

## Decline of the edentulism epidemic in Australia

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### INTRODUCTION

Edentulism, the loss of all natural teeth, reflects both the accumulated burden of oral disease and the consequences of its treatment by dental extraction. Edentulism is dentistry's equivalent to mortality. For the individual, edentulism substantially reduces quality of life.<sup>1</sup> The welfare and management of edentulous adults remains an important public health issue, having direct reference to the global goals for oral health by 2010.<sup>2</sup> It is a determinant of the demand for dental care within populations because people without teeth visit the dentist far less frequently than dentate people.<sup>3</sup> The prevalence of edentulism (i.e., the percentage of people with no natural teeth) has declined in the last 50 years in most Western nations.<sup>4</sup> In Australia, edentulism prevalence reduced between 1979 and 2002 among all ages and genders, and in all States/Territories.<sup>5</sup> This paper provides an update on that trend, and further analyses prevalence of edentulism within birth cohorts to illustrate that the decline is related entirely to the passing of generations that experienced an epidemic of complete tooth loss during the first half of the twentieth century.

### METHODS

#### National Survey of Adult Oral Health 2004–06

The most recent information about edentulism in the Australian population comes from the National Survey of Adult Oral Health 2004–06 (NSAOH).<sup>6</sup> Subjects for the Survey were sampled at random from an electronic database of residential phone numbers listed in the electronic white pages. Sampling was stratified between metropolitan and non-metropolitan parts of each State/Territory, and phone numbers were clustered within selected postcodes. Some 14 123 adults, defined as people aged 15 years or more, were interviewed giving a participation rate of 49 per cent. Interviewed people were asked 79 questions including one question about complete tooth loss: "Do you have any of your own natural teeth?" Possible responses were "yes", "no" and "don't know" (although none of the latter were reported). Other questions asked about demographic characteristics including age and state of residence.

For this analysis, data were weighted to reflect the age-, gender- and State/Territory distribution of the Australian population in 2005. Permission was sought and received for

all aspects of data collection from the Human Ethics Committee of The University of Adelaide.

#### National Oral Health Survey of Australia 1987–88

The 1987–88 National Oral Health Survey of Australia (NOHSA) was an examination survey of a representative sample of Australian adults and children living in the six States and the Australian Capital Territory. They were sampled at random from residential dwellings located within selected Census Collection Districts using a stratified, clustered sampling design. The survey collected similar information to NSAOH, although from an independent sample of people. In NSAOH, dentist-examiners assessed whether study subjects were dentate or edentulous. For this analysis, data were weighted to reflect the age-, gender- and State/Territory distribution of the Australian population, excluding the Northern Territory, in 1986.

The passage of time between population surveys captures two dimensions of time.<sup>7</sup> One dimension represents the effects of age and events that occur between surveys on the life course of individuals in the population. The other reflects the unique historical experiences of the different birth cohorts, also called generations, that constitute the

**Table 1. Percentage of adults\* with complete tooth loss**

Age	
All ages	6.4
15-34 years	0.0
35-54 years	1.7
55-74 years	13.9
75+ years	35.7
Gender	
Male	5.2
Female	7.7
Indigenous identity	
Indigenous	7.9
Non-Indigenous	6.4
Residential location	
Capital city	5.0
Other places	9.0
Level of schooling	
Year 9 or less	21.9
Year 10 or more	4.1
Public dental care	
Eligible	17.1
Ineligible	2.7
Dental insurance	
Insured	3.1
Uninsured	9.4

\*People aged 15 years or more.

\*Prepared by LA Crocombe and GD Slade.

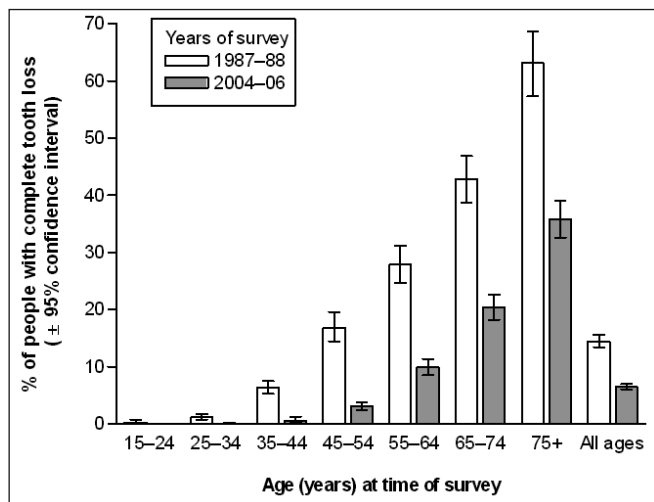


Fig 1. Age group trends in percentage of Australian adults with complete tooth loss, 1987-88 to 2004-06.

populations studied in each survey. Changes attributable to effects within generations and between generations can be assessed using birth cohort analysis, whilst age group analysis aims to describe the amount of change in population health for selected age groups.

## RESULTS

### Cross-sectional findings

In 2004-06, edentulism was virtually non-existent among people aged 15-34 years, but its prevalence was greater for successively older age groups, reaching 35.7 per cent among people age 75 years or above (Table 1). Edentulism prevalence was greater among people with nine years or less of schooling compared with people who had 10 years or more, among people who were eligible for public dental care compared with people who were not, and among people without private insurance compared with people with private insurance. In contrast, prevalence differed only to a small degree between the genders, between Indigenous and non-Indigenous people, and between people who lived in capital cities compared with other places. As reported elsewhere,<sup>8</sup> some between-group differences were a consequence both of

the effect of the variable itself and of age. When the prevalence of complete tooth loss within each age group was compared, the effects of level of schooling and eligibility for public dental care were attenuated but not removed, whilst the effect of no private insurance was not diminished.

### Age group analysis

In the 17 years between the two national surveys, the prevalence of edentulism halved, from 14.4 to 6.4 per cent (Fig 1). There were dramatic reductions in every 10-year age group, with the relative reduction being greater among younger age groups.

### Birth cohort analysis

When comparing the same birth cohort at the two survey times, the prevalence of edentulism was unchanged, no matter which age group was considered (Fig 2).<sup>9</sup> In other words, population prevalence did not change as members of each birth cohort aged the 17 years between the two surveys. This conclusion is valid, even though different individuals were studied in each survey because each survey was an independent representative sample of the Australian population.

### Projections of prevalence of complete tooth loss

The analysis of the historical trends in edentulism allows projection into the future of the prevalence of complete tooth loss. Based on the assumption that prevalence of edentulism will increase by no more than 1 per cent each 15-20 years within cohorts, prevalence in the adult population is projected to decrease to 2.7-3.1 per cent by 2021 and 0.4-1.0 per cent by 2041 (Table 2).

## DISCUSSION

These latest findings confirm the continuing trend of declining edentulism prevalence in the Australian population. In addition to an overall halving of prevalence in the 17 years between surveys, the birth cohort analysis illustrates an intriguing paradox: edentulism is unrelated to age and instead is entirely dependent upon when people were born. In any one survey, these two dimensions of time overlap

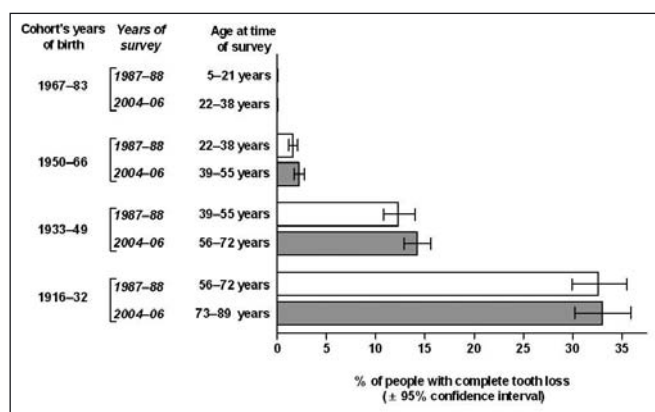


Fig 2. Birth cohort trends in percentage of Australian adults with complete tooth loss, 1987-88 to 2004-06.

Table 2. Projected prevalence of complete tooth loss in Australia

Age (years)	2004-06	2021 Low - High	2041 Low - High
40-44	0.8%	0.0-0.0%	
45-49	2.1%	0.0-0.0%	
50-54	3.9%	0.3-1.3%	
55-59	7.5%	0.8-1.8%	
60-64	12.9%	2.1-3.1%	0.0-1.0%
65-69	17.9%	3.9-4.9%	0.0-1.0%
70-74	23.3%	7.5-8.5%	0.3-2.3%
75-79	33.6%	12.9-13.9%	0.8-2.8%
80-84	36.2%	17.9-18.9%	2.1-4.1%
85+	42.7%	23.3-24.3%	3.9-5.9%
Projected %	Edentulous	2.7-3.1%	0.4-1.0%

\*Low: Assuming continued trend of no within-cohort increase in prevalence. High: Assuming continued trend of 1% within-cohort increase in prevalence.

unavoidably, therefore masking the separate effects of ageing and history. However, the birth cohort analysis reveals no effect of ageing during the 17 years between surveys. Instead, the difference between age groups within one survey is due entirely to different historical experiences of those age groups.

The seemingly unspectacular finding that edentulism did not significantly change for any birth cohort between 1987–88 and 2004–06, needs to be understood within its historical context. In the first half of the twentieth century people were exposed to a virtual “epidemic” of complete tooth loss in direct response to the theory of focal infection.<sup>4</sup> Hunter and others hypothesized that dental decay and other oral diseases created reservoirs of bacteria that could spread through the body, causing a wide range of systemic disease, some of them fatal.<sup>10</sup> In response to this belief, full mouth extractions were commonplace between 1920 to the late 1940s, a situation that changed rapidly after the late 1940s.

Because edentulism is influenced entirely by year of birth, and not by ageing, it is inevitable that its prevalence will continue to decline with the passing of generations born in the first half of the twentieth century. The projections presented in this paper suggest that the decline will continue until the middle of this century, by which time only about 1 per cent of Australians will be edentulous. One of the “consequences of success”<sup>3</sup> from this trend is an expected increasing demand and need for dental care, particularly in older age groups.

#### ACKNOWLEDGEMENTS

The National Survey of Adult Oral Health 2004–06 was supported by the National Health and Medical Research Council, the Australian Government Department of Health and Ageing, the Australian Institute of Health and Welfare, Colgate Oral Care, the Australian Dental Association and the US Centers for Disease Control and Prevention.

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