Measuring the Need for Medical Care in an Ethnically Diverse Population

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Objective. To examine measures of need for health care and their relationship to utilization of health services in different racial and ethnic groups in California.

Data Source. Telephone interviews obtained by random-digit dialing and conducted between April 1993 and July 1993 in California, with 7,264 adults (ages 18–64): 601 African Americans, 246 Asians, 917 Latinos interviewed in English; 1,045 Latinos interviewed in Spanish; and 4,437 non-Latino whites.

Study Design. A cross-sectional survey was conducted from a stratified, probability telephone sample.

Data Collection. Interviews collected self-reported indicators of need for health care: self-rated health, activity limitation, major chronic conditions, need for ongoing treatment, bed days, and prescription medication. The outcome was self-reported number of physician visits in the previous three months.

Principal Findings. Compared to whites, one or more of the other ethnic groups varied significantly ($p < .05$) on each of the six need-for-care measures after adjustment for health insurance, age, sex, and income. Latinos interviewed in Spanish reported lower percentages and means on five of the need measures but the highest percentage with fair or poor health (32 percent versus 7 percent in whites). Models regressing each need measure on the number of outpatient visits found significant interactions of ethnic group with need compared to whites. After adjustment for insurance and demographics, the estimated mean number of visits in those with the indicator of need was consistently lower in Latinos interviewed in Spanish, but the differences among the other ethnic groups varied depending on the measure used.

Conclusion. No single valid estimate of the relationship between need for health care and outpatient visits was found for any of the six indicators across ethnic groups. Applying need adjustment to the use of health care services without regard for ethnic variability may lead to biased conclusions about utilization.

Key Words. Need for care, health status, health measurement, utilization, race, ethnicity

In efforts to compare utilization of health services among groups, investigators have recognized the importance of adjusting for health status or the need

for care; but no consensus has been reached on what measures should be used in the adjustment. Aday, Andersen, and Fleming (1980) did some of the earliest work by adjusting utilization with the number of reported days of activity limitation or disability. Later studies used other measures of need for care to adjust utilization (Weiner et al. 1991). More recently, Hafner-Eaton (1993) adjusted physician visits for self-rated health and for the presence of chronic conditions in order to compare the insured and the uninsured, and Blendon et al. (1989) used the same two measures to adjust ambulatory visits for comparison between whites and African Americans.

Theoretical arguments have been raised about the limitations of various need-for-care measures (Ware et al. 1981). For example, measuring need for care by the presence of specific chronic conditions or by the number of chronic conditions may undercount patients who have poor access to care and go undiagnosed. Alternatively, self-rated health is probably less dependent on access to care but may be sensitive to health states not amenable to medical care. Disability days may be confounded by factors like social support, for instance, whether an individual has sick leave or someone who can assist in child care.

An aspect of choosing indicators of need for care that has received less attention is the degree to which indicators measure differently across racial and ethnic groups. Some research has been done on variation across such groups, but many of the studies reported in the literature have been carried out among persons over age 64, in non-population-based samples on relatively small numbers, or in studying a specific illness (Wolinsky, Aguirre, Fann, et al. 1989; Mutchler and Burr 1991; Krause and Jay 1994; Johnson and Wolinsky 1994; Crawford, McGraw, Smith, et al. 1994). Need adjustment in

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Funding for this research was from the Robert Wood Johnson Foundation, Grant No. 22907, and the Agency for Health Care Policy and Research, Grant No. HS07373. Dr. Bindman is a Robert Wood Johnson Foundation Generalist Physician Faculty Scholar.

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these cited studies was done with the assumption that the relationship between the need measure and utilization did not vary significantly among racial and ethnic groups. If there are significant interactions between ethnicity and the need-use relationship, then applying a single need adjustment across racial and ethnic groups is inappropriate and could lead to biased results.

In this report we take advantage of a large population–based survey of adult Californians that contains substantial numbers of African Americans, Asians, Latinos, and whites, to evaluate variation in self-reported measures of need for care and their association with outpatient visits. The questions we sought to address were:

1. Did the need for care vary across racial and ethnic groups after controlling for health insurance and demographic differences?
2. How well did each need measure predict outpatient visits? and
3. Did the association between need measures and utilization differ significantly between ethnic groups?

METHODS

COMMUNITY RESIDENT SURVEY

The data for this analysis are from a random-digit-dialing telephone survey of 51 California communities conducted in 1993 to study access to care and preventable hospitalization rates (Bindman, Grumbach, Osmond, et al. 1995). Three hundred ninety-four zip code clusters covering all of California (median population 52,000) were stratified on the basis of whether they were urban or rural, their median income, and three levels of the preventable hospitalization rate. A probability sample of zip code clusters was selected within these strata, oversampling communities with high and low hospitalization rates.

Eligible subjects spoke English or Spanish, were age 18–64, and had lived in the community for a minimum of three months. The interview was translated into Spanish by one translator and then translated back into English by a second translator to detect significant deviations in meaning from the original. One respondent was chosen randomly from each household. The overall response rate for the survey was 65.4 percent, estimating the proportion eligible among those without phone contact by the proportion eligible among those with contact. The completion rate for screened and eligible households was 81 percent.

Demographic Measures. Race/ethnicity was classified as African American, Asian, Latino (not African American or Asian), and white. Latinos were further divided by whether they were interviewed in English or in Spanish. We defined a total of five groups by race, ethnicity, and language of interview, but in the interest of linguistic economy those groupings are referred to herein as "by ethnicity." In the same interest, to avoid repeating phrases such as "Latinos interviewed in English versus Latinos interviewed in Spanish," we identify the former group as Latinos(Eng) and the latter as Latinos(Sp).

Annual household income was categorized as below $20,000, from $20,000 to $49,999, and $50,000 or more. Insurance was coded as private insurance, MediCal (Medicaid), or none. Private insurance included subjects with Medicare or Champus (together, 3.9 percent of those classified as having private insurance).

Measures of Health and Need for Care. To assess health status and need for care, we selected indicators of health that represented diverse perspectives on describing a population, based largely on the approaches taken by national health surveys. These included indicators of self-perceptions of health, activity limitations, disability days, presence of major chronic conditions, and the use of prescription medications. Self-rated health is the widely used 5-point scale ranging from excellent to poor, with 5 equaling excellent. Any activity limitation is "any impairment or health problem" that interferes with working at a job or around the house; this corresponds to the national Health Interview Survey's definition of "any major activity limitation" (National Center for Health Statistics 1992). Bed days are the number of days in the previous three months when more than half of the day was spent in bed because of illness or injury. Prescription medicines are current regular use, excluding birth control pills. The major chronic conditions asked about are cancer, angina or history of heart attack, enlarged heart, asthma, chronic bronchitis or emphysema, ulcer, hypertension, kidney disease, goiter or thyroid trouble, diabetes, stroke, and HIV infection/AIDS.

In addition, because we wanted to determine if direct query about the need for care could provide an alternative to these more lengthy assessments, we developed a new question to assess need for medical care directly, based on our work with focus groups prior to the study. This question, which asked, "Do you have a health condition that requires ongoing medical attention?" is referred to as "ongoing need."

Ongoing need, activity limitation, and prescription medication are dichotomous variables throughout this report. For the purpose of graphical presentation in Figure 1 (later in the article), the other three measures were

also dichotomized: self-rated health as fair or poor health versus other; any major chronic condition; and any bed days. Utilization was measured by self-reported number of visits in the previous three months to a "medical doctor" (specifying that medical specialties as well as "general practitioners and osteopaths" were to be included) or an emergency room, excluding pregnancy-related visits.

Statistical Methods. For adjusted means, percentages, and *p*-values in Table 2 (further on), parameter estimates and significance tests were used from logistic and multiple linear regressions. Means were adjusted to the mean values of the covariates: age, income, percent male, percent with no insurance, and percent with MediCal.

Number of outpatient visits in the previous three months was modeled as the outcome in Poisson regression. The number of visits had a highly skewed distribution, tailing off to a maximum of 40 visits. When this count was used as a raw value, residual diagnostics to examine model fit showed substantial overdispersion, so we used the count of visits truncated at five or more in all of the Poisson regressions presented here; this method provided better fit (ratios of deviance to degrees of freedom 1.2–1.4). We refer to the independent variables in these models as "predicting" the number of visits, following conventions of regression analysis, but it should be understood that we are "predicting" retrospectively the number reported for the previous three months.

If measures of the need for care are to be used to adjust utilization, they should be predictive of the use of services. To examine the strength of this association for each need measure, separate Poisson models were run within each ethnic group using the number of outpatient visits as the outcome and controlling for the covariates of age, sex, income, and health insurance (see Table 4 further on). Percent of deviance reduction attributed to the need measure was calculated for each model by subtracting the residual deviance of the fitted model, after removing the deviance attributed to the covariates, from the deviance of the null model, then dividing by the null deviance. The deviance reduction is presented as a measure of model fit analogous to the percent variance explained in linear regression (deviance equals -2 log likelihood) and therefore as a measure of the degree to which each need measure predicts outpatient visits.

To test for significant interactions between the need measures and ethnic group we used a Poisson regression model for each need measure with the covariates given above; a main term for the need measure and for each ethnic group; and an interaction term for each of the four non-white groups times

the need measure (Appendix). Coefficients for each interaction term were tested for difference from whites (the reference group); that is, each interaction coefficient was tested for being different from zero. Adjusted mean numbers of visits in Figure 1 are from the models for each need measure with interactions, using dichotomous versions of the need measures. The mean number of visits was estimated in those with and without the indicator of need, adjusting the estimates with the coefficients for the covariates multiplied by their mean values and percents. The estimated means were tested for statistical significance using contrasts in the Poisson models. Because our sample was clustered by zip code areas, we also performed regressions using the generalized estimating equations (GEE), as implemented in a SAS (Statistical Analysis System) macro (version 2.02, U. Groemping), to adjust the variances for possible clustering effects. The clustered analyses had no appreciable effect on our conclusions or the significance levels of p-values, so the unclustered estimates are given throughout.

Human Subjects. This study was approved by the Committee on Human Research of the University of California, San Francisco.

RESULTS

Interviews were conducted with 7,800 adults, but race and ethnicity information was missing for 350, and 204 others are not included in this analysis because their race or ethnicity was reported as mixed or in one of a number of other groups with numbers too small to analyze. The results reported here are based on 7,246 interviews with persons self-identified as African American (601), Asian (246), Latino (1,962), or white and non-Latino (4,437). Interviews were conducted in Spanish with 1,045 Latinos and in English with 917 Latinos; all other interviews were conducted in English. Ninety-six percent of the Latinos in our sample who were interviewed in Spanish were born outside the United States, 81 percent in Mexico and 15 percent in Central America. Of Latinos interviewed in English, 13 percent were born in Mexico and 6 percent in Central America.

Measures of Need for Health Care and Health Status by Ethnicity. For all measures of need for care, the mean or percentage differed significantly from whites in one or more of the other ethnic groups (Table 1A, $p < .01$). Overall, African Americans reported the most need for care, and Latinos(Sp) and Latinos(Eng) reported the least, with Latinos(Sp) reporting less need than Latino(Eng). This general pattern, however, did not hold across all six

indicators of need. Ranking need for care in the five ethnic groups varied with the measure used. In particular, the self-rated health score gave a substantially different relative ranking than other measures. Latinos(Sp) reported the worst health whereas on the other five measures they reported the least need for care. Whites reported the best mean self-rated health score but were second to African Americans in most need for care on four of the other five measures. Asians and Latinos(Eng) reported less need for care than whites on four measures but reported more bed days in the previous three months as well as worse self-rated health.

Need for Care Adjusted for Variation in Health Insurance and Demographic Variables. The demographic variables in Table 1B varied by ethnicity. Latinos(Sp) reported low income and a lack of health insurance much more frequently than other ethnic groups, and Latinos(Eng) and Latinos(Sp) were younger on average ($p < .01$). These variables were also associated with the need-for-care measures and therefore were confounders of the associations between ethnicity and need for care. To control for confounding we adjusted the means and percentages for each need-for-care measure by age, sex, income, and health insurance (Table 2). Adjustment narrowed the magnitude of some of the differences between ethnic groups but, for the most part, relative rankings across ethnic groups were unchanged. Mean number of bed days and activity limitation were exceptions to this generalization. After adjustment, Asians rather than African Americans had the highest mean number of bed days and whites rather than African Americans had the highest percentage with some activity limitation. Differences in the self-rated health score were reduced, but whites still had the highest score and Latinos(Sp) had a significantly lower score than other groups. Other measures retained similar relative rankings across ethnic groups. Differences between responses from Latinos(Sp) and those from whites remained statistically significant after adjustment for all six measures.

Measures of Utilization. African Americans and whites reported about the same number of outpatient visits and more visits than the other three groups (Table 3). Mean number of visits was slightly higher in African Americans, but the percentage with at least one visit was higher in whites. Asians and Latinos(Eng) reported similar numbers of outpatient visits, but Latinos(Sp) reported a mean number 47 percent less than Latinos(Eng) and 60 percent less than African Americans.

Need-for-Care Variables Related to Utilization of Outpatient Services. We next examined how well each of the need-for-care measures predicted the number of outpatient visits in regression models separately within ethnic

Table 1: Distribution of Responses to Need-for-Care and Demographic Measures by Race, Ethnicity, and Language of Interview

	*Race/Ethnicity**				
	African American (n = 601)	*Asian (n = 246)*	*Latino (Eng) (n = 917)*	*Latino (Sp) (n = 1045)*	*White (n = 4437)*
A: Need for care/Health status measures					
Self-rated health:					
% excellent	24	27	27	9	38
% very good	32	38	33	10	37
% good	29	29	28	48	19
% fair	10	6	9	30	5
% poor	5	1	2	2	2
Mean self-rated health score†	3.6	3.9	3.8	2.9	4.0
% Ongoing need for medical attention	26	18	18	13	24
% Prescription medication	28	20	20	16	31
% Any activity limitation	16	9	10	9	12
% Any bed days	26	24	23	15	21
Mean number bed days	2.4	1.5	1.4	0.8	1.2
% Major chronic condition	38	28	27	26	29
Mean number major chronic conditions	0.7	0.4	0.4	0.4	0.5
B: Demographic measures					
Sex					
% Female	61	56	59	58	58
% Male	39	44	41	42	42
Age:					
% 18–34	42	47	57	58	32
% 35-49	34	37	31	34	43
% 50-64	24	17	12	8	26
Income:					
% <$20,000	36	19	32	67	17
% $20,000–$49,999	43	36	46	30	42
% ≥$50,000	21	45	23	2	41
Health Insurance:					
% Private	77	88	71	37	85
% MediCal	9	4	8	12	3
% None	14	8	20	51	13

* Latino (Eng) = Latino interviewed in English; Latino (Sp) = Latino interviewed in Spanish.

† Self-rated health: 1–5; 1 = poor, 5 = excellent.

Table 2: Estimates of Need for Care by Race/Ethnicity, Adjusted for Age, Sex, Income, and Insurance

	Race/Ethnicity†				
Need-for-Care Measure	*African American (n = 601)*	*Asian (n = 246)*	*Latino (Eng) (n = 917)*	*Latino (Sp) (n = 1045)*	*White (n = 4437)*
% Fair/Poor health	9.7**	6.0	8.8**	19.8**	5.5
Mean self-rated health score‡	3.7**	3.8**	3.8**	3.2**	4.0
% Ongoing need for medical attention	21.4	19.9	18.8	13.2**	20.0
% Prescription medication	22.9	19.4*	21.6*	18.7**	25.7
% Any activity limitation	22.8	20.4	20.1**	10.6**	24.1
% Any bed day	23.9	25.8	21.3	12.5**	22.5
Mean number bed days	1.9	2.0	1.3	0.2**	1.5
% Major chronic condition	34.5**	30.5	28.3	24.3**	27.9
Mean number major chronic conditions	0.60**	0.48	0.49	0.37**	0.45

* $p < .05$ versus whites; ** $p < .01$ versus whites.

† Latino (Eng) = Latino interviewed in English; Latino (Sp) = Latino interviewed in Spanish.

‡ Self-rated health: 1–5; 1 = poor, 5 = excellent.

Table 3: Utilization of Health Services by Race, Ethnicity, and Language of Interview

	Race/Ethnicity†				
Utilization Measure	*African American (n = 601)*	*Asian (n = 246)*	*Latino (Eng) (n = 917)*	*Latino (Sp) (n = 1045)*	*White (n = 4437)*
% Outpatient visit‡ in prior 3 months	44	46	38	20	48
Mean number outpatient visits prior 3 months	1.3	0.9	1.0	0.5	1.2

† Latino (Eng) = Latino interviewed in English; Latino (Sp) = Latino interviewed in Spanish.

‡ Visits to physicians or emergency rooms excluding hospitalizations and pregnancy visits.

group. Table 4 shows the variation in the fit of these models. The deviance reduction shown is for the need measure alone. Only an additional, and

fairly constant, 3 percent to 4 percent of deviance was accounted for by the covariates in the model. The relative ranking of each need measure by its model fit was similar across ethnic groups. Ongoing need for medical attention gave the best fit in four of the five ethnic groups, closely followed by prescription medications. Self-rated health gave the worst fit in three of five, but for whites and African Americans number of bed days gave the worst fit. However, the magnitude of the percent deviance reduction for the model varied greatly across ethnic groups. For the three strongest predictors the percent deviance reduction was approximately 50 percent to 100 percent higher in African Americans and Latinos(Sp) than in whites. Thus, the stronger predictors accounted for less of the variation in outpatient visits in whites and Asians than in African Americans and Latinos. This implies that use of outpatient health services is less driven by need for care in whites and Asians than in African Americans and Latinos.

The differences by ethnicity in model fit and the differences in the coefficients (coefficient values not shown) suggest that adjusting utilization across ethnic groups with a single coefficient for a need measure might be inappropriate. Adjusting with a single coefficient is inappropriate if the measure has different effects in different groups, that is, if the coefficient

Table 4: Predicting Number of Outpatient Visits with Need-for-Care Measures, Adjusted for Age, Sex, Income, and Insurance

	*Model Fit: Percent Reduction in Deviance Attributed to Need Measure**				
	Race/Ethnicity†				
Need-for-Care Measure	*African American (n = 601)*	*Asian (n = 246)*	*Latino (Eng) (n = 917)*	*Latino (Sp) (n = 1045)*	*White (n = 4437)*
Ongoing need for medical attention (%)	20	9	14	17	11
Prescription medication (%)	16	11	13	17	9
Any activity limitation (%)	17	5	10	10	7
Number major chronic conditions (%)	9	5	5	6	6
Number bed days (%)	3	2	4	4	3
Self-rated health (%)	5	<1	2	1	5

* Deviance equals −2 log likelihood from Poisson regression model; additional deviance attributed to covariates–age, sex, income, and health insurance–was 3 percent for whites and African Americans and 4 percent for the other three groups.

† Latino (Eng) = Latino interviewed in English; Latino (Sp) = Latino interviewed in Spanish.

shows significant interactions within the groups. To investigate this inference formally we tested for interactions between each need variable and ethnicity in predicting visits. We examined a separate Poisson regression model for each need measure with terms for the adjustment covariates, main effects, and interaction of need and ethnicity. One or more of the interaction terms for the need variable within the ethnic group was significantly different from the term in whites in all six models. The interaction term for Latinos(Sp) was significantly different from that for whites in all six models ($p < .001$ for all six models). The term for Asians was not significant in any of the six models, although this may in part have been a consequence of lower power to detect differences with the smaller sample size for Asians. For African Americans the interaction was strongly significant in the models for ongoing need, prescription medications, and activity limitation ($p < .004$); significant in the model for bed days ($p = .02$); and not significant in the models for major chronic condition ($p = .27$) or self-rated health ($p = .64$). Interactions for Latinos(Eng) were strongly significant for ongoing need and prescription medications ($p < .001$); significant for activity limitation ($p = .02$) and bed days ($p = .01$); and not significant for self-rated health score ($p = .85$) or major chronic conditions ($p = .17$). The six full models with coefficients for all variables and p-values are given in the Appendix.

Estimated Adjusted Utilization Within Ethnic Groups. The presence of significant interactions between the need measures and ethnicity indicated that we could not need-adjust across ethnic groups without ignoring important variation in measurement performance within our groups. To illustrate how different need-specific utilization was within ethnic groups, we calculated the adjusted mean number of visits for those with and those without the need indicator in each ethnic group. To do this we employed models using a dichotomous version of each need variable with interaction terms and adjusting for the covariates (see Figure 1). Each panel in Figure 1 shows two adjusted mean numbers of outpatient visits in each ethnic category, the higher number for those with the need and the lower number for those without the need.

Figure 1 illustrates how the need measures estimate utilization within ethnic groups. First, Figure 1 shows that among those without the indicator of need there is only small variation in the estimated mean number of visits for all groups except Latinos(Sp), who have consistently lower estimated means. In those four groups they range between approximately 0.6 and 0.8 visits per three months, compared with approximately 0.3 visits in Latinos(Sp).

Second, the magnitude of the difference in the adjusted number of visits is striking among those with a given need for care. For fair/poor health the

Figure 1: Estimated Mean Number of Outpatient Visits in the Previous Three Months in Those with and without the Indicator of Need for Health Care, Adjusted for Age, Sex, Income, and Health Insurance

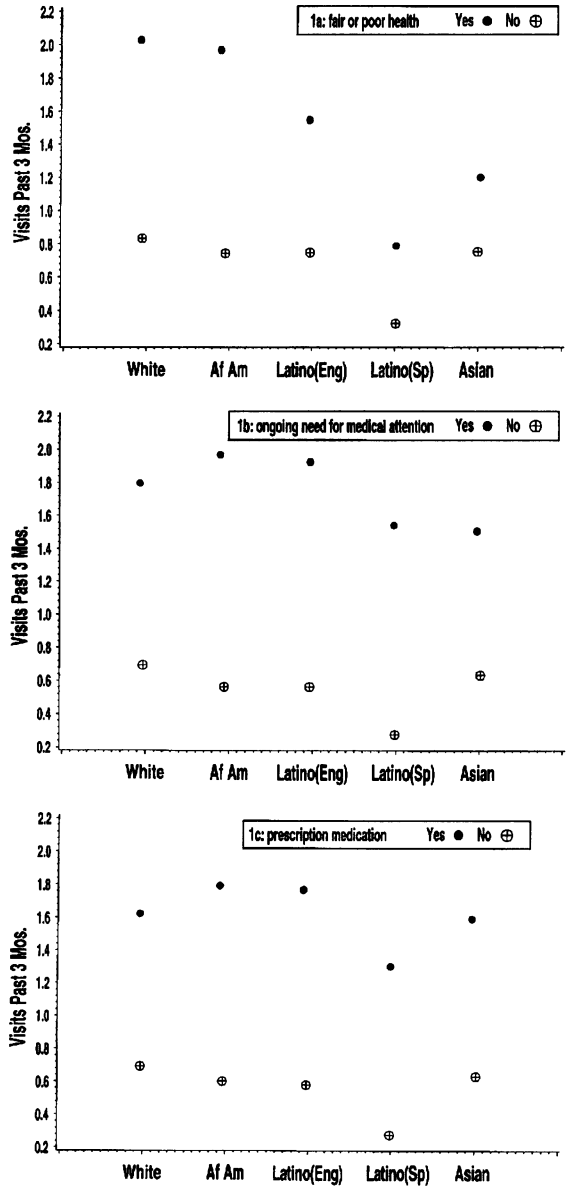
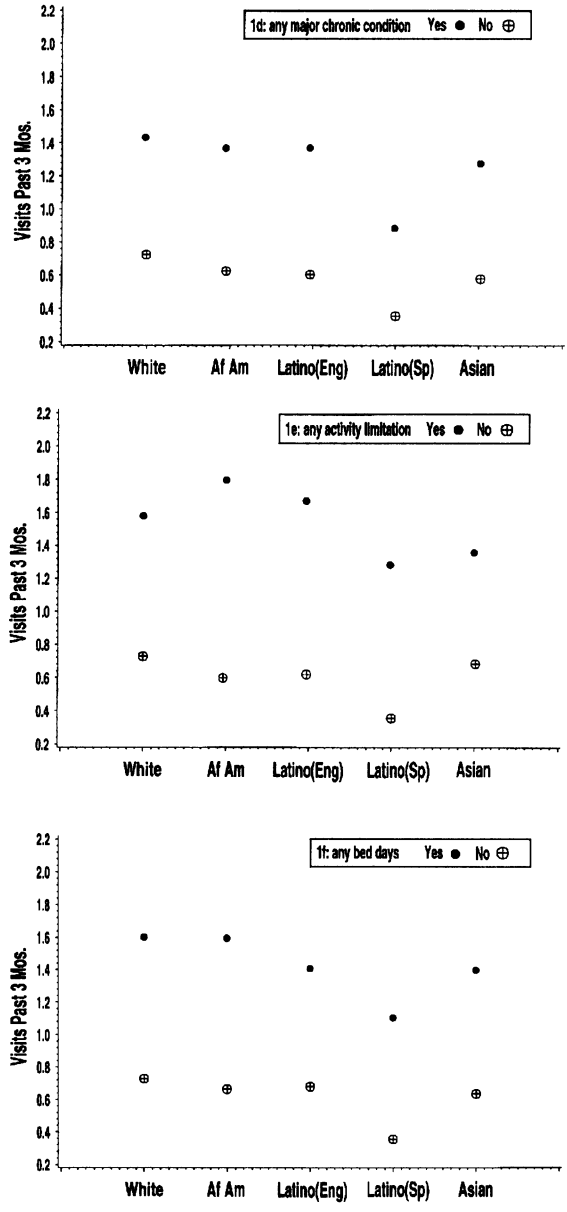


Figure 1: Continued



Af Am = African American; Latino (Eng) = Latino interviewed in English; Latino (Sp) = Latino interviewed in Spanish.

adjusted number of visits in whites and African Americans is nearly 150 percent greater than the number in Latinos(Sp), and in Latinos(Eng) it is nearly 100 percent greater. For the other five variables the ethnic group with the highest adjusted number among those with need has between 30 percent and 50 percent more visits than the group with the lowest estimate. The least variation is seen with ongoing need for medical attention, the measure that best predicted outpatient visits in all groups except Asians.

Third, the figure illustrates that inferences about the amount of need-adjusted utilization by members of minority groups relative to whites depend on the need measure chosen. Latinos(Sp), with the lowest adjusted number on five of the six measures and nearly the lowest on the sixth, are an exception to this generalization. The relative ranking of use in the other four groups changes with the need measure used. Using fair/poor health, whites have the highest adjusted number (2.03), which is not significantly higher than the estimate for African Americans (1.95, $p = .65$), but is significantly higher than the estimates for Latinos(Eng) (1.57, $p = .005$), Asians (1.19, $p = .0002$), and Latinos(Sp) (0.79, $p < .001$). With prescription medication, African Americans and Latinos(Eng) have the highest estimates, which are marginally different from those of whites ($p = .07$ and .09, respectively); whites and Asians have nearly the same number, and Latinos(Sp) are significantly different from all other groups ($p < .01$). Using activity limitation, African Americans have a significantly higher estimate than whites ($p = .04$), whereas whites and Latinos(Eng) have similar values, and Latinos(Sp) are not significantly different from Asians ($p = .006$). For ongoing need for medical attention and for any major chronic condition, only the Spanish estimate is significantly different from that of whites ($p = .04$ and $p < .001$, respectively), but for using bed days both Latinos(Eng) and Latinos(Sp) are significantly different from whites ($p = .05$ and $p < .001$).

DISCUSSION

Participants in our survey reported significantly different levels of the need for health care across ethnic groups even after adjustment for differences in health insurance and demographic characteristics. Similar ethnic differences in need for care have been reported by others, although most previous reports have not distinguished Latino subjects interviewed in English from those interviewed in Spanish, or have interviewed only English speakers (Linn, Hunter, and Linn 1980; Roberts and Lee 1980; Berkanovic and Telesky

1985; Cox 1986; Johnson and Wolinsky 1994; Andersen, Lewis, Giochello, et al. 1981). Less anticipated was the observation that the relative amounts of need for care reported varied with the measure of need or health status used. Although the general pattern was for African Americans to report the most need for care and Latinos(Sp) the least, the relative ranking of the five ethnic groups we defined varied with the particular measure of need.

The self-rated health question especially gave different results from the other indicators. Latinos(Sp) reported much worse health and in particular reported a high percent with "fair" health. "Excellent, very good, good, fair, poor" were translated into Spanish as "*excelente, muy buena, buena, regular, mala.*" "*Regular*" as a translation of "fair" may be too close to normal health to capture the more negative connotation that "fair" carries in English when it is applied to health. "*Pasable*" is an alternative translation for "fair," and our results with "*regular*" suggest that it might be preferable (Keller et al. 1995). It should be noted, however, that a significantly larger percentage of Latinos interviewed in English reported fair health (9 percent) as compared with whites (6 percent), and their mean health score was significantly lower than whites even though they reported less need for care on other measures. In addition, only 9 percent of Latinos(Sp) chose "*excelente*" (the first choice read), compared to 38 percent of whites who chose "excellent," a more than fourfold difference that is not likely to be due solely to a scale distortion introduced by one later choice. Although difficulties in finding a good translation undoubtedly contributed to the difference between Latino(Sp) and the other groups on this measure, additional cultural factors appear to exist that affect the responses to self-rated health.

The effect of translations on responses to self-rated health items in public access databases may not always be readily apparent or easy to detect. It should be noted that the National Health Interview Survey (National Center for Health Statistics 1992) questionnaire, which includes the self-rated health question, has only an English version. Interviewers make use of ad hoc translators (friends, neighbors) where necessary when they encounter a household without an English speaker.

Being interviewed in Spanish was a good surrogate for recent immigration to the United States. Our results show very significant differences between these two populations of Latinos. On several measures Latinos interviewed in English responded more like the other three ethnic groups than Latinos interviewed in Spanish (Wells, Golding, Hough, et al. 1989). Other regions of the United States have Latino populations that are not predominantly Mexican American and have different mixes of recent immigrants and long-

time U.S. residents, for example, the Puerto Rican population in New York City and the Cuban population in Florida (Vega and Amaro 1994). Our results may not apply to these populations, but it seems likely that other important differences in the application of need-for-care measures may exist in these populations. Similar large differences in Asian populations may have gone undetected in our study because our sample of Asians was somewhat small and we did not interview in Asian languages.

Ethnic differences in reported need-for-care measures could not be accounted for by differences in the demographic variables we measured. Although significant differences in health insurance and income status did exist by ethnicity, as well as smaller differences in age and sex distributions, the pattern of different ranking by ethnicity with different measures of need for care persisted after adjustment. We did not study an exhaustive list of potential covariates that might explain the relationship between ethnicity and need measures, and perhaps a more in-depth investigation of acculturation, health beliefs, and health-seeking behaviors would have explained the additional variation we observed.

When we moved from examining need for care alone to investigating its relationship to utilization, we were restricted to looking at retrospective use of services during the three months prior to the interview. Because our analyses are retrospective, it is likely that the associations between need measures and outpatient visits are stronger than they would have been if prospective data had been available. The variables most strongly associated with number of visits are those that imply previous contact with the health care system. Taking prescription medications requires prior contact with the system and probably recent contact, and having a condition requiring ongoing medical attention would also seem to imply such contact. Knowing that one has a specific major chronic condition also implies contact with health care services, but not necessarily recent contact. There is a degree of circularity in "predicting" past visits with these measures. Manning, Newhouse, and Ware (1982) reported on both retrospective and prospective analyses of RAND Health Insurance Experiment data for a wide variety of health status measures. They found generally higher R^2 values for linear regression models fitting retrospective outpatient cost data than for fitting prospective costs, but for measures similar to those we used, the prospective estimates were not greatly different from the retrospective estimates.

The strength of ongoing need for medical attention, as compared with having a major chronic condition, indicates that it can be substituted for the longer checklist of chronic conditions if the primary goal is to predict

outpatient visits and if a short item to measure need for care is desirable. In our data it was associated with chronic conditions more strongly than self-rated health, which has been reported by Pope (1988) to reflect serious, chronic conditions. Since this was the one new measure we evaluated, it would be useful to replicate our findings in another population and with prospective data. The three measures that were the poorest predictors of utilization–self-rated health, bed days, and having a major chronic condition–appear to be among the measures most commonly used in the past to need-adjust utilization (Aday, Andersen, and Fleming 1980; Andersen, Mullner, and Llewellyn 1987; Gibson 1991; Blendon et al. 1989; Hafner-Eaton 1993). Our results suggest that in addition to ongoing need for treatment, taking prescription medications and activity limitation are also both better indicators of use. It is not surprising that these measures are more closely linked to utilization than is self-rated health, since self-rated health is a more global measure that appears to measure different dimensions in different age groups (Krause and Jay 1994).

The three need measures that were the best predictors in regression models explained more of the variation in number of visits for African Americans and Latinos than for whites and Asians. Although we did not collect information on the reason for outpatient visits, we interpret this result as suggesting that among African Americans and Latinos, especially those who communicate primarily in Spanish, use of health care services is more strongly associated with chronic need for care. Other investigators have also noted that use of services may be more "need driven" in non-white populations (Bassford 1995; Wolinsky 1982; Wolinsky, Aguirre, Fann, et al. 1989). The use of services by whites may be more discretionary, and it may involve more visits for minor complaints or preventive care. Less acculturated Latinos may use more alternative medicine or may rely more on unlicensed providers.

Our analysis revealed significant differences in the ways that each need-for-care measure estimated the number of visits within ethnic groups after controlling for differences in health insurance, income, sex, and age. Among those not reporting a need for care, the lack of differences among all groups except Latinos(Sp) would seem to imply that the "baseline" use of outpatient services is very similar among those who perceive themselves as healthy. This baseline for Latinos(Sp), however, was only about half or less the mean number of visits in the other groups. Latinos(Sp), even if they had private health insurance, appeared simply to use health care much less than any other group (Wells, Golding, Hough, et al. 1989).

Among those reporting a need for care, Latinos(Sp) still used fewer services, but the level of use in the other four groups was much more variable across the groups than among those without the need. We do not know whether these differences in utilization reflect real differences in health, differences in access to care not captured by health insurance and income (such as language barriers or education), differences in trust in the health care system, or differences in the use of health care that result from culturally distinct ways of coping with illness (Angel and Thoits 1987; Wells, Golding, Hough, et al. 1989). All of these and perhaps other, unknown factors may play some role in determining the need-adjusted variation in utilization we observed.

None of our need measures could be applied to adjust utilization uniformly across all five ethnic groups. The presence of these significant interaction effects suggests that need-adjusting utilization in an ethnically diverse population may be misleading or biasing. The importance of variation in the relationship between need and utilization may be quite population-specific and may be influenced by decisions about collecting data in languages other than English, as the large differences we observed in Latinos interviewed in Spanish show. The amount of bias in need-adjusted utilization will vary in accordance with such decisions. The substantive meaning of this bias will depend on the demographic distribution of the study population and the degree to which error can be tolerated. If, for example, financial incentives are linked with capitation payments to need-adjusted utilization, then even relatively small errors in calculating expected utilization rates could result in large profits or losses. Those interested in need-adjusting or predicting utilization for health planning should explore the sensitivity of their conclusions to the measures used by obtaining data with more than one or two measures and by looking at how they perform within ethnic groups.

Appendix: Six Poisson Regression Models to Test Interactions of Ethnic Groups with Need Measure in Predicting Outpatient Visits

	Prescription Medication Coeff (p-value)	*Self-rated Health Score Coeff. (p-value)*	*Any Activity Limitation Coeff. (p-value)*	*Bed Days Coeff. (p-value)*	*Major Chronic Condition Coeff. (p-value)*	*Ongoing Need Treatment Coeff. (p-value)*
Intercept	−0.2055 (.0007)	−1.0643 (.0000)	−0.3998 (.0000)	−0.4389 (.0000)	−0.3966 (.0000)	−0.2375 (.0001)
No insurance	−0.2928 (.0000)	−0.4287 (.0000)	−0.4251 (.0000)	−0.3834 (.0000)	−0.3902 (.0000)	−0.3278 (.0000)
MediCal	0.1244 (.04)	0.0221 (.71)	0.0656 (.27)	0.0828 (.17)	0.0613 (.30)	0.0352 (.55)
Private insurance	ref	ref	ref	ref	ref	ref
Male	−0.1472 (.0000)	−0.2611 (.0000)	−0.2584 (.0000)	−0.2596 (.0000)	−0.2294 (.0000)	−0.2147 (.0000)
Female	ref	ref	ref	ref	ref	ref
Age	0.0007 (.54)	0.0084 (.0000)	0.0069 (.0000)	0.0144 (.0000)	0.0079 (.0000)	0.0019 (.11)
Income	−0.0216 (.0003)	0.0131 (.04)	−0.0035 (.56)	−0.0164 (.007)	−0.0123 (.04)	−0.0114 (.05)
Need measurement	0.8630 (.0000)	0.3662 (.0000)	0.7914 (.0000)	0.0214 (.0000)	0.6714 (.0000)	0.9519 (.0000)
Asian	−0.0912 (.35)	−0.0827 (.69)	−0.0370 (.69)	−0.1270 (.11)	−0.1745 (.09)	−0.0763 (.43)
African American	−0.1419 (.04)	−0.2152 (.08)	−0.1927 (.005)	−0.0078 (.87)	−0.1492 (.04)	−0.1995 (.004)
Hispanic	−0.2185 (.0002)	−0.2205 (.04)	−0.1593 (.004)	−0.1133 (.01)	−0.1670 (.004)	−0.2082 (.0002)
Spanish	−0.9343 (.0000)	−1.7555 (.0000)	−0.6920 (.0000)	−0.6852 (.0000)	−0.8631 (.0000)	−0.8817 (.0000)
White	ref	ref	ref	ref	ref	ref
Need* Asian	0.0964 (.53)	−0.0477 (.56)	−0.1660 (.31)	−0.0016 (.73)	0.0558 (.71)	−0.1123 (.47)
Need* African	0.2586 (.005)	0.0187 (.64)	0.3253 (.0005)	−0.0068 (.02)	0.1034 (.27)	0.2921 (.002)
Need* Hispanic	0.3236 (.0001)	0.0069 (.85)	0.2048 (.01)	0.0070 (.01)	0.1127 (.17)	0.2829 (.0006)
Need* Spanish	0.7335 (.0000)	0.2296 (.0008)	0.4488 (.0001)	0.0209 (.0000)	0.3905 (.0004)	0.7129 (.0000)
Need* White	ref	ref	ref	ref	ref	ref

Note: coeff. = coefficient (in log scale); ref = reference group (coefficient = 0).

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