

# Health-related quality of life in individuals with anxiety in southern Espírito Santo, Brazil

## Qualidade de vida relacionada à saúde em indivíduos com ansiedade no sul de Espírito Santo, Brasil

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### Abstract

**Objective:** to assess health-related quality of life (HRQoL) and its associated factors among individuals with anxiety in a municipality in southern Espírito Santo during the COVID-19 pandemic. **Methods:** we conducted a cross-sectional household study between November and December 2021 in Alegre, Espírito Santo, Brazil. In a representative probabilistic sample of the urban population, we collected data on sociodemographic and clinical characteristics, as well as health-related habits. HRQoL was assessed using the European Quality of Life 5 Dimensions 3 Levels (EQ-5D-3L) instrument. Associated factors were identified through Tobit regression analysis. **Results:** the study included 694 individuals, of whom 309 (44.5%) reported a diagnosis of anxiety. Lower HRQoL was observed among individuals with hypertension, depression, dyslipidemia, diabetes mellitus, or heart disease. Lower educational attainment, poorer self-rated health, undergoing medical appointments, polypharmacy, and short sleep duration (<6 hours) were independently associated with lower HRQoL. **Conclusions:** anxiety was highly prevalent and associated with multiple sociodemographic, clinical, and behavioral factors that negatively impact individuals' quality of life. These findings highlight the urgent need for integrated public policies aimed at improving care and well-being.

**Keywords:** anxiety; quality of life; epidemiology; cross-sectional studies.

### Resumo

**Objetivo:** avaliar a qualidade de vida relacionada à saúde (QVRS) e seus fatores associados em indivíduos com ansiedade em um município da região sul do Espírito Santo durante a pandemia de COVID-19. **Métodos:** realizamos um estudo transversal domiciliar entre novembro e dezembro de 2021 em Alegre, Espírito Santo, Brasil. Em uma amostra probabilística representativa da população urbana, coletamos dados sobre características sociodemográficas e clínicas, bem como hábitos relacionados à saúde. A QVRS foi avaliada utilizando o instrumento European Quality of Life 5 Dimensions 3 Levels (EQ-5D-3L). Os fatores associados foram identificados por meio de análise de regressão Tobit. **Resultados:** o estudo incluiu 694 indivíduos, dos quais 309 (44,5%) relataram diagnóstico de ansiedade. Observou-se menor QVRS entre indivíduos com hipertensão, depressão, dislipidemia, diabetes mellitus e doença cardíaca. Níveis mais baixos de escolaridade, pior autopercepção de saúde, comparecimento a consultas médicas, polifarmácia e curta duração do sono (<6 horas) foram associados de forma independente a uma menor qualidade de vida relacionada à saúde. **Conclusões:** a ansiedade apresentou alta prevalência e esteve associada a múltiplos fatores sociodemográficos, clínicos e comportamentais que impactam negativamente a qualidade de vida dos indivíduos. Esses achados destacam a necessidade urgente de políticas públicas integradas voltadas para a melhoria do cuidado e do bem-estar.

**Palavras chave:** ansiedade; qualidade de vida; epidemiologia; estudos transversais.

### INTRODUCTION

Mental health disorders pose significant diagnostic challenges because they require healthcare professionals to possess not only technical expertise but also strong clinical examination skills, often with limited reliance on complementary tests. Consequently, patients frequently fail to recognize early warning signs, leading them to overlook symptoms such as anxiety and stress<sup>1</sup>.

In its normal form, anxiety is a beneficial response that functions as a protective mechanism, helping individuals adapt

to new situations. However, when anxiety becomes excessive and generalized, accompanied by persistent tension and fear, it may evolve into a pathological condition, with the perceived threat being either internal or external. If left unrecognized and untreated, these symptoms can intensify over time and potentially progress to depression, which manifests differently in each individual, with distinct features and symptoms<sup>1,2</sup>.

According to the World Health Organization (WHO), the global prevalence of anxiety disorders is 3.6%. In Brazil, however, the

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prevalence is markedly higher at 9.3%, making the country the world leader in anxiety cases<sup>3</sup>. This situation has been further exacerbated by the COVID-19 pandemic, which has had a profound impact on mental health. Increased levels of anxiety have been largely driven by social isolation, uncertainty, and a lack of interpersonal contact<sup>4,5</sup>.

The high prevalence of anxiety in Brazil stems from a complex interplay of factors such as social inequality, urban violence, and inadequate access to mental health services. Social inequality fosters chronic stress and insecurity, while urban violence contributes to trauma that can aggravate anxiety disorders. Furthermore, insufficient availability of mental health services prevents many individuals from receiving timely diagnoses and treatment<sup>6</sup>.

Anxiety disorders often interfere with daily functioning, causing individuals to avoid routine activities due to fear of anxiety attacks or symptoms. Such situations may lead to prolonged distress and reliance on others for basic activities, reducing autonomy and compromising quality of life. Social withdrawal, relationship difficulties, and abandonment of previously enjoyable activities are also common outcomes<sup>7,8</sup>.

Given the high prevalence of anxiety disorders, their considerable impact on quality of life, and the scarcity of studies focusing on this topic, further research is warranted. This study aimed to evaluate the health-related quality of life (HRQoL) of individuals with anxiety and identify associated factors among residents of southern Espírito Santo.

## METHODS

### Study design and setting

This study is part of a broader project aimed at conducting a situational health diagnosis in a Brazilian municipality during the COVID-19 pandemic to generate evidence to support health management and policy development. The project included analyses of health profiles, medication and medicinal plant use, health service utilization, and quality of life. This article focuses specifically on the quality of life among individuals with anxiety. A cross-sectional epidemiological study was conducted through a household survey in the municipality of Alegre, located in southern Espírito Santo, between November and December 2021. As of 2022, Alegre had an estimated population of 29,177 and comprises the town center and the districts of Anutiba, Araraí, Café, Celina, Rive, Santa Angélica, and São João do Norte<sup>9</sup>.

### Study population and sampling

Eligible participants included urban residents aged 18 years or older from both the town center and the surrounding districts. Participation was voluntary, and all individuals provided written informed consent. To ensure inclusion of individuals with functional limitations (e.g., hearing or cognitive impairments),

proxy responses were accepted when accompanied by a caregiver or family member. Exclusion criteria included non-residency in Alegre and incomplete or insufficient questionnaire responses.

Sample size was calculated based on the estimated urban population of 21,512 inhabitants<sup>10</sup>, a 95% confidence level ( $\alpha = 0.05$ ), an assumed prevalence of 50% for various outcomes, and a design effect of 1.5. These parameters yielded a minimum required sample size of 567 individuals. To account for potential losses, 10% was added, resulting in a final target of 624 participants<sup>11</sup>.

Cluster sampling with probability proportional to size (PPS) was employed to enhance representativeness. In the first stage, 10 of the 37 urban census tracts in Alegre were randomly selected. In the second stage, an equal number of individuals were surveyed within each selected tract<sup>12</sup>.

### Data collection

Data were collected through structured, pre-coded interviews covering sociodemographic characteristics, general health, COVID-19, health service use, medication and medicinal plant consumption, lifestyle habits, and quality of life. HRQoL was assessed using the EQ-5D-3L (EuroQol, 5 Dimensions, 3 Levels), a standardized instrument widely used in HRQoL research. It evaluates five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression, each with three response levels: no problems, some problems, or extreme problems<sup>13</sup>.

Each combination of responses produces a five-digit code representing one of 243 possible health states, ranging from 11111 (perfect health) to 33333 (worst possible health)<sup>13,14</sup>.

All researchers received standardized training and participated in a pilot study to test the instrument and procedures. Strict COVID-19 safety protocols were followed throughout data collection, including hand hygiene, face masks, and the use of personal protective equipment<sup>15</sup>.

### Variables

Anxiety was defined based on self-report to the question: "Have you received a confirmed diagnosis of anxiety from a healthcare professional?"

The dependent variable was the HRQoL score for individuals with anxiety, derived by applying Brazilian population-based utility weights<sup>16</sup> to EQ-5D-3L health states.

Independent variables included age, sex, race/ethnicity, place of residence (district or town center), marital status, religion, education level, income, self-perceived health, number of medical consultations in the previous year, private health insurance, self-medication, polypharmacy, use of medicinal plants, alcohol use, smoking status, sleep duration, history

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of COVID-19 infection, vaccination status, and presence of comorbidities.

#### Statistical analysis

Descriptive statistics included frequencies for categorical variables and means with standard deviations for continuous variables. Tobit regression was used to identify factors associated with HRQoL in both bivariate and multivariate models, due to the bounded nature of EQ-5D-3L utility scores (−0.156 to 1.000) and the presence of a ceiling effect<sup>17</sup>.

Variables with  $p \leq 0.20$  in bivariate analysis were included in the multivariate model, which retained only those with  $p \leq 0.05$ . Analyses were conducted using Jamovi version 2.2.5, except for Tobit models, which were run in Stata version 16.1.

#### Ethical considerations

The study was approved by the Research Ethics Committee of the Federal University of Espírito Santo (UFES) (approval number

4.732.878). All participants provided written informed consent. The research complied with the ethical principles outlined in the 1964 Declaration of Helsinki and its subsequent revisions<sup>18</sup>.

## RESULTS

### Sociodemographic characteristics

A total of 694 individuals participated in the study, of whom 309 (44.5%) reported having received a professional diagnosis of anxiety. The mean age of participants with anxiety was 52.6 years (SD = 18.0). The majority were female (84.5%), White (52.0%), resided in the town center (67.6%), and were married (40.9%). Regarding religion, 52.1% identified as Catholic, and 53.7% had completed high school. Additionally, 45.5% reported a monthly income of up to one minimum wage.

In the bivariate analysis, age and education level were significantly associated with health-related quality of life (HRQoL), while gender, race, place of residence, marital status, religion, and income were not (Table 1).

**Table 1.** Sociodemographic characteristics of individuals with anxiety in the sample

Variables	Category	n (%)	Mean (SD)	p-value
Age (years)			52.6 (18.0)	< 0.001
Sex	Female	261 (84.5)	0.768 (0.184)	0.300
	Male	48 (15.5)	0.737 (0.216)	
Race	White	160 (52.0)	0.765 (0.181)	0.934
	Brown	95 (30.8)	0.762 (0.181)	
	Others	53 (17.2)	0.753 (0.226)	
Region of residence	District	100 (32.4)	0.762 (0.164)	0.970
	Town center	209 (67.6)	0.763 (0.200)	
Marital status	Single	81 (26.3)	0.787 (0.198)	0.421
	Married	126 (40.9)	0.753 (0.179)	
	Others*	102 (32.8)	0.755 (0.194)	
Religion	No religion	26 (8.4)	0.789 (0.151)	0.554
	Catholic	161 (52.1)	0.750 (0.188)	
	Evangelical	100 (32.4)	0.777 (0.197)	
	Others	22 (7.1)	0.761 (0.203)	
Education	Elementary	105 (34.0)	0.699 (0.217)	< 0.001
	High school	166 (53.7)	0.793 (0.162)	
	Technical/Higher	38 (12.3)	0.805 (0.175)	
Income	≤ 1 minimum wage	129 (45.5)	0.750 (0.191)	0.498
	1–2 minimum wages	131 (45.2)	0.763 (0.191)	
	> 2 minimum wages	30 (10.3)	0.781 (0.190)	

\*SD: standard deviation; n: number of respondents; %: percentage of respondents.

### Clinical characteristics and health-related behaviors

Table 2 presents clinical characteristics and health-related habits. Among participants with anxiety, 50.8% rated their

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health as "fair," 37.9% as "very good" or "good," and 11.3% as "poor" or "very poor." Most participants (85.1%) had attended at least one medical consultation in the previous year, and 79.3% did not have private health insurance.

Self-medication was reported by 73.3% of participants, and 30.2% reported polypharmacy (use of five or more medications). The use of medicinal plants was reported by 46.7%. Regarding health behaviors, 66.8% did not engage in physical activity, 74.7% did not consume alcohol, 84.1% were non-smokers,

and 27.7% reported sleeping fewer than six hours per night. In terms of COVID-19, 79.5% had not been infected, and 98.7% had received at least one dose of the vaccine.

Lower HRQoL was significantly associated with poorer self-perceived health ( $p < 0.001$ ), recent medical consultations ( $p = 0.014$ ), and polypharmacy ( $p < 0.001$ ). Other variables, including physical activity, private insurance, self-medication, sleep duration, and COVID-19 status, were not significantly associated with HRQoL ( $p > 0.05$ ).

**Table 2.** Clinical and Health Characteristics of Individuals with Anxiety in the sample.

Variables	Category	n (%)	Mean (SD)	p-value
Self-rated health	Very good/good	117 (37.9)	0.835 (0.154)	< 0.001
	Regular	157 (50.8)	0.745 (0.170)	
	Bad/Very Bad	35 (11.3)	0.597 (0.249)	
Medical appointments	Yes	263 (85.1)	0.752 (0.192)	0.013
	No	46 (14.9)	0.827 (0.156)	
Private health insurance	Yes	64 (20.7)	0.775 (0.187)	0.567
	No	245 (79.3)	0.760 (0.195)	
Self-medication	Yes	222 (73.3)	0.769 (0.172)	0.182
	No	81 (26.7)	0.736 (0.229)	
Polypharmacy	Yes	93 (30.2)	0.664 (0.191)	< 0.001
	No	215 (69.8)	0.805 (0.172)	
Use of medicinal plants	Yes	142 (46.7)	0.766 (0.177)	0.703
	No	162 (53.3)	0.757 (0.199)	
Physical activity	Yes	104 (33.8)	0.781 (0.157)	0.231
	No	204 (66.8)	0.754 (0.204)	
Alcohol consumption	Yes	78 (25.3)	0.773 (0.150)	0.584
	No	230 (74.7)	0.759 (0.201)	
Smoking	Yes	49 (15.9)	0.736 (0.195)	0.281
	No	259 (84.1)	0.768 (0.188)	
Sleep duration	< 6 hours	85 (27.7)	0.735 (0.181)	0.153
	6–7 hours	91 (29.6)	0.796 (0.171)	
	7–8 hours	82 (26.7)	0.760 (0.200)	
	> 8 hours	49 (16.0)	0.754 (0.215)	
COVID-19 infection	Yes	63 (20.5)	0.776 (0.166)	0.540
	No	245 (79.5)	0.760 (0.195)	
COVID-19 vaccination	Yes	305 (98.7)	0.764 (0.189)	0.424
	No	4 (1.3)	0.688 (0.240)	

\*SD: standard deviation

#### Comorbidities

Table 3 shows the association between comorbidities and HRQoL. Participants with hypertension, depression, dyslipidemia, diabetes mellitus, or heart disease had significantly lower HRQoL scores than those without these conditions ( $p < 0.05$ ).

Other comorbidities, including obesity, gastroesophageal reflux disease, kidney disease, hypothyroidism, asthma, and cancer, were not significantly associated with HRQoL.

**Table 3.** Main Comorbidities of Individuals with Anxiety According to Quality of Life

Comorbidities	Category	n (%)	Mean (SD)	p-value
Hypertension	Yes	157 (50.8)	0.722 (0.244)	< 0.001
	No	152 (49.2)	0.805 (0.226)	
Depression	Yes	120 (38.8)	0.731 (0.183)	0.019
	No	189 (61.2)	0.783 (0.194)	
Obesity	Yes	64 (20.7)	0.643 (0.163)	0.345
	No	245 (79.3)	0.768 (0.195)	
Dyslipidemia	Yes	94 (30.4)	0.710 (0.214)	0.001
	No	215 (69.6)	0.786 (0.172)	
GERD	Yes	63 (20.4)	0.735 (0.178)	0.195
	No	246 (79.6)	0.770 (0.191)	
Diabetes mellitus	Yes	55 (17.8)	0.715 (0.202)	0.039
	No	254 (82.2)	0.773 (0.185)	
Kidney disease	Yes	50 (16.2)	0.733 (0.202)	0.221
	No	259 (83.8)	0.769 (0.186)	
Heart disease	Yes	39 (12.6)	0.696 (0.229)	0.019
	No	270 (87.4)	0.772 (0.181)	
Hypothyroidism	Yes	35 (11.4)	0.758 (0.183)	0.865
	No	273 (88.6)	0.763 (0.191)	
Asthma	Yes	23 (7.5)	0.706 (0.145)	0.137
	No	286 (92.5)	0.767 (0.192)	
Cancer	Yes	12 (3.9)	0.688 (0.237)	0.162
	No	297 (96.1)	0.766 (0.187)	

\*GERD: Gastroesophageal reflux disease; SD: standard deviation.

### Multivariate analysis

The multivariate Tobit regression (Table 4) identified several factors significantly associated with higher HRQoL among individuals with anxiety. Participants who completed high school had significantly higher HRQoL compared to those with incomplete elementary education ( $\beta = 0.084$ ; 95% CI: 0.027–0.140;  $p = 0.004$ ). Although individuals with technical or higher education also showed higher scores, the association did not reach statistical significance ( $\beta = 0.082$ ; 95% CI: –0.006–0.169;  $p = 0.067$ ). Participants with “regular” self-rated health had significantly higher HRQoL than those with “very bad/bad” health ( $\beta = 0.099$ ; 95% CI: 0.014–0.184;  $p = 0.023$ ), while those

reporting “very good/good” health had even higher HRQoL ( $\beta = 0.186$ ; 95% CI: 0.092–0.280;  $p < 0.001$ ).

Participants who had not had medical appointments in the past year presented higher HRQoL compared to those who had ( $\beta = 0.080$ ; 95% CI: 0.007–0.154;  $p = 0.031$ ). Similarly, the absence of polypharmacy was significantly associated with higher HRQoL ( $\beta = 0.117$ ; 95% CI: 0.059–0.175;  $p < 0.001$ ). Regarding sleep duration, sleeping 6 to 7 hours per night was significantly associated with higher HRQoL compared to sleeping fewer than 6 hours ( $\beta = 0.081$ ; 95% CI: 0.014–0.147;  $p = 0.017$ ).

**Table 4.** Factors Related to Quality of Life (HRQoL) in Individuals with Anxiety (Tobit Regression Estimates).

Factor	Category	Estimate	95% CI	p-value
Education	Incomplete elementary	Reference		
	High school (complete)	0.084	(0.027 to 0.140)	0.004
	Technical/Higher	0.082	(–0.006 to 0.169)	0.067
Self-rated health	Very bad/bad	Reference		
	Regular	0.099	(0.014 to 0.184)	0.023

	Very good/good	0.186	(0.092 to 0.280)	< 0.001
Medical appointments	Yes	Reference		
	No	0.080	(0.007 to 0.154)	0.031
Polypharmacy (≥ 5)	Yes	Reference		
	No	0.117	(0.059 to 0.175)	< 0.001
Sleep duration	< 6 hours	Reference		
	6 to 7 hours	0.081	(0.014 to 0.147)	0.017
	7 to 8 hours	0.021	(-0.047 to 0.088)	0.544
	> 8 hours	0.033	(-0.047 to 0.113)	0.419

CI: Confidence Interval.

### EQ-5D Domains with Reported Problems

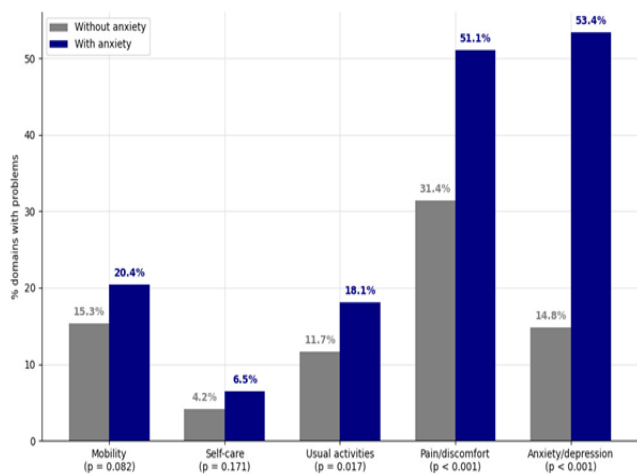
Figure 1 presents the distribution of reported problems across EQ-5D domains according to anxiety status. Individuals with anxiety consistently reported more problems in all five dimensions compared to those without anxiety.

The highest differences were observed in the domains of anxiety/depression, pain/discomfort, and usual activities, all of which showed statistically significant associations with anxiety ( $p \leq 0.05$ ). Specifically, 53.4% of individuals with anxiety reported problems in the anxiety/depression domain, compared to 14.8% of those without anxiety. Similarly, 51.1% of individuals with anxiety reported pain or discomfort, compared to 31.4% without anxiety. In the usual activities domain, 18.1% of anxious individuals reported difficulties, while only 11.7% of those without anxiety did.

In contrast, differences in the mobility and self-care domains were not statistically significant ( $p > 0.05$ ), although individuals with anxiety still reported a slightly higher proportion of problems.

These findings highlight the broad and multidimensional impact of anxiety on health-related quality of life, particularly in emotional, physical, and functional aspects of daily living.

**Figure 1.** EQ-5D Domains with Reported Problems by Anxiety Status.



### DISCUSSION

Our study revealed a high prevalence of anxiety disorders, which appears to have been exacerbated by the COVID-19 pandemic. Similar findings have been reported in other studies, where increased anxiety levels in 2020 were associated with both elevated SARS-CoV-2 infection rates and reduced human mobility. These indicators reflect the combined effects of viral spread and restrictive public health measures, including lockdowns, school and business closures, limited access to public transportation, and diminished social interaction<sup>19</sup>.

Anxiety disorders were more prevalent among women, a pattern observed in other studies as well. This disparity may reflect the disproportionate social and economic impact of the pandemic on women. Increased caregiving responsibilities due to school closures and family illness, along with greater financial vulnerability, including lower wages, smaller savings, and less job stability, may have contributed to higher anxiety levels in this population<sup>20-22</sup>.

Our findings also indicate that individuals with comorbidities such as hypertension, depression, dyslipidemia, diabetes mellitus, and heart disease experienced lower HRQoL. This result highlights the complex bidirectional relationship between mental health and chronic physical conditions. Previous research has shown that chronic diseases are strongly associated with reduced HRQoL, reinforcing the need for integrated approaches that address both physical and mental health simultaneously<sup>23</sup>.

Educational level was another factor associated with HRQoL. Participants who completed high school reported significantly better quality of life compared to those with lower education, a finding consistent with previous studies<sup>24</sup>. Education may enhance health literacy, promote healthier behaviors, and facilitate access to healthcare and health promotion strategies, all of which contribute to improved HRQoL<sup>25</sup>.

Self-perceived health was also a strong predictor of HRQoL. Individuals who rated their health as “very good” or “good” had significantly higher HRQoL compared to those with negative self-assessments. This is consistent with findings from Ascef and collaborators<sup>26</sup>, who observed a substantial reduction in

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HRQoL among individuals with poor self-rated health. Self-perceived health is a well-established predictor of morbidity and mortality and should be considered in both clinical practice and research<sup>27</sup>.

Interestingly, participants who did not seek medical care in the previous year reported better HRQoL. It may suggest a lower burden of illness among these individuals. However, it is also possible that those with more frequent medical visits had more severe or uncontrolled conditions, which could negatively affect their perceived quality of life. In contrast, other studies have found that structured medical interventions, such as shared medical appointments, can improve HRQoL in patients with chronic pain and other conditions<sup>28</sup>.

The negative association between polypharmacy and HRQoL found in our study is supported by prior research. Polypharmacy has been linked to increased adverse drug reactions, treatment burden, and reduced adherence, all of which can contribute to lower HRQoL<sup>29</sup>. These findings underscore the importance of careful medication review and deprescribing strategies, especially for patients with multiple chronic conditions.

Finally, sleep duration was partially associated with HRQoL. Participants who slept between six and seven hours per night showed better quality of life compared to those who slept less than six hours. However, no significant associations were observed for longer sleep durations. This is consistent with Sanchez and collaborators<sup>30</sup>, who found that good sleep quality significantly improves perceived quality of life among university faculty. Given the growing evidence linking sleep with physical

and mental well-being, promoting healthy sleep habits may be a key strategy for enhancing HRQoL.

This study has several limitations. First, its cross-sectional design does not allow for causal inferences. Second, data collection occurred during regular working hours, which may have led to an overrepresentation of individuals not engaged in formal employment. Third, self-reported data may be subject to recall and social desirability biases. Despite these limitations, the sample size exceeded the calculated minimum, enhancing the study's statistical power and precision. Moreover, conducting the survey during the COVID-19 pandemic provides a valuable snapshot of HRQoL in a unique and underexplored context.

## CONCLUSIONS

Our findings emphasize the need for integrated public health strategies aimed at improving the well-being of individuals with anxiety. Interventions should prioritize the timely diagnosis and management of comorbidities, rational use of medications, and the promotion of sleep hygiene, mental health literacy, and self-care practices. By addressing both mental and physical health determinants, such measures may contribute to improving quality of life and overall functioning, particularly in vulnerable populations.

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