

Original article

## Factors associated with health literacy among school caregivers during Covid-19: a cross-sectional study

Comportamento preventivo para COVID-19 e fatores associados ao letramento em saúde em cuidadores de escolares

*Conducta preventiva ante COVID-19 y factores asociados a la alfabetización en salud en cuidadores de escolares*

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### Abstract

**Objective:** To identify the factors associated with health literacy among school caregivers during COVID-19. **Method:** A cross-sectional study was conducted in schools in a municipality in Minas Gerais, Brazil, in 2022, with 131 school caregivers. Data collection was carried out using a form for sociodemographic and clinical characterization of the population, behavior towards COVID-19, and a health literacy instrument. Descriptive analyses and multiple logistic regression were implemented. **Results:** Caregivers with higher education (OR = 0.18 p < 0.001), who self-identified as white (OR = 3.49 p = 0.035), and who had no history of COVID-19 (OR = 0.31 p = 0.006) were more likely to have adequate health literacy. **Conclusion:** Sociodemographic factors and a personal history of SARS-CoV-2 infection are associated with health literacy among school caregivers during the COVID-19 pandemic.

**Descriptors:** Health Literacy; COVID-19; Caregivers; Primary Prevention; Behavior

### Resumo

**Objetivo:** identificar os fatores associados ao letramento em saúde de cuidadores de escolares durante a COVID-19. **Método:** estudo transversal realizado em escolas de um município mineiro, em 2022, com 131 cuidadores de escolares. Coleta de dados por meio de formulário para caracterização sociodemográfica e clínica da população, comportamento frente a COVID-19 e instrumento de letramento em saúde. Foram implementadas análises descritivas e regressão logística múltipla. **Resultados:** cuidadores com maior escolaridade (OR=0,18 p<0,001), com cor autodeclarada branca (OR=3,49 p=0,035) e sem história de COVID-19 (OR=0,31 p=0,006) tiveram mais chance de letramento em saúde adequado. **Conclusão:** fatores sociodemográficos e história pessoal de infecção pelo SarsCov2 se associam com o letramento em saúde em cuidadores escolares durante a pandemia pela COVID-19.

**Descritores:** Letramento em Saúde; COVID-19; Cuidadores; Prevenção Primária; Comportamento

## Resumen

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**Objetivo:** Identificar los factores asociados con la alfabetización en salud entre los cuidadores de escolares durante la COVID-19. **Método:** Se realizó un estudio transversal en escuelas de un municipio de Minas Gerais, Brasil, en 2022, con 131 cuidadores de escolares. La recolección de datos se realizó mediante un formulario para la caracterización sociodemográfica y clínica de la población, su comportamiento frente a la COVID-19 y un instrumento de alfabetización en salud. Se implementaron análisis descriptivos y regresión logística múltiple. **Resultados:** Los cuidadores con educación superior (OR=0,18 p<0,001), que se autoidentificaron como blancos (OR=3,49 p=0,035) y que no tenían antecedentes de COVID-19 (OR=0,31 p=0,006) presentaron mayor probabilidad de tener una alfabetización en salud adecuada. **Conclusión:** Los factores sociodemográficos y los antecedentes personales de infección por SARS-CoV-2 se asocian con la alfabetización en salud entre los cuidadores escolares durante la pandemia de COVID-19.

**Descriptor:** Alfabetización en Salud; COVID-19; Cuidadores; Prevención Primaria; Conducta

## Introduction

Brazil was one of the epicenters of the COVID-19 pandemic and recorded 7,465,806 cases and approximately 190,795 deaths between February and December 2020.<sup>1</sup> The following year, mortality declined substantially thanks to mass vaccination. By July 2021, more than 190 million doses of COVID-19 vaccines had been administered, and more than 80 % of the target population had received the first dose.<sup>2</sup>

The World Health Organization declared the end of the public health emergency of international concern on May 5, 2023. However, it reinforced that COVID-19 remains prevalent globally, making preventive measures against the disease essential, whether related to vaccination, surveillance, or people's behavior.<sup>3</sup>

Regarding preventive behavior, even though the signs and symptoms of COVID-19 have been widely disseminated and socialized to the general population, it is necessary to maintain active behaviors that minimize and control the persistence of the disease.<sup>3</sup> A systematic review evaluated the effectiveness of mask use in preventing COVID-19 and concluded that this practice reduces the risk of contracting the virus by about 49 % when it is a surgical mask and up to 69 % when the mask is of the N95 type.<sup>4</sup> In fact, American research has obtained evidence that lower infection and mortality rates from COVID-19 were related to social distancing, showing the importance of preventive behavior regarding the disease.<sup>5</sup>

Despite the general knowledge of the relevance of adopting preventive measures, such as vaccination, mask use, hand hygiene, and social distancing,

actions such as vaccine hesitancy and disruption of behavioral measures are still common.<sup>6-8</sup> Different factors have been described for this scenario, such as the level of genuine and well-founded knowledge of people about the disease and the presence of comorbidities.<sup>9-10</sup> Another essential aspect for outlining health behavior, but still little explored in the context of COVID-19, is health literacy. This is understood as a series of cognitive and social skills and competencies necessary for the individual to encourage them to understand and use information to promote health.<sup>11</sup>

Investigations into this topic are relevant, given that the disease can cause pediatric multisystem inflammatory syndrome (MIS), a serious illness that progresses in infected patients in pediatric health centers.<sup>12</sup> Researchers who followed the evolution of patients infected with the virus in pediatric health centers in the United States found a large number of children and adolescents who developed multisystem inflammatory syndrome, similar to Kawasaki disease, after being exposed to COVID-19.<sup>12</sup> These findings demonstrate the importance and urgency of producing more research that investigates the impact of COVID-19 on this population, and not only on adults.

The objective of this investigation is to identify the factors associated with the health literacy of school caregivers during COVID-19.

## **Method**

This is a cross-sectional study that used the Strengthening Reporting of Observational Studies in Epidemiology Statement (STROBE) recommendations as a guideline for the presentation and writing of the research.<sup>13</sup>

The research setting involved six public elementary schools in a municipality in the Central-West region of Minas Gerais, whose principals gave their consent for the development of the study. The eligible population consisted of 680 schoolchildren, aged six to 10 years,<sup>14</sup> and their caregivers. The inclusion criterion was caregivers of the children who were duly enrolled in the schools. Those who were not directly responsible for the child's care were excluded. A total of 131 caregivers and children who voluntarily attended on the scheduled day for data

collection participated, constituting a non-probabilistic sample. Initially, an explanation of the project was given and, with their agreement, the participants signed the Informed Consent Forms.

Although no pilot test was conducted, data were collected by researchers previously trained in the instruments and logistics of the activity, from April to September 2022. A printed form with 40 questions about demographic data, clinical history, and preventive behavior regarding COVID-19 was used, along with an instrument for assessing health literacy, called the Short Assessment of Health Literacy for Portuguese-speaking Adults (SAHLPA-18), which includes 18 health-related terms.<sup>15</sup> The caregiver had to select, from two alternatives, which word was associated with each term. Each correct answer was evaluated as one point.

Outcome variable: adequate health literacy, defined by the SAHLPA-18 score. Scores equal to or less than 14 were considered low health literacy.

Explanatory variables: Caregiver's gender (male, female); Caregiver's education level (up to elementary school, from high school to higher education); Marital status (single or married); Skin color of the caregiver (white, non-white); Previous history of illness in the child (none, respiratory diseases, and others); Previous history of COVID-19 in the child, i.e., whether or not they were previously infected by Sars-CoV-2 (no, yes); Previous history of COVID-19 in the caregiver (no, yes); Caregiver's concern about contracting COVID-19 (no, yes, don't know); Caregiver's perception of the risk of contracting COVID-19 (no risk, risk exists).

The database was built in Google Sheets spreadsheets and later transferred to the Statistical Package for Social Science for Windows (SPSS) version 20.0. Consistency, descriptive, and multivariate logistic regression model analyses were implemented.

Absolute and percentage distributions for categorical variables were presented. The caregiver's age variable, after being subjected to the Shapiro-Wilk test, showed asymmetry; therefore, it is presented as a median in quartiles. The association between adequate health literacy and the explanatory variables was determined through bivariate analysis using Pearson's chi-square test ( $X^2$ ) or Fisher's exact test in the presence of at least one expected frequency less than five,

and the results were expressed as crude odds ratio (OR<sub>b</sub>) and 95 % confidence interval (CI). For the caregiver's age variable, the Mann-Whitney test was applied. Variables with an association at the 20 % level ( $p < 0.200$ ) in the bivariate analysis were included in the multivariate model using the backward method in multiple logistic regression (MLR). Variables that did not show significance ( $p \geq 0.05$ ) were removed from the model one by one. This procedure was repeated until all variables present in the final model showed statistical significance ( $p < 0.05$ ). To verify the fit of the final model, the Hosmer-Lemeshow test was used. The adjusted odds ratio (OR<sub>a</sub>) with 95 % CI was calculated as a measure of effect. For all analyses, a significance value of 5 % ( $p < 0.05$ ) was adopted.

The caregivers signed the Informed Consent Form and the project was approved by the Research Ethics Committee of the Federal University of São João del Rei, Centro Oeste Dona Lindu campus, according to opinion number 5,954,038 and the ethical precepts contained in Resolution 466/2012 of the National Health Council.

## **Results**

Among the study participants, the majority were female; with a median age of 35 (Q1 = 30, Q3 = 41); had education ranging from high school to higher education; were married; self-identified as non-white; had never been infected with COVID-19; were concerned about the chance of contracting COVID-19 and considered that there was a risk of contracting COVID-19. Among the participants, 47 (35.8 %) had inadequate health literacy. Regarding the schoolchildren, most also had no history of previous illness and had never been infected with COVID-19. (Table 1).

**Table 1** – Sociodemographic, clinical, and preventive behavior characteristics regarding COVID-19 in caregivers and schoolchildren from schools in the municipality of Central-West Minas Gerais, 2022

<b>Variables</b>	<b>n (%)</b>
<b>Caregiver's age</b>	35 (30-41)*
<b>Caregiver's gender n = 124</b>	
Male	13 (10.5)
Female	111 (89.5)
<b>Caregiver's education level n = 123</b>	
Up to Elementary School	60 (48.4)
From High School to Higher Education	63 (51.6)
<b>Caregiver's marital status n = 128</b>	
Single	47 (36.7)
Married	81 (63.2)
<b>Caregiver's skin color n = 129</b>	
White	37 (28.2)
Non-white	92 (71.8)
<b>Child's history of illness n = 131</b>	
None	116 (88.5)
Respiratory and other diseases	15 (11.5)
<b>Child's history of COVID-19 n = 122</b>	
No	107 (87.7)
Yes	15 (12.3)
<b>Caregiver's history of COVID-19 n = 122</b>	
No	81 (66.4)
Yes	41 (33.6)
<b>Caregiver's concern about contracting COVID-19 n = 129</b>	
No	28 (22.9)
Yes	101 (77.1)
<b>Caregiver's perception of the risk of contracting COVID-19 n = 131</b>	
No risk	18 (13.7)
Risk exists	113 (86.3)
<b>Health Literacy n = 131</b>	
Adequate	47 (35.8)
Inadequate	84 (64.2)

\*Median (Q1 and Q3)

When assessing the association between adequate health literacy and associated factors (Table 2), the study revealed that caregivers with education up to elementary school had only 43.3 % adequate literacy, while those with high school or higher education had a higher proportion of 81 %. Bivariate analysis showed an odds ratio (OR) of 0.18 ( $p < 0.001$ ), and multivariate analysis maintained this value (OR = 0.18,  $p < 0.001$ ). These results indicate that caregivers with low education are 82 % less likely to have adequate health literacy compared to those with high education.

In addition to education, the skin color of caregivers also proved to be a relevant factor. Caregivers with white skin color had a higher proportion of adequate literacy, reaching 78.4 %, compared to those with non-white skin color, who had 51.1 %. Bivariate analysis revealed an OR of 3.46 ( $p = 0.005$ ), and in multivariate analysis the adjusted OR was 3.49 ( $p = 0.035$ ). These data suggest that white caregivers are 3.49 times more likely to have adequate health literacy compared to non-white caregivers.

Finally, caregivers' prior diagnosis of COVID-19 also influenced health literacy levels. Caregivers who had previously had COVID-19 had a lower proportion of adequate literacy, at 49.4 %, compared to those who did not, who reached 75.6 %. Bivariate analysis showed an OR of 0.31 ( $p = 0.006$ ), which adjusted to 0.28 ( $p = 0.017$ ) in multivariate analysis.

Thus, education, skin color, and history of COVID-19 emerge as significant factors that were statistically associated with health literacy among caregivers, regardless of other variables considered.

**Table 2** – Factors associated with adequate health literacy among school caregivers in a municipality in the Central-West region of Minas Gerais, in the year 2022

Variables	Health Literacy		Bivariate analysis		Multivariate analysis	
	Adequate	Inadequate	OR <sup>b</sup> (95 % CI)	p-value	OR <sup>a</sup> (95 % CI)	p-value
	n (%)	n (%)				
Median age of caregiver	36 (32-42)	33(28-41)	0.98 (0.93-1.03)	0.437		
<b>Caregiver's gender</b>						
Male	6 (46.2)	7 (53.8)	0.48 (0.15-1.53)	0.230		
Female	71 (68.9)	40 (42.1)	1			
<b>Education level of caregiver</b>						
Up to Elementary School	26 (43.3)	34 (56.7)	0.18 (0.08-0.04)	< <b>0.001</b>	0.18 (0.06-0.49)	< <b>0.001</b>
High School to Higher Education	51 (81.0)	12 (19.0)	1		1	
<b>Marital status of caregiver</b>						
Single	24 (51.1)	23 (48.9)	0.58 (0.28-1.20)	0.145	0.86 (0.32-2.30)	0.775

Married	52 (64.2)	29 (35.8)	1		1	
<b>Skin color of caregiver</b>						
White	29 (78.4)	8 (21.6)	3.46(1.43-8.40)	<b>0.005</b>	3.49 (1.09-11.17)	<b>0.035</b>
Non-white	46 (51.1)	44 (48.9)	1		1	
<b>Previous history of illness in the child</b>						
None	58 (61.7)	36 (38.3)	0.87(0.29-2.58)	0.814		
Respiratory and other illnesses	1 (64.7)	6 (35.3)	1			
<b>Previous history of COVID-19 in the child</b>						
No	60 (56.1)	47 (43.9)	0.63 (0.20-1.99)	0.437		
Yes	10 (66.7)	5 (33.3)	1			
<b>Previous history of COVID-19 in the caregiver</b>						
No	40 (49.4)	41 (50.6)	0.31 (0.13-0.72)	<b>0.006</b>	0.28 (0.10-0.80)	<b>0.017</b>
Yes	31 (75.6)	10 (24.4)	1		1	
<b>Caregiver's concern about contracting COVID-19</b>						
No	16 (62.7)	6 (27.3)	2.05(0.74-5.69)	0.159	1.23 (0.31-4.80)	0.764
Yes	57 (56.4)	44 (43.6)	1		1	
<b>Caregiver's perception of the risk of contracting COVID-19</b>						
No risk	2 (33.3)	4 (66.7)	0.28(0.05-1.62)	0.198	0.31 (0.03-3.26)	0.335
Risk exists	72 (63.7)	41 (36.3)	1		1	

## Discussion

This investigation showed a statistically significant association between health literacy and education level, skin color, and history of COVID-19 infection among caregivers.

A study conducted with 129 adult patients from a reference hospital for kidney transplants in the state of Goiás corroborates the findings by identifying that the highest prevalence of low health literacy was found in individuals with low

socioeconomic status and low education levels.<sup>16</sup> Education is a strongly linked aspect to health literacy, as in this context it reflects access to relevant health information and the ability to assimilate and put this knowledge into practice.<sup>16</sup>

A survey conducted in the Public Health System, within the scope of Primary Health Care, evaluated adults aged 20 to 59 years and confirmed the findings of this investigation. Inadequate health literacy was more prevalent in individuals with lower levels of education, and with primary, and secondary education, when compared to those with higher education.<sup>17</sup>

A study that observed patients with coronary artery disease in a hospital in the city of São Paulo, analyzed the health literacy of these patients, and its results corroborate the findings presented here by showing that specific knowledge about the disease did not influence the health literacy of the patients observed, and the rate of inadequate literacy among them reached 41.8 %.<sup>18</sup>

In the present investigation, patients with a history of COVID-19 infection were 1.31 times more likely to have inadequate literacy than those who had never been infected. This finding may indicate that having a disease does not necessarily imply improving literacy about the condition. A study evaluated the health literacy of patients with chronic diseases in primary health care and showed that the construction of health knowledge is complex and involves interpersonal relationships, mediated by health professionals through bonding and communication.<sup>19</sup> Although these aspects were not evaluated in our study, it is imperative to reflect on them.

Still within the scope of COVID-19, a study conducted in Thailand with child caregivers at a child development center showed a high level of health literacy (mean = 58.74, SD = 5.57), as well as high levels of parental behavior in disease prevention (mean = 37.31, SD = 3.76). A statistically significant association was also found between health literacy and behaviors in COVID-19 prevention ( $r = 0.403$ ,  $p = 0.000$ ).<sup>20</sup>

In the present study, a high level of inadequate health literacy was found. This finding is relevant because the literature indicates that individuals at higher risk of having low health literacy are those with low income, immigrants, ethnic-racial minorities, the elderly, people with comorbidities, and people with disabilities. Therefore, these are vulnerable groups that require greater health care, and also because they have lifestyle habits that can cause harm.<sup>21</sup>

Even with the robust contributions of this article in pointing out the relevance of controlling sensitive social issues to adjust the equity of access to information and treatments offered, limitations are highlighted. The Salpha Scale 18,<sup>15</sup> although widely used in adult populations,<sup>17,22</sup> was validated with the elderly, increasing the risk of bias.

It is also important to highlight the value of understanding that, if it is not possible to modify the literacy conditions of a population, even due to the peculiar social contexts of each community that contribute to shaping literacy levels, it is necessary to think about strategies for equitable access to information for all people in order to preserve the health of the population in general.

## Conclusion

Adequate health literacy among caregivers of schoolchildren was associated with higher education, white skin color, and no history of COVID-19 infection.

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