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## ABSTRACT

A population's utilization of dental services is an important parameter in oral health care planning, which has rarely been studied in China. The objectives of this report were to describe the dental service utilization pattern of middle-aged and elderly Chinese and to analyze the influence of selected variables on the use of dental services. A Guangdong Province population of 1573 35- to 44-year-olds and 1515 65- to 74-year-olds recruited from urban and rural communities was interviewed in their local dialect. It was found that 23% of the middle-aged and 24% of the elderly subjects had visited a dentist within the preceding year. The two most commonly cited reasons for not having seen a dentist for at least 3 years were: no perceived need, and no serious dental problems. Among subjects who had visited a dentist within 3 years, the 3 most commonly received treatments were: fillings, extractions, and dental prostheses. Furthermore, a logistic regression analysis showed that women, subjects who lived in urban areas, were better educated, were wealthier, and had better oral health knowledge were more likely to be a recent dental service user. In conclusion, dental service utilization among the adult Southern Chinese was found to be low, problem-driven, and influenced by some socio-economic factors.

**KEY WORDS:** adult, use of dental care, oral health survey, Chinese.

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# Utilization of Dental Services in Southern China

## INTRODUCTION

It is well-established that early diagnosis and appropriate treatment, including preventive and curative measures, can prevent dental diseases from reaching a stage where pain or other symptoms would force a person to seek professional dental care (WHO, 1984; Glavind and Nyvad, 1986), and that adopting a habit of visiting a dentist regularly is one of the common messages in oral health education (Ashley, 1989). There have been many studies on people's dental service utilization behaviors, but these were mainly conducted in the highly industrialized countries (Petersen and Holst, 1995). In fact, there are very few published oral epidemiological studies on adults in Mainland China, and none of them has reported specifically on the use of dental services. Around half of the adult urban residents in Hunan Province (Zhu, 1993) and around 90% of the adults in Hubei Province (Petersen *et al.*, 1997) stated that their main reason for visiting a dentist was due to a dental problem. Another study in Southern China reported that only 15% of the urban residents and 5% of the rural residents had visited a dentist when they last had dental problems (Sun, 1992). Thus, one can speculate that the dental service utilization rate among Chinese adults is low because of the above-mentioned dental visit behavior, a very high dentist-to-population ratio (1:100,000), and the poorly developed dental care delivery system (FDI, 1990). A survey conducted in Hong Kong, a city in Southern China adjoining Guangdong Province, found that around one-third of the Chinese adults had visited a dentist within a year, and few were regular users (Lo and Schwarz, 1994). This utilization rate was low compared with that found in most Western industrialized countries (Petersen and Holst, 1995).

The main objectives of this analysis were to describe the dental service utilization patterns of the middle-aged and the elderly Southern Chinese and the influence of various factors on the use of dental services in these two age groups.

## MATERIALS & METHODS

The sample was comprised of 1573 35- to 44-year-old and 1515 65- to 74-year-old Chinese living in different areas of Guangdong Province, Southern China. The subjects were recruited from 16 survey sites (8 urban and 8 rural) through a combination of multi-stage stratified sampling and quota sampling. First, 4 major administrative regions of the Province were chosen for the survey, mainly based on their geographic location. Then, by two-stage stratified simple random sampling, 2 urban sub-districts and 2 rural townships in each region were selected to be the survey sites. With assistance from the local government and health authority, about 100 subjects in each age group were recruited either from their work place or from their houses. Details of the sampling methods and recruitment of subjects have been described in a preceding paper (Schwarz *et al.*, 2001).

Information for this analysis was collected by a face-to-face interview conducted by means of a structured questionnaire. Because some of the subjects, especially the elderly, could communicate only in their local dialect, interviewers fluent in that dialect were recruited from staffs of the local government or hospital. Training was provided to the interviewers prior to the interviews, and

the researchers monitored their performance throughout the survey. In the interview, besides providing information on their socio-economic background, the subjects were asked when they last visited a dentist. Those respondents who had not made a dental visit within the previous 3 years were asked to give the reasons for not doing so. Respondents who had visited a dentist within 3 years were asked to give information on the treatments they had received in their last dental visit.

Four questions were asked so that the dental knowledge of the subjects could be measured. Two questions were on the causes and the prevention of tooth decay, and the other two were on gum disease. Up to 3 answers were recorded for each question. We constructed a dental knowledge score by counting the total number of acceptable answers given by the subjects, excluding those responses like "do not know" and "no answer". Thus, the dental knowledge score was in an interval scale and ranged from 0 to 12, with a higher dental knowledge score indicating better dental knowledge.

Eight statements concerning the importance of oral health, importance of retaining natural teeth, dental service utilization, and dental health beliefs were designed to explore the subjects' attitudes toward oral health. The subjects were asked to indicate whether they agreed with, disagreed with, or had no comment on each of the statements. We constructed a dental attitude score by counting the total number of statements to which the subjects, in their responses, showed a positive attitude. Again, this score was in an interval scale and ranged from 0 to 8, with a higher score indicating a more positive attitude.

### Data Analysis

According to the analytic model used in this study (Schwarz *et al.*, 2001), location of residence (urban/rural areas), gender, education level, material wealth measured by the Family Material Possession Index (FMPI), dental knowledge, dental attitudes, and dental fear were selected as possible factors affecting the subjects' use of dental services.

The study subjects were categorized into two groups according to the time lapsed since their last dental visit, within 3 years and more than 3 years. This was used as the dependent variable in the bivariate analysis. Statistical analysis was performed by the software Statistical Package for Social Sciences (SPSS). Chi-square tests were used to detect significantly different distributions of dental service users in relation to the various independent variables. For the analysis

**Table 1.** Recency of Last Dental Visit in the Two Age Groups According to Location of Residence (%)

Time Since Last Dental Visit	35- to 44-year-olds <sup>a</sup>		65- to 74-year-olds <sup>a</sup>	
	Urban (n = 798)	Rural (n = 775)	Urban (n = 774)	Rural (n = 741)
< 12 months	28	17	30	18
1-3 years	20	17	24	18
3-5 years	9	9	12	9
> 5 years	20	16	24	33
Never visited dentist	23	41	10	22

<sup>a</sup> Significant between urban and rural residents,  $p < 0.0001$  (Chi-square test).

with mean score variables, a two-sample  $t$  test was used. The statistical significance level was set at 0.05.

For assessment of the relative importance of the independent variables in explaining the use of dental services within 3 years, a backward stepwise logistic regression analysis was performed. The significance level chosen for retention of a variable in the model was 0.05, and 95% confidence intervals of the odds ratio were calculated for all variables that were retained in the final logistic model.

### RESULTS

Table 1 shows the percentage distribution of the study subjects according to the time lapsed since their last dental visit, age group, and location of survey site. It can be seen in both age groups that less than one-third of the urban residents and less than 20% of the rural residents had visited a dentist within the preceding year. The dental service utilization patterns of the two age groups were similar, and proportionally more of the urban residents had made a recent dental visit than the rural residents ( $p < 0.001$ ).

The most commonly cited reason for not having seen a dentist for at least 3 years was no perceived need. This was more commonly cited by the urban residents (62-73%) than by the rural residents (43-55%) in both age groups ( $p < 0.001$ ). The second most commonly reported reason was that the dental problems were not perceived as serious (25-31%). Close to one-third of the rural elderly said that financial difficulty was a barrier to receiving dental care, but the percentages of the urban elderly and the middle-aged who cited financial difficulty as a barrier were significantly smaller ( $p < 0.001$ ).

Among the subjects who had visited a dentist within 3 years, the 3 most common treatments which they received in their last dental visit were fillings, extractions, and dental prostheses (Table 2). It was further found that proportionally more of the urban residents had received fillings, while more of the rural residents had received extractions and fixed dental prostheses ( $p < 0.05$ ). Furthermore, a rather low percentage of the subjects received scaling in their last dental visit—less than 20% in the middle-aged and only a few percent in the elderly.

**Table 2.** Treatments Received in the Last Dental Visit among Those Who had Visited a Dentist within the Past 3 Years (multiple response analysis; percentages total more than 100)

Treatment Received	35- to 44-year-olds		65- to 74-year-olds	
	Urban (n = 385)	Rural (n = 265)	Urban (n = 415)	Rural (n = 268)
Examination <sup>a</sup>	23	14	18	5
Scaling <sup>b</sup>	17	11	3	1
Filling <sup>b</sup>	53	25	18	13
Extraction <sup>a</sup>	21	33	30	38
Fixed prosthesis <sup>a</sup>	9	19	23	34
Dentures	0	0	14	10
Others <sup>b</sup>	12	20	16	18

<sup>a</sup> Significant between urban and rural residents in both age groups,  $p < 0.05$  (Chi-square test).

<sup>b</sup> Significant between urban and rural residents in 35- to 44-year-olds only,  $p < 0.05$  (Chi-square test).

In the 35- to 44-year-old subjects, having made a dental visit within 3 years was more commonly found among the urban residents, women, those who were better educated or wealthier, and those who had better oral health knowledge or more positive dental attitudes (Table 3). It was interesting to find that having had a more recent visit to a dentist was related to being afraid of dentists. A similar pattern was also found in the 65- to 74-year-olds, except that gender and dental fear did not have a statistically significant relationship with dental service utilization. Results of the logistic regression analysis (Tables 4 and 5) were similar to those found in the bivariate analysis. In the 35- to 44-year-olds, 4 of the 7 independent variables remained in the final logistic regression model. These were location of residence, gender, fear of dentists, and dental attitudes. The variables retained in the final logistic regression model in the 65- to 74-year-olds were slightly different from those in the younger age group. Five variables were retained: location of residence, gender, educational attainment, material wealth, and dental knowledge.

**DISCUSSION**

Findings from this study confirmed the speculation that dental service utilization among adults in Mainland China was very low. Compared with the highly industrialized countries, where about 60 to 80% of the adults would have visited a dentist within a year (Miller *et al.*, 1987; Todd and Lader, 1991; Petersen and Holst, 1995), the utilization rate of the study subjects was only about one-third. Even when compared with the situation in Hong Kong, where most of the people are Southern Chinese (Lo and Schwarz, 1994), the utilization rate of the middle-aged Guangdong subjects was lower, while that of the elderly subjects was similar. The dental service utilization rate of the Guangdong adults found in this study is very close to that of adults in Central China (Petersen *et al.*, 1997; Petersen and Esheng, 1998). In these studies, it was found that the dental utilization rate of the younger adults was rather low, and that of the elderly was higher.

Similar to the findings of other Chinese studies (Zhu, 1993; Peng *et al.*, 1997; Petersen *et al.*, 1997), it was found that the use of dental services among the Southern Chinese was very much symptom-driven, and preventive dental visits were rare. This pattern was also found among the Chinese living in Hong Kong (Lo and Schwarz, 1994) and those in the United Kingdom (Kwan and Williams, 1999).

Several measures of dental services utilization have been used in different studies (Gift, 1984). The main measure used in the bivariate and multivariate analyses in this study was a dichotomous variable, whether the subject had made a dental visit within 3 years. This measure was chosen because the low rate of utilization of dental services among the study subjects rendered the use of more sophisticated variables—*e.g.*, the number of dental visits within a year and the regularity of

**Table 3.** Use of Dental Services in Adult Chinese According to Selected Demographic and Socio-Behavioral Factors

Factor	Time Since Last Dental Visit					
	35- to 44-year-olds			65- to 74-year-olds		
	n	< 3 yrs %	> 3 yrs %	n	< 3 yrs %	> 3 yrs %
Location <sup>a</sup>						
Urban	798	48	52	774	54	46
Rural	775	34	66	741	36	64
Gender <sup>a</sup>						
Male	763	37	63	579	45	55
Female	810	46	54	756	46	54
Education <sup>a</sup>						
Up to primary	461	35	65	722	38	62
Lower secondary	468	42	58	540	46	54
Upper secondary and above	644	46	54	253	62	38
Afraid of dentists <sup>a</sup>						
Yes	500	52	48	377	46	54
No	1073	36	64	1138	45	55
		$\bar{x}$	$\bar{x}$		$\bar{x}$	$\bar{x}$
Mean FMPI <sup>b</sup>	1573	24.4	19.6	1515	17.6	11.8
Mean dental attitude score <sup>b</sup>	1573	6.4	6.1	1515	5.9	5.7
Mean dental knowledge score <sup>b</sup>	1573	3.8	3.3	1515	2.4	1.8

<sup>a</sup> Significant between groups with  $p < 0.001$  (Chi-square test).

<sup>b</sup> Significant between groups with  $p < 0.001$  (*t* test).

**Table 4.** Results of a Logistic Regression Analysis on the Use of Dental Services within 3 Years among the 35- to 44-year-olds

Factor	Beta (SE)	Odds Ratio (95% CI)	p-value
Location			
Rural <sup>a</sup>			< 0.001
Urban	0.46 (0.11)	1.6 (1.3–2.0)	
Gender			
Male <sup>a</sup>			0.011
Female	0.28 (0.11)	1.3 (1.1–1.6)	
Afraid of dentists			
No <sup>a</sup>			< 0.001
Yes	0.46 (0.12)	1.6 (1.3–2.0)	
Dental attitude	0.13 (0.04)	1.1 (1.1–1.2)	0.020
Constant	-1.72 (0.28)		< 0.001

$\chi^2 = 71$ ;  $df = 4$ ;  $p < 0.001$ .

<sup>a</sup> Reference category.

dental visits—less appropriate. The relationships between dental service utilization and the main demographic variables, *e.g.*, gender, location of residence, education, and wealth, found in this study were similar to the findings of most dental utilization studies, including those from China (Petersen *et al.*, 1997), Hong Kong (Schwarz and Lo, 1994), and other parts of the world (Gift, 1984). However, the relationship between dental fear and utilization as found in this study is worth some

**Table 5.** Results of a Logistic Regression Analysis on the Use of Dental Services within 3 Years among the 65- to 74-year-olds

Factor	Beta (SE)	Odds Ratio (95% CI)	p-value
Location			
Rural <sup>a</sup>			0.041
Urban	0.27 (0.13)	1.3 (1.0–1.7)	
Gender			
Male <sup>a</sup>			< 0.001
Female	0.49 (0.14)	1.6 (1.2–2.1)	
Education			
No formal schooling <sup>a</sup>			< 0.001
Primary	0.52 (0.15)	1.7 (1.3–2.2)	
Secondary and above	0.84 (0.19)	2.3 (1.9–3.5)	
Family Material			
Possession Index	0.02 (0.01)	1.02 (1.01–1.03)	0.002
Dental knowledge score	0.06 (0.03)	1.06 (1.00–1.11)	0.026
Constant	-1.25 (0.15)		< 0.001

$\chi^2 = 102$ ;  $df = 6$ ;  $p < 0.001$ .

<sup>a</sup> Reference category.

discussion. Being afraid of dentists is usually presented as a barrier to dental service use (Feske *et al.*, 1990; Locker *et al.*, 1991), and one would expect the regular or more recent dental service users not to be afraid of dentists. This was not the case in this study, and the odds ratio of 1.6 in the 35- to 44-year-old subjects suggested that people who were afraid of dentists would more likely be recent dental service users. This is probably because the subjects in this study mainly visited a dentist when they had serious dental problems, and one of the most common treatments received was extraction. Thus, their dental visits were perhaps very unpleasant, which would make the recent users afraid of dentists. This proposition was supported by the further analysis of the survey data which showed that the recent users were also more likely to have experienced pain, to perceive their oral condition as poor, and to have perceived need for more treatment. Similar findings were also obtained in a recent survey of adults in Central China (Petersen *et al.*, 1997). This kind of attitude and behavior hinders the development of preventive dental visits. Oral health education alone most probably cannot break this vicious cycle in the Southern Chinese. Changes in the organization of dental care services (*e.g.*, improving accessibility by setting up more dental clinics or outreach dental services), provision of better care (*e.g.*, better pain control during treatment and the use of more conservative approaches), and better dentist-patient interactions (*e.g.*, paying more attention to patients' feelings and using a more patient-friendly approach) will probably be required to change this situation.

Due to a severe lack of trained dental personnel in Southern China and the low utilization of dental services, it would be very ineffective and inefficient to implement dental-clinic-based oral health education and promotion activities. The use of mass media or collaborations with other disciplines in primary health care may be better ways to disseminate oral health messages under the current situation in Southern China. The oral health policy should place more emphasis on community-based preventive programs than on clinic-based curative services.

In conclusion, dental service utilization among the adult Southern Chinese was low, problem-driven, and influenced by some socio-economic factors. Improvement in the dental service utilization rate in this population will depend on the general social and economic development as well as on the success of improvements in the delivery of dental care services and community-based oral health promotion activities.

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