# Use of Clinical Services Compared with Patients' Perceptions of and Satisfaction with Oral Health Status

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## Abstract

***Objectives:*** *To examine the relationship between rates of clinical service use and self-reported perception of and satisfaction with oral health status.* ***Methods:*** *Dental services provision rates were calculated using health maintenance organization electronic data for members 55 years of age and older with at least four years of eligibility between 1990 and 2000. A mail survey yielded 986 responses (response rate=65.7%). Poisson regression was used to examine the relationship between service utilization rates and self-reported perception of and satisfaction with oral health status, controlling for age, education, sex, and marital status.* ***Results:*** *Perceptions of oral health status and levels of satisfaction with oral health status generally were closely associated. Greater dissatisfaction with oral health status and perception of poorer oral health status were associated with higher usage of nonpreventive dental services. Less satisfaction with oral health status was associated with higher restorative services usage and lower preventive services usage and slightly associated with periodontal service usage. Perception of a less favorable oral health status was strongly associated with higher restorative and periodontal services usage, but had only a weak association with preventive services usage.* ***Conclusions:*** *Dental plan members' service use is associated with their perception of their oral health status and their level of satisfaction with it. Future work should seek to clarify whether opinions on oral health status and satisfaction are a result of clinical experiences over time or whether the behavior and the values associated with seeking and obtaining care instead shape opinions on status and satisfaction. [J Public Health Dent 2004;64(2):88-95]*


*Key Words: satisfaction, oral health, health services research, restorative, periodontal, preventive.*

Research has shown various strengths of association between perceptions of oral health status and use of dental services (1,2), and between levels of satisfaction with oral health status and use of dental services (3). While most studies have been focused on lay perceptions (1,3-6), others have investigated how health professionals perceive oral health status (2,7). These diverse studies most commonly have attempted to ascertain the validity of such appraisals as representations of health care needs or health care experience (1,2,4,5,8). The perceptions of oral health status and the levels of satisfaction with perceived conditions and clinical needs varied across age groups, clinical history, socioeconomic status (SES), and the level of sophistication of dental IQ among the respondents, precluding identification of clear-cut trends (1,5,6).

These complex relationships have led authors to consider perceptions of health status and satisfaction with care as dubious representations of needs and experience at the individual person level. However, they have concluded that validation of perceptions for specified oral features did show promise as an adjunct to other forms of group-level evaluation (2,5,8,9). A further complicating factor is how other predictors of health care usage, such as having dental insurance, modify the perceptions of health status and satisfaction. Patients' perceptions of need for care does not necessarily lead to contacting and making use of available resources (10), since many other factors also come into play (11).

Our research examined how perceptions of and satisfaction with oral health status compare with patients' long-term experience with use of dental care services. Such perceptions may be used in preliminary assessments of oral health needs rather than more expensive evaluations carried out by dental professionals collecting clinical data (2).

## Methods

**Study Participants.** The study population was made up of adult dental plan members of a large nonprofit managed care organization (MCO) in the northwestern United States, Kaiser Permanente Northwest (KPNW). The KPNW Institutional Review Board approved the study design. KPNW's members, which number over 400,000 (>185,000 in the dental plan) come from most sociodemographic levels and are fairly representative of the population in the geographic service region. Participants in this study ($n$=1,500) were randomly selected from records included in a larger analysis of rates of dental services provision. Participants in the study were 55 years of age and older.

**Research Setting.** KPNW and the Center for Health Research (CHR) have a long history of conducting population-based, publicly funded, public domain research (12). CHR is a

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professionally autonomous, multidisciplinary organization that conducts research using KPNW and KP-Hawaii databases in Oregon, Washington, and Hawaii.

The dental professionals who serve KPNW patients are not KPNW employees, but rather are salaried contract service providers. KPNW clinicians have been trained to classify patients in a standardized manner but may evaluate and treat patients according to their professional judgment. KPNW imposes no guidelines, quotas, or constraints on dentists, who remain independent professionals.

**Calculation of Service Usage Rates.** Dental service usage rates (member/year) were calculated using administrative data (dental, medical, and pharmacy insurance plans) for members aged 55 years and older with at least four years of continuous dental plan eligibility between 01/01/1990 and 12/31/2000. To be included in this study, members were required to have had at least one dental visit during this time period. Rates of dental health care service usage were calculated as dental procedures per member per year.

**Survey.** In 2002, a 35-question survey was mailed to the home addresses of 1,500 plan members randomly selected from records included in a larger analysis of dental services provision rates. Two reminder cards (at two-week intervals after the survey was mailed) were sent to the addresses of members who had not returned the survey. No incentives were offered for participation.

To obtain comparable data from members with and without recent caries diagnoses, half of the addresses in the original mailing were selected from records of members who had at least one carious lesion diagnosed between 01/01/1999 and 12/31/2000, and half from members who did not.

The caries classification variable used in the analyses presented below captures this information. The survey was designed to assess whether certain factors might contribute to an increased risk for xerostomia, dental caries, and tooth loss. The survey also solicited data on satisfaction with oral health status ("How satisfied are you with the health of your teeth and gums?") and perception of oral health ("In general, how would you describe the health of your teeth and gums?") using Likert-type scales, as well as some sociodemographic aspects. The survey items were derived from established instruments used in other studies. Only selected variables are included in the present report.

**Statistical Methods.** Poisson regression was used to examine the relationships between dental health care usage rates (specifically periodontal, preventive, and restorative service rates) and two self-report measures: perceived oral health status (STATUS) and satisfaction with oral health (SATISFACTION). These models controlled for age, caries classification, education, sex, and marital status. All analyses were performed using the SAS® statistical software package (SAS Institute, Cary, NC). Sample sizes vary for different analyses due to missing data.

## Results

Surveys from 986 members living in Oregon or Washington were returned completed or partially completed (response rate=65.7%). Results presented here focus on the 935 individuals who reported that they were dentate. About half of the respondents in our analysis dataset were female (53.4%), and most identified themselves as white (90.5%) (consistent with the ethnic/race mix in the Pacific Northwest). A small proportion of respondents were Hispanics (1.0%). Approximately 47.4 percent were 55 to 64 years old, 30.7 percent were 65 to 75 years old, and 21.9 percent were 76 years and older.

Our sample consisted of 47.9 percent without caries reported during 1999–2000 and 52.1 percent with caries during that time period. Our sample included few current tobacco users (6.3%), with 39.2 percent former smokers and 49.0 percent never smokers (5.5% of the sample did not disclose their smoking status).

The mean length of eligibility in our analysis dataset was 9.8 years (SD=2.1), with about two-thirds having eligibility during the entire 11-year observation period. Most respondents were either satisfied (49.0%) or very satisfied (15.8%) with the health of their teeth and gums; 21.2 percent felt neutral about it; a few were dissatisfied (11.7%) or very dissatisfied (1.4%). When asked to describe the health status of their teeth and gums, 5.7 percent of respondents considered their condition to be excellent, 22.1 percent

**FIGURE 1**
**Mean Yearly Restorative Services Rates Associated with Stated Satisfaction with Oral Health Status, and with Perceived Status**

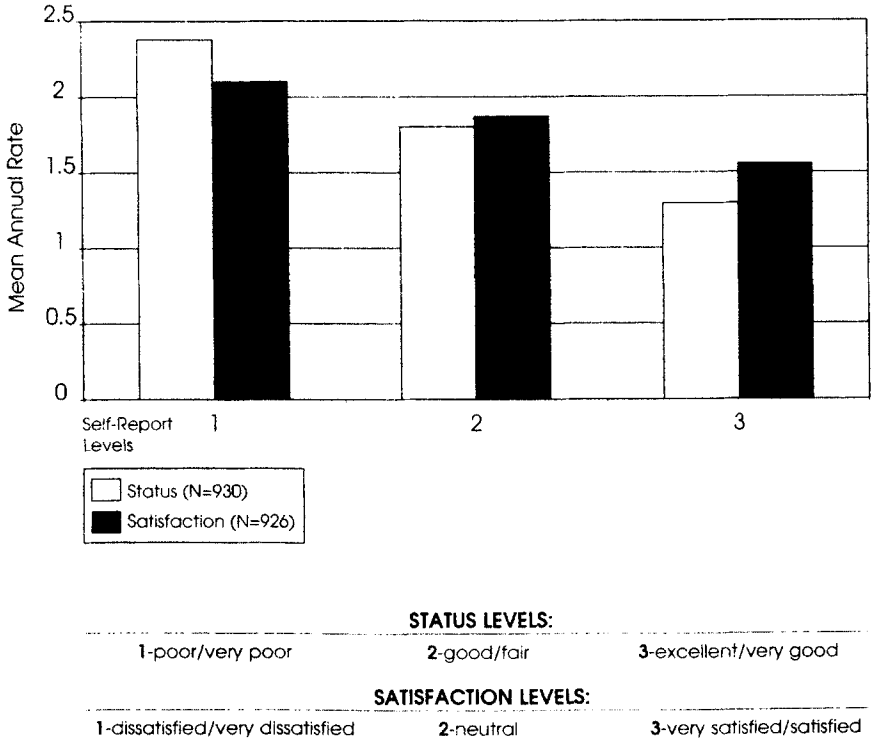


FIGURE 2
**Mean Yearly Periodontal Services Rates Associated with Stated Satisfaction with Oral Health Status, and with Perceived Status**

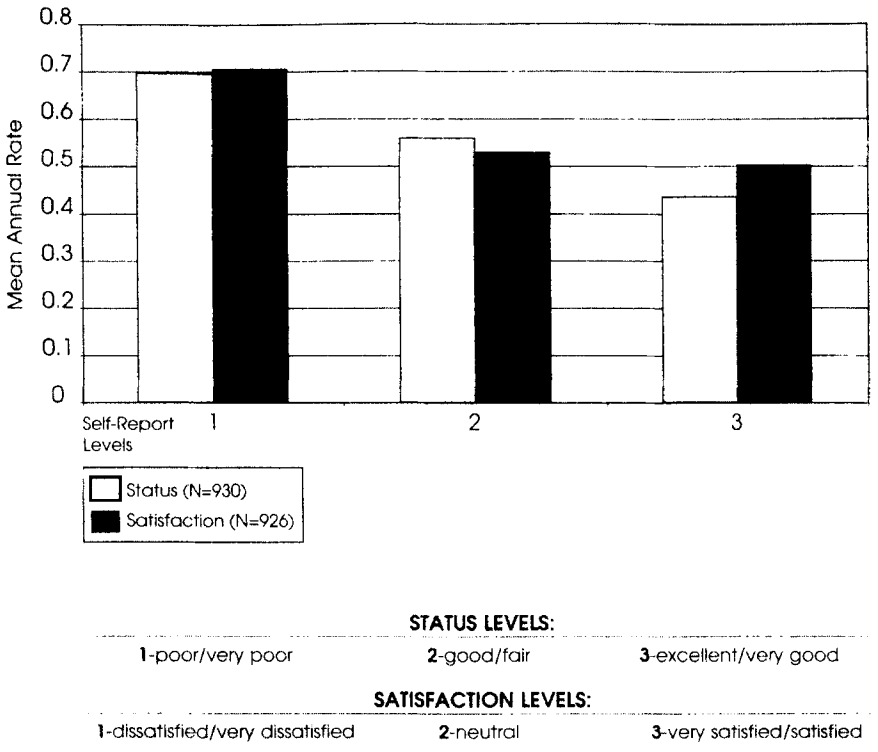
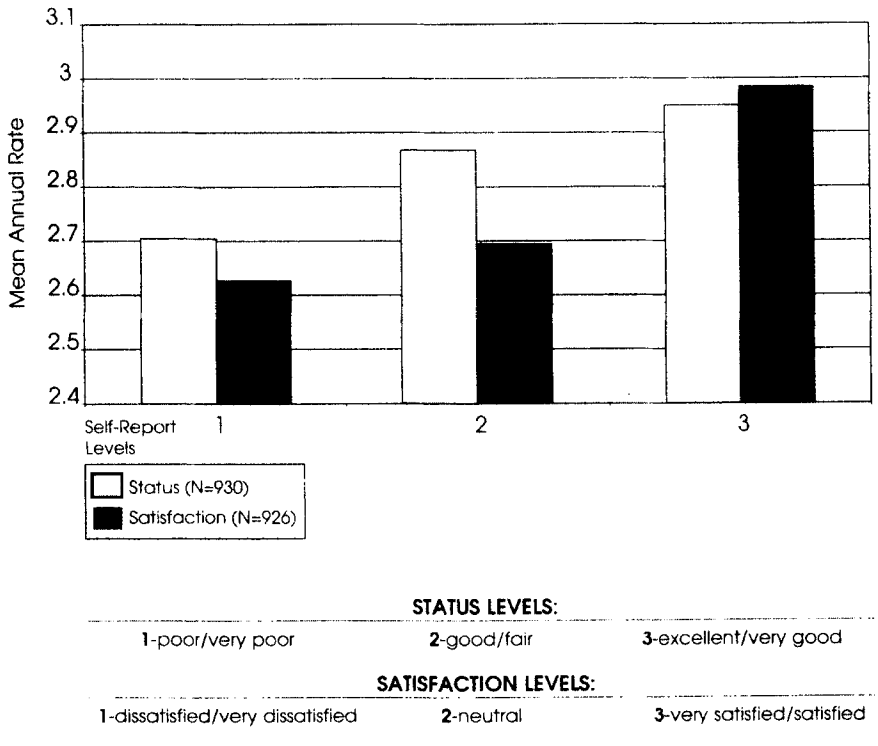



FIGURE 3
**Mean Yearly Preventive Services Rates Associated with Stated Ssatisfaction with Oral Health Status, and with Perceived Status**




very good, 39.0 percent good, 24.7 percent fair, 6.5 percent poor, and 1.4 percent very poor. Generally, level of satisfaction with health status and perception of health status were closely associated.

In Figures 1–3 we display mean yearly utilization rates as a function of perceived oral health status and oral health satisfaction. Beginning with Figure 1, we see an inverse relationship between mean number of restorative services per member per year and each of the two self-report measures. Individuals with low restoration rates tended to report higher satisfaction with their oral health and a more positive description of their oral health status than those with high restoration rates. Likewise, mean number of periodontal services per member per year tended to be inversely associated with each of the self-report measures (Figure 2). The mean number of preventive services per member per year, on the other hand, were positively associated with perceived oral health status and satisfaction with oral health. Individuals with high preventive service rates tended to describe their oral health in a positive fashion and, accordingly, report high levels of satisfaction with their oral health.

To examine these relationships more extensively, we used Poisson regression (Tables 1–6) to assess the statistical significance of these effects, while controlling for caries classification and demographic variables. These regression models allowed us to determine if the observed positive relationship between, for example, SATISFACTION and preventive service rates was statistically significant. In assessing this relationship in a regression model, we simultaneously controlled for the effects of the various demographic variables. We also examined in these models the relationships between the demographic variables and utilization rates. Model estimates for the SATISFACTION and STATUS variables can be interpreted as the estimated ratio of mean rates for individuals who report a given level of satisfaction (status) relative to individuals reporting the next lower level of satisfaction (status). Hence, the estimate of the mean restoration ratio for individuals reporting the highest level of satisfaction relative to those reporting neutral satisfaction in Table 1 was 0.88 (and is the same as the estimated

ratio for those reporting neutral satisfaction relative to the lowest satisfaction level). That is, we estimated that those most satisfied had a mean restoration rate that was about 12 percent less than those reporting neutral satisfaction.

As seen in Table 1, the estimated ratio was significantly different from 1 ($P$=.0005; 95% CI=0.82, 0.95). Consistent with Figure 1, such a result suggests that after controlling for caries classification and demographic variables, satisfaction remained inversely associated with restoration rates: higher satisfaction reports tended to coincide with lower restoration rates. The corresponding estimated mean restoration rate ratio for perception of oral health status was 0.79 ($P$<.0001; 95% CI=0.72, 0.86), again providing evidence of a negative relationship between restoration rates and perceived oral health status (Table 2). Tables 3 and 4 present results for periodontal service rates, where there was evidence of a negative relationship between perceived oral health status and periodontal rates (estimated mean rate ratio=0.78, $P$=.015), but only a suggestion of a negative relationship between oral health satisfaction and periodontal rates (estimated mean rate ratio=0.88, $P$=.091). Finally, Tables 5 and 6 present the corresponding results for preventive service rates: a positive association with satisfaction (estimated mean rate ratio=1.07, $P$=.001) and a marginally significant positive association with perceived oral health status (estimated mean rate ratio=1.05, $P$=.071).

Estimated effects of covariates can also be obtained from Tables 1–6. For dichotomous variables (sex, caries classification, and marital status), estimated mean rates adjusted for model covariates are presented along with associated confidence intervals and $P$-values to test for a difference in rates across the two levels of each variable. For example, in Tables 1 and 2 we observe a significant effect of sex after adjusting for model covariates: men tended to have higher restoration rates than females. Similarly, unmarried individuals tended to have higher restoration rates than married individuals. Not surprisingly, individuals with identified caries during 1999–2000 had higher overall restoration rates during the entire eligibility period than those without caries in 1999–2000. (This was to be expected and was not particularly meaningful. We included the caries classification variable in the regression so that the model would explicitly allow for a different mean restoration rate in those with a recent caries diagnosis compared to those without a recent diagnosis.) Education results are presented in terms of estimated mean rate ratios—estimated mean rate for a given level of completed education (post-college work, college graduate, some college or technical school, high school or GED, grades 9–11, grades 0–8) relative to the estimated mean rate at the next lower education level. We did not find any education effects on rates for restorative, periodontal, or preventive services. For age, the mean rate ratios refer to the ratio of the estimated mean rate for a given age, relative to that for individuals 10 years younger. For comparison of restoration and preventive services rates, we see that older individuals (at time of survey) tended to have significantly more services than younger individuals during the observation period (ratios>1.0). The opposite was observed for periodontal services: younger persons had more services than older persons (ratios<1.0).

**TABLE 1**
**Regression Model for Estimation of Restorative Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Stated Satisfaction with Oral Health Status ($N$=886)**

| | $P$-value for Testing Effect | Est. Mean Restorative Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .0005 | | |
| Male | | 1.78 | (1.64, 1.94) |
| Female | | 1.47 | (1.36, 1.58) |
| Caries classification | <.0001 | | |
| No caries | | 1.23 | (1.12, 1.35) |
| Caries | | 2.13 | (1.99, 2.27) |
| Marital status | .0426 | | |
| Not married | | 1.72 | (1.56, 1.89) |
| Married/living with partner | | 1.52 | (1.42, 1.63) |
| | | Est. Mean Restorative Services Rate Ratio Adjusted for Covariates | |
| Satisfaction* | .0005 | 0.88 | (0.82, 0.95) |
| Age† | .0251 | 1.07 | (1.01, 1.13) |
| Education‡ | .8443 | 1.00 | (0.96, 1.05) |

*Estimated mean yearly rate ratio for individuals reporting a given level of satisfaction with the health of their teeth and gums, relative to individuals at the next lower (less satisfied) level. Satisfaction levels: 1=dissatisfied/very dissatisfied, 2= neutral, 3=very satisfied/satisfied.
†Estimated mean yearly rate ratio for individuals at any fixed age relative to individuals 10 years younger.
‡Estimated mean yearly rate ratio for individuals who have completed a given level of education, relative to individuals at the next lowest level. Education levels: 6=post-college work, 5=college graduate, 4=some college of technical school, 3=high school graduate or GED, 2=grades 9–11, 1=grades 0–8.

## Discussion

Our results confirmed that the lay public's perceptions of oral health status and related satisfaction are associated with receiving certain types of clinical services. The results offer one of the first published links between (cross-sectional) lay perceptions and the long-term use of services. Both the perception of oral health status and satisfaction were aligned along the expected directions with the type of services delivered. Overall, more restorative services were associated with a greater dissatisfaction, and more preventive services were associated with greater satisfaction. Also, a perception of a less favorable health status was associated with more re-

**TABLE 2**
**Regression Model for Estimation of Restorative Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Perceived Oral Health Status (*N*=889)**

| | *P*-value for Testing Effect | Est. Mean Restorative Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .0025 | | |
| Male | | 1.76 | (1.62, 1.91) |
| Female | | 1.48 | (1.38, 1.60) |
| Caries classification | <.0001 | | |
| No caries | | 1.23 | (1.13, 1.35) |
| Caries | | 2.12 | (1.98, 2.26) |
| Marital status | .0527 | | |
| Not married | | 1.71 | (1.56, 1.88) |
| Married/living with partner | | 1.53 | (1.43, 1.63) |
| | | Est. Mean Restorative Services Rate Ratio Adjusted for Covariates | |
| Satisfaction* | <.0001 | 0.79 | (0.72, 0.86) |
| Age† | .03761 | 1.06 | (1.00, 1.12) |
| Education‡ | .6911 | 1.01 | (0.96, 1.06) |

*Estimated mean yearly rate ratio for individuals reporting a given level of oral health status, relative to individuals at the next lower (poorer status) level. Status levels: 1=poor/very poor, 2= good/fair, 3=excellent/very good.
†Estimated mean yearly rate ratio for individuals at any fixed age relative to individuals 10 years younger.
‡Estimated mean yearly rate ratio for individuals who have completed a given level of education, relative to individuals at the next lowest level. Education levels: 6=post-college work, 5=college graduate, 4=some college of technical school, 3=high school graduate or GED, 2=grades 9–11, 1=grades 0–8.

storative and periodontal services.

Typically, past studies looking into the validity of perceptions of status as representations of health conditions have relied on somewhat rigid assessments of how well lay appraisals resemble normative evaluations. Many of these assessments resorted to calculating the sensitivity, specificity, and positive and negative predictive values of the lay appraisals in contrast with the normative evaluations (1,5,8). Some studies concluded that lay opinions may provide reasonably accurate estimates of teeth present (13-16), identification of prostheses (14,16,17), prospective tooth loss (18), periodontal status (7,16,19,20), and assorted dental and periodontal conditions (4). A few publications focused their attention on the stated satisfaction with self-reported oral health status (3). The rationale for the latter is that a contextual placement of the appraisal is then feasible, providing values, expectations, and beliefs about what makes up healthy and diseased states (21). Jokovic and Locker (3) looked at various functional and appearance components of satisfaction, which were analyzed alone and in conjunction with the larger realm of overall satisfaction. The bottom line is that there is general lack of agreement between normative and lay appraisals of status (4,22,23) and between normative appraisals and stated levels of satisfaction (24-26). This situation does not mean that striving to obtain valuable information through self-report is futile; it suggests, rather, that many of these studies have been designed with substantially different goals and under diverse methodologic assumptions. Results derived from these studies are thus difficult to compare directly with each other and with our results.

The most salient problem appears to be that many oral health features have been looked at in past reports. Studies incorporated many concepts making up status, including, but not limited to, number of teeth in the mouth (1,13-16), restorative status of teeth (1), restorative needs of teeth (8,22), prostheses in the mouth (1,14,16,17,27), perceived presence of periodontal disease (1,2,7,19,20), whether the subjects had been told that they had periodontal disease (1), experience with periodontal treatment (1,2,16), overall grading of oral health status (6), actual tooth loss and its etiology (18), and/or level of satisfaction with oral status (23-26), including function and appearance variables associated with stated satisfaction (3). Furthermore, with few exceptions [see, e.g., Gilbert et al. (5)], most of the normative assessments undertaken to validate those perceptions were limited to one-time examinations, rather than more detailed assessments of health status. Against this diverse background, it is hardly surprising that one-time assessments of oral health features have led to interpretation problems when a summary of a long history of dental events has been attempted. This approach to clinical measures supplies relatively weak predictors of patient perceptions (3). In the present research approach, a long-term perspective of usage of services would be expected to yield more useful information than that derived from mere cross-sectional assessments of treatment needs and disease experience.

We found that greater dissatisfaction with oral health status was associated with higher restorative services rates and lower preventive services rates. These associations are not surprising, since the usage pattern of more restorative services and fewer preventive services describes emergency-oriented attendance patterns, higher experience of established dental disease, or both. The lack of association with periodontal service usage rates that we found is probably a reflection of the more covert nature of periodontal conditions. Even though Glavind and Attström (19) indicated that a correct self-identification of periodontal conditions can be improved by guiding patients' perceptions with written instructions and instruments, it remains to be determined whether these special evaluations could be similar to unaided observations, or rather represent a unique experience derived from a fairly artificial environment.

Our findings pertaining to oral

**TABLE 3**
**Regression Model for Estimation of Periodontal Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Stated Satisfaction with Oral Health Status (*N*=886)**

| | *P*-value for Testing Effect | Est. Mean Periodontal Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .1830 | | |
| Male | | 0.58 | (0.49, 0.70) |
| Female | | 0.50 | (0.42, 0.58) |
| Caries classification | .2671 | | |
| No caries | | 0.57 | (0.49, 0.68) |
| Caries | | 0.50 | (0.43, 0.59) |
| Marital status | .3281 | | |
| Not married | | 0.57 | (0.47, 0.70) |
| Married/living with partner | | 0.50 | (0.44, 0.58) |
| | | Est. Mean Periodontal Services Rate Ratio Adjusted for Covariates | |
| Satisfaction | .0907 | 0.88 | (0.75, 1.02) |
| Age | .0108 | 0.85 | (0.74, 0.96) |
| Education | .1736 | 1.07 | (0.97, 1.19) |

**TABLE 4**
**Regression Model for Estimation of Periodontal Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Perceived Oral Health Status (*N*=889)**

| | *P*-value for Testing Effect | Est. Mean Periodontal Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .2006 | | |
| Male | | 0.58 | (0.49, 0.70) |
| Female | | 0.50 | (0.43, 0.59) |
| Caries classification | .1849 | | |
| No caries | | 0.58 | (0.49, 0.68) |
| Caries | | 0.50 | (0.42, 0.59) |
| Marital status | .2590 | | |
| Not married | | 0.58 | (0.47, 0.71) |
| Married/living with partner | | 0.50 | (0.43, 0.58) |
| | | Est. Mean Periodontal Services Rate Ratio Adjusted for Covariates | |
| Status | .0153 | 0.78 | (0.64, 0.95) |
| Age | .0110 | 0.85 | (0.75, 0.96) |
| Education | .1597 | 1.08 | (0.97, 1.19) |

health status fit expected directions, as well. The perception of a less favorable oral health status was associated with higher restorative and periodontal services usage rates. This finding would be expected if we assume that more periodontal and rehabilitative treatment is allocated to people in worse periodontal and dental conditions. These patients' perceptions of health status fit with their long-term experience of illness. The finding that preventive services were associated with more favorable health status is intuitive.

We incorporated educational level in our analyses as a simple proxy measure of SES. Educational attainment was not significant in the models. Our sample and the KPNW population comprised mostly employed persons with health coverage in a relatively homogeneous locale; hence, it is not surprising that the educational attainment variable failed to identify differential utilization of services. Age was significant, however; older members had more restorative and preventive services than younger members, but fewer periodontal services. Participants living with a partner had fewer restorations than members living alone, a result that resembled findings previously reported (28). In our study, periodontal service rates were not significantly different in terms of marital status—this in contrast to Croucher et al. (29), who found that marital status became significant as a factor in periodontitis only after adjusting for psychosocial factors and oral health risk behaviors.

The present findings are not directly generalizable to other population groups, since most participants were dentate, white, employed, and had dental insurance. However, several methodologic considerations and strengths are relevant to the study. First, we appraised these perceptions within a managed-care organization, an environment in which access to care is not an important factor. Such an environment reduced deviations in perceptions due to problems in access to care, controlled for the sociodemographic variables often confounded by limitations in access to care, and allowed the provision of dental services prescribed by a dental clinician without the modifications that might be introduced by the ability of clients to pay at point of service. Second, it is only among users of dental care services that we can investigate perceptions and utilization. The issue of nonutilizers, which probably covers the entire spectrum from the very healthy to some of the very unhealthy, is an important one, but not one that we could address in the present study. Third, at the same time, our study design is not complicated by the

TABLE 5
**Regression Model for Estimation of Preventive Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Stated Satisfaction with Oral Health Status (*N*=886)**

| | *P*-value for Testing Effect | Est. Mean Preventive Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .8617 | | |
| Male | | 2.91 | (2.78, 3.04) |
| Female | | 2.90 | (2.79, 3.01) |
| Caries classification | .0644 | | |
| No caries | | 2.83 | (2.71, 2.95) |
| Caries | | 2.98 | (2.87, 3.10) |
| Marital status | .4177 | | |
| Not married | | 2.94 | (2.80, 3.09) |
| Married/living with partner | | 2.87 | (2.77, 2.97) |
| | | Est. Mean Preventive Services Rate Ratio Adjusted for Covariates | |
| Satisfaction | .0010 | 1.07 | (1.03, 1.11) |
| Age | <.0001 | 1.06 | (1.03, 1.09) |
| Education | .9935 | 1.00 | (0.98, 1.02) |

TABLE 6
**Regression Model for Estimation of Preventive Services Rates as a Function of Age, Caries Classification, Education, Sex, Marital Status, and Perceived Oral Health Status (*N*=889)**

| | *P*-value for Testing Effect | Est. Mean Preventive Services Rate (per Year) Adjusted for Covariates | 95% Confidence Interval |
|---|---|---|---|
| Sex | .8083 | | |
| Male | | 2.92 | (2.79, 3.05) |
| Female | | 2.90 | (2.79, 3.01) |
| Caries classification | .1318 | | |
| No caries | | 2.85 | (2.73, 2.97) |
| Caries | | 2.97 | (2.86, 3.09) |
| Marital status | .3662 | | |
| Not married | | 2.95 | (2.81, 3.10) |
| Married/living with partner | | 2.87 | (2.77, 2.97) |
| | | Est. Mean Preventive Services Rate Ratio Adjusted for Covariates | |
| Status | .0707 | 1.05 | (1.00, 1.10) |
| Age | <.0001 | 1.06 | (1.03, 1.09) |
| Education | .9622 | 1.00 | (0.98, 1.02) |

ethical and financial dilemmas inherent in including subjects who are affected by unmet treatment needs, but who lack adequate access to dental care. Fourth, generally speaking, our results are similar to national data. NHANES III data for 6,259 males 20–70 years of age (75.5% of them white) were reported by Gibson et al. (6) in their appraisal of perceived oral health status, and the distribution of values in their paper is remarkably similar to our perceived oral health status (excellent/very good, 29.9% NHANES vs 28.0% KPNW; good, 35.9% vs 38.9%; fair, 23.0% vs 25.0%; and poor/very poor, 11.2% vs 8.0%). Finally, we acknowledge that it is not entirely accurate to equate utilization with need. Data depicting long-term services utilization in the absence of major access-to-service barriers, however, support the tenet that courses of treatment prescribed and delivered in such an environment should closely resemble actual need.

In summary, we confirmed that individuals rate their oral health status, and their level of satisfaction with it, in a manner that is associated with the type and frequency of clinical services they received over a long period of time under fairly standardized conditions. Because we conducted this appraisal using individual-level data, the potential to use the two clearly delimited questions on perceptions of oral health and satisfaction may be applicable to the individual person. Carefully targeted instruments can be used in survey-level preliminary assessments to probe those two features less expensively than using dental professionals to collect clinical data (2). We emphasize the "preliminary" nature of the assessment, since some people provide inaccurate information, for example forgetting or misrepresenting that dental visits have taken place at all (5). Some populations may benefit from having their perceptions taken into account when their oral health status and needs are appraised (9).

Future work should address if and how the relationships found between specified components of the perceptions and clinical services change when perceptions are disassembled into various smaller units, such as functional, comfort, and psychosocial factors (3,30). Qualitative research would be well suited to address this more detailed level of analysis. These approaches could be valuable to clarify the chicken-or-egg dilemma implicit in the present research: are opinions on status and satisfaction a result of clinical experiences over time, or are the behavior and the values associated with seeking and obtaining care the driving influences that shape opinions on status and satisfaction?

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## References

1. Pitiphat W, Garcia RI, Douglass CW, Joshipura KJ. Validation of self-reported oral health measures. J Public Health Dent 2002;62:122-8.
2. Joshipura KJ, Pitiphat W, Douglass CW. Validation of self-reported periodontal measures among health professionals. J Public Health Dent 2002;62:115-21.
3. Jokovic A, Locker D. Dissatisfaction with oral health status in an older adult population. J Public Health Dent 1997;57:40-7.
4. Buhlin K, Gustafsson A, Andersson K. Hakansson J, Klinge B. Validity and limitations of self-reported periodontal health. Community Dent Oral Epidemiol 2002;30:431-7.
5. Gilbert GH, Rose JS, Cantey ED, Earis JL, Eford EI, Eldreth MA, et al. On adding a dental practice component to an ongoing longitudinal population-based study of oral health. J Public Health Dent 2002; 62:32-7.
6. Gibson G, Rosenheck R, Tullner JB, Grimes RM, Seibyl CL, Rivera-Torres A, et al. A national survey of the oral health status of homeless veterans. J Public Health Dent 2003;63:30-7.
7. Joshipura KJ, Douglass CW, Garcia RI, Valachovic R, Willett WC. Validity of a self-reported periodontal disease measure. J Public Health Dent 1996;56:205-12.
8. Robinson PG, Nadanovsky P, Sheiham A. Can questionnaires replace clinical surveys to assess dental treatment needs of adults? J Public Health Dent 1998;58: 250-3.
9. Simons D, Brailsford S, Kidd EAM, Beighton D. Relationship between oral hygiene practices and oral status of a group of dentate elderly people living in residential homes. Community Dent Oral Epidemiol 2001;29:464-70.
10. Maupomé G, MacEntee MI. Prosthodontic profiles relating to economic status, social network and social support in an elderly population living independently in Canada. J Prosthet Dent 1998;80:598-604.
11. Brennan DS, Spencer AJ. Influence of patient, visit and oral health factors on dental service provision. J Public Health Dent 2002;62:148-57.
12. Greenlick MR, Freeborn DK, Pope CR. Health Care Research in an HMO. Baltimore, MD: Johns Hopkins University Press, 1988:18.
13. Douglass CW, Berlin J, Tennstedt S. The validity of self-reported oral health status in the elderly. J Public Health Dent 1991; 51:220-2.
14. Axelsson G, Helgadottir S. Comparison of oral health data from self-administered questionnaire and clinical examination. Community Dent Oral Epidemiol 1995;23:365-8.
15. Gilbert GH, Duncan RP, Kulley AM. Validity of self-reported tooth counts during a telephone screening interview. J Public Health Dent 1997;57:176-80.
16. Unell L, Soderfeldt B, Halling A, Paulander J, Birkhed D. Oral disease, impairment, and illness: congruence between clinical and questionnaire findings. Acta Odontol Scand 1997;55:127-32.
17. Palmqvist S, Soderfeldt B, Arnbjerg D. Self-assessment of dental conditions: validity of a questionnaire. Community Dent Oral Epidemiol 1991;19:249-51.
18. Gilbert GH, Chavers LS, Shelton BJ. Comparison of two methods of estimating 48-month tooth loss incidence. J Public Health Dent 2002;62:163-9.
19. Glavind L, Attström R. Periodontal self-examination. A motivational tool in periodontics. J Clin Periodontol 1979;6:238-51.
20. Gilbert AD, Nuttall NM. Self-reporting of periodontal health status. Br Dent J 1999;186:241-4.
21. Stewart AL, Ware J. Measuring functioning and well-being: the medical outcomes study approach. Durham and London: Duke University Press; 1992.
22. Drake CW, Beck JD, Strauss RP. The accuracy of oral self-perceptions in a dentate older population. Spec Care Dentist 1990;10:16-20.
23. Gilbert GH, Heft MW, Duncan RP, Ringelberg ML. Perceived need for dental care in dentate older adults. Int Dent J 1994;44:145:53.
24. Alvesalo I, Uusi-Heikkila Y. Use of services, care-seeking behavior and satisfaction among university dental clinic patients in Finland. Community Dent Oral Epidemiol 1984;12:297-302.
25. Van Waas MA, Meeuwissen JH, Kayser AF, Kalk W, Vant Hof MA. Relationship between wearing a removable partial denture and satisfaction in the elderly. Community Dent Oral Epidemiol 1994; 22:315-18.
26. Barenthin I. Dental health status and dental satisfaction. Int J Epidemiol 1977; 6:73-8.
27. Heløe LA. Comparison of dental health data obtained from questionnaires, interviews and clinical examination. Scand J Dent Res 1972;80:495-9.
28. Marcenes WS, Sheiham A. The relationship between work stress and oral health status. Soc Sci Med 1992;35:1511-20.
29. Croucher R, Marcenes WS, Torres MC, Hughes F, Sheiham A. The relationship between life-events and periodontitis. A case-control study. J Clin Periodontol 1997;24:39-43.
30. Gooch BF, Dolan TA, Bourque LB. Correlates of self-reported dental health status upon enrollment in the Rand Health Insurance Experiment. J Dent Educ 1989; 53:629-37.