

## Meta-analysis of the prevalence of dental caries among primary and secondary school students in China

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**ADMINISTRATIVE INFORMATION****Support** - Scientific research plan projects of Shaanxi province Education Department [Grant No.22JK0205].**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202480122**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 August 2024 and was last updated on 27 August 2024.**INTRODUCTION**

**Review question / Objective** To comprehend the prevalence of dental caries among primary and secondary school students over the past five years, and to furnish a scientific foundation for the prevention and management of dental caries in this demographic. The incidence of dental caries is widespread among primary and secondary school students in China.

**Condition being studied** Dental caries, also known as tooth decay, is a prevalent and chronic condition globally. Individuals are susceptible to this condition throughout their lifespan. Gradually, a multifaceted interaction between acid-forming bacteria, fermentable carbohydrates, and various host factors—including dental and salivary components—contributes to the development of caries, which typically emerges within the crown and root of the tooth. Dental caries represents one

of the most widespread chronic diseases affecting children, as indicated by the Fourth Chinese National Oral Health Epidemiological Survey Report. The findings revealed that the incidences of caries among permanent teeth among students aged 12 and 15 were 38.5% and 44.4%, respectively. The presence of caries not only diminishes masticatory function but also hampers nutritional digestion and absorption, which in turn can adversely impact the growth and development of students. Educational performance and school attendance are frequently compromised in children affected by dental caries. Currently, adoption of suitable preventive and therapeutic measures is a paramount objective. Despite extensive research on dental caries in primary school children, variations in findings can be attributed to discrepancies in geographical locations, sample sizes, study designs, among other factors. A review of both domestic and international literature focusing on dental caries in primary and secondary school students has identified only one comprehensive assessment of dental caries status

in these age groups, published in 2018. Given the passage of time and subsequent changes in the prevalence of dental caries among primary and secondary school students, this study revisits and synthesizes relevant data from 2020 to 2024, thereby providing a more up-to-date and reliable evidence base for the management and comprehensive prevention of dental caries in primary and secondary school students moving forward.

## METHODS

**Participant or population** Chinese primary and secondary school students.

**Intervention** No intervention.

**Comparator** No comparator.

**Study designs to be included** A comprehensive literature search was conducted in the CNKI, PUBMED, VIP, Wanfang, Web of Science, EMBASE, and MEDLINE databases for studies on the epidemiology of dental caries among primary and secondary school students in China from 2019 to 2024. Subsequently, a meta-analysis was performed on the selected studies that met the predefined criteria. Furthermore, subgroup analyses were carried out based on gender, educational level, regional distribution, and residential status. A comprehensive search of the literature on the epidemiology of dental caries among primary and secondary school students.

**Eligibility criteria** Additionally, literature from non-primary and secondary school students, those containing incomplete information and data, duplicate publications, as well as academic papers, reports, conference abstracts, and other similar forms of documentation, which were not encompassed within the qualifying basic characteristics scale or did not meet the criteria set by the scale, should be considered.

The research period is confined to the timeframe between January 2019 and July 2024; comprehensive data will be made available in its entirety; and the incidence of dental caries among primary and secondary school-aged children should be documented within the scholarly works.

**Information sources** A comprehensive search of the literature on the epidemiology of dental caries among primary and secondary school students in China was conducted in the CNKI, PUBMED, VIP, Wanfang, Web of Science, EMBASE, and MEDLINE databases from 2019 to 2024.

**Main outcome(s)** A cumulative total of 136,763 instances involving primary and secondary school-aged children were included across 20 scholarly articles, encompassing 65,681 cases of dental caries. Meta-analysis findings indicated that the composite detection rate of dental caries among primary and secondary school-aged children in China was 53.6% (95% Confidence Interval: 48.1%-59.0%).

**Quality assessment / Risk of bias analysis** The evaluation criteria established by the STROBE cross-sectional study were employed to ascertain the quality of the included literature, encompassing the following aspects: (1) the scientificity and rationality of the research design; (2) the clarity of the research objectives; (3) the representativeness of the research subjects; (4) the precision of the diagnostic standards; and (5) the reasonableness of the statistical approaches. These criteria were categorically annotated as "Yes," "Unclear," or "No," corresponding to the numerical designations of "2," "1," and "0," respectively. Literature with an aggregate score exceeding 8 were deemed to possess high quality, whereas those with a score of 8 or less were considered to be of inferior quality.

**Strategy of data synthesis** The analysis of the caries consolidation rate among primary and secondary school students was conducted using the State16 software, incorporating a 95% confidence interval (95% CI). Heterogeneity testing revealed an  $I^2$  value greater than 50%, necessitating the utilization of a random-effects model for the integration of the data. A funnel plot was constructed to detect publication bias, followed by subgroup analysis ( $P < 0.05$  was deemed statistically significant) and sensitivity analysis. The significance level,  $\alpha$ , was set at 0.05.

**Subgroup analysis** Twenty studies examining the incidence of dental caries among primary and middle school students across various academic levels were incorporated into the analysis. The meta-analysis utilizing a random effects model revealed that the prevalence rates for primary and middle school students were 60.6% (95%CI: 55.3%-65.7%) and 40.3% (95%CI: 34.6%-46.1%), respectively, demonstrating statistically significant variations by grade. Additionally, a meta-analysis of twenty studies assessing the prevalence of dental caries among primary and secondary school children across different geographical locations was conducted. The findings indicated that the Northeastern region of China exhibited the highest prevalence at 68.9% (95%CI: 66.8%-71.0%), whereas the North region reported the lowest

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prevalence at 44.0% (95%CI: 32.7%-55.6%), with statistically significant differences observed among these regions. Furthermore, an analysis incorporating twenty studies with varying gender demographics and five studies with diverse residential locations failed to yield statistically significant results.

**Sensitivity analysis** The sensitivity analysis conducted on the dental caries incidence rates among primary and secondary school students revealed that the removal of any of the articles did not alter the combined effect size in this study.

**Country(ies) involved** China.

**Keywords** Elementary and secondary school students; decayed dentition; prevalence ratio; meta-analysis.

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