Persistence of food insecurity during COVID-19 pandemic in slum: a cohort study

Luciana Yuki Tomita (✉ Luciana.tomita@unifesp.br)

Escola Paulista de Medicina, Universidade Federal de São Paulo

Catarina Vezetiv Manfrinato

Escola Paulista de Medicina, Universidade Federal de São Paulo

Bárbara Hatzlhoffer Lourenço

Universidade de São Paulo

Maria do Carmo Pinheiro Franco

Escola Paulista de Medicina, Universidade Federal de São Paulo

Elke Stedefeldt

Escola Paulista de Medicina, Universidade Federal de São Paulo

Research Article

Keywords:

Posted Date: February 24th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1348149/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: The COVID-19 pandemic has considerably increased food insecurity with disproportionate social and racial distribution. The present study aimed to examine the persistence of food insecurity and the associated factors during the pandemic.

Methods: A cohort study was conducted in two São Paulo city slum, Brazil. Participants answered questionnaires in three moments: April and October 2020 and April 2021. Food insecurity was assessed using the Brazilian food insecurity scale (EBIA) comprising five questions. Temporal trends in sociodemographic, economic, social assistance coverage, food insecurity, and difficulties related to buying personal use goods were assessed using the Kruskal-Wallis or χ^2 test. Prevalence ratios of food insecurity persistence categorized as “never,” “sometimes in food insecurity,” “always in food insecurity,” were calculated using the Poisson regression model.

Results: A total of 424 householders completed two assessments. The majority of householders were young, non-White women; more than half of householders had less than nine years of education and were working in non-qualification jobs. During the follow-up, families covered by social assistance increased; however, their income had decreased ($p < 0.05$). From 302 householders that completed three assessments, 33% were “always in food insecurity”, and 46% were “sometimes in food insecurity”. Low income in the second wave was associated with “always in food insecurity” [aPR=1.62 (95%CI: 1.17-2.24)], regardless of education level. Households constantly facing difficulties related to buying gas canisters [aPR=2.54 (95%CI: 1.78-3.62)], hand sanitizers [aPR=5.67 (95%CI: 83.24-9.91)], and basic hygiene products [aPR=4.08 (95%CI: 2.49-6.68)] were associated with “always in food insecurity” independent of education.

Conclusions: The COVID-19 pandemic has adversely impacted the key factors of health maintenance. Guarantees of sufficient food quantities and regularity, and without risk of losing access to basic needs, must be guaranteed by the cross-government action to fight social inequities.

Introduction

The downward trend in moderate and severe food insecurity (FI) in Brazil from 2004 to 2013 (21.5% to 10.3%, respectively) has been diverted (15.9% in 2018) [1]. Economic crisis, labor precariousness, reduction in the conditional cash transfer program, and inflation of minimally processed food and gas canisters for cooking were identified as the factors responsible for FI [2, 3].

In April 2021, Brazil was the global epicenter of COVID-19, with more than four thousand daily deaths. By June 2021, over half a million deaths had occurred in Brazil, and the death toll in Brazil accounted for 13% of COVID-19 deaths worldwide [4].

Disproportionate racial and economic burdens of infections and deaths caused by COVID-19 were observed in Brazil with a higher risk of mortality for Black and *Mulato* (people with mixed-race ancestry)

people, compared to that of White people [5–8]. These social disparities in COVID-19 mortality can be attributed to various factors, such as household crowding, occupation, modes of transportation, comorbidities, and differential access to healthcare and healthy food (in terms of regularity and quantity), that lead to increased vulnerability toward viral infections [6, 9].

During the COVID-19 pandemic, two national population surveys related to FI were conducted in Brazil in December 2020 in a federal unit. Inequity in food access was observed among householders who were female, non-White, and had low educational levels. The majority of the population was experiencing FI: 33% experienced mild FI, 12% experienced moderate FI, and 12% experienced severe FI. A higher prevalence of severe FI has been observed in the north, northeast, and rural areas [1, 10]. However, investigations focusing on city populations are important because of high inequality in food access [11, 14].

São Paulo city is the most populous metropolitan area in the country and severe socioeconomic inequalities are noted among those living in this area. More than half a million households are in disadvantaged communities (known as favela), and accounting for 14% of the unemployed population in April 2021, and 6.4% of COVID-19 deaths in Brazil [2, 14]. According to a national survey, severe FI was observed in 9–15% of households [1, 13]. However, in São Paulo's favela, almost half the households faced FI at the beginning of the COVID-19 pandemic [14].

Due to the unrelenting nature of the pandemic, the present study aimed to examine the prevalence of FI persistence during the COVID-19 pandemic in favelas.

Methods

A cohort study was conducted using households living in two favelas—Heliópolis and Vila São José—in São Paulo, Brazil. The inclusion criterion was people living in the aforementioned favelas. Heliópolis favela is the largest and most densely populated shantytown located close to the downtown area of São Paulo city. Vila São José is a favela located south of São Paulo city. Further characterization of the study site can be found in Manfrinato et al. [14].

The study began in the early period of the pandemic, in April 2020, and the same householders were interviewed six months apart: October 2020, and April 2021.

Data collection

A standardized online questionnaire was employed to derive data on socioeconomic and demographic characteristics, finances, and FI during three periods of the study. Interviewers were previously trained.

In wave 1, an online questionnaire was conducted by the observatory 'De Olho na Quebrada' (Eyes in the Quebrada, slang for "slum") in Heliópolis for one week. In Vila São José, the community leader sent a questionnaire to households that he had contact with. In both communities, questionnaires were sent to

some households through an instant messaging application, WhatsApp, and were then shared with other residents in these communities. Participants reported their skin color as defined by the Brazilian Institute of Geography and Statistics as White, *Mulatto*, Black, Yellow, or Indigenous. Data about participants' education level, occupation, number of children and elderly people in the household, existing morbidity among residents in the household, number of residents in the household, family income, and social assistance coverage from (i) the *Bolsa Família* Program (BFP) (federal conditional cash transfer program); (ii) the *Auxílio emergencial* (federal cash transfer offered during the COVID-19 pandemic); (iii) food kits called *cesta básica*; and (iv) tickets for students (a city program offered during school closure). The *Auxílio emergencial* fund was offered to address political, sanitary, and economic crises. This fund was available from April to December 2020, Int\$254 (R\$600), and ended at half the value. From April to October 2021, it was available at a quarter of the value (Int\$64).

During waves 2 and 3, trained interviewers collected information via phone. Socioeconomic, demographic, social assistance program coverage, and additional information about difficulties related to buying gas canisters for cooking (electric stoves are uncommon in Brazil), water supply for cooking, handwashing, and showers, hand sanitizers, and personal hygiene products (toothpaste, shampoo, and hand soap). In the third wave, data on rental expenses were collected. If participants did not respond after three contact attempts on different days and times, this was considered follow-up loss.

Family income was assessed, including monetary value received from the social assistance program. The monetary values in Reais (R\$) to international dollars (Int\$) were calculated while considering the purchasing power parity for 2020 (conversion factor 2.362) [15]. The Int\$ currency is used to compare the purchasing power of basket goods and services prices in different currencies from the Organisation for Economic Co-operation and Development (OECD).

Food insecurity experience

Data on FI were collected according to the Brazilian Food Insecurity Scale—*Escala Brasileira de Insegurança Alimentar* (EBIA) in Portuguese [16]. The short version of the scale comprises five questions and presents high sensitivity and specificity, compared to the original EBIA scale. The short version was not classified based on FI severity [5]. However, it is useful for the fast diagnosis of families in FI and as a dichotomized variable (presence or absence of FI). The householder responsible for food acquisition or preparation was required to respond to the scale. Households that reported FI by answering “yes,” were scored with 1 point, whereas those who responded with “no” were scored with 0 points, with a maximum of five points in the questionnaire. The five questions were based on assessing: (1) anxiety and concerns about the ability to obtain food; (2) whether households were too poor to buy more food; (3) whether the quality and variety of food have been compromised, particularly for nutritious food; (4) quantity reduction; and (5) skipping meals[17]. In the present study, we adapted a short version of the FI over the past month. We created a dichotomized household food security variable: households with food security and quite FI (EBIA total score ≤ 2) and FI when (EBIA total score ≥ 3). EBIA=1 was considered safe, based

on model-based cutoffs of the EBIA in the original scale [18]. Concerns about food acquisition, monotony of food, or reduction of food amount brought about by money shortage are characteristics of households experiencing FI. However, due to the small sample size of households with food security, EBIA=2 was also considered in the same group as food security.

Ethical consideration

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 Universidade Federal de São Paulo (CAAE 30805520.7.0000.5505). Online consent was obtained from all participants. The questionnaire only opens after online consent. The present study complies with the guidelines for Strengthening the Reporting of Observational Studies in Epidemiology.

Statistical analysis

The distribution of sociodemographic and economic characteristics, EBIA questions, and the prevalence of FI severity are presented according to the study period. To test the differences according to each wave, we used the Pearson χ^2 or Kruskal–Wallis tests.

Persistence of FI during the follow-up

The outcomes of interest were (i) FI persistence from wave 1 to wave 2 (“no,” “yes”) and (ii) FI persistence during the three waves: “no/never,” “sometimes in FI” (FI in one or two waves during the study), or “always in FI”. The independent variables were sociodemographic characteristics in wave 1, per capita income and social assistance coverage in waves 1 and 2, and income changes in different periods (waves 1 and 2; waves 2 and 3; and waves 1 and 3). Sociodemographic variables were gender (male, female), age (continuous), education level (<9, ≥ 9 years), race/ethnicity (White, non-White), number of dwellers (<4 or ≥ 4), presence of children aged below 10 years, and presence of elderly people (>60 years old). Economic variables were per capita income (cut-off value was the median value among families in food security for each wave) and social assistance program coverage (whether or not they received assistance) of scholar tickets, BFP, *auxílio emergencial*, food basket, and number of social assistance programs received. The categories “no/never” or “sometimes” in this variable were combined because of the reduced sample size for “never.”

To identify the factors associated with (i) FI persistence from waves 1 to 2 and (ii) FI persistence during the three waves, the prevalence ratio (PR) was calculated using the Poisson regression model. PR adjustment was conducted while considering a conceptual model [19]. The variables were maintained if a significance level of $p \leq 0.20$ was noted. Final model was adjusted for education

A significance level of 5% was adopted. Statistical analyses were performed using STATA 14.0 (Texas, USA).

Results

In waves 1 and 2, we interviewed 424 householders. In wave 3, 302 (71%) participants were interviewed since the baseline, answering three assessments. During the cohort study, the reasons for follow-up loss were as follows: 101 (24%) participants did not answer their phones or respond to Whatsapp messages, 12 (3%) participants refused to participate, and 5 (1%) participants had shifted out of the favela. The mean interview duration was 5.5 minutes for each wave.

Participants' characteristics at baseline and during follow-up

The majority of householders were young, non-White women; more than half of householders had less than nine years of education and were working in non-qualification jobs as cleaners, kitchen assistants, drivers, or deliverymen. Most households were densely populated and included children (Table 1). The proportion of families receiving benefits from the *Bolsa Família* program, tickets for students, and food kits were 24%, 47%, and 46%, respectively. The reported morbidities were hypertension (17%), respiratory disease (9%), type 2 diabetes (6%), and dyslipidemia (4%). In the baseline, majority of households in FI were leaded by women (91%) and non-White (75%). No significant differences in the proportion of food security and FI were observed between communities.

Table 1

Brazilian´s favela household characteristics during COVID-19 pandemic, baseline, April 2020 (n=424)

Brazilian's favela	n (%) or P50 (P25, P75)
Householder characteristics	
Female (%)	383 (91%)
Age, years	33 (29,39)
<9 years of education	332 (79%)
Number of dwellers	4 (3,4)
Presence of children	406 (96%)
Presence of elderly	39 (9%)
Non-White	323 (77%)
Occupation	
Cleaner, kitchen assistant, driver, deliveryman, no qualification	234 (55%)
Unemployed, housewife, retired	111 (26%)
Graduated	78 (19%)

During the study, we observed reduced income but an increase in the proportion of families receiving benefits from some social assistance programs ($p=0.001$). Federal assistance was provided until December 2020. During this period, the proportion of families experiencing extreme poverty (Int\$38 per day) increased from the second wave: 0 (0), 22/398 (5.5%), and 30/287 (10.4%) in April 2020, October 2020, and April 2021, respectively (χ^2 , $p<0.001$). A total of 72% of families had expenses related to rent, with a median (IQR) value of Int\$ 254 (212; 296). The frequently reported difficulty in guaranteeing food security was related to uncertainty regarding food acquisition. This was followed by a reduction in the amount of food, inability to have a healthy diet, skipping meals, and food running out before receiving or buying more food. Over time, access to healthy and nutritious food was compromised, and participants struggled to buy gas canisters for cooking. More than half the participants experienced difficulty with buying personal hygiene products and alcohol (Table 2). Difficulty in water supply was observed in 60 participants (14%).

Table 2

Impacts during COVID-19 pandemic, Brazil, April 2020 to April 2021 (n=424)

Brazilian's favela	April 2020 (n=424)	October 2020 (n=424)	April 2021 (n=302)	p-value*
Household characteristics	P50 (P25, P75) or n(%)			
Per capita income, Int\$	147 (110; 212)	135 (85; 183)	127 (85; 212)	0.007
Receive some social assistances	173 (43%)	361 (85%)	252 (84%)	0.001
Difficulties in buying gas canister	-	303 (71%)	227 (76%)	<0.001
Difficulties in buying hygiene products	-	223 (53%)	170 (56%)	0.39
Difficulties in buying alcohol 70%	-	236 (56%)	178 (59%)	0.45
Difficulties in clean water supply	-	60 (14%)	32 (11%)	0.16
Food insecurity				
EBIA score at risk of food insecurity	3 (2,4)	3 (1,3-5)	3 (2,4)	
Food security (EBIA = 0)	10 (2%)	28 (7%)	25 (8%)	0.009
$1 \leq \text{EBIA} \leq 2$	171 (40%)	183 (43%)	105 (35%)	
$3 \leq \text{EBIA} \leq 4$	207 (49%)	179 (42%)	149 (49%)	
EBIA = 5	36 (9%)	34 (8%)	23 (8%)	
Uncertainty about food acquisition or receiving more	390 (92%)	340 (81%)	251 (83%)	<0.001
Ate less than one should	286 (68%)	273 (65%)	194 (65%)	0.61
Unable to eat healthy and nutritious food	235 (55%)	228 (55%)	193 (65%)	0.01
Skipped a meal	162 (38%)	140 (33%)	130 (44%)	0.01
Ran out of food before buying or receiving more	93 (22%)	80 (19%)	37 (12%)	0.004

* χ^2 or Kruskal-Wallis test, total differs due to missing

The distribution of some experiences related to difficulties in food acquisition ($1 \leq \text{EBIA} \leq 2$) and FI ($\text{EBIA} \geq 3$) changed during the study ($p=0.009$) (Figure 1). Most participants experienced FI. Less than 10% of participants experienced food security since the beginning of the COVID-19 pandemic. Migration from some experience of food access difficulties ($1 \leq \text{EBIA} \leq 2$) to FI ($\text{EBIA} \geq 3$) were observed from wave 1 to 2 in 33% (χ^2 , $p<0.001$) participants and from wave 2 to 3 in 38% (χ^2 , $p<0.001$) participants.

Persistence of FI during the follow-up

FI persistence during the cohort period was not associated with the favela, sociodemographic characteristics, or the existing morbidity.

The variable associated with FI persistence in waves 1 to 2 was income in the second wave [PRadjusted=1.46 (95%CI: 1.08-1.97)] after adjustment for education. Educational level was associated with “always in FI” [PRcrude=1.50 (95%CI: 1.03-2.17)], but after adjustment for baseline income, no association was observed [PR adjusted=1.49 (95%CI: 1.00-2.22)] (data not shown).

Table 3

Associated factors of food insecurity persistence during COVID-19 pandemic, April 2020 to April 2021, Brazil (n=302)

Variables	EBIA≤2/ sometimes FI/"always in FI"	Crude PR (95%CI)		Adjusted PR (95%CI) for education	
		Sometimes FI	"Always in FI"	Sometimes FI	"Always in FI"
n	65 (22%) /138 (46%) /99 (33%)	138 (46%)	99 (33%)	138 (46%)	99 (33%)
Income					
<i>1st wave*</i>					
≥ median	26 (44%) /53 (43%) /26 (31%)	1·00	1·00	1·00	1·00
< median	33 (56%) /71 (57%) /58 (69%)	1·02 (0·71- 1·45)	1·27 (0·92- 1·77)	1·02 (0·71- 1·46)	1·24 (0·88- 1·74)
<i>2nd wave*</i>					
≥ median	33 (55%) /62 (48%) /25 (27%)	1·00	1·00	1·00	1·00
< median	27 (45%) /68 (52%) /68 (73%)**	1·10 (0·78- 1·55)	1·66 (1·20- 2·30)	1·08 (0·77- 1·53)	1·62 (1·17- 2·24)
Difficulty to buy gas canister					
Never, sometimes	42 (67%) /52 (39%) /19 (19%)**	1·00	1·00	1·00	1·00
Always	21 (33%) /83 (61%) /80 (81%)	1·44 (1·02- 2·04)	2·55 (1·79- 3·62)	1·46 (1·02- 2·06)	2·54 (1·78- 3·62)
Difficulty to buy hand sanitizer					
Never	39 (62%) /36 (26%) /7 (7%)**	1·00	1·00	1·00	1·00
Sometimes	11 (17%) /52 (38%) /26 (26%)	1·72 (1·12- 2·63)	4·62 (2·56- 8·33)	1·76 (1·145- 2·72)	4·68 (2·58- 8·47)
Always	13 (21%) /48 (35%) /66 (67%)	1·64 (1·06- 2·53)	5·49 (3·16- 9·52)	1·69 (1·09- 2·61)	5·67 (3·24- 9·91)
p-trend			<0·001		<0·001
Difficulty to buy hygiene products					
Never	34 (55%) /40 (29%) /10 (10%)**	1·00	1·00	1·00	1·00
Sometimes	19 (31%) /51 (38%) /29 (29%)	1·35 (0·89- 2·04)	2·66 (1·60- 4·42)	1·36 (0·89- 2·09)	2·76 (1·64- 4·64)
Always	9 (15%) /45 (33%) /60 (61%)	1·54 (1·01- 2·36)	3·83 (2·38- 6·14)	1·58 (1·03- 2·43)	4·08 (2·49- 6·68)

p-trend

<0.001

<0.001

*median values among food secure Int\$147 (1st wave), Int\$154 (2nd wave), ** p<0.05 by χ^2 test

Table 3 presents the factors associated with FI persistence during the three waves of the study. Almost half of the households presented FI at least once during the cohort period, and 33% were in FI at the three time points of the study. Income in wave 1, sociodemographic characteristics, social assistance program coverage, and water supply were not associated with FI persistence. However, lower income in wave 2 was associated with a higher prevalence of FI persistence [PR adjusted=1.62 (95%CI: 1.17-2.24)] adjusted by educational level.

Changes in income during the cohort were not associated with FI persistence.

Families who always experienced difficulties with buying gas canisters were also “always in FI.” Households with hardships related to buying hand sanitizer and hygiene products presented more than four times higher prevalence of “always in FI,” compared to families without those necessities (p-trend <0.001).

Discussion

In this cohort study, half of the households had some experience with FI at some point of the assessment, and one-third were “always in FI.” Lower income was associated with FI persistence. Households experiencing permanent difficulties accessing gas canisters, hygiene products, and hand sanitizers were “always in FI.”

To date, most studies conducted during the COVID-19 pandemic were cross-sectional focusing on the early period of the pandemic. The prevalence of FI varied from 15–44% in Canada, Brazil, USA, and Jordanian, and among Australian families reduced intake of fresh foods [20–25]. At the end of 2020, in Brazil, 59% experienced FI, with a higher prevalence among those living in favelas [1, 10, 14].

Some cohort studies examined changes in FI before and after the COVID-19 pandemic. Income reduction was noted in approximately 90% of households, and half of them shifted into FI during lockdown to control the COVID-19 infection. Self-employed people, families with children, people moving from employment to unemployment, living in rural or under-served settlements were more compromised [6, 14, 26–28, 34]. In England, inequity in access to healthy and nutritious food was observed [29]. Lack of the

guarantees of sufficient food and basic needs were compromised in the American households particularly among households with FI [31].

Although social assistance coverage during the study increased, it was not associated with FI persistence. Partial FI protection from the *Auxílio emergencial* fund was observed in two national surveys conducted during the COVID-19 pandemic. The majority of families receiving federal social assistance are accustomed to buying food. Among the poorest populations, rice, beans, and maize flour are part of their basic diet and were strongly affected by inflation, including gas canisters for cooking [2, 7]. Even after receiving benefits, the prevalence of severe FI was three times higher, compared to that of non-recipients [1, 10]. Therefore, FI protection is observed when income is Int\$423 (R\$1,000) per capita [1].

A limitation of the present study is the follow-up loss that occurred when participants could not be contacted by phone or Whatsapp. Those households could be more vulnerable with a strong income limitation to pay rent and had to move from favela or difficulty to buy credit for mobile phones. Another limitation is the convenience sample, which can yield biased prevalence estimates and should not be generalized. The third limitation is related to the short version of the FI questionnaire. The short FI version did not classify FI severity. However, it is useful for screening families for FI [17].

Conclusions

Guarantees of sufficient food quantities of appropriate quality with regularity, and without risk of losing access to basic needs, such as hygiene products, were compromised in the examined communities, particularly among households with FI persistence.

Due to the relentless nature of the COVID-19 pandemic, research on this topic is important to call attention to and encourage cross-government action to level up health and fight inequities [32]. The Brazilian government extinguished i) the Food and Nutritional Security Council, an advisory board responsible to propose guidelines, execution and monitoring of food and nutritional security policies, ii) reduced budget of the Food Purchase Program that subsidized food baskets from family farm foods for communities in vulnerability, and iii) deleted the government agricultural stockpiles [33]. These programs should be recovered, along with social safety net programs, payment deferrals, and tax breaks for food basket items [34]. Strengthening the family farm, the Millennium Development Goals for 2030 for sustainable development, to end hunger, can be achieved.

Efforts to address the need for assistance of all kinds, particularly food assistance, gas canister acquisition, and hygiene products, are required due to the COVID-19 pandemic.

Abbreviations

Bolsa Família Program (BFP), federal conditional cash transfer program; COVID-19: coronavirus disease; EBIA: Brazilian Food Insecurity scale; FI: Food Insecurity; PR: prevalence ratio.

Declarations

Ethics approval and consent to participate

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 Universidade Federal de São Paulo (CAAE 30805520.7.0000.5505). Online consent was obtained from all participants. The questionnaire only opens after online consent. The present study complies with the guidelines for Strengthening the Reporting of Observational Studies in Epidemiology.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Authors' contributions

LYT, FMC, ES were responsible for study design and data acquisition. LYT, FMC, CSM, BHL were responsible for data analysis and interpretation. LYT and CSM conducted literature search and database organization. LYT was responsible for writing original draft and prepare figure and tables. All authors were responsible for review and editing the final draft.

Acknowledgements

We thank the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for CVZ scholarship and financial code 001. We are grateful for nursing students Vitória Ferreira Condé, Giovanna Superbi, Anni Lei, Maria Carolina Rocha Roswell, Bruna Perroni Cogo that kindly contributed for phone interviews. We thank members from the Observatory “De Olho na Quebrada”, Reginaldo José Gonçalves and Aluizio Marino, and Vila São José community leader Luiz Alberto F. Alves for phone numbers and support to conduct our study in the community.

References

1. VIGISAN RP. Inquérito Nacional de Insegurança Alimentar no Contexto da Pandemia da Covid-19 no Brasil. 2021. <http://olheparaafome.com.br/>. Accessed 1 June 2021.
2. Instituto Brasileiro de Geografia e Estatística - IBGE. Pesquisa Nacional por Amostra de Domicílios Contínua, PNADc. Brasília (DF); 2021. <https://www.gov.br/fazenda/pt-br/centrais-de-conteudos/publicacoes/conjuntura-economica/emprego-e-renda/2021/informativo-pnad-ago2021.html>. Accessed 1 December 2021.
3. Silva MLL. Contrarreforma da Previdência Social sob comando do capital financeiro. *Serviço Soc Soc.* 2018;131:130–54.
4. WHO. WHO Coronavirus Dashboard. <https://covid19.who.int/> Accessed 2 Feb 2022.
5. Cavalcante JR, Cardoso-dos-Santos AC, Bremm JM, Lobo A de P, Macário EM, Oliveira WK de, et al. COVID-19 no Brasil: evolução da epidemia até a semana epidemiológica 20 de 2020. *Epidemiol e Serviços Saúde.* 2020;29. doi:10.5123/S1679-49742020000400010.
6. Li SL, Pereira RHM, Prete Jr CA, Zarebski AE, Emanuel L, Alves PJH, et al. Higher risk of death from COVID-19 in low-income and non-White populations of São Paulo, Brazil. *BMJ Glob Heal.* 2021;6:e004959. doi:10.1136/bmjgh-2021-004959.
7. Ribeiro KB. Social inequalities and COVID-19 mortality in the city of São Paulo, Brazil. . *Int J Epidemiol.* 2021.
8. Baqui P, Bica I, Marra V, Ercole A, van der Schaar M. Ethnic and regional variations in hospital mortality from COVID-19 in Brazil: a cross-sectional observational study. *Lancet Glob Heal.* 2020;8:e1018–26. doi:10.1016/S2214-109X(20)30285-0.
9. Horton R. Offline: COVID-19 is not a pandemic. *Lancet.* 2020;396:874. doi:10.1016/S0140-6736(20)32000-6.
10. Marco Antonio Teixeira, Renata Motta EG. Insegurança alimentar no Brasil em tempos de pandemia. 2021.
11. Junior JRSR, Sampaio M de AP, Bandoni DH, Carli LLS de. Atlas das situações alimentares no Brasil: a disponibilidade domiciliar de alimentos e a fome no Brasil contemporâneo. Bragança Paulista; 2021. https://drive.google.com/file/d/1ri3NJ3dN7o8GGwjeYUsbhZlrrr3iT_CP/view.
12. PAHO. Influenza Situation Report. 2021. <https://www.paho.org/en/influenza-situation-report>. Accessed 1 June 2021.

13. Galindo E, Teixeira MA, Araújo M de, Motta R, Pessoa M, Mendes L, et al. Efeitos da panemia na alimentação e na situação da insegurança alimentar no Brasil. Food for J. Berlin: Food for Justice Working Paper Series, no. 4; 2021. <https://doi.org/10.17169/refubium-29554>
14. Manfrinato C V, Marino A, Condé VF, Franco M do CP, Stedefeldt E, Tomita LY. High prevalence of food insecurity, the adverse impact of COVID-19 in Brazilian favela. Public Health Nutr. 2021;24:1210–5. doi:10.1017/S1368980020005261.
15. OECD. Purchasing power parities. <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>. Accessed 1 June 2021.
16. Pérez-Escamilla R, Segall-Corrêa AM, Kurdian Maranhã L, Sampaio M de FA, Marín-León L, Panigassi G. An Adapted Version of the U.S. Department of Agriculture Food Insecurity Module Is a Valid Tool for Assessing Household Food Insecurity in Campinas, Brazil. J Nutr. 2004. <https://doi.org/10.1093/jn/134.8.1923>
17. dos Santos LP, Lindemann IL, Motta JV dos S, Mintem G, Bender E, Gigante DP. Proposal of a short-form version of the Brazilian Food Insecurity Scale. Rev Saude Publica. 2014. <https://doi.org/10.1590/S0034-8910.2014048005195>
18. Reichenheim ME, Interlenghi GS, Moraes CL, Segall-Corrêa AM, Pérez-Escamilla R, Salles-Costa R. A Model-Based Approach to Identify Classes and Respective Cutoffs of the Brazilian Household Food Insecurity Measurement Scale. J Nutr. 2016;146:1356–64. doi:10.3945/jn.116.231845.
19. Kepple AW, Segall-Corrêa AM. Conceituando e medindo segurança alimentar e nutricional. Cien Saude Colet. 2011;16:187–99. doi:10.1590/S1413-81232011000100022.
20. Wolfson JA, Leung CW. Food insecurity and COVID-19: Disparities in early effects for us adults. Nutrients. 2020. <https://doi.org/10.3390/nu12061648>
21. Polsky JY GH. Food insecurity and mental health during the COVID-19 pandemic. Heal Rep. 2020;16:3–11. <https://doi.org/10.25318/82-003-x202001200001>
22. Owens MR, Brito-Silva F, Kirkland T, Moore CE, Davis KE, Patterson MA, et al. Prevalence and social determinants of food insecurity among college students during the COVID-19 pandemic. Nutrients. 2020. <https://doi.org/10.3390/nu12092515>
23. Elshahoryi N, Al-Sayyed H, Odeh M, McGrattan A, Hammad F. Effect of Covid-19 on food security: A cross-sectional survey. Clin Nutr ESPEN. 2020;40:171–8. doi:10.1016/j.clnesp.2020.09.026.
24. dos Santos TG, da Silveira JAC, Longo-Silva G, Ramires EKNM, de Menezes RCE. Trends and factors associated with food insecurity in Brazil: The national household sample survey, 2004, 2009, and 2013. Cad Saude Publica. 2018. <https://doi.org/10.1590/S0034-8910.2014048005195>
25. Kent K, Murray S, Penrose B, Auckland S, Godrich S, Lester E, et al. Food insecure households faced greater challenges putting healthy food on the table during the COVID-19 pandemic in Australia. Appetite. 2021;105815. doi:10.1016/j.appet.2021.105815.
26. Jayatissa R, Herath HP, Perera AG, Dayaratne TT, De Alwis ND, Nanayakkara HPLK. Impact of COVID-19 on child malnutrition, obesity in women and household food insecurity in underserved urban

- settlements in Sri Lanka: a prospective follow-up study. *Public Health Nutr.* 2021;24:3233–41. doi:10.1017/S1368980021001841.
27. Hamadani JD, Hasan MI, Baldi AJ, Hossain SJ, Shiraji S, Bhuiyan MSA, et al. Immediate impact of stay-at-home orders to control COVID-19 transmission on socioeconomic conditions, food insecurity, mental health, and intimate partner violence in Bangladeshi women and their families: an interrupted time series. *Lancet Glob Heal.* 2020;8:e1380–9. doi:10.1016/S2214-109X(20)30366-1.
 28. Giacomani C, Herrera MS, Ayala Arancibia P. Household food insecurity before and during the COVID-19 pandemic in Chile. *Public Health.* 2021;198:332–9. doi:10.1016/j.puhe.2021.07.032.
 29. Koltai J, Toffolutti V, McKee M, Stuckler D. Prevalence and changes in food-related hardships by socioeconomic and demographic groups during the COVID-19 pandemic in the UK: A longitudinal panel study. *Lancet Reg Heal - Eur.* 2021;6:100125. doi:10.1016/j.lanepe.2021.100125.
 30. Ribeiro Junior JRS, Sampaio M de AP, Bandoni DH, De Carli LLS. Atlas das situações alimentares no Brasil: a fome no Brasil contemporâneo. Universidade. Bragança Paulista; 2021.
 31. Stockman JK, Wood BA, Anderson KM. Racial and Ethnic Differences in COVID-19 Outcomes, Stressors, Fear, and Prevention Behaviors Among US Women: Web-Based Cross-sectional Study. *J Med Internet Res.* 2021;23:e26296. doi:10.2196/26296.
 32. Suleman M, Sonthalia S, C W, A T, Kane M, Bunbury S, et al. Unequal pandemic, fairer recovery: the COVID-19 inquiry report. 2021. 2021. <https://www.health.org.uk/publications/reports/unequal-pandemic-fairer-recovery>.
 33. Alpino T de MA, Santos CRB, Barros DC de, Freitas CM de. COVID-19 e (in)segurança alimentar e nutricional: ações do Governo Federal brasileiro na pandemia frente aos desmontes orçamentários e institucionais. *Cad Saude Publica.* 2020;36. doi:10.1590/0102-311x00161320.
 34. Akseer N, Kandru G, Keats EC, Bhutta ZA. COVID-19 pandemic and mitigation strategies: implications for maternal and child health and nutrition. *Am J Clin Nutr.* 2020;112:251–6. doi:10.1093/ajcn/nqaa171.

Figures

χ^2 test, $p=0.009$

Figure 1

Prevalence of food insecurity during COVID-19, São Paulo favela, April/2020 to April 2021 (n=424)