Charges for Oral Health Care During a Period of Economic Growth in the US: 1987–96

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Abstract

Objectives: *This study aimed to provide estimates of amounts charged for dental care during 1996 for the US adult population and its major sociodemographic subgroups, and to evaluate whether charges had increased since 1987.* ***Methods:*** *We used data from the 1996 Medical Expenditures Panel Survey and report results for 12,931 adults aged 19–64 years. For comparison with previously published charges, we converted 1987 charges to their 1996 "constant dollar" value to control for inflation. Data were analyzed using SUDAAN and the results can be generalized to the US adult population.* ***Results:*** *In 1996, 43.7 percent (95% CI=42.7%, 44.6%) of the US population incurred dental care charges, which did not differ significantly from the 1987 estimate of 44.5 percent. In 1996, mean per capita charge for dental care was $182 (95% CI=$171, $192), which did not differ significantly from the inflation-adjusted 1987 estimate of $174. The average charge per patient who incurred charges in 1996 was $416 (95% CI=$394, $438), which was only 7 percent greater than the inflation-adjusted 1987 estimate of $389 (P=.08). Sociodemographic variations were observed in per capita charges, but were less apparent in mean charge per patient who incurred charges.* ***Conclusions:*** *During a period when economic growth and other market forces were expected to increase delivery of dental services, there was little or no change in percentage of US adults incurring charges or in mean per capita charges. The booming US economy did not raise dental charges significantly and did not increase utilization of dental care services. [J Public Health Dent 2003; 63(2):104-11]*

Key Words: dental care, Hispanics, health expenditures, socioeconomic factors, dental economics.

One of the ambitious goals for oral health for the year 2010 is to increase the proportion of children and adults who report using the oral health care system each year to 83 percent (1). This objective, which is also a necessary step toward achievement of many of the other 16 oral health goals for the nation, calls for improvements in access to oral health care. It necessarily would increase aggregate charges billed for dental care for the US population and payments made by patients and/or third parties such as insurance would need to increase to pay for those increased charges. At the same time, however, the cost of care is cited as a major barrier to oral health, primarily because a large proportion of the amount charged for dental care is paid out of pocket by patients, which is in contrast to the financing of medical care (2). Although various mechanisms have been proposed to increase provision of dental services to the population by defraying direct costs to patients, a more fundamental approach for the vast majority of US dental patients whose care is provided in fee-charging settings would draw on the forces of the free market to increase delivery of oral health care. However, to determine if such an approach would be effective, it is necessary first to assess whether free market forces, such as a period of marked economic growth, increase provision of dental care.

There are several reasons to believe that free market forces operating during the period 1987–96 should have increased the provision of dental services, and hence charges billed for dental care by the United States adult population. First, the decade through 1996 was characterized as a period of economic prosperity in the United States as measured by the rise in gross national product with accompanying increases in real (inflation-adjusted) household income (3). Consistent with that economic growth, the annual rate of increase in health care expenditures was at least 5 percent per year in this time period (4). Second, as the United States "baby boom" generation has aged, need and demand for dental care should have increased. As an indicator of the ongoing demographic impact of the baby boom, the proportion of people aged 20–29 years in the US population declined by 19 percent between 1990 and 2000, whereas the proportion of people aged 45–54 years increased 36 percent (5). In comparison with earlier cohorts, this baby boom generation has low levels of tooth loss; yet compared with younger adults, they have more dental caries experience including larger numbers of filled teeth that need periodic repair, they have more periodontal disease, and they are more likely to use dental services (6). Third, the supply of dentists relative to the population increased modestly from 56.6 dentists per 100,000 population in 1987 to 58.1 dentists per 100,000 population in 1996 (7). An increase in dentist-to-population ratio should allow a larger volume of services to be delivered to the population. Fourth, biomedical and dental technology has expanded dramatically to include a wide array of new procedures including expensive treatments such as implants (8). There is also evidence of a

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real increase in dental fees charged (9). These trends in the economy, population, dental workforce, and oral health care appear to have had an impact on some indicators of dental care delivery. The American Dental Association's "Future of Dentistry" report asserts that a strong economy contributes significantly to the demand for dental services, and finds that dental expenditures have increased at a more rapid rate than expenditures for most other goods (10). Surveys of private practice dentists reveal that their average total income per annum rose from $80,190 in 1987 (11) to $135,870 in 1996 (12), which represents a 23 percent increase after adjusting for inflation using constant, 1996 dollars. Consistent with these trends, there was a 30 percent increase in real gross billings of dental practices over the same 10-year period (13).

A more systematic way to assess the impact of the market forces on provision of dental services is through analysis of sequential surveys of dental care charges and payments during a period of economic growth. The Agency for Healthcare Research and Quality (AHRQ) has conducted two surveys specifically to evaluate charges for all forms of health care in the US population. Using data from the first of those, the National Medical Expenditure Survey (NMES), Vargas and Manski (14) reported mean per capita dental charges (defined below) of $129 during 1987. Nine years later, the Medical Expenditure Panel Survey (MEPS) was conducted to provide an update on patterns of health care charges and payments in the US population.

The purpose of this study was to provide estimates of amounts charged for dental care during 1996 for the US adult population and its major sociodemographic subgroups and to evaluate whether charges had increased since 1987. Charges are defined as amounts billed for care, whether the charges are reimbursed or not, and whether reimbursement is made by patients, government, or other third parties. Our expectation of increases in charges is predicated on our interpretation of trends in the economy, the population, and the dental profession described above. The specific aims of this study were: (1) to describe the percentage of persons incurring charges, average charges per capita, and average charges per patient who incurred charges during 1996 for the US adult population aged 19–64 years and for subgroups defined by age, sex, race/ethnicity, income, and employment status; and (2) to determine whether the percentage of persons incurring charges, average charges per capita, and average charges per patient who incurred charges were greater (after controlling for inflation) in 1996 compared with estimates for 1987 reported previously by Vargas and Manski (14).

Methods

This study used data from the MEPS conducted January 1, 1996, to December 31, 1996. MEPS is the third in a series of national probability surveys conducted by the AHRQ on the financing and utilization of medical care in the United States. For the purpose of comparability, we replicated methods used by Vargas and Manski (14) in this analysis and selected the major demographic categories they identified. Full details of the MEPS methodology are described for the public use data files (15) and are summarized in the next two paragraphs.

MEPS was designed to provide nationally representative estimates of health care utilization, charges, payments, sources of payment, and insurance coverage for the US civilian noninstitutionalized population. The sampling frame for the MEPS household component was drawn from respondents to the National Health Interview Survey (NHIS) conducted by the National Center for Health Statistics, and reflects an oversampling of Hispanics and African Americans. A subsample of 10,500 households was drawn from the NHIS sampling frame for the initial 1996 MEPS household component. Overall, response rate for the 1996 MEPS household survey was 77.7 percent. Charges and expenditure data were collected through a preliminary contact followed by a series of six rounds of interviews over a two-and-a-half year period using computer-assisted personal interviewing technology. This series of data collection rounds was launched again each subsequent year on a new sample of households to provide overlapping panels of survey data, which when combined with other ongoing panels, provided the estimates of health care expenditures. This analysis uses data from 12,931 people aged 19–64 years who completed the 1996 round of interviews for the household component.

At the initial visit to a household, respondents were given a calendar and asked to record details of forthcoming health care encounters. At each subsequent interview round, subjects were asked if they had used various forms of health care including dental care. Additional questions were asked about the charges for health care, payments made by respondents, other family members, insurance, or any other third parties. Where possible, respondents' reports of charges and expenditures were verified with documentation, such as receipts, bills, or explanations of benefits provided by third parties. The definition of "expenditures" used in MEPS differed from the 1987 NMES survey where "charges" rather than "sum of payments" were enumerated. However, MEPS enumerated both payments and charges. Hence, to maintain comparability with 1987 NMES data reported by Vargas and Manski (14), the following analysis used reported charges for dental care, and in this paper we use the term "charges" to distinguish our data from other payments data recorded in MEPS.

To be consistent with the previous report of 1987 charges (14), our analysis adopted the following conventions. We restricted the analysis to people between 19 and 64 years of age. Income level was categorized into three levels: low (≤200% of the Federal Poverty Level [FPL]), middle (201–400% of FPL), and high (>400% of FPL). Employment status was defined as being employed if the respondent had held a job or had a business during any part of the year. Race/ethnicity was categorized as non-Hispanic white, non-Hispanic black, Hispanic, and Other. The first three of those categories were reported by Vargas and Manski (14). Although not reported previously, our analysis further categorized subjects by age using 10-year age groups from 19 years, while the highest age group was restricted to 60–64-year-olds.

The 1996 MEPS data were analyzed in SUDAAN (17) using appropriate weights and variance adjustments that accounted for the complex sampling design. Hence, data in this report can be generalized to the US adult population. When comparing these data with

TABLE 1
Percent of US Adults Aged 19–64 Years with Dental Charges, 1996

	All Persons		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Others	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
All Persons	43.7	(42.7, 44.6)	48.9	(47.7, 50.0)	27.5	(25.0, 30.0)	28.3	(26.2, 30.4)	38.9	(34.1, 43.7)
Age group (yrs)										
19–29	35.9	(33.8, 37.9)	42.1	(39.5, 44.8)	21.2	(16.7, 25.7)	22.5	(19.0, 26.1)	31.6	(22.8, 40.4)
30–39	44.1	(42.2, 46.0)	48.9	(46.6, 51.2)	31.8	(26.9, 36.7)	31.1	(27.2, 35.1)	35.9	(26.7, 45.1)
40–49	47.1	(45.2, 49.1)	52.1	(49.8, 54.4)	28.7	(23.6, 33.8)	28.5	(23.7, 33.3)	46.5	(37.2, 55.9)
50–59	48.7	(46.3, 51.0)	52.1	(39.5, 54.8)	30.6	(23.9, 37.3)	37.7	(31.1, 44.2)	43.3	(31.0, 55.6)
60–64	47.2	(43.4, 51.0)	51.0	(46.7, 55.4)	24.7	(15.5, 33.8)	31.2	(21.3, 41.1)	53.5	(27.1, 79.9)
Sex										
Men	38.6	(37.2, 40.0)	43.9	(42.2, 45.5)	21.0	(17.5, 24.5)	22.6	(19.7, 25.4)	35.4	(28.4, 42.3)
Women	48.5	(47.1, 49.9)	53.7	(52.0, 55.4)	32.8	(29.3, 36.2)	34.3	(31.2, 37.4)	42.3	(35.6, 48.9)
Income*										
Low	28.1	(26.5, 29.7)	33.3	(30.9, 35.6)	22.1	(18.5, 25.7)	19.2	(16.6, 21.8)	31.5	(23.0, 40.0)
Middle	42.3	(40.6, 44.1)	45.8	(43.7, 47.9)	27.9	(23.3, 32.4)	33.4	(29.4, 37.4)	41.4	(33.1, 49.8)
High	55.8	(54.1, 57.4)	58.4	(56.6, 60.1)	38.3	(33.1, 43.6)	47.5	(41.7, 53.4)	42.0	(34.0, 49.9)
Employment†										
Yes	45.0	(43.9, 46.1)	49.8	(48.5, 51.2)	29.0	(26.1, 32.0)	29.0	(26.5, 31.5)	38.9	(33.3, 44.5)
No	38.4	(36.2, 40.5)	44.4	(41.6, 47.2)	23.3	(18.4, 28.2)	26.0	(21.9, 30.0)	39.8	(30.2, 49.4)

*Income: low=<200% federal poverty level (FPL); middle=200–400% FPL; high=>400% FPL.
†Employment: employed in 1996 or part thereof.
CI=confidence interval.

TABLE 2
Mean per Capita Charges (US Dollars) for Dental Services Among US Adults Aged 19–64 Years, 1996

	All Persons		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Others	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
All Persons	182	(171, 192)	204	(190, 217)	106	(87, 124)	116	(95, 137)	180	(130, 230)
Age group (yrs)										
19–29	128	(111,144)	154	(130, 177)	61	(35, 87)	80	(53, 107)	105	(51, 158)
30–39	161	(144, 178)	174	(154, 195)	127	(90, 164))	119	(83, 156)	154	(26, 282)
40–49	201	(176, 226)	221	(190, 252)	95	(60, 129)	141	(83, 200)	243	(137, 348)
50–59	255	(223, 288)	277	(238, 316)	183	(110, 256)	169	(92, 245)	157	(72, 242)
60–64	224	(187, 261)	232	(191, 274)	92	(24, 160)	138	(46, 231)	737	(260, 1213)
Sex										
Men	159	(144, 174)	179	(160, 197)	92	(63, 120)	101	(68, 134)	147	(92, 203)
Women	203	(188, 218)	228	(209, 247)	117	(93, 141)	132	(107, 157)	211	(130, 292)
Income*										
Low	106	(93, 120)	128	(107, 148)	74	(51, 98)	75	(53, 98)	127	(67, 187)
Middle	168	(152, 183)	177	(158, 195)	118	(81, 155)	141	(98, 183)	201	(117, 284)
High	246	(225, 267)	259	(234, 283)	154	(109, 199)	200	(134, 266)	200	(106, 294)
Employment†										
Yes	185	(173, 197)	207	(192, 222)	105	(85, 125)	122	(97, 147)	160	(114, 205)
No	165	(144, 186)	189	(163, 216)	96	(56, 135)	96	(59, 133)	250	(99, 401)

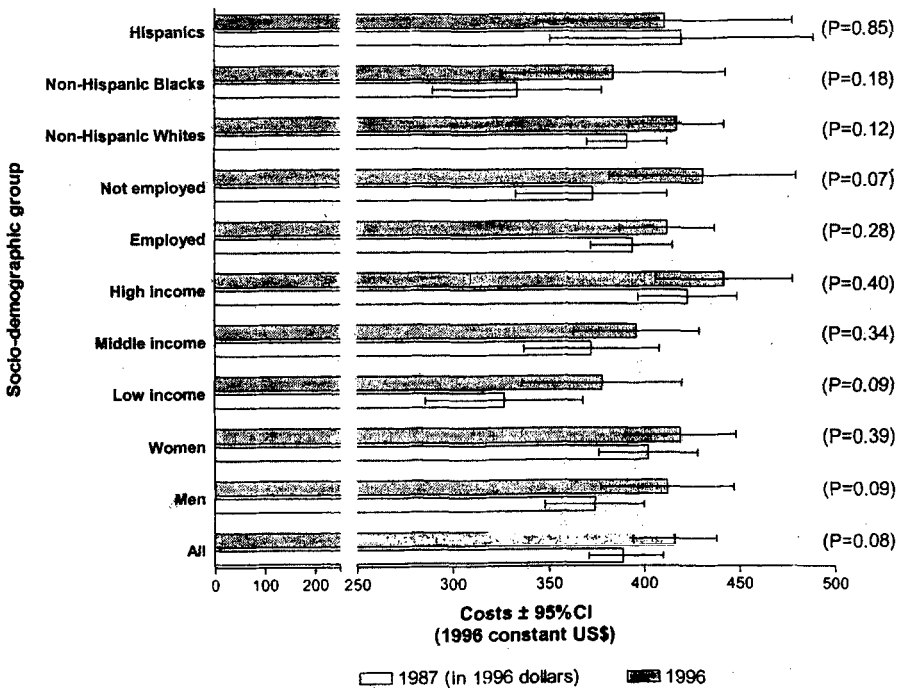
*Income: low=<200% federal poverty level (FPL); middle=200–400% FPL; high=>400% FPL.
†Employment: employed in 1996 or part thereof.
CI=confidence interval.

TABLE 3
Mean per Capita Expenditures (US Dollars) for Dental Services Among US Adults Aged 19–64 Years Who Incurred Charges, 1996

	All Persons		Non-Hispanic Whites		Non-Hispanic Blacks		Hispanics		Others	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
All Persons	416	(394, 438)	417	(391, 442)	384	(325, 443)	411	(344, 477)	463	(348, 578)
Age group (yrs)										
19–29	356	(313, 399)	364	(313, 416)	289	(178, 399)	357	(247, 467)	331	(183, 478)
30–39	365	(331, 400)	357	(319, 395)	399	(298, 500)	383	(278, 489)	429	(96, 763)
40–49	426	(377, 476)	425	(369, 482)	329	(224, 435)	495	(309, 681)	522	(322, 722)
50–59	524	(463, 586)	531	(461, 600)	598	(404, 791)	448	(264, 632)	362	(187, 537)
60–64	475	(406, 543)	455	(384, 527)	373	(147, 598)	444	(180, 708)	1,377	(821, 1933)
Sex										
Men	412	(377, 447)	407	(368, 447)	436	(322, 550)	448	(316, 579)	417	(277, 556)
Women	419	(390, 447)	424	(391, 458)	357	(290, 424)	385	(319, 451)	500	(327, 673)
Income*										
Low	378	(336, 421)	384	(329, 439)	337	(247, 427)	392	(287, 497)	404	(240, 568)
Middle	396	(363, 429)	386	(349, 423)	423	(307, 538)	421	(307, 535)	485	(304, 665)
High	442	(406, 478)	446	(407, 485)	403	(299, 507)	421	(290, 552)	476	(272, 680)
Employment†										
Yes	412	(387, 437)	416	(387, 444)	362	(300, 424)	420	(342, 498)	411	(308, 513)
No	431	(382, 480)	426	(372, 480)	410	(267, 552)	369	(238, 500)	629	(286, 972)

*Income: low=<200% federal poverty level (FPL); middle=200–400% FPL; high=>400% FPL.
†Employment: employed in 1996 or part thereof.
CI=confidence interval.

FIGURE 1
Constant Dollar Charges for Dental Care Among US Adults Aged 19–24 Years Who Incurred Charges, 1987 and 1996



published charges from 1987 NMES (14), we converted 1987 charges to their "constant dollar" value in 1996 to control for the effects of inflation. To achieve this, reported 1987 charges were multiplied by the ratio of the average consumer price index (CPI) for 1996 (156.9) divided by the average CPI for 1987 (113.6). CPI data were obtained from the US Department of Labor Statistics (16). We statistically evaluated the null hypothesis that real charges for patients who incurred charges did not change between the two survey periods by subtracting the mean (inflated) charge in 1987 from the mean charge in 1996. The difference was divided by the pooled standard error[1], yielding a test statistic that was evaluated for significance by reference to the critical values of the z-distribution.

Pooled standard error=

$$\sqrt{SE^2_{(1987)} + SE^2_{(1996)}}$$

where $SE_{(1987)}$=standard error of inflated 1987 charges and $SE_{(1996)}$=standard error of 1996 charges.

Results

In 1996, 43.7 percent of the US adult population incurred some dental charges (Table 1). There was an approximate twofold difference in percentage of people incurring charges between the lowest income group (28.1% for people below 200% of FPL) and the highest income group (55.8% for people above 400% of FPL). Other sociodemographic characteristics were associated with smaller differences in percentage of persons incurring charges. People aged 19–29 years were less likely to incur charges than older age groups, non-Hispanic blacks, and Hispanics were less likely to incur charges than whites or other race/ethnic groups, males were less likely to incur charges than females, and people not in employment were less likely to incur charges than employed persons. Variations among groups defined by income, age, sex, and employment status generally were consistent within each of the race/ethnic groups, although some exceptions were noted. For example, among the "other" race/ethnic group, the percentage of people incurring charges was virtually identical for employed and unemployed persons, whereas the percentage was higher for employed than unemployed persons in each of the other three race/ethnic groups.

For all US adults, mean per capita charges for dental services in 1996 were $182 (Table 2). Sociodemographic trends in mean per capita charges generally were similar to the trends noted for Table 1. That is, charges were more than twice as high for highest-income versus lowest-income groups. There was also a pronounced age gradient, increasing from $128 per person aged 19–29 years to $255 per person aged 50–59 years, while mean per capita charges for non-Hispanic whites ($204) were approximately twice as high as non-Hispanic blacks ($106). Women (mean=$203) incurred significantly more charges than men (mean=$159). However, in contrast to the results from Table 1, per capita charges did not differ meaningfully between employed and unemployed people. Sociodemographic patterns of per capita charges generally were similar within race/ethnic groups. However, among non-Hispanic blacks, there was no clear age trend, and there were large 95 percent confidence intervals that masked several differences among subgroups of non-Hispanic blacks.

Table 3 limits the analysis of average charges for dental services to people who incurred some charges, hereafter described as "dental patients." Since fewer than one-half of the US population incurred charges, the figures for dental patients in Table 3 are generally about twice as high as per capita population estimates in Table 2. Average charges in 1996 were $416 per patient (Table 3). Greater charges were observed with increasing age, but other sociodemographic trends were weak. For example, there was only a 17 percent difference in charges between low-income dental patients (mean=$378 per patient) and high-income patients (mean=$448 per patient).

Figure 1 compares average charges for dental services among dental patients in 1987 and 1996, with values from the 1987 NEMS study (14) expressed in constant (1996) dollars. The 1996 average of $416 per patient was $27 (7%) higher than the 1987 estimate of $389, although the difference was not statistically significant (P=.08). Average charges for other sociodemographic groups of patients necessarily have larger 95 percent confidence intervals (CI) than the overall sample of patients, and differences between years were not statistically significant for all subgroups. The largest increase between 1987 and 1996 was observed for patients not in employment whose average charges increased by $58 (15%) per patient ($P$=.07). Hispanics represented the only sociodemographic group with a reduction in average charges per patient, although the amount was only $9 less in 1996 compared with 1987 (P=.85).

Discussion

The principal findings from this analysis of charges incurred for dental care among US adults in 1996 are strikingly similar to results reported by Vargas and Manski (14) for the 1987 NEMS survey that used similar methodology. Specifically, 43.7 percent of the US population incurred charges in 1996 (Table 1), which did not differ meaningfully from the corresponding 1987 estimate of 44.5 percent (14). Selected sociodemographic groups differed between years by no more than two percentage points in the proportion of people who incurred dental charges. Estimated per capita charges for all persons in 1996 were $182 (95% CI=$171, $192) (Table 2) and did not differ significantly from the 1987 figure, expressed in constant 1996 dollars, of $174, (95% CI=$166, $182; data not tabulated). In part, this similarity in per capita charges for the entire population is a consequence of stability in the percentage of persons incurring charges for each year, since nonusers of dental services remain in the denominator for calculation of per capita, population charges. For our temporal comparison of charges we presented data for average charge per patient who incurred charges (Figure 1) because, unlike per capita charges, we observed some small increases. However, the average increase of $27 (constant dollars) per patient between 1987 and 1996 was not statistically significant and represents less than the fee typically charged for even the least costly dental service. Hence, there was little or no basis to support the hypothesis in our second aim that charges had increased between 1987 and 1996.

Before considering the implications of these findings for our stated hypothesis, we first consider the four trends underpinning our expected temporal increase in charges of dental care. There is very strong evidence about the extent of US economic growth between 1987 and 1996 and the accompanying growth in health care expenditures (4). Nonetheless, economic growth had only a modest impact on income for many people. For example, inflation-adjusted median household income increased by only $2,016 to $38,262 in the period 1985–95 (amounts expressed in year 2000 dollars) (3). It is probable that an extra $2000 is simply insufficient to increase demand for dental care for many people. In addition, out-of-pocket expenditures may be relatively unaffected by general growth in the economy, as evidenced by overall stability in out-of-pocket expenditures for health care in the period 1990–97 among insured workers (18). Just as the majority of health expenditures are concentrated among only 5 percent of the US population, a skewed distribution that has persisted for the decade studied here (19), it is possible that economic forces affect the aggregate volume of services

provided to a relatively small proportion of dental patients, while charges billed to the majority of people remain unaffected.

Our second premise concerning population trends is also based on well-documented demographic trends, although it must be acknowledged that they are, at best, only a general indicator of likely dental care needs and demands. Hence, although it is clear that the proportion of 45–54-year-olds has increased, it remains possible that the "baby boom" cohort differed from earlier generations in ways that would have reduced their receipt of dental care. However, our assumptions appear well grounded at least on some major trends known to affect oral health. For example, the baby boom generation has much higher levels of tooth retention than earlier cohorts (6); yet, like their parents, most people aged 45–54 years in 1996 did not have the benefit of lifetime exposure to community water fluoridation efforts that began to become widespread in the 1960s.

Turning to the relevance of dental workforce trends, we assumed that a small increase in supply of dentists would at least create the potential for provision of more dental services in the US population. However, dentist-to-population ratio is but a crude indicator of capacity to supply services, particularly as there are competing trends such as increasing part-time work among registered dentists (10). Nevertheless, our assumption of increasing capacity to supply services is supported by more detailed examination of productivity of individual dentists and the dental care system, both of which have shown small annual increases in the time period reported here (10). The final trend that we have cited, namely greater technological sophistication of treatments, is difficult to evaluate. Even high-profile procedures such as a dental implants with subsequent restoration provided by a number of specialist dentists may be no more expensive than alternative treatments, and in any event it is difficult to quantify the impact of such technologies at a population level. Indirect evidence, such as a 23 percent increase in dentists' incomes after adjusting for inflation (11,12) is based on sparse survey data of uncertain reliability and may reflect increased efficiency and reduced expenses rather than increased charges.

Despite limitations in evidence about some of the influences reviewed above, the combined evidence at least suggests that conditions for increase in charges for dental care were favorable in the period 1987–96. However, it remains possible that methodological limitations may have limited the ability of these two surveys to detect change in charges for care. One apparent discrepancy exists between our data in Table 1, where 43.7 percent of persons had expenditures, and the 1997 NHIS finding that 64.1 percent of 18–64-year-olds reported one or more dental visits in the preceding year (20). Not only are MEPS and NHIS national surveys, MEPS uses the NHIS sampling frame to select subjects, so this difference cannot be attributed to differences in populations studied. It is inconceivable that the discrepancy could be attributed to use of nonfee-charging dental services such as community health centers or county health departments that provide indigent care, because those facilities are distributed so sparsely. A more likely explanation concerns study methodology: it seems probable that the MEPS method of enumerating health care encounters prospectively in a calendar maintained by study participants yields a lower estimate of utilization than the single NHIS question asking respondents when they last had a dental visit, and records responses in broad categories such as "within the previous 12 months," which may be subject to recall bias. However, even if the MEPS estimate is artificially low, it does not detract from the validity of our finding that there was little or no change in the decade, because the 1987 NMES used identical methodology to enumerate utilization. Furthermore, the reported proportion of people incurring charges in the 1987 NMES was also much lower than contemporaneous estimate of dental visits within the preceding 12 months (21). Hence, we attribute the discrepancy to a methodologic artifact that appears to have affected both expenditures surveys, which therefore does not alter our conclusions about temporal stability in utilization.

Additional evidence supports our finding of little or no change in charges. Our findings for dental care are consistent with reported stability in use of ambulatory health care services (22). Within the larger context of population health during the previous 40 years, these results also are consistent with the finding that proportions of the population reporting symptoms, visiting a physician, receiving care in a hospital, and receiving care in an academic medical center have changed little in 40 years (23). Therefore, we believe it remains appropriate to conclude that the provision of fee-incurring dental care within the US adult population has remained stable in the decade studied.

There are contrasting ways to interpret the implications of this finding for the dental care system. An economically conservative perspective would argue that charges in 1987 were appropriate and that our finding of no substantial change in those charges is therefore indicative of an optimally functioning dental care delivery system able to maintain this appropriate state of affairs despite broader changes in the economy and population. The observation that patients were charged about the same amount (in constant dollars) for their care despite growth in the size of the dental workforce, increases in dentists' salaries, and technological advances in patient care could be seen as evidence that the predominant free market system of dentistry in the United States is eliciting appropriate adjustments in delivery of care without placing an escalating burden of payment on patients themselves. Indeed, a tendency ($P=.07$) for a greater increase in charges among nonemployed people (Figure 1) could be construed as evidence that free market adjustments led to the greatest increase in care for patients who no doubt had a greater need for care, hence helping to reduce inequalities in oral health.

A more liberal economic perspective would place a greater emphasis on population indicators of charges, rather than charges per patient, and lament the failure of the dental care system to extend the provision of dental services to a larger proportion of the US population in response to favorable economic forces. That is, only 44 percent of US adults incurred charges in 1987 (14), a figure that did not change during the next nine years (Table 1), and average, constant dollar charges per capita remained stable. Consequently, over one-half of the US population remained deprived of fee-

incurring dental services despite an economic boom. Based on this perspective, the failure of the dental care system to extend its benefits to a larger proportion of the US population represents a substantial lost opportunity. More broadly, it suggests the dental care system did not respond according to the economic forces of a free market. A lack of response to economic forces was also observed in an evaluation of Norwegian private-sector dental practices where competition had only a weak impact on fees charged by dentists (22). Presence or absence of free market behavior is not merely of academic interest: if the economic boom during the decade studied was insufficient to affect provision of dental care for the US population, it suggests that strategies other than economic influences will be needed to achieve the ambitious oral health goals of Healthy People 2010.

As a corollary of the general similarities between estimates for the two surveys, we found that sociodemographic variations in charges during 1996 generally were similar to those reported by Vargas and Manski (14). That is, the proportion of people incurring charges and per capita charges generally were lower for people aged 19–29 years compared with older age groups, for men compared with women, for low-income compared with high-income groups, and for minority racial/ethnic groups compared with non-Hispanic whites. However, sociodemographic variations were much less pronounced when the analysis was limited to dental patients (i.e., those who incurred charges). For example, in 1996 there was only a 17 percent difference in average charges for dental patients between the lowest and highest income patients (Table 3), but there was a twofold difference between low- and high-income groups in percentage of the population incurring charges (Table 1) and in average per capita charges (Table 2). Vargas and Manski (14) characterized this phenomenon as the "discretionary" nature of dental care. Its persistence in 1996 suggests that inequalities among sociodemographic groups in provision of fee-incurring dental services arise primarily due to barriers that operate prior to contact with the dental care system. For example, the 1996 findings indicate that people in the US population whose income was below 200 percent of FPL were less likely to seek fee-charging dental services than people with higher incomes (Table 1), but those who did initiate care and become patients incurred average charges per patient that did not differ dramatically according to income (Table 3). Hence, the major challenge to improving equity in provision of dental services exists at the population level, prior to entering the dental care system, where there continues to be a need for private and/or public strategies to promote and enable use of dental services. This is particularly apparent among low-income, unemployed, and minority groups in the US population.

In the absence of data about oral disease or treatment needs, this study cannot comment on whether the levels of care provided to patients were sufficient or appropriate to address their needs. Nonetheless, relatively small differences observed among sociodemographic groups in average charges per patient suggest that the volume of services provided by the fee-charging dental care system are delivered in an equitable manner among patients who initiate care. In part this may reflect a self-selection process whereby only those members of the population who believe they have sufficient resources actually seek care in the fee-charging system. However, it also seems likely that many patients, perhaps in collaboration with their dentist, are able to "master the system" despite their lack of resources. Some possible examples of "mastering the system" could include payment plans with dentists, securing third party coverage, or budgeting limited personal resources. To the extent that some patients have acquired such skills, it would appear valuable to draw on their experiences to identify additional strategies that could be used by the majority of adults who did not incur expenses in 1996, by dentists who could treat them, or by third parties who could craft innovative plans to manage costs. However, the findings here also suggest that any such strategies will need to be implemented in ways that circumvent the apparent unresponsiveness of the dental care system to economic effects of market forces.

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