

Utilization of dental services in relation to socioeconomic and health factors in the middle-aged and elderly Swedish population

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The aims of this study were to describe the change in reported time since the latest visit to a dentist between the years 1980/81 and 1988/89 and the reported use of dental services in relation to age, dental state, and socioeconomic and health characteristics in a sample of the Swedish population in 1988/89. The studies are based on interviews by Statistics Sweden about the living conditions. In the investigations in 1980/81, 14,964 inhabitants between 16 and 84 years of age participated, and in 1988/89, 13,309 inhabitants. In all age groups there was a significantly higher frequency of reported visits to a dentist last year in 1988/89 than in 1980/81. In the age group 50–64 years old this figure increased from 54% to 75%, and in the age group 65–84 years old it increased from 26% to 39%. In the investigation in 1988/89 about 75% of the dentulous women in all age groups up to 75 years reported visiting a dentist last year. The relative risk for not visiting a dentist last year, adjusted for age, gender, and dental state, was higher in dentulous subjects with low income and education, not married, not native-born, living in rural areas, smoking, and low social and physical activity. The results of the logistic regression analysis showed that, among the elderly, functional ability and general health factors have lower significance for time since last visit to a dentist than socioeconomic, social support, and life-style factors. □ *Dental health; elderly; epidemiology; general health; socioeconomics*

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The prevalence of edentulousness and number of remaining teeth per capita are commonly used as main indicators of dental health status in national surveys. There is a continuous improvement in dental health status in the industrialized countries of Western Europe and the USA (1–7). The decrease in edentulousness over time is most marked in the Scandinavian countries, particularly in Norway and Sweden, and in the USA. National surveys performed in Sweden show that the proportion of dentulous inhabitants in the age group 45–64 years increased from 77% in 1975 to 92% in 1988/89 and is predicted to reach 96% in the year 2000. The corresponding figures for the age group 65–74 years are 48%, 71%, and 85%, respectively (5). Similar trends have been reported from several local community-based population studies in Scandinavia and the USA (1, 4, 8–10). Cohort comparisons in these studies indicate an increasing number of teeth and a reduction of removable dentures among middle-aged and elderly dentulous persons. These positive trends imply a substantial increase of dentulous subjects, who will need dental services (5).

It is well documented in epidemiologic studies that the demand for dental care is low among edentulous people independent of age (11, 12). The positive changes in dental health mean that the dental health services will have the responsibility for an increasing number of patients with an increasing number of teeth (13, 14). The ongoing change in the dental care panorama in the population is reflected

in an increasing amount of preventive and restorative modalities registered in the dental insurance statistics of the middle-aged and elderly (15–18). Knowledge of the changes in dental health over time is important, as prevention, need, and demand for dental care by dentulous individuals differs from that of the edentulous (1–5).

During the last few decades there have also been demographic, social, and health changes in Sweden (19). In the population studies of elderly people in Göteborg, for example, comparisons of four 70-year-old birth cohorts during the period 1972–92 indicate an increase in height and weight, improvement of cognitive functions and of living conditions, and an increasing diversity of food items. The results of these studies also showed that the prevalence of edentulousness decreased from 52% in 1972 to 17% in 1992 (20).

In Sweden the life expectancy after 65 years has increased markedly and is predicted to be 17 years for men and 20 years for women in the year 2000, which means a substantial increase in the number of people more than 80 years of age (19). The same trend can be expected in other developed countries. The improved general health, at least among the young elderly, and increased survival rate may be due to better living conditions, prevention, and health care. Today many functional impairments can be compensated (for example, bypass operation, cataract operation, hip joint prosthesis, and medications). However, in the age groups above 80 years uncompensated functional impair-

Table 1. Number of participants and participation rates (percentage of sample) in two investigations of living conditions performed in 1980/81 and 1988/89

Age (years)	Time of investigation	
	1980/81	1988/89
16–74	12,695 (86)	11,411 (80)
75–84	2,269 (88)	1,312 (80)
85–	–	586 (77)
Total	14,964 (86)	13,309 (80)

ments increase. The prevalence of dementia increases from a low percentage at the age of 70 years to about 25% at 85 years of age among elderly Swedes (21).

In view of the demographic, social, and health changes and the recovery of dental health, it is urgent to study what these trends imply with regard to the need and demand for dental care and for the utilization of dental services.

The aims of this study were therefore to describe i) the change in reported time since the latest visit to a dentist between the years 1980/81 and 1988/89 and ii) the reported non-use of dental services in relation to age and dental state and to socioeconomic and health characteristics in a nationwide sample of the middle-aged and elderly populations in Sweden.

Materials and methods

In Sweden the living conditions of the population have been investigated every year since 1974 by Statistics Sweden. These investigations are based on interviews about welfare components, such as health, occupation, education, housing conditions, and social network and support. The interviews are performed by trained persons from Statistics Sweden. The sampling and performance of the investigations have been presented previously (22). The sample size and participation in the present study are shown in Table 1.

The investigations in 1975, 1977, 1980/81, and 1988/89 contained odontologic questions about dental status, utilization of dental services, and chewing ability. The

sampling was performed systematically from the register of the entire Swedish population in the age group 16–74 years in 1975 and 1977 and 16–84 years in 1980/81 and in all age groups above 16 years in 1988/89. The present study has been restricted to data from the 1980/81 and 1988/89 investigations, since the age group above 75 years have been included in only these two investigations.

Information about dental status was based on the following question: 'Do you have only your own natural teeth or do you have removable dentures?' The answers were classified in accordance with one of the following alternatives: 'only own teeth' (dentulous), 'own teeth and removable dentures' (dentulous with dentures), 'edentulous with removable dentures', and 'edentulous without removable dentures'. Utilization of dental services was based on questions about the time of the latest visit to a dentist and on regularity of visits to a dentist. Questions about the regularity of visits were not asked in the age groups more than 75 years old.

Variation in the utilization of dental services was related to the following different population characteristics: i) demographic factors such as age, gender, native-born, urbanization; ii) socioeconomic factors such as education, income, occupation; iii) social support factors such as marital status, living alone, social support index (based on frequency of contacts with relatives, friends, neighbors, and so forth); iv) life-style factors such as tobacco-smoking; v) low physical activity (practically no activity or low activity now and then); and vi) health factors and physical ability such as self-assessed health, disease/handicap (long-standing disease, handicap, or other weakness), and ADL function. Further details of the classification used have been described in a previous report (23).

Analysis of data

Adjusted relative risk of reported time since the latest visit to a dentist was calculated for potential predictive factors, using age, gender, and dental status as background factors. Significance levels have been calculated with the Mantel-Haenszel test for cohort studies and test-based confidence intervals (24).

Owing to the large number of potential predictors, a two-stage strategy was used for selection of variables for the logistic model used to explain the variation in time of

Table 2. Number (*n*) and frequency distribution (%) of subjects on the basis of reported time since last visit to a dentist in the investigations in 1980/81 and 1988/89

Age (years)	Time of last visit to a dentist					
	Less than 1 year		1–5 years ago		>5 years ago	
	1980/81, <i>n</i> (%)	1988/89, <i>n</i> (%)	1980/81, <i>n</i> (%)	1988/89, <i>n</i> (%)	1980/81, <i>n</i> (%)	1988/89, <i>n</i> (%)
25–44	3319 (67)	3260 (75)	1437 (29)	1000 (23)	198 (4)	87 (2)
45–64	2213 (59)	2507 (75)	975 (26)	602 (18)	563 (15)	234 (7)
65–74	624 (36)	992 (59)	468 (27)	337 (20)	642 (37)	353 (21)
75–84	558 (25)	503 (39)	446 (20)	258 (20)	1227 (55)	529 (41)
85–	–	125 (25)	–	95 (19)	–	281 (56)

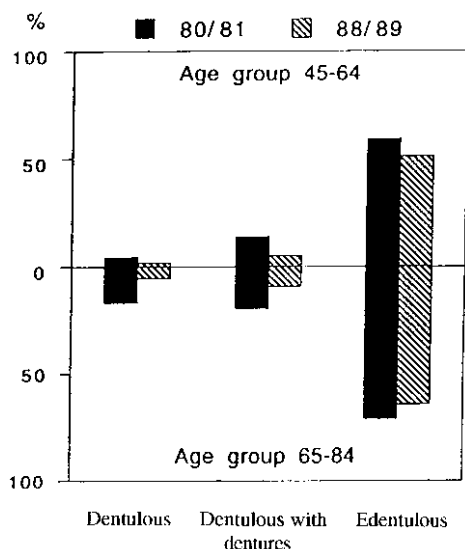


Fig. 1. Reported no visit to a dentist within the last 5 years in relation to dental state in age groups 45-64 and 65-84 years in the investigations in 1980/81 and 1988/89.

the latest visit to the dentist. In the first step the variables were divided into two groups: socioeconomic variables and health and physical ability. Then, each group of variables was put into a logistic model with stepwise selection of

variables. For all models, age, gender, and dental state were forced into the model as the first three variables, to function as confounders for the other variables. In the second step the significant (at the 5% level) variables in each of the two models were put into one final model, with age, gender, and dental state used in the same manner as earlier.

Results

The relation between age and utilization of dental services in 1980/81 and 1988/89 is shown in Table 2. In the age group 45-64 years 59% of the subjects in 1980/81 and 75% in 1988/89 reported that they had visited a dentist during the past year. The corresponding figures for the age group 65-74 were 36% and 59%, and for age groups 75-84 years 25% and 39%, respectively. The proportion of subjects who reported no visit to a dentist within the last 5 years in 1980/81 increased from 15% in the age group 45-64 years to 55% in age group 75-84 years and in 1988/89 from 7% to 41%. In all age groups there was a significant difference in time since last visit to a dentist between the two investigations.

The prevalence of subjects with non-utilization of dental services in the last 5 years in different dental state groups is illustrated for both investigations in Fig. 1. In 1988/89 only a low percentage of the dentulous subjects in the age

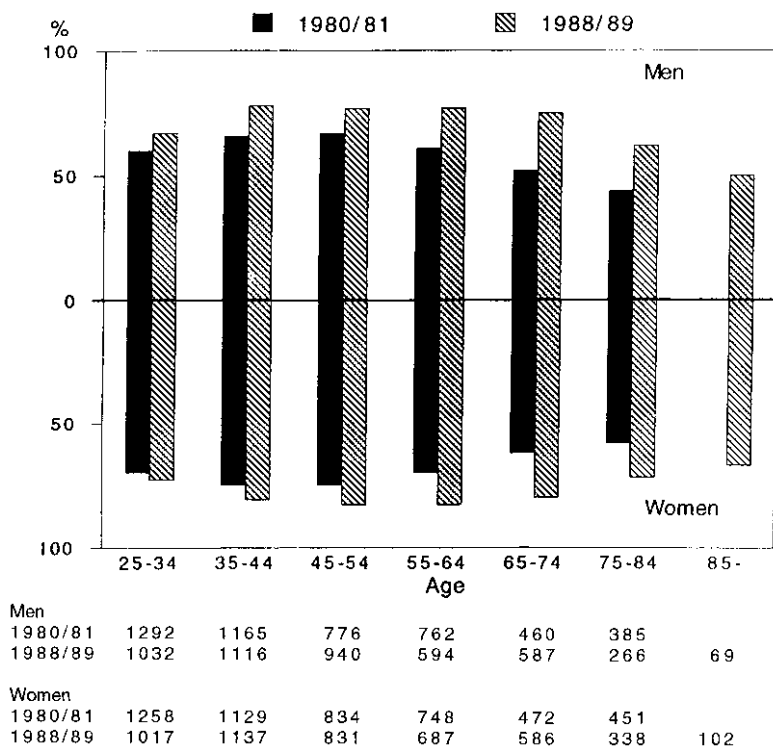


Fig. 2. Reported visit to a dentist last year in relation to age and gender in the investigations in 1980/81 and 1988/89 (edentulous subjects excluded). The number of subjects distributed with regard to investigation year, gender, and age is given below the figure.

group 45–64 years and 6%–9% in the age group 65–84 years reported no utilization. Among the edentulous subjects in the age group 65–84 years the corresponding figure was about 70% in both investigations. Because the demand for dental care is low, and regular utilization of dental services is rare among edentulous subjects, further analysis of the utilization of dental care will focus on dentulous subjects.

Among the dentulous subjects a significantly higher proportion of all age groups reported visits to a dentist during the past year in 1988/89 compared with 1980/81 (Fig. 2). The differences were most marked for the elderly. In all age groups the women reported a higher frequency than men in both investigations ($P < 0.01$), with the exception of the age group 35–44 years in 1988/89. In the 1988/89 investigation the frequency of reported visits to a dentist the past year was high, 75%–80%, in all dentulous age groups from 35 to 75 years. In the age group 85 years and older the figures were 50% for men and 67% for women.

In the investigation in 1988/89 an analysis was performed to study the relationship between the answers to the question 'last time for visit to a dentist' and different health and socioeconomic characteristics. The results indicate that socioeconomic factors contribute to variation in the utilization of dental services, independent of age, gender, and dental state (Table 3). Among dentulous subjects with elementary school education the factor 'no

visit within the last 5 years' was two to three times commoner than for other dentulous subjects. Other characteristics, such as not married, living in rural areas, low physical and social activity, and tobacco-smoking, were commoner in the elderly subjects who had not visited a dentist the past year than among the other elderly. Impaired self-assessed health and inability to take a quick walk were the only health characteristics that were significantly associated with low utilization. In the middle-aged group, reported lower utilization was significantly more prevalent among individuals who were not native-born, not married, living alone, and had low physical and social activity. Low utilization was also commoner in individuals in this age group with regular need for assistance and service, impaired working capacity and ADL function, and prevalence of disease and impaired self-assessed health.

The multivariate analysis showed that age, gender, and denture-wearing, which were forced into the model, were highly significant factors for the utilization by the elderly. Besides these factors, factors such as education, income, and occupation were of great importance for variation in the time since the last visit to a dentist. In the elderly (≥ 65 years) the factors not married, tobacco-smoking, low physical activity, and living in rural areas were also significant risk indicators for lower utilization among the dentulous subjects (Table 4). However, functional and health factors seemed to have low significance. In the age

Table 3. Relative risk of reported no visit to a dentist last year and no visit within the last 5 years for population groups with different characteristics. Relative risk (RR) with significance level and 95% confidence interval (CI) are given, and with adjustment for age, gender, and dental state. The prevalence of each characteristic is given as a percentage of the sample (Prev). Edentulous subjects are excluded

Population characteristics	45–64 years old					65 years old and older				
	Prev	No visit last year		No visit last 5 years		Prev	No visit last year		No visit last 5 years	
		RR	CI	RR	CI		RR	CI	RR	CI
Male	(50)	1.33***	1.15–1.54	2.86***	1.78–4.58	(47)	1.36***	1.18–1.56	2.05***	1.52–2.76
Denture-wearing	(19)	1.58***	1.34–1.86	2.42***	1.59–3.73	(43)	1.73***	1.50–2.00	1.33*	1.00–1.77
Not native-born	(10)	1.32**	1.07–1.61	2.01*	1.17–3.47	(4)	1.16	0.83–1.63	1.30NS	0.67–2.56
Living in rural area	(36)	1.10	0.95–1.27	1.22	0.78–1.92	(33)	1.43***	1.24–1.65	1.56**	1.16–2.08
Income < median	(47)	1.19*	1.03–1.37	1.30	0.82–2.05	(41)	1.36***	1.17–1.57	2.31***	1.71–3.14
Blue-collar work	(45)	1.30***	1.12–1.50	1.97**	1.24–3.12	(48)	1.84***	1.57–2.16	2.82***	1.99–3.98
Elementary school only	(33)	1.32***	1.14–1.54	2.44***	1.56–3.83	(52)	1.76***	1.52–2.05	2.83***	2.06–3.91
Not married	(27)	1.30***	1.11–1.50	2.02**	1.31–3.11	(44)	1.22*	1.04–1.42	1.64**	1.20–2.26
Living alone	(15)	1.33**	1.11–1.60	1.72*	1.04–2.87	(40)	1.15	0.98–1.34	1.33	0.98–1.81
Low social activity (<5)	(20)	1.21*	1.02–1.43	1.78*	1.14–2.82	(34)	1.20*	1.03–1.39	1.06	0.78–1.45
Low physical activity (<3)	(52)	1.26**	1.09–1.46	1.81*	1.14–2.88	(61)	1.35***	1.15–1.59	1.93***	1.32–2.82
Tobacco-smoking	(27)	1.13	0.96–1.22	1.53	0.97–2.41	(13)	1.31**	1.07–1.54	1.32	0.87–1.99
Regular home help services	(1)	2.82***	1.69–4.70	3.85*	1.06–13.9	(8)	1.32*	1.06–1.65	1.46	0.98–2.18
Regular need for assistance	(2)	1.91***	1.34–2.71	4.31***	2.14–8.70	(14)	1.23*	1.02–1.48	1.25	0.88–1.76
Walking aids outdoors	(2)	1.52	0.95–2.26	1.12	0.28–4.41	(14)	1.01	0.82–1.24	0.95	0.63–1.41
Need of assistance outdoors	(1)	1.74	0.85–3.54	4.76*	1.31–17.3	(6)	1.34*	1.03–1.73	1.38	0.86–2.21
Inability to take a quick walk	(4)	1.30	0.93–1.81	2.02	0.95–4.33	(20)	1.25**	1.06–1.89	1.58**	1.13–2.20
Impaired working capacity	(13)	1.35**	1.12–1.64	2.01**	1.25–3.23	(21)	1.02	0.87–1.21	1.12	0.79–1.54
Impaired ADL functions	(8)	1.25	0.97–1.61	2.75***	1.58–4.77	(32)	1.05	0.88–1.25	1.30	0.93–1.84
Handicap/disease	(44)	1.15	0.99–1.33	1.81**	1.16–2.83	(65)	1.09	0.93–1.28	1.26	0.90–1.77
Moderate/severe disease symptoms	(38)	1.23**	1.07–1.43	2.16***	1.39–3.35	(55)	1.01	0.87–1.17	1.13	0.84–1.53
Impaired self-assessed health	(27)	1.39***	1.20–1.62	2.16***	1.40–3.33	(42)	1.08	0.94–1.25	1.57**	1.16–2.11

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table 4. Significant factors for reported no visit to a dentist last year and no visit within the last 5 years obtained by stepwise logistic regression analysis. Odds ratio (OR) with significance level and 95% confidence interval (CI) are given. Edentulous subjects are excluded

Independent variables	45–64 years old (<i>n</i> = 3040)				≥65– years old (<i>n</i> = 1778)			
	No visit last year (<i>n</i> = 579)		No visit last 5 years (<i>n</i> = 77)		No visit last year (<i>n</i> = 459)		No visit last 5 years (<i>n</i> = 132)	
	OR	CI	OR	CI	OR	CI	OR	CI
Male	1.50***	1.24–1.81	3.08***	1.82–5.23	1.66***	1.30–2.11	2.58***	1.74–3.84
Age	0.98*	0.96–0.99			1.03***	1.01–1.05	1.07***	1.04–1.10
Denture-wearing	1.54***	1.22–1.94	1.88*	1.14–3.10	1.94***	1.54–2.43		
Not native-born	1.40*	1.05–1.86	2.01*	1.11–3.65				
Living in rural area					1.43**	1.13–1.81		
Only elementary school	1.28*	1.04–1.58	2.52***	1.56–4.03	1.57***	1.22–2.03	2.28***	1.43–3.64
Blue-collar work					1.94***	1.50–2.52	1.92**	1.21–3.07
Income < median							1.64*	1.11–2.43
Not married	1.26**	1.03–1.55					1.70**	1.15–2.52
Low physical activity					1.50**	1.13–1.44		
Low social activity			1.77*	1.07–2.92				
Tobacco-smoking					1.66**	1.20–2.30		
Impaired self-assessed health	1.37**	1.11–1.69						
Moderate or severe disease symptoms			1.93**	1.18–3.16				
Regular home help services	3.32*	1.06–10.40						
Regular need of assistance			3.34**	1.38–8.07				
Walking aids outdoors							0.43*	0.22–0.84

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

group 45–64 years old, impaired self-assessed health, moderate or severe disease symptoms, regular home help services, and regular need for assistance were significant factors (besides the factors not native-born, only elementary school, not married, and low social activity).

Discussion

In the elderly population the development of, for example, socioeconomic and health factors over time calls for a flexible planning of oral health care. Information on the utilization of dental care can be obtained either in controlled population studies with a limited sample or in a nationwide-based sample as in the present study. A large sample is needed if the data are to be representative of a whole country and to analyze complex relationships and predict the need for dental care. In the present nationwide survey rather few indicators have been used to describe dental health and utilization. This may be regarded as sufficient for reflecting the change over time with regard to utilization of dental services (6, 23).

The results from this study indicate that there has been an increase in the use of dental services between 1980/81 and 1988/89. The change is partly explained by the substantial decrease in the prevalence of edentulousness during the period (5). The present study confirms results from other investigations showing that edentulous people have low utilization of dental services (11, 12). The analyses also showed that there are significant cohort differences in every 10-year age group with regard to the

time of latest visit to a dentist among dentulous people. The proportion of dentulous individuals who had visited a dentist during the past year increased by about 20% in the age groups ≥55 years old during the period 1980–89 and reached in 1988/89 almost the same level (about 75%) as in the younger middle-aged. We have only limited information about the non-responders. However, the difference in the non-response rate between 1980/81 and 1988/89 may only to a small extent explain the marked increase of utilization during the period.

In a recent population study of 88-year-old people in Göteborg, Sweden, 72% of the dentulous population reported regular visits to a dentist (25). The corresponding value for people ≥85 years old in the present nationwide study was about 60%. The increasing utilization of dental care with higher urbanization, shown in the present study, may explain the differences in the frequency of visits to a dentist. The consistency in the results of the two studies indicates that the utilization is remarkably high also in old age. Most of the dentulous middle-aged and young elderly in Sweden today demand regular dental care and prevention. Other recent studies have also shown that the use of dental services among the elderly has increased (26–32). For example, cohort studies of elderly people in Jönköping, Sweden, in 1983 and 1993 showed that regular utilization of dental care among 80-year-old dentulous individuals increased from 60% to 90% (33).

There are marked differences between individuals in the utilization of dental care. Our cohort comparison indicates that also factors other than age, gender, and dental state explain the cohort differences in this regard. Several

reasons may be anticipated, such as socioeconomic and health situations. Furthermore, the access to and costs of dental care may be of importance.

The reason for doing a relative risk evaluation, including health factors, was that we believed that there were health and handicap barriers to utilization of dental care. The results of the bivariate analyses indicate that health factors like prevalence of disease, self-assessed health, and physical disabilities were significantly associated with the latest visit to a dentist independent of age, gender, and dental state. These associations were more marked among the middle-aged than among the elderly. However, the logistic regression analysis showed that in the middle-aged group, factors in both the socioeconomic and health fields could be related to the latest visit to a dentist, whereas among the elderly few variables with regard to health or physical disability were significant. The reason for this may be, first, that socioeconomic factors, social network and support, and life-style factors dominate as indicators for visits to a dentist and that these factors covary with health factors. Secondly, the prevalence of disease and functional impairments is relatively high among elderly people. Furthermore, the questions about health and functional disabilities may not have a sufficient discriminating effect. There is little information about the non-responders. In the groups more than 45 years old the non-responders do not differ from the responders with regard to age and gender. However, the response was higher in the married subjects than in the unmarried. It is also possible that the non-responders had more severe diseases and were more mentally handicapped than the responders, factors that may affect the results, especially in the elderly (25). Studies performed in old Americans (34) confirm these results, whereas others have observed associations between utilization of dental care and health factors (35–37).

The pattern of predicting utilization of dental care among the dentulous elderly in the present investigation in 1988/89 is similar to the prediction of edentulousness reported in the investigations of living conditions in 1980/81 and 1988/89 (5, 23). These results imply that demographic, socioeconomic, social network, and life-style factors have been of great importance for utilization of dental care not only cross-sectionally but also retrospectively, especially among the elderly. This also indicates that economic factors and health behavior still seem to be dominant barriers to regular utilization of dental care among dentulous elderly, an assumption that is in line with observations in several other studies (16, 25, 26, 29, 35, 37–39).

The ongoing increase in the number of dentulous elderly with increasing demand for dental care will have a great impact on the planning of dental health services among the elderly. Since adults today are used to visiting their dentist, they may expect the dental health services to offer them care also in old age, when diseases and uncompensated functional impairments become common. However, the high utilization of dental care in Sweden is

probably to some extent dependent on allowances from the public dental care insurance. Although there are conflicting reports that cost is a real barrier for using dental services, several studies have shown that cost–benefit programs and dental insurance are contributing factors for regular use of dental care. The relation between socioeconomic factors and utilization rate indicates that the demand for care may decrease with decreasing level of the allowances.

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