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Retrospective summary analysis on the results of oral health epidemiological investigations in China

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ABSTRACT

Objective: Comparative analysis of the results of the four national oral health epidemiological investigations conducted in 1983, 1995, 2005 and 2015 respectively, to understand the changes in the oral health status of the Chinese people with economic development, and provide a scientific basis for the country to formulate effective oral health defense measures.**Methods:** Collect the data of four large-scale oral health epidemiological investigations conducted in the past 40 years, make a retrospective summary and comparative analysis of the list below to understand the changes in Chinese oral health-related indicators such as dental caries and analyze the reason.**Results:** Since 1995, the preventive counseling rate was increased. Since 1983, the incidence of caries has decreased, but it has increased in children aged 5 and 12 in the last ten years. Four investigations have examined gingivitis and the situation has not improved significantly. Tooth loss was mainly concentrated in the old group, the repair rate of denture was significantly increased. There are significant differences between the gender and urban and rural distribution of oral health.**Conclusions:** There is an imbalance in the degree of oral health knowledge of Chinese people, and the incidence of caries and periodontal diseases is still relatively high. It is necessary to strengthen hygiene guidance for different age groups, focusing on prevention and combining prevention and treatment to jointly promote oral health.

Oral epidemiology is used to describe the oral health of the population by investigating certain oral diseases in a certain area and a certain population within a certain period of time, obtain the prevalence and distribution characteristics of certain oral diseases in a specific population in the area, then summarize and analyze the survey results, which can be used to monitor the development trend of oral diseases. It is conducive to the development of oral health target plans for a certain period of time by the health administration department, propose specific oral health care strategies and measures, allocate and utilize various resources rationally. In China, a national oral health epidemiological survey is carried out every ten years, a total of four times so far, the purpose is to find out the frequency and distribution characteristics of oral diseases within a specific period of time to understand and analyze the related factors affecting oral health. This article will conduct a descriptive epidemiological analysis of the national oral health epidemiological investigation results, it is helpful to understand the epidemiological characteristics and trends of oral diseases, provide a scientific

basis for the development of effective measures to prevent and control the occurrence and development of oral diseases in China. The results of the four national oral health epidemiological investigation from 1983 to 2015 are analyzed as follows.

1. Materials and methods

Source of materials Collect and organize the data of the four national oral health epidemiological investigation reports conducted in 1983, 1995, 2005 and 2015 respectively in China. They are: the oral health investigation of primary and middle school students nationwide, the survey ages were 7, 9, 12, 15, 17 years old, and a total of 131,340 people were surveyed in 1983; the second national oral health epidemiological investigation surveyed ages 5, 12, 15, 18, 35–44, 65–74 years old, a total of 140,712 people were surveyed in 1995; the third national oral health epidemiological investigation, the survey ages were 5, 12, 35–44 and 65–74 years old, and a total of 93,826 people were surveyed in 2005; the

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fourth national oral epidemiological investigation, the survey ages were 3–5, 12–15, 35–44, 55–64 and 65–74 years old, and a total of 172,000 people were surveyed in 2015. The above information has been verified, and the analysis results are derived from the real data of the national epidemiological investigation report. Some missing data are due to the differences in the four national oral health epidemiological investigation items. However, this article comprehensively collects important data from each survey and conducts a summary and classification analysis on it.

Analysis method Search for relevant literature, refer to World Health Organization (WHO) standards, organize data and perform descriptive epidemiological analysis on it, use Word software to make tables, and Excel software to make maps.

2. Results

Changes in the educational intensity of oral health promotion During the two decades from 1995 to 2015, the promotion of oral health education has been strengthened, and the national oral health literacy (OHL) level has gradually improved in China (Table 1). At present, the Chinese people's attitude towards oral health care knowledge have been greatly improved, but still at a medium level. The attendance rate for oral disease prevention, consultation and examination is also very low, indicating that the Chinese people's awareness of the prevention of oral diseases is still very poor. It arouses our country that we should stick to strengthen the promotion and education of oral health care, publicize the important role of oral disease prevention and inspection, and improve the national level of OHL and healthy behavior. Low levels of OHL may impair a person's ability to process and understand preventive oral health information, as well as to seek treatment.¹ Improving the OHL of patients may help in the efforts to improve the adherence to medical instructions, self-management skills and the overall treatment outcomes.²

Changes in oral self-care awareness and ability During the two decades from 1995 to 2015, the Chinese people's awareness of oral self-care has increased, their self-care ability has been improved to varying degrees also (Table 2). In 1995, although the national tooth brushing rate was relatively higher, the ability to remove plaque was poor, there was still a lot of soft dirt on the tooth surface, indicating that the nationals did not have enough time to brush their teeth and the way they brushed their teeth was incorrect. In 2015, the survey indicators for brushing teeth more than 2 times a day were added, the usage rate of fluoride toothpaste, the usage rate of toothpaste, dental floss and toothpicks in different ages were investigated. Children in the 3-5-year-old group have the lowest tooth brushing rate, tooth brushing frequency and fluoride toothpaste usage rate. Studies have shown that the use of standard fluoride toothpaste can effectively reduce the incidence of dental caries in preschool children³; the self-care awareness and ability of people aged 35 to 44 were slightly better than those of other age groups, the frequency of tooth brushing, tooth brushing rate, the use rate of dental floss and fluoride toothpaste were higher than those of other groups to a slight extent. This shows that people in our country are brushing their teeth more frequently, their awareness of oral self-care is

increasing, they are gradually mastering the correct method of brushing their teeth. However, the current usage rate of dental floss is at a very low level. Using dental floss in addition to toothbrushing may reduce gingivitis or plaque, or both, more than toothbrushing alone.⁴ The rate of brushing their teeth more than twice a day and the use of toothpicks among middle-aged and elderly people are also low, the use of fluoride toothpaste is at a moderate level only. This recommends that oral self-care related knowledge should be promoted in place for different ages, how to brush teeth properly and use dental floss as well as fluoride toothpaste rationally needs to be further promoted in our country also.

2.3. Changes in the development of the disease

Caries From 1983 to 2015, the incidence and development of dental caries showed slight fluctuations and an overall downward trend in China. However, the people have not paid enough attention to the occurrence and development of dental caries (Table 3), the occurrence of dental caries in women in all age groups is more serious than that of men (Fig. 1, Fig. 2). In 1983, the prevalence of dental caries and caries average among the primary and middle school students of various ethnic minorities were quite different in China, indicating that the incidence of dental caries differed greatly between different ethnic groups due to economic, cultural development, living habits and geographical environment. Compared with 1995, the prevalence of dental caries and the average dental caries rate among primary and middle school students decreased in 2005. Among them, the 12-year-old group had lower caries and caries average, but the 35-44-year-old groups and 65-74-year-old groups were at extremely high levels. By 2015, the prevalence of dental caries and caries average in primary and middle school students are on the rise, and the prevalence of dental caries in middle-aged and elderly people has declined, but it is still at a high level (Fig. 3, Fig. 4). In 2005, there was a high untreated caries rate, and the rate of dental caries filling was extremely low, in 2015, although the rate of dental caries filling increased slightly compared with 10 years ago, it was still low (Fig. 5). The prevalence of root caries and caries average in middle-aged and elderly people increased with age. Compared with 2005, the prevalence of root caries in middle-aged and elderly people decreased significantly in 2015. This shows that with the development of economy in China, people's living standards is improving. Although the awareness of oral health care of people has gradually increased, the ability to effectively remove plaque is still poor, leading to the continuous development of caries. Professional tooth cleaning (PTC)'s efficacy in terms of significant reductions in plaque and gingivitis scores in addition to lower caries increment, when compared to toothbrushing, to mouthrinsing or to no intervention.⁵ Therefore, it is recommended to strengthen the popularization of oral health knowledge, improve the people's awareness of oral self-care, and develop good oral habits. From 1995 to 2015, the prevalence of caries and caries average in women in all age groups were higher than those in men, indicating the fact that women had more caries than men. The main reasons for this trend include: ①The time of deciduous tooth loss and permanent teeth eruption of women is earlier than that of man. Female's teeth are exposed to the oral environment for longer, so they are more likely to be eroded by caries; ②In the process of preparing meals, women are more likely to contact with food, on the other hand, women often eat snacks is a reason can't be ignored; ③Influenced by various factors during pregnancy, women have an increased chance of suffering from dental caries. The reasons for more dental caries in pregnant women have been detailed as increased acidity in the oral cavity, sugary dietary cravings, and inadequate attention to oral health.⁶ ④The influence of factors such as different saliva composition and flow rate, hormone fluctuations, eating habits, genetic variation and specific social roles in the family⁷

Periodontal disease Periodontal disease has always been one of the most serious oral problems in China. During the 30 years from 1983 to 2015, its occurrence and development showed an upward trend, especially in the middle-aged and elderly stages (Table 4). Moreover, the

Table 1
Changes in the publicity and education of oral health care of people in China.

Year	1995	2015
Oral health promotion and education	Students who have received oral health education:50%	Awareness rate of oral health knowledge: 60.1% Have a positive attitude towards oral health care: 84.9% The preventive inspection rate: 40% The preventive counseling rate:43.2%

Table 2
Changes in the awareness and ability of oral self-care of residents in China.

Types	1995			2015				
	Year	Age		3-5	12-15	35-44	55-64	65-74
Daily tooth brushing rate	76.58%–97.95%			59.5%	85.9%	93.8%	87%	81.7%
Number of brushing \geq 2	–			19.8%	31.5%	49.4%	31.7%	31.1%
Debris index	urban area	15	29.35%	–	–	–	–	–
	rural area	35–44	44.12%	–	–	–	–	–
Daily dental floss usage rate	–			–	0.6%	2.3%	1.0%	0.9%
Daily toothpick usage rate	–			–	–	22.5%	31.8%	30.0%
Toothpaste usage rate	–			96.4%	–	–	–	–
Usage rate of fluoride toothpaste	–			38.5%	57.8%	73.1%	54.9%	43.9%

Table 3
The occurrence and development of dental caries among Chinese people from 1983 to 1995.

Types	Age	Year	1983	1995				2005				2015				
			Minority primary and secondary school students	5	12	5	12	35-44	65-74	3	4	5	12	35-44	55-64	65-74
Caries prevalence (%)	Caries prevalence (%)	Up to 56.0	Urban: 75	Urban:48.3	65.1	28.9	88.1	98.4	50.5	63	70.9	38.5	62.7	72.6	76.7	
	Caries average	Down to 18.2	Rural:78	Rural:40.8	–	–	–	–	–	–	–	–	–	–	–	
Caries filling rate (%)	Caries filling rate (%)	Up to 1.52	–	Urban : 1.1	3.50	0.54	4.51	14.65	2.28	3.40	4.24	0.86	4.54	8.69	13.33	
	Caries untreated rate (%)	Down to 0.3	–	Rural:0.89	–	–	–	–	–	–	–	–	–	–	–	
Prevalence of root caries (%)	Prevalence of root caries (%)	–	–	Very low	2.8	10.6	19.9	7.9	1.5	2.9	4.1	17.5	26.6	16.9	12.8	
	Root caries average	–	–	97.1	88.9	80.1	92.1	–	–	–	–	–	–	–	–	
Prevalence of root caries (%)	Prevalence of root caries (%)	–	–	–	–	32.7	63.6	–	–	–	–	10.9	29	39.4		
	Root caries average	–	–	–	–	0.75	2.74	–	–	–	–	–	–	–		

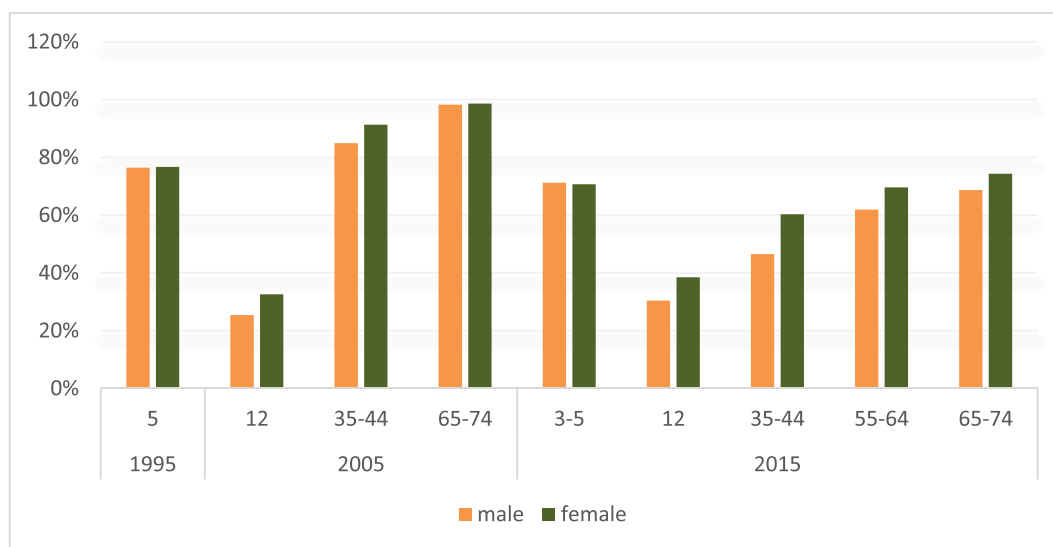


Fig. 1. Gender distribution of caries prevalence in different age groups from 1995 to 2015.

periodontal status of males is worse than that of females. Data from 2005 to 2015 show that with the increase of age, the severity of periodontal disease among Chinese people is on the rise, and also at a high level. The rate of bleeding gums and the detection rate of calculus were the highest in the middle-aged groups of 35–44 and 55–64 years, while the detection rate of periodontal pockets and the rate of attachment loss were the highest in the elderly group. Data show that the detection rates of men’s gum bleeding, calculus, periodontal pockets, and attachment loss were

higher than women’s in 2005 and 2015, indicating that the periodontal condition of males is worse than that of females in China, this is related to the higher number of male smokers than females and more harmful alcohol consumed by male non-smokers.^{8,9} It is also associated with men’s work pressure and irregular life. A recent systematic review of the sex differences found overwhelming evidence of a higher prevalence of periodontitis in men than in women.¹⁰ The above data show that the periodontal disease status of Chinese people has not been well improved.



Fig. 2. Gender distribution of caries average in different age groups in 2005 and 2015.

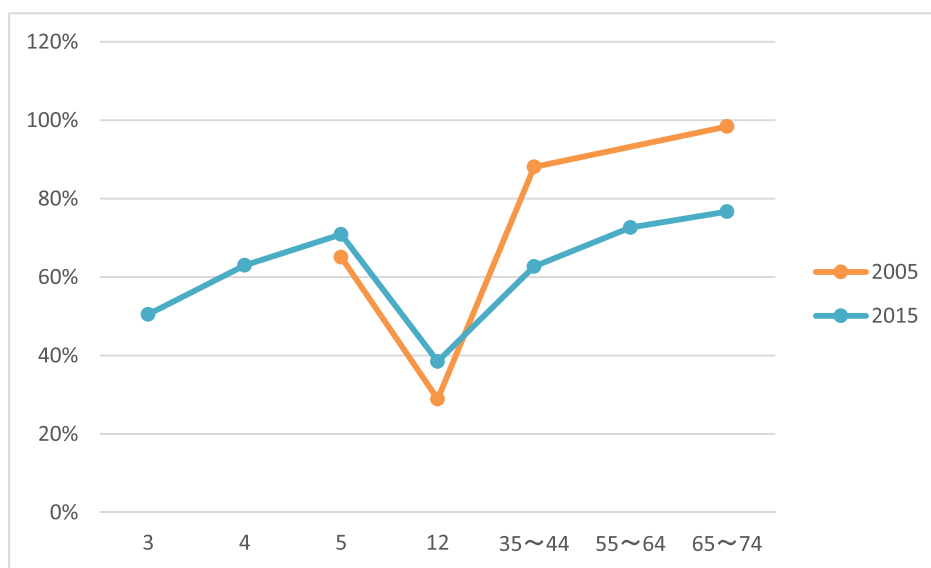


Fig. 3. The level of caries prevalence in different age groups in 2005 and 2015.

Paying attention to the occurrence and development of periodontal disease, especially the condition of periodontal disease in middle-aged and elderly citizens, is one of the main problems that our country needs to solve urgently.

Loss of teeth among middle-aged and elderly people From 1995 to 2015, the incidence of periodontal disease has not been reduced, and the loss of teeth among middle-aged and elderly people is not optimistic in China. However, due to the attention paid to oral problems in recent years, the situation of denture repair has been improved to a certain extent (Table 5). From 1995 to 2015, the tooth loss of middle-aged and elderly people was serious in China. The tooth loss of the elderly was more serious than that of the middle-aged people. However, the tooth loss of the elderly in the 65 to 74-year-old group was significantly improved in 2015; from 2005 to 2015 the rate of denture repair is also gradually increasing. This shows that with the improvement of the quality of life of the middle-aged and elderly people in China, the importance of oral health has increased correspondingly, yet the situation of tooth loss still needs to be improved. Relevant studies have shown that tooth loss is related to age, partial dentures, self-limiting diet,

malnutrition, poor mental cognition and physical disability.¹¹ At the same time, tooth loss showed a dose-dependent association with incident myocardial infarction, heart failure, ischemic stroke, and all-cause death and was a good predictor of cardiovascular outcome.¹² Denture reinforcement as a preventive measure is effective against denture fracture, allowing patients to use their dentures more effectively.¹³ Therefore, relevant departments need to pay more efforts into the awareness of oral health care and self-care of middle-aged and elderly people, strengthen their attention to oral health, increase the rate of denture restoration, wear safe and qualified dentures; remind middle-aged and elderly people to pay attention to a reasonable diet, maintain nutrition balance, improve the oral health of middle-aged and elderly people to reduce the number of missing teeth and maintain a positive attitude and healthy body.

Dental Fluorosis In recent years, the incidence of dental fluorosis among 12-year-old children is on the rise in China (Table 6). In 1983, the incidence of dental fluorosis among primary and middle school students was investigated based on the concentration of fluoride in water, indicating that since 1983, attention has been paid to the occurrence and

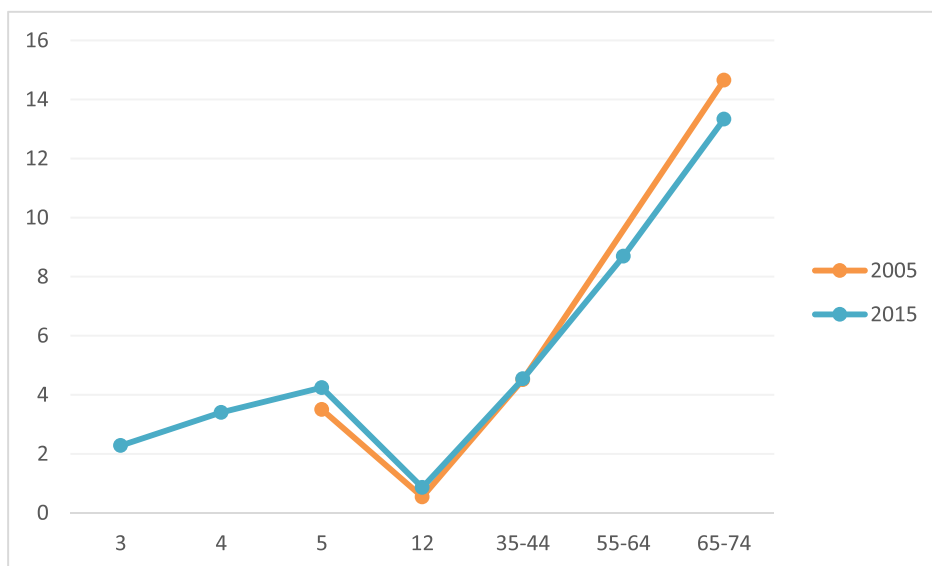


Fig. 4. The level of caries average in different age groups in 2005 and 2015.

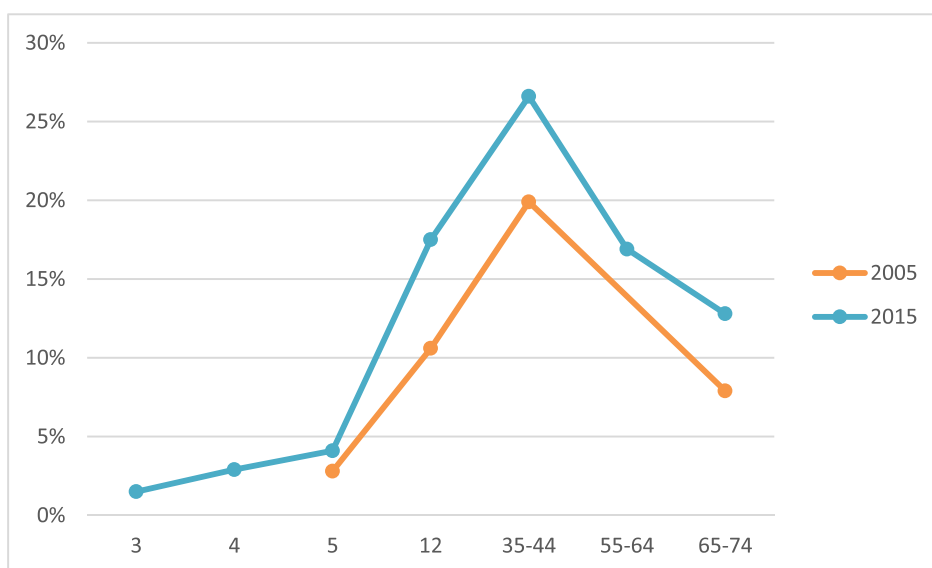


Fig. 5. The rate of dental caries filling in different age groups in 2005 and 2015.

Table 4
The occurrence and development of periodontal disease among Chinese people.

Types Age Year	1995					2005			2015					
	5	12	15	35–44	65–74	12	35–44	65–74	12	15	35–44	55–64	65–74	
Periodontal disease	Detection rate of gum bleeding (%)													
	–													
	57.7 77.3 68.0 58.4 64.7 87.4 88.4 82.6													
	Detection rate of calculus (%)													
38–94.15														
59.0 97.3 88.7 61.3 73.6 96.7 96.4 90.3														
Detection rate of periodontal pocket (%)														
–														
40.9 52.2 – 6.5 52.7 69.3 64.6														
Detection rate of attachment loss (%)														
–														
38.9 71.3 – 0.5 33.2 69.9 74.2														

development of dental fluorosis, the conditions for the occurrence and development of dental fluorosis have been further explored in China. The rate of dental fluorosis and dental fluorosis index of 12-year-old children in 2015 were higher than those of ten years ago. This suggests that relevant departments should control the fluoride concentration in drinking water and the rational use of fluoride-containing oral preparations to reduce the occurrence of dental fluorosis. Although

reducing the fluoride concentration in drinking water can control the occurrence and development of dental fluorosis, studies have shown that water fluoridation can prevent dental caries to a certain extent,¹⁴ so it is important to formulate an appropriate fluoride concentration in drinking water.

Dentin sensitivity and acid erosion With the increasing emphasis on dentin sensitivity and acid erosion, the occurrence and development of

Table 5
The development and changes of tooth loss among middle-aged and elderly people in China.

Types Age Years		1995		2005		2015		
		35–44	65–74	35–44	65–74	35–44	55–64	65–74
tooth loss of middle-aged and elderly people	Average number of missing teeth	0.88	9.86	0.9	9.3	–	–	–
	Average number of teeth retained	–	–	29.40	20.97	29.60	26.3	22.5
	Dentition defect rate (%)	–	–	37	86.1	–	–	–
	Missing dentition rate (%)	–	–	0.06	6.8	0	1.10	4.5
	Denture repair rate (%)	–	–	31.4	48.8	59.7	–	63.2

Table 6
The incidence of dental fluorosis, dentin sensitivity and acid erosion in Chinese people.

Types Age Years		1983	2005			2015
		primary and secondary school students	3–5	12	20–69	12
Dental Fluorosis	Dental fluorosis rate (%)	When the water fluoride concentration is 0.6–0.8 mg/L, the dental fluorosis rate is about 10%; when the water fluoride concentration is higher than 0.8 mg/L, the dental fluorosis rate rises linearly	–	11.7	–	13.4
	Community dental fluorosis index	–	–	0.25	–	0.28
Acid erosion (%)			4.5–12.4	22.1–61.8	–	–
Dentin sensitivity	Dentin sensitivity rate (%)		–	–	32.1	–
	Number of sensitive teeth		–	–	1.5	–

this two diseases were investigated in 2005 (Table 6). The results show that the prevalence of acid erosion in 12-year-old children is more serious than that in children aged 3–5 years, which may be related to the incorrect way of teeth brushing and excessive intake of carbonated drinks by adolescents. Symptoms of tooth sensitivity are concentrated in the 20–69-year-old, the prevalence of women is higher than that of men. Factors such as wedge-shaped defects caused by improper tooth brushing, gingival recession in middle-aged and elderly patients, and excessive abrasion of the occlusal surface can all cause the symptoms of dentin sensitivity. Related studies have shown that stomach acid reflux is a risk factor for dentin sensitivity.¹⁵ This suggests that dental medical workers not only need to promote relevant oral health knowledge, but also require patients to check their oral cavity regularly for preventive diagnosis and treatment.

Tooth trauma Data in 2005 showed that 19.5% of 12-year-old students had tooth trauma in the past year, and the proportion of tooth trauma occurring outside the school was much higher than that of the school, which was 73.9% and 31.6% respectively. Adolescent children are agile and active, lack of self-protection consciousness, because of the poor prognosis of traumatic deciduous teeth, poor healing of surrounding soft tissues, injury inherited permanent teeth, and children’s inability to accept complex dental treatments, as a result, they need to be removed if necessary in the end, nevertheless, the premature loss of deciduous teeth can affect diet, speech development, the integrity of jaw development, aesthetics, quality of life and the development of oral habits.¹⁶ The roots of most young permanent teeth have not yet been fully developed, and problems such as aesthetic and jaw development will occur after trauma also. The level of IL-1α in gingival sulcus fluid can be considered as a potential marker of the external inflammatory root resorption in children after permanent teeth trauma.¹⁷ Therefore, while carrying out oral propaganda and education for children and adolescents to improve their self-protection awareness, parents should protect their children from falls and tooth trauma. After tooth trauma, they need to go to the hospital for timely diagnosis and treatment.

Oral mucosal abnormalities and oral malignant tumors In 2005, the nationwide information on the prevalence of oral mucosa was obtained for the first time in China. From 2005 to 2015, the prevalence of oral mucosal abnormalities and oral malignant tumors among Chinese people showed a significant downward trend (Table 7). The survey results

Table 7
The incidence of oral mucosal abnormalities and oral malignant tumors among Chinese people.

Types Age Years	2005		2015		
	35–44	65–74	35–44	55–64	65–74
Prevalence of abnormal oral mucosa	4949/100,000	7965/100,000	4195/100,000	6792/100,000	6455/100,000
Incidence of oral malignant tumors	17/100,000	30/100,000	0/100,000	–	16/100,000

show that the occurrence of the two diseases is mainly concentrated in the middle-aged and elderly age group, and the prevalence in the elderly group is higher than that of the middle-aged group. This shows that the importance of oral mucosal is gradually increasing in China, and the prevention of them in the future should be mainly placed in the middle-aged and elderly age groups, especially the elderly represented by 65–74 years old. However, the incidence of oral malignant tumors in young people under the age of 45 is rising, which may be related to the risk factors such as tobacco and alcohol, human papillomavirus (HPV), human immunodeficiency virus (HIV) infection and genetic factors.¹⁸ Young adults should be treated on a case-by-case basis and post-therapy quality of life must be considered in any treatment-decision making process.

Distribution of urban and rural areas The awareness of oral health care, self-care ability and oral health of rural residents are far lower than those of urban residents in China (Fig. 6-Fig. 7-Fig. 8). From 1995 to 2015, the prevalence of caries and caries average in all age groups in rural areas were higher almost, while the caries filling rate in rural areas was lower; in 1995, the percentage of soft scale index of 5 in all age groups was higher in rural areas than in urban areas; in 2015, the tooth brushing rate, toothpaste, dental floss and fluoride toothpaste usage rate of urban adolescents were higher than those in rural areas; from 1983 to 2015, the detection rate of gingival bleeding, calculus, periodontal pockets and attachment loss among rural residents was higher; from 2005 to 2015, the number of teeth lost among middle-aged and elderly rural residents was more than that of urban residents, while the rate of

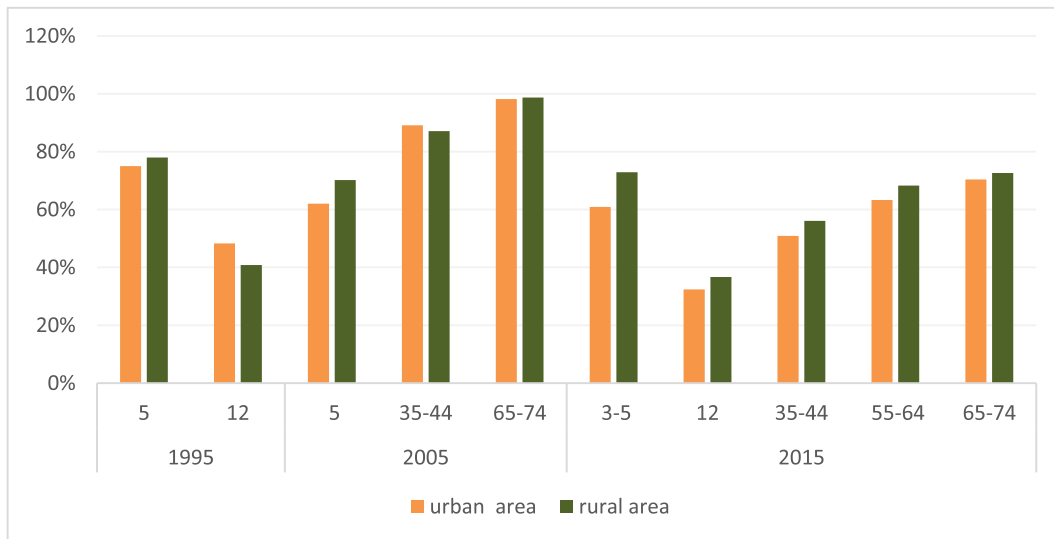


Fig. 6. Urban and rural distribution of caries prevalence in each age group from 1995 to 2015.

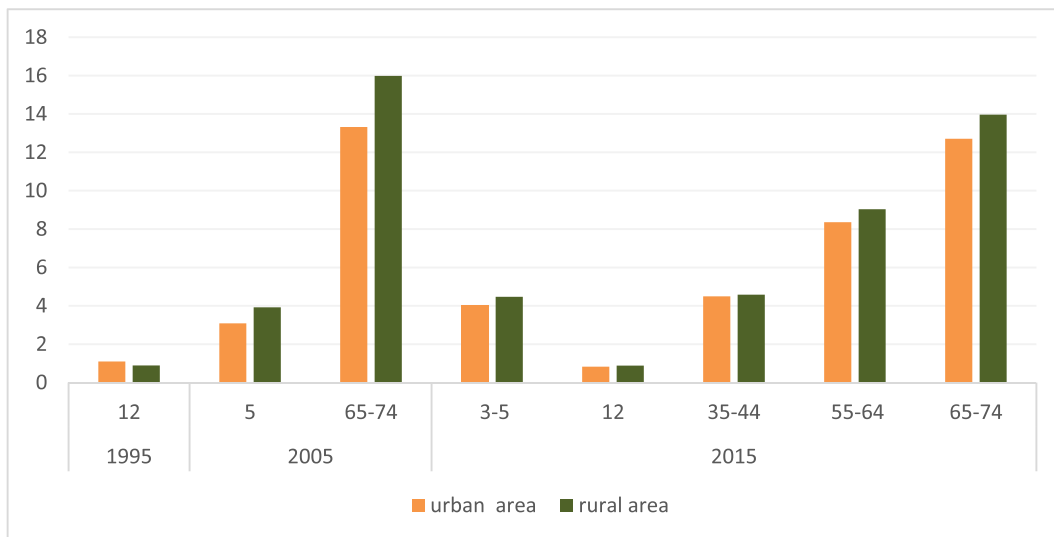


Fig. 7. Urban and rural distribution of caries average in each age group from 1995 to 2015.

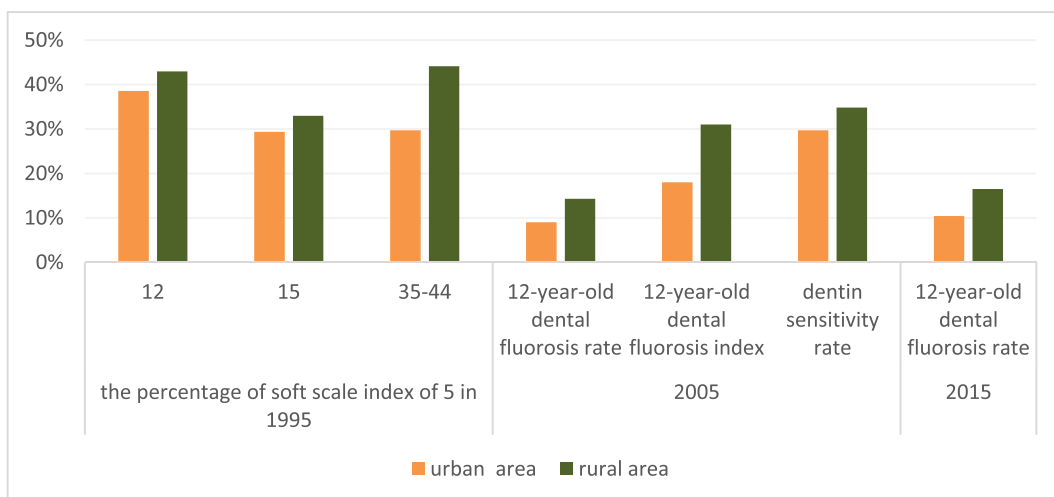


Fig. 8. Urban and rural distribution of soft scale index, dental fluorosis and dentin sensitivity from 1995 to 2015.

denture restoration is lower; the rates of other oral diseases such as dental fluorosis, tooth sensitivity, oral mucosal abnormalities and oral malignant tumors are higher in rural areas in China. The above data shows that the incidence of various oral diseases in rural residents is higher than that in urban residents, the ability to effectively remove plaque is poor, oral disease visit rate is low, which is related to the large difference in the level of economic and cultural development between urban and rural areas. There is considerable evidence from previous studies that the utilisation of oral health services could be affected by socio-economic status, educational level and beliefs about oral health, as well as self-perception of oral health status.^{19–23} It is reminded that cultural publicity and oral health education should be strengthened in rural areas to increase the importance of oral health, investment in preventive basic health care facilities, and train more professional medical personnel. At the same time, government agencies should formulate effective policies to narrow the gap of economic and cultural development between urban and rural areas, and to further improve the oral health care awareness and self-care ability of rural residents, so as to reduce the occurrence and development of oral diseases.

3. Discussion

Oral diseases such as caries and periodontal disease are chronic diseases that not only affect the functions of chewing, pronunciation, appearance, etc., but also closely related to systemic diseases. Oral disease remains a major public health burden worldwide. It is of great importance to integrate oral health into global health agenda, to improve global oral health.²⁴ With the improvement of the material life, people's requirements for the quality of life are gradually increasing, and the oral health is also getting more and more attention. Although oral health problems have been improved from 1983 to 2015 in China, there is still a gap compared with developed countries. Some oral diseases have been prevented and controlled for 40 years already, the disease has not improved significantly. Dental caries and periodontal disease still have a high incidence. It is worth noting that the incidence of dental caries in children aged 5 and 12 has increased in the past decade, the incidence of periodontal disease has increased year by year, and the gap between urban and rural areas of various oral diseases can't be ignored. With the development of economy in China, people's living standards is improving, the diet of teenagers and children is gradually refined, which can easily lead to the occurrence of caries.

The data analysis from the four national oral health epidemiological investigations suggests that: the relevant departments should strengthen the propaganda of oral health knowledge, increase the national awareness of preventing, consulting and checking oral diseases, and increase the education on how to brush teeth correctly and use fluoride toothpaste reasonably; pay attention to and prevent the occurrence and development of periodontal disease, oral mucosal abnormalities and oral malignant tumors of Chinese people, especially middle-aged and elderly people, also should remind them to eat a reasonable diet, maintain a balanced nutrition, a positive attitude and a healthy body; control the concentration of fluoride in drinking water and the rational use of fluoride-containing oral preparations; strengthen cultural publicity and oral health education for ethnic minorities and rural areas, improve medical conditions in rural and remote minority areas, reduce the gap in economic and cultural development between urban and rural areas, further improve the awareness of oral health care and self-care ability of ethnic minorities and rural people in China, and reduce the occurrence and development of oral diseases.

In the process of oral health education and prevention of oral diseases, different kinds of publicity should be carried out for different groups of people. Oral health education for children and adolescents should be integrated into general education in order to improve the awareness of oral health care, so as to develop good oral hygiene habits; for young patients, the focus should be on the correct method of brushing teeth, the use of dental floss, and regular periodontal cleansing

to maintain good oral hygiene; for middle-aged and elderly people, in addition to teaching the correct method of brushing teeth and the use of dental floss and toothpicks, informing the necessity of regular tooth cleaning, they should also be encouraged to repair missing teeth in time to restore the integrity of dentition and basic oral functions; for women, especially pregnant women, should learn the correct method of brushing their teeth, develop good oral hygiene habits, maintain oral health, and actively control gingivitis in the early pregnancy; for men, the focus of oral hygiene education is to reduce smoking and alcohol consumption, maintain oral hygiene. In addition, there should be a lot of publicity about dental fluorosis, oral mucosal abnormalities, oral malignant tumors and other related oral diseases to improve the national self-protection awareness, actively prevent the occurrence of related oral diseases.

Based on the summary analysis and comparison of four national oral health epidemiological investigations, the following suggestions are put forward: when conducting oral health epidemiological surveys, relevant departments should try to keep the survey indicators, population selection and areas consistent. The survey population should select several representative age groups and control them within a roughly equal number of people, so as to facilitate the comparison and analysis of the results of several surveys; the survey indicators should be as consistent as possible to help track the improvement of the disease and provide a scientific basis for the formulation and implementation of prevention measures for oral diseases in the future. At the same time, the survey indicators should be changed with the occurrence and development of different oral diseases, appropriately add oral disease indicators such as oral leukoplakia, oral cancer, dental trauma, malocclusion, etc., whose incidence or importance is increasing year by year, oral disease indicators such as dental fluorosis that are gradually decreasing or well-controlled can be deleted also. Of course, some necessary indicators such as caries rate, gingival bleeding rate, calculus detection rate, average number of teeth lost among middle-aged and elderly people and denture restoration rate need to continue to be retained, further unify inspection standards to ensure the consistency of inspection results.

In short, oral health actions need to be built on the basis of the entire population. By 2025, a healthy oral social support environment will be basically formed, the population's oral health literacy level and the formation rate of healthy behaviors will be greatly improved, and oral health services will cover the entire population and the entire life cycle to better meet the health needs of the people.

Author contribution

YSP, KYZ and LJY performed the data acquisition. QX and HL checked the data. TZ and QYZ conducted statistical analysis and drafted the manuscript. WRT and YL conceived the study, supervised the process, and corrected the final version of the manuscript. All authors read and approved the final manuscript.

Data availability statement

The datasets analyzed during the current study are available in the CNKI repository, doi:CNKI:SUN:SYIY.0.2012-14-008 [J].

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Conflict of interest disclosure

The authors declare that they have no competing interests.

Ethics approval statement

Not applicable.

Patient consent statement

Not applicable.

Permission to reproduce material from other sources

Not applicable.

Clinical trial registration

Not applicable.

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