

## RESEARCH REPORT

## Neighbourhood composition and depressive symptoms among older Mexican Americans

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*J Epidemiol Community Health* 2003;**57**:987–992

**Study objective:** Research suggests that economically disadvantaged neighbourhoods confer an increased risk of depression to their residents. Little research has been reported about the association between ethnic group concentration and depression. This study investigated the association between neighbourhood poverty and neighbourhood percentage Mexican American and depressive symptoms for older Mexican Americans in the south western United States.

**Design:** A population based study of older non-institutionalised Mexican Americans from the baseline assessment (1993/94) of the Hispanic established population for the epidemiologic study of the elderly (H-EPESE) merged with 1990 census data.

**Setting:** Five south western states in the United States.

**Participants:** 3050 Mexican Americans aged 65 years or older.

**Main results:** There was a strong correlation between the percentage of neighbourhood residents living in poverty and the percentage who were Mexican American ( $r=0.62$ ;  $p<0.001$ ). Percentage neighbourhood poverty and percentage Mexican American had significant and opposite effects on level of depressive symptoms among older Mexican Americans. After adjusting for demographic and other individual level factors, each 10% increase in neighbourhood population in poverty was associated with a 0.763 (95% CI 0.06 to 1.47) increase in CES-D score, while each 10% increase in Mexican American neighbourhood population was associated with a  $-0.548$  (95% CI  $-0.96$  to  $-0.13$ ) unit decrease in CES-D score among older Mexican Americans residing in their neighbourhoods.

**Conclusions:** The findings suggest a sociocultural advantage conferred by high density Mexican American neighbourhoods, and suggest the need to include community level factors along with individual level factors in community based epidemiological health studies.

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Accepted for publication  
20 May 2003

Depression is a major health problem for older adults.<sup>1</sup> A number of factors have been consistently identified as predictors of depressive symptoms including low formal education, low income, unemployment,<sup>2,3</sup> and limited social contact.<sup>4–8</sup> These individual level factors are nested within more global community level factors such as neighbourhood composition. As such, there has been growing interest in investigating higher order contextual factors in conjunction with individual level factors in an attempt to better understand the health and wellbeing of the older adult.<sup>9</sup>

Initial studies have sought to isolate the effects of neighbourhood composition on health risk; that is, does neighbourhood composition confer health risks or benefits on their residents, independent of the individual attributes of those residents? Most of the work in this area has reported on the adverse effects of poor neighbourhoods on health outcomes, including higher cardiovascular morbidity<sup>10,11</sup> and all cause mortality.<sup>12,13</sup> Yen and Kaplan<sup>14</sup> found the risk of depression to be twice as high for a majority of older white and black people living in residential areas with high poverty rates, after adjusting for age and gender.

In this study, we examine the association between neighbourhood composition (that is, percentage of Mexican Americans living in a community and percentage poverty of households with incomes below the poverty line in a community) and depressive symptoms for a cross sectional sample of older Mexican Americans. Older Mexican Americans are a unique group in which to study community level and individual level factors on a health outcome. This is an economically disadvantaged population, with 20% of older Mexican Americans living in households with poverty level

incomes in 2000.<sup>15</sup> Despite their economic disadvantage, Mexican American neighbourhoods have comparatively high rates of labour force participation, intact family structures, home ownership, and residential stability.<sup>16–18</sup> If the quality of social support from community is an important determinant of health,<sup>5,6</sup> we would expect that high density Mexican American communities may act as a buffer, protecting older Mexican Americans from some of the adverse consequences of poverty, such as depression. The study has three hypotheses. Firstly, increasing tract percentage poverty will be associated with increased depressive symptoms. Secondly, increasing proportion of older Mexican Americans in a census tract (a small census based geographical area) will be associated with decreased depressive symptoms. Thirdly, increasing proportion of older Mexican Americans in a census tract will moderate the effects of increasing tract percentage poverty on depressive symptoms.

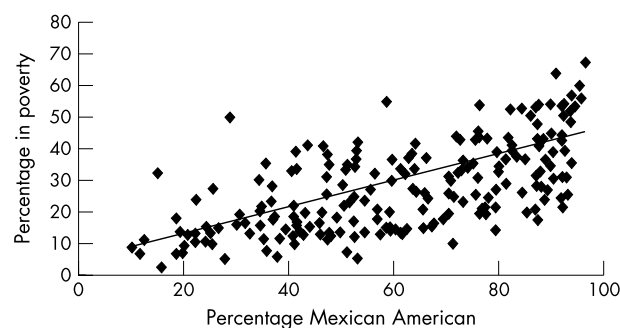
## METHODS

## Sample

Data are from the Hispanic established population for the epidemiologic study of the elderly (H-EPESE), a population based study of non-institutionalised Mexican Americans aged 65 years or older.<sup>19</sup> Subjects were selected from the five south western states of Texas, California, Arizona, Colorado,

**Abbreviations:** H-EPESE, Hispanic established population for the epidemiologic study of the elderly; ADL, activities of daily living; CES-D scale, Center for Epidemiologic Studies-Depression

and New Mexico. The sample design was for a multistage area probability cluster sample that involved selection of counties, census tracts (a small census based geographical area), and households. In the first stage, counties were selected if at least 6.6% of the county population was of Mexican American ethnicity. In the second stage, census tracts were selected with a probability proportional to the size of their older (age 65+) Mexican American population, using counts from the 1990 US census. There were 206 census tracts in the analysis sample. In the third stage, census blocks (very small area units within census tracts) were selected at random in order to obtain at least 400 households within each census tract. These households were screened to identify persons in the target population of older Mexican Americans. The sampling procedure assures a sample that is generalisable to the about 500 000 older Mexican Americans living in the south west. The five states in the H-EPESE sampling frame contain 85% of the 65 and older Mexican American population living in the United States. The response rate at baseline (1993/1994) was 83%.<sup>19</sup> In-home interviews were conducted in Spanish or English. This study included 2710 persons where complete data were available on the Center for Epidemiologic Studies—Depression (CES-D) scale.



**Figure 1** Scatterplot of neighbourhood poverty on percentage Mexican American.

## Measures

### Physiological level factors

Physiological level factors included chronic disease and activities of daily living (ADL) limitations. Subjects were asked at the baseline assessment if they had a physician diagnosis of heart attack, stroke, cancer, or diabetes. For each subject the number of individual chronic diseases reported was totalled and a summary chronic disease scale was

**Table 1** Baseline characteristics of older Mexican Americans with mean and 95% confidence intervals of CES-D Score

	Total sample n (%)	Mean CESD score	95% Confidence intervals	p Value*
<b>Census tracts (n = 206)</b>				
Tract percentage				
Mexican American				
0–41%	48 (23.3)	11.56	9.53 to 13.58	
42–59%	45 (21.8)	10.80	8.04 to 13.55	0.59
60–82%	65 (31.6)	9.38	7.04 to 11.72	0.07
83%+	48 (23.3)	9.28	6.84 to 11.72	0.07
Tract percentage in poverty				
0–16%	56 (27.2)	9.70	7.59 to 11.80	
17–25%	50 (24.3)	10.40	7.58 to 13.22	0.62
26–39%	55 (26.7)	11.15	8.70 to 13.59	0.24
40%+	45 (21.8)	9.88	7.35 to 12.41	0.89
<b>Subjects (n = 2710)</b>				
Age				
65–74	1850 (68.3)	9.92	8.99 to 10.86	
75–84	719 (26.5)	10.95	9.73 to 12.16	0.10
≥85	141 (5.2)	11.55	8.59 to 14.50	0.28
Gender				
Men	1128 (41.6)	7.96	7.12 to 8.80	
Women	1582 (58.4)	11.99	11.01 to 12.97	0.00
Marital status				
Married	1524 (56.2)	9.30	8.35 to 10.24	
Unmarried	1186 (43.8)	11.51	10.22 to 12.81	0.00
Education (years)				
0–6	1976 (72.9)	10.52	9.54 to 11.50	
7–11	466 (17.2)	10.74	9.29 to 12.18	0.77
≥12	268 (9.9)	7.73	6.26 to 9.20	0.00
Per capita household income relative to county median				
<0.25	1835 (67.7)	10.79	9.76 to 11.83	
0.25 to <0.50	706 (26.1)	9.13	7.81 to 10.46	0.01
>0.50	169 (6.2)	7.88	5.52 to 10.25	0.02
Place of birth				
US born	1531 (56.5)	9.66	8.25 to 11.07	
Mexico born	1179 (43.5)	10.98	9.61 to 12.35	0.07
Chronic medical condition				
0	1821 (67.2)	9.50	8.55 to 10.45	
1	711 (26.2)	11.43	9.96 to 12.90	0.01
≥2	178 (6.6)	13.27	10.90 to 15.63	0.00
ADLs				
0	2450 (90.4)	9.63	8.75 to 10.52	
≥1	260 (9.6)	16.55	14.47 to 18.63	0.00

\*p Value is for two tailed t test for two sample comparison of means to first listed category. Confidence intervals and significance test are adjusted for design effects using Taylor series linearisation method.

**Table 2** Regression models predicting continuous CES-D scores by percentage Mexican American and neighbourhood poverty adjusting for relevant risk factors (n = 2710)

Characteristic	Model 1			Model 2			Model 3			Model 4		
	$\beta$	(95% CI)	P	$\beta$	(95% CI)	P	$\beta$	(95% CI)	P	$\beta$	(95% CI)	P
<b>Census tract variables</b>												
% Neighbourhood poverty (0–100%)	2.03	(-3.56 to 7.62)	0.48	-2.20			7.64	(0.40 to 14.88)	0.04	7.63	(0.57 to 14.69)	0.03
% Mexican American (0–100%)							-5.16	(-9.47 to -0.85)	0.02	-5.48	(-9.66 to -1.29)	0.01
<b>Individual variables</b>												
Age	0.10	(0.04 to 0.15)	0.001	0.10	(0.04 to 0.15)	0.001	0.10	(0.04 to 0.15)	0.001	0.00	(-0.06 to 0.06)	0.94
Female	3.45	(2.76 to 4.14)	0.00	3.40	(2.77 to 4.14)	0.00	3.45	(2.76 to 4.14)	0.000	3.25	(2.54 to 3.95)	0.00
Unmarried										0.84	(0.09 to 1.58)	0.03
Schooling (0–6 years)										0.30	(-0.64 to 1.24)	0.54
7–11 years										-2.70	(-3.91 to -1.50)	0.00
$\geq 12$ years										-0.59	(-1.16 to -0.59)	0.04
Per capita income relative to county median												
Born in United States												
Chronic medical conditions (0–4)												
ADL limitation ( $\geq 1$ )												
Intercept	0.75			2.62			2.32			-0.83	(-1.60 to -0.06)	0.03
										1.64	(1.11 to 2.16)	0.00
										5.58	(4.35 to 6.81)	0.00
										7.58		0.00

created with a range of 0 to 4. At the baseline assessment 65.5% reported no chronic disease, 26.5% reported one chronic disease, and 8% reported two or more chronic diseases. ADLs were assessed at baseline assessment according to a modified version of the Katz Activities of Daily Living Scale.<sup>20</sup> Subjects were coded as ADL disabled if they reported one or more ADL limitations: bathing, using the toilet, transferring from bed to chair, walking across a small room, personal grooming, dressing, and eating.<sup>20</sup> At the baseline assessment 88.9% reported no ADL limitations, and 11.1% reported one or more ADL limitations.

### Individual level factors

Individual level factors included age, gender, marital status, highest grade of schooling completed, per capita household income, and place of birth (Mexico compared with US born). Highest grade of schooling completed was categorised as 0 to 6 years, 7 to 11 years, and 12 years or more. Per capita household income was expressed as a ratio to county median household income to adjust for the sharp differences in cost of living across the study area, and was logged for the regression analysis to normalise the distribution of the variable. Of sample respondents, 59% were women, 44% were foreign born, and 44% were unmarried.

Data were missing because of item non-response for schooling (34 cases; 1.2% of sample) and household income (268 cases; 9.3%). In both cases, missing values were imputed using best subset regression. Education was imputed using information about age, gender, tract education level, immigrant status, English language ability, census occupation, and personal income. Household income was imputed using personal income, house value, number of persons in household, marital status, education, English language ability, state of residence, median income of county of residence, and reported financial strain. There were no substantive changes in reported regression parameters when cases were imputed rather than excluded.

### Community level factors

Neighbourhood characteristics were measured using data from the 1990 census for the 206 census tracts where subjects lived at baseline. Sample subjects had a high degree of residential stability. The median year in which subjects moved into their current dwelling at the 1993–94 baseline assessment was 1974. Neighbourhood percentage Mexican American was scaled from 0 to 1, where higher scores indicate greater homogeneity. Neighbourhood socioeconomic status was operationalised by the percentage of persons living in households with income below poverty by the census definition,<sup>21</sup> and was scaled from 0 to 1, where lower scores indicate increased neighbourhood poverty.

Figure 1 presents the scatterplot of percentage Mexican American compared with percentage neighbourhood poverty for the 206 census tracts in the Hispanic EPESE study. There was a strong linear association ( $r = 0.62$ ) between percentage Mexican American and percentage neighbourhood poverty. Correlations of this magnitude are common in hierarchical models of contextual effects on individual behaviours.<sup>22</sup> This is the case because important dimensions of community structure are typically more highly correlated than are individual level variables. The variance inflation factor (VIF) of 1.69 that is associated with this correlation, calculated for the 206 census tracts, was well below the threshold (VIF = 10) that would indicate a problem of multicollinearity in multivariate regression models.<sup>23</sup> That is, there is sufficient independent variation of neighbourhood poverty and percentage Mexican American to investigate both effects as distinct characteristics of neighbourhood context.

## Depressive symptoms

Depressive symptoms were measured using the CES-D scale.<sup>24</sup> The CES-D consisted of 20 items where subjects are asked whether they have experienced certain feelings or symptoms in the past week. Responses were scored on a four point scale (0 to 3). Scores for the CES-D ranged from 0 to 60 where higher scores indicated increased depressive symptomatology. In the analysis, the CES-D scale was used both as a continuous and a categorical variable (0–15 and  $\geq 16$ ). Subjects with a score of 16 or more were classified as having high depressive symptomatology.<sup>24</sup>

## Statistical analysis

Using descriptive statistics, sociodemographic and health factors were examined for all subjects on mean CES-D score at the baseline assessment interview. Bivariate regression statistics were used to test the strength of the association between neighbourhood percentage Mexican American and neighbourhood poverty. To perform this analysis, we capitalised on the fact that the primary sampling units (PSUs) for the H-EPESE sample design were a random sample of census tracts in the five south western states. Census tracts have been found to be a useful approximation for neighbourhood environments in numerous studies of contextual influences on social behaviour and health.<sup>25–27</sup> Thus we estimated two level random intercept linear regression models, using HLM software distributed by Scientific Software International. The second level in this analysis, neighbourhood, are the census tracts that are the primary sampling units for the study. We regress depressive symptoms on neighbourhood tract percentage Mexican American and neighbourhood poverty, adjusting for age, gender, marital status, Mexico (compared with US) birth, a number of medical conditions, and ADL limitations. We tested additional cross level interactions between neighbourhood characteristics and individual characteristics including age, gender, neighbourhood poverty, medical condition, and ADLs using random slopes models. No significant interactions were identified and these models are not reported. The linear regression analyses were weighted using post-stratification weights so that the results

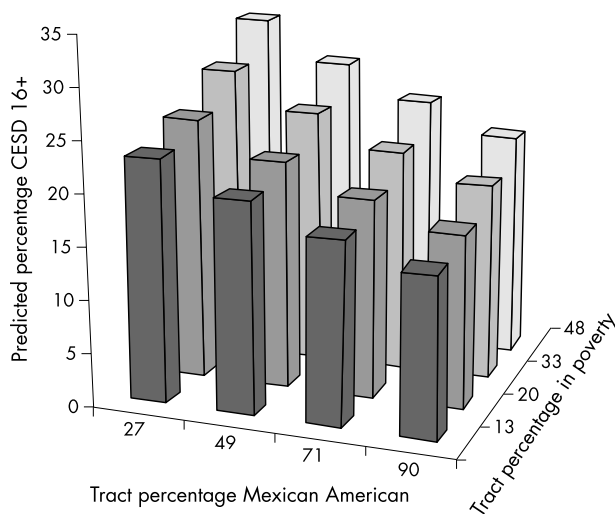
are representative of the older Mexican American population of the south western states.

## RESULTS

Table 1 presents mean CES-D scores for neighbourhood and individual level data. Community level data are presented by the percentage of a neighbourhood population that was Mexican American and also the percentage of a neighbourhood that was living in poverty. There was a trend for older Mexican Americans living in higher density Mexican American neighbourhoods to report lower mean CES-D scores. No such trend appeared for the association between tract percentage poverty and mean CES-D score. The intraclass correlation (percentage of variance that occurs between neighbourhoods) for the CES-D score was 24%. For the individual level data older age, female gender, being unmarried, and less formal education was associated with higher mean CES-D scores. Additionally, having a lower per capita household income relative to the county median, being born in Mexico, reporting one or more chronic medical conditions or one or more ADL limitations were associated with higher mean CES-D scores.

Table 2 presents unstandardised  $\beta$  coefficients for the prediction of continuous CES-D scores (range 0–60) by percentage Mexican American and percentage neighbourhood poverty, adjusting for relevant individual level factors. Model 1 indicates a non-significant association between percentage neighbourhood poverty and CES-D score with adjustments for age and sex. Similarly, Model 2 indicates a non-significant association between percentage neighbourhood Mexican American and CES-D score. In Model 3 with both percentage neighbourhood poverty and percentage Mexican American included in the model, older Mexican Americans who reside in the highest percentage Mexican American census tracts had a 5.16 point decrease in CES-D score compared with those who live in the lowest percentage Mexican American census tracts. Mexican Americans who live in the highest percentage neighbourhood poverty areas had a 7.64 point increase in CES-D score compared with those in the lowest percentage neighbourhood poverty census tracts. Because the results are linear and additive, another way of describing the findings in Model 3 is to say that each 10% increase in percentage Mexican American was associated with a 0.516 point decrease in CES-D score, while each 10% increase in percentage poverty was associated with a 0.764 point increase in CES-D score. In the fully adjusted model results for percentage neighbourhood poverty and percentage Mexican American with CES-D score were similar to model 3 results.

Figure 2 shows the association among percentage neighbourhood poverty and percentage Mexican American with percentage of subjects with high ( $\geq 16$ ) CES-D scores, with adjustment for individual level data. The figure indicates a gradient of risk for percentage Mexican American and percentage neighbourhood poverty on high depressive symptoms (CES-D score  $\geq 16$ ). Subjects living in the lowest density Mexican American communities and in lowest percentage poverty tracts had the lowest risk of depression. At each level of neighbourhood poverty, neighbourhoods with the highest percentage Mexican American residents had the lowest rates of subjects with high depression scores.



**Figure 2** Predicted high depressive symptoms (CES-D  $\geq 16$ ) at midpoints of quartiles of tract percentage neighbourhood poverty and tract percentage Mexican American. Predictions are derived from a hierarchical logistic regression model of high depressive symptoms (CES-D  $\geq 16$ ) using factors from table 2 (model 4), evaluated at the mean (age = 71 years, percentage county income = 18%) and mode (female, <12 grades of school, US born, and no medical conditions or ADL limitations) of individual level data.

## DISCUSSION

Using a population based cohort, our findings indicate that high density Mexican American communities moderate the adverse consequences of poverty on the psychological well-being of its residents. In an unadjusted analysis no clear pattern was observed between tract percentage poverty and depressive symptoms, and a weak association was observed



between tract percentage Mexican American and depressive symptoms. When both factors were included in the same model both neighbourhood poverty and neighbourhood density of Mexican American were significantly associated with the risk of depressive symptoms, in opposite directions. For example, each 10% unit increase in tract percentage Mexican American was associated with approximately a 0.5 point decrease in depressive symptom score as measured by the CES-D.

Although results from previous studies point to a strong positive association between community poverty and poor health,<sup>28–30</sup> our current data indicate that high neighbourhood ethnic density may buffer the deleterious effect of poverty on health. Our findings are concordant with, and suggest a mechanism that helps to explain, the so called “Hispanic paradox” that older Mexican Americans have many health indicators similar to or better than that of more advantaged older non-Hispanic white people despite clear disadvantages in terms of income, health insurance, housing, and education.<sup>31–34</sup> One hypothesis offered to explain this “Hispanic paradox” is that strong social and family support structures buffer the effects of low social and economic status.<sup>35–36</sup> Our results could be seen as further evidence of the importance of social networks and social cohesiveness at the community level.

A shared cultural identity, common language and appearance may contribute to the health of the individual. A recent cohort study by Hjern and colleagues<sup>37</sup> examined social adjustment of intercountry adopted children on mental health disorders in Sweden. The study found intercountry adoptees were three to five times more likely to develop psychiatric illnesses than native born people. One explanation offered was that discrimination and prejudice could be higher for non-Swedish appearance, negatively impacting on the mental health of the person.

Strongly held community beliefs may also lead to the adoption or change of health practices or behaviours. However, the direction for change can either be positive or negative. For example, at the individual level strong marriage and good friendship ties are associated with less smoking and alcohol intake, better nutrition, and more cancer screening, while less successful marriages or friendships are associated with an increase risk for poor health behaviours.<sup>38</sup> Lower rates of smoking and drinking and drug use are reported for Mexican Americans, particularly among immigrants and women.<sup>31–39</sup>

A unique characteristic of many high density Mexican American communities is that they are stable environments where labour force participation, intact family structures, home ownership, and residential stability are all comparatively high.<sup>16–18</sup> Ross has suggested that the association between neighbourhood poverty and depression is mediated by increased social disorder.<sup>28</sup> That is, in many high poverty neighbourhoods a resident’s daily experiences are more likely to include exposure to crime, vandalism, noise pollution, and overcrowding than in more advantaged neighbourhoods. If Ross is correct, then the negative effects of neighbourhood poverty on mental health may be attenuated where material disadvantage is not accompanied by a high degree of social disorganisation. Immigrant and ethnic enclaves present examples of community contexts where concentrated economic disadvantage is frequently not accompanied by other social pathologies because of the offsetting buffering effects of high levels of group cohesion.

Interpretation of our findings should take into account several considerations. It is possible that older Mexican Americans from high density Mexican American neighbourhoods may be more likely to migrate to Mexico in response to ill health including high depressive symptoms. However,

follow up data on this cohort suggest that few older Mexican Americans return to Mexico. The associations reported are cross sectional rather than longitudinal and reflect differential degrees of exposure to community environments. However, older Mexican Americans experience a high degree of residential stability. The median length of residence at current address at the time of the survey was 22 years. Finally, no direct measure of social support variable was included in the analysis. Theoretical considerations suggest that high levels of social support associated with high levels of tract percentage Mexican American may explain the lower depressive symptoms associated with variables. However, this hypothesis was not directly tested in this study. The importance of our findings is based on the following strengths of the investigation. We collected information from a large well defined sample, which is generalisable to 500 000 Mexican Americans living in the south western United States.<sup>19</sup> The reliability and consistency of the data collection procedures in the Hispanic EPESE investigation are well established.<sup>19</sup>

In conclusion, our findings suggest the need for careful examination of neighbourhood effects on health. This examination should go beyond negative community factors and include positive factors such as local resources and social cohesiveness and neighbourhood composition.

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Funding: this research was supported by National Institute on Aging grant AG-10939. Glenn V Ostir is supported by a fellowship grant from the Canadian Institutes of Health Research (CIHR).

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