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Model of wellbeing, work dissatisfaction, and stress in nursing staff during the COVID-19 pandemic.

Daniela Lilian González-Sánchez[1], María de Jesús López-Ramos[†2], Estefana Lara-Esquivel[3], Nereyda Cruz-Zúñiga[4], y Efrain Armenta-Rojas[1*].

[1] Autonomous University of Baja California. Medicine and Psychology Faculty. Tijuana, Baja California, Mexico.
[2] Centro Médico Florence. Tijuana, Baja California, México.
[3] Mexican Institute of Social Security/Department of Health Education and Research. Tijuana, Baja California, México.
[4] Autonomous University of Baja California. Health Sciences Faculty. Tijuana, Baja California, México.

*** Corresponding author:** Efrain Armenta-Rojas, Medicine and Psychology Faculty, Autonomous University of Baja California, Universidad 14418, Parque Internacional Industrial Tijuana, 22390 Tijuana, B.C., Mexico. E-mail: efrain.armenta@uabc.edu.mx

Abstract.- Background: The COVID-19 pandemic has highlighted the significant deficiencies and inequities in Mexico's health sector, particularly impacting the health wellbeing of nursing personnel. Increased dissatisfaction and work stress have been reported due to new care protocols, work overload, scarcity of human and material resources, as well as the loss of colleagues and family members. The aim of this study was to develop and test a model of health wellbeing based on working conditions, work satisfaction, and stress in nursing staff during the first wave of COVID-19 in Tijuana, BC. Methods: This was a descriptive correlational study, in which measurement instruments were applied to 325 professionals to assess their health wellbeing, work satisfaction, work stress, physical activity, and perception of aspects related to the COVID-19 pandemic. Descriptive statistics, mean comparisons, as well as Pearson and Spearman correlations were performed to develop a Path Analysis model. Findings: No significant differences were found in work stress or work satisfaction with respect to the work area during the first wave of the COVID-19 pandemic. The developed model predicted the health wellbeing of nursing professionals based on their perceived work protection, work disappointment, stress, and work satisfaction. Conclusion: Work satisfaction, work stress, perceived work protection, and perceived work disappointment significantly predict health wellbeing in nursing staff in Tijuana. The developed model served as the basis for the development of a pilot intervention currently being applied to reduce work stress, increase job satisfaction, and improve interpersonal relationships.

Keywords: Nursing; Occupational stress; Work satisfaction; Well-being; COVID-19; Betty Neuman.

1. Introducción

The coronavirus pandemic (COVID-19) has caused the loss of millions of lives around the world, including health care workers [1]. According to the Pan American Health Organization, Mexico was the country with the greatest loss of human resources during the first wave. 97,632 Mexican healthcare workers were infected between February 28 and August 23, 2020. By September 3 of that year, Mexico had

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recorded more healthcare worker deaths from COVID-19 (1320) than any other country surpassing the United States (1077) and the United Kingdom (677)[2].

This could be explained by the fact that health personnel faced the pandemic with shortages of medical supplies, such as lack of personal protective equipment, work overload, lack of infrastructure, and weakened health systems[3]. In addition, personnel had to face a social phenomenon characterized by discrimination, rejection, verbal and physical aggression, with nursing personnel being the most affected[4].

Given the working conditions and the perception of aspects related to the COVID-19 pandemic, health professionals demonstrated a great capacity for adaptation; however, it is important to note that this does not necessarily imply health wellbeing[5].

According to Betty Neuman's systems theory, health is dynamic and constantly changing, including a full continuous movement from wellness to illness. Optimal wellness is achieved when all the needs of the system are fully met. In this case, the system is represented by the nursing professional, who experienced a disruption in its health wellness due to job dissatisfaction and stress[6].

Both job dissatisfaction and job stress are risk factors for the development of mental and physical health disorders in nursing personnel[7]. This was confirmed during the first wave of COVID-19, as workers presented significant physical and emotional role alterations due to job dissatisfaction and stress. The latter was related to imposed separation from loved ones due to work commitment, fear of personal and family contagion due to lack of protective equipment, and sadness due to death or illness of colleagues, confinement, and lack of physical activity[8]. Reported main alterations were anxiety, depression[9], decreased vitality and negative metabolic changes such as obesity, diabetes and hypertension[10–12].

Moreover, perceived lack of professional skills and accomplishments were factors that contributed to job stress, since disciplinary expertise and knowledge are essential for decision making in stressful situations such as the COVID-19 pandemic. Therefore, the feeling of having a lack of knowledge about the procedures to be performed on patients in COVID areas contributed to the impairment of health well-being[13].

This is based on the fact that work is not only a productive activity that generates resources to pay for one's own life, but also determines one's social position, provides a sense of belonging and identity, and contributes to the development of social self-concept[14]. In this social self-concept, working conditions also play a fundamental role in triggering job dissatisfaction and stress, since they have a direct influence on the worker, on interpersonal relationships and can even alter the work environment[15], causing friction between workgroups due to long working hours, absenteeism, work overload[8,9], low wages, as well as lack of job and social security[16].

This situation was exacerbated in the city of Tijuana due to the transformation of hospitals. This generated the need for emergent training, new management organization strategies and readaptation to new work areas[17,18]. In most cases, these

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areas were noisy, with restricted access, inadequate lighting and insufficient human and technological resources, some of which were obsolete[19].

Further, these areas involved a high level of responsibility and intense cognitive, physical, social and emotional demands. The consequences of making mistakes were potentially irreversible, leading to increased work-related stress when performing care activities[20].

Nursing staff's precarious working conditions around the world are not a novelty and have been described over the years[21]. Although it is known that these can impact the productivity of the organization and the quality of nursing care provided to users, it has always been a secondary concern to document how they affect the well-being and health of the nursing profesional[22].

Therefore, determining whether working conditions, job satisfaction and stress, as well as the perception of aspects related to the COVID-19 pandemic are related to job dissatisfaction and stress, and if physical activity and social support during confinement were protective factors, is a key issue.

Therefore, the aim of this study is to develop and test a health well-being model that explains the relationship between working conditions, job satisfaction and job stress in nursing staff during the first wave of COVID-19 in the city of Tijuana, BC.

2. Materials and Methods

This cross-sectional correlational study was conducted in Tijuana, Baja California, Mexico, during the period between June of 2021 and May of 2022. The target population consisted of nursing professionals who worked in the city of Tijuana during the first wave of the COVID-19 pandemic.

2.1 Eligibility criteria

This study included both male and female individuals who worked during the first wave of the COVID-19 pandemic in public or private hospitals that were transformed, as well as fever clinics in Tijuana. Nursing professionals who worked in municipalities other than Tijuana were excluded.

2.2 Sample definition

The sample size was obtained probabilistically from a database of the Nursing Human Resources Administrative Information System, located on the official website of the General Directorate of Quality and Health Education. The total population identified was N=1901 professionals. To calculate the sample size, the finite universe formula was used with a margin of error of 0.05 and a confidence level of 95%. The final sample consisted of n=325 nursing professionals.

2.3 Variables

The exogenous variables considered in the study were work conditions, job satisfaction, work stress, physical activity and perception of aspects related to the COVID-19 pandemic, while health well-being was considered as the endogenous variable.

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2.4 Instruments used to collect data

2.5.1 *Personal data form*

A personal data form consisting of 24 items was used: seven items that inquired about sociodemographic data: age, date of birth, sex, marital status, and number of children; nine items that explored the working conditions of the nursing personnel: degree of studies at the beginning of the pandemic, work shift during the first wave of COVID 19, work seniority, contractual status, hiring category, work area, work benefit derived from the pandemic; and finally eight items that measured personal pathological history before and one year after the first wave of the pandemic: obesity, Type II Diabetes Mellitus and Systemic Arterial Hypertension and medical care seeking.

2.5.2 SF-36 Health Survey.

To assess the current health well-being of the participants in relation to that of one year ago (first wave of COVID-19), the SF-36 Health Survey creado por Ware & Sherbourne en 1992 was used; This scale consists of 36 items that assess both positive and negative states of health and includes eight dimensions: physical function, role limitations due to physical problems, bodily pain, general health, vitality, social function, role limitations due to emotional problems, and mental health. In addition to these eight health scales, an item is included that measures the general concept of changes in the perception of current health status compared to how it was perceived in the previous year.

In order to evaluate the results, the items are coded, aggregated and transformed into a scale ranging from 0 (worst state of health) to 100 (best state of health) using the algorithms and indications provided in the scoring and interpretation manual of the questionnaire. Thus, a higher score in the different dimensions indicates a better state of health and/or a better quality of life.

2.5.3 *Perception and opinion test on COVID-19 epidemic-related aspects.*

The perception and opinion on COVID-19 epidemic-related aspects was measured with the questionnaire of the same name designed by Monterrosa-Castro et al., 2020; its objective is to address dimensions regarding governmental measures, citizen behavior and expressions of fear of the pandemic; it has 25 binary response items (Yes/No); however, for the purposes of this research a modification was made in the response options being modified from binary to Likert type with five options: Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree and Strongly Agree. In addition, item 23 was excluded, since it measures social discrimination and this was evaluated using the first item of the same instrument.

2.5.4 *Job stress test*

The Hock Job Stress Test was designed by Hock in 1988, in order to explore stress in work environments; it consists of twelve Likert-type response items, in which responses are scored as follows: Never = 1 point, Hardly ever = 2, Seldom = 3, Sometimes = 4, Relatively often = 5 and Very often = 6. The sum of the responses is rated as follows: No stress symptoms = 0-12 points; No stress symptoms, but in alarm phase = 13-24; Mild stress = 25-36; Moderate stress = 37-48, High stress = 49-

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60; and over 61= Severe stress. The cut-off point is set at 25 points, indicating the presence of job stress. High scores indicate greater psychosomatic response, which corresponds to a higher level of stress. The instrument has shown high reliability in the Latin population based on Cronbach's Alpha of 0.873[24].

2.5.5 *Font Roja Questionnaire*

The Font Roja questionnaire created by Aranaz and Mira in 1988 and expanded by Núñez González et al. en 2007 was used. It consists of 26 items assessed on a Likert-type scale in which 1 is the minimum satisfaction level and 5 is the maximum satisfaction level, and has a total score range that goes from 26 (minimum job satisfaction) to 130 (maximum job satisfaction). According to the obtained score, there were three categories to evaluate the level of job satisfaction, low satisfaction (26-61 points), medium satisfaction (62-95 points) and high satisfaction (>95 points). The result of items 6, 7, 12, 13, 14, 14, 15, 16, 17 and 19 were recoded inversely to the rest of the items, before making the total sum.

The instrument consists of ten factors, including: job satisfaction (items 7, 10, 11 and 16), which is the degree of satisfaction experienced by the individual conditioned by his or her job: job satisfaction (items 7, 10, 11 and 16) which is the degree of satisfaction experienced by the individual conditioned by his/her job; job-related stress (items 2, 3, 4, 5 and 6) which corresponds to the degree of stress that the exercise of the profession brings to the individual and which is reflected mainly in the fatigue experienced, perceived responsibility and job stress; professional competence (items 22, 23 and 24), which refers to the degree to which the individual believes that his or her professional preparation coincides with what his or her job demands; work pressure (items 18 and 20), which is the degree to which the individual feels that he or she has enough time to carry out his or her work; professional promotion (items 9, 12 and 17), understood as the degree to which the individual believes that he or she can improve, both professionally and in terms of recognition for his or her work; interpersonal relationship with bosses (items 13 and 19), which is the degree to which the individual considers that he/she knows what is expected of him/her by his/her bosses; interpersonal relationship with colleagues (item 14), which is the degree of satisfaction caused in the individual by the social relationships with his/her colleagues; extrinsic status characteristics (items 8 and 15), which is the degree to which the individual is recognized as having a specific status, both in terms of compensation and independence in the organization and performance of the job; work monotony (items 1 and 21), which is the degree to which the individual is affected by the routine of relationships with colleagues and the lack of variety in the job; and satisfaction with the physical work environment (items 25 and 26), which reflects satisfaction with the physical work environment [25,26]. This instrument has been previously used in the Latino population demonstrating adequate consistency with a Cronbach's alpha of 0.80 [27].

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2.5.6 *Physical Activity Test*

To assess the physical activity of the participants, the "Brief Physical Activity Questionnaire for Primary Care Consultation" by Puig Ribera et al. was used; it consists of two items that measure the frequency and duration of vigorous and moderate intensity physical activity during a "typical" week. The items were adapted for the purposes of this research as follows: 1.- How many times per week did you engage in 20 minutes of physical activity before the COVID-19 pandemic that made you breathe fast and hard, with multiple response options: 3 or more times per week (4 items), 1 to 2 times to twice per week (2 items), or never (0 items). How many times per week did you perform 30 minutes of moderate physical activity or walk in a way that increased your heart rate or made you breathe harder than normal, with multiple response options: 5 or more times per week (4 points), 3 to 4 times per week (3 points), 1 to 2 times per week (2 points), never (0 points).

A scoring system was used to interpret the instrument, classifying participants as "sufficiently active" with a score equal to or greater than 4, and as "insufficiently active" in any other case. The questionnaire has demonstrated good reliability in Spanish-speaking adults (k = 0.70; 95% CI; 0.53-0.82)[28].

2.6 Pilot Test

In order to validate the SF-36 Health Questionnaire and the COVID-19 Epidemic Aspects Perception and Opinion Test in the context of this study, a pilot test was conducted. The measurement instruments were applied to nursing professionals from a private hospital located in Tijuana, Baja California. The total population of professionals in the private hospital was N=80. The sample size was calculated probabilistically using the formula for pilot tests, considering a confidence level of 95% and a probability of 0.5%, which resulted in a calculated sample size of n=59[29]. The final sample size was n=80 participants. Subsequently, Cronbach's alpha and McDonald's omega coefficients were used to determine the internal consistency of the questionnaires.

Both the SF-36 Health Questionnaire and the COVID-19 Epidemic Aspects Perception and Opinion Test showed adequate internal consistency. The SF-36 Health Questionnaire showed a Cronbach's alpha coefficient of 0.867 and a McDonald's omega coefficient of 0.900, while the COVID-19 Epidemic Aspects Perception and Opinion Test showed a Cronbach's alpha coefficient of 0.887 and a McDonald's omega coefficient of 0.896. These results indicate that both instruments are reliable and consistent in measuring the variables of interest in the sample of nursing professionals during the COVID-19 epidemic in the city of Tijuana, Baja California.

2.7 Data collection

All persons (n=325) were invited to participate voluntarily in the project, and once they gave their consent, the measuring instruments were applied. The collection of information was carried out in a single 40-minute session. Due to the COVID 19 pandemic, taking into account the recommendations issued by the World Health Organization to maintain a healthy distance and in order not to expose human resources, both the informed consent form and the application of the

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measurement instrument were carried out through the Google Forms platform[30,31].

2.8 Data Processing and Analysis

The data was captured and processed using the IBM Statiscal Package for the Social Sciences (IBM SPSS) version 26.0 and Jamovi version 2.2.5 for Windows. The internal consistency of the instruments was evaluated using Cronbach's alpha and McDonald's omega tests[32]. Descriptive statistics, Chi-square, Student's t-test and ANOVA tests were used to analyze the sociodemographic data of the participants, as well as Pearson and Spearman correlations considering a $p<0.05$ as statistical significance. Based on the variables that were significantly correlated, a statistical model was designed by means of Path Analysis using IBM AMOS 24 software.

A maximum likelihood method was used to estimate the model parameters and Chi-square ($\chi 2$), Root Mean Square Error of Approximation (RMSEA), Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Parsimonious Normalized Fit Index (PNFI) and Akaike's Information Criterion (AIC) values were reported as indicators of goodness of fit.

Acceptable fit values for Chi-square, GFI, CFI and PNFI are close to 1.0. Acceptable RMSEA values are close to or less than 0.05 while lower AIC values indicate a better fit[33–35]. The results section presents the final adjusted solution, which includes as exogenous variables job satisfaction, job stress, perception of job disappointment, perception of job protection and distress at the thought of going to work, and as an endogenous variable health well-being measured by the SF-36 and its factors.

2.9 Ethical Aspects

The study complied with national ethical standards and was submitted to and approved by the Ethics and Research Committee of the Autonomous University of Baja California (UABC) with registration number 003-2022. This research complies with the universal guidelines of the Helsinki declaration of 1964, its subsequent amendments[36] as well as the General Health Law on research in Mexico[37].

3. Results

3.1 Measuring Instruments Internal Consistency

The reliability of the measurement instruments was evaluated using Cronbach's alpha and McDonald's omega tests. All instruments scored above 0.7 in both tests, which is considered a good reliability [32], It should be noted that the omega values obtained were higher than those of alpha in all the instruments (Table 1).

Table 1. Measuring instruments internal consistency

Instrument	Alfa de Cronbach	Omega de McDonald
Job stress test	0.880	0.895
Font-Roja Questionnaire	0.731	0.748
SF-36 Health Questionnaire	0.918	0.928
Perception and opinion test on COVID-19 epidemic-related aspects	0.861	0.877

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3.2 Sociodemographic Characteristics

The sociodemographic characteristics of the sample showed that 81% (*n*=263) of the participants were women. The mean age was 34 ± 9 years. Most of the participants were single (46.8%) and without children (45.2%), with a bachelor's degree (41%), followed by technical level (26%). The institution with the highest representation was the Ministry of Health (29.2%; *n*=95), followed by a private hospital (26.2%; *n*=85), the Mexican Social Security Institute (IMSS) (17.5%; *n*=57), Red Cross (12. 3%; *n*=40), Instituto de Seguridad y Servicios Sociales de los Trabajadores del Gobierno y Municipios del Estado de Baja California (ISSSTECALI) (11.5%; *n*=37) and Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE) (1.5%; *n*=5). It is worth mentioning that 1.5% (*n*=5) of the participants worked in both IMSS and the Ministry of Health and one person in ISSSTECALI and Ministry of Health. It is worth mentioning that, due to the nature of the statistical tests, this person was considered within the ISSSTECALI category.

The employment characteristics of the sample during the first wave of COVID-19 are shown in Table 2, including whether or not they received any type of benefit for working in the first line of care.

3.3 Physical activity and body weight changes pre- and post-pandemic

Regarding physical activity, 53.8% (*n*=175) of the professionals were classified as "Sufficiently active". No significant difference was found in the level of physical activity as a function of sex ($\chi 2$=1.04; *p*=0.306), but a significant difference was found as a function of institution ($\chi 2$=21.39; *p*=0.011), where 72.5% (*n*=50) of professionals from private institutions were classified as "Sufficiently active".

With respect to changes in body weight, 41.2% (*n*=134) of participants indicated that they were not overweight or obese prior to the pandemic, however, 58.8% (*n*=191) reported having acquired either of these conditions prior to the pandemic. 56.3% (*n*=183) of participants reported gaining weight during the pandemic, with 32.8% (*n*=60) referring a gain of between 3 and 5 kilograms, 27.9% (*n*=51) gaining less than 3 kilograms, 26.2% (*n*=48) gaining 5 to 10 kilograms, and 13.1% (*n*=24) gaining more than 10 kilograms

3.4 Pre- and post-pandemic personal pathological history

33.5% (n=109) of the sample had a personal pathological history (PPH), of which 63.3% suffered from obesity, followed by arterial hypertension (AHT) (16.5%) and type II diabetes mellitus (DM2) (11%). When asked if they had any medical control to treat these diseases, according to the self-report, the majority reported that they did (55.4%). On the other hand, 13.8% of the participants reported having had some pathology during the first wave of COVID-19, among which obesity stands out (61.5%). It is worth mentioning that 4.4% (n=2) were diagnosed with HT, DM2 and obesity. In addition, a weak positive correlation was found between weight gain and the diagnosis of some pathology during the first wave (*Rho* = 0.113, *p* = 0.041).

In addition, once they were aware of the pathology, only 44.9% of the participants sought medical attention for control; of the rest of the sample that for some reason did not go for consultation, 40% (n=26) self-medicated. Additional information is shown in Table 3.

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Table 2. Work characteristics of the sample during the first wave of COVID-19.

Variable	Prevalence	Frequency
Shift		
Fixed	2.1%	*n*=7
Morning	40%	*n*=130
Afternoon	19.7%	*n*=64
Evening	14.2%	*n*=46
Cumulative shift	8.3%	*n*=27
Rotating	8%	*n*=26
Worked two shifts	7.7%	*n*=25
Seniority		
Less than 6 months	28.6%	*n*=93
From 7 months to 1 year	6.8%	*n*=22
1 to 3 years	3.1%	*n*=10
4 to 6 years	25.5%	*n*=83
7 to 9 years	8.3%	*n*=27
More than 9 years	27.7%	*n*=90
Contractual status		
Base contract	42.8%	*n*=139
Eventual contract	30.2%	*n*=98
Trust contract	9.5%	*n*=31
Fee-based	4.9%	*n*=16
I was hired at the beginning of the pandemic	12.6%	*n*=41
Category		
Auxiliary Nurse	29.9%	*n*=97
General Nurse	46.5%	*n*=151
Specialist	7.7%	*n*=25
Floor Manager	3.1%	*n*=10
Supervisor	3.4%	*n*=11
Nursing Intern	0.9%	*n*=3
Nursing Student	5.8%	*n*=19
Manager	0.6%	*n*=2
Operator	0.3%	*n*=1
Other	1.8%	*n*=6
Work area		
First line	60%	*n*=195
Second line	29.8%	*n*=97
Other service	10.2%	*n*=33
Pandemic work benefit		
Yes	84.6%	*n*=275
No	15.4%	*n*=50
Type of Benefit		
COVID Award	0.3%	*n*=1
Occupational hazard pay	2.2%	*n*=7
I only received a bonus	0.6%	*n*=2
Change of contract	1.5%	*n*=5
COVID Bonus	42.1%	*n*=137
Other	37.8%	*n*=123
I will not receive any benefits	15.4%	*n*=50

n= number of cases

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Table 3. Personal pathologic history and disease control pre and post COVID-19

Variable	Prevalence	Frequency
Pre-COVID-19 PPH	33.5%	*n*=109
Type of Pre-COVID-19 PPH		
AHT	16.5%	*n*=18
DM2	11%	*n*=12
Obesity	63.3%	*n*=69
Other	9.2%	*n*=10
Self-reporting of AHT and DM2 medical control		
Controlled AHT	77.8%	*n*=14
Controlled DM2	66.7%	*n*=8
PPH diagnosed during the first wave of COVID-19	13.8%	*n*=45
AHT	22.2%	*n*=10
DM2	11.1%	*n*=5
Obesity	53.3%	*n*=24
AHT and DM2	2.2%	*n*=1
AHT and Obesity	2.2%	*n*=1
DM2 and Obesity	4.4%	*n*=2
AHT, DM2 and Obesity	4.4%	*n*=2
Have you sought medical attention to maintain control of your condition?		
Yes	44.9%	*n*=53
No	55.1%	*n*=65
Reason for not seeking medical care		
I don't have time to go to a doctor's office because of my workload.	16.9%	*n*=11
I don't feel "sick" enough to go to the doctor.	3.1%	*n*=2
I self-medicate	40%	*n*=26
Sometimes I attend, but I find it hard to be consistent with my appointments and treatment.	4.6%	*n*=3
I don't think it is necessary to go to a doctor	20%	*n*=13
I would like to go, but it bothers me to wait a long time to be treated.	15.4%	*n*=10

n= Number of cases PPH = Pathological Personal History; AHT= Systemic Arterial Hypertension; DM2= Type II Diabetes Mellitus

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3.5 Perception and Opinion of COVID-19 Pandemic-Related Issues

Table 4 shows the responses to the instrument on Perception and Opinion of aspects related to the COVID-19 pandemic. It can be seen that 35% of the professionals reported feeling discriminated against for being health personnel. In addition, more than 50% of the participants reported that they did not trust the officially reported numbers of cases and considered the governmental measures implemented to be insufficient.

80.7% considered that health personnel were not enough when COVID-19 cases began to increase, and more than 70% reported feeling stress or anguish because of the pandemic. Although 41.8% reported not feeling protected by the system in their professional activities, 76.1% reported feeling that they had contributed towards improving the pandemic situation. 34.2% indicated that they had been disappointed in their work due to the conditions of COVID-19. Finally, 17.3% of the professionals at some point considered resigning to protect themselves and their families.

When comparing the responses among all the institutions, significant differences were found in most of the items, with the exception of the perception of the application of governmental measures, compliance with measures by the community, insufficient health equipment to deal with the cases, the presence of nightmares with the virus, and the consideration of quitting their job. However, when the institutions were grouped into public and private, the only items in which no significant differences were found were compliance with measures by the community and insufficient health equipment to deal with cases.

3.6 Job Stress

80.1% of the professionals evaluated were in some category of stress level, with 4% in severe stress, 8% high stress, 33.5% moderate stress, 35.4% mild stress, 19.1% with no stress symptoms, but in the alarm phase, and 0% with no stress symptoms. The mean score of the instrument was 35.54 ± 11.73, which corresponds to the mild stress category.

No significant difference was found in the instrument score with respect to sex (t =-0.546; p = 0.586) or work area (F=0.592, p =0.554), but with respect to institution (F =5.998; p = 0.000), where ISSSTE personnel presented the highest stress score (45. 6 ± 8), followed by IMSS (40.4 ± 12.1), Red Cross (39.6 ± 12.8), private hospital (35.3 ± 11.7) and ISSSTECALI (32.1 ± 8.8), while those of the Ministry of Health had the lowest score (31.6 ± 10.3).

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Table 4. Prevalence of responses to the Perceptions and Opinions of COVID-19 Pandemic-Related Aspects instrument

Items	Strongly disagree	Disagree	Neither agree or disagree	Agree	Totally agree	p^1	p^2
1. Did you feel discriminated against for being healthcare personnel?	30.2%	22.5%	12.30%	32%	3%	0.015	0.002
2. Did you ever think you had symptoms related to COVID-19?	16.6%	8.3%	3.10%	64.60%	7.40%	0.000	0.000
3. Did you consider the reported case numbers in your city to be reliable?	32.3%	24.6%	13.80%	26.20%	3.10%	0.048	0.001
4. Do you think the COVID-19 testing conducted in your city was sufficient?	34.8%	31.7%	13.50%	18.50%	1.50%	0.005	0.000
5. Do you think the government measures taken against COVID-19 were sufficient?	36.9%	28.6%	14.80%	18.20%	1.20%	0.178	0.007
6. Did the community comply adequately with mandatory lockdown measures?	42.8%	41.5%	9.80%	5.50%	0.30%	0.118	0.277
7. Was the healthcare team sufficient when the cases started to increase?	50.5%	30.2%	8.30%	9.80%	1.20%	0.105	0.142
8. Did you fear needing to seek medical care as a patient at a healthcare facility?	14.8%	12.9%	11.10%	55.10%	6.20%	0.000	0.000
9. Did your family fear that you would bring home a COVID-19 infection?	10.5%	6.2%	5.80%	67.70%	9.80%	0.000	0.000
10. Did you live with family members who were in the high-risk group for COVID-19?	19.1%	11.7%	7.70%	52.90%	8.60%	0.000	0.000
11. Were you afraid of being an asymptomatic carrier?	10.8%	4.6%	4.90%	69.80%	9.80%	0.000	0.000
12. Did you ever consider moving out of your home during the COVID-19 pandemic?	25.2%	21.8%	9.20%	38.50%	5.20%	0.023	0.000
13. Did you have nightmares about the virus?	35.7%	25.2%	11.10%	24.30%	3.70%	0.142	0.001
14. Did you feel stressed due to the COVID-19 pandemic?	11.4%	10.2%	7.40%	62.80%	8.30%	0.000	0.000
15. Did you feel anxious due to the COVID-19 pandemic?	10.5%	10.2%	7.10%	64.60%	7.70%	0.000	0.000
16. Did you feel satisfied with the work you did daily?	8%	4.6%	6.80%	71.70%	8.90%	0.000	0.000
17. Did you feel protected by the system in your professional activities?	21.2%	20.6%	20%	34.80%	3.40%	0.010	0.000
18. Did you feel like you were contributing to improving the pandemic situation?	6.8%	4.6%	12.30%	67.70%	8.60%	0.000	0.000
19. Did you feel anxious at the thought of going to work?	16.3%	15.4%	13.80%	49.20%	5.20%	0.042	0.000
20. Did you think you could contract COVID-19 while performing your job?	8%	4%	7.10%	71.40%	9.50%	0.000	0.000
21. Did you consider resigning at any point to protect yourself and your family?	45.2%	25.8%	11.70%	15.10%	2.20%	0.193	0.016
22. Did you feel disappointed with your job due to the conditions of COVID-19?	24.9%	22.8%	18.20%	32%	2.20%	0.034	0.004
23. Did you have a disinfection protocol when arriving home?	7.4%	2.8%	4.60%	74.80%	10.50%	0.000	0.000
24. Were you afraid of bringing COVID-19 home?	6.8%	4.3%	4.60%	74.20%	10.20%	0.000	0.000

n= Number of cases; p^1= Comparison of responses among all institutions; p^2= Comparison of responses between public and private institutions. $p<0.05$ indicates statistical significance.

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3.7 Job Satisfaction

Regarding job satisfaction, the overall average score was 75.72 ± 7.69, which corresponds to the medium satisfaction category; according to the categories, only 0.6% (*n*=2) of the professionals presented high satisfaction, 95.4% (*n*=310) were in medium satisfaction and 4% (*n*=13) in low satisfaction. Among the ten factors included in the instrument, factor number one, which corresponds to job satisfaction, obtained the lowest mean (2.44 ± 0.64), followed by professional competence (2.65 ± 0.81), interpersonal relationship with their bosses (2.71 ± 0.82), physical work environment (2. 75 ± 1.05), job pressure (2.87 ± 1.2), job monotony (3.03 ± 0.95), career advancement (3.05 ± 0.81), extrinsic status characteristics (3.06 ± 0.76), interpersonal relationship with peers (3.40 ± 1.29) and job-related stress (3.42 ± 0.66).

In relation to the overall job satisfaction score, no significant difference was found between institutions ($F = 2.000$, $p = 0.065$) or work area ($F = 0.928$, $p = 0.397$), however, there was a significant difference between the factors of job satisfaction ($F = 3.61$; $p = 0.002$), job pressure ($F = 5.71$, $p = 0.001$), career advancement ($F = 2.31$, $p = 0.033$), extrinsic status characteristics ($F = 2.18$, $p = 0.044$) and job monotony ($F = 3.59$, $p = 0.002$). On the other hand, no significant difference was found with respect to sex in the overall instrument score ($t = -0.832$, $p = 0.406$), but a significant difference was found in the professional competence factor ($t = -2.61$, $p = 0.009$).

Significant correlations were found between overall job satisfaction, length of employment (*Rho* = 0.165, $p = 0.003$), and job category (*Rho* = 0.150, $p = 0.007$). The dimension of job satisfaction was correlated with length of employment (*Rho* = 0.178, $p = 0.001$). Work-related stress was correlated with job category (*Rho* = 0.165, $p = 0.003$). Professional competence was correlated with length of employment (*Rho* = 0.156, $p = 0.005$), contractual situation (*Rho* = -0.157, $p = 0.005$), and job category (*Rho* = 0.187, $p = 0.001$). Work pressure was correlated with length of employment (*Rho* = 0.263, $p < 0.01$) and contractual situation (*Rho* = 0.229, $p = 0.001$). Professional promotion was correlated with length of employment (*Rho* = -0.125, $p = 0.01$) and area of work (*Rho* = -0.131, $p = 0.05$). Interpersonal relationship with supervisors was correlated with length of employment (*Rho* = -0.221, $p = 0.01$) and contractual situation (*Rho* = 0.203, $p = 0.01$). Extrinsic characteristics of job status were correlated with length of employment (*Rho* = 0.161, $p = 0.004$). Job monotony was correlated with length of employment (*Rho* = -0.154, $p = 0.006$) and contractual situation (*Rho* = 0.129, $p = 0.020$).

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Table 5. Comparison of means of SF-36 instrument dimensions among health institutions.

Dimension	Institution								F	*p*
	Total sample (n=325)	IMSS (*n*=57)	Health Ministry (n=95)	ISSSTE (*n*=5)	ISSSTECALI (*n*=38)	Red Cross (n=40)	Private hospital (n=85)	IMSS/Health Ministry (*n*=5)		
Physical Role	87.7 ± 17.4	79.9 ± 24.4	90.7 ± 13.6	86 ± 13.9	88.8 ± 13.9	87 ± 18.5	89.3 ± 15.9	89 ± 7.4	2.64	0.016
Physical role	73.3 ± 26.2	70.2 ± 27.9	80.3 ± 23.6	70 ± 23.1	80.4 ± 21.5	66.3 ± 26.7	68.3 ± 28.4	78.8 ± 16.3	2.74	0.012
Bodily pain	77.2 ± 24.3	72.5 ± 28.3	83.3 ± 20.9	67.6 ± 21.6	86.3 ± 17.4	74.2 ± 23.9	71.8 ± 26.1	69.6 ± 23	3.43	0.002
General Health	49.7 ± 15.8	43 ± 17.4	55 ± 15.4	40 ± 13.2	50.9 ± 14.7	49.5 ± 14.2	48.4 ± 15.2	53 ± 11	4.21	0.001
Vitality	59.1 ± 15	63.7 ± 14.8	63.2 ± 11.8	62 ± 15.2	62.7 ± 11.6	56.6 ± 14.1	56.3 ± 14.3	51 ± 12.9	3.68	0.001
Social Function	73.5 ± 24.6	67.3 ± 25.4	79.9 ± 22.1	57.5 ± 14.3	80.7 ± 23.3	64.4 ± 23.9	72.5 ± 26.6	75 ± 8.8	3.62	0.001
Emotional Role	80.2 ± 26.3	74 ± 31	87.6 ± 19.2	85 ± 14.8	85.4 ± 23.8	77.3 ± 28.5	74.5 ± 28.8	95.2 ± 4.4	3.10	0.005
Mental Health	64.2 ± 16.6	61.3 ± 16.3	69.4 ± 14.9	48.8 ± 6.6	69.3 ± 14.9	62.7 ± 15.6	59.2 ± 18	72.8 ± 13.4	5.18	0.001

n: number of cases; F= F-statistic value; p<0.05 indicates statistical significance; IMSS= Mexican Institute of Social Security; ISSSTE= Institute of Security and Social Services for State Workers; ISSSTECALI= Institute of Security and Social Services for Workers of the Government and Municipalities of the State of Baja California; results are expressed as: mean ± standard deviation

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Tabla 6. Correlation between sociodemographic variables and job stress, SF-36 and job satisfaction instruments.

	Gender	Age	PA	Job Stress	Physical Role	Physical Role	Body Pain	General Health	Vitality	Social Function	Emotional Role	Mental Health	Overall Job Satisfaction	Job Satisfaction	Job-related stress	Professional Competence	Job pressure	Career advancement	Interpersonal relationship with bosses	Interpersonal relationship with colleagues	Extrinsic status characteristics	Work monotony	Physical environment
Gender	-	-.059	.057	.026	.021	-.093	.044	-.029	-.057	-.002	.001	-.077	.032	-.007	-.074	.127*	.051	.045	.006	-.034	-.055	.062	.058
Age		-	-.145**	-.157**	-.061	.124*	.092	.098	.187**	.195**	.105	.181**	.255**	.172**	.111*	.166**	.152**	-.142*	-.084	.087	.103	-.004	.041
PA			-	-.021	.122*	-.004	.059	.116*	.020	-.015	-.056	-.060	-.015	-.093	-.023	.179**	-.002	.155**	-.050	-.078	-.118*	.098	.054
Job Stress				-	-.309**	-.242**	-.382**	-.319**	-.457**	-.447**	-.322**	-.424**	-.237**	-.272**	-.028	.042	.270**	.146**	-.144**	-.229**	-.135*	-.095	-.020
Physical Role					-	.451**	.425**	.422**	.398**	.361**	.412**	.320**	.197**	-.011	.171**	.102	-.147**	.097	.013	.101	.123*	.261**	.047
Physical Role						-	.350**	.395**	.333**	.438**	.570**	.432**	.189**	.020	.180**	.058	-.005	.040	-.065	.093	.165**	.102	.035
Body Pain							-	.458**	.504**	.473**	.272**	.359**	.245**	.170**	.149**	.051	-.074	-.026	.018	.131*	.116*	.138*	-.021
General Health								-	.528**	.436**	.344**	.474**	.208**	.053	.156**	.067	-.143**	.057	-.007	.128*	.138*	.239**	.053
Vitality									-	.475**	.384**	.670**	.381**	.236**	.167**	.084	-.216**	-.036	.087	.253**	.094	.303**	.123*
Social Function										-	.485**	.559**	.292**	.140*	.187**	.079	-.208**	-.003	.067	.217**	.207**	.195**	-.030
Emotional Role											-	.541**	.168**	-.068	.183**	.075	-.099	.010	.028	.081	.096	.222**	.024
Mental Health												-	.302**	.137*	.193**	.048	-.108	-.040	.006	.225**	.141*	.160**	.086
Overall Job Satisfaction													-	.385**	.524**	.538**	-.195**	.037	.127*	.415**	.336**	.560**	.375**
Job Satisfaction														-	-.135*	-.021	-.181**	-.197**	.179**	.127*	.067	-.015	-.018
Job-related stress															-	.222**	-.187**	.247**	-.019	.083	-.007	.478**	.017
Professional Competence																-	.032	.108	-.158**	.053	-.020	.390**	.290**
Job pressure																	-	-.055	-.685**	-.269**	-.040	-.357**	.099
Career advancement																		-	-.086	-.156**	-.047	.246**	.109*
Interpersonal relationship with bosses																			-	.246**	-.005	.127*	-.142*
Interpersonal relationship with colleagues																				-	.416**	.083	-.043
Extrinsic status characteristics																					-	.019	-.019
Work monotony																						-	.140*
Physical environment																							-

n= Number of cases; PA: Physical Activity; *= $p<0.05$; **= $p<0.01$

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3.8 Health well-being SF-36

The results of the SF-36 Health Well-being instrument revealed that the most affected dimension was General Health, with a mean score of 49.7 ± 15.8, followed by Vitality (59.1 ± 15) and Mental Health (64.2 ± 16.6). There were no significant differences in the means of the dimensions based on gender, but significant differences were found between institutions, as shown in Table 5.

Contractual status positively correlated with physical function (*Rho* = 0.153, *p* = 0.006). Work area positively correlated with physical role (*Rho* = 0.111, *p* = 0.045), emotional role (*Rho* = 0.153, *p* = 0.003), mental health (*Rho* = 0.109, *p* = 0.05), and seniority (*Rho* = 0.180, *p* = 0.001). Job category positively correlated with seniority (*Rho* = 0.139, *p* = 0.012). Seniority positively correlated with vitality (*Rho* = 0.119, *p* = 0.031), mental health (*Rho* = 0.118, *p* = 0.033), job category (*Rho* = 0.139, *p* = 0.012), and work area (*Rho* = 0.180, *p* = 0.001). Lastly, work shift negatively correlated with job category (*Rho* = -0.163, *p* = 0.003). These findings indicate that work conditions are related to the perception of health well-being among professionals and may have important implications for job satisfaction and quality of life at work.

3.9 Correlation between sociodemographic variables and labor stress, SF-36, and job satisfaction instruments.

The correlations shown in Table 6 between the instruments and the sociodemographic variables reveal important associations. It was observed, that gender correlated with professional competence, age correlated with job stress, job satisfaction, mental health, social function, vitality and physical role. In addition, job stress showed correlations with all variables except job-related stress, professional competence, job monotony and physical environment.

Particularly, work-related stress correlated with all dimensions of the SF-36, while vitality was related to overall job satisfaction, job pressure, interpersonal relationships with colleagues and job monotony. Likewise, general health correlated with work pressure, vitality and social function. Finally, significant correlations were found between all the factors of the SF-36 and between the dimensions of the job satisfaction instrument, indicating an association between different aspects of health well-being and job satisfaction.

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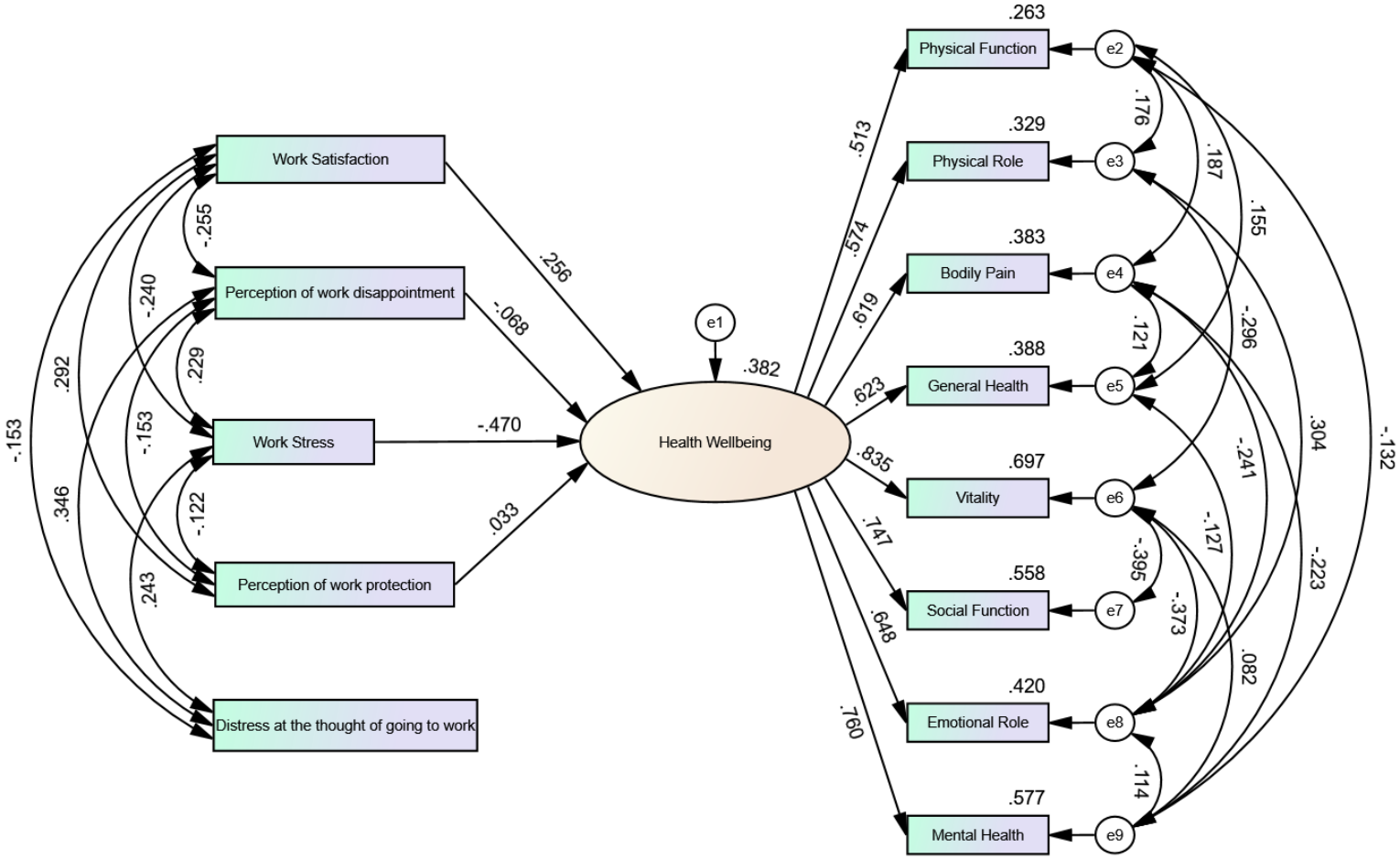
Figure 1. Health well-being explained by job stress, job satisfaction, perceived job disappointment, perceived job protection and distress at the thought of going to work.



In the graphical representation, the rectangles represent the observed variables and the ovals represent the estimated variable (Well-being in health) and errors associated with the endogenous variables (e1, e2, e3, e4, e5, e6, e7, e8 and e9), the values of the unidirectional arrows correspond to the standardized regression weights while the bidirectional arrows indicate correlations.

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3.10 Model of wellbeing, work dissatisfaction, and stress in nursing staff during the COVID-19 pandemic.

Based on the obtained results, a parsimonious model was developed with a good fit: χ^2 = 50.085, *gl* = 43, *p* = 0.213; *RMSEA* = 0.023; *GFI* = 0.978; *CFI* = 0.994; *PNFI* = 0.551; *AIC* = 146.08 (Figure 1). In the model, it was found that health well-being, which includes the dimensions of the SF-36 instrument, is explained by job satisfaction, job stress, perception of job disappointment, perception of job protection, and distress when thinking about going to work.

The model showed positive correlations between the covariates of job disappointment and job stress (*r* = 0.229) and distress when thinking about going to work (*r* = 0.346), as well as between job satisfaction and perception of job protection (*r* = 0.292), indicating that an increase in one of these variables is correlated with an increase in the other. On the other hand, negative correlations were found between job satisfaction and job disappointment (*r* = -0.255), job stress (*r* = -0.240), and distress when thinking about going to work (*r* = -0.153). Additionally, a negative correlation was found between job disappointment and perception of job protection (*r* = -0.153).

The standardized regression weights revealed that job satisfaction and perception of job protection had a positive effect on health well-being. For every unit increase in job satisfaction and perception of job protection, health well-being increased by 0.256 and 0.033, respectively (p<0.001). Additionally, the figure shows that for every unit increase in job stress, health well-being decreased by 0.470 (p<0.001), while an increase in job disappointment resulted in a decrease of 0.068 in health well-being (p<0.001). Finally, the percentage of explained variance of health well-being was 38.2%.

Health well-being demonstrated a significant effect on all dimensions of SF-36. The dimensions with the highest percentage of explained variance were vitality (69.7%), mental health (57.7%), and social functioning (55.8%). Additionally, multiple correlations were found among the dimensions, which was expected as it is a validated instrument.

Initially, gender was considered as a covariate that could potentially have an effect on health well-being. However, the results indicated that it did not influence or significantly correlate with any of the variables included in the model. This could be explained by the characteristics of the sample, as the majority of participants were female, making it difficult to clearly establish the effect of this variable.

4. Discussion

The reliability of the measurement instruments was demonstrated by means of Cronbach's alpha and McDonald's omega tests, both in the pilot test and in the main study. These results are relevant,

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since most research only considers Cronbach's alpha, despite the fact that the literature has proposed the use of statistics such as McDonald's omega to evaluate the internal consistency of the measurement instruments. This may be attributed to the high familiarity with this statistic, or to the belief that there is no difference between the results of alpha and omega [38,39].

However, the latter is not entirely true or not absolute, since Cronbach's alpha assumes that all instrument dimensions are tau-equivalent, which may not be true in all cases, while McDonald's omega is based on a factorial model that may be more appropriate when it is suspected that the dimensions of the measurement instrument are not tau-equivalent, which may occur in multidimensional instruments or in specific populations [40].

The sample consisted mostly of women, which is consistent to what has been reported by Carlsson en 2020, who pointed out that nursing is a job traditionally assigned to women due to its continuation of the work performed at home, not only in terms of instrumental or technical aspects, but also in the affective and empathic attitudes that characterize this profession [42]. However, it should be noted that these statements are based on general trends and do not necessarily apply to all situations or contexts.

With respect to working conditions, most of the nursing staff worked in the morning shift, which is consistent with a study conducted by Rendón Montoya et al. in 2020, in which a higher percentage of the participants worked this shift and worked between 40 and 60 hours per week. This workload may be attributed to the need to work two shifts due to low pay, which can cause physical and emotional overload, and have a negative impact on the well-being of nursing staff, as also reported by Dos Santos Ribeiro en 2021.

Furthermore, this study showed that, worldwide, nursing personnel were hired urgently, where 47.7% of the participants had a non-permanent contractual situation, such as temporary contracts, fee contracts, or contracts hired at the beginning of the pandemic. This was due, in part, to the fact that the characteristics of the transmission of the disease favored the rapid contagion of personnel who were in contact with infected persons, and, secondly, to the shortage of personnel due to the fact that those who belonged to the risk group because of some comorbidity were sent to shelters. This aggravated the situation, considering that before the pandemic there was already a shortage of personnel [45].

Although 40% of the participants were not working on the front line during the first wave of the pandemic, no significant difference in stress and job satisfaction was found relative to the working area.

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This could be attributed to the crisis experienced by workers, who constantly faced circumstances that challenged their capacities for emotional processing, containment, and resilience. Among these circumstances were overload and overflow of care demand, the continuous risk of infection, insufficient and uncomfortable personal protective equipment, the need to provide not only health care but also intensive psychological support to people with the infection and their families, the great emotional pressure in the direct care areas, as well as ethical and moral dilemas [46].

Regarding the government compensations granted due to the COVID-19 pandemic, 15.4% of the study participants indicated that they had not received any benefit, despite the fact that the Ministry of Health at nationwide level had announced the delivery of a COVID bonus to nursing personnel working in the first front line of care, as well as the extraordinary delivery of Merit Notes to personnel who were part of the response teams for the care of patients with COVID-19. The lack of compensation could be due to the fact that the personnel belonged to private institutions or because in some public institutions these bonuses were raffled and were not granted to 100% of the personnel, which generated job dissatisfaction, stress and a reduced perception of labor protection for those who did not receive the benefit [47].

Moreover, a significant difference in physical activity was found between the staff of private and public institutions. This could be due to the guidelines and requirements of each institution as part of their hiring, or to the fact that the personnel hired in the private sector were mostly recent graduates and younger, which led them to engage in more physical activity and perform a greater number of functions in the work field with the objective of acquiring job skills and abilities. In addition, it is possible that the contractual situation, which in the private sector often does not include fixed contracts, may also have influenced the higher physical activity observed. These data could be different in the case of personnel in public institutions, where there is generally greater job stability and functions may be more limited. It is important to note that age also played a key role, as in public institutions it was more common to find older nurses with contracts based on a stable basis.

Regarding the possible causes of weight gain of personnel during the pandemic, it was identified that they could be related to what was reported by Barnett en 2017. This study pointed out that the causes of overweight and obesity are mainly determined by an increase in the intake of caloric foods rich in sugars and fats, combined with a generalized decrease in physical activity, which generates an energy imbalance. These factors may be influenced by a combination of genetic, behavioral, psychological, physical and

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social environmental factors. During the pandemic, mobility restrictions, stress, change in routines, and availability of unhealthy foods may have contributed to an increase in caloric intake and a decrease in physical activity, which could have led to weight gain in nurses and other health care workers.

In this sense, it was found in a study co that nursing personnel are not exempt from overweight and obesity, considering them a vulnerable group with a frequency that increases in those who are not sufficiently active, who increase the consumption of meals during working hours and who work night or rotating schedules. It was observed that the 25 to 34 age groups presented a higher frequency of overweight, while the 45 to 55 age groups presented a higher frequency of obesity, which coincides with the sociodemographic data of the sample. These findings suggest that there are factors related to age, physical activity level, and work schedules that may contribute to overweight and obesity in nurses.

In 2022, the Centers for Disease Control and Prevention indicated that as people's weight increases to overweight and obese levels, so do their risks of suffering from or developing Chronic Non-Communicable Diseases (NCDs) such as type 2 diabetes, high blood pressure, heart disease, among other diseases [49–51]. These data are consistent with the results obtained in the study population, as a positive correlation was found between staff weight gain and the diagnosis of one or more NCDs. Such findings highlight the importance of addressing overweight and obesity in nursing staff as part of the prevention and management of NCD.

During the pandemic, an important sociocultural aspect was the way in which the world's population reacted to health personnel, including nurses. In some countries, nurses were revered as heroes and received massive applause in appreciation for their bravery and sacrifice in risking their own lives to care for and save the population. However, in other countries such as Mexico, some people, including children, viewed nurses as "dirty", "infected" and a potential health risk. This led to verbal and physical aggression, mistreatment and even denial of access to transportation services. Discrimination against nurses was evident and different cases were reported in social networks and national and international newspapers [52].

These acts of discrimination generated work and social stress in the nursing staff, which depended to a great extent on the worker's abilities and resources to face them, as well as on his or her culture and personal situation outside of work. It is important to remember that psychosocial work factors can become negative dysfunctional conditions that provoke a maladaptive response. Discrimination can

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therefore be considered as a psychosocial risk factor [53]. These findings highlight the importance of addressing sociocultural and psychosocial aspects of nursing care during crisis situations such as a pandemic to promote a healthy work environment and prevent discrimination and job stress.

The obtained model revealed that job satisfaction and the perception of job protection have a positive impact on the worker's health well-being, improving their general health, physical role, vitality and social function. On the other hand, the perception of job disappointment and job stress have a negative impact on the worker's health well-being, becoming risk factors for their physical and mental health, affecting their general health, social function and emotional role. In other words, the health well-being of workers is significantly influenced by their working conditions, job satisfaction and stress in the environment in which they work. These findings highlight the importance of considering the work environment and working conditions in promoting workers' health well-being, and the need to address the factors that contribute to stress and job dissatisfaction in order to improve workers' health and well-being.

5. Conclusions

In conclusion, this study highlights the importance of addressing occupational health and well-being of nursing personnel as fundamental elements in maintaining their quality of life and their ability to provide high-quality care to patients. To improve working conditions and the work environment of these professionals, concrete strategies are suggested, such as promoting active participation of workers in decision-making, implementing workplace psychosocial support programs, reducing workload, improving salary, and promoting positive leadership practices.

It is important to recognize that challenges may arise in the implementation of these strategies, such as lack of resources and budgetary constraints, as well as possible organizational barriers. However, evidence supports the importance of effectively addressing these challenges through appropriate occupational health policies, where organizational leaders, policymakers, and other relevant stakeholders collaborate in implementing specific strategies that promote occupational health and well-being of workers in the nursing field.

One limitation of this study was that the participants belonged to a single municipality, which may affect the generalizability of the results. Further research is needed to address this limitation and strengthen the evidence in this field.

6. Statements

6.1 Conflict of interest

The authors declare no conflict of interest.

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6.2 Acknowledgments

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6.3 Data and material availability

The data sets used and analyzed during the present study are available from the corresponding author upon reasonable request.

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