

# Psychosocial Risks and Mental Disorders among Mexican Oil Workers

Riesgos psicosociales y trastornos mentales en trabajadores petroleros mexicanos

Riscos psicossociais e transtornos mentais em trabalhadores petrolíferos mexicanos

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## Abstract

**Introduction:** The psychosocial risks faced by workers can influence their health as well as job performance and satisfaction. However, this phenomenon among Mexican workers in the oil industry has not been well studied. The purpose of this study was to analyze the association of stress and job-related burnout with mental disorders among oil workers in the southeastern region of Mexico. **Materials and methods:** This cross-sectional and analytical study included 501 workers from the onshore oil industry in the southeastern region of Mexico. The Work Burnout Inventory, the Symptoms of Stress Inventory, and the Goldberg General

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Health Questionnaire (GHQ 28) were applied between October and November, 2016. Chi-square test was used to analyze the relationship between variables and the odds ratio was determined to establish the level of risk for mental disorders. *Results:* Moderate levels of stress (21.41 %), efficacy (41.5 %), cynicism (30.6 %), and exhaustion (39.7 %) were observed. Mental disorders were noted in 11.8 % of workers. Stress and burnout were associated with mental disorders ( $p < 0.05$ ). Finally, workers who experienced stress and job burnout were more likely to have mental disorders ( $OR = 12.96$ ; 95 % CI [7.03–23.94];  $p = 0.00$ ). *Conclusions:* Stress and job burnout are risk factors for mental disorders among Mexican oil workers.

**Keywords:** Mental disorders; oil and gas industry; occupational health; Mexico.

## Resumen

*Introducción:* los riesgos psicosociales en los trabajadores tienen influencia en la salud, rendimiento del trabajo y satisfacción laboral; sin embargo, poco se ha estudiado este fenómeno en los trabajadores mexicanos de la industria petrolera. El objetivo fue analizar la asociación entre estrés y desgaste laboral y trastornos en los trabajadores de la industria petrolera terrestre de la región sureste de México. *Materiales y métodos:* diseño transversal y analítico. La muestra estuvo integrada por 501 trabajadores. Los instrumentos utilizados fueron el Inventario de Desgaste Laboral, el Inventario de Síntomas de Estrés y el Cuestionario de Salud General de Goldberg (GHQ 28). Se aplicaron los instrumentos entre octubre y noviembre de 2016. Se utilizó la prueba de chi cuadrado para analizar la relación entre las variables, y se determinaron *odds ratio* para establecer el nivel de riesgo a trastornos mentales. *Resultados:* se encontraron niveles moderados de estrés (21.41 %), eficacia (41.5 %), cinismo (30.6 %) y agotamiento (39.7 %). Se encontró presencia de trastornos mentales en el 11.8 % de los trabajadores. El estrés y las dimensiones del desgaste laboral se asociaron con los trastornos mentales ( $p < 0.05$ ). Finalmente, los trabajadores que presentaron estrés y desgaste laboral tuvieron mayor probabilidad de sufrir trastornos mentales ( $OR = 12.96$ ; IC 95 % [7.03-23.94];  $p = 0.00$ ). *Conclusiones:* el estrés y el desgaste laboral representan factores de riesgo para presentar trastornos mentales en los trabajadores petroleros mexicanos.

**Palabras clave:** trastornos mentales; industria del petróleo y del gas; salud ocupacional; México.

## Resumo

*Introdução:* os riscos psicossociais nos trabalhadores influenciam a saúde, o desempenho no trabalho e a satisfação no trabalho, no entanto, esse fenômeno tem sido pouco estudado em trabalhadores mexicanos da indústria petrolífera. O objetivo do estudo foi analisar a associação do estresse e desgaste no trabalho com transtornos em trabalhadores da indústria petrolífera terrestre da região sudeste do México. *Materiais e métodos:* desenho transversal e analítico. A amostra foi composta por 501 trabalhadores. Os instrumentos utilizados foram o Inventário de Desgaste Laboral, o Inventário de Sintomas de Estresse e o Questionário de Saúde Geral de Goldberg (GHQ 28). Os instrumentos foram aplicados entre outubro e novembro de 2016. O teste qui-quadrado foi utilizado para analisar a relação entre as variáveis e o *odds ratio* foi determinado para estabelecer o nível de risco para transtornos mentais. *Resultados:* foram encontrados níveis moderados de estresse (21,41 %), eficácia (41,5 %), cinismo (30,6 %) e exaustão (39,7 %). A presença de transtornos mentais foi encontrada em 11,8 % dos trabalhadores. O estresse e as dimensões de desgaste laboral foram associadas aos transtornos mentais ( $p < 0,05$ ). Por fim, os trabalhadores que apresentavam estresse e desgaste laboral apresentaram maior probabilidade de apresentar transtornos mentais ( $OR = 12,96$ ; IC 95 % [7,03-23,94];  $p = 0,00$ ). *Conclusões:* o estresse e desgaste laboral representam fatores de risco para o desenvolvimento de transtornos mentais em trabalhadores petrolíferos mexicanos.

**Palavras-chave:** transtornos mentais; indústria de petróleo e gás; saúde ocupacional; México.

## Introduction

Psychosocial risks are defined as interactions between the work environment, job content, organizational conditions, working culture, and personal considerations external to the job that may influence the health, job performance, and job satisfaction of the workers based on perceptions and experience (1). Some of these psychosocial health disorders include stress, job burnout, anxiety, depression, and sleep disorders (2,3).

Studies suggest that organizational characteristics at work, such as shift rotation, long or inflexible schedules, lack of teamwork (4), changes in working hours, and work overload lead to psychosocial risks among workers (4-6). In this sense, a higher prevalence of psychological discomfort, sleep and rest disorders, higher levels of smoking, cardiovascular disorders, physical and mental fatigue, increased alcohol consumption during the days off, and loss with the family bond (5-9) are observed in people with high-risk jobs.

Factors such as gender, musculoskeletal discomfort, job ambiguity, role conflict, exhaustion, and low job satisfaction are reportedly related to psychosocial health problems among workers in various areas (10-12). In the case of oil workers, evidence suggests that psychosocial factors are associated with onshore and offshore work environments, stressful working conditions, perceived job burnout, and mental disorders (13-16).

The literature mentions that research on psychosocial risks in the oil industry has been increasing worldwide (6-8, 13,14,17,18). However, this is not the case in Mexico as there are no studies on the psychosocial risk factors for oil industry workers, even though Mexico is one of the main oil producing countries in the world (19). One explanation for the lack of investigations in this working population could be the difficulty in accessing this industry and the lack of labor contexts to investigate where this work is conducted.

Nonetheless, it is important to assess mental health in this high-risk population because oil industry workers may suffer from mental disorders owing to the high occupational risk they are exposed to at work. The purpose of this study was to analyze the association of stress and job burnout with mental disorders among Mexican oil workers.

## Materials and methods

This was quantitative, cross-sectional, and analytical study that included 501 workers (n = 721) at a terrestrial oil plant in the southeastern region of Mexico. The sample population was intentional and non-probabilistic, and personnel from the administrative (26.5 %), operational (26.1 %), and drilling (47.3 %) areas were included. Data was collected in October and November of 2016. All measurements used in this study were reported by

the participants. The measured psychosocial variables included the three dimensions of job burnout (exhaustion, cynicism, and professional efficacy), stress, and mental disorders.

Using a questionnaire, we collected sociodemographic data such as age, sex, marital status, education, and number of children. Work-related data, such as job category, working hours, type of contract, seniority in the company, and personnel, were also collected. The category was classified into three types of workers: workers in the drilling area (whose main duty was oil extraction), operational workers (who handled the control system), and administrative workers (who performed office work). The types of contracts were the following: trusted workforce (permanent plant worker holding managerial positions), unionized plant (permanent plant worker who belongs to a union), transitory trusted workforce (temporary worker who does not belong to a union), and unionized transitory (temporary worker who belongs to a union).

The Work Burnout Inventory by Bresó et al. was used to assess work burnout. For this study, the instrument was subjected to expert judgment for a cultural adaptation to Spanish, where there was agreement on the meanings of the words for both countries (20). This instrument comprised three dimensions, exhaustion, cynicism, and professional efficacy, with a total of 15 items and a Cronbach's alpha of 0.70. The response options are Likert-type, ranging from "Never/Not even once" to "Always/Every day."

The Stress Symptom Inventory created and validated by Lipp and Guevara and translated and adapted for Mexico by Domínguez et al. was used to evaluate stress, with Cronbach's alpha of 0.94 (21,22). It is made up of 42 psychophysiological symptoms characteristic of chronic stress, which are classified on a Likert scale with 6 response options, ranging from "Never" to "Always."

Finally, the Goldberg General Health Questionnaire (GHQ 28), developed by Goldberg and validated for the Mexican population by Medina-Mora et al., was applied to assess the presence of mental disorders, with a Cronbach's Alpha of 0.91 (23,24). The questionnaire includes Likert-type answers with options ranging from "Better than usual" to "Much worse than usual."

For data collection purposes, participants went to a classroom where they were sensitized to participate through a talk. Those who agreed to participate signed the informed consent and completed the surveys provided, in pencil and paper, after they were explained how to fill them out. This task was conducted during working hours.

Descriptive statistics were applied to demographic and occupational variables for data analysis. The Chi-square test was applied to identify the association between occupational, demographic, job burnout, and stress variables with mental disorders. Subsequently, the odds ratio was determined for the associated variables in order to know to what extent the associated variables constitute a risk factor for the presence of mental disorders. The level of significance to evaluate the existence of association and risk in the study variables was a *p*-value of less than 0.05, whereas the statistical analysis was conducted using the statistical program IBM SPSS version 22.0 for Windows.

This research adhered strictly to the principles expressed in the Declaration of Helsinki as it was a project with no conflicts of interest independently reviewed by the Ethics and Research Commission of the Department of Nursing in the Poza Rica-Tuxpan region and the General Directorate of Research of the Universidad Veracruzana, which approved the proposal and procedures of this project (25). Likewise, it was conducted in strict adherence to article 100 of the General Health Law of Mexico, in terms of being a low-risk research, respecting and guaranteeing participants the ethical principles of freedom, confidentiality, respect, and nonmaleficence with informed consent (26). Surveys were confidential for academic investigation purposes, guaranteeing non-disclosure individually and institutionally, in order to ensure and protect participants' rights.

## Results

The study involved a total of 501 workers, most of whom were men (60.5 %) aged 40–59 (38.3 %) years. Most were married (64.0 %) with children (50.1 %). The most common educational level among workers was a bachelor's degree (49.1 %). Men were found to have more mental disorders than women (6.6 %). Mental disorders increased at older ages between 20 and 49 years (0.8 % to 5.2 %). Workers who were married reported having a higher prevalence of mental disorders (8.0 %) as did workers who had 1 to 2 children (6.6 %) compared to those who did not (2.2 %). Furthermore, it was observed that workers with a higher level than secondary education (1.2 %) tend to have a higher prevalence of mental disorders (5.2 %). However, the demographic variables did not show a significant association with mental disorders ( $p > 0.05$ ) in all cases (Table 1).

**Table 1.** Demographic characteristics of oil workers with a mental disorder ( $n = 501$ )

Variables	Indicator	Total (%)	Mental disorder (%)		$\chi^2$	df	<i>p</i>
			Yes	No			
Sex	Male	60.5	6.6	53.9	0.81	2	0.66
	Female	38.5	5.0	33.5			
	Not reported	1.0	0.2	0.8			
Age (years)	<20	5.0	0.4	4.6	8.46	5	0.13
	20–29	8.0	0.8	7.2			
	30–39 years	22.6	3.8	18.8			
	40–49	38.3	5.2	33.1			
	50–59	23.1	1.6	21.5			
	≥60	3.0	0.0	3.0			

*Continue*

Variables	Indicator	Total (%)	Mental disorder (%)		$\chi^2$	df	p
			Yes	No			
Marital status	Single	18.2	2.2	16.0	2.26	6	0.89
	Married	64.0	8.0	56.0			
	Common law	6.0	0.2	5.8			
	Separated	3.6	0.4	3.2			
	Divorced	5.0	0.6	4.4			
	Widowed	1.4	0.2	1.2			
	Not reported	1.8	0.2	1.6			
Number of children	None	18.4	2.0	16.4	1.24	4	0.87
	1-2	50.0	6.6	43.4			
	3-4	25.9	2.8	23.2			
	≥5	3.0	0.2	2.8			
	Not reported	2.6	0.2	2.4			
Educational level	Primary	1.6	0.0	1.6	3.94	5	0.55
	Secondary	7.0	1.2	5.8			
	High school	14.2	2.0	12.2			
	College degree	49.1	5.2	43.9			
	Postgraduate	26.5	3.4	23.2			
	Not reported	1.6	0.0	1.6			

\* p-value < 0.05

In terms of occupational characteristics, a greater representation of the drilling labor category (47.2 %) was found. Generally, the participants worked 40 hours a week (90.8 %) and did not double their work shift within a month (72.2 %). Regarding the type of contract, they were mainly trusted employees (53.1 %) with seniority in the company of more than 26 years (26.9 %), not in charge of personnel (56.3 %). It was observed that the workers who had more mental disorders were those who belonged to the drilling area, worked 40 hours a week, did not work double shifts, belonged to a trusted workforce category, had a seniority of 26 years or more, and were not in charge of any staff. Out of these labor variables, only the occupational group presented a significant association with mental disorders ( $\chi^2[2] = 6.49; p = 0.03$ ) (Table 2).

**Table 2.** Occupational characteristics of oil workers with mental disorders (n = 501)

Variables	Indicator	Total (%)	Mental disorder (%)		$\chi^2$	df	p
			Yes	No			
Work category	Drilling	47.2	7.4	39.8	6.49	2	0.03*
	Operators	26.2	2.0	24.2			
	Administrative	26.6	2.4	24.2			
Weekly working time (hours)	40	90.8	10.8	80.0	1.01	3	0.79
	48	6.4	0.6	5.8			
	56	0.6	0.0	0.6			
	Not reported	2.2	0.4	1.8			
Double shift per month	Yes	21.2	3.0	18.2	0.76	2	0.68
	No	72.2	8.0	64.2			
	Not reported	6.6	0.8	5.8			
Type of contract	Trusted employee	53.1	7.4	45.7	2.83	4	0.58
	Unionized plant	29.3	3.4	25.9			
	Trusted temporary employee	6.6	0.8	5.8			
	Unionized temporary employee	10.0	0.6	9.4			
	Not reported	1.0	0.0	1.0			
Experience (years)	<1	1.6	0.0	1.6	4.60	7	0.70
	1-3	6.3	1.0	5.3			
	4-7	12.0	0.8	11.2			
	8-12	13.0	1.8	11.2			
	13-17	15.4	2.2	13.2			
	18-25	23.8	2.6	21.2			
	≥26	26.9	3.4	23.5			
	Not reported	1.0	0.0	1.0			
In charge of personnel	Yes	38.9	3.8	35.1	1.27	2	0.53
	No	56.3	7.4	48.9			
	Not reported	4.8	0.6	4.2			

\* p-value < 0.05

Regarding the psychosocial risks, a moderate level of stress (21.4 %) was observed, whereas for job burnout, the dimensions of efficacy and cynicism showed moderate levels (41.5 % and 30.6 %, respectively). In terms of exhaustion, workers presented a moderate level (39.7 %); while mental disorders occurred in a tenth (11.8 %) of respondents. Mental disorders were present in 11.8 % of participants. This prevalence is considered to have had an effect on not showing associations between mental disorders and variables (demographic and

work) that were polytomous with more than 3 responses. Finally, the stress and job burnout dimensions were found to be associated ( $p < 0.05$ ) with mental disorders (Table 3).

**Table 3.** Psychosocial problems among oil workers (n = 501)

Variables	Indicator	Total (%)	Mental disorder (%)		$\chi^2$	df	p
			Yes	No			
Work stress	Low	78.2	3.2	75.0	109.87	2	0.00*
	Moderate	21.4	8.2	13.2			
	High	0.4	0.4	0.0			
Efficacy	Low risk	45.7	3.4	42.3	9.60	2	0.00*
	Moderate risk	41.5	5.8	35.7			
	High risk	12.8	2.6	10.2			
Cynicism	Low risk	64.8	3.0	61.8	48.10	2	0.00*
	Moderate risk	30.6	7.2	23.4			
	High risk	4.6	1.6	3.0			
Fatigue	Low risk	47.9	1.4	46.5	72.72	2	0.00*
	Moderate risk	39.7	5.2	34.5			
	High risk	12.4	5.2	7.2			

\* p-value < 0.05

Table 4 shows the risk of Mexican workers in the oil industry have mental disorders. Workers who belong to the drilling job category have a double risk of developing mental disorders compared to those who are part of another job category (OR = 2.03; 95 % CI [1.16–3.56];  $p = 0.01$ ). Workers with moderate stress have twelve times greater risk of mental disorders than those who have low symptoms of stress (OR = 12.96; 95 % CI [7.03–23.94];  $p = 0.00$ ), whereas workers who show a moderate to high level of cynicism have four times greater risk of presenting mental disorders than those with a low cynicism (OR = 4.46; 95 % CI [1.80–11.04];  $p = 0.00$ ). Furthermore, workers who present high exhaustion levels have eight times greater risk of mental disorders (OR = 8.88; 95 % CI [4.79–16.46];  $p = 0.00$ ). Finally, workers who perceive low efficacy have double the risk of mental disorders compared to those who perceive high efficacy (OR = 2.16; 95 % CI [1.09–4.28];  $p = 0.02$ ).



**Table 4.** Psychosocial risk for oil workers of mental disorders (n = 501)

Variable	Categories	OR	95 % CI		p
Work category	Drilling	2.03	1.16	3.56	0.01*
	Operators	0.54	0.26	1.10	0.08
	Administrative	0.67	0.34	1.32	0.25
Stress	Low	0.06	0.35	0.12	0.00*
	Moderate	12.97	7.03	23.94	0.00*
	High	0.11	0.89	0.14	0.00*
Efficacy	Low risk	0.43	0.24	0.79	0.00*
	Moderate risk	1.42	0.82	2.44	0.20
	High risk	2.16	1.09	4.28	0.02*
Cynicism	Low risk	0.14	0.78	0.27	0.00*
	Moderate risk	4.34	2.47	7.64	0.00*
	High risk	4.46	1.80	11.04	0.00*
Fatigue	Low risk	0.12	0.54	0.27	0.00*
	Moderate risk	1.22	0.70	2.12	0.46
	High risk	8.88	4.79	16.46	0.00*

\* p-value &lt; 0.05

## Discussion

Considering that not many studies have investigated the association of stress and job-related burnout with mental disorders among oil workers in Mexico, these results were mostly contrasted with studies conducted with other populations of workers and, in a few cases, with research conducted in the oil industry. The results of this study indicate that just less than half of workers had moderate levels of job burnout, a quarter of workers experienced moderate level of stress, and only some of the workers were coping with mental disorders. Stress and job burnout in its three dimensions were significantly associated with mental disorders, and oil industry workers were at high risk of mental disorders.

Our results were similar to those of other studies in other occupations, such as teaching, medicine, microelectrical engineering, and salaried workers because they showed that exposure to stressful work situations implies high psychological demands, low autonomy in decision-making, low social support, and a reported high risk of depressive symptoms (16,27-29). These similarities can be due to the fact that work by itself represents a mental burden that, associated with variables such as the type of task, personal interactions, and

the worker's personal characteristics, combine to give rise to psychosocial risks that harm mental health, when the individual does not have the resources and skills to deal with them.

Among the main findings related to the dimensions of job burnout, exhaustion has a higher risk of presenting mental disorders, similar to what was found among Chinese oil workers whose emotional exhaustion was associated with a significantly higher risk of leading to mental disorders (17). Regarding cynicism and efficacy, it was determined that these categories suggest a significant association with mental disorders, similar to what was reported for South African nurses, whose dimensions were associated with somatic symptoms, social dysfunction, and severe depressive symptoms (11). These findings indicate that job burnout occurs more frequently in jobs that require a high physical and mental demand, as is the case of workers in the oil industry and nursing fields. This is because the type of activity they perform requires the effective management of emotions and skills (1).

In this study, the demographic characteristics analyzed were not associated with mental disorders, unlike what was reported for Chinese oil workers, where it was determined that there are statistical differences between sex and the degree of mental anguish, on the one hand (17). On the other, the age of Norwegian oil workers was a significant predictor of depressive symptoms (18). This difference in results may be explained by the fact that the research reviewed was conducted with oil workers on the high seas, who work shifts of 12 hours, with 12 hours of rest on board, and workers on land work shifts of 8 hours and return home. This implies that the support they can receive from their family is greater than that of workers who return home on land after 14 days of work.

In terms of the occupational characteristics of weekly hours, overtime and double shifts, no association was found with mental disorders in this research, according to the results obtained with Norwegian oil workers who reported that there was no difference between mental anguish and the work shift (13). These findings indicate that the physical health of workers who perform overtime allows them to sustain an adequate mental workload. It could also be considered that the extra hours worked were not enough to lead to damage to workers' health.

On the other hand, an association was found between the work category and mental disorders, which indicated that belonging to the drilling department increases the risk of mental disorders compared to the other categories. In accordance with this, the workers at the drilling department are exposed not only to common occupational risks but also to potential risks to their health because of the dangerous nature of the work they perform, including oil and gas extraction tasks performed by workers in this department.

We concluded that exhaustion, cynicism, and efficiency are risk factors for presenting mental disorders among the oil workers studied. Stress was the most important risk factor for mental disorders, and these factors seem to be more important than other sociodemographic factors such as age, sex, and/or schooling, or occupational factors such as working

hours, work shifts, seniority in the position, type of contract, and working hours. Based on these findings, we suggest carrying out studies in which the influence of the characteristics of the tasks, the social and family support, the personal interactions, and the characteristics of workers, such as their physical condition and their relationship with mental disorders, are analyzed, for a further understanding of this phenomenon. Furthermore, it is important to conduct intervention programs that lower work stress levels and develop actions focused on mental health to minimize the problems identified in this population.

Some of the limitations observed in this study include generalization and those typical of a cross-sectional study. However, the results of this study can serve as empirical support for future investigation with oil workers due to the incipient nature of research. We also suggest continuing this study with other populations of oil workers to compare results and improve generalization.

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## Author contributions

**M**aría Ángeles Carrión-García was responsible for creating ideas and acquiring data and information. David Zepeta Hernández worked on the design and creation of the study, analysis and interpretation of the data, as well as the critical review of the content. Gemma Roque Santiago drafted the text, searched for information and revised the content. Nazaria Martínez Díaz participated by writing the manuscript, validating the statistical analysis, and reviewing the content. Erika Mayte del Ángel Salazar was in charge of generating ideas, designing and supervising the study, searching for information, and writing the text. All authors approved the final version of the manuscript.

## Conflict of interests

**N**one declared.

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