

# Sleep quality is associated with sociodemographic and clinical determinants in users attended in Primary Health Care during the COVID-19 pandemic

A qualidade do sono está associada a determinantes sociodemográficos e clínicos em usuários acompanhados na Atenção Primária à Saúde durante a pandemia de COVID-19

*La calidad del sueño se asocia con determinantes sociodemográficos y clínicos en usuarios monitoreados en Atención Primaria de Salud durante la pandemia de COVID-19*

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## Abstract

**Introduction:** The advancement of the COVID-19 pandemic has resulted in changes in the sleep patterns of the population. Sleep disorders are related to major mental health changes and are also associated with psychosocial factors. **Objective:** To estimate the prevalence and factors associated with sleep quality changes among users attended in Primary Health Care during the COVID-19 pandemic. **Methods:** This was a cross-sectional study involving adults (age >18 years) of both genders who were being followed at a healthcare unit. Information was gathered from the unit's electronic medical records, and during home visits (between August and September 2021), socioeconomic data, risk factors, vital signs, anthropometric variables, lifestyle habits, current medication use, healthcare service utilization, hospitalization, and consultations in the past year were collected. Quality of life was assessed using the SF-36 questionnaire, and the Pittsburgh Sleep Quality Index (PSQI) was used to evaluate sleep quality. **Results:** The sample consisted predominantly of women (82.9%) with a mean age of 60.5±11.7 years, of white ethnicity (70.7%), with a partner (61%), and belonging to class C (65.8%). 53.7% of the sample had up to two comorbidities, 87.8% were overweight/obese, and 80% were using antihypertensive medication. The prevalence of poor sleep quality was 87.8% (95%CI 73.1–95.0). The findings indicate a relationship between poor sleep quality and alcohol consumption, the presence of ≥3 comorbidities, systolic blood pressure levels, use of anxiolytics, education level, and the use of healthcare services during the pandemic. **Conclusions:** The high prevalence of poor sleep quality in the study sample suggests that sociodemographic determinants, presence of comorbidities, and lifestyle habits should be considered to minimize the effects of sleep disturbances during the pandemic.

Keywords: Primary health care; Sleep quality; COVID-19; Risk factors.

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## Resumo

**Introdução:** O avanço da pandemia de COVID-19 acarretou alterações no sono da população. Os distúrbios do sono têm relação com as principais alterações de saúde mental e também possuem relação com os fatores psicossociais. **Objetivo:** Estimar a prevalência e fatores associados às alterações na qualidade do sono em usuários acompanhados na Atenção Primária à Saúde durante a pandemia de COVID-19. **Métodos:** Estudo do tipo transversal, com adultos (idade >18 anos) de ambos os gêneros, acompanhados por uma unidade de saúde. Foram levantadas as informações do prontuário eletrônico da unidade e, durante a visita domiciliar (entre agosto e setembro de 2021), os dados socioeconômicos, fatores de risco, sinais vitais, variáveis antropométricas, hábitos de vida, medicações em uso, uso dos serviços de saúde, internação e consultas no último ano. A qualidade de vida foi avaliada pelo questionário SF-36 e foi usado o Índice de Qualidade do sono Pittsburgh (PSQI). **Resultados:** A amostra foi formada predominantemente por mulheres (82,9%) com 60,5±11,7 anos de idade, da cor branca (70,7%), com companheiro (61%) e pertencentes à classe C (65,8%). 53,7% da amostra apresentou até duas comorbidades, 87,8% apresentavam sobrepeso/obesidade e 80% faziam uso de anti-hipertensivo. A prevalência de qualidade do sono ruim foi de 87,8% (IC95% 73,1–95,0). Os achados apontam para uma relação entre má qualidade do sono com consumo de álcool, presença de ≥3 comorbidades, níveis de PAS, uso de ansiolíticos, nível de escolaridade e uso de serviços de saúde durante a pandemia. **Conclusões:** A alta prevalência de qualidade do sono ruim na amostra estudada sugere que determinantes sociodemográficos, presença de comorbidades e hábitos de vida devem ser considerados para minimizar os efeitos das alterações do sono na pandemia.

Palavras-chave: Atenção primária à saúde; Qualidade do sono; COVID-19, Fatores de risco.

## Resumen

**Introducción:** El avance de la pandemia de COVID-19 ha ocasionado cambios en el sueño de la población. Los trastornos del sueño están relacionados con los principales cambios en la salud mental y también se asocian con factores psicossociales. **Objetivo:** Estimar la prevalencia y los factores asociados con alteraciones en la calidad del sueño en usuarios atendidos en la Atención Primaria de Salud durante la pandemia de COVID-19. **Métodos:** Estudio transversal con adultos (edad >18 años) de ambos géneros que son atendidos en una unidad de salud. Se recopiló datos del historial clínico electrónico de la unidad y durante la visita domiciliar (entre agosto y septiembre de 2021) se obtuvieron datos socioeconómicos, factores de riesgo, signos vitales, variables antropométricas, hábitos de vida, medicamentos utilizados, uso de servicios de salud, hospitalización y consultas en el último año. La calidad de vida se evaluó mediante el cuestionario SF-36 y se utilizó el Índice de Calidad del Sueño de Pittsburgh (PSQI). **Resultados:** La muestra estuvo compuesta predominantemente por mujeres (82,9%) con una edad de 60,5±11,7 años, de raza blanca (70,7%), con pareja (61%) y pertenecientes a la clase C (65,8%). El 53,7% de la muestra presentó hasta dos comorbilidades, el 87,8% tenían sobrepeso/obesidad y el 80% utilizaba medicación antihipertensiva. La prevalencia de mala calidad del sueño fue del 87,8% (IC95% 73,1–95,0). Los hallazgos señalan una relación entre la mala calidad del sueño y el consumo de alcohol, la presencia de ≥3 comorbilidades, los niveles de presión arterial sistólica (PAS), el uso de ansiolíticos, el nivel de escolaridad y el uso de servicios de salud durante la pandemia. **Conclusiones:** La alta prevalencia de mala calidad del sueño en la muestra estudiada sugiere que se deben considerar los determinantes sociodemográficos, la presencia de comorbilidades y los hábitos de vida para minimizar los efectos de los trastornos del sueño en la pandemia.

Palabras clave: Atención primaria de salud; Calidad del sueño; COVID-19; Factores de riesgo.

## INTRODUCTION

Sleep is crucial for maintaining physical and mental health, as it enables the body to recover, consolidate memories, and regulate emotions, all of which contribute to improved performance and overall well-being. Healthy sleep has beneficial effects on immune function, metabolism, and hormonal regulation.<sup>1,2</sup> Conversely, changes in sleep quality have been linked to various risk factors and chronic conditions, affecting emotional, physical, and health perceptions. Additionally, a study of over 45,000 Brazilians found that 43.5% reported the onset of sleep problems, and 48.0% experienced a worsening of pre-existing sleep issues during the COVID-19 pandemic.<sup>3</sup>

In the last decade, research has highlighted the importance of the glymphatic system, which is crucial for the proper functioning of nervous tissue — during slow-wave sleep. This system plays a key role in detoxifying the nervous system and clearing metabolites produced during wakefulness. The processing begins when light is detected by the retina, which sends information through ganglion cells to the suprachiasmatic nucleus in the hypothalamus. This nucleus regulates the circadian rhythm,<sup>4</sup>

emitting signals that control behavior, physiology, and metabolism. Essentially, it generates rhythmic and light-synchronized information that governs hormone secretion, temperature regulation, and the duration of the sleep-wake cycle.<sup>5</sup>

As the COVID-19 pandemic progressed, the scientific community focused on addressing the acute aspects of the situation and combating the disease biologically.<sup>6</sup> However, despite the period of great uncertainty, there was a notable increase in research centered on improving people's quality of life.

A systematic review and meta-analysis assessed the prevalence of sleep problems during COVID-19 and found an overall rate of 35.7%. These difficulties, which have been exacerbated by the pandemic and associated anxiety about the global situation, should not be overlooked due to their potential serious consequences.<sup>7</sup>

Several factors are identified as contributing to increased sleep problems, including the presence of non-communicable chronic diseases (NCDs). These diseases are highly prevalent in our population and are associated with increased life expectancy. Additionally, NCDs are among the conditions that most demand health interventions, procedures, and services, leading to the highest public health expenditures in Brazil and worldwide.<sup>8,9</sup>

Other risk factors, such as behavioral habits, alcohol consumption, and smoking, also contribute to health problems and negatively impact sleep quality. As a result, individuals with impaired sleep quality are likely to experience more associated morbidities and have a shorter life expectancy.<sup>10</sup>

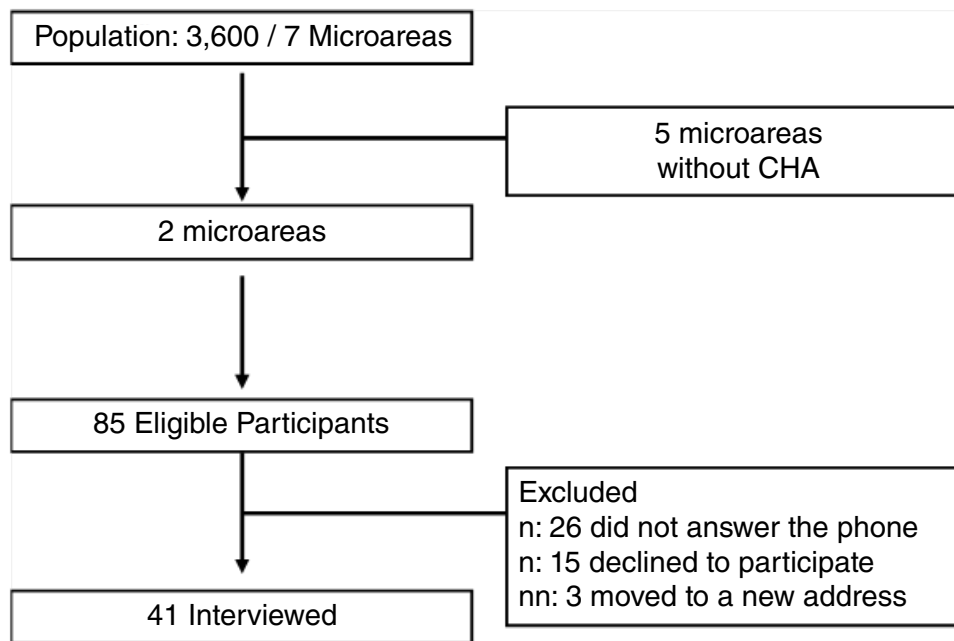
The objective of this research was to estimate the prevalence of changes in sleep quality and identify the factors related to these changes among users monitored in Primary Health Care during the COVID-19 pandemic.

## METHODS

This research is a cross-sectional study with convenience sampling. The study population consisted of adult patients (age >18 years) of both genders, who were followed by the Family Health Strategy — FHS/UBS Cohab Duque, in São Leopoldo (Rio Grande do Sul – RS). The research was approved by the Research Ethics Committee of Universidade do Vale do Rio dos Sinos — UNISINOS under approval No. 4.848.910 —, CAAE 48257221.0.0000.5344. Ethical considerations were ensured through an Informed Consent, issued in two copies and signed by both the responsible researcher and the voluntary participant.

The study included users with preserved cognitive status, residents of the assigned region, and those who had active contact with the health unit in the past year. The following individuals were excluded from the sample: those with difficulty understanding and signing the Informed Consent, those who refused to participate, and those who could not be contacted by telephone or Community Health Agents (CHA). To determine the sample size, a population study was referenced,<sup>11</sup> which identified a prevalence of 33.3% of poor sleep quality (PSQI  $\geq 5$  points). The Family Health Strategy — FHS/UBS Cohab Duque had approximately 3,600 registered and monitored individuals. With a power of 80% and a confidence level of 95%, the sample size was calculated to be 22 participants.

Of the seven micro-areas within the territory covered by the UBS, only two were actively covered by CHA. Consequently, a draw was conducted within these two micro-areas to invite users over 18 years of age to participate in the study. Home assessments were scheduled by telephone from August to September 2021. Due to the pandemic, personal protective equipment was used in accordance with health agency guidelines. In the two micro-areas with CHA coverage, 85 eligible subjects were contacted. Figure 1 illustrates the participant recruitment flow for the study.



CHA: Community Health Agents.

**Figure 1.** Flowchart for study participant enrollment.

The data collection instruments included reviewing medical records at FHS Cohab Duque to record participants' contact telephone numbers and additional information. During the home visit, the socioeconomic variables were collected, specifically economic class (according to the Brazilian Association of Research Companies [Associação Brasileira de Empresas de Pesquisa – ABEP]: A/B, C, and D/E). This classification considered the education level of the head of the household, ownership of certain material goods, and the number of domestic employees.<sup>12</sup>

The demographic variables collected were: age (in years), gender (male or female), marital status (with partner/without partner), and self-declared race/ethnicity (white, black, brown, or indigenous). Additionally, behavioral and health variables were collected, including: active smoking (smoking YES/NO), alcohol consumption (defined as using alcohol more than once a week in the last three months), body mass index (BMI), comorbidities, use of anxiolytics, use of antidepressants, use of emergency services during the pandemic, use of health insurance, hospital admissions in the past year, and the number of consultations during the pandemic.

Self-reported body weight (kg) and height (m) were used to calculate BMI (kg/m<sup>2</sup>) using the formula  $BMI = W/H^2$  — where W=body weight (kg) and H=height (m). According to the WHO, BMI classifications were as follows: “underweight” was defined as a BMI less than 18.5 kg/m<sup>2</sup>, “overweight” was defined as a BMI between 25.0 and 29.9 kg/m<sup>2</sup>, and “obese” was defined as a BMI greater than 30 kg/m<sup>2</sup>.<sup>13</sup> Additionally, blood pressure was measured during a home visit. Participants were asked to sit on a chair with their feet flat on the floor, arms positioned at heart level with palms facing up. They were instructed to remain at rest for five minutes before measurement, and the cuff was positioned two centimeters above the cubital fossa, following standard measurement techniques.<sup>14</sup>

The assessment of quality of life (QoL) utilized The Medical Study 36-item Short- Form Health Survey (SF-36), a widely used and validated instrument in Brazil.<sup>13</sup> This questionnaire consists of thirty-six

questions divided into eight domains: functional capacity, physical aspects, pain, general health status, vitality, social aspects, emotional aspects, mental health, and a comparative assessment of current health conditions *versus* the previous year. Each question is scored and then transformed into a scale from 0 to 100, where 0 represents the “worst health status” and 100 represents the “best health status.” The scores for all domains were categorized into two groups: “low” ( $\leq 50$  points) and “high” ( $> 50$  points).

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), which has been translated and validated in Brazil.<sup>14</sup> PSQI evaluates sleep quality and disturbances over the past month through nineteen questions divided into seven components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disorders, medication use, and daytime dysfunction. The scores for these components range from 0 to 21. A total score of “ $< 5$  points” indicates good sleep quality, while a total score of “ $\geq 5$  points” indicates poor sleep quality.<sup>14</sup>

For statistical analysis, data were tabulated using SPSS, version 21.0 (SPSS Inc., Chicago, USA), and analyses were conducted with Stata, version 14.0 (StataCorp, College Station, TX, USA). The Shapiro-Wilk normality test was used to analyze the distribution of data. Descriptive variables were presented as means and standard deviations, while categorical variables were presented as absolute numbers and percentages. To test the strength of association between continuous variables, either the Pearson or Spearman correlation test was used, as appropriate. The chi-square test was employed to analyze differences in frequencies of categorical variables related to the dependent variable, and simple linear regression analysis was conducted, with statistical significance set at 5% ( $p < 0.05$ ).

## RESULTS

The results indicated that the prevalence of poor sleep quality was 87.8% (95% CI 73.1–95.0). The mean age of the sample was 60.5 ( $\pm 11.7$ ) years, with the majority being women (82.9%), white (70.7%), with a partner (61.0%), and belonging to economic class C (65.8%). Regarding behaviors, most individuals were not active smokers (75.6%), and just over half consumed alcohol (51.2%).

Regarding health conditions, most individuals were classified as obese (56.1%), had 1 or 2 comorbidities (53.7%), used antihypertensive medication (80.5%), and did not use anxiolytics (92.7%) or antidepressants (73.2%). The mean systolic blood pressure (SBP) was 137.2 ( $\pm 21.1$ ) mmHg, and the mean diastolic blood pressure (DBP) was 94.7 ( $\pm 16.6$ ), as shown in Table 1.

Regarding the use of the health system, 9.8% of the sample reported having health insurance, 26.8% indicated that they had used emergency services during the pandemic, and 12.2% reported hospitalization in the past year. Additionally, 34.1% of the sample reported having at least three consultations during the pandemic (Table 1).

The findings of our study reveal a relationship between risk factors for chronic diseases, medication use, and worsening sleep quality. Simple linear regression analysis showed an average reduction of 3.55 points on the sleep scale for individuals who consumed alcoholic beverages compared to those who did not. Regarding health conditions, individuals with three or more comorbidities had an average increase of 6.94 points in the PSQI compared to those without comorbidities (Table 1). Additionally, a 1 mmHg increase in SBP was associated with an average increase of 0.08 points on the sleep scale. Furthermore, individuals who used anxiolytics had an average increase of 5.27 points in the PSQI compared to those who did not use these medications (Table 1).

**Table 1.** Distribution of the sample and simple linear regression of the Pittsburgh Sleep Quality Index score according to sociodemographic, economic, behavioral, and health variables of primary care users. São Leopoldo (RS), Brazil, 2021 (n=41).

Characteristics	Mean (SD) n (%)	Coefficient (95%CI)	p-value
Sociodemographic and Economic			
Gender			
Male	7 (17.1)	0	0.097
Female	34 (82.9)	3.01 (-0.57; 6.59)	
Age (years)	60.5 (11.7)	0.06 (-0.05; 0.18)	0.238
Race			
White	29 (70.7)	0	0.839
Non-White	12 (29.3)	0.31 (-2.75; 3.38)	
Economic Class			
A/B	7 (17.1)	0	0.236
C	27 (65.8)	-1.25 (-4.95; 2.45)	
D/E	7 (17.1)	1.86 (-2.80; 6.52)	
Marital Status			
With partner	25 (61.0)	0	0.856
Without partner	16 (39.0)	0.26 (-2.60; 3.12)	
Behavioral			
Active Smoking			
No	31 (75.6)	0	0.255
Yes	10 (24.4)	-1.83 (-5.02; 1.37)	
Alcohol Consumption			
No	20 (48.8)	0	<0.05
Yes	21 (51.2)	-3.55 (-6.10; 1.01)	
Health Conditions			
BMI			
Normal	5 (12.2)	0	0.236
Overweight	13 (31.7)	2.89 (-1.70; 7.48)	
Obesity	23 (56.1)	3.68 (-0.63; 7.98)	
Comorbidities			
Without comorbidities	3 (7.3)	0	<0.05
1 or 2 comorbidities	22 (53.7)	3.86 (-1.09; 8.81)	
≥3 comorbidities	16 (39.0)	6.94 (1.87; 12.00)	
SBP (in mmHg)	137.2 (21.1)	0.08 (0.02; 0.14)	<0.05
DBP (in mmHg)	94.7 (16.6)	-0.01 (-0.09; 0.08)	0.919
Use of Anxiolytics			
No	38 (92.7)	0	<0.05
Yes	3 (7.3)	5.27 (0.19; 10.4)	
Use of Antidepressants			
No	30 (73.2)	0	0.139
Yes	11 (26.8)	2.29 (-0.77; 5.35)	

It continues.

**Table 1.** Continuation.

Characteristics	Mean (SD) n (%)	Coefficient (95%CI)	p-value
Use of Emergency Services			
No	30 (73.2)	0	0.057
Yes	11 (26.8)	2.91 (-0.10; 5.91)	
Hospitalization in the last year			
No	36 (87.8)	0	0.923
Yes	5 (12.2)	-0.21 (-4.47; 4.06)	
Health insurance			
No	37 (90.2)	0	0.290
Yes	4 (9.8)	2.46 (-2.18; 7.09)	
Consultations during the pandemic			
0 consultations	8 (19.5)	0	0.517
1 consultation	11 (26.8)	0.53 (-3.61; 4.68)	
2 consultations	8 (19.5)	2.63 (-1.83; 7.08)	
≥3 consultations	14 (34.2)	2.20 (-1.75; 6.15)	

SD: standard deviation; CI: confidence interval; BMI: body mass index; SBP: systolic blood pressure; DBP: diastolic blood pressure.

In the bivariate analysis, the PSQI score showed a significant “positive and moderate” association with SBP levels and a “negative and moderate” association with the domains of functional capacity, limitations due to physical aspects, pain, vitality, and mental health in the QoL questionnaire (Table 2).

**Table 2.** Correlation coefficient between the Pittsburgh Sleep Quality Index score and age, health variables, and domains of the SF-36 quality of life questionnaire for primary care users. São Leopoldo (RS), Brazil, 2021 (n=41).

Characteristics	r*	p-value
Age	0.172*	0.283
BMI	0.103*	0.524
SBP	0.400*	0.010
DBP	-0.016*	0.919
SF-36		
Functional capacity	-0.505*	0.001
Limitations due to physical aspects	-0.477†	0.002
Pain	-0.424†	0.006
Overall health status	-0.299*	0.058
Vitality	-0.435*	0.005
Social aspects	-0.080†	0.619
Limitations due to emotional aspects	-0.215†	0.178
Mental health	-0.326*	0.038

\*Pearson correlation; †Spearman correlation.

BMI: body mass index; SBP: systolic blood pressure; DBP: diastolic blood pressure.

Significant associations were also found between the classification of sleep quality (good/poor) and factors such as: level of education ( $\chi^2(5)=11.694$ ,  $p<0.039$ ;  $f=0.534$ ), presence of Hypertension ( $\chi^2(1)=7.601$ ,  $p<0.006$ ), and use of emergency services ( $\chi^2(1)=4.228$ ,  $p=0.040$ ) (Table 3).



**Table 3.** Distribution of frequencies for education levels, presence of hypertension, and use of emergency services during the pandemic in relation to sleep quality among primary care users. São Leopoldo (RS), Brazil, 2021 (n=41).

	Sleep quality		$\chi^2$ (df)
	Good	Poor	
Education Level			
Illiterate	0	2	11.694 (5)*
Incomplete Elementary Education	1	13	
Complete Elementary Education	2	11	
Incomplete High School	1	0	
Complete High School	4	6	
Incomplete Higher Education	1	0	
Hypertension			
Yes	4	28	7.601 (1)†
No	5	4	
Use of emergency services			
Yes	0	11	4.228 (1)†
No	9	21	

\*p=0.039; †p&lt;0.05.

 $\chi^2$ : chi-square; df: degrees of freedom.

## DISCUSSION

In the present study, a high prevalence of poor sleep quality (87.8%) was identified in the analyzed sample. Additionally, the sample's characteristics reflect the broader health scenario, with a high prevalence of NCDs — such as hypertension and obesity — and the presence of multiple comorbidities in over 90% of the sample.

The prevalence found in this study is higher than that reported in other investigations. For example, a systematic review that included ten studies reported a combined prevalence of 34% for sleep disorders during the pandemic.<sup>15</sup> Another Brazilian cross-sectional study, conducted using a virtual questionnaire, found that 48.0% of adults experienced issues related to pre-existing poor sleep, with 43.5% reporting that these problems began during the COVID-19 pandemic.<sup>6</sup> Additionally, a separate Brazilian study indicated that 56% of respondents reported changes in sleep hours, with 31% sleeping fewer hours than usual.<sup>16</sup> In comparison, research conducted before the pandemic — such as the population-based study by Barros et al., which found a 29.1% prevalence of poor sleep based on self-assessment —, shows lower prevalence rates than those observed during the pandemic.<sup>17</sup>

Several factors may have contributed to the worsening of sleep quality,<sup>7,18</sup> including: fear of contracting the disease; exposure to a significant amount of distressing news; anxiety affecting emotional health; and social distancing, which can impact various aspects of life such as work, family income, and social relationships.

This study demonstrated a “positive and moderate” association between age and sleep quality classification. Similarly, the population-based study mentioned also found this association, with poor sleep affecting 29.1% of individuals aged 20 years old or older. The latter study also noted that poor sleep is significantly more prevalent among females, those who are not physically active, and individuals who rate their own health as poor.<sup>17</sup>

Another result observed was that an increase in SBP was associated with a higher PSQI score, indicating poorer sleep quality, as well as with the presence of hypertension. Data from the National Health



Survey (*Pesquisa Nacional de Saúde – PNS*) also revealed an association between high blood pressure and sleep problems occurring on more than half of the days, affecting both men and women.<sup>19</sup>

Notably, sleep disorders impact patients with hypertension, who are at a higher risk and worse prognosis for cardiovascular outcomes.<sup>20</sup> Evidence in the literature suggests that adequate nighttime rest is crucial, as disruptions in homeostasis during this period are closely associated with sleep.<sup>21,22</sup>

In the present research, the presence of comorbidities was related to sleep quality. Similarly, another population-based study found higher prevalences of poor sleep among individuals with a greater number of chronic diseases.<sup>18</sup> These findings underscore the importance of screening patients with multiple comorbidities and addressing the impact of these conditions on their sleep quality.

This study found that individuals who consume alcohol had lower PSQI scores. However, the literature does not yet provide a clear understanding of the relationship between alcohol and sleep disorders. A systematic review with meta-analysis found that general alcohol consumption is associated with the incidence of sleep disorders, but no specific link was established with the abusive use of alcohol.<sup>23</sup>

In a pre-pandemic investigation involving adults, a clear association was found between lower levels of education and a higher prevalence of sleep disorders. This parameter is related to socioeconomic factors and working conditions, which also impact sleep quality.<sup>24</sup> It is important to note that during the COVID-19 pandemic, individuals with lower education levels were more exposed to job losses and worse financial and working conditions, which may contribute to potential sleep problems.<sup>18</sup>

From another perspective, our data indicated that the use of anxiolytics resulted in an increase in the PSQI score, reflecting a negative impact on sleep quality. For instance, insomnia is one of the symptoms associated with increased use of these medications during the pandemic.<sup>25</sup> This situation is supported by research showing a rise in the use of anxiolytics and antidepressants during the COVID-19 pandemic. The increased use of these medications may be attributed to the restrictions imposed by social isolation, which reduced daily and leisure activities.

Finally, it is worth noting that in this study, several QoL domains were related to the PSQI score. A population-based study not previously cited found that aged individuals who slept less than six hours a day had lower quality of life scores.<sup>7</sup> Sleep disorders can significantly impact individuals' QoL, leading to absences from work, daily activities, and leisure.

It is also known that sleep quality is influenced by financial and occupational factors, which were exacerbated by the pandemic.<sup>18</sup> It was observed that there was a 34% increase in the probability of worsening sleep quality among individuals with an income less than one minimum wage; a 71% increase for those who lost their jobs during the pandemic; and a two-fold increase for individuals who experienced a reduction or loss of income.

It is important to note that the present study has limitations inherent to its design, including the possibility of reverse causality. Additionally, the outcome is self-reported and retrospective, which may introduce recall bias. Furthermore, participant selection was mediated by the actions of CHA, resulting in the exclusion of five other micro-areas from the study coverage.

## CONCLUSION

The high prevalence found in this study suggests that sociodemographic determinants, the presence of comorbidities, and lifestyle habits should be considered in health promotion strategies. Addressing these factors can help minimize the effects of sleep disturbances both during the pandemic and in the long term.

## CONFLICT OF INTERESTS

Nothing to declare.

## AUTHORS' CONTRIBUTIONS

ACS: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Methodology, Supervision, Validation, Visualization. CNBM: Formal analysis, Data curation, Writing – review & editing, Investigation, Software, Supervision, Validation, Visualization. TD: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Methodology, Funding acquisition, Resources, Software, Supervision, Validation, Visualization.

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