# Oral Health Status of 12-year-olds from Regions with and without Coverage of the National Oral Health Comprehensive Intervention Program for Children in China

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**Objective:** *To investigate the oral health status and related factors of 12-year-olds from regions with and without coverage of the National Oral Health Comprehensive Intervention Program in China by means of analysing national data from the 4th National Oral Health Survey.*

**Methods:** *Data of 12-year-olds participating in the 4th National Oral Health Survey of China were used for statistical analysis. Children who were recruited in the survey completed a dental examination and filled in a questionnaire. Oral health status, pit-and-fissure sealant history, oral hygiene behaviours, sugar consumption habits, status of dental service utilisation, and oral health knowledge were compared between children from regions with and without coverage of the national programme. For the number of decayed, missing and filled permanent teeth (DMFT) and its components, as well as the number of teeth with pit-and-fissure sealants, mean values were statistically tested to see if significance existed between regions covered by the national programme and uncovered regions, whereas caries prevalence and percentage of pit-and-fissure sealants presented were also compared.*

**Results:** *Data from 27,821 12-year-old children were analysed, among whom 7,726 were from regions covered by the national programme and 20,095 were from uncovered regions. Statistical significance was found in caries experience and activity, pit-and-fissure sealant history, sugar consumption habits, utilisation of dental services and oral health knowledge when compared between the covered and uncovered regions. Prevalence of dental caries and indices for caries experience and activity was lower in regions covered by the national programme than those not covered, while the percentage of pit-and-fissure sealants presented and the number of teeth with pit-and-fissure sealants exhibited higher in the covered regions. This remained the same even if we focused only on the first molars instead of the full dentition.*

**Conclusion:** *The National Oral Health Comprehensive Intervention Program for Children in China potentially contributed to better oral health status, behaviour and knowledge in 12-year-old children. The expansion and extension of coverage of the national programme was expected to be beneficial for improving oral health status in children, as well as constructing teams of oral and dental workforce and working mechanisms in some underdeveloped regions.*

**Key words:** *National Oral Health Comprehensive Intervention Program for Children, oral health status, pit and fissure sealants, 12-year-olds, the 4th National Oral Health Survey*

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Owing to increased health demands that have emerged along as China's social economy has developed[1], the Chinese government had implemented a series of public health programs for health promotion. The year 2008 became a milestone for dental public health in China, as the central government started to invest annually in the National Oral Health Comprehensive Intervention Program for Children, the purpose of which was to promote the oral health and control oral diseases for children, and to explore and develop the working mechanisms on construction of the oral and dental workforce in selected regions[2]. This was the first nationwide public health programme on oral and dental health supported by the Chinese government and was an important part of the medical reform in China.

Previous evidence from research investigations and the 3rd National Oral Health Survey found oral health status, knowledge and practice were not so good among Chinese children, and the prevention and control of dental caries were extremely urgent[3,4]. Based on this, the National Oral Health Comprehensive Intervention Program for Children in China provides a series of measures for oral health promotion, including strengthened oral health education, training of dental workforce, regular oral health examination, and pit-and-fissure sealants for school children who met the criteria[5,6]. This national programme was a precious opportunity to promote public dental health for the school-aged population in China, and the investment and coverage had been up-scaling since it began. However, an evaluation of its outcome has not yet been fulfilled. The 4th National Oral Health Survey of China performed in 2015 to 2016, which covered 12-year-olds as a reference age group according to the latest criteria established by the World Health Organization (WHO)[7], had provided a lot of information on oral health status and related factors for this age group. Thus, it was anticipated that the survey would also provide an estimate of the effects of the National Oral Health Comprehensive Intervention Program for Children in China.

The aim of this study was to investigate the oral health status and related factors of 12-year-olds from regions with and without coverage of the National Oral Health Comprehensive Intervention Program for Children in China, by means of analysing national data from the 4th Chinese National Oral Health Survey.

## Materials and methods

### *Data resource*

This cross-sectional study used data from the 4th National Oral Health Survey of China (2015-2016), which covered all the WHO index ages[7]. All 31 provinces of the mainland of China participated in the survey. Participants were selected using a multistage stratified cluster sampling method. Firstly, each province was divided into two strata – urban and rural areas, then two districts or counties were randomly selected from each stratum. Secondly, three middle schools were randomly chosen from each district or county, respectively, from the list of middle schools provided by the council. Thirdly, at each middle school, a random sample of 320 children aged 12, 13, 14 and 15 years was recruited using the list of enrolees, with 80 children enrolled for each age group. A target sample of 3840 participants was initially set per province, for a total of 119,040 children nationally. Finally, a total of 118,601 school-age participants (27,821 12-year-olds, 30,961 13-year-olds, 30,691 14-year-olds and 29,128 15-year-olds) completed the clinical examination and questionnaire survey. Data for those aged 12 years old were chosen for the present analysis, as this age group was considered as an important reference group for adolescents according to the recommendation of the WHO[7]. During the 8-year process since the national program started until 2015, most of the children were initially covered from 2010, when the coverage commenced to grow quickly owing to new policies. As these 12-year-old children were at the appropriate age for pit-and-fissure sealants at that time, they could be chosen as suitable subjects for analysing this large-scale and comprehensive programme nationally. Among all 124 selected districts or counties, 34 were covered by the National Oral Health Comprehensive Intervention Program for Children in China. Ethical clearance was approved by the Stomatological Ethics Committee of Chinese Stomatological Association (Approval no. 2014-003).

### *Variable selection*

Clinical dental examinations were carried out with participants seated on a chair, using artificial light, plane mouth mirrors and standard WHO CPI probes. All permanent teeth were examined, and dental caries was diagnosed according to the WHO criteria[7]. Unified training sessions were provided to representative survey examiners from all the provinces, before the national survey began. For reliability assessment, duplicate examina-

tions were conducted during the main survey. Five percent of participants were re-examined to calculate inter-examiner reliability, and the Kappa score was 0.94 for examination of dental caries in 12- to 15-year-olds.

The number of decayed, missing and filled permanent teeth (DMFT) was calculated to show overall caries status and experience. Each item of DMFT, namely the number of decayed permanent teeth (DT), missing permanent teeth (MT) and filled permanent teeth (FT), was also separately computed. These values could exhibit children's dental caries experience and activity. For the National Oral Health Comprehensive Intervention Program for Children in China, the variable of coverage, representing if the region in which the children were living was already covered by the national programme, was used as the grouping variable in the subsequent steps of comparative analysis.

Variables involved in the present study included five categories: Oral health status, oral hygiene behaviours, sugar consumption habits, utilisation of dental services, and oral health knowledge. Caries experience (DMFT = 0 or DMFT ≥ 1), caries activity (DT = 0 or DT ≥ 1) and pit-and-fissure sealant history (no sealants or sealants presented) were reported as indices for oral health status. Oral hygiene behaviours included frequency of toothbrushing (more than twice a day, once a day, less than once a day, and seldom or never), use of toothpaste (yes, no, and unknown), use of fluoride toothpaste (yes, no, and unknown), and use of dental floss (never, occasionally, every week, and every day). Sugar consumption habit score refers to the summary of frequency scores of taking three typical categories of sweet things: Sweet foods, sweet drinks, and sweetened milk/yogurt/tea/coffee, based on six groups of frequency: never (score: 1), one to three times a month (score: 2), once a week (score: 3), two to six times a week (score: 4), once a day (score: 5), and more than once a day (score: 6). Utilisation of dental services was measured by the time of last dental visit (within 6 months ago, 6 to 12 months ago, more than 12 months ago, and never) and the purpose of that visit (consulting and dental examination, prophylactic reasons, treatment, and unknown). Oral health knowledge was reported in the form of whether the participant regarded the following seven statements as incorrect or correct: bleeding after toothbrushing is normal, bacteria can cause gum inflammation, toothbrushing cannot prevent bleeding of gums, bacteria can cause caries, sugary foods can cause caries, fluorides cannot protect the teeth, pit-and-fissure sealants can protect the teeth, and oral diseases may affect general health. All these variables extracted from the examination tables and questionnaires were representative oral health related factors, which will then be further statistically analysed of their relationships with the coverage of the region by the National Oral Health Comprehensive Intervention Program for Children in China.

### *Statistical analysis*

Descriptive analysis of the national programme was performed to show the summary of the number of counties covered, the number of children receiving oral health education and examination, and the number of children receiving pit and fissure sealants, from 2008 when the programme began until 2015, the year when the national survey was performed. Then, variables were compared between 12-year-olds from regions with and without coverage of the national programme. A Chi-square test was performed to test if statistical significance existed between those from regions covered by the national programme and those who were not. Furthermore, the prevalence of dental caries and percentage of pit-and-fissure sealants presented was compared between covered and uncovered regions of the national programme by Chi-square test, while the mean values of DMFT and its subcategories (DT, MT and FT), as well as the mean number of teeth with pit-and-fissure sealants, were compared under different conditions of coverage using *t* test. $P < 0.05$ was considered as statistically significant.

## Results

From 2008 onwards, the number of counties covered by the National Oral Health Comprehensive Intervention Program for Children in China increased year by year. During the 8 years from 2008 to 2015, the completed number of workloads also rose up accordingly, as shown in Table 1. By 2015, when the 4th National Oral Health Survey was performed, in total 149.4 million children received oral health education, 7.2 million of them received oral health examination, and 4.2 million children accepted pit-and-fissure sealants. All these costs were completely covered by the expenditure from the central government of China. The covered regions were expanded, and the service contents of the programme were also extended gradually, with about 25% of counties and 6% of age-appropriate children nationally covered by the national programme by 2015.

In the present study, 27,821 12-year-olds in total – among whom 7,726 were from regions covered by the national programme and 20,095 were from uncovered regions – were finally enrolled. The participants had a half-and-half gender composition, as 49.75% (n = 13,841) of the enrolees were boys, while the other

**Table 1** Summary of the National Oral Health Comprehensive Intervention Program for Children in China, 2008 to 2015.

| Year | Number of counties covered | Number of children who had received oral health education (thousand) | Number of children who had received oral health examination (thousand) | Number of children who had received pit and fissure sealants (thousand) |
|---|---|---|---|---|
| 2008 | 80 | 2,597.0 | 272.7 | 151.2 |
| 2009 | 112 | 3,293.9 | 251.9 | 163.6 |
| 2010 | 267 | 5,876.5 | 810.3 | 523.4 |
| 2011 | 297 | 36,900.5 | 938.4 | 539.6 |
| 2012 | 406 | 41,321.5 | 981.2 | 611.2 |
| 2013 | 508 | 38,892.7 | 1,032.5 | 657.1 |
| 2014 | 542 | 8,447.1 | 1,192.9 | 716.2 |
| 2015 | 591 | 12,100.2 | 1,703.4 | 796.8 |

50.25% (n = 13,980) were girls. The study population was also evenly distributed to urban (51.27%) and rural (48.73%) areas.

Table 2 shows the comparison of four categories of variables, including oral health status, oral hygiene behaviours, utilisation of dental service and oral health knowledge, between children from regions with and without coverage of the national programme. Overall, 35.6% of 12-year-olds from covered regions and 39.6% from regions that were not covered experienced permanent dental caries. 14.8% from covered regions and 3.9% from uncovered regions had the history of pi- and-fissure sealants. Among all the variables, 12 of them were significantly associated with coverage of the national programme in 12-year-olds, including caries experience, pit-and-fissure sealant history, and tooth-brushing frequency, etc ($P < 0.001$, Table 2). Statistical analysis also showed significant difference ($P < 0.001$) in the mean sugar consumption habit scores between those from covered regions (score: $9.42 \pm 3.49$) and those who were not (score: $9.52 \pm 3.56$). However, some other oral hygiene behaviours, such as use of toothpaste ($P = 0.059$), as well as the other three items of oral health knowledge, showed no significant difference when compared between children from regions covered by the national program and those who were not (Table 2).

As shown in Table 3, the mean DMFT score, and its subgroup (DT, MT and FT) score of children from covered regions was $0.76 \pm 1.39$, $0.60 \pm 1.22$, $0.00 \pm 0.07$, and $0.16 \pm 0.65$, respectively, whereas that of children from uncovered regions was $0.89 \pm 1.52$, $0.76 \pm 1.37$, $0.00 \pm 0.08$, and $0.13 \pm 0.61$, respectively. In the regions covered by the national programme, the prevalence of dental caries was 35.55% and the percentage of pit-and-fissure sealants presented was 14.77%, whereas that of children from uncovered regions was 39.61% and 3.87%, respectively. Statistical analysis showed significant difference in prevalence of dental caries, mean DMFT, mean DT, mean FT, percentage of pit-and-fissure sealants presented, and number of teeth with pit-and-fissure sealants ($P < 0.001$) between those from covered regions and those who not. When we took into account the first molars only, all these statistical significances still existed ($P < 0.001$).

## Discussion

This study compared oral health status and its related factors in 12-year-old children from regions with and without coverage of the National Oral Health Comprehensive Intervention Program for Children in China, using the data of the 4th National Oral Health Survey, conducted in 2015 and which covered all 31 provinces, municipalities and autonomous regions nationally in the mainland of China. We found that in regions covered by the national programme, prevalence of dental caries, experience and activity was at a lower level than those not covered, while the presence of pit-and-fissure sealants were also at a better status in the covered regions. Some related factors, such as certain oral hygiene behaviours, sugar consumption habits, utilisation of

**Table 2** Univariate analysis of oral health related factors between 12-year-olds from regions with and without coverage of the National Oral Health Comprehensive Intervention Program for Children in China.

| Variables | | Covered regions | | Uncovered regions | | *P* value |
|---|---|---|---|---|---|---|
| | | N | % | N | % | |
| **Oral health status** | | | | | | |
| Caries experience | | | | | | < 0.001 |
| | DMFT = 0 | 4,979 | 64.4 | 12,136 | 60.4 | |
| | DMFT ≥ 1 | 2,747 | 35.6 | 7,959 | 39.6 | |
| Caries activity | | | | | | < 0.001 |
| | DT = 0 | 5,395 | 69.8 | 12,835 | 63.9 | |
| | DT ≥ 1 | 2,331 | 30.2 | 7,260 | 36.1 | |
| Pit-and-fissure sealant history | | | | | | < 0.001 |
| | No sealants | 6,885 | 85.2 | 19,318 | 96.1 | |
| | Sealants presented | 1,141 | 14.8 | 777 | 3.9 | |
| **Oral hygiene behaviours** | | | | | | |
| Toothbrushing frequency | | | | | | < 0.001[a] |
| | More than twice a day | 3,128 | 40.5 | 5,751 | 28.6 | |
| | Once a day | 3,507 | 45.4 | 10,651 | 53.0 | |
| | Less than once a day | 290 | 3.8 | 1,179 | 5.9 | |
| | Never or seldom | 801 | 10.4 | 2,512 | 12.5 | |
| Use of toothpaste | | | | | | 0.059[a] |
| | Yes | 6,865 | 99.0 | 17,377 | 98.8 | |
| | No | 20 | 0.3 | 66 | 0.4 | |
| | Unknown | 49 | 0.7 | 140 | 0.8 | |
| Use of fluoride toothpaste | | | | | | < 0.001[a] |
| | Yes | 538 | 7.8 | 1,107 | 6.4 | |
| | No | 418 | 6.1 | 928 | 5.3 | |
| | Unknown | 5,899 | 86.0 | 15,341 | 88.3 | |
| Use of dental floss | | | | | | < 0.001[a] |
| | Never | 6,838 | 88.5 | 18,311 | 91.1 | |
| | Occasionally | 769 | 10.0 | 1545 | 7.7 | |
| | Every week | 82 | 0.9 | 116 | 0.6 | |
| | Everyday | 47 | 0.6 | 117 | 0.6 | |
| **Utilisation of dental services** | | | | | | |
| Time of the last dental visit | | | | | | < 0.001[a] |
| | Less than 6 months ago | 1,088 | 14.1 | 2,558 | 12.7 | |
| | 6 to 12 months ago | 1,123 | 14.5 | 2,581 | 12.8 | |
| | More than 12 months ago | 2,467 | 31.9 | 4,966 | 24.7 | |
| | Never | 3,048 | 39.5 | 9,990 | 49.7 | |

| Variables | | Covered regions | | Uncovered regions | | *P* value |
|---|---|---|---|---|---|---|
| | | N | % | N | % | |
| Purpose of the last dental visit | | | | | | < 0.001[a] |
| | Consulting and dental examination | 590 | 26.7 | 1,201 | 23.4 | |
| | Prophylactic reasons | 466 | 21.1 | 914 | 17.8 | |
| | Treatment | 914 | 41.3 | 2,358 | 45.9 | |
| | Unknown | 241 | 10.9 | 662 | 12.9 | |
| **Oral health knowledge** | | | | | | |
| Bleeding after toothbrushing is normal | | | | | | 0.039 |
| | Incorrect statement | 2,720 | 35.2 | 7,341 | 36.5 | |
| | Correct statement | 5,006 | 64.8 | 12,754 | 63.5 | |
| Bacteria can cause gum inflammation | | | | | | < 0.001 |
| | Incorrect statement | 1,839 | 23.8 | 5,214 | 25.9 | |
| | Correct statement | 5,887 | 76.2 | 14,881 | 74.1 | |
| Toothbrushing cannot prevent bleeding gums | | | | | | 0.851 |
| | Incorrect statement | 1,828 | 23.7 | 4,776 | 23.8 | |
| | Correct statement | 5,898 | 76.3 | 15,319 | 76.2 | |
| Bacteria can cause caries | | | | | | 0.109 |
| | Incorrect statement | 3,234 | 41.9 | 8,625 | 42.9 | |
| | Correct statement | 4,492 | 58.1 | 11,470 | 57.1 | |
| Sugary foods can cause caries | | | | | | < 0.001 |
| | Incorrect statement | 1,782 | 23.1 | 4,947 | 24.6 | |
| | Correct statement | 5,944 | 76.9 | 15,148 | 75.4 | |
| Fluorides cannot protect the teeth | | | | | | < 0.001 |
| | Incorrect statement | 4,774 | 61.8 | 12,813 | 63.8 | |
| | Correct statement | 2,952 | 38.2 | 7,282 | 36.2 | |
| Pit-and-fissure sealants can protect the teeth | | | | | | < 0.001 |
| | Incorrect statement | 5,262 | 68.1 | 16,257 | 80.9 | |
| | Correct statement | 2,464 | 31.9 | 3,838 | 19.1 | |
| Oral diseases may affect general health | | | | | | 0.581 |
| | Incorrect statement | 2,707 | 35 | 6,970 | 34.7 | |
| | Correct statement | 5,019 | 65 | 13,125 | 65.3 | |

Chi-square test was performed to test the statistical significance between 12-year-olds from regions covered by the national program and those who not. a $\chi^2$ for trend.

dental services, and some aspects of oral health knowledge, were significantly different between 12-year-olds from regions with and without coverage of the national programme. Thus, these preliminary results indicated that the national programme was expected to play a role in the prevention and control of dental caries in school children, as well as the change of oral health knowledge and practice.

Inequalities in the prevalence of dental caries and related factors for Chinese 12-year-olds were a typical public health problem of oral and dental health in China[8], especially for geographic reasons. This was also discovered between regions covered by the national programme and regions not covered by our present study. As dental caries remained the most apparent dental problem among Chinese children[2], prevention and control of this disease is still foremost, as the untreated caries could bring a heavy disease and economic burden to families and society in general[9]. As all the appropriate techniques used in the national programme were proven to be effective by previous international research, children from regions covered by this programme should have found it easier to access necessary preventive methods, early diagnosis and treatment of caries, as well as oral health education, hence would have better oral health status, knowledge and practice.

Among all these appropriate techniques for caries prevention and control in children, pit-and-fissure sealants were identified as a key procedure[10], particularly for caries in pits and fissures on the molars and premolars. The efficacy of pit-and-fissure sealants was confirmed in a number of studies[10-12] and could contribute directly to lower caries activity in the population. Our present study found that in regions covered by the national programme, the proportion of children with no active dental decay (DT = 0) and that of children with sealants presented were both significantly higher than those from those regions not covered, indicating that the national programme could potentially be helpful for caries control, meaning parents in these covered regions had much better access to preventive measures.

As well as sealants, oral health education was acknowledged to be an effective way to improve oral health knowledge, attitude and behaviour, so as to obtain a better outcome in the prevention and control of oral and dental diseases. We found most of the variables related to oral health knowledge and practice exhibited better in regions covered by the national programme, such as awareness of some "common sense" in the fields of oral and dental health, oral hygiene behaviours, sugar consumption habits, and utilisation of dental services. This could be very important to build a positive

**Table 3** Caries indices (prevalence, DT, MT, FT, DMFT) and pit-and-fissure sealant status of 12-year-olds from regions with and without coverage of National Oral Health Comprehensive Intervention Program for Children in China.

| Variables | N | Prevalence of dental caries (%) | DT | | MT | | FT | | DMFT | | Percentage of pit-and-fissure sealants presented (%) | Number of teeth with pit-and-fissure sealants | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | | Mean | SD |
| Full dentition | | | | | | | | | | | | | |
| Overall | 27,821 | 38.48 | 0.71 | 1.33 | 0.00 | 0.07 | 0.14 | 0.62 | 0.86 | 1.48 | 6.89 | 0.16 | 0.68 |
| Children from covered regions | 7,726 | 35.55 | 0.60 | 1.22 | 0.00 | 0.07 | 0.16 | 0.65 | 0.76 | 1.39 | 14.77 | 0.36 | 0.99 |
| Children from uncovered regions | 20,095 | 39.61 | 0.76 | 1.37 | 0.00 | 0.08 | 0.13 | 0.61 | 0.89 | 1.52 | 3.87 | 0.09 | 0.49 |
| *P* value | | < 0.001 | < 0.001 | | 0.24 | | < 0.001 | | < 0.001 | | < 0.001 | < 0.001 | |
| First molars only | | | | | | | | | | | | | |
| Overall | 27,821 | 33.66 | 0.49 | 0.91 | 0.00 | 0.06 | 0.11 | 0.48 | 0.61 | 1.01 | 6.67 | 0.16 | 0.68 |
| Children from covered regions | 7,726 | 31.69 | 0.43 | 0.84 | 0.00 | 0.05 | 0.14 | 0.53 | 0.57 | 0.98 | 14.40 | 0.36 | 0.99 |
| Children from uncovered regions | 20,095 | 34.42 | 0.52 | 0.93 | 0.00 | 0.06 | 0.10 | 0.46 | 0.63 | 1.02 | 3.71 | 0.09 | 0.49 |
| *P* value | | < 0.001 | < 0.001 | | 0.40 | | < 0.001 | | < 0.001 | | < 0.001 | < 0.001 | |

Chi-square test was used for comparison of percentages between children from regions covered by the national programme and those who were not. A t test was used for comparison of mean values.
Abbreviations: DT, number of decayed teeth; MT, number of missing teeth; FT, number of filled teeth; DMFT, number of decayed, missing and filled teeth; SD, standard deviation.

attitude for oral and dental health in children, which could influence the following decades of their lives and might be the most crucial significance of this national programme to deal with the current challenge of children's oral and dental health in China[2,3].

Some limitations needed to be addressed when attempting to put these findings to further use. Firstly, this was a cross-sectional study, which could not confirm with certainty casual relationships between the national programme and dental caries status. However, this could provide a preliminary estimate for the assumption of benefits brought about by the national programme. Secondly, only methods of univariate analyses were used to compare regions covered by the national programme and those not covered, which could not avoid the mutual effects between different potential factors. Multivariate analyses were expected to yield a better understanding of the nature in future studies.

The present findings could provide some implications for the managers of the national programme as well as policy makers. The expansion and extension of coverage of the national programme could benefit more school-aged children who were at the early stage of permanent dentition, not only reducing their prevalence of dental caries, but also changing their knowledge, attitude and practices relating to oral health. The oral health workforce could also profit from the amplification of coverage of the programme and the construction of appropriate working mechanisms, especially in some underdeveloped regions, e.g. rural areas. Complying with the rapid development of economy in China, oral and dental health ought to be put at a higher position by the public health departments of the government, especially for the well-being of school children, who must be the footstone for the future of the country.

## Conclusion

The National Oral Health Comprehensive Intervention Program for Children in China was potentially contributory to better oral health status, behaviour and knowledge in 12-year-old children. The expansion and extension of coverage of the national programme was expected to be beneficial for improving oral health status in children, as well as constructing teams of oral and dental workforce and working mechanisms, particularly in some underdeveloped regions.

## Conflicts of interest

The authors reported no conflicts of interest related to this study.

## Author contribution

Drs Chao YUAN and Xiao Zhe WANG participated in the study design, performed the research, and drafted the manuscript; Dr Xiang Yu SUN contributed to the epidemiological data collection and analyses, and critically revised the manuscript; Drs Xing WANG, Xi Ping Feng, Bao Jun TAI, De Uu HU, Huan Cai Lin, Bo WANG, Yan SI, Chun Xiao WANG, Wen Sheng RONG, Wei Jian WANG, Xue Nan LIU, and Shu Guo ZHENG trained the investigators, designed and supervised the survey; Drs Xue Nan LIU and Shu Guo ZHENG conceived and supervised the study, provided valuable guidance in study design and editorial review, and critically revised the manuscript.

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