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# Job Insecurity According to the Mental Health of Workers in 25 Peruvian Cities during the COVID-19 Pandemic

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**Abstract:** The pandemic brought various problems among workers, one of them being job insecurity, since many lost their jobs and others had the possibility of being fired, which could influence their mental health. The aim of this analytical cross-sectional study was to determine the relationship between job insecurity and mental health among workers in 25 Peruvian cities during the COVID-19 pandemic. Previously validated surveys were used to inquire about job insecurity and three mental health disorders (depression, anxiety, and stress) as well as other variables. Of the 1855 workers, 14% had moderate or higher levels of stress, 30% had anxiety, and 16% had depression. Having had job insecurity was associated with moderate or higher levels of depression (RPa: 1.71; 95% CI: 1.51–1.94; *p*-value < 0.001), anxiety (RPa: 1.43; 95% CI: 1.25–1.64; *p*-value < 0.001), and stress (RPa: 1.77; 95% CI: 1.41–2.22; *p*-value < 0.001). Depression was also associated with having been fired during the pandemic and associated with eight professions. Anxiety was associated with being a man and having been fired, while stress was associated with three professions. There is a clear association between having job insecurity and suffering from the three mental pathologies evaluated, which highlights the importance of assessing the mental impact.

**Keywords:** COVID-19; coronavirus infections; job insecurity; mental health; health workers; mortality; positivity; Peru; death; pandemic

## 1. Introduction

The implementation of social distancing [1–3] and quarantines [4–7] because of the COVID-19 pandemic [8] generated various mental health effects [9–19]. For instance, it generated job insecurity because of a higher intention workers to leave their jobs due to mental distress [20–22]. Peru was severely affected because of the first and second wave of the pandemic, resulting in the country with the highest mortality rate [23]. Multiple reasons have been reported for this, such as its fragile healthcare system [24–26] characterized by a lack of organizational support in healthcare facilities [14]. The general public was exposed to fake news [27] and conspiracy theories [28], which generated technostress [29] and multitasking behavior [30]. The lack of clear public policies generated mental distress [31,32] and an urgency for self-care behaviors [33,34] including the use of unproven drugs [25,35,36] and medicinal plants [25,36] in part based on their knowledge and appreciation of plants containing bioactive

compounds [37–48]. It has been further reported that this has impacted the vaccination intention [49].

Multiple studies reveal that university students are the leading group affected by these disorders [29,50–53]. The loss of millions of lives charged due to COVID-19 led many families to a state of mourning [54], increasing the levels of anxiety and depression [55,56]. On the other hand, it was shown that the loss of a family member produces a series of neuropsychological changes such as alterations in the reward system, neurocognitive functioning, and neuronal systems involved in emotional regulation [54]. It has been reported in all these areas that there was much deterioration of mental health because many people either lost their jobs or saw their jobs endangered because the pandemic generated business closures [57,58] and social restrictions [59–62]. There are rare exceptions where there was little job insecurity, especially among healthcare workers, police, military, and others who were in the first line of defense [63–65]. However, despite not having the insecurity of losing their job, they could become infected and generate mental problems due to specific job insecurity [63–65], which has been evidenced in populations worldwide, where it is disclosed that working populations were the most affected economically and labor-wise. However, few studies have large, multicenter samples or have been carried out during the entire period of the pandemic; some of them were conducted at a specific time [66,67].

Job insecurity has affected various business such as small firms [68,69], sports events [70], the hospitality industry [71,72], higher education [13,29,73], healthcare [74], circular economy projects [75,76], start-ups [77] and technology [78,79]. Psychological disorders such as depression, anxiety, and stress are diseases that can afflict anyone regardless of race, sex or age. Likewise, they are conditions that have a high impact on public health, hence the importance of their being investigated [80]. According to the World Health Organization (WHO, Geneva, Switzerland), "depression is a frequent mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or lack of self-esteem, sleep or appetite disorders, feelings of tiredness and lack of concentration" [81]. Similarly, anxiety and stress are less severe disorders, but they alter the quality of life of people who suffer from them [82]. The WHO revealed that these psychological disorders affect more than 264 million people worldwide, and this number is increasing [83]. Therefore, it is essential to determine how mental health was related to the job insecurity perceived by workers, especially in a severely affected country such as Peru [84–87]. In this study, we surveyed 25 cities that correspond to 19 departments of Peru with different economic frameworks. The population of the departments are Piura (2.10 million), La Libertad (2.02 million), Arequipa (1.58 million), Junin (1.41 million), Lambayeque (1.36 million), Cusco (1.36 million), Puno (1.32 million), Ancash (1.23 million), Lima (1.21 million), Loreto (0.98 million), Ica (0.97 million), San Martín (0.92 million), Ayacucho (0.70 million), Apurímac (0.45 million), Huancavelica (0.39 million), Tacna (0.38 million), Pasco (0.29 million), Tumbes (0.26 million), and Moquegua (0.20 million) [88]. Regarding the socioeconomic structure, the population (urban–rural) in each department is stratified into four socioeconomic levels; AB, C, D and E (highest to lowest) [88]. The departments with the lowest socioeconomic levels (E) are: Huancavelica (81.3% of the population) being the department with the highest poverty, followed by Ayacucho and Apurímac (67.6% for both)**,** Puno (64.4%), Cusco (64.2%), Loreto (60.1%), Pasco (53.9%), Junin (52.4%), San Martin (51.0%), Ancash (43.9%), Piura (36.4%), and La Libertad (33.3%) [88]. The department with the highest population in the D socioeconomic level was Tumbes with 42.1% of the population followed by Lambayeque (33.8%). For the C socioeconomic level, Lima (46.6%) was followed by Ica (46.0%), Arequipa (41.6%), Moquegua (40.0%) and Tacna (41.0%). The department with the highest percentage in the AB stratum was Lima (the capital) with 21.1% of the population [88]. In this context, the aim of this analytical cross-sectional study was to determine the relationship between job insecurity and mental health among workers in 25 Peruvian cities during the COVID-19 pandemic.

## 2. Methodology

### 2.1. Design and Population

An analytical, multicenter (1 center per city, 25 in total), cross-sectional study was conducted during June 2020 to February 2022. Workers of legal age (over 18 years old) were included who accepted to be part of the research and worked during the period surveyed in any company in Peru. The exclusion criteria including incomplete questionnaires or provided anomalous answers. Secondary analysis was performed on this data, since the primary endpoint has been used for other publications.

### 2.2. Variables

The dependent variable was mental health, which was measured through the suffering of three pathologies: depression, anxiety, and stress. These were measured through the DASS-21, which through 21 questions measures quickly and effectively the suffering of these three pathologies. Each one had four possible Likert-type responses and had been revalidated in Latin America [89–92] and used on multiple occasions by research in Peru [93,94]. The levels of depression, anxiety, or stress was categorized as moderate, severe, and very severe. Job insecurity was assessed using an instrument previously validated by our research group [95]. The validation process showed that the four questions had high reliability [95]. The four questions have five possible alternatives of the Likert type (from strongly disagree to agree strongly). For the analytical statistics, the points obtained for each question were added up, and those who were in the top third of the scores were considered to have job insecurity compared to those who were in the middle or bottom third of the scores (considered as those who did not have adequate job insecurity). The following demographic variables were collected: gender, age, type of work, work status during the pandemic (worked during the entire pandemic, worked during part of the pandemic, was fired), the type of work (in person, remote, hybrid), and work category (administrative or operator).

### 2.3. Data Analysis

First, a descriptive type of analysis was executed where the population was described with frequencies and percentages (for categorical variables and the best measure of central tendency and dispersion (for quantitative variables, this post evaluation with the Shapiro–Wilk statistical test). Afterward, bivariate and multivariate analysis was performed using generalized linear models (with Poisson family, log link function, models for robust variances, and adjustment for the city where they resided). With this, prevalence ratios (crude and adjusted), 95% confidence intervals, and $p$-values were obtained. It is essential to mention that for a variable to enter an adjusted model, it had to have a $p$-value < 0.05 within its categories, and this was also the cut-off point to determine the final statistical association. The data were analyzed by Stata, version 11.1.

### 2.4. Ethical Aspects

The primary research was approved by the ethics committee of the Universidad Privada Antenor Orrego (UPAO) (N° 0049-2022-UPAO).

## 3. Results

Of the 1855 workers surveyed, the most frequent work category was those working in a municipality (11.5%); most respondents were male (56.7%) and had a median age of 34 years (interquartile range: 27–44 years); the vast majority had constant work during the pandemic (75.8%), worked in person (54.4%), and were operators (57.3%) (Table 1).

**Table 1.** Characteristics of workers during the COVID-19 pandemic in Peru.

| Variable | N | Percentage |
|---|:---:|:---:|
| **Labor category** | | |
| Miner | 152 | 8.2% |
| Municipality | 213 | 11.5% |
| Police officer | 115 | 6.2% |
| Military | 111 | 6.0% |
| Primary school teacher | 188 | 10.1% |
| High school teacher | 139 | 7.5% |
| Store | 206 | 11.1% |
| Street vendor | 86 | 4.6% |
| Transportation | 75 | 4.1% |
| Guard | 98 | 5.3% |
| Legal | 108 | 5.8% |
| Doctor | 78 | 4.2% |
| Nurse | 136 | 7.3% |
| Other healthcare professional | 150 | 8.1% |
| **Gender** | | |
| Male | 1051 | 56.7% |
| Female | 804 | 43.3% |
| **Age (years)** | | |
| Mean and standard deviation | 35.9 | 11.2 |
| Median and interquartile range | 34 | 27–44 |
| **Work during the pandemic** | | |
| I always had | 1407 | 75.8% |
| I got fired | 129 | 7.0% |
| I had it for moments | 319 | 17.2% |
| **Type of job** | | |
| In person | 1008 | 54.4% |
| Remote | 275 | 14.8% |
| Hybrid | 572 | 30.8% |
| **Type of work you do** | | |
| Administrative | 792 | 42.7% |
| Operator | 1063 | 57.3% |

Thirty-three percent of the respondents were classified as having job insecurity, 14% had moderate or higher stress levels, 30% had anxiety, and 16% had depression (Figure 1).
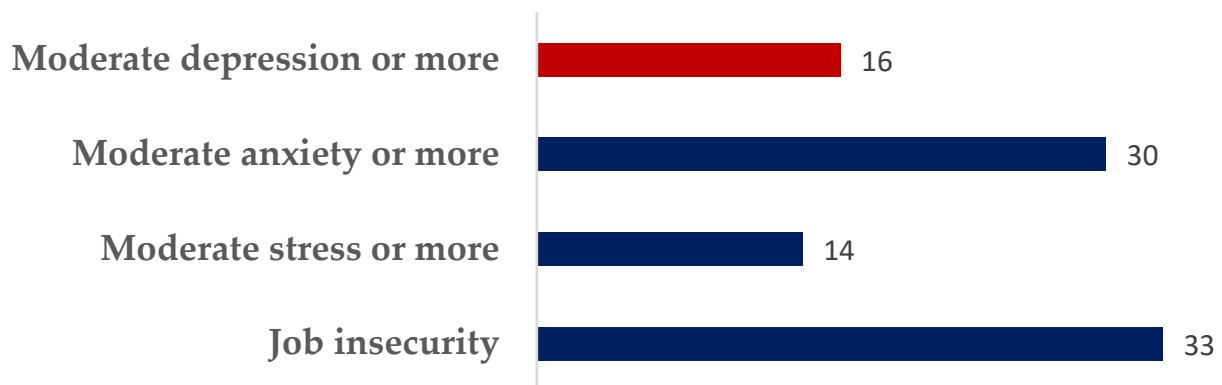
**Figure 1.** Frequencies of job insecurity and moderate or higher levels of stress, anxiety, and depression in Peruvian workers during the pandemic.

Security guards (62%), transportation workers (51%), and street vendors (50%) were the professionals with the highest levels of job insecurity. On the other hand, police officers (17%), military personnel (18%), and doctors (19%) had the lowest levels of job insecurity (Figure 2).
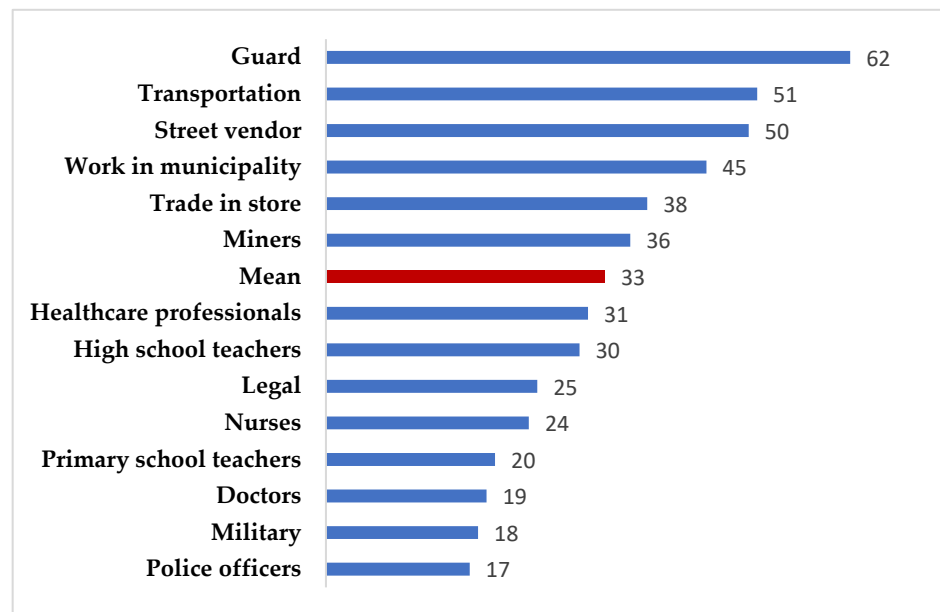


**Figure 2.** Percentage of job insecurity by type of work or industry in Peru during the pandemic.

In the multivariate model, moderate or severe depression was associated with having had job insecurity (PRa: 1.71; 95% CI: 1.51–1.94; *p*-value < 0.001), having been fired during the pandemic (PRa: 1.63; 95% CI: 1.17–2.28; *p*-value = 0.004) and, compared to the mining category, having worked in the municipality (PRa: 2.59; 95% CI: 1.15–5.86; *p*-value = 0.022), as primary school teachers (PRa: 4.26; 95% CI: 1.48–12.21; *p*-value = 0.007), as street vendors (PRa: 3.11; 95% CI: 1.33–7.32; *p*-value = 0.009), in transportation (RPa: 3.28; 95% CI: 1.35–7.97; *p*-value = 0.009), as security guards (RPa: 2.84; 95% CI: 1.47–5.49; *p*-value = 0.002), in the legal field (RPa: 2.90; 95% CI: 1.05–7.96; *p*-value = 0.039), as nurses (RPa: 3.85; 95% CI: 1.59–9.31; *p*-value = 0.003) and other health professionals (RPa: 2.92; 95% CI: 1.29–6.59; *p*-value = 0.010); this was adjusted for sex and city of residence (Table 2).

**Table 2.** Bivariate analysis of socio-occupational factors associated with moderate or severe depression in Peruvian workers during the pandemic.

| Variable | Moderate or Severe Depression | | Prevalence Ratio (IC 95%) *p*-Value | |
|---|---|---|---|---|
| | No, N (%) | Yes, N (%) | Raw (Bivariate) | Adjusted (Multivariate) |
| **Job insecurity** | | | | |
| No | 1087 (87.6) | 154 (12.4) | Comparison category | Comparison category |
| Yes | 478 (77.8) | 136 (22.2) | 1.78 (1.56–2.04) < 0.001 | **1.71 (1.51–1.94) < 0.001** |
| **Labor category** | | | | |
| Miner | 143 (94.1) | 9 (5.9) | Comparison category | Comparison category |
| Municipality | 180 (84.5) | 33 (15.5) | 2.62 (1.02–6.68) 0.044 | **2.59 (1.15–5.86) 0.022** |
| Police officer | 103 (89.6) | 12 (10.4) | 1.76 (0.42–7.38) 0.438 | 2.15 (0.47–9.84) 0.322 |
| Military | 102 (91.9) | 9 (8.1) | 1.37 (0.48–3.95) 0.561 | 1.73 (0.69–4.35) 0.245 |
| Primary school teacher | 149 (79.3) | 39 (20.7) | 3.50 (1.18–10.39) 0.024 | **4.26 (1.48–12.21) 0.007** |
| High school teacher | 113 (81.3) | 26 (18.7) | 3.16 (0.77–12.03) 0.112 | 3.47 (0.87–13.95) 0.079 |
| Store | 178 (86.4) | 28 (13.6) | 2.30 (0.99–5.34) 0.054 | 2.33 (0.99–5.48) 0.052 |
| Street vendor | 66 (76.7) | 20 (23.3) | 3.93 (1.62–9.51) 0.002 | **3.11 (1.33–7.32) 0.009** |
| Transportation | 58 (77.3) | 17 (22.7) | 3.83 (1.52–9.62) 0.004 | **3.28 (1.35–7.97) 0.009** |
| Guard | 80 (81.6) | 18 (18.4) | 3.10 (1.50–6.42) 0.002 | **2.84 (1.47–5.49) 0.002** |
| Legal | 92 (85.2) | 16 (14.8) | 2.50 (0.95–6.46) 0.058 | **2.90 (1.05–7.96) 0.039** |
| Doctor | 68 (87.2) | 10 (12.8) | 2.17 (0.81–5.73) 0.121 | 2.65 (0.96–7.29) 0.060 |
| Nurse | 107 (78.7) | 29 (21.3) | 3.60 (1.56–8.30) 0.003 | **3.85 (1.59–9.31) 0.003** |
| Other healthcare professionals | 126 (84.0) | 24 (16.0) | 2.70 (1.19–6.15) 0.018 | **2.92 (1.29–6.59) 0.010** |
| **Sex** | | | | |
| Female | 908 (86.4) | 143 (13.6) | Comparison category | Comparison category |
| Male | 657 (81.7) | 147 (18.3) | 1.34 (1.07–1.69) 0.012 | 1.18 (0.99–1.39) 0.061 |
| **Age (years)** | 33 (27–43) | 35 (26–46) | 1.00 (0.99–1.02) 0.583 | Did not enter the model |
| **Work during the pandemic** | | | | |
| I always had | 1206 (85.7) | 201 (14.3) | Comparison category | Comparison category |
| I got fired | 98 (76.0) | 31 (24.0) | 1.68 (1.21–2.35) 0.002 | **1.63 (1.17–2.28) 0.004** |
| I had it for moments | 261 (81.8) | 58 (18.2) | 1.27 (0.85–1.90) 0.237 | 1.20 (0.72–2.09) 0.479 |
| **Type of job** | | | | |
| In person | 851 (84.4) | 157 (15.6) | Comparison category | Did not enter the model |
| Remote | 229 (83.3) | 46 (16.7) | 1.07 (0.70–1.64) 0.743 | Did not enter the model |
| Hybrid | 485 (84.8) | 87 (15.2) | 0.98 (0.69–1.39) 0.894 | Did not enter the model |
| **Type of work you do** | | | | |
| Administrative | 659 (83.2) | 133 (16.8) | Comparison category | Did not enter the model |
| Operator | 906 (85.2) | 157 (14.8) | 0.88 (0.67–1.15) 0.349 | Did not enter the model |

Prevalence ratios, 95% confidence intervals (95% CI), and *p*-values were obtained with generalized linear models (Poisson family, log link function, models for robust variances, and adjusted for the city where they lived). The age variable was analyzed quantitatively.

In the multivariate model, moderate or major anxiety was associated with having had job insecurity (PRa: 1.43; 95% CI: 1.25–1.64; *p*-value < 0.001), having been fired during the pandemic (PRa: 1.58; 95% CI: 1.27–1.98; *p*-value < 0.001) and sex (RPa: 1.38; 95% CI: 1.23–1.55; *p*-value < 0.001); this was adjusted for the category and the city where they resided (Table 3).

**Table 3.** Bivariate analysis of socio-labor factors associated with moderate or major anxiety in Peruvian workers during the pandemic.

| Variable | Presence of Moderate or Severe Anxiety | | Prevalence Ratio (IC 95%) *p*-Value | |
|---|---|---|---|---|
| | No, N (%) | Yes, N (%) | Raw (Bivariate) | Adjusted (Multivariate) |
| **Job insecurity** | | | | |
| No | 928 (74.8) | 313 (25.2) | Comparison category | Comparison category |
| Yes | 375 (61.1) | 239 (38.9) | 1.54 (1.30–1.83) < 0.001 | **1.43 (1.25–1.64) < 0.001** |
| **Labor category** | | | | |
| Miner | 117 (77.0) | 35 (23.0) | Comparison category | Comparison category |
| Municipality | 144 (67.6) | 69 (32.4) | 1.41 (0.69–2.87) 0.349 | 1.30 (0.73–2.34) 0.377 |
| Police officer | 93 (80.9) | 22 (19.1) | 0.83 (0.37–1.88) 0.657 | 0.90 (0.41–1.97) 0.791 |
| Military | 89 (80.2) | 22 (19.8) | 0.86 (0.45–1.66) 0.654 | 1.01 (0.55–1.85) 0.975 |
| Primary school teacher | 135 (71.8) | 53 (28.2) | 1.22 (0.63–2.40) 0.554 | 1.32 (0.68–2.56) 0.408 |
| High school teacher | 81 (58.3) | 58 (41.7) | 1.81 (0.75–4.39) 0.188 | 1.83 (0.79–4.24) 0.157 |
| Store | 156 (75.7) | 50 (24.3) | 1.05 (0.57–1.93) 0.865 | 0.96 (0.50–1.82) 0.897 |
| Street vendor | 58 (67.4) | 28 (32.6) | 1.41 (0.92–2.18) 0.118 | 1.02 (0.66–1.58) 0.929 |
| Transportation | 50 (66.7) | 25 (33.3) | 1.45 (0.65–3.22) 0.365 | 1.24 (0.56–2.76) 0.591 |
| Guard | 59 (60.2) | 39 (39.8) | 1.73 (0.94–3.18) 0.079 | 1.57 (0.86–2.87) 0.141 |
| Legal | 78 (72.2) | 30 (27.8) | 1.21 (0.64–2.29) 0.565 | 1.25 (0.66–2.40) 0.483 |
| Doctor | 62 (79.5) | 16 (20.5) | 0.89 (0.50–1.58) 0.694 | 0.97 (0.55–1.72) 0.921 |
| Nurse | 80 (58.8) | 56 (41.2) | 1.79 (1.03–3.11) 0.039 | 1.65 (0.93–2.92) 0.086 |
| Other healthcare professional | 101 (67.3) | 49 (32.7) | 1.42 (0.77–2.61) 0.261 | 1.36 (0.76–2.43) 0.298 |
| **Sex** | | | | |
| Female | 786 (74.8) | 265 (25.2) | Comparison category | Comparison category |
| Male | 517 (64.3) | 287 (35.7) | 1.42 (1.17–1.72) < 0.001 | **1.38 (1.23–1.55) < 0.001** |
| **Age (years)** | 34 (27–44) | 34 (27–43) | 1.00 (0.99–1.01) 0.583 | Did not enter the model |
| **Work during the pandemic** | | | | |
| I always had | 1020 (72.5) | 387 (27.5) | Comparison category | Comparison category |
| I got fired | 72 (55.8) | 57 (44.2) | 1.61 (1.20–2.15) 0.001 | **1.58 (1.27–1.98) < 0.001** |
| I had it for moments | 211 (66.1) | 108 (33.9) | 1.23 (0.96–1.57) 0.094 | 1.15 (0.79–1.69) 0.471 |
| **Type of job** | | | | |
| In person | 700 (69.4) | 308 (30.6) | Comparison category | Did not enter the model |
| Remote | 196 (71.3) | 79 (28.7) | 0.94 (0.62–1.42) 0.770 | Did not enter the model |
| Hybrid | 407 (71.2) | 165 (28.8) | 0.94 (0.74–1.21) 0.648 | Did not enter the model |
| **Type of work you do** | | | | |
| Administrative | 543 (68.6) | 249 (31.4) | Comparison category | Did not enter the model |
| Operator | 760 (71.5) | 303 (28.5) | 0.91 (0.75–1.10) 0.322 | Did not enter the model |

Prevalence ratios, 95% confidence intervals (95% CI) and *p*-values were obtained with generalized linear models (Poisson family, log link function, models for robust variances, and adjusted for the city where they lived). The age variable was analyzed quantitatively.

In the multivariate model, moderate or severe stress was associated with having had job insecurity (PRa: 1.77; 95% CI: 1.41–2.22; *p*-value < 0.001) and, compared to the mining sector, secondary school teachers (PRa: 2.61; 95% CI: 1.27–5.36; *p*-value = 0.009), doctors (RPa: 2.78; 95% CI: 1.64–4.70; *p*-value < 0.001), and nurses (RPa: 2.32; 95% CI: 1.44–3.72; *p*-value = 0.001); this was adjusted for sex and the city where they resided (Table 4).

**Table 4.** Bivariate analysis of socio-labor factors associated with moderate or major stress in Peruvian workers during the pandemic.

| Variable | Presence of Moderate or Severe Stress | | Prevalence Ratio (IC 95%) *p*-Value | |
|---|---|---|---|---|
| | No, N (%) | Yes, N (%) | Raw (Bivariate) | Adjusted (Multivariate) |
| **Job insecurity** | | | | |
| No | 1098 (88.5) | 143 (11.5) | Comparison category | Comparison category |
| Yes | 499 (81.3) | 115 (18.7) | 1.63 (1.26–2.10) < 0.001 | **1.77 (1.41–2.22) <0.001** |
| **Labor category** | | | | |
| Miner | 138 (90.8) | 14 (9.2) | Comparison category | Comparison category |
| Municipality | 193 (90.6) | 20 (9.4) | 1.02 (0.54–1.93) 0.953 | 0.90 (0.53–1.53) 0.693 |
| Police officer | 105 (91.3) | 10 (8.7) | 0.94 (0.26–3.43) 0.930 | 1.01 (0.29–3.44) 0.990 |
| Military | 103 (92.8) | 8 (7.2) | 0.78 (0.44–1.39) 0.405 | 0.87 (0.50–1.50) 0.606 |
| Primary school teacher | 158 (84.0) | 30 (16.0) | 1.73 (0.72–4.16) 0.219 | 1.80 (0.79–4.10) 0.160 |
| High school teacher | 105 (75.5) | 43 (24.5) | 2.66 (1.22–5.80) 0.014 | **2.61 (1.27–5.36) 0.009** |
| Store | 180 (87.4) | 26 (12.6) | 1.37 (0.71–2.63) 0.344 | 1.23 (0.66–2.27) 0.513 |
| Street vendor | 74 (86.1) | 12 (14.9) | 1.51 (0.91–2.53) 0.112 | 1.24 (0.73–2.10) 0.435 |
| Transportation | 68 (90.7) | 7 (9.3) | 1.01 (0.61–1.68) 0.959 | 0.91 (0.53–1.56) 0.725 |
| Guard | 83 (84.7) | 15 (15.3) | 1.66 (0.85–3.25) 0.138 | 1.38 (0.68–2.83) 0.373 |
| Legal | 90 (83.3) | 18 (16.7) | 1.81 (0.86–3.80) 0.117 | 1.83 (0.90–3.70) 0.094 |
| Doctor | 59 (75.6) | 19 (24.4) | 2.64 (1.46–4.78) 0.001 | **2.78 (1.64–4.70) < 0.001** |
| Nurse | 106 (77.9) | 30 (22.1) | 2.39 (1.47–3.91) < 0.001 | **2.32 (1.44–3.72) 0.001** |
| Other healthcare professional | 135 (90.0) | 15 (10.0) | 1.09 (0.70–1.68) 0.713 | 1.03 (0.62–1.69) 0.923 |
| **Sex** | | | | |
| Female | 921 (87.6) | 130 (13.4) | Comparison category | Comparison category |
| Male | 676 (84.1) | 128 (15.9) | 1.29 (1.02–1.63) 0.034 | 1.18 (1.00–1.40) 0.051 |
| **Age (years)** | 34 (27–44) | 34 (27–44) | 1.00 (0.99–1.01) 0.921 | Did not enter the model |
| **Work during the pandemic** | | | | |
| I always had | 1221 (86.8) | 186 (13.2) | Comparison category | Did not enter the model |
| I got fired | 105 (81.4) | 24 (18.6) | 1.41 (0.77–2.56) 0.262 | Did not enter the model |
| I had it for moments | 271 (85.0) | 48 (15.0) | 1.14 (0.76–1.70) 0.528 | Did not enter the model |
| **Type of job** | | | | |
| In person | 880 (87.3) | 128 (12.7) | Comparison category | Did not enter the model |
| Remote | 226 (82.2) | 49 (17.8) | 1.40 (0.82–2.40) 0.214 | Did not enter the model |
| Hybrid | 491 (85.8) | 81 (14.2) | 1.12 (0.78–1.59) 0.546 | Did not enter the model |
| **Type of work you do** | | | | |
| Administrative | 676 (85.4) | 116 (14.6) | Comparison category | Did not enter the model |
| Operator | 921 (86.6) | 142 (13.4) | 0.91 (0.78–1.08) 0.263 | Did not enter the model |

Prevalence ratios, 95% confidence intervals (95% CI), and *p*-values were obtained with generalized linear models (Poisson family, log link function, models for robust variances, and adjustment for the city of residence). The age variable was analyzed quantitatively.

## 4. Discussion

Job insecurity was strongly associated with the three mental pathologies evaluated (the *p*-value showed an influential association). Of those surveyed, 33% were classified as having job insecurity, 14% had moderate or higher levels of stress, 30% had anxiety, and 16% had depression. The professions with the highest job insecurity were security guards (62%), transportation workers (51%) and street vendors (50%). Meanwhile, the professions with the lowest job insecurity were policemen with 17%, the military with 18%, and medical doctors with 19%. These results were congruent with those of Owen et al. in Wales, who determined that 75% of the workers had mental health and job insecurity due to personnel changes during the pandemic [96]. Xiao et al. in China found that inadequate mental health and job loss were related to the pandemic [9]. Moretti et al. identified in 51 workers in Naples, Italy, a relationship between mental health and job insecurity (*p* < 0.05) [97]. At the Latin American level, Castañeda et al. established in Colombia that job security

significantly affects patients' mental health [98]. Similarly, in Peru, De la Cruz established a significant association between emotions and the level of job satisfaction in supermarket workers [99]. In addition, Guillen determined in workers of the Chancay hospital that there was no significant association between perception of job insecurity and mental health variables such as depression, anxiety, and stress, and only after multivariate analysis was a slight association shown between depression and anxiety [100].

Our results indicate that greater stress was associated with having job insecurity (RPa: 1.77; 95% CI: 1.41–2.22; value $p < 0.001$) with the following professions being the most affected: high school teachers, medical doctors and nurses. Moderate to major depression was associated with having had job insecurity (RPa: 1.71; 95% CI: 1.51–1.94; $p < 0.001$) and having been fired during the pandemic (RPa: 1.63; 95% CI: 1.17–2.28; $p = 0.004$), with the following eight professions being the most affected: municipal workers (RPa: 2.59; 95% CI: 1.15–5.86; $p = 0.022$), primary school teachers (Rpa: 4.26; 95% CI: 1.48–12.21; $p$ value = 0.007), street vendors (Rpa: 3.11; 95% CI: 1.33–7.32; $p$ value = 0.009), transportation workers (Rpa: 3.28; 95% CI: 1.35–7.97; $p$ value = 0.009), security guards (Rpa: 2.84; 95% CI: 1.47–5.49; $p$ value = 0.002), lawyers and legal workers (Rpa: 2.90; CI 95%: 1.05–7.96; value $p = 0.039$), nurses (Rpa: 3.85; CI 95%: 1.59–9.31; value $p = 0.003$) and other healthcare professionals (Rpa: 2.92; 95% CI: 1.29–6.59; $p$ value = 0.010). These professions also experienced moderate or greater anxiety with job insecurity (Rpa: 1.43; 95% CI: 1.25–1.64; $p$ value < 0.001) if they were laid off during the pandemic (Rpa: 1.58; 95% CI: 1.27–1.98; $p$-value < 0.001). Anxiety was associated with being male and having been laid off, while stress was associated with three professions: secondary school teachers (Rpa: 2.61; 95% CI: 1.27–5.36; $p$ value = 0.009), medical doctors (Rpa: 2.78; 95% CI: 1.64–4.70; $p$ value < 0.001), and nurses (RPa: 2.32; 95% CI: 1.44–3.72; $p = 0.001$). Therefore, it was possible to corroborate that there is a close relationship between job insecurity and mental health due to the fact that during the pandemic, they lost their jobs. It could be corroborated that there is a close relationship between labor conditions and mental health because, during the pandemic, various jobs were lost, and some disorders such as anxiety, excessive stress, and depression were increased [95,99]. This, together with other problems that originated during the COVID-19 pandemic, had a very significant impact in several areas of human well-being such as health, social, economic, political, labor, etc. [95,99]. In the current study, it was observed that of the 1855 workers surveyed, 30% had moderate or severe levels of anxiety, 16% had depression, and 14% had stress, and men experienced more anxiety than women with 35.7% of men and women with 25.2% experiencing anxiety ($p < 0.001$). Similar results were found by Owen et al., who determined that oral health workers during the pandemic generated high-stress levels (82%) [96]. Oteir et al. identified in Jordan that 122 workers had severe symptoms of anxiety (30%) and depression (35%) [101]. Song et al. established in China that in workers who worked during the pandemic, the following frequencies were reported: anxiety (13%) and depression (14%) [102]. Xiao et al. [9] determined that in China there were anxiety (54%) and depression (58%). Moretti et al. identified in Naples, Italy, that (39%) were stressed and (24%) had excessive workload [97].

At the Latin American level, Castro et al. determined in Chile that (15%) were insecure due to aggravating or triggering mental health illnesses [103]. In Peru, Lovón and Chegne identified in Peruvian workers that the most frequent alterations in mental health were stress, anxiety disorders, and depressive disorders [104]. Aldazabal determined in a hospital in Lima that mental health was affected, obtaining the following stress frequencies: low (47%), medium (42%), and high (11%) [105]. Román determined that the main conditions during the pandemic in workers were: mild work stress (34%), burnout syndrome (76%), anxiety (70%), and exhaustion (66%) [106]. Healthcare professionals have been reported to be the most affected during the pandemic, with oral health workers with high levels of stress [96] and first-line health workers presenting anxiety and depression [101].

In Peru, mental health effects have been reported in hospital workers [100] as well as teachers, food service, and health workers [104]. Rodríguez [107] established differences in workers who worked during the pandemic regarding their mental health, the most

affected the ones working in basic activities such as commerce, teachers, and healthcare. Acuña [108] identified in workers of a municipality that job insecurity generated moderate levels of stress during the pandemic, while Aldazabal [105] determined that healthcare personnel presented high levels of stress and anxiety, and De la Cruz established that supermarket workers presented anxiety and excessive stress [99].

*Limitations*

Among the limitations of the study, the type of sampling was non-probabilistic, and probabilistic types have greater inferential capacity. However, due to the situation experienced during the pandemic, it was difficult to collect data. Thus, this sampling was selected for the current study. Second, although the instruments were validated, mental health specialists should corroborate the definitive diagnoses.

**5. Conclusions**

A relationship between job security and mental health status was observed in workers of Peru during the COVID-19 pandemic. Depression was associated with having been fired during the pandemic and associated with eight professions. Anxiety was associated with been a man and having been fired, while stress was associated with three professions. There is a clear association between having job insecurity and suffering from the three mental pathologies evaluated, which highlights the importance of assessing the mental impact.

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