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Factors associated with worsening in the self-rated health status of Brazilian women who lived with dependent elderly people during the first wave of COVID-19

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Abstract *The objective is to analyze the factors associated with the worsening of the self-rated health (SRH) of Brazilian women who live with elderly people with functional dependence (EFD) during the first wave of COVID-19. ConVid - Behavior Research was used as a data source. For the analysis, the group of women who lived with EFD was compared with those who lived with the elderly without any dependence. Hierarchical prevalence ratio (PR) models were estimated to test the associations between sociodemographic characteristics, changes in income, routine activities and health in the pandemic, with the outcome of worsening SRH. This worsening was more frequent in the group of women living with EFD. After adjusting for hierarchical factors, being black (PR=0.76; 95%CI 0.60-0.96) and having a per capita income lower than minimum wage (PR=0.78; 95%CI 0.64- 0.96) were shown to be protective factors for SRH worsening among EFD co-residents. Indisposition, emergence/worsening of back problems, affected sleep, poor SRH, feeling loneliness and difficulty in carrying out routine activities during the pandemic were positively associated factors. The study demonstrates that living with EFD was associated with a worsening in the health status of Brazilian women during the pandemic, especially among those of higher social status.*

Key words *Caregivers, Frail Elderly, COVID-19*

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Introduction

The COVID-19 pandemic threatens survival[1] and quality of life[2] for older adults. Those who live with reduced strength, resistance, and physiological function, in a fragile situation, due to multiple causes are exposed to an even greater risk of developing severe forms of the disease[3]. Physical proximity as an infecting factor[4] and the rapid virus spread required that the care provided to the frail elderly population be intensified[5], especially in the first pandemic wave, when limited knowledge of the disease required greater caution[6].

The guidelines of international health organizations to reduce physical contact between people entailed challenges for family members who live with older adults who depend on care, such as i) the fear of infecting the most vulnerable family member[7]; ii) loss of support from helpers outside the home[8,9]; iii) the difficulty of accessing essential goods when adopting isolation at home[10] and the lack of material resources in a setting of economic crisis[11]; iv) the increasing family conflicts[12]; v) cognitive decline[13] and deteriorating functionality[14] of older adults, due to social distancing and other stressors mentioned earlier.

The care of older adults who require help to perform activities of daily living (functional dependents[15]) has been a Public Health concern[16,17] since before the pandemic, and this is because, in general, care demands a significant amount of time, dedication, and resources from caregivers[18]. In the family, those living with a dependent relative or friend are often concerned about the possibility of medical emergencies. They employ too much physical effort with care-related activities, their sleep and finances are affected, and they are exposed to several other factors affecting the quality of life[19,20].

There is evidence of worse Self-Assessed Health (SAH) of family caregivers of functionally-dependent older adults (FDOA)[21,22] and, less frequently, the effect on the health of family members who live with FDOA, regardless of being the primary caregiver[23]. While cannot be used for health assessments at a clinical level, the SAH can simultaneously measure physical, social, and mental aspects of health[24]. As a result, it has been recognized as a predictor of mortality[25], morbidity[26], future health problems[25], and quality of life[27].

Exposure to the negative effects related to the care of FDOA family members occurs unevenly between economic and social groups[16,28-31]. There is evidence that lower-income strata[28] and black people[31] are more susceptible to such effects. However, the most referenced family care inequality concerns gender, since care responsibilities fall more heavily on women[16,28-30]. In Brazil, research based on the Longitudinal Study of Elderly Health (ELSI-Brasil) conducted from 2015 to 2016[16] revealed that around 72.1% of the FDOA's primary caregivers are female family members. Such inequalities are due to the historical conformation of the care culture that is permeated with strongly hierarchical relationships and has become invisible and undervalued[31,32].

Available adequate social support can mitigate the burden and adverse effects of care for family members living with FDOA[33], especially in humanitarian emergencies, such as a pandemic[8]. However, the lack of social support networks for care is a striking feature of Brazil[34], although the Federal Constitution provides that care for older adults is a shared responsibility between family, society, and the State (Article 230). Through the results of the ELSI-Brasil (2015-2016), Giacomin *et al.*[16] shows that 94% of the FDOA in the country are cared for by a family member.

Evidence of the escalating care burden among family members living with FDOA during the pandemic in Brazil was shown in a study by Romero *et al.*[9]. However, few studies have analyzed the quality of life and health of female FDOA relatives during the pandemic, given that they are still the main ones responsible for home care[16].

Given the abovementioned, this article aims to analyze the deterioration of the Self-Assessed Health of women living with FDOA during the first COVID-19 pandemic wave, considering sociodemographic characteristics and associated contextual changes.

Methods

Data source and sample

ConVid - Behavioral Research is a cross-sectional health survey conducted nationwide during the first stage of the pandemic, from April 24 to May 24, 2020, under the coordination of the Oswaldo Cruz Foundation. Survey data were collected through a virtual self-completion questionnaire via cell phone or computer with internet access. The National Research Ethics Committee (CONEP) approved the project on April 19, 2020, under Opinion No. 3.980.277. Inclusion

criteria for participation in the survey were being 18 or older at the time of completion and residing in the Brazilian territory. Post-stratification procedures were performed to obtain a representative sample of the population. Sampling was carried out using the "virtual snowball" method, ultimately reaching 45,161 people. More details are available in the publication on the methods[35].

Three inclusion criteria were used for the present study: being female, living with at least one older adult, and living in households with at least two people. We intended to exclude cases of older adults living alone with this last criterion. In the end, we selected 7,914 participants.

Variables

As an analysis strategy, we compared women living with FDOA with those living with functionally independent older adults (FIOA). We identified people residing with older adults from the question: "How many residents are older adults (60 years old or older)?". We identified people residing with FDOA from the positive answer to the question: "Do any of the older adults residing in the household need help to perform activities of daily living, such as eating, dressing, going to the bathroom, moving around the house, or having a bath?" (Yes or No). The others were considered FIOA co-residents.

The study outcome was the deteriorated SAH during the COVID-19 pandemic, obtained from the question: "Do you think the pandemic caused changes in your health?" (Improved; remained the same; got a little worse; got a lot worse). The response options "it got a little worse" and "it got a lot worse" were considered for the outcome. The deteriorated SAH was used as a proxy indicator of changes in the respondents' health status and quality of life.

The variables included for the analysis of factors associated with the outcome were divided into three groups: (1) sociodemographic, (2) socioeconomic changes and changes in routine activities during the pandemic, and (3) the effect of the pandemic on health.

(1) *Sociodemographic variables*: Ethnicity/skin color was categorized as white or black, the latter comprising those who self-declared themselves to be black or brown. People who answered yellow or indigenous corresponded to 1% of the sample and were not considered for the analysis of this variable. Age was categorized into two groups, those under 60 and those aged 60 and over. We obtained the per capita household income in minimum wages (MW) from the question: "What was the total household income before the start of the new coronavirus pandemic?". The answer to this question was divided by the total number of household members and classified into "less than 1 MW" and "1 MW and over". The household density variable was defined based on the question: "What is the number of residents in your household?", grouped into the categories "living with one person" or "living with two people and over".

(2) *Variables regarding the socioeconomic changes and changes in routine activities during the pandemic*: The change in the level of difficulty in performing routine activities was obtained through the question: "What was your difficulty level in performing routine activities during the pandemic?", categorized as "very difficult" (very much) and "not very difficult" (no difficulty, a little, and moderate). The impact of the pandemic on income was obtained from the question: "How did the pandemic affect the household's income?", which was categorized as "very much affected" (decreased a lot) or "not very much affected" (did not decrease or decreased slightly). Changes in domestic work were obtained from the question: "Did the pandemic affect/modify the amount and type of your domestic work?" categorized into "did not increase much" (it remained the same, decreased and increased) and "increased a lot" (increased).

(3) *Variables on the effects of the pandemic on health*: Poor mood was obtained from the combination of two questions, namely: "How often did you feel sad or depressed during the pandemic?" and "How often did you feel anxious or nervous during the pandemic?". Those who answered "often" or "always" to at least one of the questions were categorized as "often/always", and those who answered "never" or "rarely" to both were categorized as "never or rarely". The feeling of loneliness was obtained from the question: "How often did you feel isolated from your family or close friends during the pandemic?", categorized as "never or rarely" (never or rarely) and "often/always" (often or always). We obtained the pandemic's impact on sleep from the question: "Did the pandemic affect the quality of your sleep?", categorized as "did not affect" (did not affect, I continue to sleep well, or I continued to have the same sleep problems) and in "deteriorated during the pandemic" (I started having sleep problems or I already had sleep problems and they got a lot worse). The following question was used to assess the general state of health: "In general, how do

you rate your health?", categorized as "excellent or good" (excellent or good) and "fair to very poor" (moderate, poor, or extremely poor). The onset or deterioration of the back problem was obtained from the questions "Did you start to have back or back pain with the changes in your usual activities During the pandemic?", categorized as "no" (no) and "yes" (yes, a little or yes, a lot) and "Did changes in your usual activities affect back pain during the pandemic?", categorized into "deteriorated" (increased a little or increased a lot) and "did not deteriorate" (remained the same or decreased).

Analysis

The proportion of women living with FDOA and FIOA and the percentage distribution of these groups were estimated, according to sociodemographic variables and variables regarding socioeconomic changes, changes in routine activities during the pandemic, and the effects of the pandemic on health (Table 1). Table 2 shows the prevalence of deteriorated SAH among women living with FDOA and FIOA, according to the same variables in Table 1. We calculated the 95% confidence intervals and the independence test between rows and columns (Pearson chi-square) for all estimates.

We estimated the crude bivariate prevalence ratio (PR) of the deteriorated SAH account, according to women living with FDOA or not (FIOA), controlled by age (Table 3), to analyze the factors associated with deteriorated SAH during the pandemic.

Then, three-stage PR hierarchical models were calculated for women living with FDOA (Table 4) and FIOA (Table 5). In the first stage, we considered sociodemographic variables; in the second stage, the variables of socioeconomic changes and routine activities in the pandemic; in the third stage, the variables of the effect of the pandemic on health.

The models were realized using Poisson regression with robust variance, a 95% confidence interval, and a significance level of 5% (or 0.05). Using variables in the three-stage model that were not significant in the bivariate model aimed to identify the variation in the relationship of these variables with the outcome and with factors intrinsic to the pandemic.

Analyses were performed using the SPSS 21 statistical package, considering the sample weight obtained for sample calibration.

Results

Concerning adult women living with older adults, 9.3% (95%CI 8.7-9.9) lived with an FDOA. Most of those living with FIOA were under 60 (66.2%; 95%CI 62.8-69.6) and received less than one MW (59.2%; 95%CI 55.4-63.0). More than 80% lived with two or more people at home (81.4%; 95%CI 78.6-84.2) (Table 1).

With the onset of the pandemic, approximately 22% of women living with FDOA found it exceedingly difficult to perform routine activities (21.9%; 95%CI 18.9-24.9). The proportion was slightly lower (18.3%; 95%CI 17.4-19.2) among those living with independent older adults. One-third of women living with FDOA had their income greatly affected during the pandemic (34.0%; 95%CI 30.6-37.4), a value higher than that of women living with FIOA (27.0%; 95%CI 26.0-28.0).

The constantly poor mood had a higher proportion among women living with FDOA (67.8%; 95%CI 64.4-71.2) than those living with FIOA (59.1%; 95%CI 58.0-60.2). The feeling of loneliness was similar between the groups of women analyzed. Deteriorated sleep affected more women living with FDOA (58.7%; 95%CI 55.1-62.3) than those living with FIOA (46.2%; 95%CI 45.0-47.4).

The sharp increase in domestic work (79.0%; 95%CI 76.0-82.0) was also more frequent among women living with FDOA than in those who did not (65.8%; 95%CI 64.7-66.9). Likewise, the proportion of women with regular to extremely poor SAH was higher among those living with FDOA (45.9%; 95%CI 42.3-49.5) than those who did not (FIOA) (29.7%;95%CI 28.6-30.8). The back problem got worse or started to affect 67.1% of the women living with FDOA (95%CI 63.7-70.5) and 49.7% of those living with FIOA (95%CI 48.5-50, 9) (Table 1).

The prevalence of deteriorated SAH among women living with FDOA or FIOA, according to sociodemographic characteristics and contextual changes due to the pandemic, is shown in Table 2. Approximately 40.3% (95%CI 36.7-43.9) of those living with FDOA had a worse perception of their health with the pandemic, whereas this percentage was 29.6% (95%CI 28.5-30.7) among those living with FIOA.

In general, a higher prevalence of deteriorated SAH was found in the group of people living with FDOA. The prevalence of deteriorated SAH among women living with FDOA was higher among those who had great difficulty carrying

Table 1. Proportion of women living with FDOA and FIOA, and percentage distribution according to sociodemographic variables and contextual changes with the pandemic. Brazil, 2020.

Variables	Living with FDOA		Living with FIOA		Total			P-value
	%	95%CI	%	95%CI	n	%	95%CI	
Total	9.3	8.7-9.9	90.7	90.1-91.3	7.842	100	-	-
Sociodemographic								
Age								
Less than 60	66.2	62.8-69.6	49.2	48.0-50.4	3.979	50.7	49.6-51.8	<0.001
60 and over	33.8	30.4-37.2	50.8	49.6-52.0	3.863	49.3	48.2-50.4	
Ethnicity/skin color								
Black	50.7	47.1-54.3	48.7	47.5-49.9	3.799	48.9	47.8-50.0	0.001
White	49.3	45.7-52.9	51.3	50.1-52.5	3.973	51.1	50.0-52.2	
Per capita income in Minimum Wages (MW)								
Less than 1 MW	59.2	55.4-63.0	50.2	49.0-51.4	3.679	51.0	49.8-52.2	0.002
1 MW and over	40.8	37.0-44.6	49.8	48.6-51.0	3.538	49.0	47.8-50.2	
Household density								
Living with two people and over	81.4	78.6-84.2	60.8	59.7-61.9	4.918	62.7	61.6-63.8	0.195
Living with one person	18.6	15.8-21.4	39.2	38.1-40.3	2.924	37.3	36.2-38.4	
Socioeconomic changes and routine activities in the pandemic								
Level of difficulty in performing routine activities during the pandemic								
Very difficult	21.9	18.9-24.9	18.3	17.4-19.2	1.454	18.6	17.7-19.5	<0.001
Not very difficult	78.1	75.1-81.1	81.7	80.8-82.6	6.364	81.4	80.5-82.3	
Impact on income during the pandemic								
Very much affected	34.0	30.6-37.4	27.0	26.0-28.0	2.171	27.7	26.7-28.7	0.018
Not very much affected	66.0	62.6-69.4	73.0	72.0-74.0	5.671	72.3	71.3-73.3	
Impact of the pandemic on domestic chores								
Increased a lot	79.0	76.0-82.0	65.8	64.7-66.9	5.221	67.0	66.0-68.0	<0.001
Did not increase much	21.0	18.0-24.0	34.2	33.1-35.3	2.572	33.0	32.0-34.0	
Effects of the pandemic on health								
Poor mood								
Often/always	67.8	64.4-71.2	59.1	58.0-60.2	4.697	59.9	58.8-61.0	<0.001
Never or rarely	32.2	28.8-35.6	40.9	39.8-42.0	3.145	40.1	39.0-41.2	
Felt isolated during the pandemic								
Often/always	44.5	40.9-48.1	41.3	40.2-42.4	3.260	41.6	40.5-42.7	<0.001
A little or never	55.5	51.9-59.1	58.7	57.6-59.8	4.583	58.4	57.3-59.5	
Impact of the pandemic on sleep								
Deteriorated during the pandemic	58.7	55.1-62.3	46.2	45.0-47.4	3.701	47.4	46.3-48.5	<0.001
Did not affect	41.3	37.7-44.9	53.8	52.6-55.0	4.114	52.6	51.5-53.7	
How do you assess your health?								
Fair to extremely poor	45.9	42.3-49.5	29.7	28.6-30.8	4.559	31.2	30.3-32.1	<0.001
Excellent or good	54.1	50.5-57.7	70.3	69.2-71.4	5.393	68.8	67.9-69.7	
Started to have a back problem or the pre-existing problem deteriorated								
Yes	67.1	63.7-70.5	49.7	48.5-50.9	4.023	51.3	50.2-52.4	<0.001
No	32.9	29.5-36.3	50.3	49.1-51.5	3.816	48.7	47.6-49.8	

Captions: FDOA = Functionally Dependent Older Adult; FIOA = Functionally-Independent Older Adult.

Source: ConVid-Research of Behaviors, 2020.

Table 2. Prevalence of reported deteriorated Self-Assessed Health (SAH) due to the pandemic among women living with FDOA or FIOA, by sociodemographic variable and contextual changes with the pandemic. Brazil, 2020.

Variables	Living with FDOA				Living with FIOA			
	n	Prevalence	95%CI	P-value	n	Prevalence	95%CI	P-value
Total	293	40.3	36.7-43.9	-	2.105	29.6	28.5-30.7	-
Sociodemographic								
Age								
Less than 60	209	43.5	39.1-48.0	0.015	1.304	37.3	35.7-39.0	<0.001
60 and over	84	34.1	28.2-40.0		801	22.2	20.8-23.5	
Ethnicity/skin color								
Black	160	43.7	38.7-48.8	0.065	1.181	34.5	32.9-36.1	<0.001
White	132	37.0	31.9-42.0		901	24.9	23.5-26.3	
Per capita income in Minimum Wages (MW)								
Less than 1 MW	153	40.7	35.7-45.7	0.109	1.107	33.5	31.9-35.1	<0.001
1 MW and over	89	34.5	28.7-40.3		809	24.7	23.2-26.2	
Household density								
Living with two people and over	237	40.0	36.1-44.0	0.768	1.346	31.1	29.8-32.5	0.001
Living with one person	56	41.7	33.4-50.0		760	27.3	25.6-29.0	
Socioeconomic changes and routine activities in the pandemic								
Level of difficulty in performing routine activities during the pandemic								
Very difficult	110	69.7	62.5-76.8	<0.001	638	49.2	46.5-52.0	<0.001
Not very difficult	182	32.2	28.4-36.1		1.451	25.1	24.0-26.2	
Impact on income during the pandemic								
Very much affected	161	65.2	59.3-71.2	<0.001	676	35.3	33.1-37.4	<0.001
Not very much affected	132	27.5	23.5-31.5		1.430	27.5	26.3-28.8	
Impact of the pandemic on domestic chores								
Increased a lot	255	44.4	40.4-48.5	<0.001	1.559	33.6	32.2-34.9	<0.001
Did not increase much	38	24.9	18.0-31.7		521	21.5	19.9-23.2	
Effects of the pandemic on health								
Poor mood								
Often/always	238	48.3	43.9-52.8	<0.001	1.767	42.1	40.6-43.5	<0.001
A little or never	55	23.5	18.0-28.9		338	11.7	10.5-12.8	
Felt isolated during the pandemic								
Often/always	141	43.6	38.2-49.0	0.105	1.044	35.7	33.9-37.4	<0.001
Never or rarely	152	37.7	33.0-42.5		1.061	25.4	24.1-26.7	
Impact of the pandemic on sleep								
Deteriorated during the pandemic	246	57.9	53.2-62.6	<0.001	1.441	44.1	42.4-45.8	<0.001
Did not affect	47	15.7	11.6-19.8		648	17.0	15.8-18.2	
How do you assess your health?								
Fair to extremely poor	201	60.4	55.1-65.7	<0.001	1.164	55.1	53.0-57.2	<0.001
Excellent or good	92	23.3	19.1-27.5		941	18.9	17.8-19.9	
Back problem								
Started to have or deteriorated	263	54.0	49.5-58.4	<0.001	1.439	40.7	39.1-42.3	<0.001
Did not start to have, nor did it deteriorate	30	12.5	8.3-16.7		666	18.7	17.4-19.9	

Captions: FDOA = Functionally Dependent Older Adult; FIOA = Functionally-Independent Older Adult.

Source: ConVid-Research of Behaviors, 2020.

Ciência & Saúde Coletiva, 28(7):2051-2064, 2023

Table 3. Bivariate prevalence ratio of deteriorated Self-Assessed Health (SAH) due to the pandemic, among women living with FDOA or FIOA, by sociodemographic variable and contextual and health changes with the pandemic. Brazil, 2020.

Variables	Living with FDOA			Living with FIOA		
	PR	95%CI	P-value	PR	95%CI	P-value
Sociodemographic						
Age						
Less than 60	1.28	0.92-1.73	0.021	1.67	1.06-1.40	<0.001
60 and over	1	-		1	-	
Ethnicity/skin color						
Black	1.07	0.89-1.28	0.492	1.31	1.21-1.41	<0.001
White	1	-		1	-	
Per capita income in Minimum Wages (MW)						
Less than 1 MW	1.01	0.80-1.28	0.911	1.2	1.10-1.30	<0.001
1 MW and over	1	-		1	-	
Household density						
Living with two people and over	0.77	0.59-1.0	0.054	0.82	0.76-0.89	<0.001
Living with one person	1	-		1	-	
Socioeconomic changes and routine activities in the pandemic						
Level of difficulty in performing routine activities during the pandemic						
Very difficult	2.12	1.80-2.51	0.054	1.78	1.65-1.92	<0.001
Not very difficult	1	-		1	-	
Impact on income during the pandemic						
Very much affected	2.43	2.02-2.92	<0.001	1.28	1.18-1.38	<0.001
Not very much affected	1	-		1	-	
Impact of the pandemic on domestic chores						
Increased a lot	1.65	1.22-2.22	0.001	1.5	1.37-1.64	<0.001
Did not increase much	1	-		1	-	
Effects of the pandemic on health						
Poor mood						
Often/always	1.90	1.46-2.46	<0.001	3.22	2.85-3.64	<0.001
Never or rarely	1	-		1	-	
Felt isolated during the pandemic						
Often/always	1.13	0.94-1.36	0.184	1.36	1.26-1.47	<0.001
A little or never	1	-		1	-	
Impact of the pandemic on sleep						
Deteriorated during the pandemic	2.34	2.14-2.56	<0.001	3.59	2.67-4.82	<0.001
Did not affect	1	-		1	-	
How do you assess your health?						
Fair to extremely poor	2.82	2.28-3.50	<0.001	3.24	3.01-3.49	<0.001
Excellent or good	1	-		1	-	
Back problem						
Started to have or deteriorated	4.92	3.32-7.29	<0.001	2.01	1.85-2.19	<0.001
Did not start to have, nor did it deteriorate	1	-		1	-	

Captions: FDOA = Functionally Dependent Older Adult; FIOA = Functionally-Independent Older Adult.

Source: ConVid-Research of Behaviors, 2020.

out routine activities (69.7%; 95%CI 52.3-82.8), with income greatly affected during the pandemic (65.2%; 95%CI 59.3-71.2), increased domestic work (44.4%; 95%CI 40.4-48.5), frequent poor mood (48.3%; 95%CI 43.9-52.8), deteriorated sleep (57.9%; 95%CI 53.2-62.6), fair to extremely poor SAH (60.4%; 95%CI 55.1-65.7), and who started to have or had a deteriorated pre-existing

Table 4. Multivariate prevalence ratio of deteriorated Self-Assessed Health (SAH) due to the pandemic, among women living with FDOA or FIOA, by sociodemographic variable and contextual and health changes with the pandemic. Brazil, 2020.

Variables	Sociodemographic			Socioeconomic changes and routine activities in the pandemic			Effects of the pandemic on health		
	PR	95%CI	P-value	PR	95%CI	P-value	PR	95%CI	P-value
Age									
Less than 60	1.22	0.94-1.60	0.141	0.95	0.73-1.25	0.735	0.97	0.74-1.28	0.837
60 and over	1	-		1	-		1	-	
Ethnicity/skin color									
Black	0.81	0.65-1.00	0.055	0.8	0.65-0.98	0.028	0.76	0.60-0.96	0.019
White	1	-		1	-		1	-	
Per capita income in Minimum Wages (MW)									
Less than 1 MW	1.17	0.91-1.52	0.222	0.96	0.75-1.23	0.730	0.78	0.64-0.96	0.018
1 MW and over	1	-		1	-		1	-	
Household density									
Living with two people and over	1.02	0.75-1.38	0.904	1.00	0.72-1.39	0.986	0.77	0.56-1.07	0.123
Living with one person	1	-		1	-		1	-	
Level of difficulty in performing routine activities during the pandemic									
Very difficult	-	-	-	2.37	1.90-2.95	<0.001	1.49	1.23-1.82	<0.001
Not very difficult	-	-	-	1	-		1	-	
Impact on income during the pandemic									
Very much affected	-	-	-	1.49	1.18-1.88	0.001	1.20	0.99-1.46	0.057
Not very much affected	-	-		1	-		1	-	
Impact of the pandemic on domestic chores									
Increased a lot	-	-	-	1.20	0.92-1.56	0.173	0.77	0.60-0.98	0.032
Did not increase much	-	-		1	-		1	-	
Poor mood									
Often/always	-	-	-	-	-	-	2.91	1.64-5.14	0.001
Never or rarely	-	-		-	-		1	-	
Felt isolated during the pandemic									
Often/always	-	-	-	-	-	-	1.33	1.10-1.61	0.003
Never or rarely	-	-		-	-		1	-	
Impact of the pandemic on sleep									
Deteriorated during the pandemic	-	-	-	-	-	-	1.73	1.32-2.27	<0.001
Did not affect	-	-		-	-		1	-	
How do you assess your health?									
Fair to extremely poor	-	-	-	-	-	-	1.71	1.39-2.11	<0.001
Excellent or good	-	-		-	-		1	-	
Back problem									
Started to have or deteriorated	-	-	-	-	-	-	1.95	1.24-3.06	0.004
Did not start to have. nor did it deteriorate	-	-		-	-		1	-	

Captions: FDOA = Functionally Dependent Older Adult; FIOA = Functionally-Independent Older Adult.

Source: ConVid-Research of Behaviors, 2020.

Table 5. Multivariate prevalence ratio of deteriorated Self-Assessed Health (SAH) due to the pandemic, among women living with FIOA, by sociodemographic variable and contextual and health changes with the pandemic. Brazil, 2020.

Variables	Sociodemographic			Socioeconomic changes and routine activities in the pandemic			Effects of the pandemic on health		
	PR	95%CI	P-value	PR	95%CI	P-value	PR	95%CI	P-value
Age									
Less than 60	1.83	1.67-2.00	<0.001	1.6	1.46-1.76	<0.001	1.38	1.28-1.50	<0.001
60 and over	1	-		1	-		1	-	
Ethnicity/skin color									
Black	1.37	1.26-1.49	<0.001	1.31	1.21-1.43	<0.001	1.16	1.07-1.25	<0.001
White	1	-		1	-		1	-	
Per capita income in Minimum Wages (MW)									
Less than 1 MW	1.23	1.13-1.35	<0.001	1.19	1.09-1.30	<0.001	1.00	0.92-1.08	0.963
1 MW and over	1	-		1	-		1	-	
Household density									
Living with two people and over	1.31	1.20-1.43	<0.001	1.30	1.19-1.42	<0.001	1.13	1.05-1.23	0.002
Living with one person	1	-		1	-		1	-	
Level of difficulty in performing routine activities during the pandemic									
Very difficult	-	-	-	1.75	1.61-1.89	<0.001	1.03	0.95-1.11	0.513
Not very difficult	-	-	-	1	-		1	-	
Impact on income during the pandemic									
Very much affected	-	-	-	1.11	1.02-1.21	0.017	0.90	0.83-0.97	0.004
Not very much affected	-	-		1	-		1	-	
Impact of the pandemic on domestic chores									
Increased a lot	-	-	-	1.42	1.29-1.57	<0.001	1.1	1.01-1.20	0.035
Did not increase much	-	-		1	-		1	-	
Poor mood									
Often/always	-	-	-	-	-	-	1.98	1.73-2.27	<0.001
Never or rarely	-	-		-	-		1	-	
Felt isolated during the pandemic									
Often/always	-	-	-	-	-	-	1.17	1.09-1.26	<0.001
Never or rarely	-	-		-	-		1	-	
Impact of the pandemic on sleep									
Deteriorated during the pandemic	-	-	-	-	-	-	1.67	1.51-1.85	<0.001
Did not affect	-	-		-	-		1	-	
How do you assess your health?									
Fair to extremely poor	-	-	-	-	-	-	2.42	2.22-2.63	<0.001
Excellent or good	-	-		-	-		1	-	
Back problem									
Started to have or deteriorated	-	-	-	-	-	-	1.48	1.34-1.63	<0.001
Did not start to have, nor did it deteriorate	-	-		-	-		1	-	

Captions: FDOA = Functionally Dependent Older Adult; FIOA = Functionally-Independent Older Adult.

Source: ConVid-Research of Behaviors, 2020.

back problem (54.0%; 95%CI 49.5-58.4) (Table 2).

All the variables were significantly associated with the prevalence of reported deteriorated SAH (Table 2) among those living only with FIOA.

Based on the results presented in the bivariate prevalence ratio model (Table 3), we observed that sociodemographic characteristics were associated with deteriorated SAH among women living with FIOA, but were not associated among women living with FIOA. Among those living with an FIOA, being under 60 (PR=1.67; 95%CI 1.06-1.40), black (PR=1.31; 95%CI 1.21-1.41), and having less than one MW per capita household income (PR=1.20; 95%CI 1.10-1.30) were characteristics associated with the outcome. The health of those living in more densely populated households was less impacted (PR=0.82; 95%CI 0.76-0.89).

The increased difficulty in carrying out daily activities and harm to income and health conditions in the pandemic were strongly associated with deteriorated SAH in both groups analyzed, except for loneliness, which was associated among females living with FDOA.

The most associated variables among women living with FDOA, against those living with FIOA, were the deterioration or onset of a back problem (PR=4.92; 95%CI 3.32-7.29 and PR=2.01; 95%CI 1.85-2.19, respectively), highly-affected income (PR=2.43; 95%CI 2.02-2.92 and PR=1.28; 95%CI 1.18-1, 38, respectively), the difficulty in performing routine activities (PR=2.12; 95%CI 1.80-2.51 and PR=1.78; 95%CI 1.65-1.92, respectively) and the increase in domestic work (PR=1.65; 95%CI 1.22-2.22 and PR=1.50; 95%CI 1.37-1.64, respectively).

The variables of poor mood, affected sleep, and SAH were more strongly associated among those living with FIOA than those living with FDOA.

Table 4 shows the results of the hierarchical model for the group of women living with FDOA. Two sociodemographic variables that were not associated in the first stage of the model started to show an association when considering the changes brought about by the pandemic, namely ethnicity/skin color (from the second stage) and per capita household income in MW (in the last stage). Being black (PR=0.76; 95%CI 0.60-0.96) and having less than 1 MW per capita income (PR=0.78; 95%CI 0.64-0.96) were inversely associated with deteriorated SAH.

Increased domestic work during the pandemic, which was not associated in stage two of the model, was inversely associated (PR=0.77; 95%CI 0.60-0.98) when controlling for the effects of the pandemic on health. The factors most associated with the outcome were poor mood (PR=2.91; 95%CI 1.64-5.14), deteriorated or onset of back problems (PR=1.95; 95%CI 1.24-3.06), affected sleep (PR=1.73; 95%CI 1.32-2.27) and SAH (PR=1.71; 95%CI 1.39-2.11). Feeling isolated, having great difficulty performing daily activities, and income greatly affected by the pandemic were associated, albeit weakly (less than 1.5). Age and household density were not associated with the outcome.

Table 5 shows the results of the hierarchical model for women living with FIOA. All variables were associated in the first and second stages of the model. The association with per capita household income and difficulty performing routine activities lost significance when considering the effects of the pandemic on health (stage three). Moreover, the income greatly affected by the pandemic reversed the direction of the association. The factors most associated with the outcome in the last stage of the model were SAH (PR=2.42; 95%CI 2.22-2.63), poor mood (PR=1.98; 95%CI 1.73-2.27), and affected sleep (PR=1.67; 95%CI 1.51-1.85). The other variables showed weaker associations (PR<1.5).

Discussion

Analyzing the quality of life and health of the principal caregivers and all women living with FDOA is one of the contributions of this article. However, we should consider that the exclusive selection of female respondents makes the role of care central in the analysis of the findings, given that mostly women assume such functions in the domestic space[36]. The few studies that analyzed the effects of living with FDOA showed a high prevalence of depression or anxiety among co-residents[37,38]. This unequal association was demonstrated in a study conducted in India, which reported that poor, illiterate women with paid employment and FDOA's spouses were even more susceptible to manifest such symptoms[37].

This study showed that women living with FDOA had worse socioeconomic conditions and had more frequent negative impacts on their daily lives, health conditions, and income during the pandemic than those living with FIOA. Regarding the results of the hierarchical models, we observed that, except for frequent loneliness, the variables related to the effects of the pandemic on

health had the strongest associations with deteriorated SAH between the two groups.

The socioeconomic factors associated with deteriorated SAH followed the patterns of inequality most commonly reported in the literature[39] among those living with FIOA. Black and poorer women were more vulnerable to the deterioration of their health and quality of life during the pandemic. However, the association with income lost significance when considering the effects of the pandemic on health. These findings corroborate the study by Szwarcwald *et al.*[40] on the adult Brazilian population in general.

Socioeconomic inequality in the deteriorated SAH was only identified among women living with FDOA when considering the effects of factors intrinsic to the pandemic. Controlling for such factors, we observed that white and higher-income women had more often a worse self-perception of their health. While outside the expected pattern, this result is similar to the study that evaluated the increased burden of care by family members living with FDOA in Brazil, which showed that those most affected in the first wave of the pandemic were men with higher incomes and white[9].

Some hypotheses could explain the unusual behavior of socioeconomic factors associated with deteriorated SAH in the population of women living with FDOA during the pandemic. Regarding ethnicity/skin color, we should consider that the historical construction of care culture naturalized the role of Black women as caregivers in the domestic environment[41]. Slavery and structural racism conditioned Black women to care for their families and white families[42]. Thus, it is reasonable to infer that the "care crisis" did not start with the pandemic for Black women. In turn, white women, especially those with higher incomes, started to assume more care responsibilities with the onset of the pandemic[43].

The greater coverage of the Family Health Strategy (ESF) among the poorest populations[44] may also have impacted the quality of life during the pandemic. The ESF is a frequent gateway for COVID-19 cases and led in some cases standardized social actions in the territory to support the social distancing of its users, established routines for home delivery of medicines and team-territory communication strategies via the internet and telephone for access to information, monitoring sick people, and care continuity. It also partially maintained routine services, such as home visits[45]. However, it should be considered that the deterioration of the model compromised the ESF's ability to act during the pandemic since the 2017 National Primary Care Policy[46] and the new PHC financing model[47].

This study showed that lower income levels were more frequent among female adults living with FDOA than those living with FIOA. The high demand for time, money, and loss of opportunities in the labor market[28] are plausible explanations for the socioeconomic disadvantages of the analyzed population. On the other hand, the more significant impact of the pandemic on the income of those residing with FDOA exacerbated the disadvantages of this group. Although the variable impact of the pandemic on income was not associated with the outcome, income is a known predictor of quality of life and health, either by facilitating access to life's material needs or the possibility of obtaining adequate nutrition and housing[48]. The economic fragility of family caregivers in the pandemic has also been evidenced in international studies[11,49]. Thus, it is essential to implement policies that guarantee income security for this population, especially in health emergencies[49].

Both deteriorated SAH (in the sense of change), and the general self-perception of health was worse among women living with FDOA. This finding aligns with the literature, which attributes the causes of worse self-perceived health[50,51] to tiredness, stress, and overload of caregivers.

Worse sleep quality was a characteristic associated with deteriorated SAH in both analyzed groups, findings consistent with a study focused on the Brazilian adult population in general[40]. However, worse sleep quality was more prevalent among women residing with FDOA, which can be explained by care work overload[9] and the significant deterioration of socioeconomic and health conditions in this group.

Back problems are one of the leading causes of loss of quality of life[52]. They are strongly associated with self-perceived health[43], which explains the strong association with the outcome, evidenced in both groups. However, the prevalence of onset/deteriorated back problems was also more significant among women living with FDOA, possibly due to the increased care[9] and domestic work workload. Studies have shown that both types of work (domestic[53] and care[54]) are associated with back problems, which occur, in general, because these activities demand long working hours, often performed in inappropriate postures and with repetitive movements[55].

The bad mood during the pandemic was the characteristic most associated with the deterio-

rated SAH among women living with FDOA, besides being more prevalent among them. Because it is a subjective measure, the SAH is directly influenced by the emotional conditions of individuals[20,27]. The burden of care[8,9] and the fear of infecting a more vulnerable family member[7] are possible explanations for the worse emotional state of those living with FDOA.

Given the observed situation, the need to improve public policies that support family members living with the FDOA is evident. Camarano[34] points out intersectoral policies that could support FDOA family care, such as financial support for caregivers, the inclusion of caregivers in the social security system due to the impact of the older adult's death on household income, care qualification, and providing a formal caregiver regularly.

Study limitations must be considered. An online survey may have biased the sample, selecting those with better socioeconomic conditions, access to digital media, and higher schooling. However, the large number and weighting of the sample mitigated this limitation. Another limitation is assuming that only one respondent from each household participated in the survey. Nevertheless, the results show that the analysis was sensitive enough to point out the worst conditions in the quality of life and health of women living with FDOA during the pandemic.

Collaborations

DE Romero participated in the design, analysis, interpretation, writing and review of the manuscript. L Maia participated in the design, database curation, analysis, interpretation, writing and review of the manuscript. J Muzy participated in the curation of the database, analysis, interpretation, writing and revision of the manuscript. N Andrade participated in the design, analysis, interpretation, writing and revision of the manuscript. PRB Souza Júnior participated in the curation of the database, analysis, interpretation and revision of the manuscript.

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