



ORIGINAL ARTICLE

# Dental caries status and risk indicators of dental caries among middle-aged adults in Shanghai, China



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## KEYWORDS

dental caries;  
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**Abstract** *Background/purpose:* Because of the dramatic changes in socioeconomic background and expansion of the oral healthcare system in Shanghai, China, it is of great importance to update the dental caries status of adults and to investigate the relationships among socioeconomic status, utilization of dental services, and dental caries experience. The objective of this study was to investigate the dental caries status and its associated factors among middle-aged adults in Shanghai, China.

*Materials and methods:* A cross-sectional study was conducted among adults aged between 35 and 44 years. An equal-sized stratified multistage random sampling method was used to select the participants. Dental caries status was assessed using the decayed, missing, and filled teeth (DMFT) and decayed or filled (DF) root indices. Information on oral health behaviors and attitude was collected using self-administered questionnaires. Negative binomial regression was performed to investigate the risk indicators that may be associated with the dental caries experience among middle-aged adults.

*Results:* The mean DMFT and DF-root scores of the surveyed adults were 5.3 and 0.7, respectively. Missing teeth and untreated decayed teeth contributed to approximately 60% and 25% of the DMFT score, respectively. The prevalence rate of dental caries experience and the prevalence of DF roots was 91.4% and 30.3%, respectively. The negative binomial regression model showed that adult females ( $P = 0.001$ ), and those who had visited the dentist ( $P < 0.001$ ) had significantly higher DMFT scores.

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*Conclusion:* Dental caries status among middle-aged adults in Shanghai shows an increasing trend. Sex and dental visiting pattern were significant risk indicators for dental caries status. Copyright © 2013, Association for Dental Sciences of the Republic of China. Published by Elsevier Taiwan LLC. All rights reserved.

## Introduction

Dental caries is a prevalent oral disease worldwide. It affects a vast majority of adults, including those in developed countries.<sup>1,2</sup> According to the criteria of the worldwide map on the dental caries level proposed by the World Health Organization, the level of dental caries in 35–44-year-old adults in China is very low.<sup>1,2</sup> However, China is the most populous and third largest country in the world with a population of over 1.3 billion, and over 30% of adults are aged between 30 and 50 years. In proportion to the large population of adults, the number of teeth affected by dental caries is very large, and subsequently a large number of resources are required to treat them.

In China, very few large-scale epidemiological studies have been conducted on middle-aged adults because of study recruitment difficulties. Although a few large-scale studies (such as the national oral health survey) have targeted middle-aged adults<sup>3</sup> and reported dental caries status, the associations of dental caries status with oral health behavior, knowledge, and attitude were not investigated. Some studies have investigated the risk indicators of dental caries among middle-aged adults in China, but they were based only on urban population groups and were conducted decades ago.<sup>4,5</sup> Therefore, up-to-date epidemiological data on the risk indicators of dental caries among middle-aged adults in China are needed.

Shanghai is the most prosperous and populous city located in eastern China with an estimated population of 16.7 million. Because of its rapid growth in the past two decades, it is now one of the world's leading cities. The socioeconomic background of the population has also changed in terms of affluence and access to health care. Nowadays, oral health care in China is provided by the public and nonpublic health services. According to a previous study conducted in Shanghai, there were 852 medical centers that had dental departments. Among them, 364 (43%) were public dental medical centers and 488 (57%) were nonpublic dental medical centers. The ratio of dentists to population in Shanghai was 1:5201,<sup>6</sup> which is similar to the 1:5000 ratio reported for moderately developed countries.<sup>7</sup> Therefore, based on changes in socioeconomic background and expansion of the oral healthcare system, it is of great importance to update the dental caries status of adults in Shanghai. The aim of this study was to investigate the dental caries status (including coronal and root caries) and associated factors among middle-aged adults in Shanghai.

## Materials and methods

### Survey sampling

This study was a part of the third national survey in China in 2005 in which Shanghai was selected as one of the sampling

units. Our study sample was selected from Shanghai residents aged between 35 and 44 years using an equal-sized stratified multistage random sampling method. In Shanghai, there are nine urban districts and nine rural counties. Three urban districts and three rural counties were randomly selected. Within each selected urban district or rural county, three subdistricts were randomly selected. For each selected subdistrict, two resident committees or villages were then randomly selected. In total, 36 survey sites were randomly selected, 18 in urban districts and 18 in rural counties. From each resident committee or village, approximately 24 middle-aged adults (male-to-female ratio was approximately 1:1) were recruited. Approximately 860 middle-aged adults were invited to participate in this survey.

With assistance from the Shanghai Municipal Health Bureau, relevant authorities in the survey sites were contacted before starting the fieldwork to discuss the aims of the study and the detailed plans. All selected participants were recruited through home visits, and then an examination date for each adult was scheduled by staff in the resident committees or villages. For the examination, the participants were asked to come over to the examination venue, which was usually set up at the resident committee's or village's offices.

### Data collection

All participants were clinically examined and dental caries status was collected according to the WHO methods and criteria.<sup>8</sup> Six trained and calibrated examiners performed all the oral examinations. For dental caries status, both crown and root were assessed. The teeth were neither cleaned nor dried before the assessment. Dental caries experience on the crown was measured using the decayed, missing, and filled teeth (DMFT) index. The root caries was measured by counting the roots that were decayed or filled (DF root). Dental caries was recorded visually and is considered present if a lesion had an unmistakable cavity, undermined enamel, or a detectable softened floor or wall. Early caries were not recorded. A portable light, disposable plane mouth mirror, and a light-weight Community Periodontal Index probe were used during the dental examinations. The participants were examined in a supine position.

All participants were asked to complete a structured questionnaire before the clinical examination. The questionnaire covered sociodemographic background, oral health behavior (including dietary habits, oral hygiene practices, use of fluoride toothpaste, and utilization of dental services), and oral health attitude. An oral health attitude score was constructed by evaluating responses to four statements regarding the importance of oral health, the importance of retaining natural teeth, utilization of dental services, and oral health beliefs. For each statement, the participants were asked to indicate whether they agreed, disagreed, or had no comment. The oral health attitude score was computed by counting the total number of statements to which the participants held a

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