
The Impact of Managed Care on the Mix of Vulnerable Populations Served by Community Health Centers

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This article examined the impact of managed care involvement on vulnerable populations served by community health centers (CHCs), while controlling for center rural-urban location and size, and found that centers involved in managed care have served a significantly smaller proportion of uninsured patients but a higher proportion of Medicaid users than those not involved in managed care. The results suggest that the increase in Medicaid managed care patients may lead to a reduced capacity to care for the uninsured, thus hampering CHCs from expanding access to health care for the medically indigent. Key words: *access to care, community health center, managed care, vulnerable populations*

SINCE THEIR INCEPTION in the 1960s, community health centers (CHCs) have served as a primary care safety net for the nation's medically vulnerable populations in both inner-city and rural areas (Freeman, Kiecolt, & Allen, 1982; Gardner, 1993; U.S. General Accounting Office, 1995). CHCs provide comprehensive, coordinated, and integrated health care, including primary and preventive care services, within a single institutional setting for persons residing in their service areas. Their central mission is to increase access to community-based primary health care services and improve the health status of medically vulnerable populations. In 1998, health centers consisted of nearly 700 organizations delivering services

at almost 2,000 sites to an estimated 9 million people, among whom about 40% were uninsured, 65% were members of racial/ethnic minority groups, 6% were homeless, 33%

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This study was supported by a grant from the Agency for Health Care Policy and Research (R03HS09831-01). Additional support was also provided by the Bureau of Primary Health Care, Health Resources and Services Administration. We would like to thank Yang Wang and Wei Hua for conducting the initial analyses and Jue Luo for verifying the analyses.

J Ambulatory Care Manage 2001, 24(1), 51-66
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were Medicaid recipients, 66% had incomes below the poverty level, and another 20% were at 100%–200% of the poverty level.

The rapid shift of Medicaid to managed care is straining the ability and willingness of safety net providers including CHCs to provide care to vulnerable populations particularly the medically indigent (i.e., patients who are unable to pay because they are uninsured or underinsured) (Cunningham, 1999; Feldman, Baxter, & Omata, 1997; Korenbrot, Miller, & Greene, 1999; Lipson & Naierman, 1996). Under the 1989 federally qualified health center (FQHC) legislation, which required states to pay CHCs for Medicaid services on the basis of reasonable cost (Cunningham, Grossman, Pter, & Lesser, 1999; Lewis-Idema, Chu, Hughes, & Lefkowitz, 1998; Korenbrot et al., 1999), many CHCs have been depending on Medicaid revenue to provide care to vulnerable populations, including the medically indigent. In 1989, Medicaid beneficiaries accounted for 26% of CHC users but only 12% of CHC revenue. By 1998, these percentages were equal: both Medicaid users and revenue stood at about 33%. To the extent that safety net providers face greater revenue constraints under Medicaid managed care, resources to provide care to the uninsured may be reduced, and the result could be reduced access to care (Cunningham, 1999; Holahan, Zuckerman, Evans, & Rangarajan, 1998; Korenbrot et al., 1999; Lipson, 1997). At the same time, since safety net providers rely on Medicaid revenue, they are concerned about losing Medicaid patients to other providers in the managed care plan's network. CHCs are beginning to feel the effect. Between 1996 and 1998, Medicaid revenue as a percent of total revenue to CHCs dropped slightly while the percent of users who are uninsured increased.

In an earlier analysis using 1996 data, we found that CHCs involved in managed care served a significantly smaller proportion of

uninsured (34.4%–38.4%) and homeless (2.5%–7%) patients than CHCs not involved in managed care (47.3% and 14.6%, respectively) (Shi, Frick, Lefkowitz, & Tillman, 2000). The analysis did not establish a causal relationship because it was based on cross-sectional data and did not control for other covariates potentially related to care provided to vulnerable populations. It was not clear whether involvement in managed care led to a reduction in services to the uninsured and homeless or having a lower proportion of uninsured and homeless and a higher proportion of insured led to easier acceptance by a managed care plan. One of the covariates is the rural-urban location of CHCs. While the availability of managed care is more limited in rural than urban communities because of the sparsity to rural populations (Kronick, Goodman, Wennberg, & Wagner, 1993; Wellever & Deneen, 1994) and greater suspicions of managed care by rural providers (Kuder & Colebaugh, 1996), rural residents generally face unique barriers to access because of a relative shortage of primary care physicians and other providers of care.

The current study overcame these limitations by performing a longitudinal analysis and controlling for potential covariates in examining the impact of managed care on vulnerable populations served by CHCs. The first objective of this study was to determine whether the proportion and number of vulnerable populations changed with the involvement in managed care and whether any changes differed from those at centers not involved in managed care. The second objective was to compare the proportion of vulnerable populations served by managed care and non-managed care centers controlling for rural versus urban status. This stratified analysis is necessary since both managed care and several of the vulnerable characteristics (such as minority, below poverty level) are associated with rural-urban location. The

third objective was to examine the impact of managed care involvement on the proportion and number of vulnerable populations served by CHCs while controlling for center rural-urban location and size. Information on both the proportion and number of vulnerable populations served is important. Proportional change of vulnerable populations served reflects a changing priority of targeted population, as the increase of one group of patients served might reduce the capacity to serve others. Number of vulnerable populations served reflects absolute change in targeted population served. It is possible to have proportional change of a certain vulnerable group without absolute change if the total number of patients is increased (i.e., the numerator remains constant but the denominator increases). Results of the study could guide policy makers in developing strategies to ensure the continual success of CHCs in fulfilling their mission of serving the nation's vulnerable populations in an era of managed care.

METHODS

Data

Data for this study came from the Uniform Data System (UDS) maintained by the Bureau of Primary Health Care (BPHC), Health Resources and Services Administration, Department of Health and Human Services. Initiated in 1996, UDS is an integrated reporting system that provides uniformly defined data for major BPHC grant programs and yields consistent information on health center, patient, and clinical characteristics that can be compared with other national and state data (Bureau of Primary Health Care, 1995). The UDS is completed by all grantees and provides a health center/grantee profile (medical and enabling services provided), user profile (demographics, socioeconomic characteristics), staffing and utilization profile (staffing, utilization, selected diagnoses

and services, perinatal profile), and financing profile (costs, revenues, managed care enrollment, and reimbursement). Before 1996, we used data from the Bureau Common Reporting Requirements (BCRR) System for the analyses. The BCRR and UDS datasets were linked via a common field: grantee's unique BCRR or UDS number. Specifically for this project, we used 1990–1998 data including 1991–1995 BCRR and 1996–1998 UDS. 1990 was selected as a starting year because CHCs initiated their involvement in managed care after 1990. 1998 was the most current year that UDS data had been collected and were available. For the purpose of this study, we included only community health centers with 330 funding. In other words, those centers with only migrant or homeless grant funding were excluded. Also excluded were centers with missing values on the measures being studied.

Measures

Vulnerable populations. The UDS captures information on six vulnerable population groups served by CHCs: the uninsured, the homeless (the homeless-only grantees were not included in this analysis), those below the federal poverty line, those at 100%–200% of the federal poverty level, Medicaid beneficiaries, and racial/ethnic minorities (including black, Hispanic non-white, Asian/Pacific Islander, and American Indian/Alaska Native). Since the BCRR did not report this information, our comparative analyses (objectives 1 and 2) were limited to 1996–1998 UDS data.

Managed care. For the purpose of this study and based on the UDS manual, managed care was defined as any prepaid arrangement health centers have made with a third party, including Medicaid, Medicare, private HMOs or PPOs, and others. All grantees participating in Medicare, Medicaid, private, or other managed care plans are required to complete Table 9c of the

UDS report (Table 8A for BCRR). The table contains information on revenue received from and expenses for prepaid plans as well as information on the number of enrollees in different managed care plans. Based on information from this table and information on center revenue and users, we define CHCs' involvement in managed care based on two indicators: managed care revenues and managed care enrollees. These two indicators also were used in the site selection process of a case study of managed care CHCs (Abrams et al., 1995). Many studies have used enrollees as a measure to capture managed care experience at the national (Ermann & Richmond, 1994; Hoy, Curtis, & Rice, 1991; Iglehart, 1992; Zarabozo, Taylor, & Hicks, 1996), regional (Gold, 1991), state (Gold, 1991), local (Feldman, Kralewski, & Qowd, 1989; Gold, 1991), and organizational (Gold, 1991; Iglehart, 1994) levels.

For the purpose of comparative analyses, CHCs were classified as managed care and non-managed care centers based on information on managed care revenue and enrollees. Centers with less than 100 managed care enrollees and less than \$100 in managed care revenues were considered outliers and were grouped under the non-managed care category. For the purpose of multivariate analyses, we defined managed care revenue as the proportion of total revenue that came from prepaid managed care and managed care enrollees as the proportion of total unduplicated users who were managed care enrollees.

Covariates. In addition to a measure of rural-urban location, obtained from the grantee profile table of the BCRR/UDS, we also used measures of center size such as total staff, total providers, total primary care providers, total patients/users, total encounters, and total revenue. Size is important because it is related to the organization's capacity to provide more services or diversify into other areas to optimize slack resources

Typically, larger CHCs are more likely to have excess capacity and thus are more motivated to be involved in managed care.

(Shortell, Morrison, Hughes, Friedman, & Vitek, 1987). Typically, larger CHCs are more likely to have excess capacity and thus are more motivated to be involved in managed care. However, some large urban centers with high volumes are also the most crowded and stressed. Another reason larger centers may be more attracted to managed care is that the variety and scope of their services may have made them more dependent on Medicaid revenue to maintain operations. Since these measures were highly intercorrelated and yielded comparable results, our final models included only one of these measures: total patients.

Analysis

Analysis of variance was performed to examine the relationship between CHCs' involvement in managed care and proportion of vulnerable populations served. The *t*-test was used to assess the relationship between rural-urban location and proportion of vulnerable populations served (the categories of which will vary by rural-urban location) controlling for managed care involvement status. To estimate the impact of managed care on vulnerable populations served, we performed pooled cross-sectional longitudinal analyses as stated in the following equation:

$$Y_{it} = \alpha + \beta_1 X_{1\tau} + \beta_2 X_{1\tau-1} + \beta_3 X_{1\tau-2} + \beta_4 X_{2\tau} + \beta_5 X_{2\tau-1} + \beta_6 X_{2\tau-2} + \beta_7 X_3 + \beta_8 X_4 + e$$

where:

Y_{it} = dependent variables (the proportion and number of the uninsured, the homeless, those below Federal

poverty line, those at 100–200% of Federal poverty line, the Medicaid, and racial/ethnic minorities);

β = multiple regression coefficients;
 X_{1t} = managed care revenue;
 X_{2t} = managed care enrollees;
 X_3 = center size;
 X_4 = year.

Since managed care revenue and managed care enrollees were highly intercorrelated, these two measures were included in separate models. To test that managed care not only has a concurrent but a lagged impact on vulnerable populations served, we included managed care for both concurrent and previous years. To account for the dependence of repeated measurements within each center, we used a random-effects growth curve model for the continuous response variables (Laird & Ware, 1982; Rao, 1965, 1975). The generalized estimating equation (GEE) methods under statistical analysis system (SAS) was used for the longitudinal data analyses (Liang & Zeger, 1986). Trend effect was captured by the variable year.

RESULTS

CHCs' involvement in managed care

In 1991, the year CHCs began reporting managed care revenue, there were 38 CHCs with managed care prepaid revenue, or 7% of the total. In 1994, the year CHCs began reporting managed care enrollees, there were 147 CHCs with managed care enrollees, or 26% of the total. By 1998, 351 CHCs had managed care prepaid revenue (62% of CHCs) and 336 had managed care enrollees (59% of CHCs) (see Figure 1).

Managed care involvement and vulnerable populations served

The relationship between managed care involvement and proportion of vulnerable populations served is displayed in Table 1.

Centers were classified as non-managed care (no managed care enrollees or prepaid revenue), new managed care in 1996 (started participating in managed care in 1996), new managed care in 1997 (started participating in managed care in 1997), new managed care in 1998 (started participating in managed care in 1998), and existing managed care (participated in managed care before 1996). Non-managed care centers served a greater proportion of uninsured users than existing and new managed care centers in 1996, 1997, and 1998 ($p < .001$). In non-managed care centers, between 1996 and 1998, uninsured users increased from 41.8% to 45% of total patients. However, for centers that turned to managed care in 1998, uninsured users declined from an average of 42% in 1997 to 39% of total patients. For centers that turned to managed care in 1997, uninsured users held steady from an average of 41.8% in 1996 to 41% of total patients in 1997. For centers that turned to managed care in 1996, uninsured users constituted 38% of total patients in both 1996 and 1997 and increased slightly to 39.8% in 1997. For existing managed care centers, uninsured users constituted only 33.4%, 34.6%, and 33.8% of total patients from 1996 to 1998, respectively.

While there was a decline in the proportion of uninsured served by managed care centers, there were no significant changes in the number of uninsured served (results not presented in separate tables but available upon request). Non-managed care centers increased their services to the uninsured from an average (center mean) of 4,361 uninsured patients in 1996 to 4,565 in 1998. In comparison, existing managed care centers served an average (center mean) of 5,483 uninsured patients in 1996 and 5,493 in 1998. While managed care centers saw more uninsured per center because of their larger capacity, non-managed care centers demonstrated a greater proportional increase in the number of uninsured served between 1996 and 1998

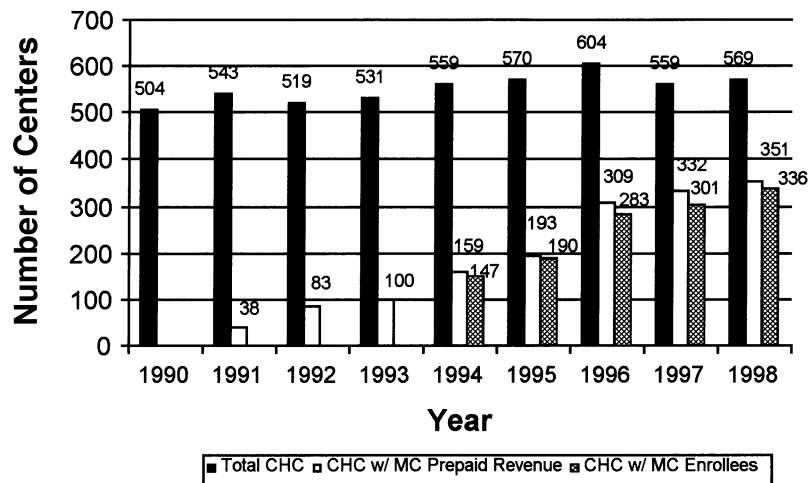


Figure 1. Community health center and managed care, 1990–1998.

Notes:

1. Total CHCs are determined by excluding those with program(s) for only homeless, only migrant, or only homeless and migrant.
2. Data on CHC with MC prepaid revenue are available beginning 1991.
3. Data on CHC with MC enrollees are available beginning 1994.

CHC = Community health center.

MC = Medicaid.

(4.7% for non-managed care centers versus 0.2% for managed care centers).

In contrast, CHCs that turned to managed care increased their proportion of Medicaid users compared to non-managed care centers ($p < .001$). In non-managed care centers, between 1996 and 1998, Medicaid users declined from 26.5% to 23.2% of total patients. However, for existing managed care centers, Medicaid users increased from 37% of total patients in 1996 to 38.3% in 1998. For new managed care centers (those that turned to managed care in 1996, 1997, and 1998), Medicaid users declined slightly in recent years, although these centers had proportionally more Medicaid users than non-managed care centers. The absolute number (center mean) of Medicaid users also increased in managed care centers (from 6,065 in 1996 to 6,239 in 1998) but declined in non-managed care centers (from 3,015 in 1996 to 2,718 in 1998).

Although there is no significant difference in the trend between managed care and non-managed care centers on other measures of vulnerable groups, CHCs saw an increasing proportion and number of users who were below the poverty line and were minorities. While managed care and non-managed care centers saw comparable proportions of homeless users, non-managed care centers saw a larger increase in the number of homeless users than managed care centers (from 184 per center in 1996 to 245 per center in 1998 for non-managed care centers; from 389 per center in 1996 to 370 per center in 1998 for managed care centers).

Rural-urban location and vulnerable populations served

Since urban CHCs are more likely to be involved in managed care than rural CHCs and the definition of vulnerability may differ between rural and urban communities, we

Table 1. Managed care status and mix of vulnerable populations served by community health centers

	Uninsured users						Medicaid users						Below-poverty-line users					
	1996		1997		1998		1996		1997		1998		1996		1997		1998	
	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	
Non-managed care centers	305 41.8% (17.7%)	241 42% (17.7%)	222 45% (18.3%)	305 26.5% (14.1%)	241 25.4% (14.2%)	218 23.2% (13.5%)	302 48.5% (24.9%)	242 46.2% (24.5%)	229 48.8% (24.3%)	242 46.2% (24.5%)	218 23.2% (13.5%)	302 48.5% (24.9%)	242 46.2% (24.5%)	229 48.8% (24.3%)	242 46.2% (24.5%)	218 23.2% (13.5%)	302 48.5% (24.9%)	242 46.2% (24.5%)
1998 cohort managed care centers			45 39% (16.8%)			37 27.8% (14.5%)			45 53.2% (21.5%)					45 53.2% (21.5%)				
1997 cohort managed care centers		47 41% (16.7%)	45 41.6% (14%)		47 29.7% (13.4%)	33 25.3% (11.9%)			45 44.8% (23%)					45 44.8% (23%)				
1996 cohort managed care centers	102 38% (18.5%)	89 38% (18.6%)	90 39.8% (18.1%)	102 35.9% (16.6%)	89 36.9% (16.1%)	69 32.7% (14.7%)	101 56.4% (25.3%)	89 55.6% (26%)	90 57.2% (23.9%)	69 32.7% (14.7%)	101 56.4% (25.3%)	101 56.4% (25.3%)	89 55.6% (26%)	90 57.2% (23.9%)	89 55.6% (26%)	69 32.7% (14.7%)	101 56.4% (25.3%)	89 55.6% (26%)
Continuing managed care centers ^a	179 33.4% (16.3%)	165 34.6% (16.5%)	156 33.8% (15.9%)	179 37% (18%)	165 37% (17.7%)	110 38.3% (16.2%)	177 55% (26.1%)	165 55.4% (24.6%)	157 57% (23.3%)	110 38.3% (16.2%)	177 55% (26.1%)	177 55% (26.1%)	165 55.4% (24.6%)	157 57% (23.3%)	165 55.4% (24.6%)	110 38.3% (16.2%)	177 55% (26.1%)	165 55.4% (24.6%)
ANOVA	0.0001 ***	0.0005 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0001 ***	0.0037 **	0.0003 ***	0.0007 ***	0.0001 ***	0.0001 ***	0.0037 **	0.0003 ***	0.0007 ***	0.0003 ***	0.0001 ***	0.0037 **	0.0003 ***
p-value	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***

(continues)

Table 1. (Continued)

	100%-200% of poverty line users						Homeless users						Minority users						
	1996		1997		1998		1996		1997		1998		1996		1997		1998		
	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	
Non-managed care centers	302	242	229	229	302	242	229	229	306	242	228	306	242	228	306	242	228	306	
	18.1% (13.6%)	18.8% (16.5%)	19.2% (16.3%)	19.2% (16.3%)	1.1% (4.4%)	1.3% (7.9%)	1.8% (10%)	1.8% (10%)	47.8% (34.2%)	48.3% (34.5%)	49.3% (33.1%)	47.8% (34.2%)	48.3% (34.5%)	49.3% (33.1%)	47.8% (34.2%)	48.3% (34.5%)	49.3% (33.1%)	47.8% (34.2%)	
1998 cohort managed care centers			45	45			45	45			45			45			45		
			20.1% (15.5%)	20.1% (15.5%)			3.5% (10.1%)	3.5% (10.1%)			43.9% (34.7%)			43.9% (34.7%)			43.9% (34.7%)		
1997 cohort managed care centers		47	45	45		47	45	45		47	45		47	45		47	45		
		17% (13%)	18.2% (14%)	18.2% (14%)		2.4% (6.6%)	2.6% (5.7%)	2.6% (5.7%)		53.8% (32.7%)	55.6% (31.3%)		53.8% (32.7%)	55.6% (31.3%)		53.8% (32.7%)	55.6% (31.3%)		
1996 cohort managed care centers	101	89	90	90	101	89	90	90	102	89	90	102	89	90	102	89	90	102	
	19.7 (15.3%)	18% (14.3%)	18.1% (14.7%)	18.1% (14.7%)	4.6% (12.4%)	3.6% (7.9%)	3.8% (7.8%)	3.8% (7.8%)	54.6% (35.1%)	57.3% (33.4%)	53.6% (33.8%)	54.6% (35.1%)	57.3% (33.4%)	53.6% (33.8%)	54.6% (35.1%)	57.3% (33.4%)	53.6% (33.8%)	54.6% (35.1%)	
Continuing managed care centers ^a	177	165	157	157	177	165	157	157	181	165	157	181	165	157	181	165	157	181	
	17.4% (13.7%)	17.5% (14.1%)	17.6% (13.8%)	17.6% (13.8%)	1.5% (4.3%)	1.9% (5%)	2% (5.1%)	2% (5.1%)	57.4% (34%)	57.7% (33.4%)	60.3% (32.6%)	57.4% (34%)	57.7% (33.4%)	60.3% (32.6%)	57.4% (34%)	57.7% (33.4%)	60.3% (32.6%)	57.4% (34%)	
ANOVA	0.4298	0.8026	0.7955	0.7955	0.0001	0.0723	0.2692	0.2692	0.0084	0.0264	0.0072	0.0084	0.0264	0.0072	0.0084	0.0264	0.0072	0.0084	
<i>p</i> -value					***				**	*	**	**	*	**	**	*	**	**	**

Note: Center = number of centers; Mean = mean % per center; S.D. = standard deviation of mean % per center.
^aThese centers became involved in managed care prior to 1996 and are continually involved in managed care; significance test of differences in percentage of vulnerable groups served by CHCs according to managed care involvement status for 1996-1998, respectively.
 * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

present the analysis of managed care and vulnerable populations separately for rural and urban CHCs. The relationship between managed care and vulnerable populations served by rural CHCs is displayed in Table 2. Non-managed care centers served a significantly higher proportion of uninsured than managed care centers (38.8% versus 31.4% for

1996, 39.5% versus 32.5% for 1997, 42% versus 33.2% for 1998). Managed care centers served significantly higher proportions of Medicaid users (32.2% versus 24% for 1996, 31.2% versus 23.1% for 1997, 26.3% versus 21.5% for 1998) than non-managed care centers. No statistically significant differences were found in proportions of users

Table 2. Managed care status and mix of vulnerable populations served by rural community health centers

	Uninsured users	Medicaid users	Below-poverty- line users	100%–200% poverty line users	Homeless users	Minority users
	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)	Center Mean (S.D.)
1996						
Managed care centers	125 31.4% (17.2%)	125 32.2% (18.3%)	124 46.4% (25.7%)	124 18.3% (14.4%)	124 0.3% (1.3%)	125 38.4% (36.9%)
Non-managed care centers	216 38.8% (16.8%)	216 24% (12.2%)	213 41.7% (23.2%)	213 18.3% (14.7%)	213 0.5% (3%)	217 40% (33.1%)
<i>t</i> -test <i>p</i> value ^a	0.0001***	0.0001***	0.0938	0.9804	0.3932	0.7016
1997						
Managed care centers	135 32.5% (16.6%)	135 31.2% (17.5%)	135 45.2% (24.5%)	135 17.5% (13.3%)	135 0.5% (1.6%)	135 40.4% (35.1%)
Non-managed care centers	179 39.5% (16.1%)	179 23.1% (12.6%)	180 40.4% (23.3%)	180 19% (17.6%)	180 0.4% (2.3%)	180 42% (34%)
<i>t</i> -test <i>p</i> value ^a	0.0002***	0.0001***	0.0845	0.3794	0.6330	0.6728
1998						
Managed care centers	153 33.2% (15.2%)	105 26.3% (13%)	153 47% (22.6%)	153 18.3% (13.5%)	153 0.9% (2.9%)	153 40.3% (35.6%)
Non-managed care centers	152 42% (16.7%)	149 21.5% (11.8%)	157 43.4% (23.9%)	157 19.7% (18.1%)	157 0.2% (1%)	157 44.2% (33.4%)
<i>t</i> -test <i>p</i> value ^a	0.0001***	0.0025**	0.1485	0.4329	0.0059**	0.3287

Note: Center = number of centers; Mean = mean % per center; S.D. = standard deviation of mean % per center.
^aSignificance test of differences in percentage of vulnerable groups served between managed care and non-managed care CHCs for 1996–1998, respectively.
 * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

Table 3. Managed care status and mix of vulnerable populations served by urban community health centers

	Uninsured users	Medicaid users	Below-poverty-line users	100%–200% poverty line users	Homeless users	Minority users
1996						
Managed care centers	155 38% (16.8%)	155 40.2% (16%)	153 62.7% (23.6%)	153 18.2% (14.4%)	153 4.5% (10.9%)	157 70.5% (24.3%)
Non-managed care centers	88 49.3% (18%)	88 32.5% (16.6%)	88 64.8% (21%)	88 17.5% (10.4%)	88 2.4% (6.5%)	88 67% (29%)
<i>t</i> -test <i>p</i> value ^a	0.0001***	0.0001***	0.4645	0.6576	0.0598	0.3352
1997						
Managed care centers	166 40% (17.2%)	166 39.6% (15.2%)	166 61.3% (23.2%)	166 17.7% (14.5%)	166 4.1% (7.9%)	166 70.5% (24.4%)
Non-managed care centers	62 49% (20.4%)	62 31.9% (16.5%)	62 62.8% (20.2%)	62 18.1% (13.1%)	62 4.2% (14.7%)	62 66.5% (29.5%)
<i>t</i> -test <i>p</i> value ^a	0.0027**	0.0019**	0.6239	0.8131	0.9495	0.3480
1998						
Managed care centers	170 40.5% (16.8%)	131 38.8% (15.5%)	171 61.5% (22.1%)	171 18.1% (14.6%)	171 4.2% (8.2%)	171 69.6% (24.4%)
Non-managed care centers	55 51.2% (20%)	54 28.3% (15.5%)	56 62.9% (19%)	56 17.7% (10.8%)	56 6.3% (19.1%)	55 62.8% (28.4%)
<i>t</i> -test <i>p</i> value ^a	0.0005***	0.0001***	0.6374	0.8359	0.4256	0.1131

Note: Center = number of centers; Mean = mean % per center; S.D. = standard deviation of mean % per center.
^aSignificance test of differences in percentage of vulnerable groups served between managed care and non-managed care CHCs for 1996–1998, respectively.
 * *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

below the poverty line, users at 100%–200% of the poverty line, homeless users, and minority users served by rural managed care and non-managed care centers.

Similar differences were noted in urban comparison between managed care and non-managed care centers (see Table 3). While non-managed care centers served a significantly higher proportion of uninsured users for 1996 through 1998, managed care centers served significantly higher proportions of Medicaid users for the same period. No

statistically significant findings were noted for other measures of vulnerable populations served by urban managed care and non-managed care centers.

The impact of managed care on vulnerable populations served

The impact of managed care on the proportion of vulnerable populations served is summarized in the GEE models in Table 4. Managed care enrollees were significantly and inversely related to proportion of

Table 4. General estimation equations: Determinants of proportion of vulnerable populations served by CHCs 1996–1998

	Proportion of uninsured users	Proportion of Medicaid users	Proportion of below-poverty- line users	Proportion of 100%– 200% of poverty line users	Proportion of homeless users	Proportion of minority users
	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)
Current managed care enrollees	–0.000535*** (0.000)	0.0005399*** (0.000)	0.0000308 (0.000)	–0.000122 (0.000)	–0.000025 (0.000)	0.0001262 (0.000)
Managed care enrollees last year	–0.000383*** (0.000)	0.0003373** (0.000)	–0.000017 (0.000)	–0.000076 (0.000)	–0.000043 (0.000)	–0.000034 (0.000)
Managed care enrollees in the year before last	–0.000187 (0.000)	0.0001358 (0.000)	0.0003152 (0.000)	–0.000053 (0.000)	–0.000066 (0.000)	0.000056 (0.000)
Rural location (Ref: Urban)	–6.51591*** (1.317)	–9.081236*** (1.148)	–16.47363*** (1.765)	0.6017609 (1.100)	–3.762829*** (0.460)	–27.58681*** (2.560)
Total patients	0.0001748** (0.000)	0.000054 (0.000)	0.0003369*** (0.000)	6.8838E–6 (0.000)	0.0000592** (0.000)	0.0002478*** (0.000)
Year	0.7389862 (0.263)	–1.237563*** (0.251)	–0.341399 (0.394)	0.340085 (0.293)	0.1821804 (0.152)	0.4618279* (0.206)

Note: S.E. = standard error.
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, based on Z-statistics (Robust).

uninsured users but positively related to proportion of Medicaid users. Further, managed care enrollees had a lagged negative impact on proportion of uninsured but a lagged positive impact on Medicaid users. Uninsured users declined by 5.4% of total users for every 10,000 managed care enrollees in the current year and by 3.8% users for every 10,000 managed care enrollees in the previous year. However, managed care enrollees in the year before last was not associated with proportion of current uninsured users. Separate analyses using managed care revenue yielded comparable results (results available upon request).

While managed care is inversely associated with proportion of uninsured users served by CHCs, it is significantly and positively related to proportion of Medicaid users. Medicaid users increased by 5.4% of total users for every 10,000 managed care enrollees in the current year and by about 3.4% of total users for every 10,000 managed care enrollees in the previous year. Separate analyses using managed care revenue yielded comparable results (available upon request). After controlling for other covariates, the impact of managed care on other vulnerable groups is less clear-cut.

Rural location was significantly and inversely related to the proportion of users who were uninsured, on Medicaid, below the poverty line, minority, and homeless, reflecting the unique characteristics of vulnerable populations in rural areas. Center size, measured by total number of patients, was positively associated with the proportion of users who were uninsured, below the poverty line, homeless, and minorities.

The impact of managed care on the number of vulnerable populations served is summarized in the GEE models in Table 5. Although the number of managed care enrollees was inversely related to the number of uninsured users, the model coefficients were insignificant. The relationships be-

Center size, measured by total number of patients, was positively associated with the proportion of users who were uninsured, below the poverty line, homeless, and minorities.

tween managed care enrollees and the number of other vulnerable population groups served were consistent with those observed when proportions of vulnerable groups were used in the analysis. In terms of other findings, the only differences from previous results (shown in Table 4) were the positive and significant relationships between center size and Medicaid users, and between center size and users living at 100%–200% of the poverty line.

DISCUSSION

Many of the nation's *Healthy People 2010* objectives are targeted at vulnerable populations, who bear the burden of poorer health in this country. The extent to which safety-net providers such as CHCs can use their limited capacity and resources to address access and quality of care for these populations will significantly determine whether these objectives are met. The results of this study indicate that the initial effect of managed care may be a decreased capacity to serve certain vulnerable population groups, in particular the uninsured. CHCs involved in managed care served a significantly smaller proportion of uninsured (33.4%–34.6%) patients than CHCs not involved in managed care (41.8%–45%). As non-managed care centers became involved in managed care, the proportion of uninsured patients they treated declined. Even after controlling for location and center-specific indicators, uninsured users declined by more than 5% of total users for every 10,000 managed care

Table 5. General estimation equations: Determinants of number of vulnerable populations served by CHCs 1996–1998

	Number of uninsured users	Number of Medicaid users	Number of below-poverty-line users	Number of 100%–200% of poverty line users	Number of homeless users	Number of minority users
	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)
Current managed care enrollees	-0.112564 (0.094)	0.3259788** (0.117)	0.0365139 (0.052)	0.0063365 (0.024)	-0.003615 (0.008)	0.1260384 (0.068)
Managed care enrollees last year	-0.098344 (0.054)	-0.041342 (0.040)	-0.008948 (0.032)	-0.018167 (0.012)	0.000096 (0.005)	-0.012792 (0.017)
Managed care enrollees in the year before last	-0.155117 (0.087)	-0.135358 (0.113)	0.0502481 (0.031)	0.0001694 (0.017)	0.0006027 (0.004)	0.0109954 (0.011)
Rural location (Ref: Urban)	-707.9303** (259.485)	-376.5475 (207.441)	-1647.88*** (345.491)	256.2176 (204.005)	-548.3921*** (107.287)	-2219.577*** (426.836)
Total patients	0.3603245*** (0.038)	0.2925525*** (0.028)	0.611044*** (0.032)	0.1788094*** (0.018)	0.0323521*** (0.009)	0.6565851*** (0.041)
Year	-1476.529*** (77.108)	-1084.686*** (65.422)	-77.70123 (57.647)	-0.549757 (42.615)	12.153231 (10.197)	-14.05992 (39.923)

Note: S.E. = standard error.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, based on Z-statistics (Robust).

enrollees. The finding that managed care centers served a significantly lower proportion of uninsured users than non-managed care centers is noted in both rural and urban CHCs for all the years studied. These findings are consistent with a recent ecological study that demonstrates the significant association between Medicaid managed care involvement in a community and reduced level of charity care in that community (Cunningham et al., 1999).

Since most CHCs have limited capacity, a higher proportion of managed care patients (through Medicaid) often means a reduced capacity to care for the medically indigent, such as the uninsured, despite their willingness and stated mission to do so. Greater financial pressures from managed care and the phase-out of FQHC payments might force CHCs to use federal grant funding to cover the full cost of their capitated Medicaid patients, thus reducing funds available to cover costs of care for the uninsured. Although the loss of indirect subsidies may be balanced by increasing direct public subsidies such as Section 329 and Section 330 funding provided to CHCs by the Bureau of Primary Health Care, these sources of revenue are limited and have largely been stable in recent years. Moreover, as CHCs use public funds to underwrite the uninsured, their ability to reach additional people—expand their capacity to strive for 100% access—is significantly hampered. Indeed, our study results indicate that while non-managed care centers saw an increasing number of uninsured patients, managed care centers saw about the same number of uninsured patients.

An alternative explanation is that reductions in the number of uninsured served might be the result of good outreach—centers moving eligible uninsured patients onto Medicaid roles (Medicaid managed care), which would result in a drop in the number of uninsured patients but no change

in the actual number of patients, just a change in their insurance status. Although the limitation of the UDS dataset precludes direct testing of this hypothesis, trend analyses do suggest that managed care has a declining impact on the proportion of uninsured users served by CHCs over time. The proportion of uninsured users is most significantly affected by managed care enrollees (and revenue) in the current year, relatively less significantly affected by managed care in the previous year, and insignificantly associated with managed care in the year before. These findings suggest that after the initial absorption of managed care enrollees, centers are able to refocus their mission to serve the uninsured. Facilitating the transition from non-managed care to managed care is important to ensuring continued service by safety-net providers to the uninsured.

Although managed care is associated with a lower proportion of uninsured users served, it has a significant, positive impact on other vulnerable populations served by CHCs. Bivariate analyses indicate that managed care centers served a significantly greater proportion and number of Medicaid users than non-managed care centers. Multivariate trend analyses further demonstrate that managed care is significantly associated with an increase of Medicaid users served by CHCs. While bivariate analyses indicate managed care centers also served significantly greater proportions of patients who were below the poverty line and minorities than non-managed care centers, these associations are primarily explained by the rural-urban location of the center, which is significantly associated with the number of below-poverty-line and minority users served.

Caution must be exercised in interpreting the results of the study and in formulating policy intervention. First, given the relatively short history of managed care within CHCs, it is still premature to provide definitive assessment of the impact of

managed care on CHCs. Further monitoring is needed—especially as managed care becomes more pervasive and the number of uninsured escalates as a result of the continued erosion of employer-sponsored coverage and welfare reform that could increase the number of uninsured (Feldman et al., 1997). Second, even with an uninsurance rate at more than 30% for centers involved in managed care, that rate is still double the national average (16%) and far greater than the percentage of uninsured patients that other providers see. Even rural sites and managed care sites with declining percentages of uninsured are still doing more than their share of taking care of the uninsured. Third, this study is limited by the availability of secondary data. CHCs' services to vulnerable populations are likely to be influenced by other external and internal factors such as community characteristics, features of managed care, management characteristics, the influence of the board, practice characteristics,

and the culture of the center. Future attention to these other variables could enlighten this analysis and amplify its interpretation. Fourth, as demonstrated in this analysis, the deleterious effect of managed care on certain categories of the medically indigent does not suggest an explicit and direct attempt by managed care to limit care for the medically indigent. It may well be an unintended consequence of the cost control strategies associated with managed care (Rosenbaum, Serrano, Magar, & Stern, 1997). It is an "untoward" event—by no means is it an abdication of the mission by the centers. It is a warning to health centers to be careful about any erosion in their mission as they try to protect their Medicaid share by engaging in managed care contracts. This study does send warning signals that CHCs' ability to fulfill their explicit mission of providing access to health care for the medically indigent might be compromised by managed care.

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