

# Depressive Symptomatology in Northern Mexico Adults

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**Abstract:** A cross-sectional field survey of 991 people in Tijuana, Mexico, a border city experiencing unbridled population growth, was designed to measure levels of depressive symptoms and identify correlates using the Center for Epidemiological Studies Depression measure (CES-D). Bivariate and multivariate analyses of the data indicate that similar variables are highly associated with depressive symptoms in the US and Mexico: low socioeconomic status, female gender, disrupted marital status, unemployment, and poor health. Risk-for-caseness is 19.1 per cent for males and 33.0 per cent for females. (*Am J Public Health* 1987; 77:1215-1218.)

## Introduction

This research presents results of a cross-sectional epidemiologic survey of 991 adults in Tijuana, Baja California, Mexico. Its purpose is to identify the distribution of depressive symptoms and their correlations with a number of epidemiologically salient variables.

The research site, the border city of Tijuana, Mexico, is geographically contiguous with the County of San Diego, California. It is one of the fastest growing cities in Mexico and the major source of illegal immigration to the United States. Today, informed estimates place the population size at 1,225,000 people, although it is impossible to make precise estimates since the metropolitan area of Tijuana is ringed by many unplanned residential zones housing new arrivals. Tijuana is a very eclectic environment combining features of mature urban development, including new museums and well planned industrial parks, as well as sprawling residential areas located on hillsides and ravines, housing the most destitute within shelters that are often very rudimentary. Despite these visible examples of grinding poverty, the metropolitan area also includes affluent, middle class, and large working-class residential zones; Tijuana enjoys a standard of living that is actually above average by Mexican standards. The age-sex structure of the population in Tijuana is similar to that of the Republic of Mexico; about half of the population is under 19 years of age.

## Methods

Our measure of depressive symptoms is the Center for Epidemiological Studies-Depression (CES-D),<sup>1</sup> a non-diagnostic checklist widely used in major community studies in the United States.<sup>2-6</sup> Validity studies with patient and community samples have established a caseness cutpoint of 16 or above as having good predictive value in identifying patient status<sup>7</sup> and, generally, some 16 to 20 per cent of community samples exceed this threshold.<sup>8</sup>

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The research tasks and instrumentation for the current study were developed and supervised by a binational (US-Mexico) research group with broad experience in epidemiological field research of this type. The interviewers were professional social workers from Tijuana. The data were gathered in face-to-face structured interviews about 30 minutes in length conducted during May and June 1985, with a cross-sectional sample of 991 respondents 18 years of age or older, in the Tijuana metropolitan area.

The primary sampling units were the 281 geo-administrative neighborhood entities known as *colonias* or *fraccionamientos*. However, the residential patterns of Tijuana, aggravated by limited resources for the research, created a number of sampling problems not commonly encountered in cross-sectional studies in the United States. Because census counts were judged not to be wholly reliable, aerial photographs, expert opinions, and on-site evaluations by the investigators were also used to estimate cluster size.

A sample of 50 clusters was selected on an approximate probability proportionate to size basis and 20 interviews were taken from each cluster. An on-site visit of the sampled neighborhoods by the investigators led us to the conclusion that a good cross-section of the sociodemographic variations in Tijuana had been achieved by this strategy. Within each cluster a specified area was defined from which the interviewers were to enlist respondents. Within a household the respondent selected was the resident adult with the most recent birthday. If that individual was not at home, an adult with the next most recent birthday was selected. If that person was also absent, no interview was conducted. Eighty per cent of the respondents reported being the individual with the most recent birthday. Because security of interviewers limited us to daytime interviewing our sample, predictably, is disproportionately female (76 per cent). Interviews were conducted on weekends so as not to overrepresent the unemployed. To adjust for sex-age bias of the sample the observations were age-sex weighted to conform to the sex-age distribution for northern Baja California derived from the Mexican census. Analyses reported below employ the sex, age, or sex-age weights where appropriate.

## Data Analyses

Bivariate and multivariate analyses were employed to depict the distribution of selected variables (Table 1) and their association with CES-D.

Because the distribution of CES-D is highly positively skewed and yields heterogeneous subgroup variances and non-normality of regression residuals, we deemed it necessary to transform its scores to meet the assumptions underlying our analyses. We found that employing the square root of CES-D raw scores transformation stabilized subgroup variances and yielded a nearly perfectly normal distribution of multiple regression residuals (i.e., error).

## Results and Discussion

The means and standard errors for both untransformed and transformed CES-D scores by the selected variables are presented in Table 1. CES-D means: are higher for females;

**TABLE 1—Untransformed and Transformed CES-D Means and Standard Errors by Selected Variables (N = 991),\* Tijuana, Mexico**

	Per Cent	Mean	Standard Error	Mean $\sqrt{\text{CESD}}$	Standard Error
Overall	—	11.07	.31	2.95	.05
Sex					
Female	76.0	12.58	.39	3.15	.06
Male	24.0	9.35	.54	2.71	.09
Age (years)					
18–24	17.8	12.08	.73	3.14	.11
25–29	17.4	10.13	.72	2.82	.11
30–34	16.3	9.41	.68	2.68	.12
35–39	11.5	10.70	.96	2.83	.16
40–44	8.1	9.91	1.14	2.70	.19
45–49	8.3	10.23	.94	2.86	.16
50–54	6.2	11.91	1.37	3.04	.21
55–59	4.5	13.21	1.54	3.37	.21
60–64	3.8	12.40	1.84	3.14	.26
65+	6.0	12.56	1.41	3.16	.21
Education					
None	9.8	14.58	1.08	3.50	.15
Some primary	26.1	13.15	.67	3.26	.10
Completed primary	20.5	11.31	.68	2.99	.11
Some secondary	12.4	10.69	.87	2.89	.14
Completed secondary	11.1	8.37	.76	2.54	.13
Preparatory	10.3	10.26	.74	2.91	.13
Professional	9.2	6.18	.68	2.06	.15
Weekly Family income in US\$					
<24	9.8	14.13	1.19	3.43	.16
24– 39	20.7	11.75	.69	3.10	.10
40– 59	25.7	12.21	.66	3.12	.10
60– 79	13.3	11.88	.89	3.07	.14
80–119	13.0	8.31	.70	2.52	.13
120–159	8.2	9.18	.86	2.67	.16
160+	9.3	8.74	.83	2.52	.16
Employment					
Full time	35.1	8.07	.40	2.52	.07
Part/under	7.5	12.20	1.13	3.20	.16
Unemployed	4.2	17.69	1.59	3.99	.21
Other	53.2	12.81	.48	3.19	.07
Years in Tijuana					
0– 5	15.8	12.27	.82	3.12	.13
6–14	21.0	11.21	.70	2.94	.11
15+	63.2	10.73	.38	2.91	.06
Marital Status					
Married	58.9	9.80	.38	2.75	.06
Disrupted	12.3	13.64	1.03	3.31	.15
Never married	19.3	11.81	.67	3.11	.11
Common law marriage	9.5	14.46	1.13	3.46	.16
No. Children under 18					
None	38.5	10.81	.48	2.93	.08
1	15.7	10.54	.74	2.86	.12
2	17.5	11.61	.79	2.96	.13
3	14.6	11.50	.82	3.06	.12
4	6.3	10.85	1.27	2.91	.20
5+	7.4	12.07	1.20	3.06	.19
Adults other Than Spouse					
None	53.0	10.39	.40	2.84	.07
1	16.8	12.10	.84	3.09	.12
2	30.2	11.82	.57	3.07	.09
Health					
Excellent	10.1	7.20	.78	2.23	.15
Good	51.7	9.39	.39	2.68	.07
Fair	27.5	12.69	.57	3.28	.09
Poor/very bad	10.7	19.20	1.18	4.12	.15

The sex distribution is age weighted, the age distribution is sex weighted, and all other variables are age-sex weighted.

non-linearly covary with age; inversely covary with education and income; are highest for the unemployed and lowest for those employed full-time; show very weak if any association with number of years in Tijuana, the number of children, and the number of adults other than spouse in the household; are higher for those in a common law or disrupted marital status; and show a strong covariation with self-

perceived health status. In addition, risk for caseness was 19.1 per cent for males and 33.0 per cent for females.

Multiple regression analysis was used to examine the simultaneous associations of our predictor variables with CES-D. In so doing, the linear covariation between CES-D and a predictor is adjusted for its linear covariation with the other predictors. To render the variables suitable for these

TABLE 2—Multiple Regression of Transformed CESD ( $\sqrt{\text{CESD}}$ ) on Selected Variables

Variables	Partial <sup>a</sup> Slope	Standard Error	Partial <sup>b</sup> Slope	Standard Error
Male	-.269	.138	-.160	.134
Age—Md	.002	.006	-.005	.006
Family Income (percentile)	-.006	.002	-.005	.002
Education (percentile)	-.009	.002	-.006	.002
Number Children under 18	.060	.029	.064	.028
Number Adults in Household	.033	.042	.027	.040
Proportion of Life in Tijuana	.000	.002	.000	.001
Employment Status				
Full-Time	-.256	.134	-.220	.130
Part/Under	-.101	.209	-.113	.203
Unemployed	.652	.333	.515	.323
Marital Status				
Disrupted	.287	.159	.175	.155
Never Married	.368	.168	.435	.163
Common Law	.566	.168	.520	.162
Health (1 = excellent, 5 = very bad)			.504	.062
Intercept	(3.538)	.198	(2.173)	.254

<sup>a</sup>Regression Equation excludes health variable (see text).

<sup>b</sup>Regression Equation includes health variable (see text).

analyses, we converted the unordered variables into sets of binary, dummy variables and examined the ordered variables for linearity against CES-D. As can be seen in Table 1, age is clearly non-linear. A large number of strategies were evaluated and it was found that transforming age into absolute deviations from the mean age (i.e., |age - Md|; Md = 34) provided the most parsimonious and strongest linear fit. To enhance interpretability of their unstandardized regression coefficients, income and education were converted to their percentile rank while years in Tijuana was converted to proportion of life in Tijuana both to improve its linear fit and to reduce its collinearity with age. No significant departure from linearity was found upon testing our operational form of each variable against the square root transformation of CES-D. The self-evaluated health status variable is substantively problematic because its strong association with CES-D may, in fact, represent confounding or construct overlap. Some researchers (such as Link and Dohrenwend<sup>9</sup>) believe that poor health status is a common component of non-diagnostic depression, or "demoralization" as Frank<sup>10</sup> characterized this affective state. For this reason, we present two regression equations in Table 2—the first excludes the health variable.

In constructing these regression models, product (interaction) terms were evaluated and because none was found to yield a partial slope larger than its standard error they were excluded from our estimating equations. Although the two equations yield relatively low explained variance ( $R_a^2 = .10$  and  $R_b^2 = .16$ ) both yield nearly perfectly normal distributions of residuals without notable outliers (all Studentized residuals were within the  $\pm 2.7$  range). Further evidence for the adequacy of these models is that none of the predictors showed correlation in either bivariate or partial regression residual plots. The partial regression coefficients in Table 2 reflect patterns of direction and strength of association similar to those observed in the bivariate data in Table 1. We see in equation 1 that: sex, income, education, number of children, employment status, and marital status show partial slopes substantially larger than their standard errors. While the remaining variables in the equation can be judged less important only in the presence of the stronger predictors, the weakness of their bivariate associations seen in Table 1

points to their lesser relevance to the prediction or explanation of CES-D scores. The addition of the health variable in the second equation can be seen to diminish the slopes of sex, education, and disrupted marital status. This change may be seen as reflecting correlation between health and these variables rather than their lack of import. Self-reported health may, for example, serve as a near proxy for sex in this population, but this in no way diminishes the import of sex to the prediction or explanation of CES-D.

In summary, we tested a number of variables demonstrated in previous epidemiological research to correlate with depressive symptoms. Bivariate and multivariate analyses indicate patterns of association similar to those previously documented in the United States.<sup>11-24</sup> Despite the admittedly exploratory nature of the study, these findings show high CES-D mean scores and risk-for-caseness levels in this Northern Mexican border population.

#### ACKNOWLEDGMENTS

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#### REFERENCES

1. Radloff L: The CES-D scale: a self report depression scale for research in the general population. *Appl Psychol Measure* 1977; 1:385-401.
2. Hough R, Karno M, Burnham A, Escobar J, Timbers D: The Los Angeles Epidemiological Catchment Area Research Program and the Epidemiology of Psychiatric Disorders among Mexican Americans. *J Oper Psychiatry* 1983; 14:42-51.
3. National Center for Health Statistics: Plan and Operation of the Hispanic Health and Nutrition Examination Survey, 1982-84. Vital and Health Statistics Series 1, No. 19. DHHS Pub. No. (PHS) 85-1321. Washington, DC: Govt Printing Office, September 1985.
4. Ensel W: Measuring depression: the CES-D scale. In: Lin N, Dean A, Ensel W (eds): *Social Support, Life Events and Depression*. New York: Academic Press 1986; 51-70.
5. Frerichs R, Aneshensel C, Clark V: Prevalence of depression in Los Angeles County. *Am J Epidemiol* 1981; 113:691-699.
6. Vernon S, Roberts: Prevalence of treated and untreated psychiatric disorders in three ethnic groups. *Soc Sci Med* 1982; 16:1575-1582.
7. Weisman M, Sholomskas D, Pottenger M, Prusoff B, Locke B: Assessing depressive symptoms in five psychiatric populations: a validation study. *Am J Epidemiol* 1977; 106:203-214.
8. Comstock G, Helsing K: Symptoms of depression in two communities. *Psychol Med* 1976; 6:551-563.
9. Link B, Dohrenwend B: Formulation of hypotheses about the true

- prevalence of demoralization in the United States. *In* Dohrenwend BP, *et al* (eds): *Mental Illness in the United States: Epidemiological Estimates*. New York: Praeger, 1980.
10. Frank J: Persuasion and healing. Baltimore: Johns Hopkins University Press, 1973.
  11. Gove W: The relationship between sex roles, marital status and mental illness. *Soc Forces* 1972; 51:34-44.
  12. Gove W: Sex, marital status and mortality. *Am J Sociol* 1973; 79:45-67.
  13. Dohrenwend BP, Dohrenwend BS: Sex differences and psychiatric disorders. *Am J Sociol* 1976; 31:1447-1454.
  14. Warheit G, Holzer C, Bell R, *et al*: Sex, marital status and mental health. *Soc Forces* 1976; 55:459-470.
  15. Warheit G, Holzer C, Schwab J: An analysis of social class and racial differences in depressive symptomatology: a community study. *J Health Soc Behav* 1973; 4:291-299.
  16. Warheit G, Holzer C, Arey S: Race and mental illness: an epidemiologic update. *J Health Soc Behav* 1975; 16:243-256.
  17. Dohrenwend BP, Dohrenwend BS: Social status and psychological disorder: a causal inquiry. New York: Wiley, 1968.
  18. Craig T, Van Natta P: Influence of demographic characteristics on two measures of depressive symptoms. *Arch Gen Psychiatry* 1979; 36:149-154.
  19. Weissman M, Myers J: Rates and risks of depressive symptoms in a United States urban community. *Acta Psychiatr Scand* 1978; 57:219-231.
  20. Briscoe C, Smith J, Robins E, *et al*: Divorce and psychiatric disease. *Arch Gen Psychiatry* 1973; 29:119-125.
  21. Bloom B, Asher S, Stephen W: Marital disruption as a stressor: a review and analysis. *Psychol Bull* 1978; 85:867-894.
  22. Kasl S, Cobb S: Variability of stress effects among men experiencing job loss. *In*: Goldberger L, Breznitz S (eds): *Handbook of Stress*. New York: Free Press, 1982; 445-465.
  23. Eastwood M, Trevelyan M: Relationship between physical and psychiatric disorder. *Psychol Med* 1972; 2:363-372.
  24. Schwab J, Traven N, Warheit G: Relationships between physical and mental illness. *Psychosomatics* 1978; 19:458-463.

### UCSF and SF Department of Public Health to Study City's Medically Underserved

The University of California, San Francisco has received a three-year grant of \$867,539 from the W. K. Kellogg Foundation to identify medically underserved groups and increase their access to health care services.

The study will focus on identifying San Francisco populations that lack adequate health care, pinpointing why they are underserved and determining how they can be linked to a health delivery system. Special emphasis will be given to assessing programs for pregnant women and for infants. UCSF will work closely with the City health department on the study, to develop the information required to target resources and plan programs to meet needs.

Co-principal investigators will be Paula Braveman, MD, PhD, assistant clinical professor in the UCSF Department of Family and Community Medicine and a fellow in UCSF's Institute for Health Policy Studies, and Geraldine Oliva, MD, MPH, director of the Office of Family Health in the SF Department of Public Health.

"Health care in the United States is changing very rapidly," said Braveman. "As state and federal support for health care lessens and as new financing and delivery methods evolve, there is serious concern that certain groups—defined by neighborhood boundaries or racial-ethnic background—may be left with inadequate care."

Oliva added. "One of the major consequences of Proposition 13 (in California) and other budget-cutting measures at federal and state levels has been the lack of resources for health agencies to obtain complete and useful data on health status and utilization. We hope to develop an effective system to provide this vital information."

The Kellogg Foundation, based in Battle Creek, Michigan, was established in 1930 to "help people help themselves." The Foundation has distributed nearly \$924 million in support of programs in agriculture, education, and health. Among the largest private philanthropic organizations in the world, the Foundation supports programs in the United States, Latin America, and the Caribbean, and provides grants in southern African countries to help prepare their national leaders.