy products reduced the chance of FC in women. One of the possible explanations for this may be the likely effect of milk proteins in satiety regulation. Although some studies have conflicting results due to variations in the method, a meta-analysis of clinical trials found that consuming dairy products (over 500 mL) can increase satiety.[63] Some possible mechanisms include the increase of plasma concentration of satiety hormones and total amino acid,[64] reducing the dietary glycemic index, and prolonged release of glucose.[63] Furthermore, protein foods such as milk and dairy are the main

sources of amino acid tryptophan.[18] This, in turn, is a precursor to the neurotransmitter serotonin and hormone melatonin.[65] Tryptophan is involved in regulating satiety and caloric intake via serotonin and melatonin, which regulates carbohydrate and fat intake. It can also decrease caloric intake, relieve stress, and inhibit neuropeptide Y, the most potent hypothalamic orexigenic peptides.[66–68]

In addition to their participation in regulating the circadian cycle, including caloric intake,[69] melatonin released during the night appears to be involved in sleep control.[70] Thus, studies have demonstrated connections between sleep and diet.[65] Henst et al.,[71] in a systematic review, identified that the increase in hours of sleep was associated with reductions in general appetite, as well as in the craving for sweet and salty foods, and in the daily intake of free sugar. However, individuals who sleep less are more likely to have more irregular meal patterns, consume more energy-rich foods, fats, refined carbohydrates, and fewer vegetables and fruits than those sleeping more.[65] In the present study, the reduction in sleep hours during the pandemic was a factor associated with FC in both genders. However, this change affected more men, representing 2.5 times more chance of FC, while among the female gender, it represented 1.57 times greater probability. The worsened quality of sleep in women also increased the chances of FC. Sleep deprivation affects the appetite by reducing leptin and increasing ghrelin, which may increase food intake and body mass.[72] It is possible that the stress related to the COVID-19 quarantine may result in sleep disturbances, which worsens stress and increases food intake.16 In a study by Buckland et al.,[73] the results showed that 48% of participants reported increased food intake in response to the COVID-19 lockdown.

Likewise, 59.5% of women and 55.4% of men reported an increased amount of food eaten during the pandemic. Furthermore, our results showed greater snacking during quarantine in women and men. The increased snacking between meals represented a 70.4% higher chance of FC in women. A study that assessed momentary hunger and craving for food found that under the snack food category, the craving for fruit was lower, while craving for sweets and snacks increased throughout the day inconsistently related with hunger[11] Richard et al.[74] showed that 86% of all reported snacks consisted of foods high in sugar or fat, with an elevated presence of chocolate. These highly palatable foods are associated with increased FC and food intake and play an important role in consuming unhealthy snacks in the absence of hunger.[75,76] In the study of Taetzsch et al.,[77] higher FC was significantly associated with a higher eating frequency compared to lower FC, but when energy was included as a covariate, the association between FC and eating frequency was no longer significant.

In the present study, consumption of other meals (other than breakfast, morning snack, lunch, afternoon snack, dinner, and supper) during the pandemic reduced the chance of FC among men by 65.9%. The consumption of more daily meals seems to facilitate the adjustment of energy intake to needs and plays a role in the quality of the diet and the control of body weight.[78] Leidy et al[79] observed, among male adolescents, the consumption of nutrient-rich snacks improves appetite control, satiety, and the overall quality of the diet. In addition, one of the theories that aim to explain FC defines that this behavior arises due to the deprivation of energy, of specific nutrients, or specific types of food.[19,80]

Other factors associated with FC were gaining and losing weight. Weight loss increased the chance of FC by 77% among women. However, there is no consensus in the literature whether weight loss is associated with increased or decreased FC.[81] Some studies reported increased cravings associated with dieting, while others observed decreased cravings with weight loss.[75,82] There are still other authors that have identified that in 11 weeks of low-calorie diets, there was a reduction in FC, and that these changes were not related to weight loss.[83]

On the other hand, FC is related to excessive weight gain.[15] Weight gain was associated with food craving in the present study (OR = 2.363). Chao et al.[75] found a significant positive relationship between BMI and FC in a sample of 646 adults. Buscemi et al.[84] studied 202 obese adults during an 18-month behavioral weight-loss trial and found that the levels of change in caloric intake interfered in the relationship between changes in FC and BMI changes. The study results showed that BMI change and change in FC were positively associated with low levels of change in the caloric intake but were unrelated at average and high levels of alteration in caloric intake.[84] In the present study, a positive (gained weight) and a negative (lost weight) difference between the weight before and during the pandemic in females were more "predictive" of FC than other anthropometric variables, like BMI or being obese or overweight.

Another relevant point is that weight gain may be intensified during the pandemic when combined with a lack of physical activity, in recurrence of FC. However, physical activity seems to be related to reduced FC. Taylor and Oliver[85] found that exercise reduced

chocolate urges, and there was a trend toward attenuated urges in response to the chocolate cue. A study of healthy adult men and women found that FC decreased among those who completed moderate-intensity walking sessions during the day compared to those who sat all day.[86] A 15-minute walking session, equivalent to light intensity exercises, reduced the desire for chocolate, with moderate effect sizes, during and for at least 10 minutes after stopping exercise.[87] Unexpectedly, in our study, the habit of practicing physical activity before the pandemic was associated with FC in men (OR = 1.004), likely explained by reverse causation. Furthermore, physical activity during the pandemic was not associated with FC by multivariate analysis.

Our study found other associations, increasing the chance of FC in men, such as morning snacks, living with parents, and increased homemade meals. However, literature does not include studies that allow the comparison and discussion of these results. A possible explanation is that living with parents can increase craving for meals that bring emotional comfort since, in this family context, several meals with an effective appeal may be desired (as comfort foods). Also, the increase in homemade meals may have occurred due to the FC. We hope that future studies can clarify the relationship and the impact of these variables on FC.

A limitation of our study was its cross-sectional design, which prevented the inference of causality. However, this is the first study that assessed the predictors of FC in the pandemic in Brazil. The main strength of our research was its large sample size, providing high statistical power. Additionally, we applied the questionnaire five months after the start of the pandemic, a period in which safety measures aimed at preventing SARS-CoV-2 contagion were in place, and people were already able to recognize the possible changes that occurred as a result. Finally, the characteristic of the sample with a high level of education ensures understanding of the questions and consequently more reliable answers.

## Translation to Health Education Practice

In this study, we provided unprecedented data about the Brazilian population's FC during the COVID-19 pandemic. Our findings demonstrate that many factors were associated with this behavior, such as weight changes, increased frequency of consumption of sweets, no changes at working or studying during the pandemic, increased snacking, and uncontrolled eating, among women; and living with parents, increased frequency of home meals, reduced sleep hours, increased frequency of sweets intake, and emotional eating, among men.

Studying the associated factors of FC during the COVID-19 pandemic is relevant because it may help health educators develop strategies for controlling this behavior and the consumption of the desired foods, thus preventing weight gain and associated morbidities. Our findings may also be useful for developing guidelines for maintaining healthy eating habits in pandemic situations. In addition, the study points to the need for health educators to consider not only the qualitative and quantitative aspects of nutrition but also mood disorders, such as stress, unhealthy ways of life, and impaired sleep, which can interfere with increased food cravings. Health educators should also consider during the planning and execution of health policies that aspects such as accessibility and availability of food and the food environment can also interfere with an increased desire for food. Another point to be highlighted is that the methods applied in this study can help Health Educators assess the presence and factors associated with food craving in different populations, and guide future studies on which factors should the assessment of this behavior focus.

During the conception and development of this study, the applied competencies and sub-competencies of the National Commission for Health Education Credentialing Inc. (http://www.nchec.org)[88] focused on those present in the area of responsibility 1, which refers to the "Assessment of Needs and Capacity." For the conception of the study design and data collection, the following responsibilities were applied: "1.1 Plan assessment" and "1.2 Obtaining primary and secondary data and other evidence-informed sources." Among the subcompetencies, we quote the "1.1.1 Define the purpose and scope of the assessment"; "1.1.2 Identify priority population(s)"; "1.1.4 Examine the factors and determinants that influence the assessment process." Finally, after analyzing the data, the competency "1.4 Synthesize assessment findings to inform the planning process" was applied with an emphasis on the sub competency related to "1.1.4 Compare findings to norms, existing data, and other information."

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## ORCID

Lívya Alves Oliveira http://orcid.org/0000-0003-0206-633X
Ceres Mattos Della Lucia http://orcid.org/0000-0002-6731-5694

Fabiane Aparecida Canaan Rezende http://orcid.org/0000-0002-5617-8778
Lívia Garcia Ferreira http://orcid.org/0000-0002-8089-351X
Lucilene Rezende Anastácio http://orcid.org/0000-0002-2269-0722
Tamires Cássia de Melo Souza http://orcid.org/0000-0002-1077-0186
Marina Martins Daniel http://orcid.org/0000-0003-2551-7682
Juliana Costa Liboredo http://orcid.org/0000-0002-5972-8480

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