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Measuring and decomposing socioeconomic-related inequality in the use of oral health services among Chinese adults

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Abstract

Objectives: This study aimed to measure socioeconomic-related inequality and horizontal inequity in the use of oral health services and decompose this inequality among adults of different age groups in China.

Methods: In total, 10 973 adults (3669 aged 35-44 years, 3767 aged 55-64 years and 3537 aged 65-74 years) who participated in the 4th National Oral Health Survey (2015-2016) in China were included. Concentration curves and the Erreygers-corrected concentration index (EI) were employed to measure socioeconomic-related inequality in the use of oral health services. Then, inequity in this utilization was measured by the horizontal inequity index (HI). Furthermore, decomposition analyses were conducted for the three groups to explain the contributions of income level, need factors (ie self-assessed oral health and evaluated oral health status), other factors (ie sex, residential location, educational attainment level and type of basic insurance) and a residual term to overall inequality in oral health service utilization.

Results: The significant positive EI and HI values indicated that pro-rich inequality and inequity in oral health service utilization exist among Chinese adults. Income and type of basic medical insurance contributed the most to socioeconomic-related inequality in the use of oral health services among adults aged 55-64 and 65-74 years. However, the main driving factors of socioeconomic inequality among adults aged 35-44 years in dental care use included income, educational achievement, type of basic medical insurance and residential location. The need variables accounted for a very small proportion of overall socioeconomic-related inequality in oral health service use in all three groups.

Conclusions: Oral healthcare service utilization was disproportionately concentrated among better-off Chinese adults. The primary determinants of inequality in dental care use in different age groups provide information for policymakers to create more targeted policies to achieve equity in the oral healthcare system in China.

1 | INTRODUCTION

Faced with the great challenge of oral diseases globally, it is imperative for oral healthcare systems to strengthen the importance of oral health and achieve greater equity in oral health.[1] Since most oral diseases are behaviour-related and can be prevented, long-term studies have shown that people who make routine dental visits have better oral health.[2,3] The equitable distribution of health care, which includes dental care, is a principle strived for by many countries.[4] However, inequality and inequity in the utilization of oral health services are observed not only in high-income countries (HICs) but also in low- and middle-income countries (LMICs).[1,5-16] A systematic review and meta-analysis of inequality in dental care utilization based on 117 studies involving more than 7 million participants indicated that socioeconomic status, educational attainment and insurance coverage are associated with dental care use.[13] Thus, recognizing socioeconomic-related inequality and inequity in the use of oral health services and exploring the determinants of this inequality can help policymakers develop and evaluate programmes aiming to reduce inequality and inequity.[4]

In China, oral diseases have caused a great economic burden,[17,18] and the government has prioritized oral health in policies and programmes, such as the National Nutrition Program (2017-2030) and Healthy China 2030 Plan, in which equity and equality in oral health service utilization are important issues. Socioeconomic-related inequality in health service utilization in China is well documented in outpatient and inpatient care,[19-22] preventive care[23] and maternal care utilization.[24] However, evidence related to inequality and inequity in oral health service utilization is insufficient. Although some studies have found disparities in the use of oral health services among Chinese adults by socioeconomic status,[25-27] quantification and measurement of inequality and inequity are lacking.

A previous study[8] showed the existence of inequality and inequity in oral health service use among Chinese adults aged 45 years and older using the concentration index (CI). As a widely used measure assessing inequality, the CI can be decomposed to quantify the contribution of each determinant to overall inequality.[4] However, on the one hand, attention has been drawn to the limitations of the CI, especially when the outcome is a binary variable, such as health service utilization.[28,29] The Erreygers-corrected concentration index (EI)[30] seems to be a better indicator for measuring inequality in the use of health services and has been used in related research.[12,20,31] On the other hand, measuring inequity correctly and decomposing inequality require the use of an accurate measure of oral healthcare needs, which were not included in the previous study.[8] Thus, this study is the first to use the EI and the horizontal inequity index (HI) to measure inequality and inequity in oral health service utilization in China based on comprehensive national data, including clinical oral examinations.

China has witnessed the emergence of an ageing society. The proportion of Chinese people aged 60 years and older had increased to 13.3% by 2010.[32] Studies have shown that age is associated with dental care use in China.[8,17,27] Furthermore, different determinants of dental care service utilization were found in adults of different ages.[26] Accordingly, this study aims to measure socioeconomic-related inequality and horizontal inequity in oral health service utilization in China and decompose this inequality among adults in different age groups.

2 | METHODS

The data were obtained from the 4th National Oral Health Survey launched in 2015 to 2016, in which all 31 provinces, municipalities and autonomous regions in Mainland China were included for the first time. A multistage, stratified, equal proportion, random-sampling method was used in the survey, and participants were enrolled in three stages using probability-proportional-to-size (PPS) sampling. More details of the survey have been presented in previous articles.[26,33,34] After signing informed consent forms, 172 425 people (40 360 children aged 3-5 years, 118 601 adolescents aged 12-15 years, 4410 adults aged 35-44 years, 4623 adults aged 55-64 years and 4431 older adults aged 65-74 years) participated in the survey. In the present analysis, 10 973 adults (3669 aged 35-44 years, 3767 aged 55-64 years and 3537 aged 65-74 years) without any missing data of relevant variables were included, accounting for 81.5% of all the adult participants.

Information on dental care use and other sociodemographic aspects was obtained through a structured questionnaire supervised by two or three trained and certified interviewers. Oral health conditions were assessed through clinical examinations performed according to the World Health Organization (WHO)'s standardized criteria.[35] In every province, two or three trained and licenced dentists conducted the examination, and three other trained individuals acted as recorders. The mean kappa values of inter-examiner reproducibility exceeded 0.60 for periodontal examinations and 0.80 for dental caries examinations. The study protocol was approved by the Stomatological Ethics Committee of the Chinese Stomatological Association, Beijing (No. 2014-003).

The outcome variable was dental care use, which is a binary variable indicating whether an individual had visited a dentist within the past 12 months. Based on the theory of decomposition[4] and previous studies,[5,8,14,16,26] socioeconomic status, need variables and other variables served as explanatory variables. The annual household income per capita was employed to measure socioeconomic status, and its natural log was used for the

computation and decomposition of the EI. The variables corresponding to the need determinants comprised the decayed, missing and filled teeth (DMFT) index, the number of teeth and self-perceived oral health status. The other variables included sex (male/female), residential location, education attainment and type of basic medical insurance.

In accordance with the well-established literature,[4,12,20,31] this study employed concentration curves and the EI to assess socioeconomic-related inequality in the use of oral health services. The concentration curve plots the cumulative share of oral health service utilization (y-axis) against the cumulative proportion of the population ranked from the poorest to the richest (x-axis).[4] The line of equality (a 45-degree line running exactly from the bottom left-hand corner to the top right-hand corner) indicates that everyone uses the same amount of oral health services regardless of their socioeconomic status. The farther the curve lies above/below the 45-degree line, the more oral health service utilization is disproportionately distributed among the poor/better-off. To quantify inequality, the CI is defined as twice the area between the concentration curve and the line of equality.[4] The CI ranges from −1 to +1 and assumes a positive value when the curve lies below the 45-degree line, which indicates a disproportionate concentration of care use among wealthier individuals, whereas a negative value suggests that inequality favours the poor. The greater the absolute value of the CI is, the higher the level of inequality is. Considering the limitations of the CI using binary health variables,[28,29] the scale correction proposed by Erreygers[30] was applied to obtain the EI in this study.

Decomposition analyses of the three groups were further conducted to identify the sources of inequality in dental care use. A probit model from which marginal effects were taken from was used in this study for the decomposition of the CI[4] and EI.[30] This approach decomposed the value of the EI into the contributions of income level, need factors, other factors and a residual term. The contribution of each factor depends on its association with dental care use and socioeconomic-related inequality in that factor.[4] A determinant with a contribution with a positive value contributes to higher use of dental services among the better-off, and vice versa. The HI, which measures the degree of inequity in health use after standardization for need, was obtained using a decomposition approach by subtracting the contributions of need factors from overall inequality.[4] Sensitivity analyses were conducted to assess the robustness of the decomposition analyses. Analyses were repeated using different reference categories in the multivariable probit model[36] and decomposing the CI. For each sensitivity analysis, any changes in the rank order of the contribution of determinants were assessed.

Post-stratification weights were computed to adjust for differences in the age-by-sex-by-location-by-province distribution between the sample and the general population in the 31 provinces involved in the study based on the latest National Demographic Census in China.[32] All the statistical analyses were carried out using STATA SE 15.0 (Stata Corp).

3 | RESULTS

A summary of the descriptive statistics of the sample is presented in Table 1. The percentages of individuals who used oral health services within the past 12 months are 21.4% (95% CI: 19.4%-23.7%), 19.9% (95% CI: 18.0%-22.0%) and 20.7% (95% CI: 18.6%-22.9%) among adults aged 35-44 years, 55-64 years and 65-74 years, respectively.

As illustrated in Figure 1, the concentration curves of all three age groups lie below the line of equality, suggesting a disproportionate concentration of dental care utilization among better-off adults. The significant positive values of the EI (Table 2) indicate that pro-rich inequality in the use of oral health services exists among Chinese adults. The pro-rich trend was maintained even after controlling for the need variables with HI values (Table 2) that are positive and significant in all three age groups.

The detailed results of the decomposition analyses are presented in Table 3. Clearly, the need variables accounted for only a very small proportion of the overall socioeconomic-related inequality in oral health service use in all three groups. Self-assessed oral health status had a negative contribution, indicating that it decreased pro-rich inequality in dental care use in all three age groups. The DMFT index had a positive contribution in all three groups, while the number of teeth had a negative contribution in adults aged 35-44 years but a positive contribution in older adults aged 55-64 and 65-74 years. Overall, most inequality in oral health service utilization could be explained by inequality in income level, basic medical insurance type, educational attainment and residential location. However, there were some differences in the roles of these factors across the three age groups. The dominant contributors to socioeconomic-related inequality in the use of oral health services among adults aged 55-64 and 65-74 years were income and basic medical insurance type. Income accounted for 40.68% of the total inequality among adults aged 55-64 years, and the type of basic medical insurance accounted for 33.20%. Approximately half of the total inequality (50.17%) among adults aged 65-74 years was explained by the type of basic medical insurance, and income explained 34.19% of this inequality. However, the driving factors of socioeconomic-related inequality in dental care use among adults aged 35-44 years included educational achievement (36.77%), income (29.21%), type of basic medical insurance (27.29%) and residential location (19.78%). These findings were robust based on the sensitivity analyses (Additional File: Tables S1 and S2).

4 | DISCUSSION

This study provides an overview of socioeconomic-related inequality and inequity in the use of oral health services among Chinese adults. The results confirmed the presence of significant pro-rich inequality in oral health service utilization, and this inequity persisted even after controlling for the need variables. Although the measurements

	35-44 y old[a]	55-64 y old[a]	65-74 y old[a]
Dental care utilization in past 12 mo			
Yes	21.4 (19.4, 23.7)	19.9 (18.0, 22.0)	20.7 (18.6, 22.9)
No	78.6 (76.3, 80.6)	80.1 (78.0, 82.0)	79.3 (77.1, 81.4)
Sex			
Male	51.1 (50.4, 51.7)	50.7 (49.7, 51.6)	50.2 (49.4, 51.1)
Female	48.9 (48.3, 49.6)	49.3 (48.4, 50.3)	49.8 (48.9, 50.6)
Educational attainment level			
Low	51.0 (46.0, 56.0)	75.6 (72.7, 78.3)	84.6 (81.6, 87.2)
Moderate	19.8 (17.5, 22.3)	19.4 (17.2, 21.7)	10.7 (9.0, 12.6)
High	29.2 (24.9, 33.9)	5.0 (4.0, 6.4)	4.7 (3.4, 6.5)
Location			
Rural	46.9 (40.7, 53.2)	54.7 (48.2, 61.0)	55.8 (49.5, 61.9)
Urban	53.1 (46.8, 59.3)	45.3 (39.0, 51.8)	44.2 (38.1, 50.5)
Basic medical insurance coverage			
NCMS	48.7 (42.4, 55.1)	57.0 (50.0, 63.7)	57.2 (50.8, 63.5)
URBMI	10.8 (8.5, 13.5)	10.8 (8.1, 14.2)	11.7 (9.2, 14.7)
UEBMI	36.5 (31.2, 42.2)	29.3 (24.2, 35.0)	27.2 (22.6, 32.3)
GMI	1.1 (0.6, 2.0)	1.3 (0.7, 2.2)	1.8 (1.2, 2.7)
No basic medical insurance	2.9 (2.2, 3.9)	1.7 (1.1, 2.5)	2.1 (1.5, 2.9)
Perceived oral health status			
Poor/very poor	14.2 (12.7, 15.9)	16.0 (13.7, 18.4)	18.6 (16.1, 21.5)
Fair	46.0 (43.4, 48.6)	41.9 (39.2, 44.7)	44.3 (41.2, 47.3)
Very good/good	39.8 (36.7, 43.0)	42.1 (38.7, 45.6)	18.6 (16.1, 21.5)
Number of teeth			
0-9	0.1 (0.0, 0.3)	3.5 (2.6, 4.6)	11.0 (9.4, 12.7)
10-19	0.5 (0.3, 0.9)	6.3 (5.3, 7.5)	13.5 (12.1, 15.0)
20-32	99.4 (99.1, 99.7)	90.2 (88.4, 91.8)	75.6 (73.2, 77.8)
DMFT index	4.5 (0.14)	8.4 (0.29)	13.1 (0.33)
Annual household income per capita (Yuan)	30 480.9 (14 693.6)	13 653.8 (894.8)	12 856.9 (771.4)

TABLE 1 Characteristics of the study population, by age groups

Abbreviations: DMFT, decayed, missing and filled teeth index; GMI, government medical insurance; NCMS, New Cooperative Medical Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Resident Basic Medical Insurance.
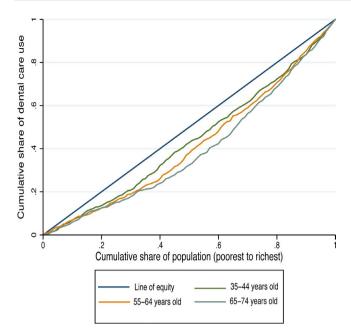
[a]Demonstrated in percentage (95% confidence interval) for categorical variables and mean (standard error) for continuous variables.

of dental care use and socioeconomic status in previous studies differ,[8,25-27] these results combined with the results of this study show a pro-rich trend in the utilization of oral health services among Chinese adults. Furthermore, the results of this study can provide a baseline for the evaluation of newly implemented policies in China, such as the National Nutrition Program (2017-2030) and Healthy China 2030 Plan.

To the best of our knowledge, this study is the first to explain inequality in oral health service utilization across different age groups in China through decomposition. According to the theory of the Andersen model,[37] equitable and inequitable access is defined based on the dominant predictors of health service utilization. Although equity is always in the eye of the beholders and value judgments

vary among different populations, it was traditionally defined by Andersen that in most circumstances equitable access occurs when need accounts for most of the variance in healthcare utilization, whereas inequitable access is occurring if social structure (eg education), health beliefs and enabling resources (eg income, insurance and residence location) explain most of the disparities in healthcare use. Although most of the inequality in oral health utilization in China can be explained by inequality in income, type of insurance, education and location, there are differences in the roles of these factors across the three age groups.

This study suggests that income is a great contributor to inequality in oral health service utilization, especially among older people,

FIGURE 1 Concentration curves of the dental care utilization of Chinese adults by age group [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 2 Concentration indices by income (measuring income-related inequality in dental care utilization)

	CI	EI	HI[a]
35-44 y old	0.127*** (0.084, 0.171)	0.109*** (0.072, 0.146)	0.117*** (0.081, 0.155)
55-64 y old	0.168*** (0.122, 0.213)	0.133*** (0.097, 0.170)	0.150*** (0.114, 0.186)
55-64 y old	0.214*** (0.169, 0.259)	0.177*** (0.139, 0.215)	0.184*** (0.147, 0.222)

[a]HI was obtained by subtracting the contributions of need factors from EI.

***P < .001.

which is consistent with the previous literature.[5,8,9,12,14-16] As an indicator of socioeconomic status and an important enabling factor of healthcare use according to the Andersen model,[37] an individual's income level always determines their ability to pay for dental care. Compared to younger people, older people are more likely to encounter economic barriers to visiting dentists due to unemployment or retirement. As China rapidly grows economically, inequity in income is increasing.[38] Combined with the ageing process in the Chinese population, more attention should be paid to access to dental care for older people, especially those who are poor.

As in a previous study in China,[8] basic medical insurance type was found to contribute to inequality in the use of oral health services in this study. The results also reveal that the contribution of basic medical insurance type to inequality in dental care use among older people (55-64 and 65-74 years of age) is greater than that among younger adults (35-44 years of age). China launched a new round of medical reforms in 2009 to achieve the goal of universal medical insurance coverage by 2020. However, although most people are covered by basic medical insurance, dental care services are not fully covered; thus, there are still out-of-pocket expenses for dental care, and the amount varies depending on the insurance type. Health care and drug packages covered by the Urban Employee Basic Medical Insurance (UEBMI) are more generous than those of the New Cooperative Medical Scheme (NCMS) and Urban Resident Basic Medical Insurance (URBMI). In addition, private dental clinics, where costs are fully self-paid by patients, account for a higher proportion (69.8%) of the total number of dental institutions—over twice that of public-sector clinics (30.2%) according to the latest National Investigation of Resources for Oral Health in China.[39] Thus, Chinese medical reform, especially reform of the dental system, has much room for improvement.[40]

The results of the decomposition analyses supplement previous findings that socioeconomic-related inequality in dental care service utilization cannot be comprehensively explained by those variables influencing the affordability of dental care payments, which further suggests that this inequality may not be eliminated only by providing financial support.[10] Mirroring previous research that also found that education[5,8,14] and residential location[8] contributed to inequality in the use of oral health services, the present study suggests that educational attainment and residential location have more of an impact among younger adults aged 35-44 years than among older adults. Better-educated adults have not only a greater ability to pay for dental care but also greater health literacy in regard to general and oral health.[5,8,41] Regarding the utilization of dental care, the differences between rural and urban areas in China mainly lie in the unbalanced distribution of dental care services and available information on oral health care.[8,18] To close these gaps, more interventions targeting vulnerable populations should be implemented in China. For instance, oral health literacy should be improved among less-educated individuals and those residing in rural areas.

Based on the inverse care law proposed by Dr Tudor Hart,[42] which posits that the availability of health care tends to vary inversely with the need for it in the population served, it was not surprising to find that need and demographic variables contributed relatively minimally to inequality in oral health service utilization. The small shares of their contributions also confirmed inequitable access to dental care according to the Andersen model.[37] Self-assessed oral health made a negative contribution and narrowed the pro-rich inequality in all three age groups. In a previous study using the same data source,[17] the perceptions 'no dental diseases' and 'dental disease was not severe' ranked as the top 2 reasons for not visiting dentists. Combining the above findings, it seems that some oral health needs of poorer Chinese individuals remain unrealized and unmet. On the other hand, given that better-off individuals were more likely to use dental care and rated their oral health better, the reverse causality of dental care utilization influencing oral health cannot be ignored. Previous studies suggested an association between routine dental visits and better oral health.[2,3] Moreover, Shen et al[43] found that dental service use contributed greatly to inequality in oral health in a study based on 14 European countries. Thus, the bi-directional

TABLE 3 Decomposition of the Erreygers-corrected concentration index for dental care utilization in China, by age groups

	35-44 y old				55-64 y old				65-74 y old			
	Elasticities	CIs	Contributions	%	Elasticities	CIs	Contributions	%	Elasticities	CIs	Contributions	%
Income[a]	0.5297	0.0601	0.0318	**29.21**	0.7256*	0.0748	0.0543	**40.68**	0.6673**	0.0907	0.0605	**34.19**
Need variables				**-8.39**				**-12.34**				**-4.11**
Perceived oral health status (Very good/good)				**-6.70**				**-8.61**				**-5.21**
Fair	0.1429***	0.0125	0.0018	1.63	0.0639	-0.0007	-0.0001	-0.03	0.0401	0.0283	0.0011	0.64
Poor/very poor	0.1162***	-0.0782	-0.0091	-8.34	0.1413***	-0.0810	-0.0114	-8.58	0.1260***	-0.0822	-0.0104	-5.85
DMFT index	0.2289***	-0.0045	-0.0010	-0.95	0.2301***	-0.0374	-0.0086	-6.46	-0.0660	-0.0389	0.0026	1.45
Number of teeth (0-9)				-0.74				2.73				-0.35
10-19	0.0165***	-0.0728	-0.0012	-1.10	0.0749***	-0.0307	-0.0023	-1.72	0.0288	-0.0080	-0.0002	-0.13
20-32	0.8113***	0.0005	0.0004	0.36	0.6094***	0.0097	0.0059	4.45	-0.0222	0.0179	0.0004	-0.22
Other variables				**82.59**				**52.67**				**65.69**
Sex (Male)				**-1.26**				**-0.61**				**-1.30**
Female	0.0459	-0.0298	-0.0014	-1.26	0.0271	-0.0302	-0.0008	-0.61	0.1177***	-0.0195	-0.0023	-1.30
Educational attainment level (Low)				**36.77**				**10.07**				**10.96**
Moderate	0.0286	0.0882	0.0025	2.32	0.0088	0.2395	0.0021	1.57	0.0182	0.4040	0.0074	4.16
High	0.0954**	0.3937	0.0375	34.45	0.0184*	0.6157	0.0113	8.50	0.0174*	0.6910	0.0120	6.80
Location (Rural)				**19.78**				**10.01**				**5.86**
Urban	0.0963*	0.2238	0.0216	19.78	0.0453*	0.2948	0.0134	10.01	0.0312	0.3316	0.0104	5.86
Basic medical insurance type (NCMS)				**27.29**				**33.20**				**50.17**
URBMI	-0.0022	0.0841	-0.0002	-0.17	0.0192	0.2019	0.0039	2.91	0.0502**	0.2263	0.0114	6.42
UEBMI	0.0880*	0.3377	0.0297	27.28	0.0858**	0.4496	0.0386	28.92	0.1424***	0.5180	0.0738	41.68
GMI	0.0011	0.3448	0.0004	0.34	0.0027	0.4889	0.0013	0.98	0.0071	0.5273	0.0037	2.11
No insurance	0.0038	-0.0463	-0.0002	-0.16	0.0051	0.1007	0.0005	0.39	0.0007	-0.0651	-0.0001	-0.03
Residual term			-0.0037	**-3.41**			0.0253	**18.98**			0.0075	**4.23**

Note: Aggregated contributions are in bold.

Abbreviations: DMFT, decayed, missing and filled teeth index; GMI, government medical insurance; ME, marginal effect; NCMS, New Cooperative Medical Scheme; UEBMI, Urban Employee Basic Medical Insurance; URBMI, Urban Resident Basic Medical Insurance.

[a]Natural log of annul household income per capita was calculated in the regression.

*$P < .05$.

**$P < .01$.

***$P < .001$.

interactions between oral health and dental care utilization as described in the Andersen model[37] should be paid attention to.

Notably, several limitations should be considered when extrapolating the findings of this study to actual applications. First, although CI has good comparability and decomposition attributes, it is hard to interpret the levels of inequality or inequity. Second, because the 4th National Oral Health Survey did not include detailed information on the proxy of wealth, this study employed income as an indicator of socioeconomic status. Some recent studies have indicated that compared with income, wealth appears more sensitive in measuring socioeconomic-related inequality, especially among older populations.[10,44,45] However, another study revealed that socioeconomic disparity may be better measured by income than wealth.[46] Third, information on dental visits and some related variables was self-reported, which could cause certain recall bias. Fourth, due to the cross-sectional design of this study, causal interpretations cannot be established. Fifth, according to the WHO's standardized criteria,[35] for adults older than 30 years old, all missing teeth (whether or not due to dental caries) were counted in the DMFT index, which might exaggerate the influence of dental caries. In the present study, the DMFT index could be a comprehensive indicator of oral health considering the high prevalence of both dental caries and periodontal diseases in China. Finally, curative and preventive utilization were not distinguished, and changes in inequality in oral health service use were not examined and might require further research.

5 | CONCLUSIONS

The present study revealed that oral health service use is disproportionately concentrated among better-off Chinese adults. The decomposition analysis indicated that although most inequality in the use of oral health services can be explained by disparities in income level, type of basic insurance, educational attainment and residential location, there are differences in the roles of these factors across different age groups. The determinants of inequality in oral health service use in different age groups provide referential information for policymakers to create more targeted policies to achieve equity in oral health service utilization in China.

CONFLICT OF INTERESTS
The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS
YS and MRX designed the study. XW, XPF, BJT, DYH, HCL, BW, CXW, SGZ, XNL, WSR, WJW and YS contributed to the acquisition and interpretation of the data. MRX, XLG, HJW, MD, CZZ and SD performed the data analyses. MRX wrote the manuscript. TX and YS critically reviewed and revised the paper. The final version of the manuscript was approved by all co-authors.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.