THE ORAL HEALTH OF OLDER NEW ZEALANDERS: WHAT DO WE KNOW FROM RECENT RESEARCH?

Timaru U3A, Monday 9 November 2020

Professor WM Thomson
Faculty of Dentistry

OUTLINE

Thinking about ageing

The common oral conditions

Oral health and older people

OPOHS findings

- Nutritional status and oral health
- Dry mouth and polypharmacy
- Etc

Current challenges

MY BACKGROUND

Grew up in Huntly (North Waikato)

University of Otago graduate – BSc (physiology), BDS, MComDent

University of Leeds – MA (health services studies)

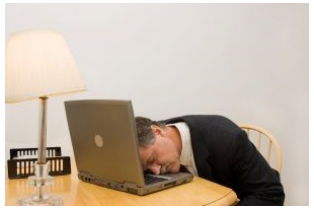
University of Adelaide – PhD (dental epidemiology)

Private dental practice – NZ, England (five years)

Dental public health/hospital dentistry – NZ (seven years)

Academic since 1994 (Adelaide then Otago – from 1996)

WHAT I DO AS AN ACADEMIC



Teaching

Undergraduate

DENT 263, 363, 463

DENT 363 - coordinator

Postgraduate

MComDent

DClinDent

Research supervision

13 current:

6 PhDs, 5 DClinDents,

2 MComDents

81 completions to date:

10 PhD, 27 DClinDents,

26 MComDents, 12 MDS,

6 MPH

Service

University

HoD Oral Sciences

(2014-19)

Other

Journal work:

Editor-in-Chief,

Comm Dent Oral Epidemiol

(≈570 MS/year)

Associate Editor,

Eur J Oral Sci

(≈45 MS/year)

Research

Epidemiology

Life course epidemiology

Dunedin Study

Australia – SADLS, SMILE

National survey work

Gerodontology

Health Services Research

OHRQoL, outcomes

Service use

Workforce

THINKING ABOUT THE MOUTH

Biomedical

Entrance to the gastrointestinal system

Comminution of food

Commencement of digestion

Facilitative role of saliva

Bone, mucosa, teeth, supporting connective tissues, tongue, cheeks, lips

Biopsychosocial

Central to our identity

Visible marker of social status

Communication – verbal, nonverbal

Eating, drinking, kissing

Quality of life

THINK ABOUT OLDER PEOPLE IN LIFE-COURSE TERMS

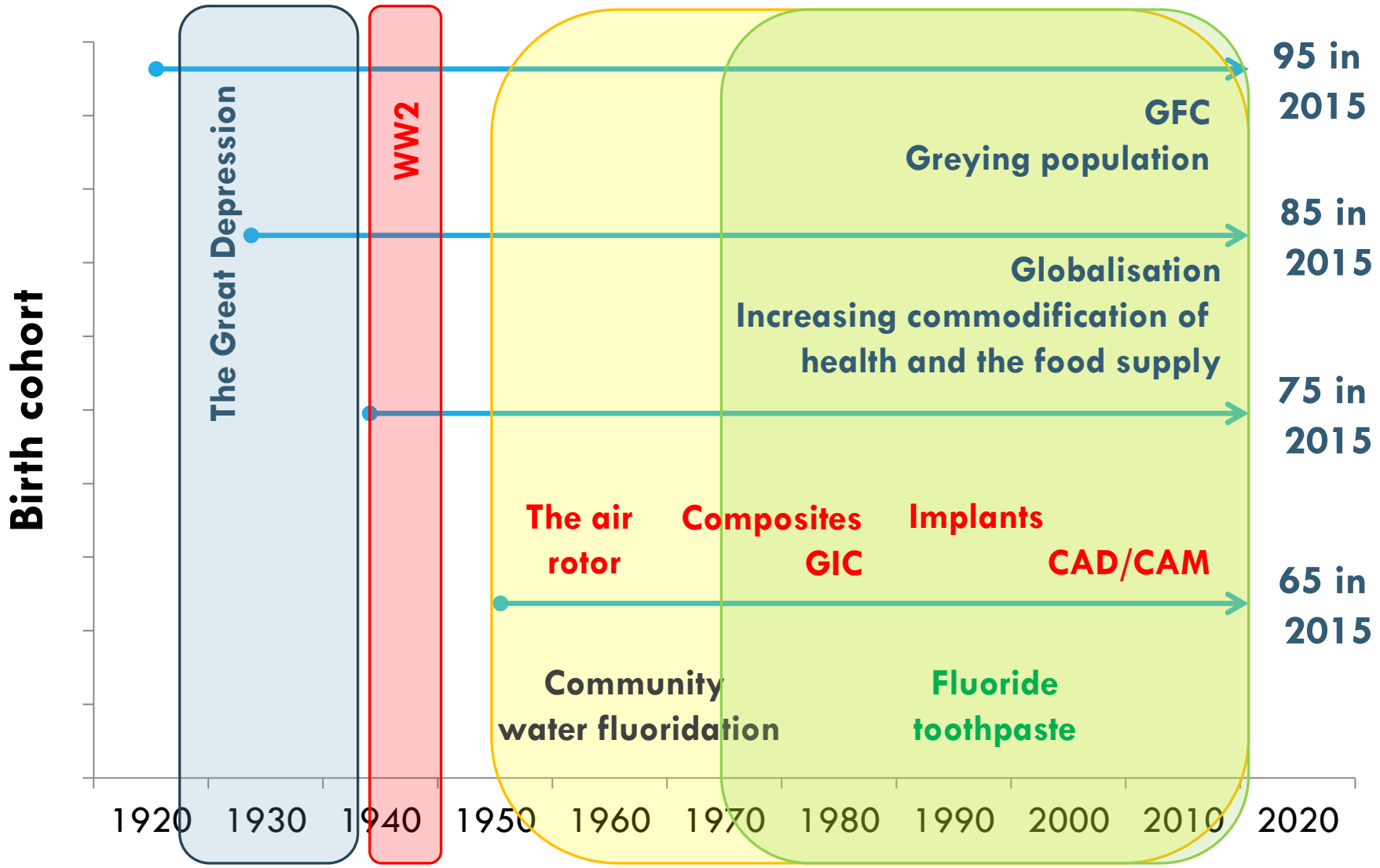
Older people have not arrived from space(!)

They have been shaped by their journey through the life course

- Age effects (maturation/senescence)
- Period effects (time)
- Cohort effects (generation)

What we see in their oral health reflects all of those influences

> Ettinger (1993): Elderly individuals are a complex combination and expression of their individual genetic predispositions, lifestyles, socialization and environments, all of which affect their health beliefs and, consequently, their health behavior. To understand an individual, one must evaluate the social, cultural, economic and chronologically specific cohort experiences which have shaped his/her life.


Birth cohort
The Great Depression
WW2
GFC
Greying population
Globalisation
Increasing commodification of
health and the food supply
The air
rotor
Composites
GIC
Implants
CAD/CAM
Community
water fluoridation
Fluoride
toothpaste
95 in
2015
85 in
2015
75 in
2015
65 in
2015
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020

THE COMMON ORAL CONDITIONS

Tooth loss

Dental caries (tooth decay)

Periodontal (gum) disease

Dry mouth

Oral cancer/precancer

TOOTH LOSS

Incremental tooth loss

The unplanned, symptom-driven loss of teeth

Disease- or trauma-related

More common among males

Very common among adults, especially older adults

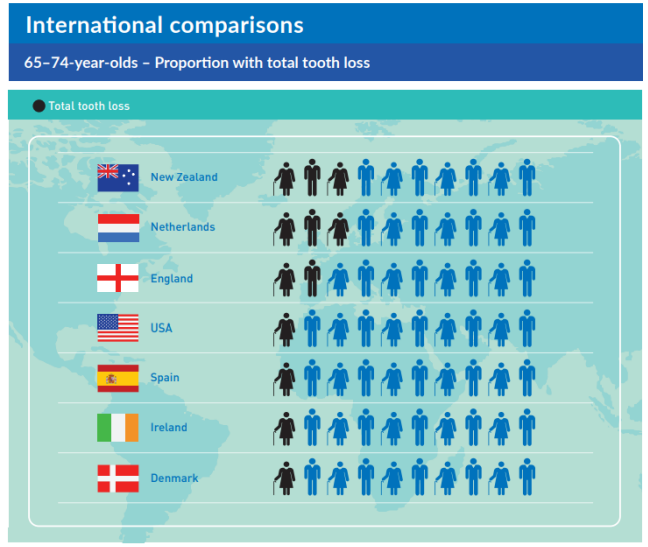
Edentulism

Consequence of complete removal of the remaining dentition

Socially and clinically determined

More common among females

Declining



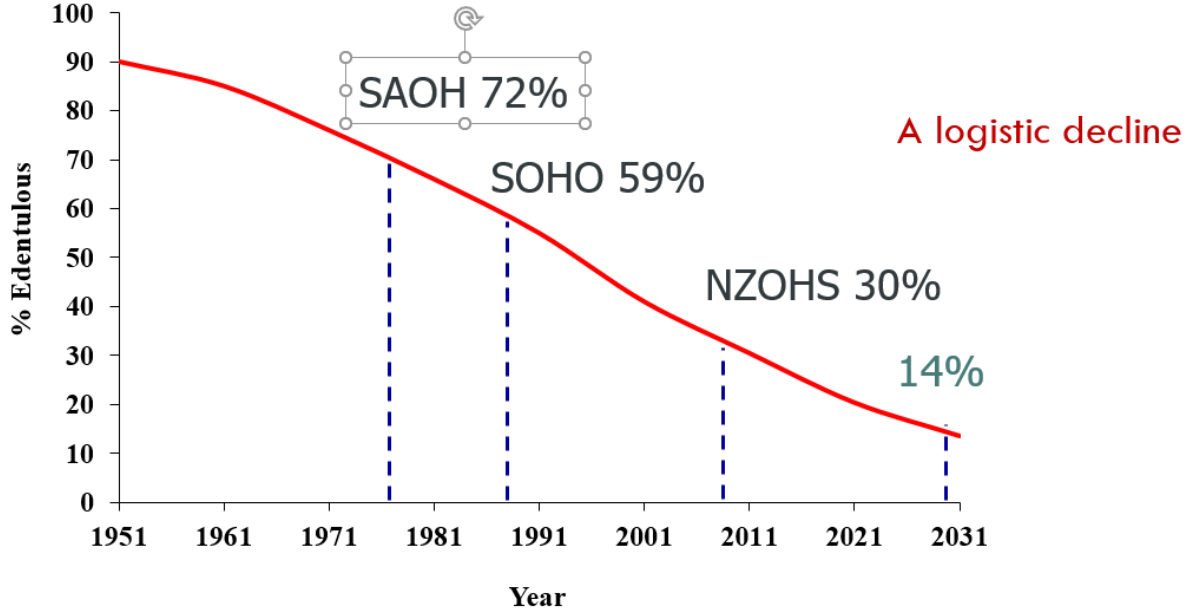
EDENTULISM (NO NATURAL TEETH LEFT)

NZ has historically had the highest rates in the world

Complex social and historical reasons

People are able to eat with no teeth, but it's easier with full dentures

No really good evidence for poorer nutrition in edentulous people



INVESTIGATING THE LAY CULTURE OF EDENTULISM

Semi-structured interviews with 20 people

- Purposive maximum-variation sampling
- Aged 75+; all European (12F, 8 M)
- Living in or around Nelson
- Became edentulous before 1960
  - Age at clearance ranged from 15 to 40 (mean 26)

Data interpretation supplemented by perusing the published literature of the time

Gerodontology

Original article

Understanding the 'epidemic' of complete tooth loss among older New Zealanders

Philip V. Sussex[1], W. Murray Thomson[2] and Ruth P. Fitzgerald[3]

[1]Department of Oral Health, Nelson Hospital, Nelson, New Zealand; [2]School of Dentistry, The University of Otago, Dunedin, New Zealand; [3]Department of Anthropology, The University of Otago, Dunedin, New Zealand

Gerodontology 2009; doi:10.1111/j.1741-2358.2009.00306.x

Understanding the 'epidemic' of complete tooth loss among older New Zealanders

Objective: The aim of this study was to obtain a deeper understanding of the social factors driving New Zealand's historic 'epidemic of edentulism' and how they operated.
Method: In-depth, semi-structured interviews with 31 older New Zealanders were analysed using applied grounded theory.
Results: Universal factors present in the data were: (a) the way in which New Zealand society accepted and indeed encouraged edentulism without stigma for those who had a 'sub-optimal' natural dentition; (b) how the predominant patterns of dental care utilisation (symptomatic and extraction-based) were often strongly influenced by economic and social disadvantage; and (c) the way in which lay and professional worldviews relating to 'calcium theory' and dental caries were fundamental in decisions relating to the transition to edentulism. Major influences were rural isolation, the importance of professional authority and how patient-initiated transitions to edentulism were ultimately facilitated by an accommodating profession.
Conclusion: The combined effects of geography, economics, the dental care system and the professional culture of the day, in the context of contemporary (flawed) understandings of oral disease, appear to have been the key drivers. These were supported (in turn) by a widespread acceptance by the profession and society alike of the extraction/denture philosophy in dealing with oral disease.

Keywords: complete tooth loss, edentulism, dental care, qualitative research.

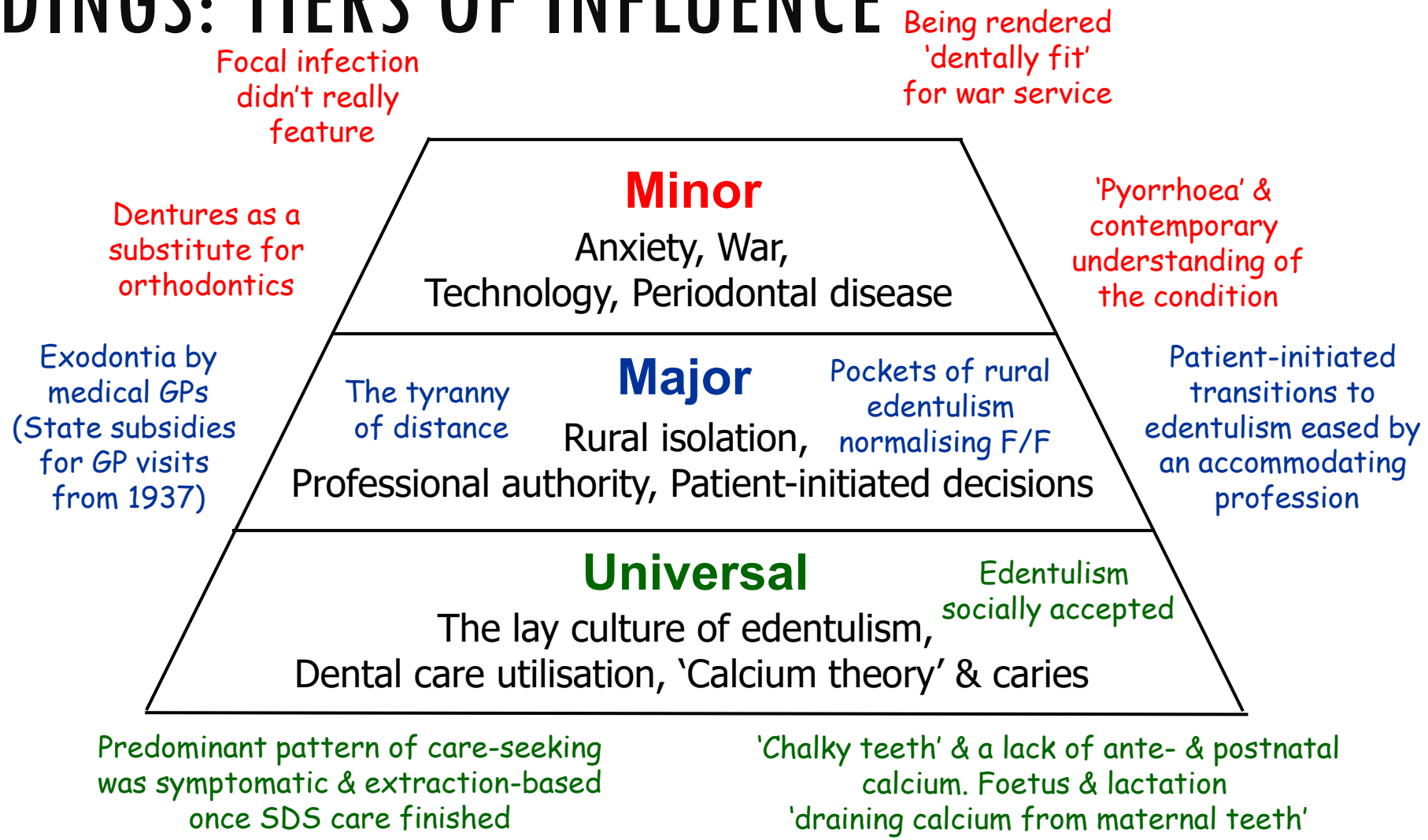
Accepted 30 April 2009

Introduction

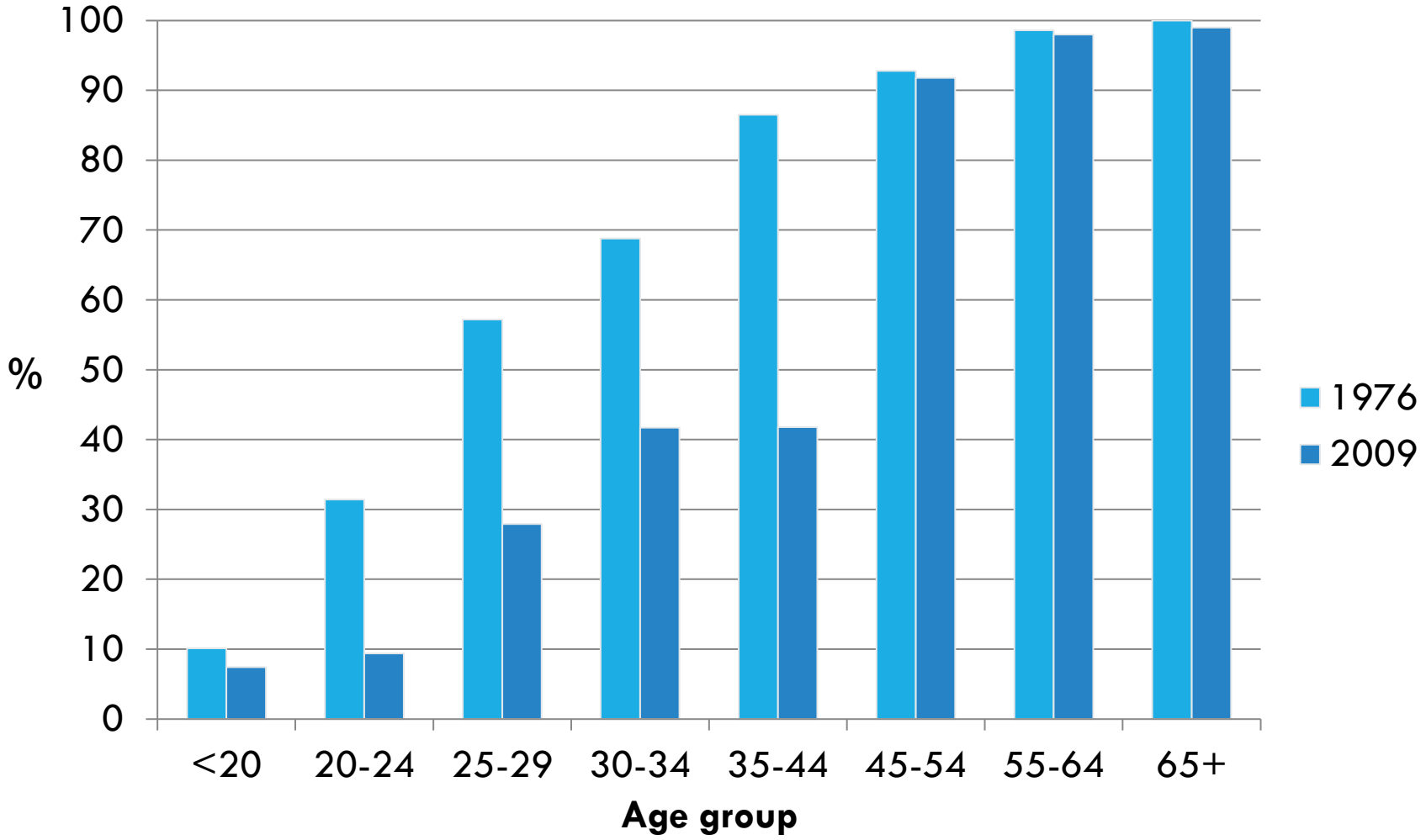
Edentulism is the state of having lost all of one's natural teeth. New Zealand has the dubious distinction of being a worldwide leader in the prevalence of edentulism among adults; it is a phenomenon which, according to national survey data[1,2], peaked in the middle of the 20th century and has since dramatically declined. Analysis of such data has shown that the risk of edentulism does not increase because of ageing but, rather, is a period effect due to today's older people having experienced much higher rates of edentulism than the successive generations[3]. Internationally, different countries have dealt with comparable rates of dental disease in radically different ways and variations in edentulism rates are an objective measure of this. However, as yet, little research has focused on uncovering what social factors (rather than disease related characteristics) were driving this 'epidemic of edentulism', and how they operated[4]. The rise in popularity of the theory of focal infection (a theory popular in the early 20th century which included the belief that oral disease could cause serious diseases at distant sites) has previously been cited as a key driver in edentulism; however, the extent to which this was in fact the case is not clear[4]. Although it has not previously been used to investigate the New Zealand edentulism phenomenon, the qualitative research approach has the intellectual rigour and process to seek to objectively answer these questions from the perspective of the research participants and to explore with them the socio-dental factors that led to their edentulous state.

The objective of this study was to enhance understanding of the factors contributing to the

FINDINGS: TIERS OF INFLUENCE



PREVALENCE OF 1+ MISSING TEETH IN NZ



TOOTH DECAY AMONG OLDER PEOPLE

RESEARCH REPORTS
Clinical

Estimating Rates of New Root Caries in Older Adults

S.O. Griffin[1]*, P.M. Griffin[2], J.L. Swann[2], and N. Zlobin[2]

[1]Centers for Disease Control and Prevention/Division of Oral Health/Surveillance, Investigations, and Research Branch, 4770 Buford Highway, MS#10, Chamblee, GA 30341, USA; and [2]School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0205, USA; *corresponding author, sig1@cdc.gov

J Dent Res 83(8):634-638, 2004

ABSTRACT

Although older adults are keeping their teeth longer, no national data are available on new caries in this age group. To characterize the extent of caries among older adults, we systematically reviewed studies on root caries incidence, increment, attack rate, and annual total (root + coronal) caries increment. We used a random-effects model to estimate annual summary measures and their 95% confidence intervals (CI) and tested for heterogeneity. For the 9 studies reporting root caries incidence, the summary measure equaled 23.7% (CI = 17.1-30.2%). For the 9 studies reporting root caries increment, the summary measure was 0.47 surfaces (CI = 0.34-0.61). For the 7 studies reporting total caries increment, the summary measure equaled 1.31 surfaces (95% CI = 1.01-1.61 surfaces). Because of heterogeneity, summary measures should be interpreted with caution. This research suggests, however, that older adults experience high rates of new caries and could benefit from caries-prevention programs.

KEY WORDS: root caries, incidence, increment.

INTRODUCTION

US adults are keeping their teeth longer (US Department of Health and Human Services, 2000); however, increased retention of teeth means that more adults are at risk for root caries. Gingival recession caused by normal aging puts root surfaces especially at risk (US Department of Health and Human Services, 2000). Among dentate adults, the prevalence of root caries experience is about 8 times higher among those aged 75+ yrs (55.9%) than among those aged 18 to 24 yrs (6.9%) (Winn *et al.*, 1996). Because the overall US population is growing, with the proportion of the US population aged 65 yrs or older projected to increase from 12.5% in year 2000 to 20.1% in 2030 (Administration on Aging, 2003), root caries experience can be expected to increase in future years.

Very few public dollars are allocated to adult dental disease. Dental care is one of the few health areas not covered by Medicare (US Government program that covers medical costs for adults over age 65 years), and only a limited safety net exists to provide dental care to low-income adults; Medicaid frequently covers only emergency dental care for adults; approximately 15% of state Medicaid programs (US program funded by Federal and state governments that covers medical costs for the poor) provide no adult dental benefits, and approximately 45% cover only tooth extraction and emergency services (Oral Health America, 2003). With the exception of water fluoridation, virtually all community prevention programs target children and youth (Association of State and Territorial Dental Directors and Centers for Disease Control and Prevention, 2002). As a result, decay among adults is more likely to remain untreated, the mean number of untreated decayed surfaces among American adults (1.8) (Winn *et al.*, 1996) is about 4 times that among US schoolchildren (0.4) (Kaste *et al.*, 1996).

Documenting the burden of root caries is important, because this condition can be prevented and/or arrested in its early stages with fluorides, and such early preventive treatments have been shown to lower overall treatment costs (US Department of Health and Human Services, 2000; Leake, 2001). In this study, we systematically reviewed published studies of root caries incidence (the proportion of population developing caries in at least 1 root surface), root caries increment (the mean number of root surfaces becoming decayed or filled *per person*), and root caries attack rate (proportion of root surfaces at risk for caries [*i.e.*, sound, exposed, which developed caries]). We also estimated the total caries increment (root plus coronal) by analyzing data from studies that presented both root and coronal caries increments.

One previous study has summarized (the findings of 5 North American studies on new root caries (Leake, 2001). Our study adds the findings of 6 studies conducted among populations living in advanced market economies and uses different assumptions on how to adjust for negative reversal and to derive annual estimates of incidence. Our study also differed from the

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See appendix to this article is published at http://www.dentalresearch.org

IN BRIEF

- More and more people are retaining their teeth into old age. This paper examines the findings of a number of large studies which have followed older people over time in order to examine the natural history of dental caries in that age group.
- Surprisingly, the dental decay rate over time among older people is at least as great as that among adolescents.
- Interventions aimed at improving the oral health of older people should take into account and use a broad combination of clinical and population-based strategies, as there is no 'magic bullet' which will eliminate the problem.

RESEARCH

VERIFIABLE CPD PAPER

Dental caries experience in older people over time: what can the large cohort studies tell us?

W. M. Thomson[1]

Background Little was known of the natural history of dental caries among older adults until recently, but reports from a number of large cohort studies have now enabled better understanding of the nature and determinants of dental caries in older people. The aim of this review is to examine and compare findings from established population-based longitudinal studies of older adults in order to determine their preventive implications.

Methods The dental literature was reviewed in order to identify reports on dental caries incidence from large, population-based dental longitudinal studies of older adults (age 50+) with at least 3 years of follow-up.

Results Reports were identified from four studies (in Iowa, North Carolina, Ontario and South Australia) which met the criteria; four reports dealt with coronal caries, and five with root surface caries. When annualised, coronal and root surface caries increments were combined and compared with those reported for adolescents, the caries experience of older people over time (between 0.8 and 1.2 new surfaces affected per year) exceeded that reported from cohort studies of adolescents (between 0.4 and 1.2 surfaces per year). The only caries risk factor common to all four studies was the wearing of a partial denture (for root surface caries only).

Conclusions Older people are a caries-active group, experiencing new disease at a rate which is at least as great as that of adolescents.

Practice implications Dentate older people should be the target of intensive monitoring and preventive efforts at both the clinical practice and public health levels. There is no easily identifiable 'magic bullet' for preventing caries in that age group, but the use of evidence-based preventive interventions (such as fluoride) should suffice.

As well as undergoing a demographic transition, whereby the number and proportion of older people in the population are increasing steadily,[1] industrialised countries are also undergoing a 'dental transition', marked by a steady reduction in edentulism and missing teeth among older people.[2] The dental profession is now faced with the challenges of treating and preventing dental caries in an age group in which little is known or understood of the disease. Moreover, there is a perception among dental professionals and policy-makers that dental caries is, for the most part, only active in younger people.[3] Over a decade ago, a clear need was identified for information on the natural history of dental caries among older people,[4,5] in order to provide clarification of issues such as: (a) whether root surface caries is, in fact, the predominant form of caries experienced; (b) whether coronal caries increments continue in dentitions which are already heavily restored; and (c) the nature and timing of possible interventions to prevent those diseases or arrest their progression.

Studying the natural history of chronic, progressive diseases such as dental caries, requires the use of the longitudinal study design, whereby repeated examinations are made on the same individuals over time. It also requires that the people being studied have been randomly selected from the general population; findings from studies involving samples of dental patients (termed 'clinical convenience samples') may not necessarily be generalisable, because people who are regular users of dental care tend to differ in several important respects from those who are not.[6]

In recent years, a number of reports have appeared from dental longitudinal studies ('cohort studies') of population-based samples of older people, and these are making a substantial contribution to our knowledge of the natural history of dental caries in that age group. The aim of this brief review is to examine and compare the findings of those studies in order to consolidate our current knowledge of the natural history of dental caries among older people.

METHODS

The MEDLINE bibliographic database was searched (via Ovid and PubMed) for eligible studies using the key terms 'aged', 'dental caries' and 'cohort studies'. The searches were repeated substituting, in turn, 'follow-up studies', 'longitudinal studies' and 'prospective studies' for the term 'cohort studies'. The EMBASE bibliographic database was searched in the same manner. The reports obtained in this way were further limited by applying the following criteria for inclusion:

1. They had to have been published in English
2. Participants had to be at least 50 years old and number at least 500 at baseline (for reasons of statistical efficiency)
3. A probability-based population sample was used

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Email: mthomson@gandalf.otago.ac.nz

Refereed Paper
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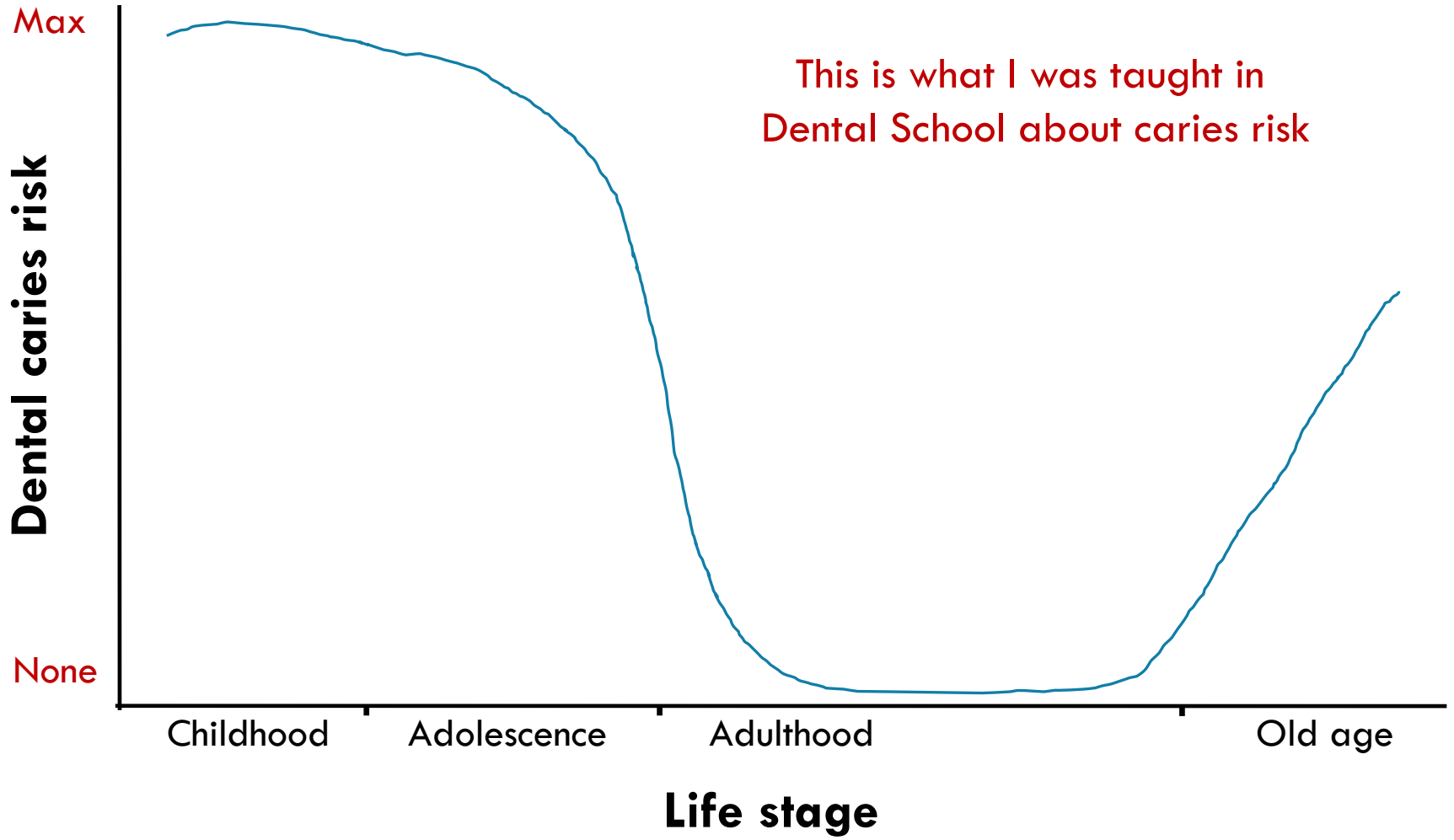
doi:10.1038/sj.bdj.4810900
© British Dental Journal 2004; 196: 89–92

MYTHS ABOUT TOOTH DECAY RISK



TOOTH DECAY IN ADULTS

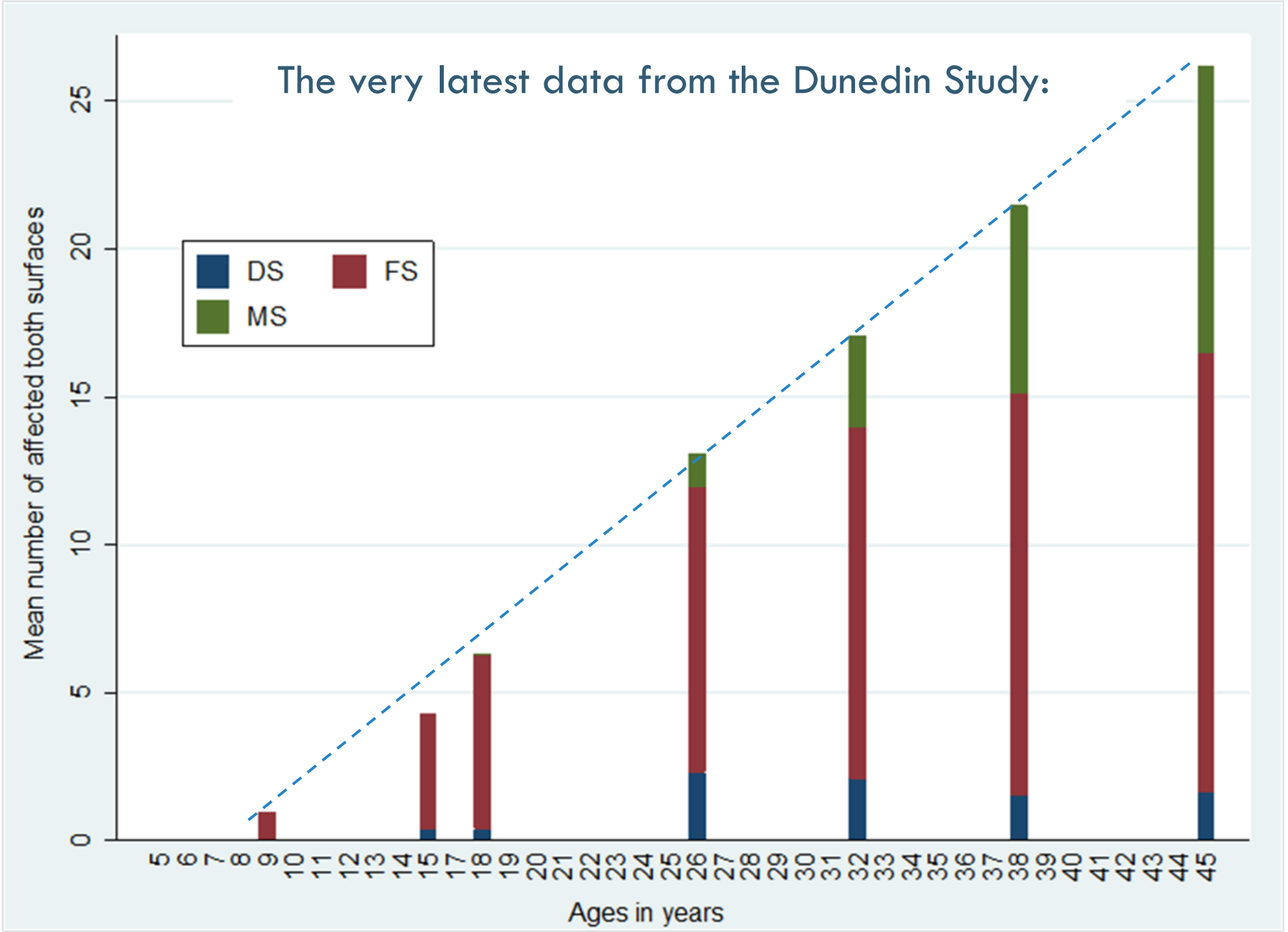
Dental caries is a life-long disease

- Contrary to earlier assumptions
- Life-course studies…

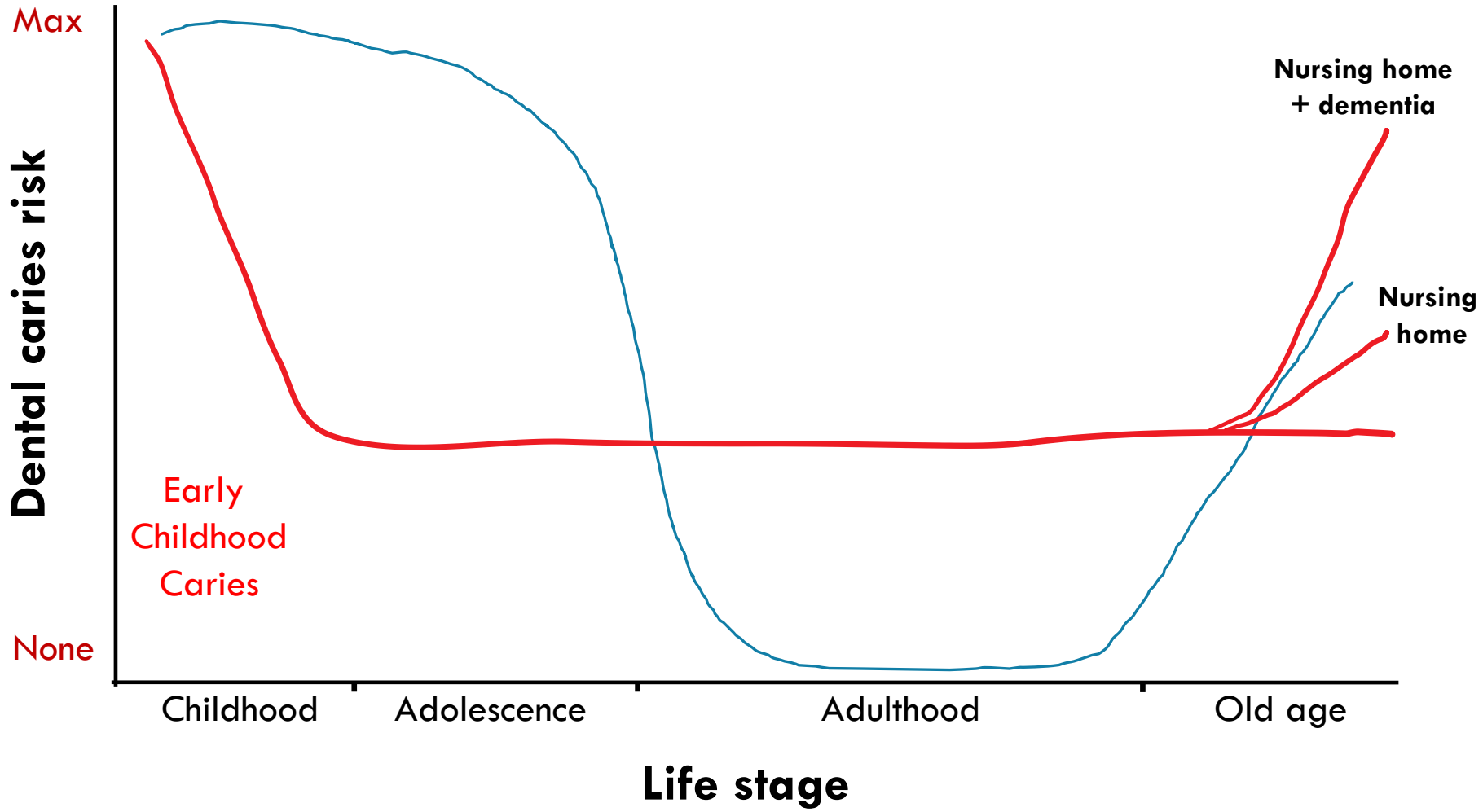
Reports from longitudinal studies (and reviews of those) show that caries continues in older people

- Findings are remarkably consistent
  - About 1 surface per year
  - Coronal caries predominates, contributing 60% of the increment

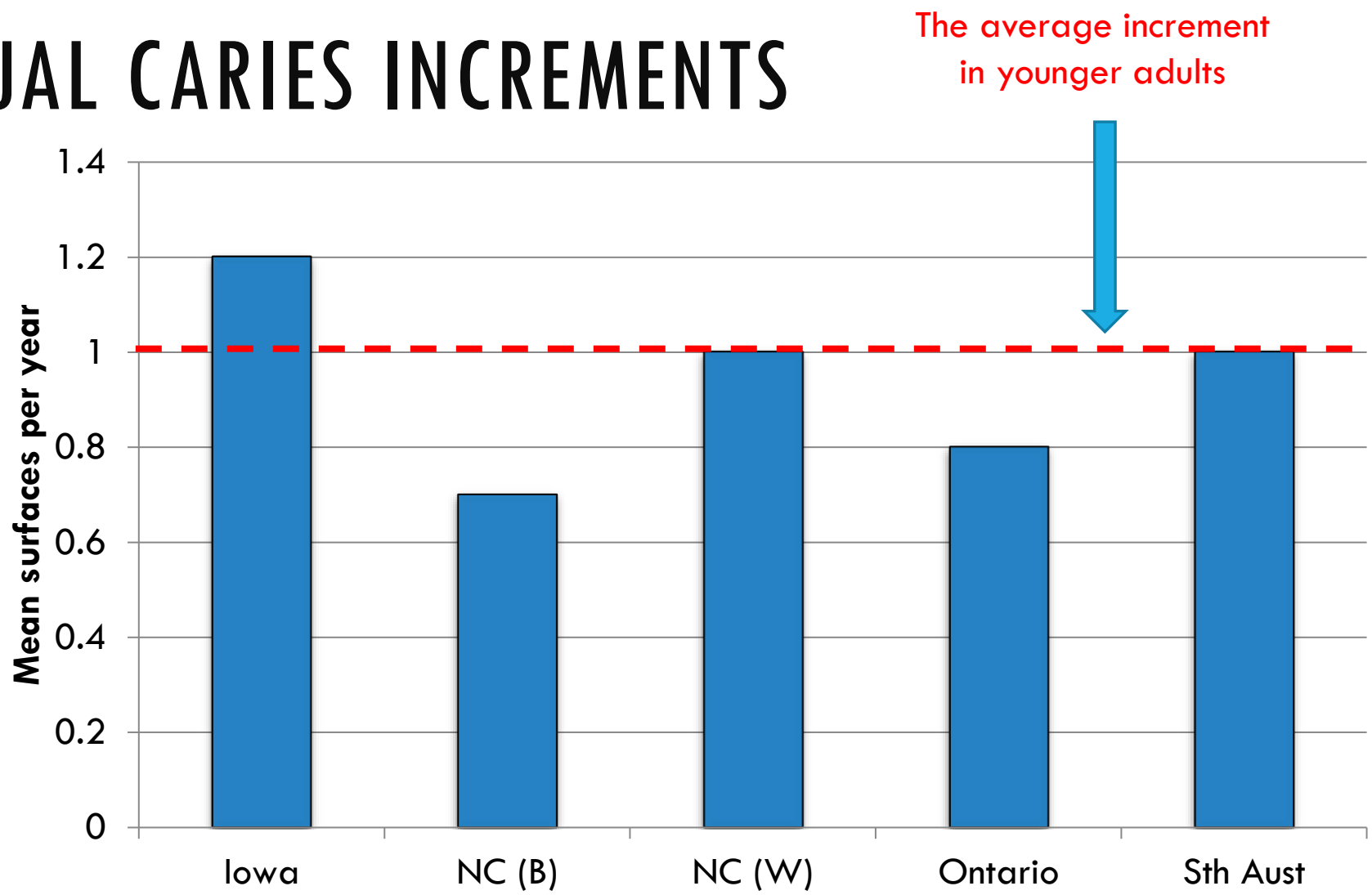
The very latest data from the Dunedin Study:



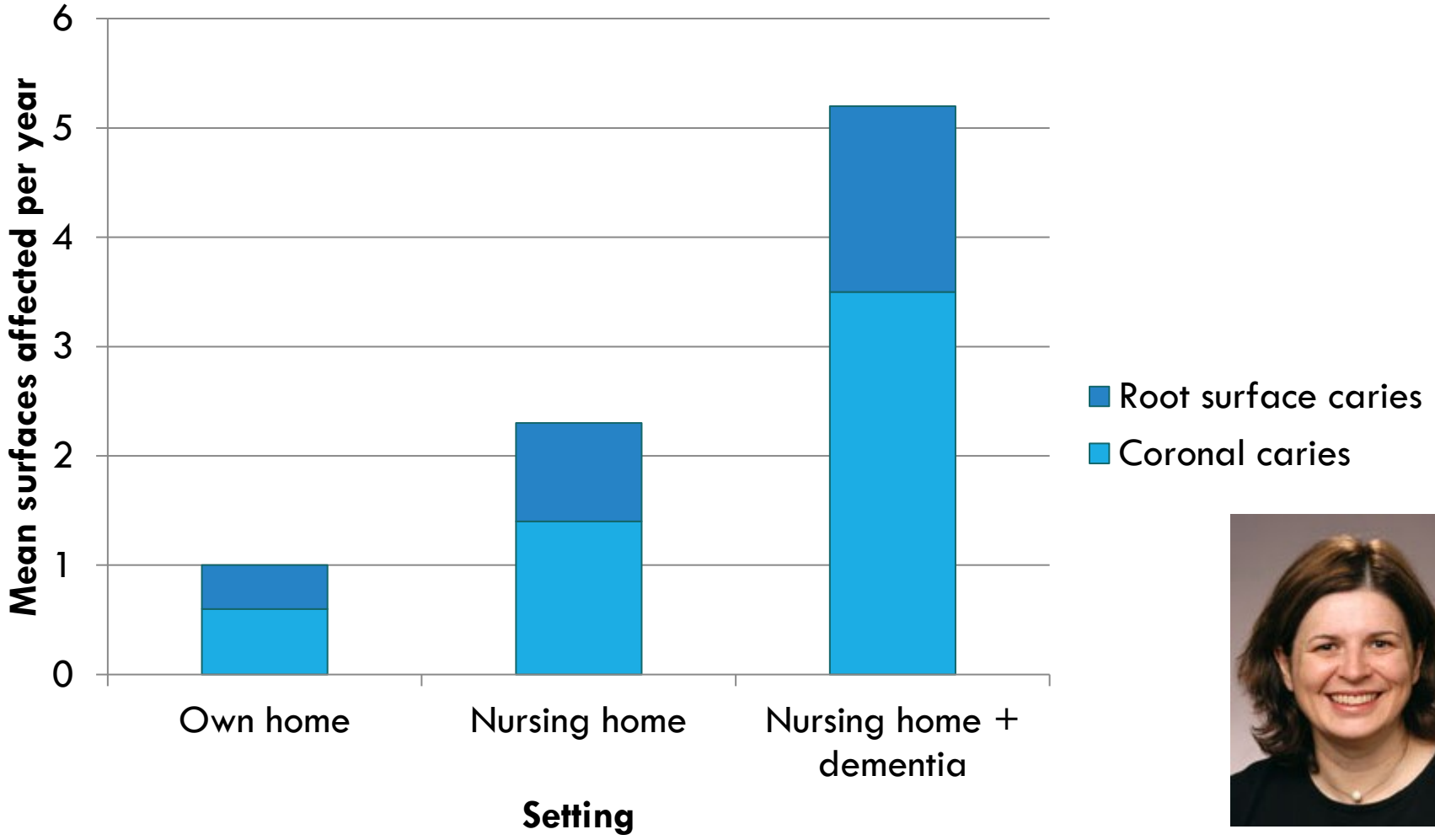
TOOTH DECAY RATES THROUGH LIFE



ANNUAL CARIES INCREMENTS



DENTAL CARIES INCREMENTS BY TYPE & SETTING



Chalmers et al *Spec Care Dent* 25: 96-105 (2005)

CLINICAL EXAMPLE FROM WESTERN AUSTRALIA

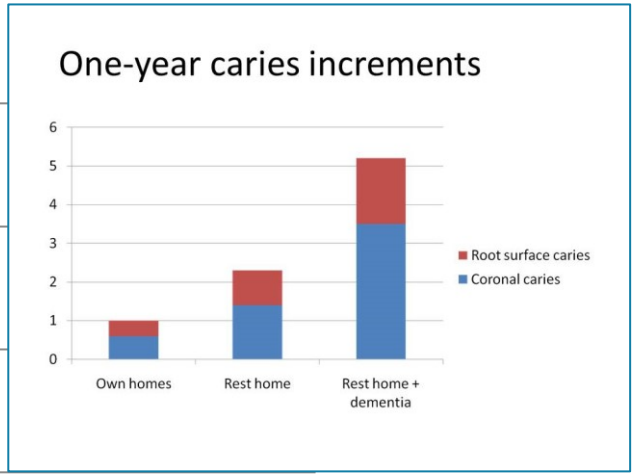
[Thanks to Dr Clive Rogers, Perth]

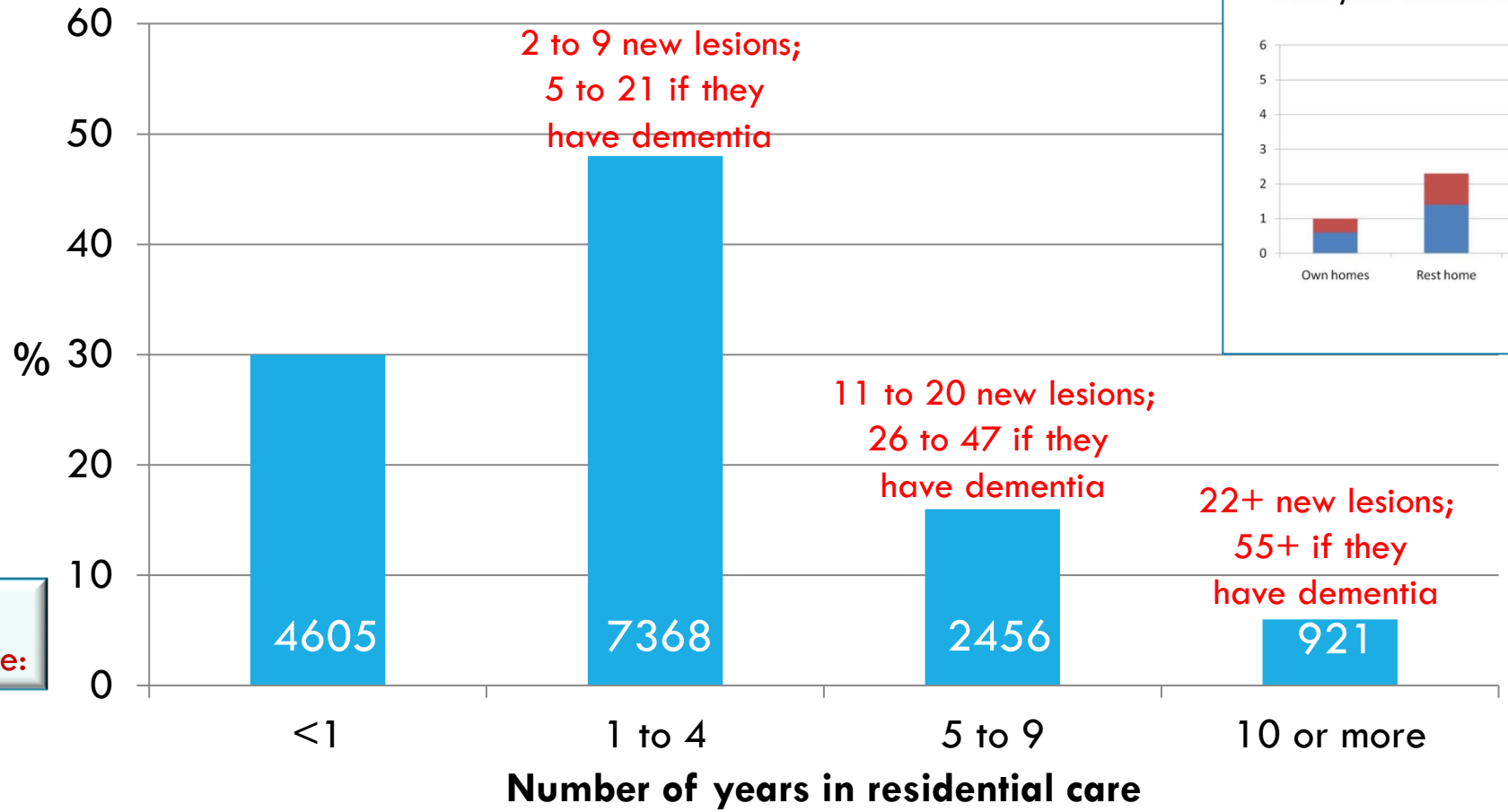
3 years

August 2007, age 83, on entry

August 2010, age 86

LENGTH OF STAY IN NZ FACILITIES





Current number of dentate people:

These numbers will only get worse and there are going to be more and more acute presentations at hospital dental units

[Source: 2013 Census, Statistics New Zealand]

CLINICAL EXAMPLE FROM WESTERN AUSTRALIA

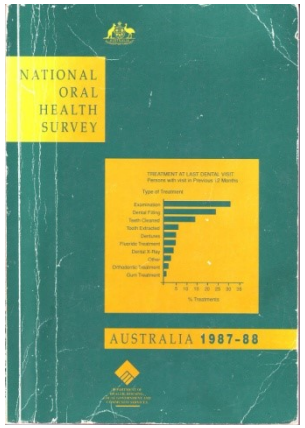
[Thanks to Dr Clive Rogers, Perth]

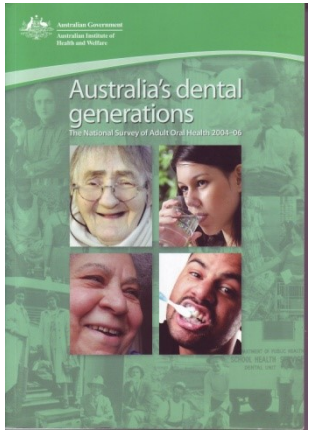
3 years

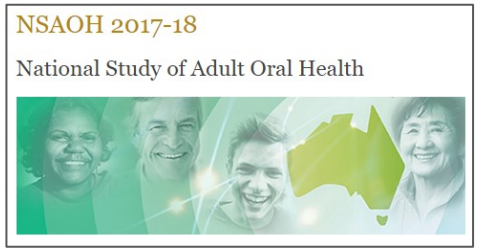
August 2007, age 83, on entry

August 2010, age 86

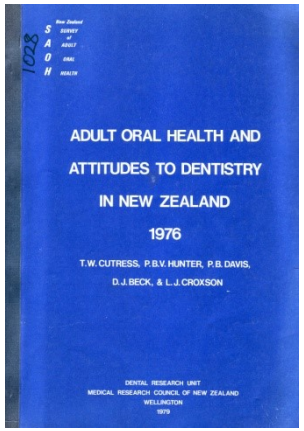
MONITORING OF ADULT ORAL HEALTH DOWN UNDER



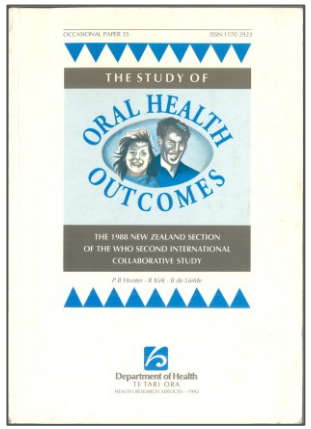


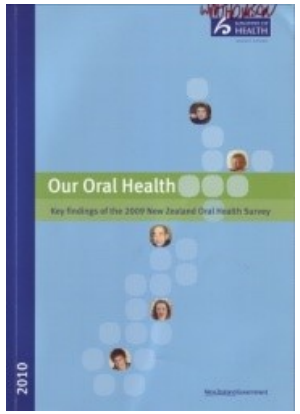


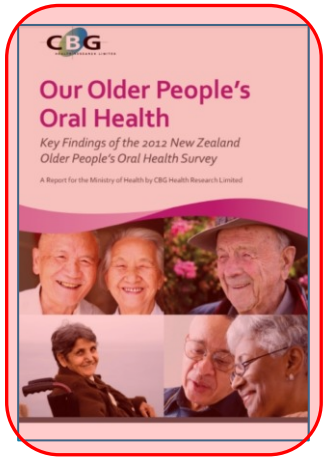
1970 1976 1980 1982 1987/88 1988 1990 2000 2004/06 2009/10 2010 2012 2017/18 2020



MAOH







THE NZ OLDER PEOPLE'S ORAL HEALTH SURVEY

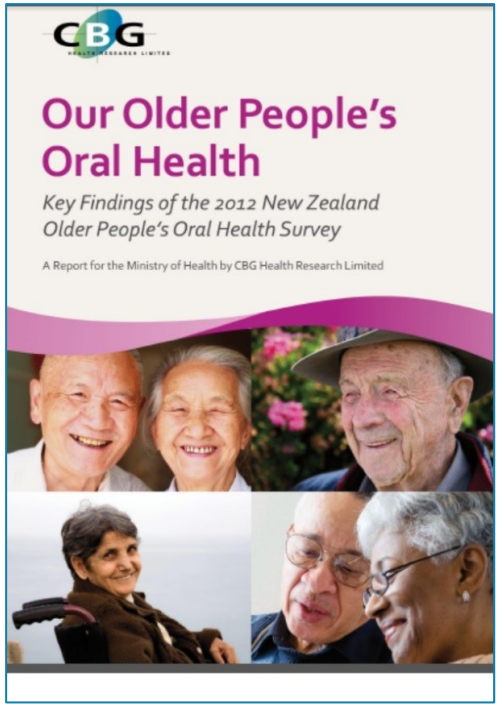
Conducted in 2012

National survey of oral health in rest homes and among those receiving MOH-funded assistance

- Only the second such national survey – the other was in Belgium

Conducted by CBG Ltd

Technical report released by the Ministry of Health in April 2016



THOSE INVOLVED

Dental examiners

Dr. Abeer Al Sammak, Dr. Jeff Annan, Dr. Marian Bassalious, Dr. Doris Bodker-Madsen, Dr. Harvey Brown, Dr. John Dalton, Dr. Gerry Davis, Dr. Cheryl Downey, Dr. Anna Ferguson, Dr. David Healey, Dr. David Kay, Dr. Roger Larkin, Dr. Chris Ledger, Dr. Jocelyn Logan, Dr. Howard Mace, Dr. Andrew Mackie, Dr. Chris Newbould, Dr. Sandie Pryor, Dr. Rebecca Schipper, Dr. Stephen Smith, Dr. Tania Stuart.

Technical Advisory Group

WM Thomson - Otago University
MB Smith - Otago University
PI Koopu – Te Ao Marama
NM Kerse – Auckland University
K Peri – Auckland University
B Gribben – CBG Research
C Boustead-Gibb – CBG Research
N Tee – CBG Research
A Blackwell – CBG Research

Key staff

K Roberts-Thomson – dental trainer
MB Smith – gold standard examiner
R Haisman-Welsh – calibration
WM Thomson – expert advisor

Technical report writing

MB Smith
WM Thomson
B Gribben

NUMBERS

Assessed 2,218 individuals aged 65+

- 1120 in residential aged-care facilities
- 1098 in their own homes and receiving home-based personal care assistance

Stratified random sample

For most of this presentation, I will concentrate on the aged residential care sample

WHY IS ORAL HEALTH IMPORTANT FOR FRAIL OLDER PEOPLE?

Medical aspects

- Adequate nutrition, hydration
- Side-effects of medications
- Aspiration pneumonia risk

Quality of life

- Eat, talk comfortably
- Stay pain-free & maintain self-esteem

Behavioural management

- Aggression, mood alterations can result from oral problems

DENTITION STATUS

All previous descriptions of this in NZ national surveys have reported:

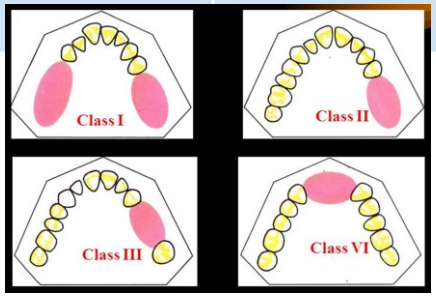
- Dentate vs edentulous
- Denture wearing – whether F/-, -/F, F/P, P/F, P/P, etc

Natalie Hyland's work has taken this further than ever before

- Characterising the dentitions of OPOHS participants using the Kennedy classification
- Unprecedented detail – see *Gerodontology* 2019; 36: 216-222

DENTITION STATUS IN REST HOMES

Maxillary dentition	Mandibular dentition	Prevalence (95%CI)
Almost completely dentate	Almost completely dentate	2.1% (1.0, 4.3)
Kennedy 1	Kennedy 2, 3 or 4	19.3% (15.7, 23.6)
Kennedy 2	Kennedy 1, 3 or 4	11.4% (8.5, 15.1)
Kennedy 3 or 4	Kennedy 3 or 4	34.4% (29.5, 39.7)
Kennedy 1, 2, 3 or 4	Edentulous	1.1% (0.4, 3.0)
Edentulous	Kennedy 1	21.7% (17.3, 27.0)
Edentulous	Kennedy 2, 3 or 4	7.2% (5.0, 10.1)
Kennedy 1, 2, 3 or 4	Dentate	2.9% (1.7, 5.0)
		[Total = 100.0]



The above comprises the 43.4% of the rest home sample who were at least partially dentate

OTHER RECENT WORK

Clinical oral disease status by cognitive function and dependency level

Accepted: 8 March 2018
DOI: 10.1111/ger.12337

ORIGINAL ARTICLE

WILEY Gerodontology

Oral status, cognitive function and dependency among New Zealand nursing home residents

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Funding information
New Zealand Ministry of Health

Objectives: To investigate clinical oral disease and its association with cognitive function and dependency among older New Zealanders in residential aged care.

Material and methods: National survey of oral health in aged residential care throughout New Zealand. We classified residents into 1 of 3 levels of care: "low dependency care (or assisted living)"; "high dependency care"; or "specialist dementia care/psychogeriatric care." The Abbreviated Mental Test characterised cognitive function as "unimpaired" (scores of 7-10), "moderately impaired" (4-6) or "severely impaired" (0-3). Intra-oral examinations were conducted, along with a computer-assisted personal interview.

Results: Most of the 987 clinically examined participants were either at low or high dependency care level, with another 1 in 6 in psychogeriatric care. Almost half overall had severely impaired cognitive function. Just under half of the sample had 1 or more natural teeth remaining. Negative binomial regression modelling showed that the number of carious teeth was lower among women and higher among those who were older, those with more teeth and in those with severely impaired cognitive function. Oral debris scores (representing plaque biofilm and other soft deposits on teeth) were higher in men, those with more teeth, and in those with severely impaired cognitive function.

Conclusions: Impaired cognitive function is a risk indicator for both dental caries and oral debris in aged residential care.

KEYWORDS
cognition, dependency, epidemiological study, oral health

1 | INTRODUCTION

As the older population in New Zealand steadily increases, so too does the proportion of people entering older age with at least some remaining natural teeth (dentate).[1,2] From 1976 to 2009, the proportion of dentate New Zealanders aged 65-74 increased from 28% to 70%.[3] The proportion of those who had 21+ natural teeth (considered a "functional dentition") increased from 24% to 55%.[3] Many dentate people now entering older age have had more extensive restorative treatment—including fillings or crowns, and missing teeth replaced with bridges and implants—than ever before.[3,4] Maintaining the integrity of such restorations requires a sustained high level of oral self-care, along with regular professional dental care and monitoring; both can be challenging in older people. Multimorbidity (including conditions such as dementia, stroke, cardiovascular disease, osteoarthritis and cancer) means that older people have higher rates of cognitive and physical impairments that can adversely affect their oral self-care and health and complicate the provision of oral care.

MODEL FOR NUMBER OF DECAYED TEETH

	IRR (95% CI)	P value
Female	0.69 (0.52, 0.91)	0.010
Age (continuous)	1.03 (1.01, 1.05)	0.003
European	ref	
Maori	1.40 (0.97, 2.01)	0.070
Pacifika	1.94 (1.17, 3.24)	0.011
Asian	1.56 (1.10, 2.22)	0.014
Number of teeth	1.02 (1.00, 1.04)	0.034
Normal cognition	ref	
Moderately cognitively impaired	0.81 (0.50, 1.31)	0.386
Severely cognitively impaired	1.52 (1.09, 2.13)	0.015
Low dependency	ref	
Moderate dependency	1.28 (0.91, 1.82)	0.157
Psychogeriatric dependency	0.93 (0.57, 1.51)	0.773

MODEL FOR DEBRIS SCORE

	IRR (95% CI)	P value
Female	0.66 (0.45, 0.98)	0.037
Age (continuous)	1.02 (0.99, 1.05)	0.237
European	ref	
Maori	1.04 (0.61, 1.78)	0.783
Pacifika	0.97 (0.58, 1.64)	0.913
Asian	0.70 (0.34, 1.46)	0.337
Number of teeth	1.08 (1.05, 1.11)	<0.001
Normal cognition	ref	
Moderately cognitively impaired	1.73 (0.95, 3.12)	0.070
Severely cognitively impaired	1.82 (1.13, 2.92)	0.014
Low dependency	ref	
Moderate dependency	0.94 (0.61, 1.46)	0.783
Psychogeriatric dependency	1.02 (0.62, 1.68)	0.925

ANOTHER RECENT INVESTIGATION

Secondary analysis of OPOHS data

Assigned people to 3 ordinal nutritional status categories using the MNA:

- Normal 54.2% (95%CI 44.8, 61.5)
- At risk 39.2% (95%CI 34.6, 44.0)
- Malnourished 6.6% (95%CI 4.6, 9.3)

Examined associations with oral disease experience

Received: 16 March 2020 | Revised: 25 June 2020 | Accepted: 28 June 2020
DOI: 10.1111/odi.13536

ORIGINAL ARTICLE

ORAL DISEASES WILEY

Dentition and nutritional status of aged New Zealanders living in aged residential care

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Funding information
New Zealand Ministry of Health; New Zealand Dental Research Foundation

Abstract

Background: Previous studies of the nutritional status of older individuals have used measures such as plasma vitamin and mineral levels, which can be difficult to interpret. The relationship between nutrition and dentition has been limited to studying exposures such as the number of posterior occluding pairs of teeth, edentulousness, and the number of natural teeth.

Objectives: To investigate the association between dentition status and nutritional status in a national survey of older New Zealanders living in aged residential care facilities.

Material and methods: Secondary analysis of clinical oral status and nutrition data collected in 2012 in New Zealand's Older People's Oral Health Survey. The validated Mini Nutritional Assessment short format was used to categorize participants as "normal nutritional status," "at risk of malnutrition" or "malnourished."

Results: Just under half of older New Zealanders living in aged residential care facilities were classified as either at risk of malnutrition or malnourished (with about one in sixteen in the latter category). The prevalence of malnutrition was higher among those in hospital-level and psychogeriatric-level care, as well as in those of high socioeconomic status. Individuals who were at risk of malnutrition had the most untreated dental caries and untreated coronal caries. Relative to their counterparts in nursing-home-level care, dentate individuals in hospital-level care were 2.4 times—and those in psychogeriatric-level care were 2.8 times—as likely to be malnourished or at risk of it.

Conclusions: Just under half of the New Zealanders living in aged residential care were at risk of malnutrition or were malnourished. Greater experience of untreated dental caries was associated with a higher rate of being malnourished or at risk of it. Poorer cognitive function and greater dependency were important risk indicators for malnutrition.

KEYWORDS
dental diseases, epidemiology, geriatric conditions, medicine, mouth, nutrition, public health

OVERVIEW OF MODELS

People with more decayed teeth were at higher risk of being malnourished

TABLE 3 Multivariate model for malnourishment or being at risk of malnourishment (dentate individuals only; brackets contain 95% CI)

	Prevalence ratio (95% CI)	*p* value
Male	reference	
Female	1.07 (0.91, 1.26)	.40
Age (continuous)	1.00 (0.99, 1.01)	.83
European ethnicity	reference	
Māori ethnicity	1.12 (0.83, 1.51)	.45
Pacifika ethnicity	0.95 (0.70, 1.28)	.74
Asian ethnicity	0.85 (0.59, 1.23)	.39
High socioeconomic status	reference	
Medium socioeconomic status	0.87 (0.73, 1.03)	.11
Low socioeconomic status	0.91 (0.71, 1.16)	.46
Number of teeth (continuous)	1.00 (0.99, 1.01)	.78
Untreated carious teeth (continuous)	1.02 (1.00, 1.04)	.04
Normal cognition	reference	
Moderately impaired cognitive function	1.14 (0.68, 1.91)	.61
Severely impaired cognitive function	1.94 (1.41, 2.67)	<.01
Nursing-home-level dependency	reference	
Hospital-level dependency	2.40 (1.64, 3.49)	<.01
Psychogeriatric-level dependency	2.80 (1.89, 4.15)	<.01

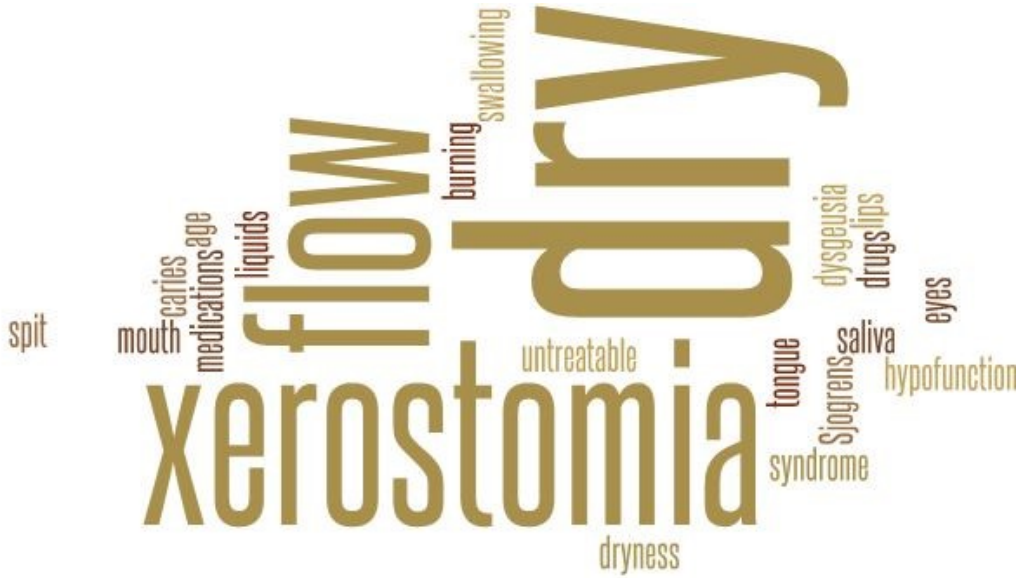
TABLE 4 Multivariate model for malnourishment or at risk of malnourishment (dentate and edentulous individuals combined; brackets contain 95% CI)

	Prevalence ratio (95% CI)	*p* value
Male	reference	
Female	1.00 (0.89, 1.13)	1.00
Age (continuous)	1.00 (0.99, 1.00)	.90
European ethnicity	reference	
Māori ethnicity	1.05 (0.88, 1.26)	.57
Pacifika ethnicity	1.00 (0.80, 1.24)	.98
Asian ethnicity	0.85 (0.64, 1.14)	.29
High socioeconomic status	reference	
Medium socioeconomic status	0.89 (0.78, 1.01)	.07
Low socioeconomic status	0.91 (0.78, 1.06)	.24
Edentulous	1.04 (0.92, 1.16)	.54
Normal cognition	reference	
Moderately impaired cognitive function	1.38 (1.02, 1.87)	.04
Severely impaired cognitive function	2.45 (1.98, 3.04)	<.01
Nursing-home-level dependency	reference	
Hospital-level dependency	2.08 (1.68, 2.56)	<.01
Psychogeriatric-level dependency	2.30 (1.85, 2.86)	<.01

People with no teeth at all were not at higher risk of being malnourished

WHAT ABOUT DRY MOUTH?

Dry mouth is one of the most important influences on quality of life in older people



TERMINOLOGY

Salivary Gland Hypofunction (SGH)

Chronically low saliva flow

A **sign** – observed by the diagnostician

Patient may not be aware of it

Xerostomia

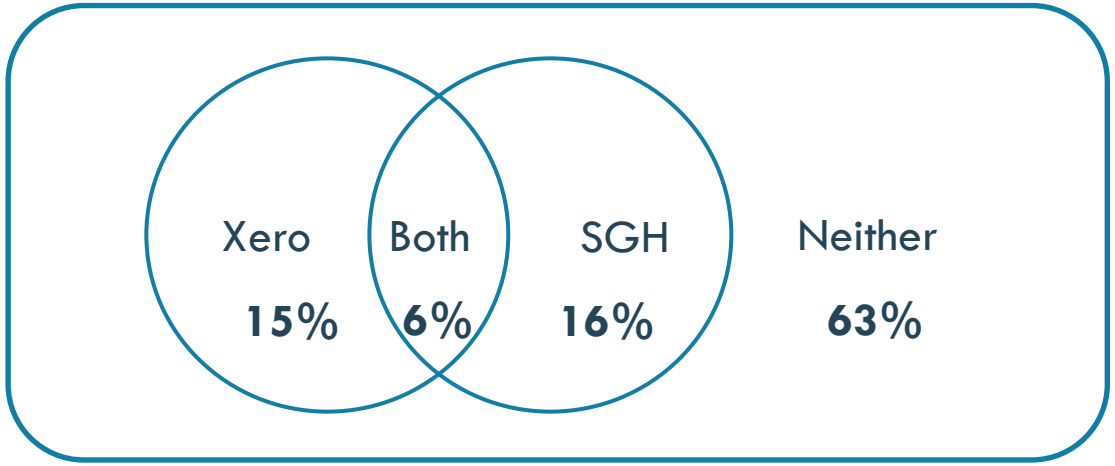
The **symptom(s)** of dry mouth

Felt by the sufferer

Patient may not have low flow

HOW MUCH DO THEY COINCIDE?

South Australian Dental Longitudinal Study



Population-based sample of 636 community-dwelling older people (60+) assessed (Thomson et al, 1999)

DIFFERENT MEASUREMENT ISSUES

Xerostomia

A symptom, so have to ask the sufferer

What do we ask?

How do we ask it?

Salivary Gland Hypofunction

Can't ask the sufferer

Need to measure salivary flow directly

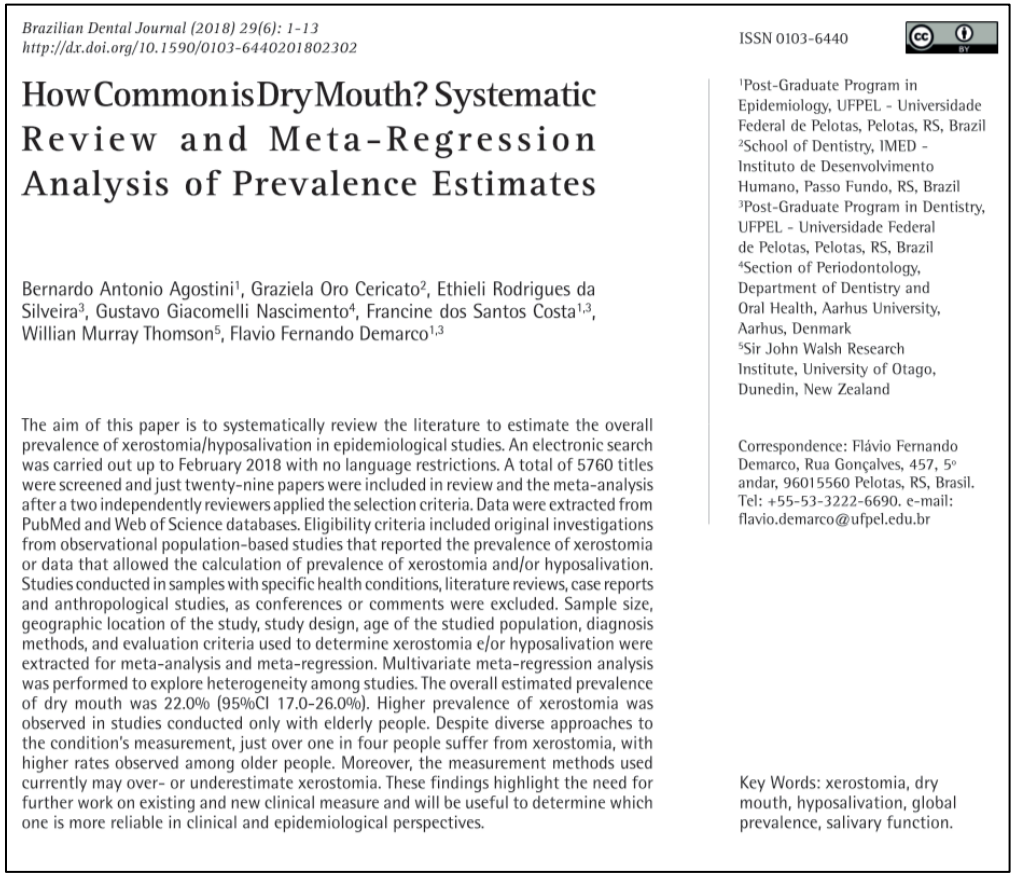
Is the individual below the threshold?

PREVALENCE

Medication-induced dry mouth is the most common by far: > 90% of cases

Prevalence of the three most common types:

- Medication-induced = 13% (of adults of all ages)
- Secondary to radiotherapy = 0.1%
- Sjögren's syndrome = 1%



Brazilian Dental Journal (2018) 29(6): 1-13
http://dx.doi.org/10.1590/0103-6440201802302

ISSN 0103-6440

How Common is Dry Mouth? Systematic Review and Meta-Regression Analysis of Prevalence Estimates

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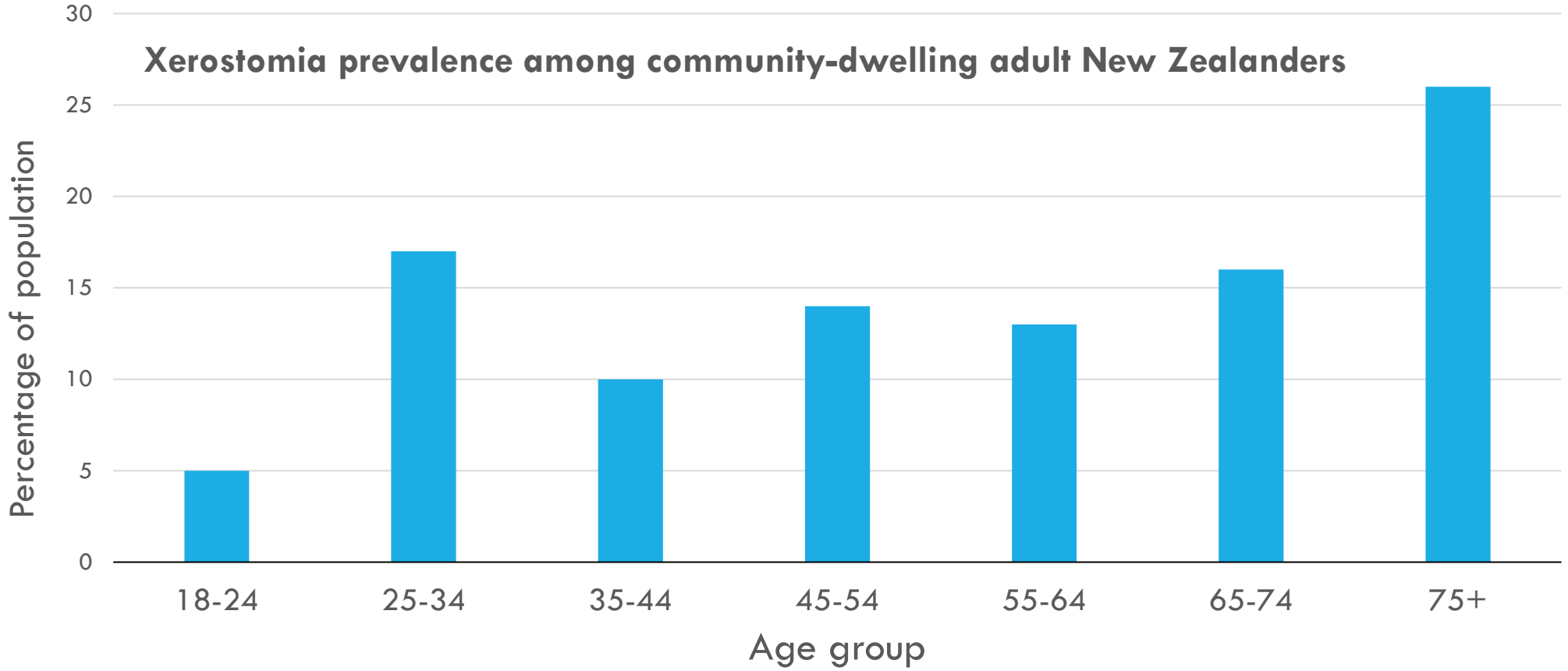
The aim of this paper is to systematically review the literature to estimate the overall prevalence of xerostomia/hyposalivation in epidemiological studies. An electronic search was carried out up to February 2018 with no language restrictions. A total of 5760 titles were screened and just twenty-nine papers were included in review and the meta-analysis after a two independently reviewers applied the selection criteria. Data were extracted from PubMed and Web of Science databases. Eligibility criteria included original investigations from observational population-based studies that reported the prevalence of xerostomia or data that allowed the calculation of prevalence of xerostomia and/or hyposalivation. Studies conducted in samples with specific health conditions, literature reviews, case reports and anthropological studies, as conferences or comments were excluded. Sample size, geographic location of the study, study design, age of the studied population, diagnosis methods, and evaluation criteria used to determine xerostomia e/or hyposalivation were extracted for meta-analysis and meta-regression. Multivariate meta-regression analysis was performed to explore heterogeneity among studies. The overall estimated prevalence of dry mouth was 22.0% (95%CI 17.0-26.0%). Higher prevalence of xerostomia was observed in studies conducted only with elderly people. Despite diverse approaches to the condition's measurement, just over one in four people suffer from xerostomia, with higher rates observed among older people. Moreover, the measurement methods used currently may over- or underestimate xerostomia. These findings highlight the need for further work on existing and new clinical measure and will be useful to determine which one is more reliable in clinical and epidemiological perspectives.

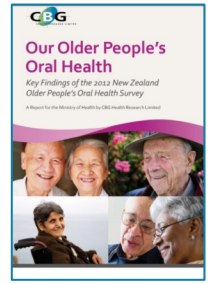
Key Words: xerostomia, dry mouth, hyposalivation, global prevalence, salivary function.

NZ POPULATION RATES



[Benn et al, *Aust Dent J* 2015; 60:362-367]

POLYPHARMACY



Medications the major risk factor for dry mouth

NZ national survey of older people:

- All were taking at least 1 medication
- 53.2% took 5-9 medications
- 13.9% took 10 or more

Contents lists available at ScienceDirect

Research in Social and Administrative Pharmacy

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Medication taking in a national sample of dependent older people

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ARTICLE INFO

Keywords:
Polypharmacy
Older people
Inappropriate medication use
Drug-related harm

ABSTRACT

Background: Polypharmacy is associated with inappropriate medication use, and subsequently increasing older persons' risk of drug-related harm and health-related costs to individuals and society.
Objective: To examine and describe, using a national sample of patient-level medication data, the prevalence of older people's polypharmacy and medication use across dependency levels. To examine oral and general pain prevalence and associated analgesic usage.
Methods: Medication data from the 2012 New Zealand Older People's Oral Health Survey, a nationally-representative, cross-sectional study of dependent older people's oral health, were analysed descriptively, comparing classes and sub-classes of drugs and nutrient supplements taken across four categories of dependency: very low (own homes receiving in-home support), low, high and psychogeriatric (all receiving aged residential care). Self-reported current general pain and frequency of orofacial pain data were cross-tabulated by sub-classes of analgesics taken.
Results: All participants were taking at least one medication overall, 53.2% (95% CI: 50.4, 56.0) took between five and nine (polypharmacy), and 13.9% (95% CI: 17.4, 22.5) took 10 or more (hyperpolypharmacy). Antihypertensives, analgesics, antiulcer drugs, aspirin, laxatives, statins and antidepressants were the most common drug classes taken, the proportions differing between psychogeriatric level care and all other dependency groups. Overall, simple analgesics were taken (34.5%; 95%CI: 30.8, 38.4) more commonly than other analgesics; the use of nonsteroidal anti-inflammatory drugs was low (3.6%; 95% CI: 2.7, 4.7). Of those reporting experiencing extreme general bodily pain, 63.3% (95% CI: 56.6, 69.4) took an analgesic, more than those experiencing mouth pain occasionally or often. Fat-soluble vitamins were the most common vitamin supplement taken (32.0%; 95%CI: 27.0, 37.4).
Conclusions: Polypharmacy and hyperpolypharmacy are common among older people, regardless of dependency level, and pain may be undertreated.

Ferguson et al, *Res Soc Admin Pharmacy* (in press)

MEASURING XEROSTOMIA IN THE OPOHS

How often does your mouth feel dry?

Never Occasionally Frequently Always

Xerostomic

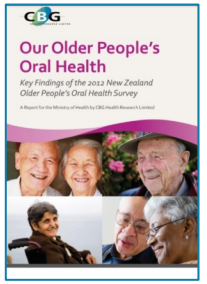
Prevalence of xerostomia in the OPOHS = 29.4% (95% CI 26.5, 32.5)

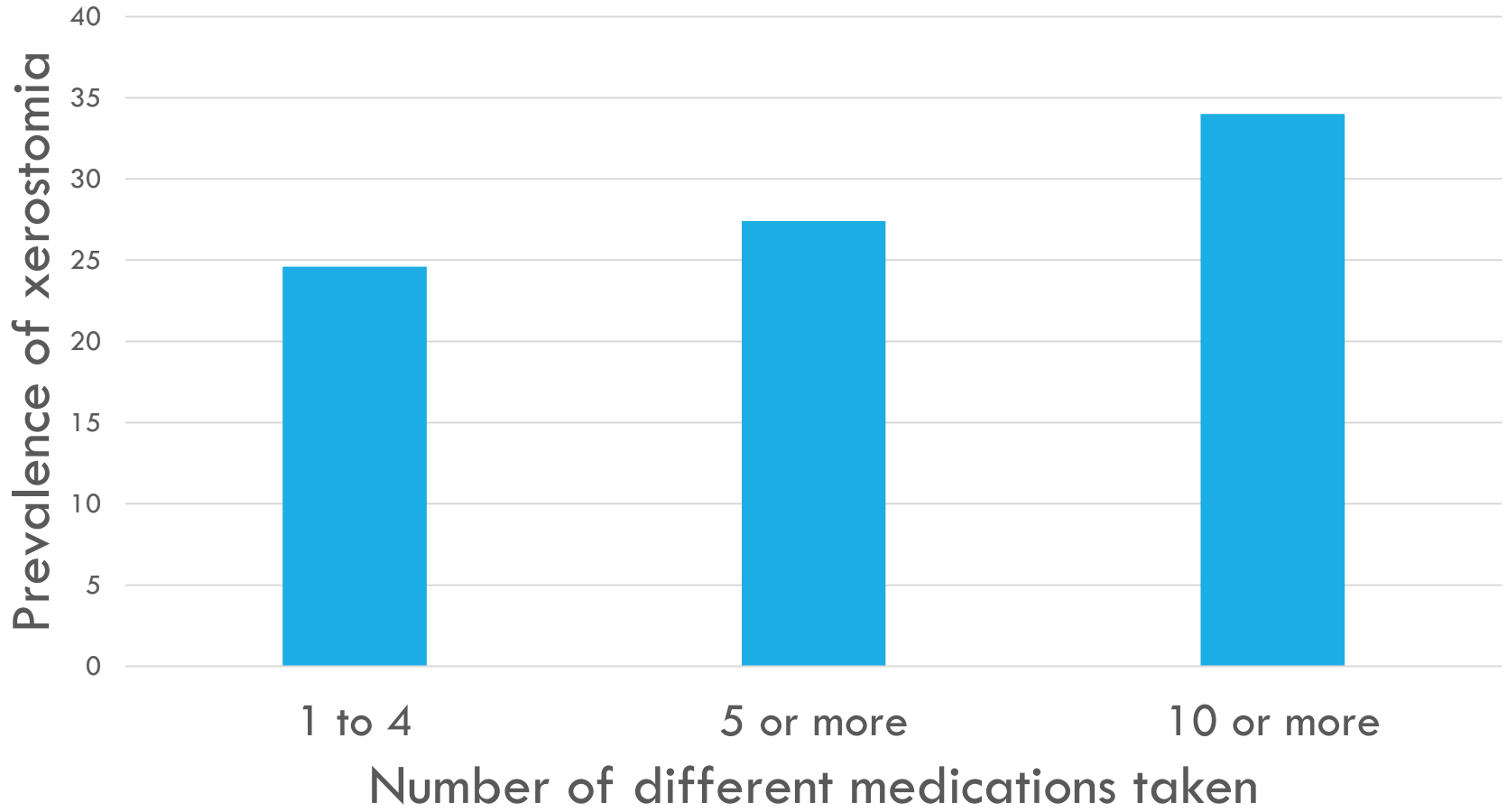
How typical is this?

Benn et al (2015) NZers 75 or older = 26.0% (95% CI 17.2, 37.3)

Agostini et al (2018) – systematic review = 27.2% (95% CI 21.4, 33.0) for older adults

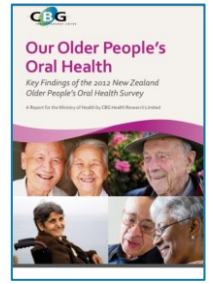
POLYPHARMACY AND XEROSTOMIA

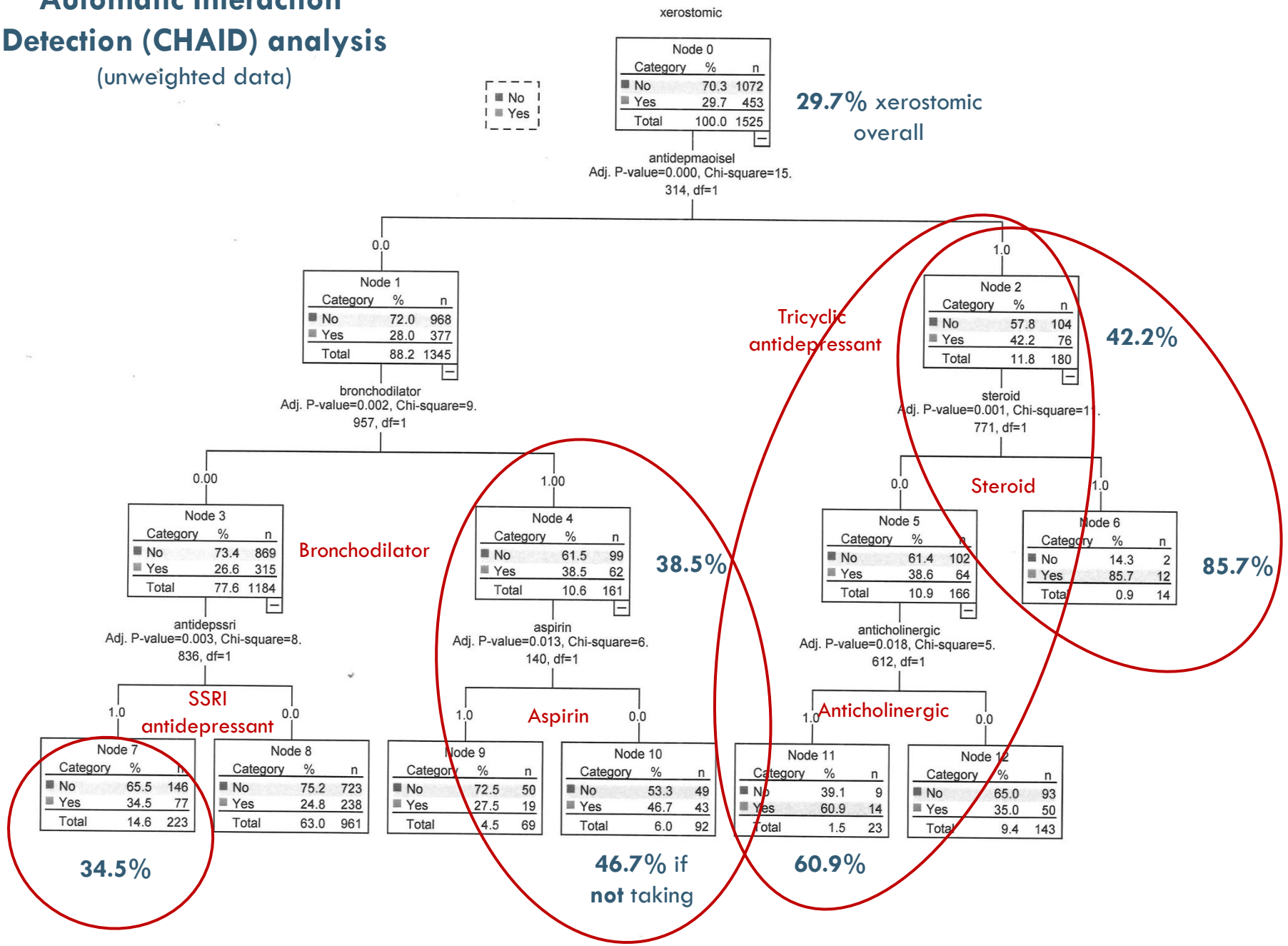




Automatic Interaction Detection (CHAID) analysis

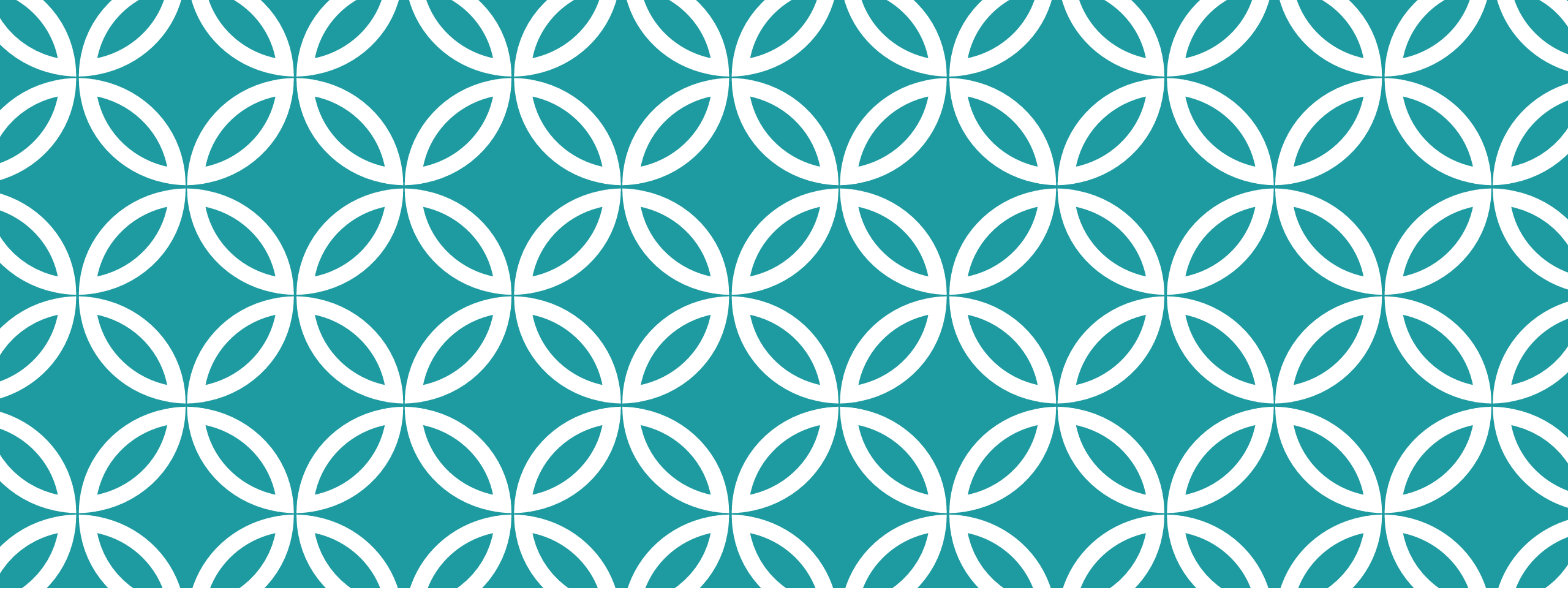
(unweighted data)





POISSON REGRESSION MODEL (WEIGHTED DATA)

	Prevalence ratio	95% CI	P value
Female	1.06	0.91 to 1.24	0.477
Age (continuous)	0.99	0.98 to 1.00	0.141
Rest home care (ref cat = own home)	0.77	0.63 to 0.94	0.010
Hospital care	0.82	0.67 to 0.99	0.040
Psychogeriatric care	0.62	0.40 to 0.95	0.028
Cyclic antidepressant	1.45	1.14 to 1.86	0.003
Cyclic antidepressant + steroid	2.33	1.65 to 3.29	<0.001
Cyclic antidepressant + anticholinergic	1.67	1.15 to 2.43	0.007
Bronchodilator w/out aspirin	1.67	1.05 to 2.65	0.029
Bronchodilator	1.04	0.69 to 1.57	0.856
SSRI antidepressant	1.44	1.17 to 1.76	0.001



CURRENT CHALLENGES

MORE OLDER PEOPLE WITH MORE TEETH

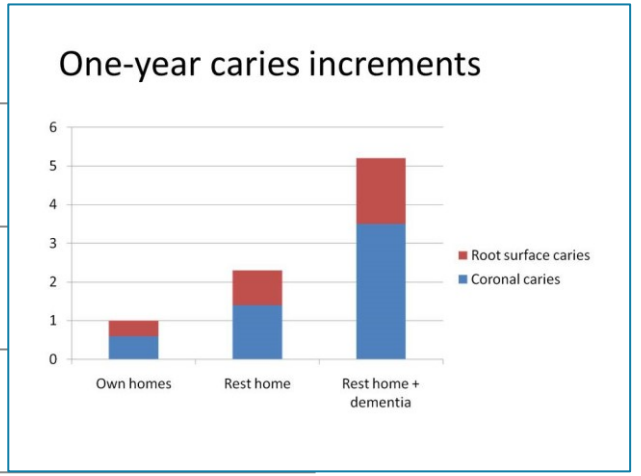
An ageing population

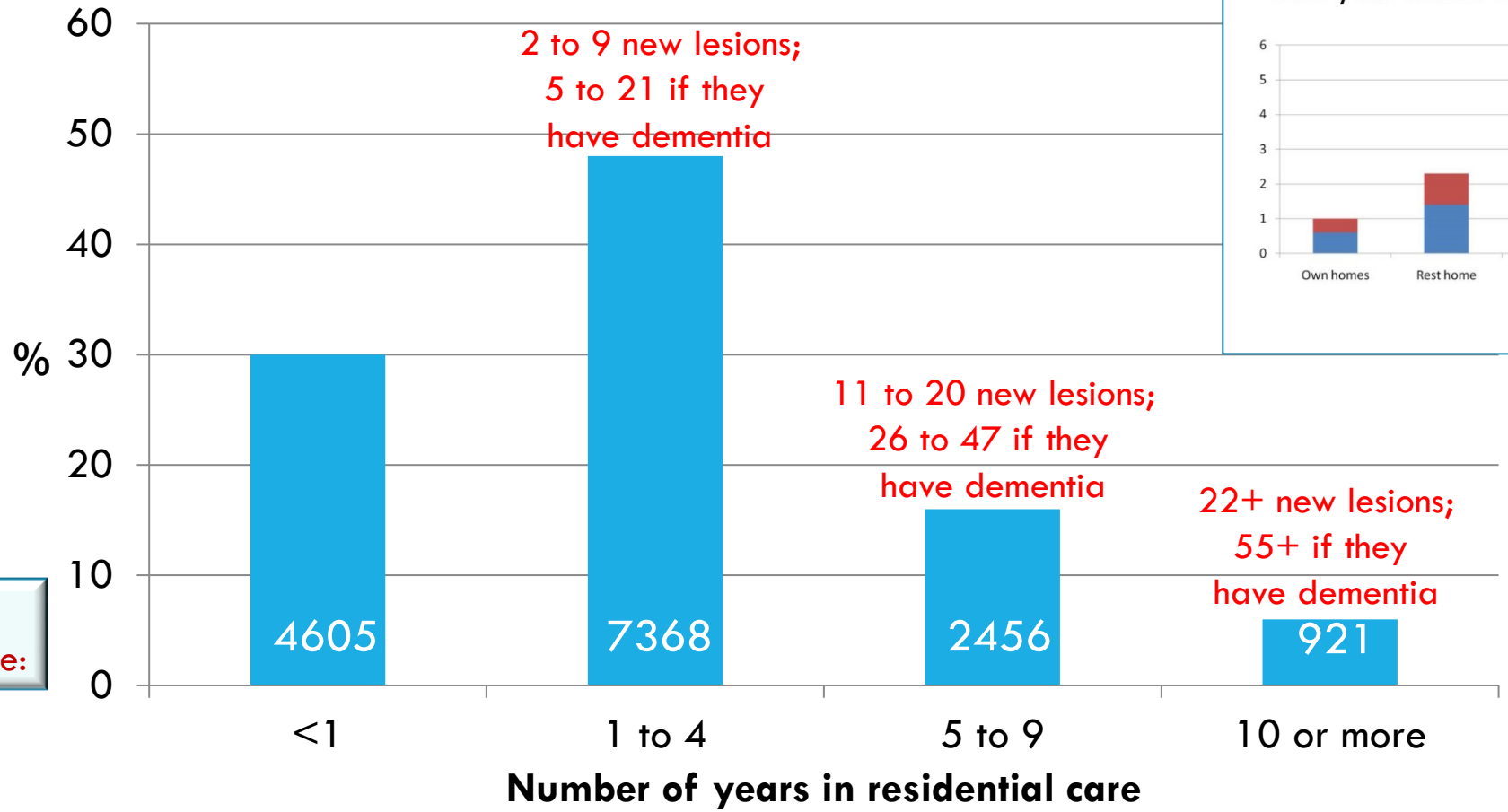
Greater tooth retention than ever before

- Changes in social norms
- Lower caries rates and less smoking
- More dentists and better technology

Fertile research field – the issues have gradually become more pressing over my research career

LENGTH OF STAY IN NZ FACILITIES



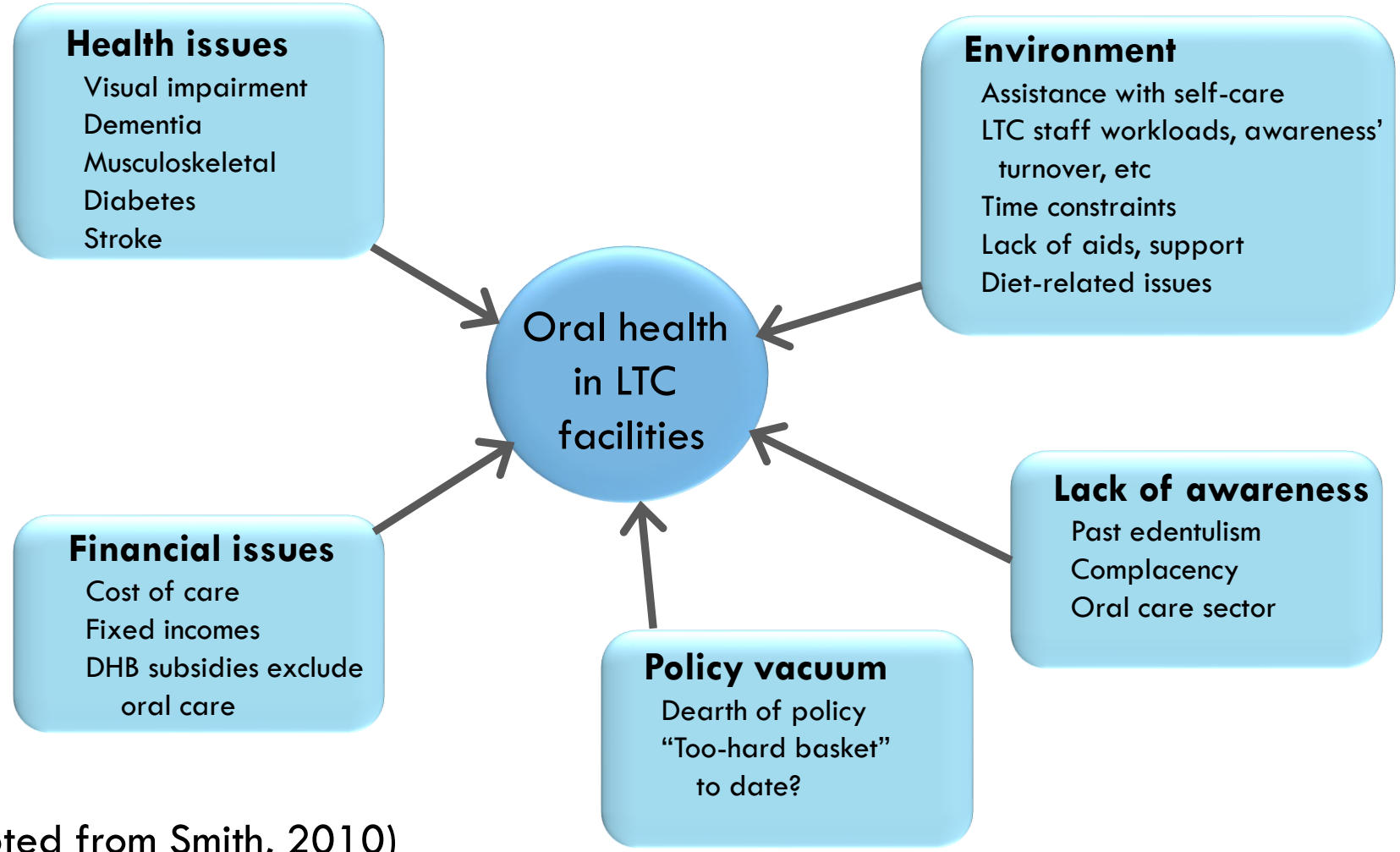


Current number of dentate people:

These numbers will only get worse and there are going to be more and more acute presentations at hospital dental units

[Source: 2013 Census, Statistics New Zealand]

INFLUENCES ON ORAL HEALTH IN LTC



(Adapted from Smith, 2010)

CURRENT WORK

AWESSoM programme – supported by the NZ Government's Ageing Well research funding stream

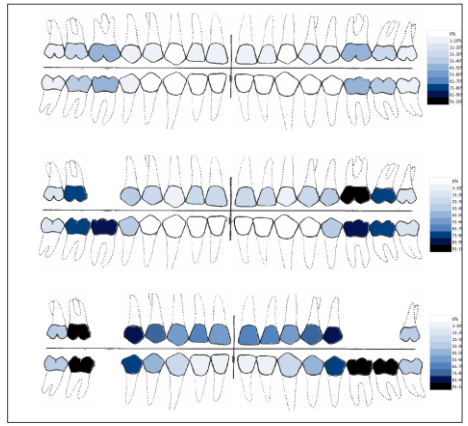
- Ageing Well through Eating, Sleep, Socialising and Mobility (AWESSoM)
- Led by Auckland University (Prof Ngaire Kerse)
- A group of projects about older people's function and well-being
- Common threads of sleep, oral health, social connections/support, and mobility
- Care home project being developed using a co-design approach

Costs of treating dependent older people

TEETH FOR LIFE?

Or oral health for life?

What happens through the life course?



Segue … dental charts

IMPLICATIONS

When (and with whom) should we be having a conversation with about making the transition?

Alternatives/variations on a theme

- Shortened dental arch concept
- Pre-emptive removal of the 6s?
- Japanese 80:20 concept – 20+ teeth retained by age 80

WHAT CAN YOU DO?

Brush twice daily with a fluoride toothpaste

Clean between the teeth at least twice a week

Stay hydrated

Avoid sugar in tea, coffee or snacks

e.g. 5 cups of tea or coffee per day = 4g X 7 X 365 = 51kg of sugar per year

Avoid tobacco in all its forms

Visit for dental check-ups

Talk to your GP about reviewing your medications

ACKNOWLEDGMENTS

Co-researchers on the work reported here:
Moira Smith, Anna Ferguson, Ngaire Kerse, Jonathan Broadbent, Richie Poulton, Maria van Kuijk and the late Jane Chalmers

Jill Clark and the Timaru U3A
For the invitation, the enthusiasm and for looking after me so well