

# DEPRESSION AMONG HEALTH WORKERS: THE ROLE OF SOCIAL CHARACTERISTICS, WORK STRESS, AND CHRONIC DISEASES

Jyoti Mudgal\*, Guilherme Luiz Guimaraes Borges\*\*, Juan Carlos Díaz-Montiel\*, Yvonne Flores\*, Jorge Salmerón\*

## SUMMARY

### Antecedents

A substantial number of Mexican adults (9-13%) experience psychological distress and a significant minority suffers from severe mental impairment. Most people suffering from depression do not seek treatment, even though they can be helped and treated. In some families, depression may occur across generations, but it may also affect those without any family history. Low self-esteem, stressful life changes and chronic stress may provoke a depressive episode. In recent years, it has been demonstrated that medical conditions, such as cardio-vascular diseases, cancer, Parkinson's disease and hormonal disorders, may lead to depression, making a sick individual apathetic, incapable of taking care of his/her physical needs. In turn, such apathy increases the recovery period. Most probably, a combination of genetic, psychological, and social factors work together in the development of a depressive disorder. However, very little is known about the principal causes of depression in Mexico. It is possible that, due to cultural and social differences, these factors and their impact are distributed differently on the Mexican population as compared to those from the US population.

### Objectives

The first objective from this study is to estimate the frequency and distribution of depression by social characteristics on a population of health workers in Mexico. The second objective is to study the effect of stress and chronic diseases on depression.

### Methods

To study the effects of stress and chronic diseases on depression we used a cross-sectional data obtained from a total of 4048 workers. These workers participated in the "IMSS Health Worker Cohort Study in Morelos" through the years 1998 to 2000. Their age varied from 18 to 89 years. A self-reported questionnaire was administered to obtain information on life-style factors, social characteristics, work stress, and chronic diseases. Data were analyzed using politomic regressions to study the effects of social characteristics on moderate and high levels of depressive symptomatology and on risk factors, such as work stress and chronic diseases. The analysis is stratified by gender as it is expected that effects of such characteristics vary by gender.

### Results

Our results show that the workers' socioeconomic characteristics are significantly associated with their depression level. Being female, being separated from the spouse, having lower education, and working in non-professional jobs with lower income is significantly and positively associated with depression. Similarly, having a less satisfying job and having more than one chronic disease is significantly and positively associated with depression. Workers from a lower socioeconomic status report higher levels of stress and suffer more chronic diseases compared to those from higher socioeconomic levels. Hence, some of the effects of social characteristics seem to be mediated by stress and chronic diseases.

### Conclusion

Our results are consistent with previous research demonstrating systematic variations among groups of people who are at a higher risk for depression. In our study, we find that depression is higher among selected groups, such as women, young and old workers, those without a partner, and those with lower economic resources. We also find that stress and chronic diseases are among the reasons for which groups, which are socially and economically vulnerable, tend to become depressed. To be effective in the long run, any intervention directed to these groups of people must take into account associations highlighted in this paper.

**Key words:** Depression, stress, and chronic diseases.

## RESUMEN

### Antecedentes

Los reportes sobre la carga de la enfermedad para distintas patologías en todo el mundo y las encuestas conducidas en México informan que la depresión es un problema común y una de las primeras causas de años de vida perdidos. Entre 9 y 13% de la población adulta mexicana sufre alguna enfermedad depresiva grave. La prevalencia es doble en las mujeres en comparación con los hombres; los jóvenes y ancianos presentan altos niveles de depresión en comparación con aquellos de mediana edad. La mayoría de las personas con enfermedad depresiva no busca tratamiento, aunque casi todos podrían ser ayudados. En algunas fa-

\*Unidad de Investigación Epidemiológica y en Servicios de Salud, Instituto Mexicano del Seguro Social. Av. Plan de Ayala s/n esquina Av. Central. Cuernavaca, Morelos. Teléfono: 01-777-315-5000, ext. 2000. Fax: 01-777-316-2944.

\*\*Universidad Autónoma Metropolitana, Xochimilco, México.

Recibido primera versión: 16 de noviembre de 2005. Recibido segunda versión: 12 de julio de 2006. Aceptado: 12 julio de 2006.

milias, la depresión grave parece ocurrir una generación tras otra, aunque también puede manifestarse en personas sin antecedentes familiares. Por otro parte, una autoestima baja, cambios estresantes o un estrés crónico también pueden desencadenar un episodio depresivo, o bien favorecer la recurrencia o la cronicidad de los síntomas depresivos. Asimismo, en los últimos años se ha mostrado que enfermedades como el infarto al miocardio, el cáncer, la enfermedad de Parkinson y los trastornos hormonales pueden causar enfermedad depresiva, lo que a su vez puede influir en la disposición del enfermo para atender sus necesidades físicas y prolongar el periodo de recuperación. Muy a menudo, una combinación de factores genéticos, psicológicos y ambientales interviene en el comienzo de un trastorno depresivo. El estrés crónico cumple un importante rol en la etiología de la depresión. A su vez, éste se encuentra muy relacionado con características sociales y económicas del individuo.

Se conoce muy poco acerca de los principales determinantes de la enfermedad depresiva en México. Es posible que, debido a diferencias culturales y sociales, en el país estos factores se distribuyan de manera diferente a lo que ocurre en otros y que tengan un impacto diferente en la población mexicana. Por lo tanto, en este estudio se examinó la asociación entre el estrés laboral crónico y la existencia de enfermedades crónicas con la depresión entre un grupo de trabajadores del Sector Salud en México.

### Objetivos

El objetivo de esta investigación es estimar la frecuencia y la distribución de la enfermedad depresiva grave de acuerdo con las características sociales de una población de trabajadores de la salud en México. El segundo objetivo es estudiar la asociación entre el estrés en el trabajo, las enfermedades crónicas y la depresión.

### Métodos

Se desarrolló un estudio transversal con una población base de 4048 trabajadores, que participaron en el proyecto "Cohorte de Trabajadores del IMSS-Morelos", durante el periodo de octubre de 1998 a marzo de 2000. Los participantes contestaron un cuestionario autoaplicable con que se recolectó información sobre condiciones de exposición a diversos factores de estilo de vida, características sociales, estrés en el trabajo y enfermedades crónicas. Por medio de un análisis de regresión polimórfica, se evaluó la asociación entre características sociales, estrés y depresión moderada y grave. Para estimar las diferencias de género en los efectos de las características sociales, del estrés y de la depresión, se realizó un análisis estratificado por sexo.

### Resultados

Nuestro análisis muestra que 12% de los trabajadores sufre depresión. Sin embargo, en comparación con los hombres (8.9%) la prevalencia en las mujeres es casi el doble (14.4%). Además, los resultados señalan que las características socioeconómicas de los trabajadores se asocian de manera significativa con el nivel de depresión. Así, ser mujer, estar separada de la pareja, tener menor educación, laborar en un trabajo no profesional, recibir un menor ingreso, se asocian positivamente con la depresión. Tener un trabajo menos satisfactorio y padecer más de una enfermedad crónica también se asocian positivamente con la depresión. Sin embargo, hay diferencias de género y el análisis estratificado por esta variable señala que el efecto del nivel socioeconómico, en términos de ingreso y ocupación, se asocia significativamente con el nivel de depresión de las mujeres. Cabe señalar que estos factores económicos no mantienen una relación significativa con el nivel de depresión de los hombres. Aun así, en éstos, el efecto de ser soltero es mucho más fuerte (OR=3.5, IC95% 2.11-5.33) en comparación con las mujeres (OR=1.52, IC95% 1.18-1.95). No hay

diferencias de género para los efectos del estrés en el trabajo y las enfermedades crónicas. Nuestro análisis señala que hay una relación entre un menor nivel socioeconómico y un mayor nivel de estrés y las enfermedades crónicas. Por lo tanto, es posible que el efecto de las características sociales en la manifestación de la depresión esté mediado por la presencia de estrés y enfermedades crónicas.

### Conclusiones

Nuestros resultados concuerdan con investigaciones previas que muestran una variación sistemática en grupos de personas expuestas a un alto riesgo de depresión. En nuestro estudio de trabajadores de la salud en México encontramos que la depresión es más alta entre grupos específicos de personas, como las mujeres, los trabajadores muy jóvenes y de la tercera edad, y aquellos en desventaja económica. También encontramos que el estrés y las enfermedades crónicas son las sendas por las que estas personas social y económicamente vulnerables llegan a padecer depresión. Cualquier intervención dirigida a esta población debe tomar en cuenta estas asociaciones.

**Palabras clave:** Depresión, estrés, enfermedad crónica.

## Introduction

The Global Burden of Disease Study (Murray and López, 1996) reported that unipolar depressive disorders rank as the fourth leading cause of burden among all diseases. They account for 3.7% of the total disability-adjusted life years (DALYs). They are also one of the leading causes of years lived with disability (YLD), accounting for 10% of total YLDs. Using improved measures for cross-cultural comparability, validity and reliability, similar results were obtained by the Global Burden of Disease Study 2000 (Ustun et al., 2004; WHO, 2002). According to this survey, unipolar depressive disorder remained one of the leading causes of total DALYs lost (4.46%) and accounted for 12.1% of total YLDs. The National Mental Health Survey in Mexico, which uses cross-culturally validated WHO-CIDI (Medina-Mora et al., 2003), also reported that anxiety and depression are the main mental health problems in Mexico. Among adults between 18 to 64 years, they report a prevalence rate of 13% for major episodes of life-time depression, and of 15% for severe depression in the last 12 months. In addition, the survey reports that women are nearly twice more likely to be depressed than men (14% versus 9%), and that both the young and the elderly are at a higher risk for depression as compared to middle-aged individuals. Similar rates of depression are reported in other studies (Medina-Mora, 1992; Gómez, 1992). These studies suggest a great number of Mexican adults are experiencing psychological distress (moderate levels of depression) and a substantial minority suffers from severe mental impairment (major depression). Hence, rates are higher among vulnerable groups such as women, children, and the elderly.

Although comparable data on the prevalence statistics and the associated demographics related to depression has become available, very little is known about other proximal risk factors associated with depression among Mexican adults. Some of the risk factors reported in the literature are both acute and chronic stressors, as well as the lack of psychosocial resources, which otherwise may help an individual to cope with stressors. Thus, at the work place stress could be a potential risk factor. A lower socioeconomic level could be another important risk factor. It has been observed that individuals from lower socioeconomic levels are more likely to be depressed than those who are relatively well off. This is because of differences in their levels of exposure to stress and in their accessibility to psychosocial resources (Aneshensel et al., 1990; Offord et al., 1987; Pearlin, 1989; Turner et al., 1995). Chronic diseases could also be a risk factor. Emerging research suggests a link between chronic diseases and depression (Frasure-Smith et al., 1995; Ziegelstein et al., 2000; Nemeroff et al., 1998; Anderson et al., 2000; Ciechanowski et al., 2000). These studies report that, even though it is not clear which comes first, what is clear is that the presence of one aggravates the other. Hence, individuals suffering from chronic diseases are at a greater risk of becoming depressed, and vice versa.

Our research examines the effect of work stress, socioeconomic level and chronic diseases on depression. The data used is a sample of health workers in Mexico. We analyze our data separately for men and women to evaluate if the aforementioned risk factors affect men and women differently. We do so because women are nearly twice more likely to be depressed than men, and because gender may modify some of the effects of the stressors on mental health (Roberts and O'Keefe, 1981). Understanding the role of work stress and chronic diseases could be useful in designing treatment and prevention programs for depressed individuals.

## Methods

### Study population and subject recruitment

We analyze cross-sectional data from the "IMSS Health Worker Cohort Study in Morelos". Data were collected from the end of 1999 to the end of 2000 to study the relationship between life-style factors and chronic diseases. The study sample consisted of 4254 men and women between 18 and 89 years. Subjects were recruited from a population of workers at the Mexican Institute of Social Security (IMSS) in the state of Morelos, both from medical and administrative job positions. Based on cluster sampling, a sample of over 6000 work-

ers was selected, out of which 4254 responded (response rate: 70%) to a self-administered questionnaire. Responding the questionnaire was considered as informed consent. There was no statistically significant difference between respondents and non-respondents (nearly 30% of the sample) in terms of gender, age, marital status, and education (Salmerón-Castro et al., 2002). These data allow for an analysis of social characteristics, exposure to stress, chronic diseases, and mental health outcomes such as depression. Our analysis uses a sample of 4048 respondents who answered questions regarding all the key study variables.

## Measures

**Depression.** We used a Spanish-language version of the 20-item depression scale created by the Center for Epidemiologic Studies (CES-D), which measures depressive symptomatology in the community. The scale has been evaluated and used in a number of studies on adult population in Mexico (Mondragón et al., 2001). The CES-D scale has also been used for rural and urban populations (Radloff and Locke, 1985; Mariño et al., 1993; Salgado de Snyder et al., 1994) and has shown excellent internal consistency and reliability (Benjet et al., 2004)\*. The scale includes items measuring the most important symptoms of depression: affective interpersonal relations, activity level, and somatization. In addition, Likert-type items assessed the frequency of depressive symptomatology in the previous week, using questions such as: "Do you get upset by things that usually would not bother you?", "Don't you feel hungry?", etc. Response categories ranged from 0-3, where 0 represents "never" and 3 stands for "more than five days." All items are added to create a total score on depression for each subject. The score varies from 0 to 60, where a higher score means more depression. Although CES-D is an instrument to measure depressive mood in the community, rather than cases of depressive disorder, American researchers have previously used a cut-off point of 16 in this scale to measure cases of depression among American adults. This cut-off point has shown to correlate well with the Diagnostic Interview Schedule (DIS), a depression inventory designed to measure "cases" of depression in the community (Robins et al., 1981; Radloff, 1977; Freichs et al., 1981). However, in Mexico, most studies have used a mean plus one standard deviation as a cut-off point to measure a case. In this study, we utilize mean plus one standard deviation as a cut-off point for a case of severe depression (a score of 19), and a

\*GONZALEZ-FORTEZA C, LARA A, MARINO M, SALGADO DE SNYDER N: Traducción y adaptación de la Escala de Depresión del Centro de Estudios Epidemiológicos CES-D. Instituto Mexicano de Psiquiatría, mimeo, 1988.

cut-off point of 16 as a case of moderate depression. Subjects who answered less than 15 of the 20 items were excluded from the analysis.

**Socioeconomic characteristics.** These were measured using standard survey items such as gender, age (in the categories of less than 40, 40-49, and 50 and more years), education (elementary, junior high, high school, college or more), marital status (married or living together, single, separated or divorced, and widowed), income, and occupational work categories (physicians, nurses, preventive health workers, social workers, nutritionists, physiotherapists, health educationists, and laboratory technicians), administrative staff (departmental heads, nurse administrators, secretaries, cashiers, pharmacy staff, shop assistants), and manual labor staff (electricians, plumbers, cleaners, drivers, security guards, etc.).

**Work stress.** A stressor is an environmental demand that exceeds the ordinary adaptive capacity of the individual or the lack of environmental opportunities to satisfy individual needs (Aneshensel and Perlin, 1987). We examined work-stress as a risk factor for depression, because an excessively demanding job or a less satisfactory job could be a stressor leading to depression.

Work stress is measured by a four-item scale. Participants were asked four questions regarding their feelings about their job on a Likert-scale representing very satisfactory to less satisfactory. Questions included: "The relations with my colleagues are?", "The recognition that I get from the institute is?", "My work activities are?", and "If I had to make a balance between all good and bad things as a worker at IMSS, I would say?" A summary score was created which was further divided into tertiles to create a categorical variable representing no stress or low stress, moderate stress, and high stress.

**Chronic diseases.** The self-reported clinically diagnosed chronic disease was used as a measure of chronic disease. The diseases included are: various types of cancer, degenerative disorders, heart problems, diabetes, cerebral palsy, hypertension, chronic bronchitis, asthma, osteoporosis, cirrhosis, and Parkinson's disease. Finally, the categories of 'no disease' and 'one or more diseases' were used to measure the effect of chronic diseases on depression.

## Analysis

We first examined the prevalence of moderate and severe depression by social characteristics at 95% confidence interval levels. Second, we used crude odds-ratios to measure bivariate associations between depression and social characteristics, as well as stress and chronic diseases. Finally, multiple-logistic regressions were used to describe the relationship between depression and social characteristics, stress, and chronic dis-

eases (p-value < .05 was used as a cut-off point for statistical significance) (Rosner, 1995; Aneshensel, 2002). It is worth bearing in mind all our analyses were stratified by gender because we hypothesized that gender differences existed among the effects of social characteristics, stress, and chronic diseases on depression.

## Results

The social and demographic characteristics of the population are shown in table 1 (column 1). More females than males participated in the study (there are more female than male workers at IMSS) and over 85% of the population is between 30 and 60 years old. While 68% of the population is married, nearly 30% are divorced, separated, or widowed. Nearly 87% completed secondary education, and 40% are college graduates. Nearly 45% of the population work as professionals (which includes physicians, nurses, social workers, and nutritionists), 35% work in administrative jobs (secretaries, cashiers, pharmacy staff, nurse administrators), whereas 20% work as manual laborers (electricians, cleaners, plumbers, drivers, and security guards). The average family income is 800 dollars per month (based on an exchange rate of 11.4 pesos to a dollar), although 17% reported an average family income of less than 600 dollars per month.

The overall prevalence of depression in this sample is 12%. However, the rate almost doubles in women: 14.4% compared to 8.9% (table 1).

For both sexes, prevalence of moderate and severe depression is generally higher among the younger and older age groups, individuals without a partner, individuals with lower than high school education, individuals in administrative or manual jobs, and individuals who earn less than 600 dollars a month. Conversely, prevalence is lower among males, individuals between 30-49 years, married individuals or those living with someone permanently, individuals who have more than preparatory education, those earning more than 1000 dollars per month, and among physicians and nurses. The rate of depression is higher among females than males in all age groups (except for moderately depressed 19-29 year old males), as well as across all social characteristics.

The adjusted odds ratios for moderate and severe depression by social characteristics, work-stress, and chronic diseases are shown separately for men and women in table 2.

We find that several social characteristics are significantly associated with moderate and severe depression in women. Very young women are more likely to be severely depressed than those middle-aged ones (OR=1.54 CI=1.08-2.19). Older women also appear

TABLE 1. Prevalence of depression by social characteristics among IMSS workers

	Females/Males	Females				Males			
		Moderate CES-D*		Severe CES-D*		Moderate CES-D*		Severe CES-D*	
		%**	C.I.	%**	C.I.	%**	C.I.	%**	C.I.
Total	2559/1489	37.9	36.0 - 39.8	14.4	13.0 - 15.7	33.4	30.6 - 35.4	8.9	7.4 - 10.3
Age									
19-29	323/140	36.8	31.5 - 42.1	18.2	14.0 - 22.5	40.0	31.7 - 48.2	10.0	4.9 - 15.0
30-39	783/392	35.7	32.3 - 39.1	14.5	12.0 - 17.0	31.6	27.0 - 36.2	7.1	4.5 - 9.7
40-49	975/602	38.4	35.4 - 41.5	11.7	9.7 - 13.8	29.0	25.4 - 32.7	8.9	6.6 - 11.2
50-59	326/261	37.1	31.8 - 42.3	16.8	12.7 - 20.9	35.6	29.7 - 41.4	11.1	7.2 - 14.9
60 and above	119/72	52.9	43.8 - 62.0	17.6	10.6 - 24.5	51.3	39.5 - 63.2	8.3	1.7 - 14.8
Marital status									
Married/living together	1532/1239	36.8	34.3 - 39.2	12.4	10.7 - 14.0	33.1	30.5 - 35.7	7.2	5.8 - 8.7
Single/separate/divorced	866/212	38.4	35.2 - 41.6	16.8	14.3 - 19.3	33.0	26.6 - 39.4	17.4	12.3 - 22.6
Widows	128/17	47.6	38.8 - 56.4	21.8	14.6 - 29.1	23.5	10.4 - 46.0	23.5	1.0 - 46.0
Education									
Primary	283/262	41.3	35.5 - 47.1	20.4	15.7 - 25.2	43.5	37.4 - 49.5	11.8	7.8 - 15.7
Secondary	585/353	39.5	35.5 - 43.5	17.0	13.9 - 20.0	35.1	30.1 - 40.1	11.0	7.7 - 14.3
Higher secondary	549/324	40.2	36.1 - 44.3	12.7	9.9 - 15.5	33.0	27.8 - 38.1	8.0	5.0 - 10.9
Collage and more	1112/529	35.0	32.2 - 37.8	12.3	10.3 - 14.2	26.4	22.6 - 30.2	6.6	4.4 - 8.7
Income									
Less than 600 dlls	683/314	42.6	38.8 - 46.3	16.2	13.4 - 19.0	43.3	37.8 - 48.8	9.8	6.5 - 13.1
Between 600 and 800 dlls	545/450	43.3	39.1 - 47.4	16.5	13.3 - 19.6	34.2	29.8 - 38.6	10.0	7.2 - 12.7
Between 800 and 1000 dlls	717/279	34.7	31.2 - 38.2	13.1	10.6 - 15.5	30.4	25.0 - 35.9	8.9	5.5 - 12.3
More than 1000 dlls	581/425	31.3	27.5 - 35.1	11.8	9.2 - 14.5	25.8	21.7 - 30.0	7.0	4.6 - 9.5
Labor categories									
Doctors	166/287	34.3	27.0 - 41.6	9.0	4.6 - 13.4	22.9	18.0 - 27.8	4.1	1.8 - 6.5
Nurses	923	34.4	31.3 - 37.5	11.7	9.6 - 13.7	-	-	-	-
Administrators	649/466	38.9	35.2 - 42.7	19.2	16.2 - 22.3	32.1	27.9 - 36.4	11.8	8.8 - 14.7
Housekeeping	204/479	42.6	35.8 - 49.4	16.6	11.5 - 21.8	37.3	33.0 - 41.7	8.3	5.8 - 10.8
Retired	223/117	45.2	38.7 - 51.8	16.1	11.2 - 21.0	46.1	36.9 - 55.3	8.5	3.4 - 13.6
Medical assistants	361/119	39.3	34.2 - 44.3	12.7	9.2 - 16.1	30.2	21.8 - 38.6	11.7	5.8 - 17.6

\*Center for Epidemiologic Studies-Depression Inventory. \*\*A score of >/19, equivalent to mean plus one standard deviation is considered severe depression

more likely to be depressed than middle-aged women. However, this association is not statistically significant perhaps due to our small sample size. Additionally, education, income and labor categories are related to women's depression. Women with less than higher secondary education and those who work at non-professional, low to middle income jobs, are more likely to be severely depressed than those with higher education and those who work in high or middle income professional jobs (OR= 1.56, CI 1.0-2.3 and OR=1.6, CI 1.16-2.21, respectively for low education and income).

Among men, only education and marital status are significantly associated with depression once income and age are controlled for in the model. Table 2 indicates that having an elementary school education and being single are related to men's depression. Men who do not have a partner are three and a half times more likely to be depressed than men with a partner (OR=3.5, CI 2.11-5.33). Divorced/single men have a greater rate of severe depression than divorced females. In this sense, Mantel-Haientzel test for homogeneity showed a statistically significant difference between men and women. In addition, men with an education of high school or less are more likely to be moderately or severely depressed than those who have more than high school education. Income and occupational status are not significantly associated with men's depression.

In addition to social characteristics, job stress and chronic diseases are positively associated with depression in men and women (table 2). Those who reported moderate levels of stress at work, as well as those reporting high levels of stress at work are more likely to be depressed than those who reported no stress or low levels of stress at work (OR=3.86, CI 2.84-5.26 and OR=5.70, CI 3.55-9.17, respectively for severe depression in men and women). Higher stress is related to a higher likelihood of being depressed (p for trend <=.01). Although men experiencing high stress are nearly twice more likely to be severely depressed than women, this gender difference is not statistically significant. Similarly, men and women with one or more chronic diseases are more likely to be depressed than those without any (OR=2.24, CI 1.41-3.54 and OR=3.15, CI 1.31-7.59, respectively for severe depression among men and women with more than one chronic disease). The odds ratio difference for men and women is not statistically significant.

## Discussion

In this sample of health workers from Morelos, almost 12% reported being severely depressed in the last week. Nearly 15% of the women and 9% of the men report-

TABLE 2. Risk of depression by social characteristics, work stress, and chronic diseases

	Females						Males					
	Moderate CES-D			Severe CES-D			Moderate CES-D			Severe CES-D		
	OR	C.I.	95%	OR	C.I.	95%	OR	C.I.	95%	OR	C.I.	95%
Age												
30-59												
(Reference Category)	1.00			1.00			1.00			1.00		
<30	1.04	.79-1.36	0.752	1.54	1.08-2.19	0.016	1.61	1.07-2.42	0.022	1.03	.52-2.03	0.924
60 plus	1.57	.92-2.67	0.092	1.30	.63-2.66	0.471	1.77	.96-3.27	0.065	1.19	.38-3.65	0.762
Marital status												
Married/living together	1.00			1.00			1.00			1.00		
(Ref. single/separated/divorced/widows)	1.21	1.01-1.44	0.041	1.52	1.18-1.95	0.001	1.15	.82-1.63	0.397	3.35	2.11-5.33	<.001
Education												
Higher secondary or more (Ref.)	1.00			1.00			1.00			1.00		
Secondary	1.12	.92-1.37	0.241	1.08	.81-1.45	0.570	1.49	1.13-1.98	0.005	1.74	1.07-2.84	0.026
Primary	1.17	.84-1.61	0.349	1.56	1.02-2.38	0.038	2.30	1.61-3.29	<.001	2.76	1.53-4.97	0.001
Labor categories & income												
High & middle income professionals (Ref.)	1.00			1.00			1.00			1.00		
Middle income non-professionals	1.29	1.00-1.66	0.048	1.66	1.17-2.34	0.004						
Low income non-professionals	1.42	1.00-1.79	0.002	1.60	1.16-2.21	0.004	0.96	.73-1.25	0.753	0.95	.61-1.47	0.817
Work stress												
No stress (Ref. category)	1.00			1.00			1.00			1.00		
Not answered	1.42	.91-2.22	0.114	1.50	.80-2.80	0.203	1.62	.85-3.07	0.138	1.98	.63-6.28	0.243
Low work stress	1.12	.90-1.39	0.281	1.82	1.33-2.47	<.001	1.16	.87-1.53	0.294	1.71	1.00-6.28	0.047
High stress	1.65	1.31-2.10	<.001	3.86	2.84-5.26	<.001	2.03	1.51-2.73	<.001	5.70	3.55-9.17	<.001
Chronic disease												
No chronic disease (Ref. category)	1.00			1.00			1.00			1.00		
One chronic disease	1.14	.92-1.41	0.224	2.04	1.54-2.70	<.001	1.42	1.04-1.94	0.028	1.78	1.08-2.93	0.022
More than one chronic disease	1.12	.77-1.63	0.541	2.24	1.41-3.54	0.001	1.48	.75-2.93	0.259	3.15	1.31-7.59	0.010

ed being depressed. Depression depletes the sufferer of his or her ability and enthusiasm to fulfill role obligations and to enjoy life, and it also affects other family members. Additionally, due to its strong association with other chronic diseases, such as diabetes, cardiovascular problems, cancer and stroke, and because depression reduces the ability and motivation to follow and maintain medical regimens, it costs the health care system a great deal of expense. Addressing the mental health needs of these workers could help to improve overall health and save money in the long run.

Our results are consistent with other studies in the Mexican population that have used the self-administered symptoms scale (CES-D) (Medina-Mora, 1992) and interview-based categorical scale (WHO-CIDI) (Medina-Mora et al., 2003). Our results are also consistent with other studies of socioeconomic correlates of depression in adults (Aneshensel, 1986). The comparability of these results supports the utility of the CES-D scale for epidemiologic investigation of depression in our population.

In this study we highlight some of the specific characteristics of workers which increase their risk for being depressed. We find that women are at greater risk

for depression, which is consistent with other studies. Previous studies have shown that, due to multiple role obligations, roles overload, and role conflicts, women tend to get more stressed and hence depressed (Hibbard and Pope, 1985; Gore and Mangione, 1983). However, it is not roles per se, but the quality of these roles that determine mental health. If roles are not stressful, but are instead rather fulfilling of women's expectations, having multiple roles could lead to a greater satisfaction and a better mental health (Aneshensel, 1986; Avison, 1995). In this analysis, we found that workers who report greater stress are more depressed. However, men are more likely to be severely depressed than women if exposed to high work stress (OR of 5.7 compared to 3.8). This suggests that it may be exposure to stress rather than gender vulnerability which could account for the level of depression among the women in our study. In other words, since more women occupy roles lacking direction, control, and autonomy –characteristics associated with low job satisfaction and job stress (Aneshensel, 1986; Aneshensel and Pearl, 1987; Baruch et al., 1987; Ross and Bird, 1994)– these put them at a greater risk for depression than men. These hypotheses will be tested at a later date with the longi-

tudinal data obtained from the second phase of the IMSS Health Worker Cohort Study.

Our analysis also shows that those who are married or are keep a stable relationship with someone are less likely to be depressed than those who are single, separated/divorced, or widowed. This finding shows a positive effect of companionship on mental health. In addition, workers from a lower occupational status, low income, and low levels of education are at greater risk for depression, which suggests a protective effect associated with a higher socioeconomic status. We found no statistically significant gender difference, which suggests in turn that both men and women are equally vulnerable to the effects of such conditions. Finally, stress could also be mediating the effect of socioeconomic status on mental health, as we find that social characteristics are associated with higher levels of stress.

Our measure of work stress, however, does not measure a complete constellation of work stressors such as control, autonomy, and demands. Additionally, it does not measure stresses related to other role occupancies of the individual, such as that of familial roles: parent, spouse, and care-takers of elderly parents, etc.; or community roles such as being a member of the extended family, community organizations, etc. We are also limited by the cross-sectional nature of the data, which does not allow us to test for direction and causality of these relationships.

Finally, we also found age is related to depression. The older and younger groups of workers are at greater risk for depression. The younger, however, have two times a higher risk for depression than the older workers if they are suffering from a chronic disease (joint effect of age and chronic disease is significant in the younger group, data not shown in table 2). The middle-aged and older workers with chronic diseases are twice more likely to be depressed than middle-aged and older workers without chronic diseases. Hence, chronic diseases might be acting as mediators of the relationship between age and depression. On the other hand, it may be argued that there is reciprocal relationship between chronic disease and depression or that the causal relationship may exist in either direction, rather than in only one direction as theorized in this research. Existing research reports the causation in both directions (Ziegelstein et al., 2000; Frasure-Smith et al., 1995; Nemeroff et al., 1998; Anderson et al., 2000; Ciechanowski et al., 2000). Some studies demonstrate depression affecting chronic diseases, whereas others show that chronic diseases cause depression. In our study we find a strong positive correlation between the existence of one or more chronic diseases and depression. The causal pathway could be rigorously tested with longitudinal data.

To conclude, depression should be treated when it co-occurs with other illnesses, because untreated depression can delay recovery or worsen the outcome of chronic illnesses (Anderson et al., 2000). Treatment of depression may help people to manage symptoms of both diseases, thus improving the quality of their lives. Additionally, following protocols for reducing work place stress, improving work environment conditions and improving worker satisfaction could help to improve the mental health of these workers.

### Acknowledgement

The Health Workers Cohort Study was supported by grants from CONACYT(7876) and IMSS(IMSS-FP-125). I would also like to thank the team of people working at the Unidad de Investigación Epidemiológica y en Servicios de Salud (UIESS, Morelos) for their excellent work in data collection and management and for their helpful comments on this paper.

### References

1. ANDERSON RJ, LUSTMAN PJ, CLOUSE RE et al: Prevalence of depression in adults with diabetes: a systematic review. *Diabetes*, 49(suppl. 1):A64, 2000.
2. ANESHENSEL CS: Marital and employment role-strain, social support, and depression among adult women. In: Hobfoll SE (eds). *Stress, Social Support, and Women*. Hemisphere, New York, 1986.
3. ANESHENSEL CS, RUTTER CM, LACHENBRUCH PA: Social structure, stress, and mental health: Competing conceptual and analytic models. *American Sociological Review*, 56(12):166-178, 1991.
4. ANESHENSEL CS, PEARLIN LI: Structural contexts of sex differences in distress. In: Barnett RC, Biener L and Baruch GK (eds.). *Gender and Stress*. The Free Press, New York, 1987.
5. ANESHENSEL CS: *Theory Based Data Analysis for Social Sciences*. Sage Publications, Thousand Oaks, 2002.
6. AVISON WR: Roles and resources: The effects of family structure and the employment on women's psychosocial resources and psychological distress. *Research Community Mental Health*, 8:233-156, 1995.
7. BARUCH GK, BIENER L, BARNETT RC: Women and gender in research on work and family stress. *American Psychologist*, 42(2):130-136, 1987.
8. BENJET C, WAGNER FA, BORGES GG, MEDINAMORA ME: The relationship of tobacco smoking with depressive symptomatology in the third Mexican National Addictions Survey. *Psychological Medicine*, 34:881-888, 2004.
9. ROSS CE, BIRD CE: Sex stratification and health lifestyle: consequences for men's and women's perceived health. *J Health Social Behavior*, 35(2):161-78, 1994.
10. CIECHANOWSKI PS, KATON WJ, RUSSO JE: Depression and Diabetes: Impact of depressive symptoms on adherence, function, and costs. *Archives Internal Medicine*, 160(21):3278-85, 2000.
11. FRASURE-SMITH N, LESPERANCE F, TALAJIC M: Depression and 18-month prognosis after myocardial infarction. *Circulation*, 91(4):999-1005, 1995.
12. FRERICHS RR, ANESHENSEL CS, CLARK VA: Preva-

lence of depression in Los Angeles County. *American J Epidemiology*, 113(6):691-699, 1981.

13. GARRISON CZ, SCHLUCHTER MD, SCHOENBACH VJ, KAPLAN BK: Epidemiology of depressive symptoms in young adolescents. *J American Academy Child Adolescent Psychiatry*, 28:343-351, 1989.
14. GORE S, MANGIONE TW: Social roles, sex roles and psychological distress: Additive and interactive models of sex differences. *J Health Social Behavior*, 24(4):300-312, 1983.
15. HIBBARD JH, POPE CR: Employment status, employment characteristics, and women's health. *Women Health*, 10(1):59-77, 1985.
16. MARIÑO MC, MEDINA-MORA ME, CHAPARRO JJ, GONZALEZ-FORTEZA C: Confiability y estructura factorial de CES-D en una muestra de adolescentes mexicanos. *Revista Mexicana Psicología*, 10(2):141-145, 1993.
17. MCLEOD JD, SHANAHAN MJ: Trajectories of poverty and children's mental health. *J Health Social Behaviour*, 37:207-220, 1996.
18. MEDINA-MORA ME, RASCON ML, TAPIA R, MARIÑO MC, JUAREZ F et al.: Trastornos emocionales en población urbana mexicana: Resultados de un estudio nacional. *Anales Instituto Mexicano de Psiquiatría*, 48-55, México, 1992.
19. MEDINA-MORA ME, BORGES G, MUÑOZ CL, BENJET C, JAIMES JB et al.: Prevalecencia de trastornos mentales y uso de servicios: Resultados de la Encuesta Nacional de Epidemiología Psiquiátrica en México. *Salud Mental*, 26(4):1-20, 2003.
20. MONDRAGON L, BORGES G, GUTIERREZ R: La medición de la conducta suicida en México. Estimación y procedimientos. *Salud Mental*, 24:4-15, 2001.
21. MURRAY C, LOPEZ A: Alternative projections of mortality and disability by cause, 1990-2020: Global burden of disease study. *Lancet*, 349:1498-1504, 1997.
22. NEMEROFF CB, MUSSELMAN DL, EVANS DL: Depression and cardiac disease. *Depression Anxiety*, 8(suppl. 1):71-9, 1998.
23. OFFORD DR, BOYLE MH, SZATMARI P, RAE-GRANT NI, LINKS PS et al.: Ontario Child Health Study- II Six months prevalence of disorder and rates of service utilization. *Archives General Psychiatry*, 44(9):832-836, 1987.
24. PEARLIN LI: The Sociological Study of Stress. *J Health Social Behavior*, 30(3):241-256, 1989.
25. RADLOFF LS, LOCKE BZ: The community mental health assessment survey and the CES-D scale. In: Weissman MM, Myers JK, Ross CE (eds). *Community Surveys of Psychiatric Disorders*. Rutgers University Press, 177-189, New Brunswick, 1985.
26. RADLOFF SL: Center for Epidemiological Studies National Institute of Mental Health. *Applied Psychological Measurement*, 1(3):385-401, 1977.
27. ROBERTS RE, O'KEEFE SJ: Sex differences in depression re-examined. *J Health Social Behaviour*, 22(4):394-400, 1981.
28. ROBINS LN, HELZER JE, CROUGHAN J et al.: National Institute of Mental Health Diagnostic Interview Schedule: Its history, characteristics, and validity. *Archives General Psychiatry*, 38:381-389, 1981.
29. ROSNER B: *Fundamentals of Biostatistics*. 4th. Edition. Wadsworth Publishing Company, 406-412, Belmont, 1995.
30. ROSS CE, MIROWSKY J: Households, employment, and the sense of control. *Social Psychology Quarterly*, 55(3):217-235, 1992.
31. SALGADO DE SNYDER VN, MALDONADO M: Características psicométricas de la escala de Depresión del Centro del Estudios Epidemiológicos en Mujeres Mexicanas Adultas de Areas Rurales. *Salud Pública México*, 36:200-209, 1994.
32. SALMERON CJ, ARILLO-SANTILLAN E, CAMPUCANO-RINCON JC, LOPEZ-ANTUNANO FJ, LAZCANO-PONCE EC: Tabaquismo en profesionales de la salud del Instituto Mexicano del Seguro Social, Morelos. *Salud Pública México*, 44(Suppl. 1):S67-75, 2002.
33. TURNER RJ, WHEATON B, LLOYD DA: The epidemiology of social stress. *American Sociological Review*, 60:104-125, 1995.
34. USTUN TB, AYUSO-MATEOS JL, CHATTERJI S, MATHERS C, MURRAY CJL: Global burden of depressive disorders in the year 2000. *British J Psychiatry*, 184:386-392, 2004.
35. ZIEGELSTEIN RC, FAUERBACH JA, STEVENS SS et al.: Patients with depression are less likely to follow recommendations to reduce cardiac risk during recovery from a myocardial infarction. *Archives Internal Medicine*, 160(12):1818-23, 2000.