Utilization of dental care service and associated factors among pre-school children in northwest China over the past decade

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Research Article

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Abstract

Object:

The information comparing factors affecting the use of dental care services in pre-school children over the past decade in northwest China is rare. The purpose of this study was to analyze the factors influencing the utilization of oral health care among 5 years old children.

Method

The studies were conducted in 2005 and 2015 and included 5-year –old children who underwent dental examination by trained dentists and the caregivers of the children were requested to answer the questionnaire. A multi-level stratified sampling method was used. Chi-square tests were used to analyze the utilization of dental care and other socio-economic variables. Logistic regression models were employed to explore the primary factors influencing the use of dental care among pre-school children.

Results

In 2005, a total of 399 and in 2015, 492 child-caregiver pairs were included. The majority of the caregivers in both survies were females, comprising 68.2% and 74.8% of the caregivers in 2005 and 2015, respectively. 75.2% and 87.0% of the respondents had an education level of lesser than 9 years. The prevalence of caries was higher in 2015 (63.2%) than in 2005 (53.4%). In 2005 and 2015, the utilization of dental care services was 20.8% and 20.0%, respectively. A statistically significant association was observed between caries and dental care use in 5-year-olds over the past decade. After adjusting for confounders, dental service usage among children in urban areas was 1.62 times higher than that of rural areas in 2005 (95% CI: 0.069–0.571), and the self-assessment of caregivers regarding their child's oral health significantly improved oral health use in 2015.

Conclusion

The utilization of dental care services over the past decade is insufficient among pre-school children in northwest China. Availing of these services accurately and appropriately can reduce the prevalence of dental caries. Hence, with the decreasing gap about economic and health service resources, policymakers should place greater emphasis on raising awareness among caregivers about the oral health status of their children.

Introduction

China has launched various programs to promote dental health among children ranging from "happy mouth, happy family" organized by the national health commission to comprehensive intervention

programs for deciduous caries in pre-school children[1, 2]. While pre-school children oral health status is still a serious global public health problems. For instance, Meng's study shows that among children oral pathologies continue to be a significant health issue [3]. Studies have shown that a large proportion of 5-year-old children experience oral mucosal lesions[4]. Children living in rural areas suffer from higher rates of caries and oral health diseases[5]. The prevalence of caries among 5 years old children has increased from 66.0% in 2005 to 71.9% in 2015 in China[6].

Oral health services comprise an integral part of public health services. Understanding the factors influencing utilization of children's oral health services can assist in rationally allocating the resources and hence dramatically improving the social and economic benefits. Children with severe dental caries predominantly seek dental care services[7], while a child is not the decision-maker whether to consult a dentist or not[8]. Studies have revealed that parents or caregivers play an important role in children's oral health. Their socio-economic status, knowledge, and attitude toward oral health are significantly associated with children's oral health status[9–11]. For a low-income family, high quality of primary health care attributes in dental services use[12, 13].The study by Ou et al. has reported that the number of parents actively seeking dental care for their children is low, and the primary purpose for consultation was treatment rather than prevention[14]. The study conducted by Meng et al. also demonstrated that the rate of seeking dental care was low and that of self-medication was relatively high[3].

Lack of understanding of caregivers about their child's oral health status contributes to the lower utilization of dental care services[15–17]. On the contrary, better family oral health practices, higher educational status, and better knowledge are beneficial for children and contribute to access to improved dental care[18]. Moreover, accessibility to affordable oral health care is also an important factor in determining its utilization [11], and expensive dental care is a potential barrier to treatment in children[19–21].

The purpose of this study is to describe the oral health status and variation in the use of oral health services. We also explored whether the association of caregiver's perception of their child's oral health status and the dental care utilization has changed over the past decade or not in northwest China.

Methods

Data source

According to the oral health epidemiological investigation protocol recommended by WHO, we conducted two observational cross-sectional studies. The studies were conducted in 2005 and 2015 among pre-school children and their caregivers in Shaanxi province, the northwestern part of China. The sampling was done by complex probability sampling design in three steps. In the first step, we used PPS (probability proportionate to size sampling) to choose two districts and two countries. In the second step, we used the same design to collect three kindergartens. In the third step, we have chosen 5-years old children from selected schools. Dental examination was conducted on children by trained dentists, and their caregiver was asked to answer the questionnaire regarding the child's dental care status, dental care

utilization, as well as their attitude and knowledge toward the oral health of their child. The purpose of this study was to analyze the factors that influence the children's dental health care use over the past decade in northwestern China.

The survey was approved by the ethics committee of the College of Stomatology, Xi'an Jiaotong University. All subjects' rights were protected, and all data was kept confidential.

Variables and definitions

Dependent variable

The outcome variable was "How long has it been since your child visited a dentist last time?" and the options were "within six months, six to twelve months, above twelve months, and never" which was answered by their caregivers. We coded the answer dichotomously as yes and no.

Independent variables

According to Andersen's behavioral model of healthcare utilization, the independent variables included three characteristics, like predisposing factors, enabling factors, and need factors. In this study, three variables were identified as predisposing factors:(1) region, dichotomously coded as urban and rural;(2) child's gender, coded as male or female; and (3) caregiver's gender, coded as male or female. Enabling factors included education status, which was grouped into illiterate, high school, and less than or more than 9 years; family income per year which was categorized into five groups: CNY0–15000, CNY 15000–30000, CNY 30000–45000, CNY 45000, and missing. Caregiver's perceived oral health condition of their child was an important need factor. The question stated "what is your opinion about child's oral health" and the response codes included 5 levels from better to worse. The need factors also include the prevalence of utilization of child's dental care.

Analyses

The data from the questionnaire and oral examination were entered in duplicate to create the database, and the consistency of the two datasets was compared by the EpiData program. Software SPSS version 26 was employed to perform all statistical analyses. The frequencies of variables were calculated by descriptive statistical analysis. Chi-square test was used to evaluate the association between the dental care utilization and the independent variables (caregivers' gender, education levels, region, caregiver's self-perceived oral health, overall health about their child, household income, and dental caries). p-value <0.05 was considered to be statistically significant. Logistic regression analysis was used to explore the predictors of oral health service utilization independently.

Results

This study included 492 and 399 caregiver-child pairs in 2015 and 2005 respectively. In 2015, 50.2% of the respondents were from urban areas, while in 2005 47.4% of the respondents belonged to the urban

areas. The percentage of male respondents answering the questionnaire was 50.0% in 2015 and 50.1% in 2005. Self-rated general health about their child was reported as well and very well by 72.3% in 2015 and 62.7% in 2005 by the caregivers. Moreover, caregiver's perception of their child's oral health was rated as well and very well by 62.2% in 2015 and 48.9% in 2005. The prevalence of dental caries was higher in 2015 (63.2%) than in 2005 (53.4%). Demographic characteristics of subjects such as gender, education level, and dental care utilization are illustrated in Table 1 and Table 2.

Table 1
Descriptive and bivariate analyses of the independent variables related to the subjects in the study

Characteristics	Variables	2015	2005
Predisposing factors			
Region	Urban	247	189
	Rural	245	210
Child's gender*	Male	246	200
	Female	246	199
Caregiver's gender	Male	124	127
	Female	368	272
Enabling factors			
Education level*	Illiterate	34	18
	High school and below	394	282
	Above 9 years	64	99
Family income *	0–15000	60	226
	15000–30000	123	109
	30000–45000	30	17
	≥ 45000	196	10
	Missing	83	37
Need factors			
Self-rated oral health*	Very well	126	61
	Well	180	134
	Average	140	151
	Poor	37	46
	Worse	9	7
Caries *	Yes	311	213
	No	181	186
Total		492	399

Table 2
Oral health services utilization in 2015 and 2005

Variables		2015	2005
your child visited a dentist	Yes	98	83
	No	394	316
The reason to see a dentist*	Treatment	45	33
	Check-up	19	20
	Prevention	2	2
	Do not know	31	0

In single-factor analyses, caries was significantly associated with dental care utilization. Compared with 2015, predisposing factors and enabling factors were crucial for dental service use in 2005, especially the region, caregiver's gender, level of education, and family income. While in 2015, caregiver's perceived oral health about their child was statistically significant (Table 3).

Table 3
Factors associated with dental care service utilization

Variables		Yes	No
		2015/2005	2015/2005
Predisposing factors			
Region**	Urban	50/58	197/131
	Rural	48/25	197/185
Child's gender	Male	49/41	196/159
	Female	49/42	198/157
Caregiver's gender**	Male	23/18	101/109
	Female	75/65	293/207
Enabling factors			
Education level**	Illiterate	6/2	28/16
	High school and below	79/48	315/234
	Above 9 years	13/33	51/66
Family income **	0–15000	14/31	46/195
	15000–30000	20/33	103/76
	30000–45000	6/6	24/11
	≥ 45000	44/4	152/6
	Missing	14/9	69/28
Need factors			
Caries***	Yes	88/55	223/158
	No	10/28	171/158
Self-rated oral health*	Very well	8/7	118/54
	Well	21/28	159/106
	Average	42/31	98/120
	Poor	19/14	18/32
	Worse	8/3	1/4

*$p \leq 0.05$ significantly association in 2015;** $p \leq 0.05$ significantly association in 2005; *** $p \leq 0.05$ significantly association in 2015 and 2005; p-values were based on chi-square test

All independent variables were included in the logistic regression analyses was used to study the confounding factors. In 2005, dental care utilization was higher among male, urban caregivers, and among children who have caries. While in 2015, caregivers who had better perceived oral health about their child and child with caries demonstrated increased utilization of oral health service (Table 4).

Table 4
Logistic regression analysis of factors possibly associated with dental care utilization of pre-school children in 2005 and 2015

Dimensions	Characteristics	2015	2005
		AOR (95%CI)	AOR (95%CI)
Predisposing factors	Region (vs. rural)		
	Urban	0.88(0.49–1.56)	0.35(0.19–0.63)*
	Child's gender (vs. female)		
	Male	0.95(0.55–1.65)	1.02(0.58–1.79)
	Caregiver's gender (vs. female)		
	Male	1.05(0.56–1.97)	2.11(1.08–4.15)*
Enabling factors	Education level (vs. Above 9 years)		
	Illiterate	1.41(0.29–6.80)	2.75(0.51–14.82)
	High school and below	1.03(0.45–2.33)	1.28(0.63–2.59)
	Family income (ten thousand per year) (vs. ≥4.5)		
	0–1.5	1.00(0.45–2.22)	4.54(1.04–19.93)*
	1.5-.30	2.21(1.09–4.49)*	2.03(0.47–8.77)
	3.0–4.5	1.18(0.39–3.57)	1.64(0.29–9.77)
	Missing	/	/
Need factors	Self-rated oral health (vs. Worse)		
	Very well	62.03(6.07–634.20)*	2.94(0.45–19.22)
	Well	36.38(3.84–344.29)*	1.64(0.30–8.97)
	Average	11.04(1.20–101.27)*	1.80(0.33–9.90)

Dimensions	Characteristics	2015	2005
		AOR (95%CI)	AOR (95%CI)
	Poor	6.82(0.68–68.31)	1.20(0.21–7.04)
	Caries (vs. No)		
	Yes	0.21(0.10–0.43)*	-0.42(0.22–0.77)*

Discussion

In this study, we analyzed the data from two cross-sectional surveys in northwest China to show the empirical relationship between caries, caregiver's perceived oral health, and oral health service utilization over a decade. The study revealed a few novel findings. We observed that northwestern China has experienced a minor difference in the utilization of dental services among pre-school children over the past decade despite an increase in family income and the availability of more accessible dental care services. Moreover, inequalities in dental care utilization are consistent though different.

In 2005, we found that few socio-economic factors were associated with the utilization of dental care services. Urban residence and higher family income, after adjusting other confounding factors, were independently associated with dental care utilization. Moreover, the caregiver's gender was significantly associated with dental care use. Thus, these results suggest that socio-economic inequalities play a crucial role in oral health service utilization.

In 2015, there was no significant difference in the use of dental services among respondents from rural and urban areas. It can be attributed to the fact that rural oral health service resources have gradually improved and become more convenient. Moreover, caregivers are more inclined to seek dental care for their children. Though the family income per year has increased almost 3.5 times, from RMB16037 to RMB54266 over the past decade, the dental care service was still underutilization. The results indicate caregivers need to be encouraged and guided toward the utilization of children's oral preventive health care services. Health promotion activities for parents are imperative to combat the underutilization of oral health services by caregivers. This can be achieved by enhancing the oral health education system through specific strategies targeting excluded populations. This may lead to increased awareness of the child's oral status and help caregivers transform their demand into a need in the future.

The prevalence of dental care utilization among pre-school children was still low in 2015, though the deciding factors were different from those in 2005. Our finding suggests that need factors play a major role in the use of oral health care in 2015. Caregivers with better conception about their child's oral health demonstrated higher use of dental service. Studies have shown that caregivers with better knowledge and attitude about oral health are more likely to seek dental care services. In addition, the significantly

increased rate of treatment and higher probability of caries indicates the necessity for creating specific education programs.

Conclusions

We can conclude that over the past ten years, oral health service utilization among pre-school children has been limited in northwest China. However, the factors that influence the use of these services were substantially different. Policies like providing appropriate and specific oral health education about pre-school children and their oral health status even in the high-income groups will not only lower the incidence of caries but will also lead to the overall improvement of oral health service utilization.

Declarations

Ethics approval and consent to participate

Favourable ethnical opinion was obtained from College of Stomatology, Xi'an Jiaotong University which number is 918. All subjects provided written informed consent, and they all had been given the opportunity to opt-out of the trial.

Consent for publication

Not applicable.

Availability of data and materials

The datasets analysed in the current study are available from the corresponding author on reasonable request. All methods were carried out in accordance with relevant guidelines and regulations.

Competing interests

The authors declared that they have no competing interests.

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Not applicable.

Author's contributions

All authors have read and approved the manuscript. Ruizhe Huang contributed to the design of the projects and the writing of the protocol, reviewed and commented on manuscript drafts. Jiangang Tian led the qualitative element of the survey including data collection and the organization, conduct and analysis of the qualitative data. Xiaoyu Fan, Bin Zhang and Xiao Hu contributed to the design of the survey, reviewed and commented on manuscript drafts.

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