

Do HMOs Affect Educational Disparities In Health Care?

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ABSTRACT

BACKGROUND We wanted to examine how membership in a health maintenance organization (HMO) is related to delivery of preventive clinical services to patients with different educational levels.

METHODS We conducted a cross-sectional analysis of the 1996-1997 Community Tracking Study Household Survey among adults aged 18 to 64 years with private or Medicaid health insurance. We examined interactions between respondent educational level and HMO membership for the following measures: having a regular source of care and, in the past year, having had a physician visit, a mental health visit, a mammogram (women ≥ 50 years), an influenza vaccination (ages ≥ 55 years), or smoking cessation counseling (smokers).

RESULTS After adjustment for sociodemographic factors, community size, insurance type, physical and mental health status, and smoking, respondents with less education were significantly less likely to have had a physician visit or mental health visit, mammogram, or influenza vaccination in the past year. Disparities in receipt of preventive care by educational level were smaller among HMO members. Differences in disparities between HMO members and non-HMO members reached statistical significance for influenza vaccination and showed a trend for mental health visits ($P = .06$). Moreover, HMO members with less than 12 years of education received services at levels comparable to non-HMO members with more education.

CONCLUSIONS There are appreciable disparities in receipt of preventive care by education among nonelderly insured persons. HMO membership is associated with smaller disparities for some services. Those with the lowest levels of education appeared to benefit the most from HMO membership.

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INTRODUCTION

The elimination of disparities in health and health care is a central goal of Healthy People 2010.¹ Socioeconomic status and race-ethnicity have been linked to standard measures of health care quality. Lower socioeconomic status, often measured by years of education completed, is associated with receiving fewer Papanicolaou smears, mammograms,^{2,3} influenza immunizations,⁴ and diabetic eye examinations,⁵ as well as later enrollment in prenatal care⁶ and lower quality ambulatory⁷ and hospital⁸ care.

Because of a population focus and greater reliance on performance assessment, including accountability to accreditation organizations,^{9,10} health maintenance organizations (HMOs) are potentially positioned to improve health care to persons of low socioeconomic status and reduce disparities among plan members. Yet relatively little is known about the quality of care provided to persons of low socioeconomic status in HMOs or the impact of HMOs on disparities. In earlier studies, Ware and colleagues^{11,12} found that low-income, ill persons fared worse in HMOs than outside HMOs.

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Others studies suggest that HMO membership has little effect on racial and ethnic disparities in influenza shots and health care utilization measures^{4,13} and might be associated with greater barriers and lower satisfaction for minorities.¹⁴

Using a large, nationally representative survey, we compared delivery of preventive clinical services among nonelderly adults enrolled in HMOs with those in non-HMO health care plans. Because HMOs can use population-level quality measures and educational campaigns, we hypothesized that we would observe smaller disparities in the delivery of these services by educational level among HMO members.

METHODS

Data are from the Community Tracking Study (CTS) Household Survey conducted in 1996 and 1997.¹⁵ It is a telephone survey of 60,446 persons representing the US housed, noninstitutionalized population. Sixty communities were randomly selected using stratified sampling with probability in proportion to population size to ensure representation of the US population. While random-digit dialing was used to select most households, a small sample also included households without telephones; these respondents were provided cellular phones for the interviews. Survey data included sociodemographic characteristics, health insurance, health care utilization, health status, and preventive health services. The number of elderly respondents with Medicare who were enrolled in HMOs could not be determined as a result of an error in the original survey; analyses for this study were confined to adults aged 18 to 64 years with insurance (private or Medicaid). The final response rate for the CTS Household Survey was 65%. A total of 31,676 nonelderly adult respondents comprised the sample for the study.

Regular source of care; likelihood of a physician visit, mental health visit, mammogram, or influenza vaccination in the past year; and receipt of smoking cessation counseling were each modeled as a function of HMO membership and patient educational level. Interactions by insurance type were also modeled. Covariates, described below, were selected using the Andersen-Aday behavioral model that identifies predisposing, enabling, and need factors.¹⁶

Primary Independent Variables

Education (Predisposing). Data were collected regarding respondents' education (less than 12 years of completed education, 12 years, 13-15 years and 16 or more).

Insurance (enabling). This was classified as private or Medicaid.

HMO membership (enabling). This was based on the respondents' responses to a survey item asking whether their plan was an HMO or not.

Covariates

Race, Ethnicity, Language (Predisposing). The following 5, mutually exclusive categories were based on the respondent's self-identification and the language in which the interview was conducted: white; black; Hispanic, English fluent; Hispanic, non-English fluent; and other race.

Demographic characteristics (predisposing). These categories include age (18 to 29, 30 to 44, and 45 to 64 years, but entered as a continuous variable in analyses of mammography and influenza vaccination, where the sample was limited to older adults), sex, marital status (married or not), family size, community size (large metropolitan region of more than 200,000 population, small metropolitan region of less than 200,000 population, or nonmetropolitan region), and household income (as a percentage of the federal poverty level for 1996: less than 100%; 100% to 199%; 200% to 299%; 300% to 399%; more than 400%).

Health status (need). We used self-reported health status as a proxy for need. Health status was assessed based on the Medical Outcomes Study Short Form 12-item health survey (SF-12). It includes 2 summary scores, 1 for physical health (range, 10 – 69; mean, 52 in this sample) and 1 for mental health (range, 8 - 71; mean, 51 in this sample). It has been shown to be reliable and valid compared with the well-established, longer SF-36.^{17,18}

Smoking status (predisposing). Respondents were asked whether they currently smoked, formerly smoked, or never smoked.

Dependent Variables

We used standard dichotomous measures for medical, mental health, and preventive health services use.

Having a Regular Source of Care. This variable was dichotomous ("Is there a place you usually go when you are sick, or need advice about your health?") This measure was also included as an independent covariate in analyses of the remaining dependent variables.

Physician Visit. This measure was based on a respondent report of at least 1 physician visit in the past year.

Mental Health Visit. This measure was based on the respondents report that they had "seen or talked to a mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker" in the past year.

Mammography. Respondents were asked whether they had received a mammogram in the past year

(women older than 50 years, $n = 7,418$ for this subsample).

Influenza Vaccination. Respondents were asked whether they had received an influenza vaccination in the past year (adults 55 years and older, $n = 4,277$ for this subsample).

Smoking Cessation Counseling. Respondents who smoked were asked whether they had been counseled by their physician to quit smoking (adult smokers, $n = 7,488$ for this subsample).

Analysis

We conducted analyses using the statistical software package SUDAAN¹⁹ to account for the complex design of the CTS Household Survey.¹⁵ We compared HMO and non-HMO members overall and within each educational stratum.

Separate logistic regression models were developed for having a usual source of care (all) and receipt in the past year of at least 1 physician visit (all), at least 1 visit with a mental health professional (all), smoking cessation counseling (all smokers), mammography (women 50 years and older), and an influenza vaccination (all 55 years and older). We assessed for interaction between HMO status and education and also evaluated interactions between HMO status and income, race and ethnicity, and Medicaid insurance. To facilitate ease of interpretation of the size of the education and HMO effects, adjusted predicted marginal effects were calculated.²⁰

RESULTS

The characteristics of respondents in HMOs and not in HMOs are shown in Table 1. In bivariate analyses, HMO members were more likely to be younger, male, single, minority, and more educated, have a higher income, have private insurance as opposed to Medicaid, reside in a large metropolitan area, and have better physical health status. Higher educational attainment was significantly associated with greater likelihood of having a usual source of care, a physician visit, mental health visit, mammogram, and influenza vaccination (Table 2). Adjustment resulted in loss of significance for having a usual source of care but had little effect on educational disparities for the other measures. Statistically significant differences in the likelihood of having a mental health visit in the last year by educational level increased after adjustment. Interestingly, there was no association of education with receipt of smoking cessation advice.

Table 3 shows crude (bivariate) and adjusted associations of health care access and use with HMO membership. Following adjustment for race-ethnicity-lan-

Table 1. Characteristics of Health Maintenance Organization (HMO) vs Non-HMO Members Among Nonelderly, Insured Adults

| Characteristic | HMO ($n = 15,006$) % (95% CI) | Non-HMO ($n = 16,670$) % (95% CI) |
|--|---------------------------------------|---|
| Education, years* | | |
| < 12 | 9.7 (8.7-10.7) | 11.1 (10.3-11.9) |
| 12 | 33.7 (32.7-34.7) | 33.6 (32.4-34.8) |
| 13-15 | 29.5 (28.5-30.5) | 27.5 (26.3-28.7) |
| ≥ 16 | 27.1 (26.1-28.1) | 27.8 (26.8-28.8) |
| Age, years† | | |
| 18-29 | 24.0 (23.0-25.0) | 21.9 (20.9-22.9) |
| 30-44 | 44.2 (43.2-45.2) | 41.1 (40.9-42.3) |
| 45-64 | 31.8 (31.7-31.8) | 37.0 (35.8-38.2) |
| Male sex† | 49.0 (48.2-49.8) | 48.1 (47.5-48.7) |
| Race† | | |
| Black | 12.8 (10.8-14.8) | 9.7 (7.7-11.7) |
| Hispanic, English fluent | 7.9 (5.9-9.9) | 4.2 (3.0-5.4) |
| Hispanic, non-English fluent | 4.2 (3.8-4.6) | 2.5 (1.3-3.7) |
| Other race | 6.2 (5.4-7.0) | 4.8 (4.2-5.4) |
| White | 68.9 (67.7-70.1) | 78.9 (77.7-80.1) |
| Marital status, single* | 37.9 (36.5-39.3) | 35.4 (33.8-37.0) |
| Mean family size | 2.66 (2.62-2.70) | 2.70 (2.64-2.76) |
| Residence† | | |
| Large metropolitan area | 82.3 (79.5-85.1) | 66.6 (62.6-70.6) |
| Small metropolitan area | 4.3 (3.5-5.1) | 7.5 (6.5-8.5) |
| Nonmetropolitan area | 13.3 (10.7-15.9) | 25.9 (22.5-29.3) |
| Medicaid insurance† | 3.3 (2.7-3.9) | 8.0 (7.0-9.0) |
| Smoking status | | |
| Current | 25.3 (24.3-26.3) | 24.9 (23.7-26.1) |
| Former | 21.6 (20.6-22.6) | 22.4 (21.4-23.4) |
| Never | 53.1 (51.5-54.7) | 54.2 (52.6-55.8) |
| Health status | | |
| PCS 12 (physical) score, mean§ | 51.1 (50.9-51.3) | 50.8 (50.6-51.0) |
| MCS 12 (mental) score, mean | 52.3 (52.1-52.5) | 52.3 (52.1-52.5) |
| Income as percent of poverty level† | | |
| < 100% | 14.0 (13.0-15.0) | 17.2 (16.0-18.4) |
| 100%–199% | 18.1 (16.9-19.3) | 16.7 (15.7-17.7) |
| 200%–399% | 36.0 (34.8-37.2) | 33.3 (32.1-34.5) |
| $\geq 400\%$ | 31.9 (30.3-33.5) | 32.8 (31.6-34.4) |

* $P < .01$.

† $P < .001$.

‡ $P < .05$.

§ Higher scores on the physical health summary score (PCS 12) and the mental health summary score (MCS 12) of the Medical Outcomes Study Short Form 12 health survey indicate better physical or mental health status.

guage, age, sex, income, marital status, family size, community size, smoking and health status, HMO members were more likely to have a usual source of care, a physician visit, mammogram, and influenza vaccination.

Significant interactions were found between HMO status and educational attainment for influenza vaccination and smoking; there was evidence of a trend

($P = .06$) for mental health visits (Table 4). Educational disparities were narrowed for influenza vaccination and mental health visits within HMOs. For smoking cessation counseling, HMO members with less than 12 years of education were more likely to receive counseling than persons with more than 16 years of education. In contrast, there was little difference among non-HMO members. A careful review of Table 4 shows that in each instance, those with the least education fared better if they were HMO members. This effect was less consistent among those with

Table 2. Relationship Between Education and Health Care Access and Use

| Characteristic | Crude Prevalence % (95% CI) | Adjusted Prevalence* % (95% CI) |
|---|-----------------------------|---------------------------------|
| Has usual source of care | $P = .0001$ | $P = .45$ |
| < 12 years | 82.9 (80.8–85.0) | 85.3 (83.4–87.2) |
| 12 years | 85.3 (84.4–86.2) | 86.0 (85.2–86.8) |
| 13–15 years | 86.9 (85.8–88.0) | 86.8 (85.7–87.9) |
| ≥16 years | 87.1 (86.3–87.9) | 86.0 (85.1–86.9) |
| Physician visit in past year | $P < .0001$ | $P < .0001$ |
| < 12 years | 72.3 (70.1–74.5) | 72.5 (70.6–74.3) |
| 12 years | 76.0 (75.2–76.8) | 76.5 (75.7–77.3) |
| 13–15 years | 79.8 (78.8–80.8) | 79.1 (78.1–80.1) |
| ≥16 years | 81.3 (80.3–82.3) | 81.2 (80.2–82.2) |
| Mental health visit in past year | $P = .0001$ | $P < .0001$ |
| < 12 years | 7.5 (6.3–8.7) | 5.3 (4.4–6.2) |
| 12 years | 6.7 (6.1–7.3) | 6.5 (5.9–7.1) |
| 13–15 years | 8.6 (7.8–9.4) | 8.7 (8.0–9.4) |
| ≥16 years | 8.6 (8.0–9.2) | 10.1 (9.4–10.8) |
| Mammogram in past year | $P < .0001$ | $P = .005$ |
| < 12 years | 54.3 (49.8–58.8) | 57.0 (52.5–61.5) |
| 12 years | 61.8 (59.4–64.2) | 62.7 (60.3–65.1) |
| 13–15 years | 64.0 (60.7–67.3) | 63.4 (60.0–66.8) |
| ≥16 years | 69.7 (66.8–72.6) | 67.5 (64.5–70.5) |
| Influenza vaccination in past year | $P = .0001$ | $P = .0002$ |
| < 12 years | 27.1 (22.7–31.5) | 27.7 (23.8–31.6) |
| 12 years | 37.5 (33.9–41.1) | 36.5 (32.9–40.1) |
| 13–15 years | 36.2 (32.7–39.7) | 36.0 (32.0–40.0) |
| ≥16 years | 39.6 (36.2–43.0) | 40.9 (37.2–44.6) |
| Smoking cessation advice | $P = .13$ | $P = .31$ |
| < 12 years | 50.8 (46.6–55.0) | 49.1 (45.0–53.2) |
| 12 years | 47.4 (45.0–49.8) | 48.0 (45.6–50.4) |
| 13–15 years | 47.3 (44.5–50.1) | 47.2 (44.4–50.0) |
| ≥16 years | 44.4 (41.0–47.8) | 44.4 (41.0–47.8) |

* Multivariate analyses adjusted for race-ethnicity, age, sex, income, marital status, family size, community size, smoking, mental health summary score (MCS 12) and physical health summary score (PCS 12) of the Medical Outcomes Study Short Form 12, insurance type (private; Medicaid), health maintenance organization status, and usual source of care.

Table 3. Relationship Between Health Maintenance Organization (HMO) Status and Health Care Access and Use

| Characteristic | Crude Prevalence % (95% CI) | Adjusted Prevalence* % (95% CI) |
|---|-----------------------------|---------------------------------|
| Has usual source of care | $P < .0001$ | $P < .0001$ |
| HMO | 87.5 (86.7–88.3) | 88.1 (87.4–88.9) |
| Not HMO | 84.7 (83.9–85.5) | 84.4 (83.6–85.2) |
| Physician visit in past year | $P = .0005$ | $P = .001$ |
| HMO | 79.4 (78.4–80.4) | 9.1 (78.3–79.9) |
| Not HMO | 77.1 (76.3–77.9) | 77.4 (76.8–78.0) |
| Mental health visit in past year | $P = .95$ | $P = .92$ |
| HMO | 7.8 (7.3–8.3) | 7.8 (7.3–8.3) |
| Not HMO | 7.8 (7.3–8.3) | 7.8 (7.3–8.3) |
| Mammogram in past year | $P = .09$ | $P = .02$ |
| HMO | 64.8 (62.3–67.3) | 65.3 (62.8–67.8) |
| Not HMO | 62.0 (60.1–63.9) | 61.6 (59.7–63.5) |
| Influenza vaccination in past year | $P = .24$ | $P = .01$ |
| HMO | 37.3 (33.2–41.4) | 38.5 (35.0–42.0) |
| Not HMO | 35.0 (32.8–37.2) | 34.3 (31.8–36.9) |
| Smoking cessation advice | $P = .50$ | $P = .39$ |
| HMO | 47.9 (45.8–50.0) | 48.0 (45.8–50.2) |
| Not HMO | 47.00 (45.0–49.0) | 46.9 (44.8–49.0) |

* Multivariate analyses adjusted for race-ethnicity, age, sex, income, marital status, family size, community size, smoking, mental health summary score (MCS 12) and physical health summary score (PCS 12) of the Medical Outcomes Study Short Form 12, insurance type (private; Medicaid), HMO status, and usual source of care.

higher education. With the exception of having a usual source of care and smoking cessation counseling; however, persons with lower educational attainment continued to fare worse than those with more education even within HMOs.

There were few other statistically significant interactions. Respondents with Medicaid HMO membership had significantly higher likelihood of smoking cessation counseling than respondents with Medicaid in fee-for-service practices or respondents with private HMO or non-HMO coverage. Notably, there were no significant interactions between HMO membership and race-ethnicity (including non-English-fluent Hispanics) for any of the health care utilization measures, suggesting that HMO membership had no differential effect on care for minorities. There was also no interaction between HMO membership and income.

DISCUSSION

In a nationally representative sample of nonelderly, insured adults, we found significant disparities by

patient educational attainment in use of health care. Persons with less education were significantly less likely to have had a physician or mental health visit, a mammogram, or an influenza vaccination within the last year. Consistent with previous studies,²¹⁻²³ we found that HMO membership was associated with an overall beneficial effect on care. Most importantly, those with the least education tended to show improved use when in HMOs. In particular, HMO members with less than 12 years of education received services at levels comparable to non-HMO respondents with more education. Disparities were significantly smaller for influenza vaccination. The least educated smokers enrolled in HMOs reported the highest likelihood of smoking cessation counseling of any group. In no instance were educational disparities worse in HMOs.

To our knowledge, this study is first to examine specifically the impact of HMOs on educational disparities in health care utilization using nationally representative data. Previously reported results showed an absence of any apparent effect of HMOs on racial and ethnic disparities⁴ and an apparently harmful effect on health outcomes for ill persons of low socioeconomic status.¹¹⁻¹³ Our findings suggest that HMOs might have modest beneficial effects on at least some educational disparities in care.

These findings should be tempered by the limitations of the study. All data were based exclusively on self-report. There is some inaccuracy in self report of HMO membership; among privately insured persons in the CTS Household Survey, self-report of HMO membership had a sensitivity of 73% and specificity of 78%.²⁴ Educational bias in reporting HMO membership alone, however, could not account for these findings. Only if educational bias in reporting HMO membership were correlated with a bias in reporting use of services would such a bias explain these findings. Available evidence suggests that self-report of receipt of preventive services appears to be a sensitive, but not specific, measure of actual receipt of the service.^{25,26} It is important to note that there does not appear to be educational bias in reporting.^{27,28} Thus, it appears unlikely that these results are primarily attributable to reporting bias.

Our data are now more than 5 years old. Considerable changes have occurred in managed care during this period.²⁹ The extent to which these findings hold today is uncertain.

These analyses examined a limited array of health care indicators, mostly associated with prevention. We were not able to examine educational disparities in care for chronic conditions or health outcomes. Thus, our findings and those from previous studies that sug-

gest HMOs might adversely affect the health status of poorer, sicker patients are not directly comparable.^{11,12} Also, although we controlled for differences in the characteristics of HMO and non-HMO members, it is possible that unmeasured characteristics, such as attitudes about health care, differed between the 2 groups.

Our analyses did not account for differences in types of HMOs. It is possible that different types of HMOs have differing effects on disparities. Our analyses also did not account for HMO profit status. Not-

Table 4. Adjusted Prevalence of Health Care Access and Use by Education and Health Maintenance Organization (HMO) Status

| Educational Level | In HMO | Not in HMO |
|--|------------------|------------------|
| Has usual source of care, <i>P</i> = .83* | | |
| < 12 years | 86.7 (83.9–89.5) | 83.9 (81.7–86.1) |
| 12 years | 87.9 (86.8–89.0) | 84.4 (83.2–85.6) |
| 13-15 years | 88.8 (87.5–90.2) | 84.9 (83.4–86.4) |
| > 16 years | 88.1 (86.9–89.3) | 84.2 (82.9–85.5) |
| Physician visit in past year, <i>P</i> = .52* | | |
| < 12 years | 74.6 (71.3–77.9) | 70.9 (68.6–73.2) |
| 12 years | 77.4 (76.1–78.7) | 75.6 (74.4–76.8) |
| 13-15 years | 80.2 (78.9–81.5) | 78.3 (76.9–79.7) |
| > 16 years | 81.5 (80.1–82.9) | 81.0 (79.8–82.2) |
| Mental health visit in past year, <i>P</i> = .06* | | |
| < 12 years | 6.1 (4.6–7.6) | 4.8 (3.8–5.8) |
| 12 years | 6.7 (6.0–7.4) | 6.3 (5.4–7.2) |
| 13-15 years | 9.0 (8.0–10.0) | 8.4 (7.5–9.3) |
| > 16 years | 9.2 (8.2–10.2) | 10.7 (9.7–11.7) |
| Mammogram in past year, <i>P</i> = .77* | | |
| < 12 years | 61.5 (53.4–69.6) | 53.9 (47.2–60.6) |
| 12 years | 65.5 (61.5–69.5) | 60.7 (57.3–64.1) |
| 13-15 years | 64.5 (59.3–69.7) | 62.8 (58.2–67.4) |
| > 16 years | 68.6 (63.2–74.0) | 66.8 (63.3–70.3) |
| Influenza vaccination in past year, <i>P</i> = .04* | | |
| < 12 years | 31.7 (25.6–37.8) | 25.3 (20.0–30.6) |
| 12 years | 35.5 (31.1–39.9) | 37.1 (32.9–41.3) |
| 13-15 years | 39.7 (33.6–45.8) | 33.8 (29.0–38.6) |
| > 16 years | 47.3 (41.8–52.8) | 37.0 (32.7–41.3) |
| Smoking cessation advice, <i>P</i> = .01* | | |
| < 12 years | 54.3 (48.3–60.3) | 44.9 (39.4–50.4) |
| 12 years | 47.3 (44.0–50.6) | 48.7 (45.5–51.9) |
| 13-15 years | 49.4 (46.0–52.8) | 45.3 (41.5–49.1) |
| > 16 years | 41.9 (37.0–46.8) | 46.8 (42.5–51.1) |

Note: Multivariate analyses adjusted for race-ethnicity, age, sex, income, marital status, family size, community size, smoking, mental health summary score (MCS 12) and physical health summary score (PCS 12) of the Medical Outcomes Study Short Form 12, insurance type (private; Medicaid), HMO status, and usual source of care.

* *P* values represent tests for significance for interaction between HMO membership and educational level.

for-profit HMOs have been shown to deliver higher quality care than investor-owned HMOs in areas measured by Health Plan Employer Data and Information Set (HEDIS) indicators.³⁰ Clearly, differences among HMOs warrant further examination, because strengthening those kinds of HMOs that have a more beneficial effect on disparities represents a possible policy option for reducing disparities.

Although disparities tended to be smaller in HMOs, in most cases these disparities were not eliminated by HMO membership. Thus, there is ample opportunity for quality improvement. HMOs, by virtue of their population focus and reporting through the HEDIS, are better positioned than non-HMO plans to address disparities in care. Before they can begin to do so directly, however, they will need to begin collecting race, ethnicity, and education data on their members and begin stratifying their HEDIS performance measures by race-ethnicity and educational status.³¹ Once determined, these disparities can be targeted through quality improvement efforts using various approaches,³² including reminder letters^{33,34} and case management.³⁵

We can only speculate about explanations for our findings. It is possible that lower copayments improve access to influenza vaccination within HMOs. It is also possible that HMO physicians are targeting their efforts toward members who have higher rates of smoking³⁶ and who are at higher risk because of their lower educational status.³⁷ Planwide interventions undertaken by HMOs to boost use of influenza immunizations, such as reminders to patients, might provide slightly greater benefit to patients who are less aware of the potential benefits of these services. At least among the elderly, health literacy might be even more important than educational level in promoting use of preventive care.³⁸ It is possible that HMOs more effectively promote use of these services among this population. Alternatively, given the relatively small observed effect sizes, it is possible that these represent chance findings. Replication of these findings using other data sets is needed. Further research is also needed to assess the impact of improved preventive care on disparities in clinically relevant outcomes among persons with low educational levels enrolled in HMOs.

In summary, our results should help allay concerns that HMOs might have an adverse impact on receipt of preventive care by less educated persons. Instead, the results suggest, in some instances, a modest salutary effect of HMOs. Further progress in addressing disparities in managed care will likely require performance assessment and quality improvement based on educational attainment.³¹

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Key words: Socioeconomic Factors, Health Maintenance Organizations, Ethnic Groups, Blacks, Hispanic Americans, Delivery of Health Care, Preventive Health Services

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