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Sense of Coherence among Healthcare Workers in Ecuador during the COVID-19 Pandemic: Links to Work Engagement, Workplace Conditions, and Psychological Distress

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Abstract

This research sought to examine the relationships among sense of coherence, work engagement, and psychological distress among medical staff in Ecuador during the initial stage of the COVID-19 outbreak. An observational cross-sectional investigation was carried out involving 803 medical personnel from various areas across Ecuador, from April 2 to May 17, 2020. Data were gathered via an online questionnaire that included details on demographics and workplace conditions, along with the Utrecht Work Engagement Scale (UWES-9), General Health Questionnaire (GHQ-12), and Sense of Coherence Scale (SOC-13). Average scores were as follows: sense of coherence (M = 65.04; SD = 12.74), work engagement (M = 39.36; SD = 10.53), and psychological distress (M = 4.58; SD = 3.44). Significant positive links (p < 0.01) were observed between sense of coherence and work engagement, while negative associations emerged with psychological distress. In the course of the outbreak in Ecuador, medical staff experienced substantial declines in mental well-being. Sense of coherence showed connections to both work engagement and psychological distress. Participants reported declines in care quality and employment conditions relative to pre-COVID-19 levels.

Keywords: COVID-19, Health personnel, Psychological distress, Sense of coherence, Work engagement

Introduction

The COVID-19 outbreak, which began as an unusual pneumonia case in Wuhan, China [1], placed immense pressure on healthcare infrastructures worldwide, particularly straining intensive care facilities in Europe [2] and in nations with limited resources like Ecuador, facing shortages in equipment, staffing, and infrastructure [3]. Beyond physical illnesses, this crisis elevated levels of psychological distress (PD) among medical professionals [4].

A broad international analysis indicated elevated rates of mental health issues linked to the COVID-19 crisis compared to earlier crises, including post-traumatic stress, anxiety, depression, sleep disturbances, and dissociation, with higher prevalence in Latin America and lower in North America [5].

Medical workers have received extensive research attention globally regarding the effects of the COVID-19 crisis, yet gaps remain in understanding organizational measures for supporting their mental health [6], especially for those directly managing infected cases [7]. Evidence links PD to aspects such as patient outcomes and safety, family and professional settings, media coverage and societal views, and official responses to the outbreak, where factors like unpredictability, heightened alertness, and ethical challenges amplified PD [8].

With a population of around 17 million, Ecuador features an unevenly distributed healthcare network for handling critical illnesses, most notably along coastal regions, where COVID-19 infections coincided with widespread dengue outbreaks. Universal coverage is limited due to barriers in transportation and geography, complicating

access for certain indigenous communities or migrant groups [9]. This mirrors challenges in numerous Latin American nations, contrasting with fewer obstacles in Europe and the United States for detection and management of the outbreak [10]. Ecuador faced one of the most severe early outbreaks in Latin America, concentrated in densely populated and industrialized zones like Guayaquil [11], which at peaks represented 70% of national cases [12]. This highlighted deficiencies in the timely and efficient handling by the Ecuadorian healthcare framework during the outbreak's early period [13].

Relative to research from Asia, the United States, or Europe, limited publications address PD among medical staff in Latin American settings [14–16]. In those available, elevated occurrences of stress, anxiety, depression, and post-traumatic stress were noted [17]. Distress appeared particularly pronounced among frontline staff treating COVID-19 cases [18].

Work engagement (WE), assessed via the Utrecht Work Engagement Scale (UWES), represents a fulfilling, positive orientation toward work characterized by vitality, commitment, and immersion [19]. It encompasses various elements affecting engagement, such as organizational atmosphere; resources at work, professional, and personal levels; job requirements; and individual characteristics [20]. Sense of coherence (SOC) refers to the capacity to interpret circumstances, view them as controllable, and activate resources for adequate coping, encompassing comprehensibility, manageability, and meaningfulness [21].

Earlier investigations highlight sense of coherence and work engagement as vital elements for medical personnel [22], with reduced SOC potentially serving a protective role in subsequent outbreak phases [2]. Both sense of coherence and work engagement display positive mutual relations and inverse ties to PD. Thus, despite facing PD, medical staff maintained favorable and rewarding views of their roles amid demanding circumstances and difficult environments [23]. Among female workers in both medical and other fields, heightened workloads and worries over personal health or finances emerged, acting as forecasters of stress in later outbreak waves [24].

Preserving a supportive workplace has proven essential not just for boosting employee drive, contentment, and output [25], but also for mitigating adverse mental health impacts from the outbreak [26]. Research indicated that rising pandemic-related workloads among nurses correlated positively with work engagement [27].

Under the salutogenic framework [28, 29], sense of coherence acts as a significant forecaster and regulator of mental health and related symptoms throughout the outbreak, with effects persisting long-term [30]. Before the COVID-19 era, elevated SOC in nursing staff linked to improved health and engagement [31]. In essential non-medical roles during early confinement, reduced WE and SOC tied to increased PD [32].

This investigation aimed to explore links between sense of coherence, work engagement, workplace factors, and psychological distress in Ecuadorian medical staff during lockdown in the outbreak's early stage.

Materials and Methods

Research design
This investigation employed a descriptive, cross-sectional design.

Sample and participants
In 2019, Ecuador reported approximately 90,000 healthcare workers nationwide, comprising 39,593 physicians, 25,483 nurses, 17,221 nursing assistants, 5,508 dentists, 1,615 clinical psychologists, and 2,278 midwives [33]. Initially, 1,235 medical professionals from every province in Ecuador took part, with the largest proportions coming from Pichincha (31.2%) and Guayas (24.5%). Following the removal of incomplete responses (those lacking at least 99% completion), the final sample consisted of 803 participants (65% retention rate). Inclusion requirements were: 1) currently practicing as a healthcare worker; 2) aged 18 years or older; and 3) residing in Ecuador throughout the COVID-19 outbreak.

Data collection tools
Information was collected using a custom-designed questionnaire adapted from instruments employed in prior investigations of other pandemics [34]. The survey incorporated multiple components drawn from established sources: sociodemographic information (including gender, age, marital status, education, presence of children, pet ownership, and profession) and aspects of the workplace environment **(Table 1).** Variables pertaining to the work setting were rated on a scale from 1 to 10 [14], alongside assessments of sense of coherence (SOC) [29], the Utrecht Work Engagement Scale (UWES) [35], and Goldberg's General Health Questionnaire [36]. Respondents were also requested to

evaluate perceived shifts in care quality, employment conditions, occupational well-being, and patient safety by comparing the periods before and after the onset of the

pandemic. All relevant variables were scored on a 10-point scale.

Table 1. Questions on work environment related to the pandemic (Ecuador, 2020)

Variable	Question
Effectiveness	Do you believe that your department, service, unit, or institution has supplied you with the adequate resources and equipment to perform your duties EFFECTIVELY?
Safety	Do you believe that your department, service, unit, or institution has supplied you with the adequate resources and equipment to perform your duties SAFELY?
Distance	Do you regard the physical distance kept from your colleagues at work as sufficient?
Contact	Are you in direct contact with patients, users, or clients who might represent a potential infection risk?
Conflict	Have you noticed a rise in workplace conflicts or disputes in your role?
Risk	Do you consider that your occupation or work setting exposes you to a heightened chance of contracting the infection?
Acceptance	Do you view the possibility of becoming infected as an inherent and acceptable part of your professional role?
Psycho1	Do you think it would be valuable to provide psychological assistance to professionals and volunteers directly involved in managing the COVID-19 health emergency?
Psycho2	Do you think it would be valuable to provide psychological assistance to individuals and their families who have been directly impacted by COVID-19 in coping with the resulting challenges?
Psycho3	Do you think it would be valuable to provide psychological assistance to the broader population in coping with the challenges brought about by the COVID-19 health emergency?
Workload	Do you feel that your workload has increased since the beginning of the health emergency?
Stress	Do you experience higher levels of stress in your job?
Satisfaction	How would you rate your level of job satisfaction in the current COVID-19 context?
Appreciation	As a member of the healthcare workforce, do you feel valued and recognised by society?

All variables were rated on a scale from 1 to 10, where 1 represents the least favourable response and 10 the most favourable.

Sense of coherence (SOC) was evaluated using the SOC-13 questionnaire, comprising 13 items answered on a 7-point Likert scale, ranging from 1 (rarely or never) to 7 (very often or always). Total scores range from 13 to 91, where lower values reflect weaker SOC. The scale includes three subscales: meaningfulness, comprehensibility, and manageability. Reliability for the full scale was acceptable, with Cronbach's $\alpha = 0.808$. Subscale reliabilities were $\alpha = 0.652$ for comprehensibility, $\alpha = 0.575$ for manageability, and $\alpha = 0.570$ for meaningfulness [28, 29, 37–39].

Work engagement (WE) was assessed with the UWES-9, a 9-item instrument with responses on a 7-point Likert scale from 0 (never) to 6 (always), yielding a maximum total score of 54 (higher scores indicating greater engagement). It covers three dimensions: vigour, dedication, and absorption. Overall internal consistency was high (Cronbach's $\alpha = 0.928$), with subscale values of

$\alpha = 0.855$ for vigour, $\alpha = 0.852$ for dedication, and $\alpha = 0.757$ for absorption [35].

Psychological distress (PD) was measured using Goldberg's General Health Questionnaire (GHQ-12), a 12-item screening tool. Responses follow a 4-point Likert format, but scores are dichotomised (responses 1–2 coded as 0; 3–4 coded as 1), producing a total score from 0 to 12. A cut-off of 3 is typically used to identify probable cases on this unidimensional instrument. Reliability was good, with Cronbach's $\alpha = 0.874$ [36].

The complete survey was originally validated by experts in Spain [14] and subsequently adapted culturally for the Ecuadorian context to optimise item comprehension and incorporate locally relevant information.

Procedure

Recruitment followed a non-probabilistic snowball sampling approach. The survey was disseminated via social media platforms and official channels of public institutions and universities. It was hosted on the Qualtrics® platform and distributed to personnel in healthcare facilities and professional/scientific

associations. An email invitation containing the survey link was sent to potential participants, who were encouraged to forward it to colleagues, thereby generating a snowball effect. Responses were submitted online via internet-enabled devices. Data were collected from 2 April to 17 May 2020.

Data analysis

Categorical sociodemographic variables were summarised using absolute frequencies and percentages, while means and standard deviations were reported for SOC across these categories. Independent-samples t-tests were employed to examine differences in SOC between groups. Paired-samples t-tests assessed changes in perceived conditions before and after the pandemic onset, with effect sizes calculated using Cohen's d. For key continuous variables, descriptive statistics (mean, standard deviation, skewness, kurtosis, minimum, maximum) were provided, and associations were explored via Spearman's rho correlation coefficient.

Variables significantly correlated with SOC were entered into a multiple linear regression model. Model fit was evaluated with ANOVA; standardised residual normality was checked using the Kolmogorov-Smirnov test; multicollinearity was examined via tolerance values and variance inflation factors (VIF), retaining models with a condition index below 20 per Belsley guidelines. Linearity and homoscedasticity were inspected graphically, and residual independence was tested with the Durbin-Watson statistic.

Additionally, a classification and regression tree (CART) was constructed for SOC using the sample data to identify meaningful patterns. Optimal splits were chosen to maximise homogeneity within nodes and heterogeneity between them. Each node displayed the group mean and the proportion of the total sample it represented. This approach also facilitated prediction of PD likelihood in new cases. The tree was validated through sample splitting. All analyses were performed with SPSS version 26.0 and R statistical software version 4.0.0.

Ethical considerations

The research received approval from the Research Ethics Committee of Universidad San Gregorio de Portoviejo in Ecuador (USGP-DI-049-2021) and from the Research Ethics Committee of the Health System in Huelva, under the Regional Ministry of Health of Andalusia, Spain (PI 036/20)

Results and Discussion

Sociodemographic characteristics and their relation to sense of coherence

Participants had an average age of 33.8 years (SD = 8.13), ranging from 18 to 70 years. Most were female (65.3%), single or not cohabiting with a partner (56.9%), childless (52.2%), owned pets (57.2%), held university-level qualifications (95.6%), and continued working in-person during the pandemic (76.6%) **(Table 2)**. As shown in **Table 2**, SOC scores were significantly higher among those living with a partner and those with children (p < 0.05).

Table 2. Sociodemographic characteristics in relation to sense of coherence (Ecuador, 2020)

Variable	Category	SOC-13 M (SD)	N (%)	Cohen's d	Independent t-test (p-value)
Sex	Male	65.74 (12.56)	279 (34.7)	0.084	1.130 (0.259)
	Female	64.67 (12.82)	524 (65.3)		
Marital status	With a partner	66.29 (13.29)	346 (43.1)	0.173	2.421 (0.016)
	Without a partner	64.10 (12.23)	457 (56.9)		
Educational level	Upper secondary school or lower	66.89 (14.72)	35 (4.4)	0.151	0.762 (0.451)
	University or higher	64.96 (12.64)	768 (95.6)		
Children	Yes	66.25 (12.73)	384 (47.8)	0.182	2.582 (0.010)
	No	63.94 (12.66)	419 (52.2)		
Pet	Yes	65.21 (13.11)	459 (57.2)	0.031	0.429 (0.668)
	No	64.82 (12.23)	344 (42.8)		
Work location	From home	65.78 (12.49)	188 (23.4)	0.075	0.903 (0.367)

| | Outside home | 64.82 (12.81) | 615 (76.6) |

N: sample size; %: percentage; M: mean; SD: standard deviation.

Quality of healthcare, working conditions, and patient health and safety before and after the pandemic

Table 3 indicates respondents' perceptions of current healthcare quality in comparison to the pre-COVID-19 period: mean score of 5.16 now versus 6.19 previously. Similar declines were reported for working conditions (current M = 5.69 vs. prior M = 6.63), occupational health perceptions (current M = 5.47 vs. prior M = 6.61), and patient safety (current M = 5.90 vs. prior M = 6.86). All these differences reached statistical significance at $p < 0.01$.

Table 3. Perceived changes in quality of care, working conditions, occupational health, and patient safety before and during/after the COVID-19 pandemic (Ecuador, 2020)

Variable	Quality of Care		Working Conditions		Occupational Health		Patient Safety	
Period	Before the health emergency	Currently/During the health emergency	Before the health emergency	Currently/During the health emergency	Before the health emergency	Currently/During the health emergency	Before the health emergency	Currently/During the health emergency
N	803	803	803	803	797	803	786	803
Mean	6.19	5.61	6.63	5.69	6.61	5.47	6.86	5.90
Standard Deviation (SD)	2.11	2.48	2.10	2.45	2.26	2.57	2.05	2.61
Skewness	−0.555	−0.182	−0.668	−0.241	−0.517	−0.102	−0.575	−0.217
Kurtosis	−0.035	−0.823	0.139	−0.777	−0.327	−0.891	−0.107	−0.935
Paired t-test (t-value, Sig.)		8.032 (<0.001)		11.783 (<0.001)		13.583 (<0.001)		10.389 (<0.001)
Cohen's d		0.283		0.416		0.479		0.371

All variables scored on a scale from 0 to 10.

Sense of coherence, work engagement, psychological distress, and correlations between variables

As presented in **Table 4**, the average sense of coherence score was 65.04, including a mean of 23.90 for the comprehensibility dimension and 18.90 for the manageability dimension. The total mean score for the UWES was 39.36, comprising an average of 13.77 on the dedication dimension and 13.55 on the absorption

dimension. The mean score for psychological distress was 4.58.

Table 4. Results of the sense of coherence scale, work engagement scale, and general health questionnaire, and their respective dimensions or variables, during the COVID-19 pandemic, and correlations between variables (Ecuador, 2020).

| | N | Mean | SD | Skewness | Kurtosis | Minimum | Maximum | Spearman's Rho | | | | | | | | | | | | |
								SOC_13	Age	UWES	GHQ_12	Effectivenes	Safety	Distance	CONFLICT	PSYCHO1	PSYCHO2	PSYCHO3	Stress	Satisfaction	Appreciatio
SOC_13	803	65.04	12.74	-0.26	-0.32	19	91	—													
AGE	797	33.8	8.13	1.76	3.51	18	70	0.171 (<0.001)	—												
UWES	803	39.36	10.53	-0.74	-0.05	2	54	0.439 (<0.001)	0.089 (0.012)	—											
GHQ_12	803	4.58	3.44	0.47	-0.81	0	12	-0.483 (<0.001)	-0.013 (0.715)	-0.422 (<0.001)	—										
Effectiveness	803	6.41	2.90	-0.50	-0.89	1	10	0.202 (<0.001)	-0.042 (0.240)	0.266 (<0.001)	-0.235 (<0.001)	—									
Safety	803	6.42	2.94	-0.48	-0.95	1	10	0.192 (<0.001)	-0.048 (0.177)	0.255 (<0.001)	-0.223 (<0.001)	0.923 (<0.001)	—								
Distance	615	6.73	2.67	-0.59	-0.60	1	10	0.169 (<0.001)	0.071 (0.080)	0.217 (<0.001)	-0.116 (0.004)	0.416 (<0.001)	0.425 (<0.001)	—							

	CONFLICT	PSYCHO1	PSYCHO2	PSYCHO3	Stress	Satisfaction	Appreciation
	803	803	803	803	803	803	786
	6.21	9.25	9.42	9.19	7.91	6.57	6.63
	3.01	1.66	1.38	1.52	2.56	2.44	2.66
	−0.42	−2.62	−2.89	−2.11	−1.23	−0.55	−0.56
	−1.07	6.89	8.84	4.20	0.58	−0.36	−0.58
	1	1	1	1	1	1	1
	10	10	10	10	10	10	10
	−0.186 (<0.001)	0.106 (0.003)	0.115 (<0.001)	0.124 (<0.001)	−0.176 (<0.001)	0.244 (<0.001)	0.297 (<0.001)
	0.023 (0.512)	0.053 (0.133)	0.046 (0.196)	0.065 (0.069)	−0.027 (0.443)	−0.033 (0.346)	0.071 (0.048)
	−0.148 (<0.001)	0.029 (0.417)	0.062 (0.080)	0.083 (0.019)	−0.265 (<0.001)	0.371 (<0.001)	0.342 (<0.001)
	0.229 (<0.001)	0.076 (0.031)	0.032 (0.365)	0.045 (0.203)	0.357 (<0.001)	−0.263 (<0.001)	−0.271 (<0.001)
	−0.114 (0.001)	0.011 (0.745)	0.028 (0.422)	0.049 (0.164)	−0.122 (<0.001)	0.322 (<0.001)	0.281 (<0.001)
	−0.093 (0.008)	0.023 (0.515)	0.030 (0.399)	0.054 (0.129)	−0.099 (0.005)	0.312 (<0.001)	0.302 (<0.001)
	−0.031 (0.440)	0.055 (0.172)	0.079 (0.049)	0.082 (0.041)	−0.085 (0.035)	0.212 (<0.001)	0.205 (<0.001)
	—	0.095 (0.007)	0.069 (0.050)	0.092 (0.009)	0.405 (<0.001)	−0.070 (0.047)	−0.054 (0.130)
		—	0.744 (<0.001)	0.591 (<0.001)	0.296 (<0.001)	−0.011 (0.753)	0.037 (0.302)
			—	0.671 (<0.001)	0.241 (<0.001)	0.021 (0.550)	0.076 (0.034)
				—	0.281 (<0.001)	0.059 (0.092)	0.093 (0.009)
					—	−0.091 (0.010)	−0.102 (0.004)
						—	0.420 (<0.001)
							—

N denotes the sample size and SD indicates standard deviation; SOC-13 refers to the Sense of Coherence Scale, UWES represents the Utrecht Work Engagement Scale, and GHQ-12 corresponds to Goldberg's General Health Questionnaire, with detailed descriptions of all study variables provided in Table 1.

The evaluation of measures implemented by organizations to safeguard against the pandemic received comparable ratings, with perceptions of effectiveness, safety, and physical distancing among colleagues falling in the range of 6 to 7. The lowest rating was assigned to workplace conflict levels, with M = 6.21 (SD = 3.05).

The average perceived risk of contracting infection in the workplace was M = 8.72. Acceptance of the possibility of infection at work averaged M = 6.38, while satisfaction with job performance amid the pandemic averaged M = 6.57, and the sense of being valued as a healthcare worker during the crisis averaged M = 6.63. In

contrast, the highest ratings were attributed to the perceived importance of providing psychological support to frontline professionals and volunteers M = 9.25, to affected individuals and their families M = 9.42, and to the broader population M = 9.19; these items also exhibited the most pronounced skewness and kurtosis. The average level of work-related stress reported was M = 7.91, and the perceived increase in workload following the emergence of the health crisis averaged M = 7.76.

Table 4 further reveals statistically significant (p < 0.01) positive correlations between sense of coherence (SOC) and work engagement (WE), alongside negative correlations with psychological distress (PD). Likewise, SOC exhibited positive correlations (p < 0.01) with perceptions of company-provided effectiveness for safe and efficient job performance, maintenance of safe distancing by colleagues, job satisfaction during the pandemic, and perceived societal appreciation as a healthcare professional. SOC also showed positive correlations (p < 0.01) with age and with the perceived need for psychological support among patients, their caregivers, and the general population. Conversely, SOC demonstrated negative correlations (p < 0.01) with perceived increases in workplace conflict and with levels of work-related stress.

Multiple Linear Regression Model and Classification Tree Obtained in the Multiple Linear Regression Model
To develop the multiple linear regression model predicting sense of coherence (SOC), only variables showing significant correlations with the SOC-13 scale at the 0.01 level were included. Details regarding the independent variables incorporated into the model are displayed in **Table 5**. Notably, psychological distress (PD) emerged with an inverse association, whereas age, perceived social esteem, and work engagement (WE) scores contributed positively but with comparatively lower importance. Increased workplace conflict also displayed an inverse relationship. All predictors achieved statistical significance. The model was deemed valid (F = 80.085, p < 0.001) and accounted for 34.1% of the variance in the dependent variable (adjusted R^2 = 0.337). Normality of standardized residuals was confirmed via the Kolmogorov-Smirnov test (statistic = 0.032, p = 0.053). Tolerance and VIF values indicated absence of multicollinearity, and a Durbin-Watson statistic of 1.941 supported the independence of residuals.

Table 5. Multiple linear regression model (Ecuador, 2020)

Model	Standardized Coefficients (Beta)	95.0% Confidence Interval for B		Collinearity Statistics	
		Upper Bound	Lower Bound	VIF	Tolerance
(Constant)		57.104	47.068		
GHQ-12	−0.349	−1.052	−1.537	1.302	0.768
UWES-9	0.235	0.362	0.204	1.307	0.765
Age	0.129	0.304	0.115	1.026	0.975
Appreciation	0.088	0.717	0.128	1.153	0.867
Conflict	−0.073	−0.059	−0.558	1.057	0.946

Dependent variable: SOC-13. SOC: Sense of Coherence Scale; UWES: Utrecht Work Engagement Scale; GHQ-12: Goldberg's General Health Questionnaire. Appreciation: Perceived societal appreciation as a healthcare professional. Conflict: Perceived increase in workplace conflict.

Note: Assumptions of linearity among the predictors and homoscedasticity of residuals were verified through graphical inspection.

Figure 1 illustrates the classification and regression tree for sense of coherence (SOC), which begins at a root node and splits primarily based on psychological distress (PD) and work engagement (WE). For PD scores of 9.5 or higher, two terminal nodes emerge: one representing 1% of cases with UWES scores below 15.5 and a mean SOC of 38.87, and another comprising 9% of cases with a mean SOC of 53.22. When PD scores fall between 5.5 and 9.5, the tree divides into nodes yielding a mean SOC of 58.69 for 22% of participants with UWES scores under 45.5, and 65.31 for those with scores at or above 45.5. In the branch where PD is below 5.5 and UWES is less than 39.5 (covering 21 percent of the sample), the mean SOC is 55.15 for individuals aged under 26.5 years and rises to 64.44 for those aged 26.5 years or older. Lastly, for cases with PD below 5.5 and UWES at or above 39.5, three terminal nodes are formed: when societal appreciation is below 8.5 and PD is under 0.5, 5 percent of the sample shows a mean SOC of 76.33; with PD at or above 0.5 in this appreciation range, 19 percent of the sample has a mean SOC of 69.07; and when societal appreciation is 8.5 or higher, 17% of the sample achieves a mean SOC of 74.81.
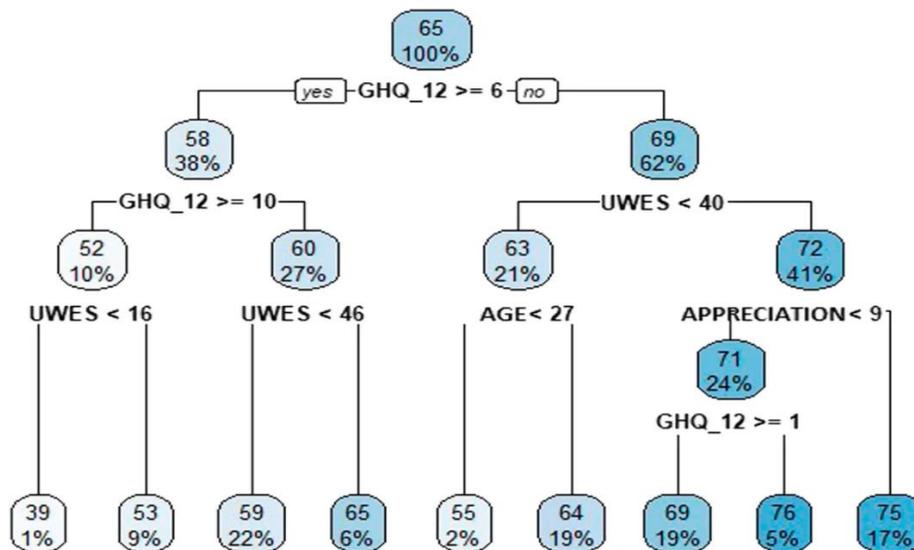
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Figure 1. Classification and regression tree derived from variables in the linear regression model (Ecuador, 2020). UWES: Utrecht Work Engagement Scale; GHQ-12: goldberg's General Health Questionnaire.

The present research has enabled an evaluation of sense of coherence (SOC) among healthcare workers in Ecuador during the initial stage of the COVID-19 pandemic, potentially affected by factors such as work engagement (WE), workplace conditions, and psychological distress (PD).

Findings align with earlier research demonstrating that elevated SOC is positively linked to favorable work environments, while both are inversely related to PD [2, 24]. Workplace environment is shaped by job satisfaction levels, with SOC serving as a moderator; moreover, job satisfaction and SOC emerge as stronger predictors of work environment compared to resilience [40]. Likewise, the observed connection between supportive work settings and higher SOC supports prior investigations indicating that enhancements in nurses' working conditions, coupled with increased SOC, contribute to better personal health outcomes [41].

Consistent with these results, existing literature highlights SOC and WE as critical elements influencing employees. For instance, European healthcare staff exhibiting greater work-related SOC appeared shielded from shifts in psychological symptoms for approximately three months, though this protective effect diminished over time, resulting in declining mental health [22]. Conversely, workers with lower SOC might experience protection during later pandemic phases [2].

This investigation reveals that individuals with a partner or children displayed higher SOC, corroborating studies in Japanese hospitals that reported elevated PD among those living alone [42], thereby confirming an inverse relationship between SOC and PD. However, these patterns diverge when examining women and younger individuals [42], or associations between gender and educational attainment [31], as no SOC differences emerged for these variables. Further research on healthcare personnel during the COVID-19 crisis is warranted, given its impact across diverse sociodemographic profiles [43].

It was not feasible to examine potential differences in SOC between infected and non-infected healthcare workers, despite prior evidence of mental health disparities [44]. This limitation arose because, although the survey inquired about infection status, diagnostic testing was limited to a small proportion of professionals in the early pandemic period—a situation aligned with the reported deterioration in occupational health during that phase, with lingering effects six months post-confinement [45].

A notable proportion, 23.4%, of responding healthcare workers performed duties remotely. This subgroup, active in the pandemic's early stage, typically handled administrative tasks, non-contact roles, telemedicine consultations (video or phone), or management of suspected cases. No distinctions were detected between teleworkers and those at health facilities, likely due to health risks tied both to patient exposure and remote

work conditions, influenced by home or job setups [46–49].

As anticipated, healthcare staff perceived substantial declines in care quality, employment conditions, and occupational well-being relative to pre-crisis levels. Earlier work has suggested approaches to bolster positive workplace elements that offset heightened workloads and related stress [50]. Stress sources could stem from infection risks (personal or to others), job demands, or virus containment measures [5]. Socioeconomic and political factors have been cited for varying national responses [51], including low vaccination rates among professionals in some settings, potentially affecting broader population conduct [52]. In Ecuador, the public health system's reaction appeared inadequate, particularly in staffing and resources, heightening contagion fears for workers and families [53].

The observed perceptions of markedly deteriorated working conditions among healthcare personnel in this study concur with prior Ecuadorian reports [11, 12] and can be attributed to delays in the national health system's response [13]. Sustaining or preventing further degradation of health facility conditions amid a pandemic largely hinges on public health infrastructure capacity to manage sudden workload surges, especially in primary care [54]. Nonetheless, as noted elsewhere, public sector workers exhibited greater PD than those in private or independent entities within the country [55]. Calls have emerged to overhaul public mental health frameworks post-COVID-19 in affluent nations [56, 57], yet this poses greater challenges for developing regions, including much of Latin America.

Importantly, data collection occurred during the pandemic's initial wave, coinciding with peak case incidence. This timing facilitates comparison with a multi-country study (Argentina, Chile, Colombia, Ecuador) that, predictably, identified poorest mental health indicators among healthcare workers at incidence peaks, in intensive care settings, and among those infected or uncertain about infection [15].

The COVID-19 pandemic has underscored the critical function of public health and the necessity of interventions across various life domains—family, community, education, recreation, and employment—which could be supported by integrating an "occupational health approach" within public health frameworks [58].

Among the study's limitations, it should be highlighted that the majority of participants held university-level qualifications, given the focus on physicians and nurses. Consequently, the findings may have reduced generalizability to lower-qualified healthcare personnel, who warrant separate investigation. Additional constraints include the absence of analysis by specific job roles or employment sector (public versus private). While access to internet-enabled devices might have posed a barrier, this did not affect the target group, as the survey was compatible with various platforms, including computers, tablets, or smartphones. In terms of statistical methods, a non-probabilistic snowball sampling strategy—distributed via institutions and social media—was selected to enable swift data collection during the pandemic's early stage; this approach has since been employed in European research as well [59]. It must also be acknowledged that the Spanish-adapted SOC scale demonstrated relatively low internal consistency in its published form. Moreover, the validated Spanish version of the SOC-13 lacks reported values for minimal clinically important differences (MCID) [60], potentially influencing the interpretation of sense of coherence in this investigation. Accordingly, upcoming research should refine the psychometric characteristics of the Spanish adaptation.

The primary limitation stems from the intense workload demands on healthcare staff during the pandemic's initial wave, when data were gathered; this restricted response volume yet enhanced the significance of contributions from those who participated. Certain factors were not examined here but merit inclusion in subsequent work, including specific clinical specialties, years of professional experience, and employment status.

Conclusion

In summary, during the early stage of the pandemic, sense of coherence levels among Ecuadorian healthcare workers were influenced by psychological distress (PD), work engagement (WE), workplace conditions, age, perceived societal appreciation as a healthcare professional, and observed rises in workplace conflict amid the crisis.

The evaluated healthcare personnel reported notable declines in care quality, employment conditions, occupational well-being, and patient safety relative to the pre-COVID-19 emergency period. Overall, these professionals exhibited elevated SOC, positively linked to WE across its three components—vigor, absorption, and dedication—while showing an inverse relationship

with PD. Workplace environment correlated significantly with perceived safety and effectiveness of organizational measures against COVID-19 infection, as well as colleague distancing practices to prevent transmission. Job satisfaction throughout the pandemic and feelings of societal recognition as a healthcare worker emerged as factors shaping SOC, whereas workplace conflict and stress levels displayed negative associations. Lastly, participants assigned substantial importance to the provision of psychological support for affected individuals, frontline treatment providers, and the wider population.

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