Oral health of Australians

National planning for oral health improvement

Australian
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Oral health of Australians: National planning for oral health improvement

FINAL REPORT

Australian Health Ministers' Advisory Council
Steering Committee for National Planning for Oral Health

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Preface

In October 1999 the Australian Health Ministers' Advisory Council (AHMAC) considered a number of issues on the national planning for oral health. It was recognised that the following issues needed to be addressed.

- There was a reduced treatment requirement among school children, but prevention and establishment of positive oral health behaviour remained a challenge. There still existed pockets of very high need for dental treatment among sections of the school-aged population, particularly the socioeconomically disadvantaged.
- Increasing proportions of adults and more retained teeth are increasing the requirement for dental services among adults, including from public dental services.
- As a prerequisite for policy development, detailed information was required on the burden, trends and distribution of oral problems among Australians.
- Possible trends in clinical approaches to dealing with these problems needed to be identified and considered.

AHMAC recommended that a report be prepared on 'The burden, trends and distribution of oral health problems in Australia and the trends in clinical approaches to dealing with these problems', coordinated by a Steering Committee for National Planning for Oral Health with assistance of the Australian Institute of Health and Welfare's Dental Statistics and Research Unit at Adelaide University.

This report on the 'Oral health of Australians: National planning for oral health improvement' has, as its goals, the improvement of oral health and the delivery of better dental care to all Australians.

Its preparation has involved various levels of government and draws on information from non-government sources, primarily the Australian Institute of Health and Welfare's Dental Statistics and Research Unit.

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Executive summary

In October 1999 the Australian Health Ministers' Advisory Council (AHMAC) recommended that a report be prepared on 'The burden, trends and distribution of oral health problems in Australia and the trends in clinical approaches to dealing with those problems'.

A Steering Committee representing all jurisdictions was formed, led by South Australia, and the Australian Institute of Health and Welfare's Dental Statistics and Research Unit at Adelaide University was engaged to assist in the preparation of the report.

An interim report was presented to AHMAC in June and to the Australian Health Ministers' Conference in July 2000.

In presenting the final report to AHMAC the Steering Committee has, as its goals, the improvement of oral health and the delivery of better dental care to all Australians.

Oral health

- Being orally healthy means that people can eat, speak and socialise without discomfort or embarrassment, and without active disease in their mouth which affects their overall well-being.
- There is a range of highly prevalent oral diseases affecting the teeth (dental caries) or gums (periodontal diseases); less frequently occurring disorders including dental impactions, malocclusions, tooth wear, joint dysfunction and trauma; and local or systemic diseases and cancers affecting the oral mucosa and other oral structures.
- These diseases and disorders have numerous pre-clinical and clinical effects. Their progression leads to impairments varying from infection, abscess formation and tissue destruction to death. More deaths occur each year from oral cancer than cervical cancer.
- Dental caries is the most prevalent health problem in Australia accounting for 19 million existing and 11 million newly decayed teeth each year. Periodontal diseases are the fifth most prevalent health problem among Australians. This establishes these oral diseases as silent epidemics in Australia.
- About 90 per cent of all tooth loss can be attributed to these two health problems, and because they are preventable and treatable, most of that tooth loss is avoidable.
- Non-clinical consequences are frequently reported problems in the Australian community, ranging from discomfort when eating, interrupted meals, pain and self-consciousness to difficulty pronouncing words. Over one-third of Australians reported discomfort when eating or pain sometimes, often, or very often in the last 12 months. Less frequent non-clinical consequences of poor oral health include impacts on appearance, self-esteem and employability.

- The 'systems' and 'parts' approach to health has tended to promote oral health as a separate aspect of health. This discounts many of the similarities in the way people respond to pain and illness and how they affect roles and tasks, regardless of the origin.
- The mouth is not separate from the rest of the body, either biologically or in the experience of individuals. Oral and general health and disease share determinants and occur together. Oral health and disease are closely linked to general health and disease. Factors which threaten general health also threaten oral health, and poor oral health has been associated with a range of other diseases.
- The mouth can be a portal of entry for infections. Epidemiologic evidence suggests an association between oral diseases (eg periodontal disease) and systemic diseases (eg cardiovascular disease). For the successful treatment of some general health problems (eg heart valve surgery), medically necessary dental care must be undertaken. The mouth is also a mirror for general health with associations between systemic diseases (eg diabetes) and oral diseases and disorders (eg periodontal disease).
- Improvements in oral health cannot be pursued in isolation from improvements in general health, and improvements in general health may be limited by poor oral health.
- Oral diseases and disorders incur both direct health system costs ($2.6 billion or 5.9 per cent of health system costs) and indirect dental and economic costs and are a substantial contributor to the cost of illness in Australia.
- The oral health of Australians can be substantially improved through public health interventions with a focus on prevention of disease.
- Clinical dental services can also play an important role in maintaining and improving oral health and well-being.
- Oral diseases and disorders can be characterised as having a high burden of illness, significant potential for health gain through prevention and treatment services, co-existence with other conditions, and an uneven impact on the population. It is because of these characteristics that oral diseases and disorders warrant receiving greater health policy priority.

Conclusion 1

Oral health is a basic expectation of all Australians. Oral health and disease are important in their own right and for their association with general health and disease, costs, disability and death. Improvement in oral health may be pursued from a public health perspective, and both prevention and early and appropriate intervention would improve oral health for all Australians. Oral health demands more attention.

Oral health and service needs

- Australians have made substantial gains in oral health, particularly in the reduced caries experience of children. Australian children and adolescents have comparatively good oral health but a minority show higher risk of dental decay. Nearly 40 per cent of 6-year-old children experience decay in their deciduous teeth, 60 per cent of which has not been

treated. Children in the lowest socioeconomic quartile experience almost twice as much caries as those children in the highest socioeconomic quartile.

- Not all the gains in reduced dental decay are carried into adulthood. From mid-adolescence on there is a more rapid accumulation of decay experience and greater variation in oral health among groups in the Australian community. For example, the level of decay experienced increases four-fold from 12 to 21 years of age: 0.90 to 3.69 permanent teeth that are either decayed, missing or filled.
- Progress has not been as marked in adults and, compared to other countries, Australians aged 35 to 44 years have a greater number of teeth with decay experience. Decay experience in 35 to 44-year-olds decreased from 18.0 to 13.6 teeth from 1973 to 1995–96, but untreated, decayed tooth numbers rose from 1.0 to 2.4 and teeth with fillings increased from 8.3 to 8.8 teeth. Where substantial change has occurred in adult oral health, as in edentulism rates, the improvement reflects changes in professional dental practice as much as reduced oral disease.
- The improvement in oral health is not evenly distributed across the population. In the adult population edentulism rates vary, with high edentulism rates reflecting the distribution of poor general health in the population. Some 16.3 per cent of the Indigenous population is edentulous compared to 10 per cent of non-Indigenous Australians. Health Card holders are nearly 2.5 times more likely to be edentulous than non-Health Card holders.
- Adults have widespread past experience of oral disease, especially dental decay and periodontal diseases. While the management of this oral disease for most Australians has moved away from tooth loss to tooth maintenance (eg restorations), substantial differences in oral health outcomes emerge in adult age groups. Many Australian adults have fewer than the 20 natural teeth required for good oral functioning.
- Poor oral health is evident in the Indigenous community, Australians on low incomes, rural and remote area dwellers and the dependent elderly. They all experience a worse oral health status than the population as a whole, or have specific oral health service needs.
- Older adults used to have little active oral disease because most had lost all or many of their natural teeth. However, increased tooth retention is placing many older adults at risk of accumulated dental decay and periodontal diseases.
- Increased tooth retention in late middle-aged and older adults (lower edentulism and fewer missing teeth) has greatly increased the risk of recurrent and new decay. A range of hitherto unseen chronic degenerative problems are emerging among middle-aged and older adults including tooth wear, tooth fracture, root caries and pulp death.
- Functionally dependent older Australians have substantially poorer oral health than people living independently in the community. Older Australians in nursing homes have three times more untreated decay and less than half the number of filled teeth than their contemporaries living in the community.
- Risk of oral disease and disorder is shaped by the physical environment (eg water fluoridation); the socioeconomic environment including the home, school, work and neighbourhood; past access to dental services; individual behaviour; and genetic endowment.

- Through the interplay of these factors a number of groups in the population show poorer oral health and greater dental services needs. These include the less educated or less skilled occupational groups, socioeconomically disadvantaged people, Indigenous Australians, people who are functionally dependent, people born in non-English speaking countries, and people living in rural and remote areas of Australia.
- The continued prevalence and severity of oral diseases and disorders and the potential for them to be effectively prevented or treated establishes a need for dental services for all Australians.
- The existing, substantial burden of oral disease is addressed mainly through clinical dental services. Need for dental services is age-specific but all age groups require diagnostic, preventive and restorative services, while periodontal, oral surgical, prosthodontic and specialist services are targeted more to particular age groups.

Conclusion 2

Despite the reduction in decay experience in children and tooth loss in adults, oral diseases and disorders remain prevalent and a substantial burden on the Australian population. There is a continuing need for a robust service system that supports access across the community to basic preventive and treatment services, and specialist care for population sub-groups with particular needs.

Dental services

- Dental services in Australia have developed in a piecemeal fashion without overarching planning to address the needs of the community. Their separation from general health services and the fact that they are largely financed from private sources has resulted in the development of a set of independent services without any systematic coordination and with minimal formal linkages to general health services.
- Dental services in Australia are largely purchased as an individual out-of-pocket expense from private dentists with unregulated fees.
- Dental expenditure is the least subsidised area of health services and most of the limited subsidy for adult dental care is directed toward higher income earners in the Australian population through the Private Health Insurance Incentives Scheme (PHIIS) and 'lifetime' health cover.
- Dental fees are increasing at twice the rate of fees for other health services, progressively moving private dental services out of reach of lower and middle income earning Australians.
- Most dental services in Australia are provided by dentists, but dental auxiliaries play an important role in the provision of particular services to some target groups.
- The capacity to provide dental services is poorly distributed both geographically and between the private and public dental sectors.

- Geographically, capital cities in Australia have 51.0 dentists per 100,000 people, while the rest of the nation has only 28.6 dentists per 100,000 people.
- Strategically, approximately one-quarter of the adult population is eligible for public dental services, but only 11.7 per cent of dentists work in or for the public dental services.
- Dental services are polarising, with an increased rate of provision of diagnostic, preventive and technically advanced services. At the same time there are small reductions in restorative and prosthodontic service provision rates.
- Access to these services is very inequitable. Some Australians enjoy access to the latest diagnostic, preventive and treatment services, while others have limited access, with much higher probabilities of tooth extractions, largely associated with emergency visits. Nearly three-quarters of those who last visited for a check-up visited in the last year, while of those who last visited for a problem, just over 40 per cent visited in the last year.
- Limited access is seen among socially disadvantaged adults: Health Card holders; migrants, especially non-English speakers; and Indigenous Australians.
    - Over two-thirds of Health Card holders who received their most recent care at a public dental clinic usually visit for a problem compared with just under half of the total population.
    - Health Card holders who made a visit to a public dental clinic had almost double the rate of extractions of the total population.
- Affordability and hardship and perceptions of dentistry, including anxiety about and dissatisfaction with dental services, are barriers to access to dental services.
- Given the linkages between oral health and general health and the increasing recognition of the importance of coordination of services, especially for people who have multiple health conditions, it is unlikely that dental health services are working for optimal oral health in Australia.
- Strategies for removing barriers to dental services have been proposed by many organisations and represent straightforward means of improving dental care for all Australians:
    - making prevention a priority;
    - conveying information on the importance of oral health, and the ability of individuals to contribute to their own health;
    - supporting population-wide oral health promotion strategies;
    - improving experiences during dental visits so as to allay anxiety and fear in the dental setting;
    - reducing financial barriers;
    - establishing mobile or portable dentistry programs for rural or remote, and non-ambulatory people;

- updating dental provider knowledge and skills and providing incentives that positively shape the provision of preventive dental services; and
- giving greater emphasis to interpersonal relationships and patient satisfaction in dental care.

- Ways of improving dental care should incorporate achieving value for money by addressing the neglect of prevention, using least-cost methods of delivery of dental services and avoiding duplication and inappropriate use of health services.

Conclusion 3

Dental services in Australia are delivered in a pluralistic and fragmented system which does not achieve efficient use of resources. Maximising the oral health improvement from dental service provision requires removal of incentives which favour treatment at the expense of prevention, and concerted effort to address the dental care needs of those with the poorest oral health.

Delivery of services

- Dental services in Australia are delivered mostly by dentists working in solo or small group practices. Their work is supported and supplemented by that of dental therapists, hygienists and prosthetists.
- The retention of much of dentistry's cottage industry roots, with small, independent private dental practices dominating the delivery of dental care, has been consistent with an emphasis on the values of individual responsibility and choice of provider ahead of equity and community responsibility. Greater value has been placed on equity of opportunity and community responsibility for the oral health of children, leading to the development of school dental services.
- Australian children have secure access to dental care through publicly provided and funded school dental services, where general dental services are provided at minimal or no cost to parents.
- About 85 per cent of dental services for adults are provided by private dentists. A small residual public dental service is available to means-tested, eligible adults. The services provided by the public dental services safety net are predominantly emergency ones with a mix of diagnostic, oral surgical (extraction) and miscellaneous (temporary filling) services. Less than half of all public dental service courses of care involve general dental care.
- Approximately half a million eligible adults are waiting for access to general dental care in public dental clinics. Waiting times are unacceptably long — over three years in many clinics of most States and Territories. This waiting time is longer than the accepted standard of time interval between dental visits.
- A number of doubly disadvantaged groups exist within those eligible for public dental services. These include Indigenous Australians, non-English speaking migrants, and functionally dependent older Australians (housebound and in residential care). A range

of small-scale programs across the States and Territories illustrate innovative ways in which better dental care can be provided to adults eligible for public dental services so as to improve their oral health.

- There are currently no national means for addressing issues of quality assurance, organisational problems including inter-governmental and intersectoral arrangements, or for addressing oral health at a public health level.
- Variation in delivery of public dental services calls for an emphasis, led by the Commonwealth Government, on evaluation and research and a national sharing and comparison of outcomes in oral health and well-being.
- National planning for better oral health and good dental care must be a purposeful, deliberate activity. Several issues stand out for national attention including oral health promotion, dental workforce planning, professional education and inclusion of oral health activities within wider general health programs like the rural health service centre program.
- Responsibilities for oral health and dental services should be clarified in an agreement between the Commonwealth and the States and Territories in the same manner as for health care and public health.
- Inter-governmental issues in oral health and dental care need to be addressed so that a coordinated and integrated approach to oral health and dental care can be pursued.
- Intersectoral arrangements need to be developed to address organisational boundaries with general health service provision and within public dental services. Much could be gained by learning from the experience of, and closer cooperation with, general health services.
- Improvements in oral health and delivery of good dental care would be aided by the stimulation and support of professional development of public health and public administration skills and competencies among dental providers through initiatives such as the Public Health Education and Research Program.

Conclusion 4

Fragmentation of services and policy development reflect a need for national leadership to support and sustain planning for better oral health and good dental care. This could include clarification between the Commonwealth, States and Territories on principles, roles and responsibilities, aspects for reform in clinical approaches, financial arrangements and supply of data and performance information.

Projections of dental service requirements

- Past improvements in oral health have not translated into reduced need for dental services. Improvements in oral health and the ageing of the population both contribute to a greater need for dental services. Lower caries experience among children has been more than matched by increased awareness of and expectations for maintaining improved oral health. A lower rate of tooth loss in middle-aged and older Australians

illustrates 'the paradox of success' when it leads to an increased burden of disease and need for treatment.

- Patterns of dental service use indicate that the requirements for dental services are increasing, reflecting changing expectations about oral health. Projections depict rapid decreases in dental decay experience among adolescents and then young adults. Middle-aged adults also show substantial decreases, but somewhat lagging behind in time. Decreases in dental decay experience are less substantial for late middle-aged and older Australians.
- Numbers of teeth present is a robust indicator of the potential risk of oral diseases and disorders. Numbers of teeth are increasing with population growth and reduced caries experience and tooth loss. Most of this increase is occurring in middle-aged and older Australians. Overall, numbers of teeth are projected to increase from 308 to 441 million across 1989 to 2009.
- Estimates of treatment needs show substantial increases in teeth needing restorations despite the underlying improvements in oral health. Teeth in need of treatment decrease in adolescents and young adults, but increase in middle-aged and older Australians. Overall, teeth in need of treatment are projected to increase from 26.5 to 31.6 million across 1989 to 2009.
- Dental dependency (teeth requiring treatment in children and older Australians per 100 working-age adults) changed little between 1989 and 1999, but increases gradually through to 2009.
- Requirements for dental visits and services have increased between 1979 and 1995. Requirements for dental visits are projected to rise by 29.3 per cent between 1998 and 2010. The increase is expected to be greater among older Australians, most of whom are eligible for use of public dental services.
- A projected shortfall in capacity to supply services is likely to put pressure on dental fees and reduce the capacity of public dental services to retain dentists. This is likely to exacerbate the current inequalities in oral health in Australia.
- Capacity to supply dental services, predominantly by dentists but also by other dental professionals, is projected to marginally decrease, leaving a widening gap between potential requirements for services and service delivery.
- This will have a negative impact on the contribution of dental services to oral health and especially for access to public dental services for people on low incomes.
- Options for increasing the capacity to deliver dental services or to rationalise resource allocation across the community need to be considered.

Conclusion 5

Both need and demand for dental services are projected to increase, without equivalent increases in capacity to supply services. This has negative implications for dental services to continue to contribute to the health of the whole population and for access to services for people on low incomes.

Approaches to improving oral health

- Health and oral health result from heredity and social, material, structural and environmental factors which shape belief systems and affect physiological functioning.
- The threats to continued oral health improvement in Australia include failure to address inequalities in oral health status and failure to reorient dental health services to primary intervention, which includes addressing the determinants of oral health, rather than secondary and tertiary intervention.
- Goals for oral health promotion might include:
  - developing settings and structures that promote and sustain oral health;
  - improving the physical environments where people live, work and play;
  - improving people's capacity to become and stay orally healthy;
  - reducing risk of oral illness, injury or premature loss of teeth or mortality in the population; and
  - improving the oral health and oral quality of life of people who experience oral diseases, injury or disability.
- A range of approaches that can provide oral health gains and are supported by evidence of their effectiveness are available and need to be pursued.
- Attempts to improve oral health could be underpinned by benchmarks for health status or for service access and delivery. Benchmarks, or minimum standards, and targets against which interventions can be measured need to be more fully developed. These should include all significant oral diseases and disorders, dental workforce composition and distribution, and dental service system performance.
- Currently, most activity for oral health is in clinical services. Opportunities exist for working 'smarter' not harder in improving oral health and dental care through:
  - reorientation of dental services from 'care' to 'cure' with a focus on population oral health gains;
  - intersectoral cooperation;
  - defining responsibilities so that management of resources, choosing priorities and development of strategies are coordinated; and
  - monitoring processes and outcomes.

Conclusion 6

Better oral health can be pursued through coordinated oral health promotion activities and good dental care. These can be provided to more Australians through a process of setting priorities for, and targeting services to, those who are most in need and who have the greatest propensity for oral health gains.

Future directions

- A number of issues raised in this report reflect the lack of leadership in, and coordination of, oral health at a national level. In particular, the development of strategies for improving oral health, including attention to inequalities, professional education, workforce planning, reorientation of services to prevention and the need for broad-based, multidisciplinary research on oral health, are best dealt with at a national level.
- Insufficient attention has been paid to improving the oral health of those in the Australian community who have the worst oral health and receive the least adequate dental care. Important public health and economic gains can be achieved if the current opportunities for better oral health and good dental care are considered and acted upon.
- Success in addressing oral health promotion, good dental care and appropriate linkage to general health require a highly educated, up-to-date dental profession which can be flexible and innovative in response to changing community needs and the environment. Increasing the role of other health professionals and personal care providers also has potential for improving oral health.
- Organisational issues, including uncoordinated and fragmented dental services and a reorientation toward primary health care, need to be addressed. This requires more attention to investment in research; community education; intersectoral activity; broad community activity; and national frameworks for planning for oral health, services and the workforce.
- Better oral health and good dental care need to be underpinned by strong and relevant national oral health research. Wider oral health research issues need discussion and setting within a coordinated agenda.
- Gaps in the routine monitoring of oral health needs, access to care, service delivery and the workforce should be filled. The information gained should be used to develop minimum standards and benchmarking of programs for achieving set targets.
- Periodic national surveys, alternating between adults and children and augmented by targeted surveys of special population groups, should be used to extend routine monitoring activities.
- Approaches to oral health and dental care are currently uncoordinated, fragmented and incomplete. There is an urgent need for national leadership and direction through a national advisory or coordinating process for prioritising issues and dealing with them.

Conclusion 7a

Opportunities exist to establish a national advisory capacity to guide and coordinate the development of approaches to oral health and dental care. The lack of national coordination limits the possibility of continued improvements in oral health. This is particularly evident in the areas of:

- **the integration of education for dental professionals;**

- **the recruitment and retention of dental personnel in the public dental services; and**
- **the maldistribution of dental resources.**

- Any attempt to undertake national planning for oral health must be underpinned by a solid understanding of the state of oral health, of deficiencies in either oral health status or the service delivery system, and of opportunities to rectify them. Substantial gaps in our understanding of each of these three elements exist and these represent an impediment to planning guided by a sound knowledge base.

Conclusion 7b

There are opportunities to enhance policy formulation for oral health by addressing current deficiencies such as the limited monitoring and surveillance activities, especially the lack of periodic national surveys. Further opportunities exist to develop an agreed research agenda, including evaluation research.

1. Oral health

Overview

Oral health, diseases and disorders

Oral health is a standard of health of the oral and related tissues which enables an individual to eat, speak and socialise without active disease, discomfort or embarrassment and which contributes to general well-being (UK Department of Health, 1994). Oral health is therefore greater than the absence of highly prevalent oral diseases and disorders affecting the teeth (dental caries) or gums (periodontal diseases). It includes less frequently occurring diseases of the oral mucosa and oral cancer, as well as disorders such as dental impactions, malocclusions, tooth wear, joint dysfunction and trauma.

Natural history and impact

The most common clinical consequences of oral disease are infection and tooth loss. However, impairment, soft tissue destruction and even death may also occur. Oral diseases and disorders are also associated with non-clinical outcomes such as pain and discomfort, eating difficulties, speech and cognitive dysfunction, embarrassment and social dysfunction. Therefore, oral diseases and disorders have a substantial negative impact on the well-being of the population.

Oral health as part of general health

Oral health is an integral aspect of general health. Individuals do not see ill-health in terms of body parts. Further, there are shared determinants and risk behaviour for oral and general health. Poor oral health and poor general health are likely to co-exist. Oral health is also part of general health through associations which exist between oral and general disease; for example, otitis media, peptic ulcers, cardiovascular and cerebrovascular disease, diabetes, aspiration pneumonia and rheumatoid arthritis.

Oral diseases and disorders:

- have substantial direct health system costs;
- have sizeable indirect costs;
- create a substantial burden of disease; and
- are associated with reduced quality of life and prosperity.

Oral health in perspective

Oral diseases are largely preventable, and when they occur, interventions are available to limit their progress, alleviate pain and suffering and restore function. Therefore, better oral health should be a significant public health goal and good dental care should be a significant health service goal.

1.1 Defining oral health and disease

Oral health

Being orally healthy means that people can eat, speak and socialise without discomfort or embarrassment, and without active disease in their mouth which affects their overall well-being (UK Department of Health, 1994). Australians of all ages have an expectation of being able to eat, drink, talk and laugh without embarrassment, pain or suffering.

Dolan (1993) reflected contemporary thinking when she defined oral health as 'a comfortable and functional dentition which allows individuals to continue in their desired social role'. An important implication, therefore, is that oral health is person — rather than mouth — centred, and thus has a psychosocial perspective in addition to the biological.

The mouth is not separate from the rest of the body either biologically or in the experience of individuals. There is a growing body of research into the associations between oral health and general health.

Oral function refers to the daily activities which the oral cavity is expected to accomplish. A capacity to chew a range of foods can be regarded as the most basic functional requirement for oral health. Anatomical impairment (such as tooth loss) can cause limitations in, or a lack of, the ability to chew a range of foods. There are other important functions of the mouth, including speech and maintenance of facial form, which can be adversely affected by oral diseases and disorders. Furthermore, the mouth contributes towards a person's sense of self-esteem, confidence during social interaction and general quality of life.

Oral health is the good order and functioning of the following structures:

- the teeth and their supporting structures;
- the oral cavity (lips, cheeks, palate, tongue and floor of the mouth);
- the structures related to mastication (jaw joint); and
- the maxillofacial complex (jaw and middle third of the face).

This means that oral health is more than just having good teeth without decay and having healthy gums — it means also that people's lives are not affected by oral mucosal disease, oral cancer, jaw joint problems, malocclusion, malformation, or trauma to the jaw and middle of the face.

This is an extended view of oral health which recognises the value of a well-functioning orofacial system without physical or psychological limitations or distress.

Oral diseases and disorders

The most prevalent diseases and disorders affecting most of the Australian population at various times are those of the mouth. The major types are dental caries (tooth decay) and periodontal diseases (gum diseases). Both of these lead ultimately to tooth loss if not treated, but are largely preventable and reversible if identified and treated early. Currently about 90 per cent of all tooth loss can be attributed to these two categories of diseases. Therefore, most tooth loss is avoidable.

Less frequently occurring oral diseases and disorders include diseases of the oral mucosa, dental impactions, trauma and oral cancer. Although not as common as dental caries and periodontal diseases, they have considerable impact on the length or quality of life of affected people. They are also more prevalent than some other, more high profile, health problems. For example, more deaths occur each year from oral cancer than cervical cancer (AIHW & AACR, 1999).

Malocclusion and dental malformation are also treated extensively in Australia, mainly for social and psychosocial reasons, to improve dental function and for long term tooth retention.

While there are many oral diseases and disorders which reduce oral health and well-being, some receive greater attention in dentistry. These include the following:

- dental caries — types of caries include early childhood caries, coronal caries, root caries and secondary caries;
- periodontal diseases — these are a group of inflammatory diseases which affect the gums (gingival tissues), deeper connective tissues and the jaw bone, all of which support and protect the teeth;
- malocclusion — this condition involves lack of 'good fit' and deviations in the alignment of teeth in the jaws or in the relation of one jaw to the other;
- oral mucosal diseases — these are a range of soft tissue diseases varying from specifically oral diseases, such as cold sores, to oral manifestations of systemic problems, such as thrush developing in response to antibiotic treatment and chronic inflammatory diseases;
- oral cancers — a number of different cancers can affect the lips, tongue, cheeks, palate and floor of the mouth;
- impactions — impaction occurs when there is insufficient space for a tooth to erupt into its position in the jaw; this is especially common for third molar teeth; and
- trauma — physical trauma to teeth and the oral cavity can result from assault, sport, and bicycle and motor vehicle accidents.

1.2 Natural history of oral diseases and disorders

Most of us think of discomfort and pain leading to tooth loss when we think about oral diseases and disorders. This view ignores many of the key oral diseases and disorders and

their consequences. Table 1.1 sets out the basic biological and clinical steps in the progression of some untreated oral diseases and disorders.

Table 1.1: Steps in the progress of oral diseases and disorders

Disease or disorder	Pre-clinical effects (microscopic)	Clinical effects (macroscopic)	Impairment (clinical progression)
Early childhood caries	Rapid enamel demineralisation	Cavities in deciduous upper incisors	Pulp infection, abscess formation, cellulitis, tooth loss
Coronal caries	Enamel demineralisation	Cavities in enamel or around root surface restorations	Pulp infection, tooth cusp fracture, abscess formation, cellulitis, tooth loss
Root caries	Cementum/dentine demineralisation	Cavities on root surfaces or around root surface restorations	Pulp infection, tooth fracture, abscess formation, possible tooth loss
Periodontal diseases	Low level inflammation/ trauma to severe, rapid inflammation	Moderate recession of gums or shallow periodontal pockets to advanced recession and/or deep periodontal pockets	Advanced destruction of tooth support leading to tooth mobility, periodontal abscess formation, possible tooth loss
Malocclusion	Tooth size/growth discrepancy	Crowding, malalignment of teeth/jaws	Trauma to oral tissues, increased risk of tooth fracture in accidents
Oral mucosal diseases	Inflammation, opportunistic infection	Desquamation, ulceration, tissue overgrowth	Local tissue destruction
Oral cancers	Neoplasia	Ulceration, tumour, metastasis	Local/systemic tissue destruction, death
Impactions	-	Inflammation	Tooth root resorption, cyst/abscess formation
Trauma	-	Bone fracture, tooth/root fracture, soft tissue laceration	Tooth mobility or loss, pulp death, root resorption

Source: Spencer et al, 1991 (adapted)

All types of caries and advanced periodontal diseases may lead to tooth loss, although coronal and root surface caries are the leading cause of tooth loss in people of all ages. The two other predominant clinical consequences of oral diseases are soft tissue destruction associated with oral cancer and impairment from chronic inflammation associated with slowly progressing periodontal disease and some oral mucosal conditions.

1.3 Impact

The impact of poor oral health is felt at many levels. For individuals these include clinical impacts (dealt with in the following chapter) and social impacts. The impact of poor oral health is also felt at a societal level.

Each of the oral diseases and disorders listed in Table 1.1 has non-clinical consequences as well as clinical consequences. Table 1.2 below summarises the non-clinical outcomes.

Social impact

The social impact of oral diseases and disorders is the effect on our daily lives of distressing symptoms like pain or discomfort and tooth loss or other impairment. The symptoms could include pain and discomfort, difficulties with eating and speech, embarrassment or aesthetic disorders, and effects on our psychological and social well-being.

Surveys suggest that these social, non-clinical consequences represent a hierarchy of effects with the less severe consequences (for example, mild discomfort or slightly reduced chewing capacity) being very prevalent, and the more severe consequences (including effects on social interaction, difficulty in gaining employment and work loss) being less frequent.

Table 1.2 shows the likelihood of particular non-clinical outcomes for a range of oral diseases and disorders.

Table 1.2: Probabilities for non-clinical consequences of oral diseases and disorders

Disease or disorder	Non-clinical outcomes					
	Pain or discomfort	Eating dysfunction	Speech dysfunction	Embarrassment or aesthetic disorder	Cognitive dysfunction (sleep, concentration)	Social dysfunction (anxiety, isolation, employability)
Early childhood caries	✓✓	✓✓	✓✓	✓	✓✓	✓✓
Coronal caries	✓✓	✓✓	0	✓✓	✓✓	✓✓
Root caries	✓	✓	0	✓	✓	✓
Periodontal diseases	✓	✓	0	✓	0	✓
Malocclusion	0	✓	✓	✓✓	0	✓✓
Oral mucosal diseases	✓	✓	0	✓	✓	✓
Oral cancer	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
Impactions	✓✓	✓✓	0	0	✓	✓
Trauma	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓

Key: 0 = negligible likelihood ✓ = increasing likelihood

Source: Spencer et al, 1991 (adapted)

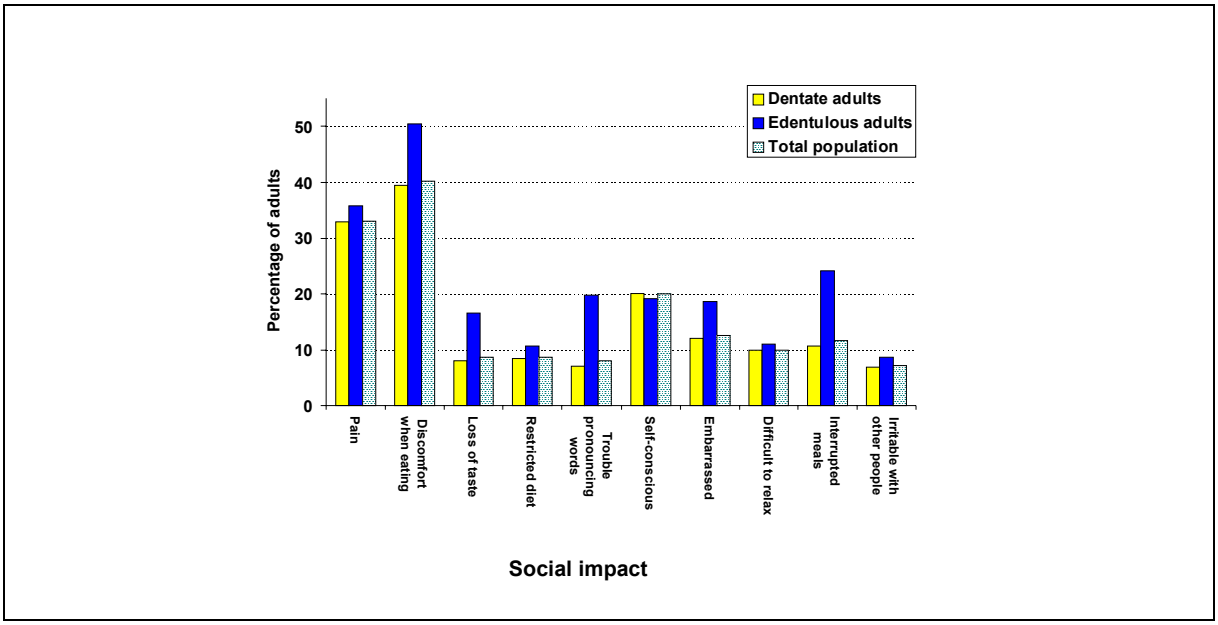
An important additional consideration is the high frequency of the underlying clinical conditions, at least within some groups of the population, and the capacity for such conditions to be recurrent. With just over 19 million decayed teeth, dental caries was the most prevalent condition affecting health reported in the Australian population in 1996. It is estimated that there were almost 11 million newly decayed teeth in 1996, making dental caries the second most commonly occurring condition after upper respiratory tract infections (AIHW, 2000b).

Figure 1.1 indicates that the social impact of oral diseases and disorders is widespread and significant across the population. Discomfort when eating is reported most frequently. Nearly two-thirds of those with no natural teeth (edentulous) and just under half of people with any natural teeth (dentate adults) report experiencing discomfort when eating 'sometimes', 'often' or 'very often' in the previous 12 months. Pain from teeth, gums or dentures is reported by approximately 40 per cent of the total Australian adult population, with similar levels among the dentate and edentulous sub-groups of the population. Self-consciousness, a psychosocial impact, is reported by one-quarter of the Australian adult

population. Again, there is little variation between the dentate and edentulous sub-groups of the population.

A number of social impacts are experienced by sizeable minorities of those people with no natural teeth. These impacts include diminished taste of food, difficulty pronouncing words, embarrassment and interruption of meals due to problems with their dentures. Approximately one in ten of dentate adult Australians also report diminished taste, having to alter their diet, difficulty pronouncing words, embarrassment, difficulty relaxing, having to interrupt meals and being irritable because of their teeth, gums or dentures 'sometimes', 'often' or 'very often' in the previous 12 months.

Figure 1.1: Social impact of oral diseases and disorders



Source: AIHW DSRU Dental Health and Lifestyle Factors Survey, 1999 (unpublished data)

Societal impact

Dental problems are very common in the population. In a two-week sample period dental problems were ranked as the fourth most frequent illness condition, behind headache, hypertension and colds (Spencer & Lewis, 1988). This suggests that recurrent problems with single teeth are common.

In 1995, dental problems were the fourth most frequently reported condition among children from birth to 14 years, affecting 6 per cent of boys and 7 per cent of girls (AIHW, 1998a).

Oral disease in Australia continues to be a burden to the community. The Australian Institute of Health and Welfare (AIHW) estimates that more than 20,000 Disability Adjusted Life Years (DALYs) will be lost due to dental caries, periodontal diseases and edentulism that occurred in 1996. This is approximately 1 per cent of all DALYs lost (Mathers et al, 1999). The significance of this number is that it represents largely preventable disease.

The estimates of DALYs lost due to dental disease are likely to be an underestimate of the true burden. These estimates do not account for recurrent disease in a previously decayed and treated tooth, which can occur several times in the lifetime of a person who has had a filling for caries when young.

The estimates of lost DALYs and cost to the health care system also do not include the effects and costs of other diseases and general morbidity (illness) that occur as a result of poor dental health. Poor oral health status has been associated with cardiovascular disease, stroke, diabetes and preterm, low birth weight babies. Furthermore, the everyday pain, discomfort, embarrassment and eating and speech difficulties associated with caries and tooth loss are not easily captured in measures such as DALYs and cost-of-illness studies. Finally, these estimates do not include the impact of oral cancers, oral trauma, oral mucosal conditions and other less common oral diseases and disorders. While they are less common, they have significant impacts on the people affected by them.

The high burden of illness from oral diseases and disorders is reflected in the costs of dental health care services. The AIHW estimates that direct costs to the health care system of dental disease in 1997–98 totalled more than $1,935 million per year. Dental caries has been estimated to account for approximately 70 per cent of this. Such cost estimates do not include indirect costs of dental diseases and disorders to individuals (Mathers et al, 1998), or the cost to society of lost work days, lost school days, or reduced productivity. For example, in 1996, 20.9 per cent of Australian workers reported taking time off work for a check-up, 15.9 per cent reported taking time off work for a problem, and 29.2 per cent continued to work despite a dental problem but possibly with reduced productivity (Yanga-Mabunga, 1998).

1.4 Relationship to general health

Oral health as part of general health

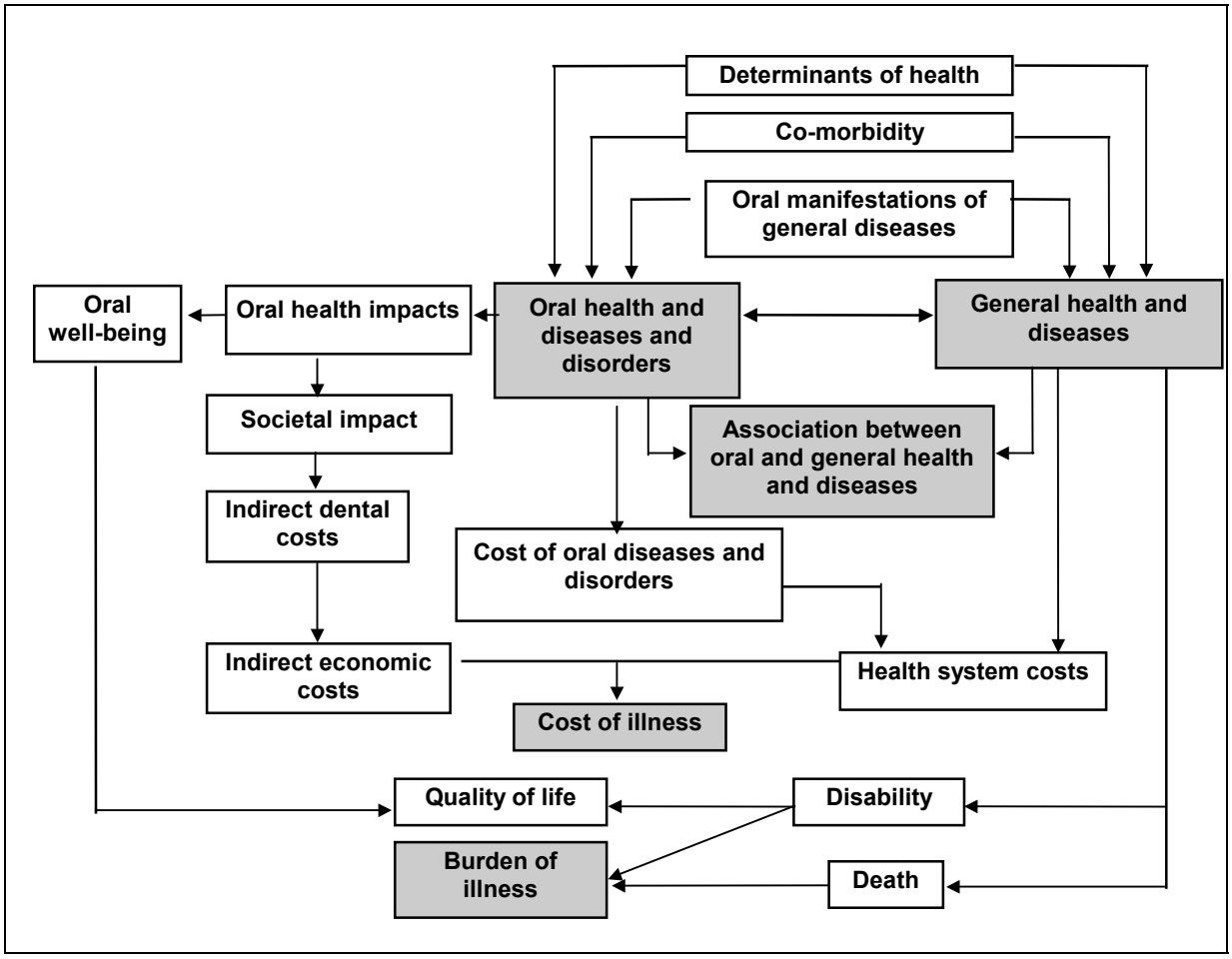
The 'systems' and 'parts' approach in the health system tends to promote the idea of oral health and oral diseases and disorders being separate aspects of 'health' and 'illness'. This is reinforced by the separation of dental professional education and the system of delivery of dental services from the education and service delivery in the general health area. Consequently, the relationship of oral health to general health may be overlooked.

Two important aspects of oral health being a part of general health need to be considered. First, most people do not separate the pain and discomfort arising from oral diseases and disorders from the pain and discomfort felt from, for example, musculoskeletal injury or an inflammatory condition. Both kinds of pain and discomfort affect their everyday roles and tasks in a similar way. People also understand what kinds of behaviour are risky (eg the consumption of a high sugar diet and its risk for obesity, diabetes and dental caries) and have integrated this into their values, expectations and beliefs about health and illness behaviour.

Second, research shows that oral health and general health are associated in a way that belies the traditional health system approach of treating them as separate and compartmentalised. Figure 1.2 outlines some of the relationships. It shows the shared determinants of oral and general health, the co-existence of oral diseases and general

disease, and the interaction between oral and general health. It also illustrates the impacts of oral diseases and disorders on oral well-being, health system costs, economic costs to individuals and the community and the burden of disease.

Figure 1.2: Relationship of oral health to general health and the cost and burden of illness



Oral and general health share many determinants, including genetic endowment, environmental factors, individual behaviour and past health care. The following connections between oral health and general health highlight the need to view 'health' as inclusive of oral health.

- As a consequence of shared determinants, general disease and oral disease often occur together. Co-morbidity is most notable in older people.
- An oral disease is occasionally the first clinical sign of a wider systemic disease. The oral cavity can act as a window to the body and has diagnostic advantages through direct observation of affected tissues.
- Oral diseases and disorders are increasingly being conceptually and empirically associated with general diseases. Some examples include:
  - early childhood caries with otitis media;
  - tooth loss with under-nutrition and gastrointestinal disorders;

- periodontal diseases with diabetes; preterm, low birth weight babies; cardiovascular disease; cerebrovascular disease and rheumatoid arthritis; and
- malocclusion with psychosocial illness.

- Oral diseases and disorders incur both direct health system costs and indirect dental and economic costs, contributing substantially to the cost of illness in Australia.
- Oral diseases and disorders are associated with reduced oral well-being and overall quality of life.
- Oral diseases and disorders contribute to disability and death and the total burden of disease in Australia.

Oral health and its relationship to specific diseases

The associations between oral disease and specific medical conditions are becoming more established. Relationships of most concern are those where a causal link is plausible; that is, there is a coherent biological explanation for oral disease as a causative factor of a particular medical condition. The associations in themselves are support for the extension in practice and policy of the definition of general health to include oral health.

The following associations between oral diseases and medical conditions have been identified.

- Cardiovascular disease (CVD). Common risk factors exist between periodontitis and CVD, but of primary concern is the possible existence of a direct cause and effect relationship between the two diseases (Mattila et al, 2000; Beck et al, 1996; Seymour & Steele, 1998; Kinane, 1998). Seymour & Steele (1998) outline possible theories that have been developed to explain a more direct cause and effect type of link between the two diseases. The interaction between bacterial products and various homeostatic mechanisms, including immune and inflammatory responses, seems the most likely mechanism linking periodontitis to CVD. With the existence of a direct cause and effect link, the ability of the dentist to accurately diagnose and treat periodontal diseases becomes of critical importance. Failure to diagnose or treat effectively would leave the patient at risk of potentially life threatening CVD.
- Cerebrovascular disease. Cerebrovascular disease is associated with CVD. However, there may also exist an association between chronic dental infection and an increased risk of cerebrovascular ischaemia (Mattila et al, 2000; Grau et al, 1997).
- Diabetes. Periodontitis is not a causal factor in systemic conditions such as diabetes. However, diabetes has been shown to affect the periodontium and the treatment of periodontal diseases. An integrated medical and dental management of such conditions is essential for the general health and quality of life of patients (Fenesy, 1998). It has been suggested that periodontal therapy may contribute to the control of diabetes (Kinane, 1998).
- Preterm, low birth weight babies. Although the cause of preterm births is considered to be multifactorial, the possible role of periodontitis is becoming apparent (Offenbacher et al, 1998a; Offenbacher et al, 1998b). Preterm infants usually require considerable medical support and intervention during the neonatal period, as complications are often

encountered in the major organ systems. It is common for preterm children to show significant delay in physical and psychological growth and development, including oral structures (Soew, 1997).

- Aspiration pneumonia. Lung infection can occur when secretions such as saliva (possibly carrying pathogens associated with periodontal diseases) are breathed into the lung (Loesche & Lopatin, 1998).
- Blood-borne diseases. Oral manifestations play a role as indicators in wider health problems. The effects that acquired immunodeficiencies will have on oral health can be predicted from the oral manifestations of primary immunodeficiencies (Atkinson et al, 2000). An example is periodontal destruction associated with HIV/AIDS and early onset diabetes (Fenesy, 1998).
- Hepatitis C. People infected with the hepatitis C virus have been shown to have high numbers of decayed, missing and filled teeth, a trend towards poor periodontal health, poor salivary flow and high rates of mouth pain (Coates et al, 2000).
- Human immunodeficiency virus (HIV) infection. People infected with HIV have high rates of oral infections, periodontitis and gingivitis, and report that their oral conditions have very negative social impacts (Coates & Slade, 1996).
- Infective endocarditis. This is a potentially fatal condition caused by microbial infection of heart valves (usually with congenital or acquired defects). Dental procedures can introduce bacteria into the blood stream and this can result in infective endocarditis. Identification of patients at risk is essential prior to dental management.
- Otitis media. Otitis media is a common childhood disease which occurs frequently during the first years of life. As a result of a treatment regime of antibiotic therapy in combination with antihistamines there is an increased susceptibility to caries (Karjalainen et al, 1992).
- Nutritional deficiencies in children. Poor dental health and consequent eating difficulties have been linked to inadequate nourishment. Feeding disorders resulting in early childhood caries have been recognised for their impact on the dentition, rather than on overall health. The progression of early childhood caries has been shown to adversely affect children's growth (Acs et al, 1992) and treatment of childhood caries can improve children's growth rates (Acs et al, 1999).
- Nutritional deficiencies in older adults. Poor diet is one of the main causes of poor health in Australia. Nutritional deficiencies may occur as a result of functional disabilities imposed by oral diseases and disorders. The elderly population's increased reliance on medication is responsible for an increased incidence of xerostomia which is a dry mouth. A dry mouth increases the incidence of oral diseases (including caries, and atrophic glossitis causing the tongue to be inflamed and to atrophy), as well as promoting the avoidance of some foods (Loesche & Lopatin, 1998). A less direct, but nevertheless telling, link between oral health and nutrition was shown in a study of Adelaide nursing home residents. Edentulous residents lost more percentage body weight following admission than dentate residents (Chalmers et al, 1999).

Whether or not these associations and others represent a causal link between oral diseases and disorders and medical conditions needs to be tested further, possibly by clinical trials of dental treatment (Taylor, 1999). There are significant implications for general health

promotion, dental health and co-morbidity. At a minimum, the associations suggest that oral health status could be seen as a risk marker for poor general health. More dramatically, the interrelationship between oral health and general health suggests a need for oral health to be considered under the general health umbrella. This provision would then enable access to oral health care that can be considered medically necessary for those groups disadvantaged in access to dental care via the existing schemes of government subsidised medical care.

Medically necessary dental care

There is a growing recognition that some oral health care is medically necessary care; that is, the success of other health care interventions is compromised by a failure to deal with oral health issues as part of the overall treatment program. It has been defined as 'oral health care that is a direct result of, or has a direct impact on, an underlying medical condition and/or its resulting therapy'. Medically necessary dental care is integral to comprehensive treatment to insure optimum health care outcomes. Medically necessary oral health care can potentially reduce the care expenditures for treatment of costly complications (Rutkauskas, 2000).

Thus, a range of the associations that are summarised in the discussion of the links between oral health and general health give rise to 'medically necessary dental care'. Conditions, patient groups and procedures which give rise to medically necessary dental care include (but are not confined to):

- chemotherapy;
- developmental and acquired maxillofacial defects;
- diabetes;
- head and neck radiation;
- heart defects including heart valve surgery;
- haemophilia;
- hepatitis C infection;
- HIV infection;
- patients affected by therapeutic drugs;
- renal dialysis;
- stroke; and
- transplantation.

Legislation is proposed in the United States to provide for public funding for 'medically necessary dental treatments' where they are currently not funded through either Medicare or Medicaid.

1.5 Public health perspective

Oral health and oral diseases and disorders are a significant public health issue in Australia. First, oral diseases and disorders, in particular, occur in patterned ways that can be easily described. This means that oral diseases and disorders are associated with people's circumstances and living conditions and are not simply a result of their individual biology. Second, many oral diseases are potentially preventable, both at a group level and at an individual level. Third, oral health concerns are part of, or interact with, other public health problems that are important, notably all of Australia's national health priority areas.

Public health interventions

A public health perspective takes a whole community view of health. It considers health problems as they affect groups of people, rather than individuals. Public health activities include the two important broad areas of measurement and intervention.

Measurement includes surveillance and survey data collections. This is necessary for good public health planning as it provides the basis of an understanding of the magnitude of health and disease, and their patterns.

Public health interventions have as their focus the prevention of disease before it occurs. Interventions fall into three broad categories: protection of health, promotion of health and prevention of disease.

Prevention can be classified as primary, secondary or tertiary. Examples of primary prevention in oral health are water fluoridation, toothpaste fluoridation, education and awareness raising, and removal of barriers to access of preventive dental services such as those offered by school dental services. Secondary and tertiary prevention are generally provided by dental health care workers in clinical settings.

The characteristics, as they relate to oral health, of an ideal public health measure are provided below (Weintraub, 1998). An ideal public health measure should be:

- medically and dentally safe;
- proven to be efficacious in the reduction of targeted disease;
- able to be administered with minimum compliance on the part of the patient;
- administered with maximum acceptance on the part of the patient;
- uncomplicated and easily learnt by utilisers;
- readily administered by non-dental personnel;
- inexpensive, therefore affordable by the majority;
- readily available and accessible to a large number of individuals;
- able to be easily and efficiently implemented; and
- attainable by beneficiaries regardless of socioeconomic, educational, income and occupational status.

Of all the dental public health measures undertaken to date in Australia, fluoridation is the one that meets all of these criteria.

Patterns of oral health and disease

Patterns of oral health and disease indicate that personal and behavioural factors can be important in oral health outcomes. However, these patterns also indicate a greater vulnerability to particular types of oral disease at different life stages and for particular population groups. The patterns relate to age, sex, economic status, location and ethnicity. Poor oral health status can be viewed as being, in some part, related to membership of these groups, in addition to being related to individual and behavioural factors. Public health interventions seek to address the factors associated with group membership which affect oral health.

Much recent public health activity in Australia has been organised by disease or 'body system'. The National Public Health Partnerships (NPHP) policy initiative recognises that the origins of many of the prevalent diseases in Australia are similar, and that a change in focus of public health activity towards these origins could be both more effective and more sustainable (NPHP, 1999).

Increasingly, the efficiency of activities to improve health status is being challenged. The opportunity cost of a range of health care interventions is being investigated with the aim of improving public health by concentrating scarce resources where they can achieve the greatest benefit in terms of improved health status. Both clinical treatment services and preventive programs are being subjected to cost-effectiveness analysis.

1.6 Clinical services perspective

Clinical dental services can play an important role in maintaining and improving oral health. Traditionally, clinical services have treated existing oral disease. Increasingly, the focus is on preventive care and patient education.

Until now, clinical services for dental health have been provided separately from other health care services. Dental services are mostly delivered by the private sector in Australia, with some public sector services available to people with low incomes. The separation of dental services from other health services has implications for planning, financing and coordination of services.

Clinical dental services can play both a prevention and a treatment role, although, for a number of reasons including history and financing arrangements, clinical services tend to focus on treatment.

Clinical services should:

- contribute to improved health through monitoring health status, identifying causes of ill-health, promoting healthy physical and social environments, and conducting prevention and early intervention programs;

- provide services that are accessible by minimising barriers to access, ensuring a fair allocation of resources, targeting groups with poor health status and minimising waiting times for services;
- provide services of good quality including appropriate services that are comprehensive and strive for continual improvement; and
- provide services that represent good value for money by ensuring that resources are used optimally, that services operate efficiently and that inappropriate care is minimised.

1.7 Priority areas for health improvement

There has been a trend in recent years to identify priority areas for health improvement, including specific goals and targets. In Australia, these have been established for cardiovascular disease, cancer, injury, mental health, diabetes and asthma. The criteria for priority attention include:

- the overall burden of the disease in terms of mortality, morbidity and disability;
- potential for health gain through prevention of the disease or ameliorating its impact;
- existence of cost-effective interventions; and
- equity issues, especially the impact on priority populations (AIHW & DHFS, 1997).

Oral health certainly meets these criteria to varying degrees and demands specific attention. In addition, the integration of oral health into the broader goals and objectives for health services generally can complement specific oral health services and add to the overall oral health improvement.

1.8 Summary of issues

- Being orally healthy means that people can eat, speak and socialise without discomfort or embarrassment, and without active disease in their mouth which affects their overall well-being.
- There is a range of highly prevalent oral diseases affecting the teeth (dental caries) or gums (periodontal diseases); less frequently occurring disorders including dental impactions, malocclusions, tooth wear, joint dysfunction and trauma; and local or systemic diseases and cancers affecting the oral mucosa and other oral structures.
- These diseases and disorders have numerous pre-clinical and clinical effects. Their progression leads to impairments varying from infection, abscess formation and tissue destruction to death. More deaths occur each year from oral cancer than cervical cancer.
- Dental caries is the most prevalent health problem in Australia accounting for 19 million existing and 11 million newly decayed teeth each year. Periodontal diseases are the fifth

most prevalent health problem among Australians. This establishes these oral diseases as silent epidemics in Australia.

- About 90 per cent of all tooth loss can be attributed to these two health problems, and because they are preventable and treatable, most of that tooth loss is avoidable.
- Non-clinical consequences are frequently reported problems in the Australian community, ranging from discomfort when eating, interrupted meals, pain and self-consciousness to difficulty pronouncing words. Over one-third of Australians reported discomfort when eating or pain sometimes, often, or very often in the last 12 months. Less frequent non-clinical consequences of poor oral health include impacts on appearance, self-esteem and employability.
- The 'systems' and 'parts' approach to health has tended to promote oral health as a separate aspect of health. This discounts many of the similarities in the way people respond to pain and illness and how they affect roles and tasks, regardless of the origin.
- The mouth is not separate from the rest of the body, either biologically or in the experience of individuals. Oral and general health and disease share determinants and occur together. Oral health and disease are closely linked to general health and disease. Factors which threaten general health also threaten oral health, and poor oral health has been associated with a range of other diseases.
- The mouth can be a portal of entry for infections. Epidemiologic evidence suggests an association between oral diseases (eg periodontal disease) and systemic diseases (eg cardiovascular disease). For the successful treatment of some general health problems (eg heart valve surgery), medically necessary dental care must be undertaken. The mouth is also a mirror for general health with associations between systemic diseases (eg diabetes) and oral diseases and disorders (eg periodontal disease).
- Improvements in oral health cannot be pursued in isolation from improvements in general health, and improvements in general health may be limited by poor oral health.
- Oral diseases and disorders incur both direct health system costs ($2.6 billion or 5.9 per cent of health system costs) and indirect dental and economic costs and are a substantial contributor to the cost of illness in Australia.
- The oral health of Australians can be substantially improved through public health interventions with a focus on prevention of disease.
- Clinical dental services can also play an important role in maintaining and improving oral health and well-being.
- Oral diseases and disorders can be characterised as having a high burden of illness, significant potential for health gain through prevention and treatment services, co-existence with other conditions, and an uneven impact on the population. It is because of these characteristics that oral diseases and disorders warrant receiving greater health policy priority.

Conclusion 1

Oral health is a basic expectation of all Australians. Oral health and disease are important in their own right and for their association with

general health and disease, costs, disability and death. Improvement in oral health may be pursued from a public health perspective, and both prevention and early and appropriate intervention would improve oral health for all Australians. Oral health demands more attention.

2. Oral health and service needs

Overview

Oral health

There is a widespread belief that the improvements in oral health, including decreased dental caries experience in children and increased tooth retention in adults, have reduced the dental service needs of the Australian population. However, a number of issues contribute to the continuation of poor oral health.

- Dental caries is still experienced by a substantial minority of children.
- The gains in the oral health of children are lost in adolescents and young adults.
- Young and early middle-aged adults have had only a small decrease in decay experience, and have unchanged numbers of untreated decayed teeth and teeth with fillings that need to be maintained.
- Increased tooth retention in late middle-aged and older adults (lower edentulism and fewer missing teeth) has greatly increased the risk of recurrent or new decay as the total number of adult teeth has increased.
- A range of chronic degenerative problems are emerging among middle-aged and older adults including tooth wear, tooth fracture, root caries and pulp death.

Dental service needs

Oral health needs in Australia are addressed implicitly in a number of ways, including nutrition and general health programs. Programs that explicitly address oral health needs include public health programs such as water fluoridation. However, explicit attempts to meet oral health needs are made mainly through the provision of dental services. The pattern of oral health changes and greater tooth retention mean that oral diseases and disorders are still prevalent and extensive in the Australian population. Dental service needs are pervasive. The services needed include preventive, diagnostic, restorative, periodontal, oral surgery, prosthodontic, and other services such as endodontic, crown and bridge and orthodontic.

Risk of oral disease

Risk of oral disease and disorder is shaped by the physical environment (eg water fluoridation); the social and economic environment including the home, school, work and neighbourhood; past access to dental services; individual behaviour; and genetic endowment. A number of population sub-groups show poorer oral health and greater dental service needs. These sub-groups include:

- middle-aged and older adults;
- people with less education and in less skilled occupational groups;
- socioeconomically disadvantaged Australians;
- Indigenous Australians;
- people who need assistance in daily living, especially nursing home residents;
- people born overseas in a non-English speaking country;
- people living in rural and remote locations; and
- people with disabilities including mental, intellectual and physical disabilities.

Achievement and needs in perspective

There is still a significant challenge to improve the oral health of the Australian population. The improvement in oral health among children is not maintained as they pass into adolescence and adulthood. Much of the Australian population remains in poor oral health with considerable dental service needs.

2.1 Major oral diseases and disorders

Most oral diseases are chronic conditions which result from the interaction of multiple causes. Many are reversible in their early stages. The most prevalent are dental caries and periodontal diseases.

Oral disease is one of the most prevalent human disorders and has an impact on people at individual and population levels. Oral disease is measurable on both levels in terms of prevalence and extent. Various indices are used to assess clinical and social impact.

Clinical indicators assess the impact of oral diseases and disorders within the mouth. They tend to focus on the extent of damage to the teeth, gums and surrounding structures. They can also be useful in assessing the amount of oral disease in the community. However, they do not give any indication of the impact of oral disease and disorders on people's lives. This is an important aspect of the definition of oral health, and social impact indices have been developed to include this broader perspective of health.

Each index of oral health and disease is useful for considering individual aspects of oral health but many have limitations. The oral health indices used in this report are described in more detail as they are used to describe the state of oral health in Australia.

Dental caries

Dental caries (tooth decay) is the result of damage to teeth by acid-producing bacteria living in the mouth. Dental caries starts as an intact, yet partially demineralised, lesion in the tooth structure. It is fully reversible at this stage. Continuing demineralisation results in cavitation

of the surface enamel or softening of the root surface. It may be arrested at this stage, though will most often require restoration of the damaged tooth structure to restore form and function. The progression of caries will lead to inflammation of the central dental pulp structure with likely pain and low grade fever. Even at this stage the tooth can be retained quite successfully if infection is controlled, diseased tissue removed and replaced and the form and function of the tooth restored.

Caries can occur at any age after teeth erupt and is therefore a dental health issue for all age groups. Caries-causing bacteria infect the mouth and proliferate on a diet of very sweet or sticky foods. Timing of food intake also plays a role in caries formation (Burt & Ismail, 1986).

The body's protective mechanisms, including saliva, that can directly fight bacteria and help to remineralise teeth by supplying calcium and phosphate play an important role in limiting tooth damage from caries-causing bacteria. Medical conditions and medications that alter the flow of saliva can increase risk of caries, especially in the elderly.

Measurement

Two indices are used to measure caries experience. The dmft is a count of the sum of deciduous (infant) teeth that are decayed (d), missing due to caries (m) and filled due to caries (f). The DMFT is the corresponding index for permanent (adult) teeth. Both indices count each tooth once and if a tooth has been filled but also has untreated decay, it is counted as decayed. The dmft and DMFT do not differentiate between a tooth that is filled which may be perfectly functional, and a decayed tooth which may cause significant discomfort.

Periodontal diseases

Periodontal (gum) diseases are a specific group of diseases, caused by bacterial infections, that affect the gums (gingivae) and the connective tissue and bone which support the teeth. These diseases range from inflammation of the gingival tissues (gingivitis) to progressive, destructive diseases of the tooth-supporting tissues (periodontitis). Gingivitis can be almost entirely prevented by dental plaque control. Periodontitis is generally preceded by gingivitis but gingivitis need not progress to periodontitis. The rate of destruction of periodontal tissues also varies greatly between individuals and within sites in the mouth. Very few people have complete periodontal health; approximately 80 per cent of Australian adults show some limited periodontal disease (Barnard, 1993).

The most common forms of periodontal diseases are associated with increased age, smoking, infrequent dental visits, low education and income levels and some medical conditions (Page, 1995), especially diabetes mellitus (Genco, 1996) and osteoporosis (Jeffcoat & Chestnut, 1993).

Measurement

The extent of periodontal disease in the community is measured using the Community Periodontal Index (CPI). It was developed as an index of treatment need, but can also give a broad indication of levels of periodontal health and disease. The CPI counts the number of people in whose mouths there is no disease (score = 0), bleeding from the gums (score = 1), calculus around the join between the tooth and gums (score = 2), a space or pocket 4–5mm

deep between the root of the tooth and the gums (score = 3), a space or pocket 6mm or deeper between the root of the tooth and the gums (score = 4), or edentulous (score = 5). The CPI scores reported here count only the most severe score for each person, and can be thought of as the 'tip of the iceberg'.

The extent of damage to gums from periodontal disease can also be assessed by counting the number of teeth that are loose as a result of periodontal disease. Loss of attachment (LOA) is a measure of the loss of support for teeth in the mouth. It indicates that the gums are sufficiently damaged so that teeth are no longer so well held in position. LOA is often used to assess the oral health of older people.

Tooth loss

Loss of teeth can arise from a number of causes such as dental caries, periodontal diseases or other reasons such as trauma. Overseas data indicate that dental caries is the nominated cause of the extraction of 70 per cent of all teeth, periodontal diseases 20 per cent and other causes 10 per cent (Brown et al, 1989). While most teeth being extracted may have a disease or condition which leads to the extraction, this outcome may nearly always be avoided if other interventions are pursued. However, such alternative interventions are often expensive and require extensive care.

Measurement

Tooth loss is partly captured in the missing components of dmft and DMFT scores. However, it can be obscured by the presentation of only the full dmft or DMFT score and may be under-estimated as this represents teeth missing due to caries.

Edentulism is complete tooth loss. Edentulism rates indicate the percentage of the population who have no natural teeth remaining. Tooth loss data are based on self-reports and clinical examination.

For people who have not lost all their teeth, the Index of Functional Teeth counts the number of teeth that are either sound (have no caries experience) or have been filled (including crowns and bridges) due to caries. This index indicates the number of teeth in the mouth which are free from current caries and are available for 'work'. The index of functional teeth does not take into account the distribution in the mouth of the functional teeth, which may affect just how well they actually do work.

Malocclusion

Malocclusion refers to a deviation from the ideal alignment of teeth. Malocclusion in itself is not a disease, but may result in disturbances in function and affect psychosocial well-being. In the long term it may lead to painful degenerative changes in the jaw joint and degeneration of affected teeth.

Measurement

Malocclusion can be difficult to assess because degrees of malocclusion vary, as does their impact on oral health and functioning. Assessment of malocclusion includes a considerable subjective component, even when the assessment is made be a dental professional. Given

this, it is possible to assess the prevalence of malocclusion only by assessing its presence or absence, as well as the need for treatment.

Oral cancers

Oral cancers include cancers of the lips, tongue, salivary glands, gums, floor of the mouth and back of the throat. Oral cancers account for between 3 per cent and 4 per cent of cancers diagnosed in Australia each year and for approximately 2 per cent of deaths from all cancers. Many oral cancers are associated with tobacco and alcohol use. Cancers of the lips are mostly associated with sun exposure. As a group, cancers of the oral cavity are the seventh most commonly occurring cancers in Australia (AIHW & AACR, 1999).

Measurement

The extent of oral cancer in the community is assessed using the incidence and prevalence of cancer as reported by Cancer Registries in each of the States and Territories.

Cleft palate and cleft lip

Cleft palate and cleft lip are congenital malformations. They can be associated with chromosomal abnormalities, other congenital malformations, and a high neonatal mortality rate. Cleft palate and cleft lip are each distinct conditions with different inherited and embryological origins. Clefting can be inherited, associated with substances which induce developmental abnormalities, related to maternal smoking during pregnancy, and associated with deficiencies in nutrition (Lidral et al, 1997; Murray, 1995; Murray et al, 1997).

Children with clefts have difficulty with feeding, speaking, breathing and swallowing and are susceptible to repeated respiratory infections. There are also frequent episodes of corrective surgery, frequent illness, delayed and altered speech and the social consequences of a facial deformity.

Measurement

The extent of cleft palate and cleft lip in the community is assessed using the incidence at birth. Data for cleft palate and cleft lip are collected by birth or congenital malformations registers in each of the States and Territories.

Oral trauma

Oral injury includes damage from mechanical causes to the tissues of the mouth and throat, including the teeth. Oral injury is associated with motor vehicle accidents, sporting injuries, falls, intentional harm caused by others, ingestion of foods containing foreign bodies and self-inflicted injury.

It is likely that most oral injuries, especially injury to oral soft tissues, are treated in the general medical sector rather than in dental settings (Hyman et al, 1993).

Many oral injuries are predictable, especially those associated with sport. Some of the factors leading to oral injury are well understood, while there is much to be learnt about others

(Pinkham & Kohn, 1991). Extended use of mouthguards in sports that carry a high risk has seen a reduction of oral injuries in those settings. However, mouthguard use by children, especially during training, is not universal in organised group sport (Banky & McCrory, 1999). Individual activities such as cycling, skating, gymnastics and trampolining also carry a risk of oral injury that is not necessarily addressed.

Measurement

Routine collection of data on oral trauma is limited to hospitalisation data collected by the AIHW National Injury Surveillance Unit.

Other oral diseases and disorders

Other diseases and disorders affecting the oral cavity include viral and fungal infective diseases of the oral mucosa and dental impactions. Whilst these problems occur less frequently than dental caries or periodontal diseases, they have considerable impact on the quality of life of affected individuals.

There are no routinely collected data for the other diseases and disorders that have been described in this report.

2.2 Burden of oral diseases and disorders

Australians enjoy a relatively high standard of oral health when compared to other countries in the Organisation for Economic Cooperation and Development (OECD). The latest available comparative data published by the AIHW indicate that in 1990 Australian children enjoyed relatively good oral health, with the second lowest reported DMFT score. However, our older population does not fare as well. Compared with other countries that have reported data for the same period, Australian adults aged 35 to 44 years had a higher than average DMFT score in 1995–96. Further, of the 14 countries that reported edentulism rates for 1990, Australia had the fourth highest rate of edentulism in people aged 65 years and over (AIHW, 1998b).

The proportion of Australians who retain their own teeth and the number of teeth retained into old age are growing. However, higher rates of edentulism and tooth loss are evident in the frail and functionally dependent, the oldest old, women, socioeconomically disadvantaged Australians, those with low levels of education, Indigenous Australians, and people with neurological impairment or chronic mental illness (NHMRC, 1994; Slade et al, 1996). The following groups, in particular, have significant needs.

- Indigenous Australians have poorer oral health status than the Australian population as a whole. It is estimated that 16.3 per cent of Indigenous Australians are edentulous, compared to 10 per cent of non-Indigenous Australians. This figure does not reflect the full difference as the Indigenous Australians are a younger population. Young Indigenous Australians are slightly more likely to have some teeth but with higher levels of untreated disease. Across the adult age groups edentulism and denture wearing are more prevalent in the Indigenous population. High rates of tooth loss in Indigenous adults are associated with the high prevalence of mature onset diabetes

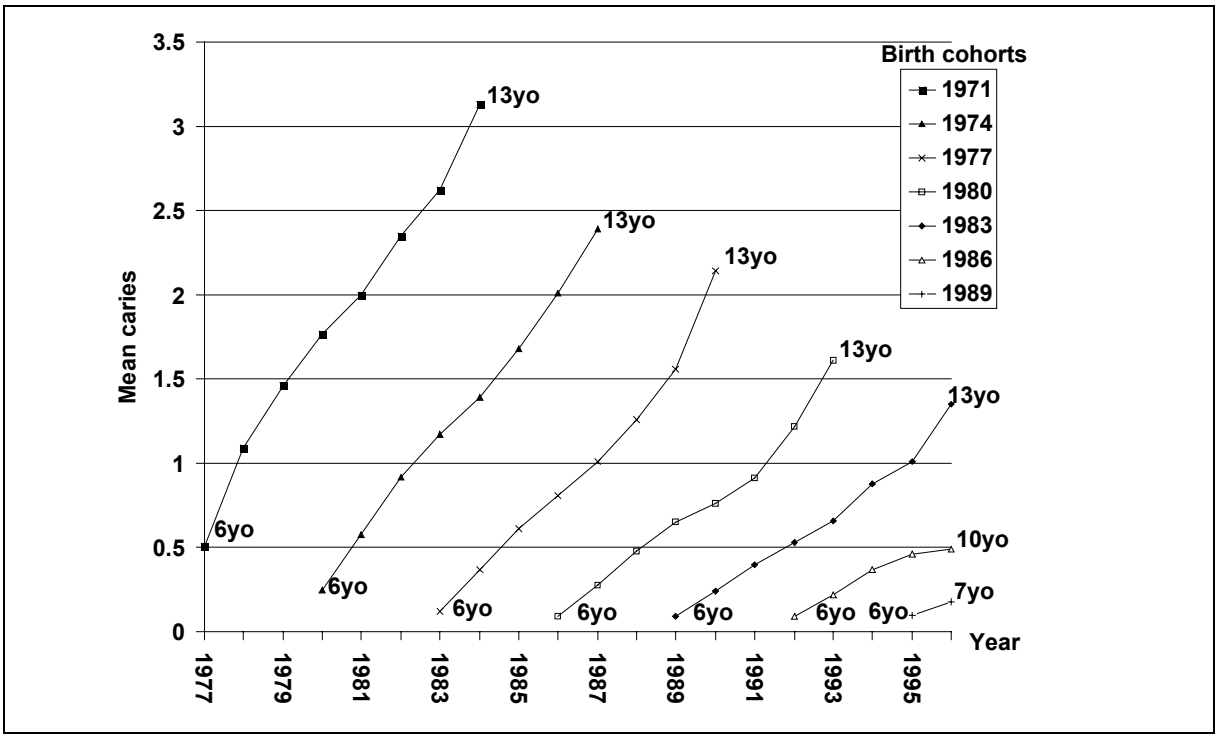
mellitus in that community. Differences within the Indigenous population also suggest poorer access to dental care for remote dwelling Indigenous Australians.

- Migrants generally have rates of edentulism and denture-wearing that are no worse than the Australian population as a whole. However, the available evidence suggests that refugees arrive with generally poor oral health status.
- Older Australians living in rural areas are more likely to be edentulous and more likely to wear a denture than those living in urban areas.
- People with lower education status and in less skilled occupational groups continue to experience higher rates of edentulism and tooth extraction.

Dental caries

Oral health in Australia has improved in recent years. The caries experience of children has decreased. This continuing trend reflects better prevention of caries in the lifetimes of recent cohorts of children. Figure 2.1 shows the distribution of caries experience as measured by the number of decayed, missing and filled teeth (DMFT). Both the prevalence of caries (the percentage of children with one or more deciduous teeth with caries experience) and the extent of caries experienced (dmft) have diminished over the period 1977–96.

Figure 2.1: Caries experience (DMFT) for birth cohorts of Australian children, 1977–96



Source: Commonwealth Department of Health, 1987; Evaluation of Australian School Dental Scheme, 1987–88 (DSRU unpublished data); CDHS, 1989–96

By world standards, children in Australia enjoy very good oral health. International comparisons presented by AIHW indicate that Australian 12-year-olds have a low DMFT score compared to children living in other developed countries (AIHW, 1998b). However,

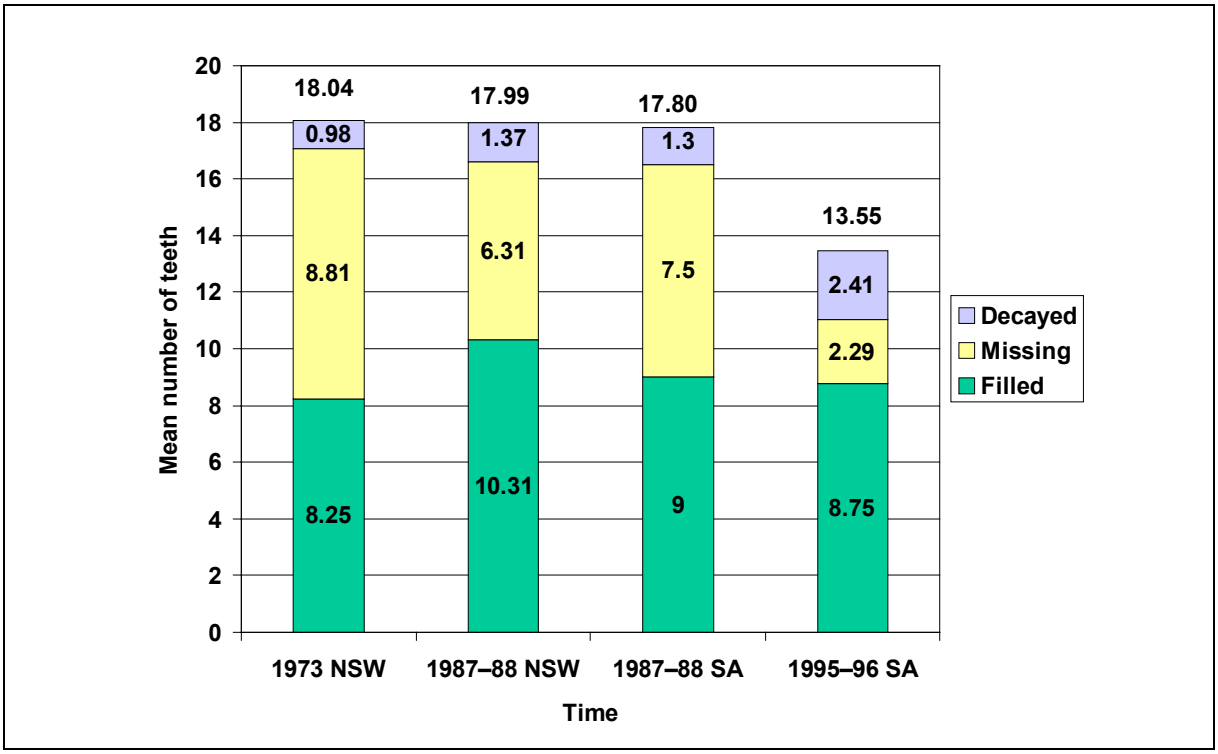
less complete data for adults aged 35 to 44 indicate that in this age group Australia does not have an equivalent record.

The oral health of children is obviously the starting point for future improvements in oral health among adults. The improvements in oral health among adults will lag behind in time, awaiting cohorts of children to reach their adult years. However, there are also indications that the gains may not be as substantial as those achieved among children. Among 35 to 44-year-olds in Australia the DMFT score showed little change for nearly two decades, but has improved more recently.

Figure 2.2 presents the DMFT of 35 to 44-year-old Australians in 1973 and 1987 and then more recently in 1995–96.

There was no decrease in the DMFT score between 1973 and 1987, with DMFT scores of approximately 18 teeth, but there has been a substantial decline to the 1995–96 score of 13.5 teeth. While the DMFT score was slow to change, the number of missing teeth has declined across the whole period. The number of teeth extracted has decreased as both the community and dental profession have sought to alter the management of caries.

Figure 2.2: Caries experience in 35 to 44-year-old Australian adults



Source: Arnljot et al, 1985; Barnard, 1993; Brennan et al, 1997

The distribution of the DMFT and its components across the permanent teeth of the dentate adult age cohorts helps locate and define caries experience and its consequences. Figure 2.3 presents the status of the permanent teeth of adults. Each illustration depicts the 16 permanent teeth of the upper and lower jaws. Each illustration represents the teeth, from right to left, by a bar that shows first tooth survival or loss (height of the bar represents percentage of teeth surviving) and second, the distribution of sound (open portion), filled

(hatched) and decayed (solid) outcomes for the teeth. Perfect oral health of teeth would be represented by the maximum possible height of the sound (open) bar.

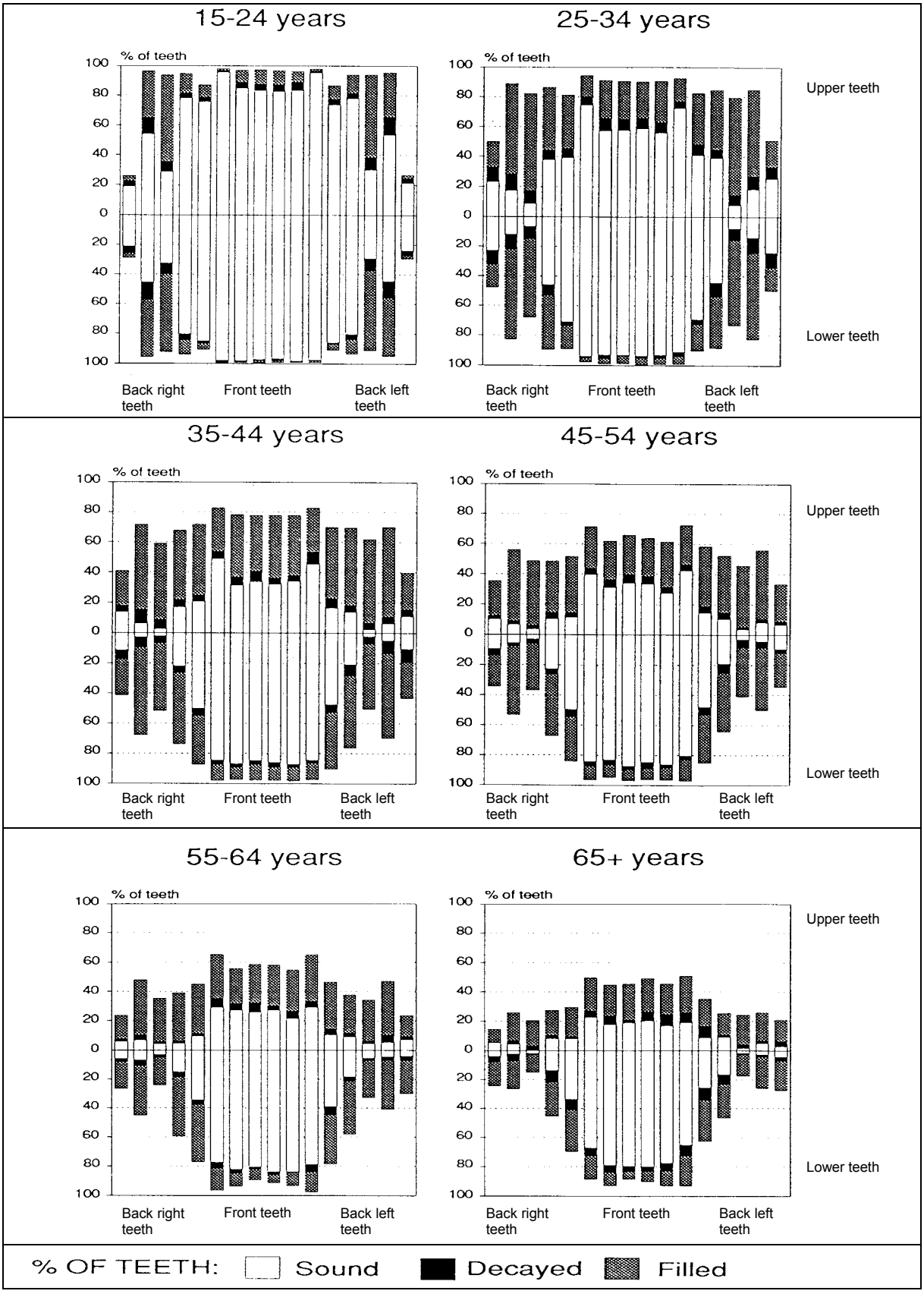
There are two striking features of these illustrations. Across the age cohorts the percentage of teeth surviving diminishes (height of the bar decreases), with only the lower front teeth showing marked survival; and the status of surviving teeth steadily moves to be dominated by fillings (hatched area of each bar).

Within each illustration for an age cohort, differences in tooth survival and the likelihood of a tooth having experienced caries and being filled varies. In the 15 to 24 years age cohort, upper and lower first premolars show lower survival (related to extractions to relieve overcrowding), while fillings or decay are most likely to be found on the upper and lower first and second molars. In the 25 to 34 years age cohort, loss of first and second molars, particularly in the lower jaw, heralds a pattern of loss of molar teeth seen in all older age cohorts. The status of the teeth remaining indicates caries experience presenting as fillings or decay spread widely across the teeth, except for the lower front teeth. Survival of individual teeth is lower in successive cohorts, except for the lower front teeth. The pattern of tooth retention moves toward the 'inadequate' minimum dentition of 20 front and premolar teeth. While retention of ten lower teeth is common, few older adults manage to retain more than the six upper front teeth. Except for the lower front teeth, those surviving are more likely to present as filled or decayed, rather than as sound, teeth.

Figure 2.3 illustrates starkly the clinical consequences of caries. There is both a substantial loss of teeth in older adult cohorts, with the issue of their replacement being of central importance, as well as heavy restoration of most of the teeth that survive. Restoration creates an ongoing cycle of repair and replacement that is as much an influence on the practice of dentistry as new caries.

New caries is not well captured in these data. Caries experience indices count the number of teeth with evidence of caries past and present. A tooth that has decay, is filled, and develops decay again contributes a count of one to the DMFT score at all times. It may alter the balance of decayed teeth to filled teeth, but this will depend on where in the decay-restoration cycle it is observed. Hence, while the DMFT index appears to plateau from middle age, this is not an indication of no new caries activity. Initiation and progression of caries occurs throughout life. Few local data are available to comment on the age-specific incidence of caries.

Figure 2.3: Decayed, missing and filled teeth, Australian population by age group



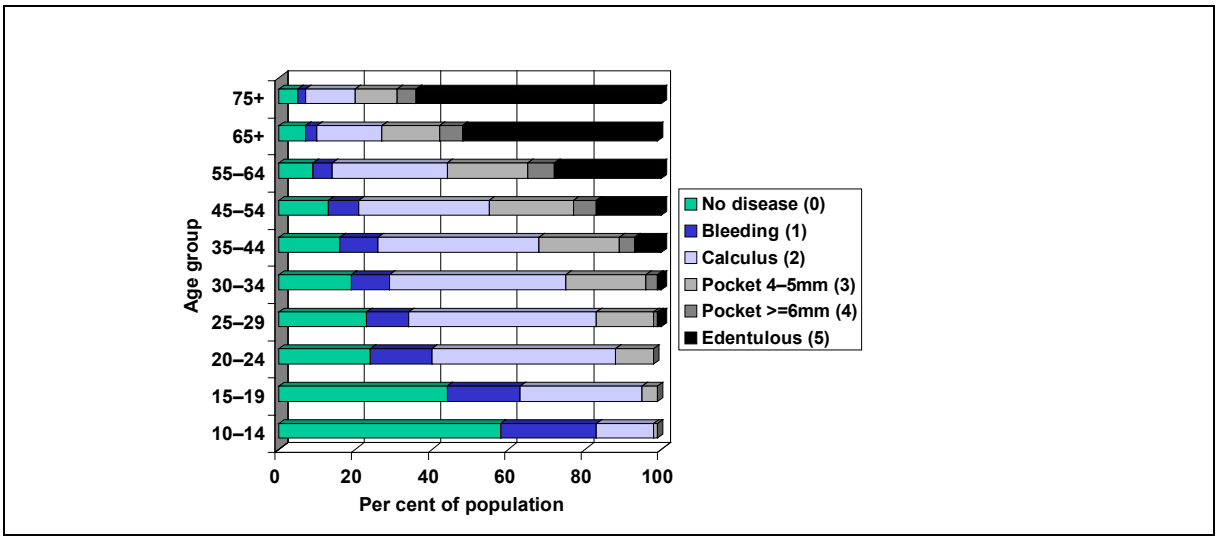
Source Spencer et al, 1991

Periodontal diseases

The health of gums can be measured using a severity score such as the Community Periodontal Index (CPI).

There are no data available to assess the trend in periodontal disease prevalence or severity. Figure 2.4 shows the percentages of the population with at least one sextant of the teeth (there are six sextants in the mouth) affected by periodontal disease. The percentages represent the proportion of people whose worst score was in each category. These data indicate that most of the population has some mild gum disease at any given time. Only a small proportion of Australians has severe gum disease affecting at least one sextant of their teeth.

Figure 2.4: CPI scores for periodontal status for Australians aged 10 and over, 1988 — percentage of persons by worst mouth score



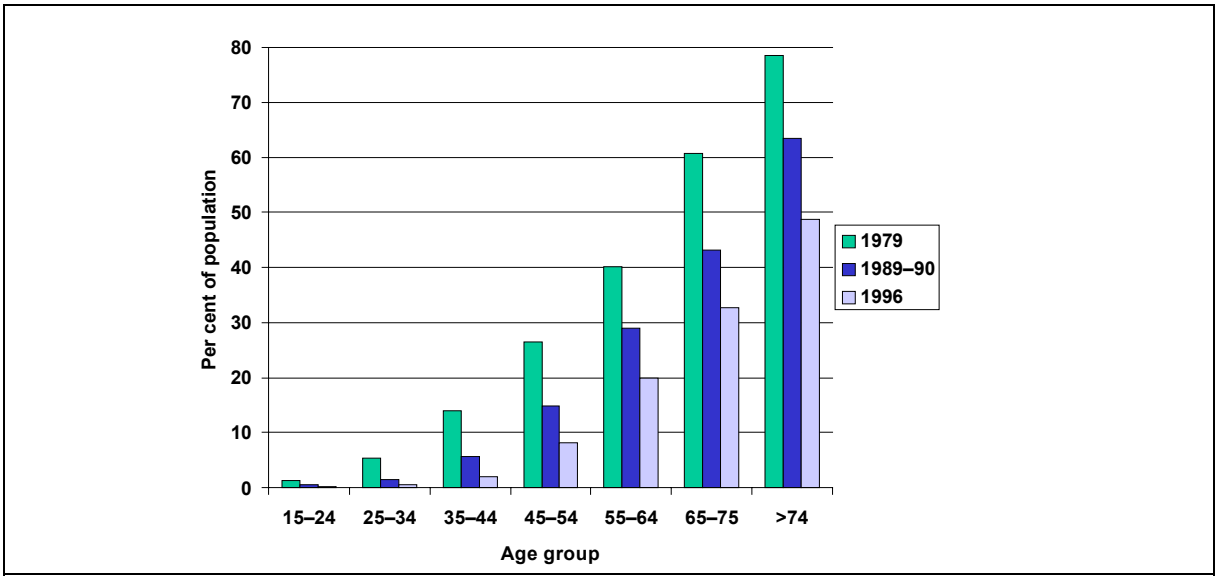
Source: Barnard, 1993

Tooth loss

Losing all natural teeth (edentulism) increases as age increases. This reflects both the cumulative loss of teeth over time and previous patterns of dental treatment.

Rates of edentulism at all ages have fallen over the last 20 years (see Figure 2.5). In contrast to the dental caries picture for children, this trend reflects more the changes in dental practice for adult Australians, rather than prevention of oral disease.

Figure 2.5: Edentulism rates, Australia, 1979–96

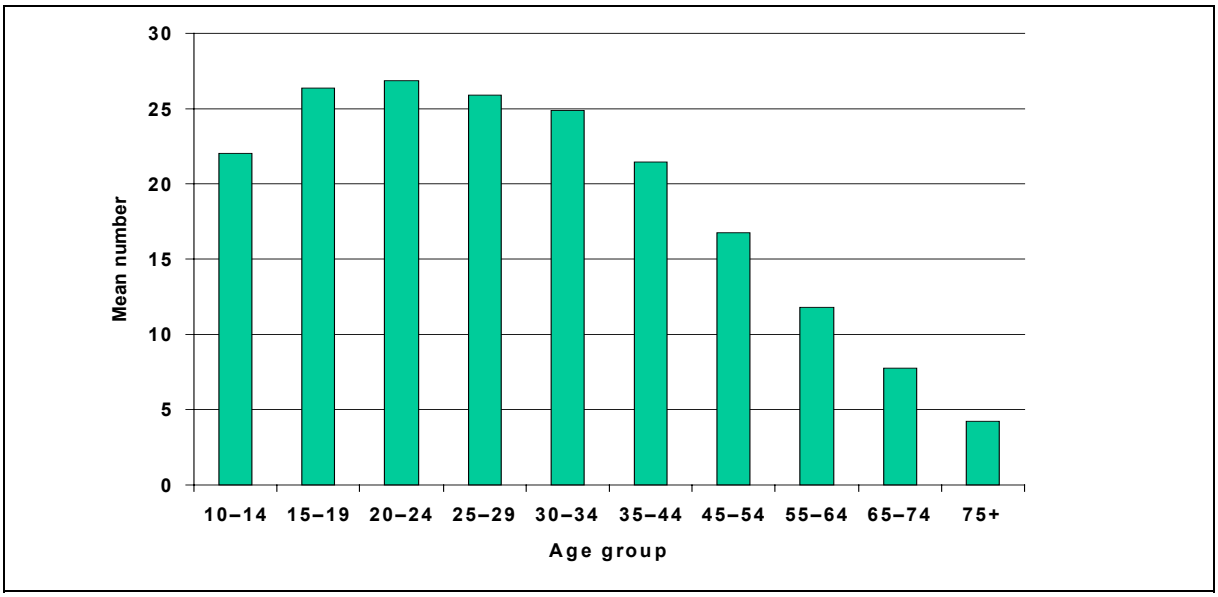


Source: AIHW DSRU (unpublished data)

Remaining teeth can be used to assess the oral health of the community. The Index of Functional Teeth can be used as a measurement even though the distribution of functional teeth can be important in determining the total functionality of the mouth. Twenty is the number of teeth often regarded as the minimum required for good oral functioning.

Figure 2.6 shows the distribution by age group of functional teeth in the Australian community. The mean number of functional teeth in younger age groups is between 21 and 27. However, for the age group of 45 to 54 years the mean number of functional teeth is less than 20. This means that a significant proportion of older Australians has fewer than 20 functioning teeth. This represents a large number of people who have fewer teeth than many consider necessary for good oral functioning.

Figure 2.6: Mean number of functional teeth in the Australian population, selected age groups, 1988



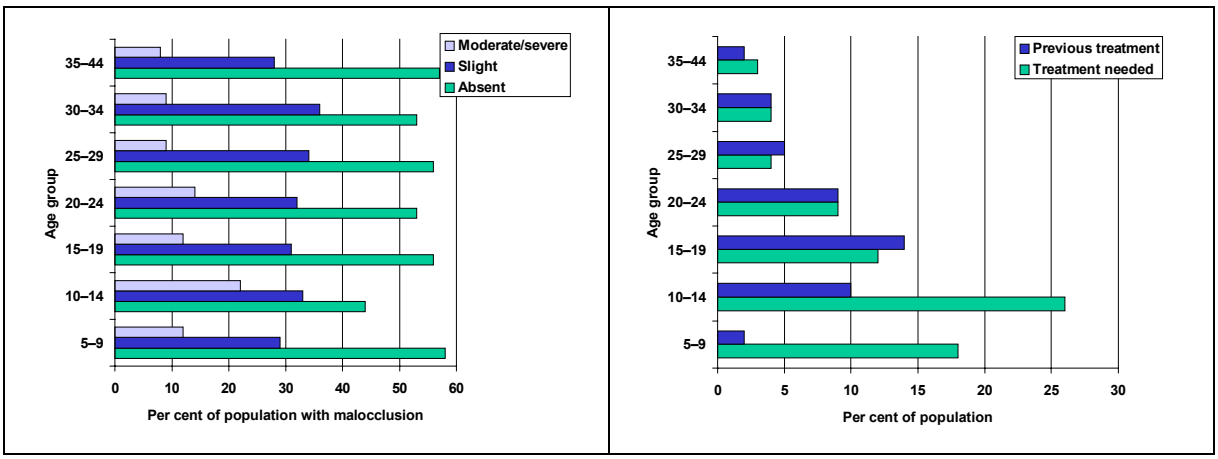
Source: Barnard, 1993

Malocclusion

The only national data on malocclusion prevalence come from the 1988–89 National Oral Health Survey of Australia (NOHSA), when occlusion status was recorded for individuals aged 5 to 44 years.

In only 54 per cent of Australians was malocclusion judged to be absent, while severe malocclusion was present in 12 per cent of people. Some treatment was judged to be needed by 11 per cent, and 6 per cent were having or had completed treatment for malocclusion. Figure 2.7 shows the most recently available data on prevalence of, treatment need for and past treatment of malocclusions for Australians.

Figure 2.7: Prevalence, treatment need and past treatment for malocclusions in Australians aged 5 to 44 years, 1988



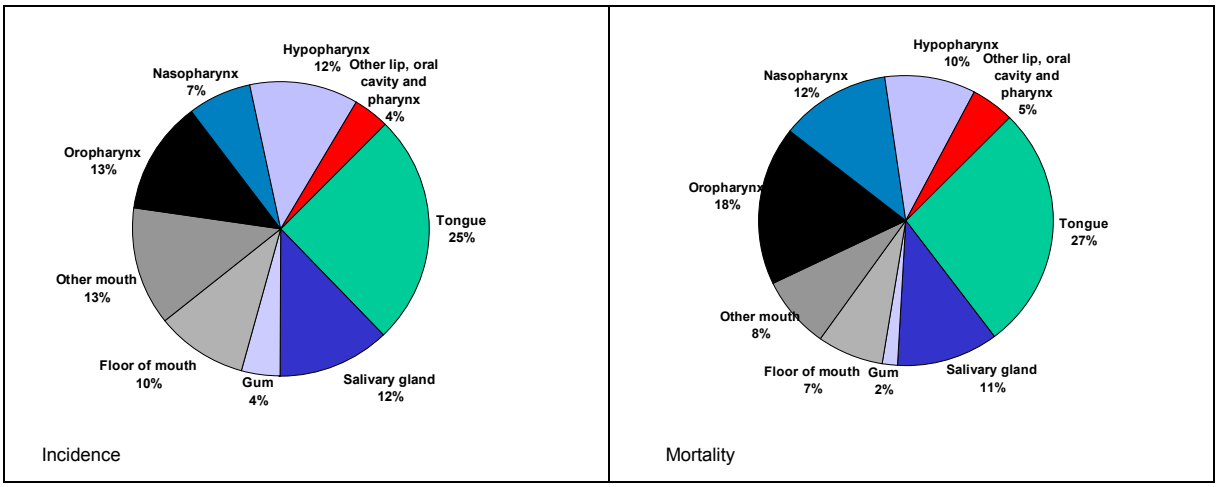
Source: NOHSA, 1988–89

Oral cancers

Cancer is a significant public health problem in Australia. It is the second most common cause of death after cardiovascular disease. The incidence of cancer is increasing, due partly to the ageing of the population, but also due to increases in the age-specific rates of cancers. Cancer encompasses a varied group of diseases with many causes.

Oral cancers represent approximately 4.5 per cent of new cancers in males and 2.3 per cent of new cancers in females. In 1996 a total of 2,372 new cases of oral cancer were diagnosed. In the same year 717 Australians died from oral cancers. The incidence of oral cancers has increased slightly and oral cancers are almost twice as likely to affect men as women (Jelfs et al, 1992; Jelfs et al, 1994; Jelfs et al, 1996; AIHW & AACR, 1998a; AIHW & AACR, 1998b; AIHW & AACR, 1999). Figure 2.8 gives the incidence and mortality rates for oral cancers in Australia in 1996.

Figure 2.8: Oral cancers in Australia, percentage of each site of cancer, incidence and mortality, 1996



Source: AIHW & AACR, 1999

Cleft palate and cleft lip

Cleft palate and cleft lip are congenital malformations. In 1996 178 babies were born with either cleft palate, cleft lip or both. Over the period from 1987 to 1996 there were approximately 6.1 cases of cleft palate and 9 cases of cleft lip per 100,000 live births each year (Hurst et al, 1999). Cleft palate is more common in boys and cleft lip is more common in girls (Lancaster & Pedisich, 1995). There has been no significant change in the total number of new cleft palates and cleft lips in Australia over the period in which systematic data collection has been conducted (ie 1981 to 1996).

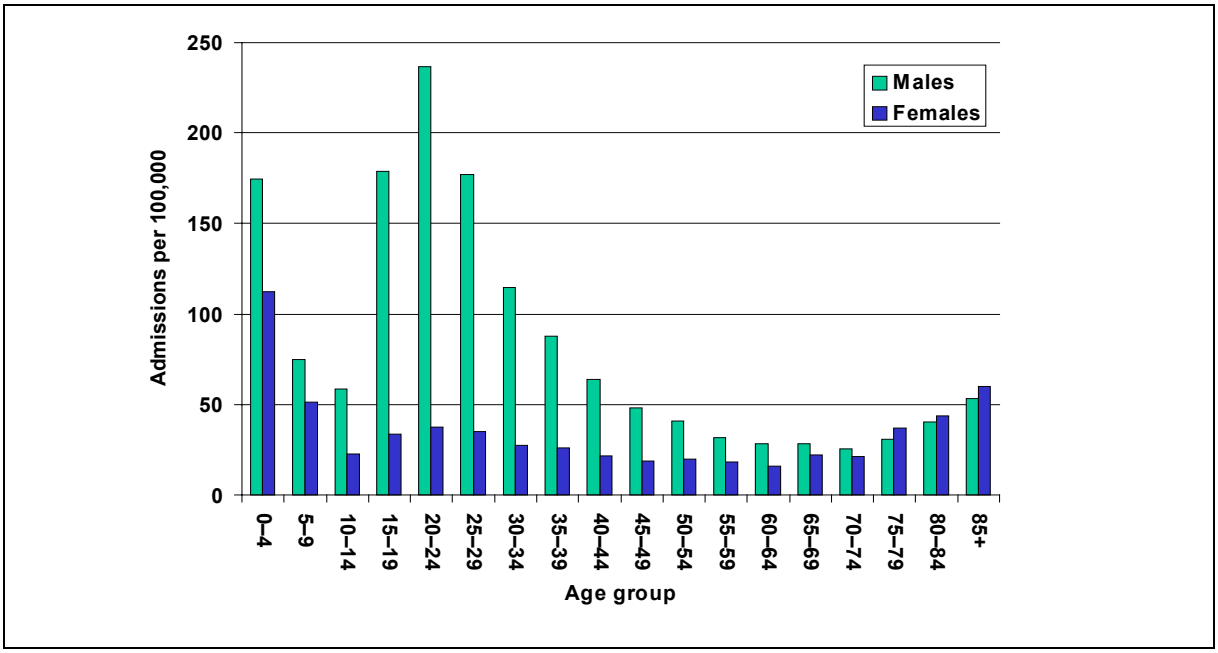
Oral trauma

The pattern of oral injury in Australia indicates that some population groups are particularly vulnerable to having their oral health damaged by injury. Australians are admitted to hospital for oral injury at a rate of 66.6 per 100,000 people. This includes only hospital admissions where oral injury is the principle diagnosis, not all admissions that include an oral injury. Thus this figure can be considered just a small indication of oral injury.

Males are at least 1.5 times more likely than females to be admitted for an oral injury at all ages, except 65 years and over. Oral injury rates peak in infancy and in early adult life. In the young and early adult categories, males are 5 to 6 times more likely than females to be admitted to hospital. The cumulative effect of these oral injury rates suggest that by the age of 25, approximately 2.5 per cent of Australians and approximately 7 per cent of all males have had a hospital admission for oral injury.

Oral injuries in these young age groups can affect oral health throughout life. Many oral injuries are potentially preventable. Thus, oral trauma represents a largely preventable cause of oral disorders. The distribution of hospitalisation for oral injury is summarised in Figure 2.9.

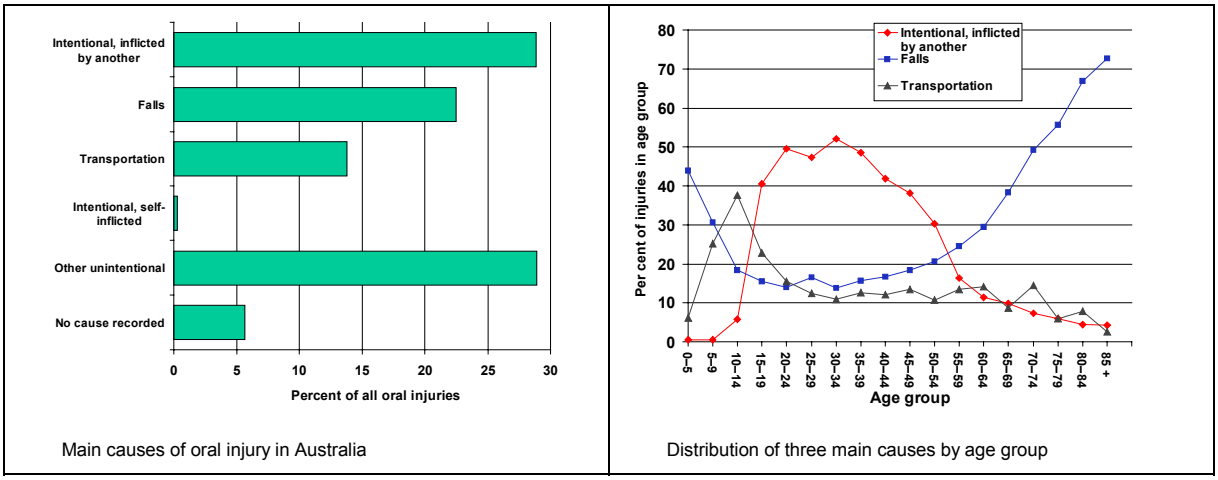
Figure 2.9: Rates of hospital admission for oral injury in Australia, by age and sex, 1997–98



Source: AIHW National Injury Surveillance Unit (unpublished data)

The main causes of oral injury resulting in hospitalisation are summarised in Figure 2.10. Half of all oral injuries that result directly in hospital admission are associated with either intentional injury inflicted by others (28.9 per cent) or with falls (22.4 per cent). The pattern of the main causes varies across age groups, with falls being predominant at very young ages and increasing steadily after the age of 60 years. Intentional injury by others is the main cause of oral injury resulting in hospitalisation in the younger adult age groups. These patterns suggest that the safety of the work and living environments, as well as the level of violence in young adults, are important oral health issues.

Figure 2.10: Main causes of oral injuries in Australia, 1997–98



Source: AIHW National Injury Surveillance Unit (unpublished data)

Oral trauma not resulting in hospitalisation is also substantial. In 1988 it was estimated that there were 24.2 cases of oral trauma per 1,000 children aged 6 to 12 years. Approximately

one-third of all oral trauma occurred at school, one-third at home, and the remainder elsewhere. Trauma to the top teeth occurred most frequently at home, while injury to more than one tooth occurred most commonly at school. The incidence of injury was high amongst boys, at 33.8 per 1,000, compared with girls, at 13.2 per 1,000. However, dental injury resulting from falling or being pushed was almost twice as high among girls as among boys. Bicycle accidents caused a higher than average rate of multiple injury and exposure of dental pulp (Stockwell, 1988).

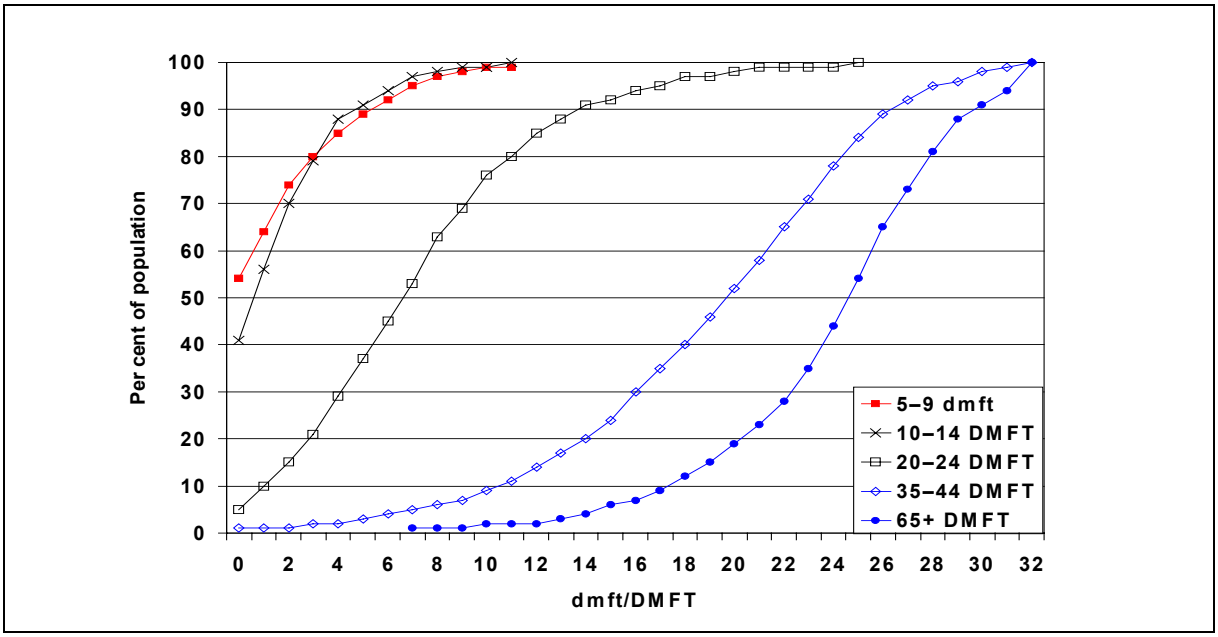
Other oral diseases and disorders

Population data are not routinely collected on the less commonly occurring and minor oral health problems. It is, therefore, not possible to make an assessment of their independent impact on oral health. It is important to note, however, that some of the less common oral diseases and disorders do represent significant morbidity for the people who experience them.

2.3 Variations among population sub-groups

The gains in oral health have not been shared equally across the community. In all age groups general improvement in health status is accompanied by a concentration of poor oral health status in a percentage of the community. Oral health status varies by age, social group and economic status. Figure 2.11 shows the cumulative distribution of DMFT scores for selected age groups in the dentate population. A high proportion of teeth that have been affected by dental caries is concentrated in a relatively small proportion of the population. For example, over 50 per cent of children aged 5 to 9 years have a dmft of zero. However, 10 per cent have more than five missing, filled or decayed teeth.

Figure 2.11: Distribution of the proportion of DMFT in selected age groups from the Australian population, 1988



Source: NOHSA, 1988 (unpublished data)

This concentration of poor oral health across age groups mirrors variations in oral health status that are evident across social groups and geographic locations. Groups in the Australian population which have pressing dental needs include frail aged persons, Indigenous Australians, migrants (especially refugees), and people living in rural areas.

Social inequalities in health status have been identified both in Australia and internationally (Davis & George, 1998; Marmot et al, 1987; Feinstein, 1993). The National Health Strategy (Dooland, 1992) identified inequalities in oral health and access to dental services as major public health issues in Australia.

A fuller understanding of the oral health status of Australians can be had by considering the variations of oral health status among population sub-groups. Considerable variation exists according to age, sex, economic status, location and ethnicity.

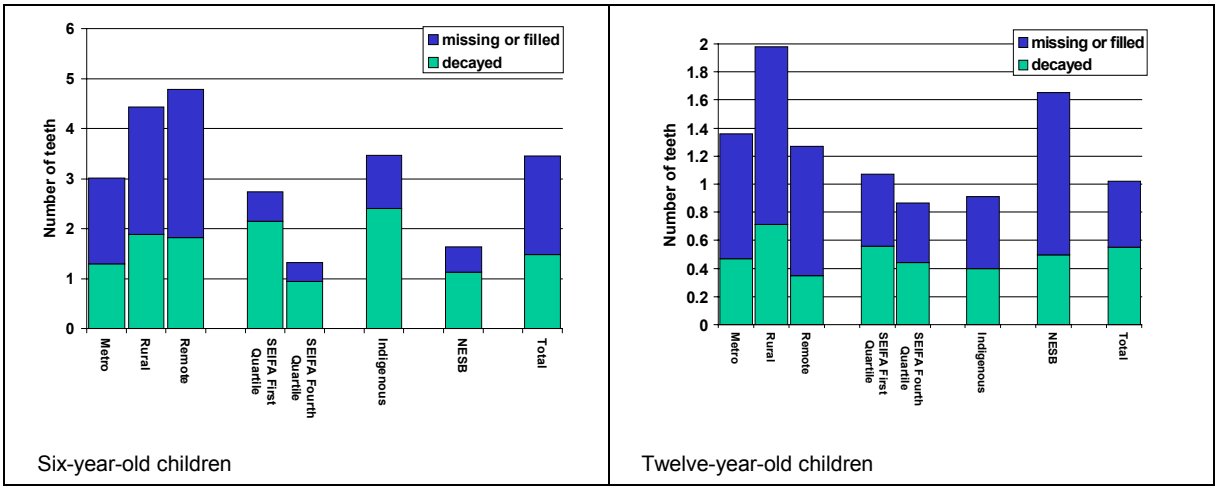
Children

The uneven distribution of dmft scores in Australian children is associated with geographic and socioeconomic characteristics. These differences are summarised in Figure 2.12.

In 6-year-old children, caries experience increases from urban to rural and remote locations. Children living in areas within the lowest socioeconomic quartile experience almost twice as much caries as children in the highest socioeconomic quartile. Indigenous children have similar caries experience, but almost twice as much untreated decay when compared to the whole population of 6-year-olds. Children from non-English speaking backgrounds have less caries experience than the whole population of 6-year-olds. However, nearly two-thirds of their caries is characterised by untreated decay, compared to less than half for other children.

Twelve-year-old children living in rural areas fare worse than both urban-dwelling and remote-dwelling children. There is less difference between the lowest and highest socioeconomic quartiles in this age group. Indigenous children in this age group have comparable oral health to the whole population of 12-year-olds. However, children from non-English speaking backgrounds have 1.5 times the caries experience of the whole population of 12-year-olds.

Figure 2.12: Variations in caries experience among children, 1996



Source: AIHW DSRU Child Dental Health Survey, 1996 (unpublished data)

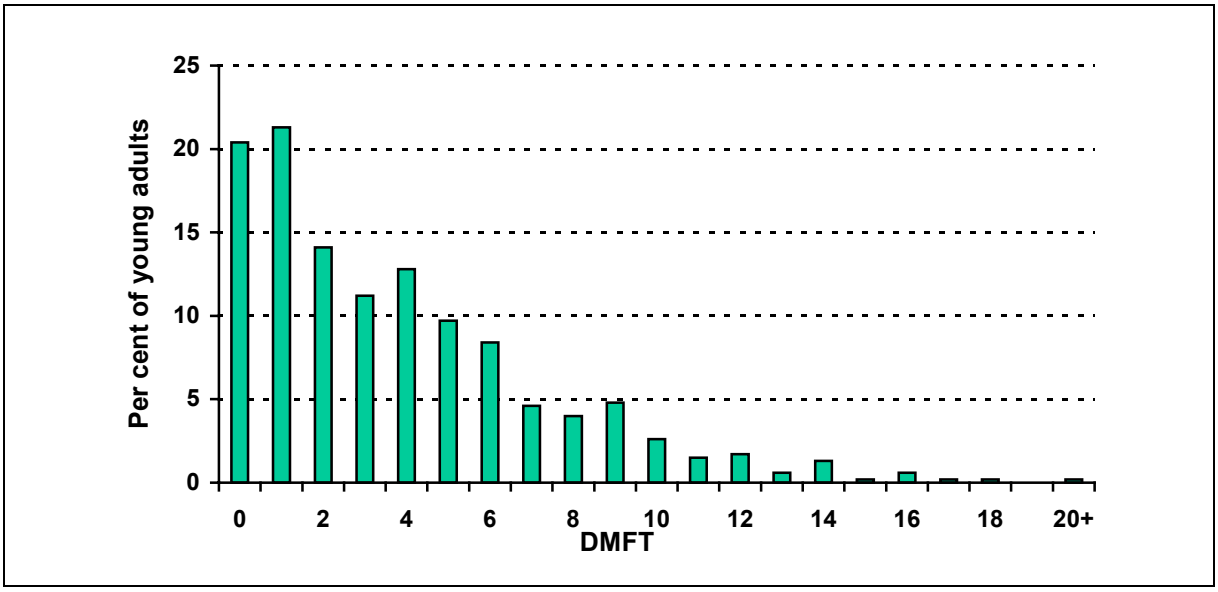
Young Australians

A 1999 study of South Australians aged 20 to 24 years indicates significant residual oral health problems and raises concerns about oral health behaviour in this age group (Roberts-Thomson et al, 2000).

Figure 2.13 shows the distribution of caries experience. Twenty-one per cent of Australians aged 20 to 24 have no caries experience as measured by DMFT scores. The mean number of teeth affected by caries is 3.7. The components of DMFT are 0.69 decayed, 0.16 missing and 2.79 filled. Filled teeth contribute over 75 per cent of the mean DMFT score, indicating substantial attention to treatment of decayed teeth. However, almost one-third of the group (28.4 per cent) has cavitated decay, with an additional one-half having signs of early decay. Just under 14 per cent of subjects had a DMFT of 8 or more.

Within this group there is substantial variation of oral health status. This variation is associated with economic status and patterns of use of dental services.

Figure 2.13: Distribution of caries experience in South Australian young adults, 1999



Source: Roberts-Thomson et al, 2000

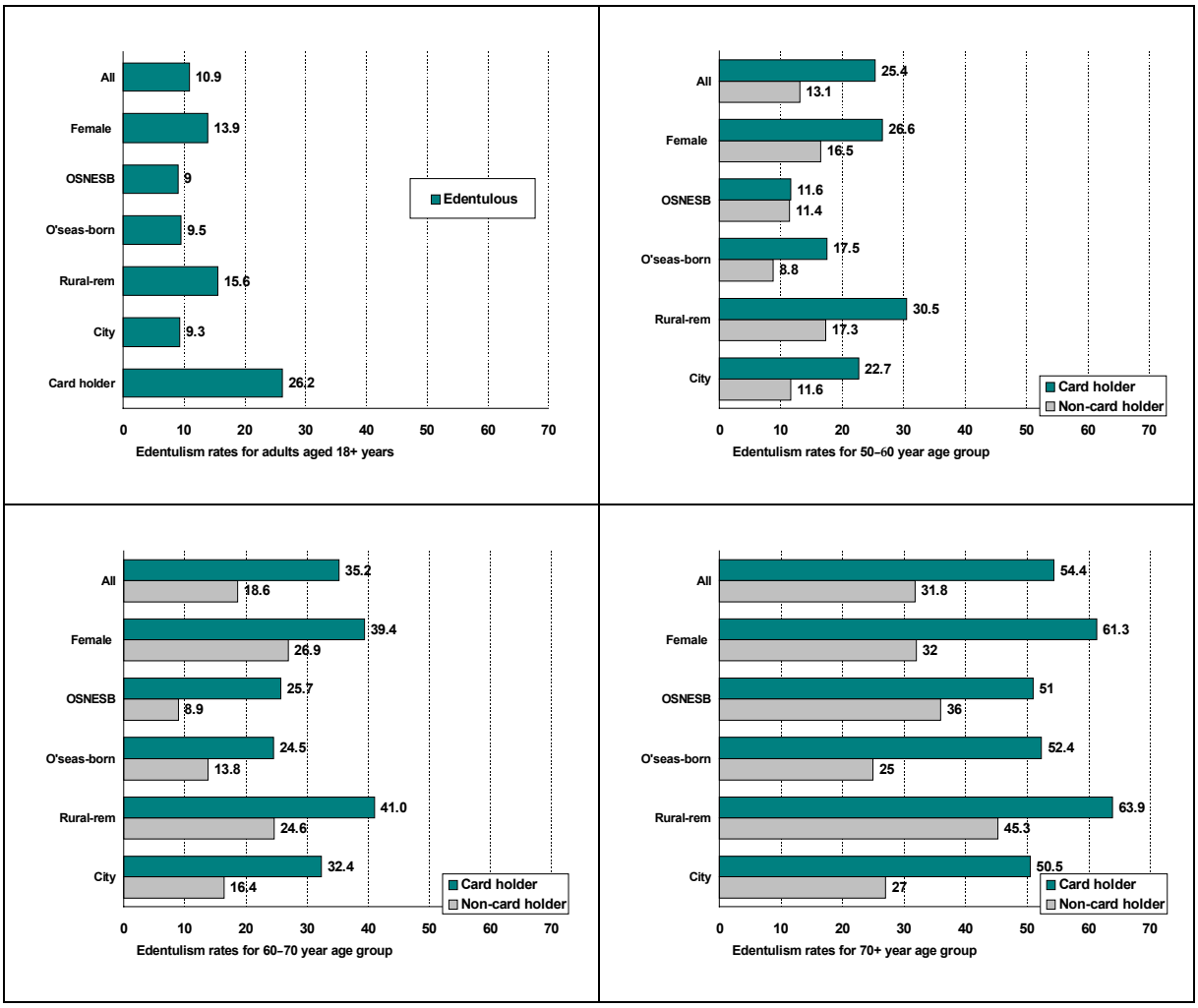
The majority of young South Australians have low DMFT scores, but 10 to 15 per cent could be regarded as high risk. Precavitated lesions in 47.7 per cent and cavitated lesions in 28.4 per cent of young adults indicate significant needs for preventive and restorative care. High prevalence and severity of gingivitis and high prevalence of calculus in young adults may reflect lower rates of dental service utilisation. These results for young adults represent the oral health of metropolitan, fluoridated Adelaide and are likely to be an under-representation of the oral health needs of this age group nationally.

Adults

Within the adult Australian population there are significant variations in edentulism rates. Figure 2.14 shows the variation by sex, ethnicity and location. Edentulism rates increase with age, reflecting both past dental practice and the cumulative effects of tooth loss over

time. Higher rates of edentulism are evident in women, rural and remote dwellers and Health Card holders. The greatest increased risks for edentulism are in the Health Card holder population, who are nearly 2.5 times more likely to have lost all their teeth, and in rural or remote dwellers, who are nearly 1.5 times as likely to have lost all their teeth than the population as a whole.

Figure 2.14: Variations in edentulism rates for Australian adults, selected population groups, 1994–96



Source: National Dental Telephone Interview Survey, 1994, 1995, 1996 (unpublished data)

Older Australians

The proportion of Australians, including older Australians, who retain their own teeth and the number of teeth retained into old age are growing. However, higher rates of edentulism and tooth loss, reflecting past oral disease, and tooth destruction, reflecting current oral disease, are evident in functionally dependent older Australians.

A survey of Adelaide nursing home residents in 1997 (Chalmers, 1999) indicated very poor oral health status in this population. Edentulism rates and sound, filled and decayed teeth data are presented in Table 2.1. The rate of edentulism was lower than the 80 to 90 per cent reported in the 1970s and 1980s, suggesting that edentulism rates are falling even in this

compromised population. However, they were higher rates than for community-dwelling older adults. High levels of edentulism and tooth loss represent a history of substantial oral disease in this cohort. They also indicate a high level of need for maintenance of restorations (including fillings and crowns) and prostheses (including full and partial dentures).

Nursing home residents who did retain some teeth had fewer teeth, on average, than community-dwelling people aged 65 and over. The main difference was that they had fewer filled teeth and more missing teeth. Nearly all residents had poor oral hygiene.

Eighty-nine per cent of community-dwelling older Australians had significant periodontal problems, having a CPI score of 3 or more (Slade & Spencer, 1995).

Table 2.1: Edentulism rates and mean numbers of sound, filled and decayed teeth for older Australians, 1988–97

	All Australians aged 5+ (1988–89)	Adults aged 65+ (1996)	Nursing home residents (1997)
Edentulous (per cent)	16%*	38%	66%
Sound teeth	13.1	8.7	7.0
Filled teeth	5.6	8.3	3.8
Decayed teeth	1.1	0.3	1.1
Total number of teeth	**19.8**	**17.3**	**11.9**

*Data available only for people aged 20 years and over.
Source: Barnard, 1993; Slade & Spencer, 1995; Chalmers, 1999; NDTIS, 1996 (unpublished data)

Both functionally independent, community-living adults and functionally dependent nursing home residents have poor oral health when measured by the number of functional teeth. Nursing home residents are admitted with poor oral health status, and oral diseases, especially caries, progress rapidly after admission. The poorer oral health of nursing home residents reflects their older average age, functional dependence, behavioural difficulties and generally poorer health (Chalmers, 1999). Seventy per cent of dentate residents and 80 per cent of edentulous residents were Health Card holders. Approximately 13 per cent were eligible for dental treatment subsidised by the Department of Veterans' Affairs.

The oral health of older Australians is of particular concern. Poor oral health need not necessarily be associated with ageing per se. However, the cumulative effects of oral disease throughout life become apparent in old age. In addition, the many chronic and systemic diseases that have been associated with poor oral health become more prevalent. The oral health of functionally dependent older Australians is further compromised by their inability to meet their own health and hygiene needs, financial and physical barriers to accessing dental care and the effect on the oral cavity of some medical conditions and many of the medications, both prescribed and non-prescribed, that people in this age group may be taking. Nursing home residents had an average of six medical conditions and were taking an average of nine medications (Chalmers, 1999).

Indigenous Australians

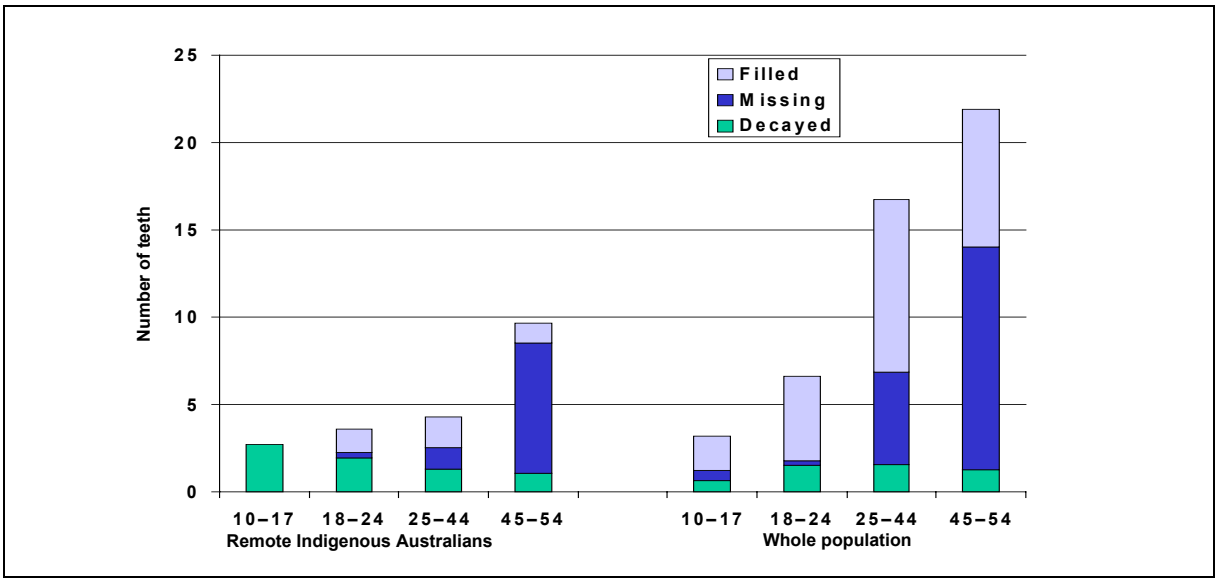
Indigenous Australians have a markedly different experience of oral health than other Australians. Indigenous Australians tend to have lower DMFT scores than the rest of the population. However, two distinct trends indicate that access to appropriate dental care is a problem for Indigenous Australians. For Indigenous children the lower DMFT score is made

up entirely of decayed teeth. For older Indigenous Australians missing teeth are disproportionately high in the DMFT score. In both these cases, access to preventive and, particularly, restorative dental services appears to be inadequate.

Older Indigenous Australians provide an important example of the crucial relationship between oral health and other diseases. Missing teeth in older Indigenous Australians are associated with high rates of diabetes mellitus and advanced periodontal disease.

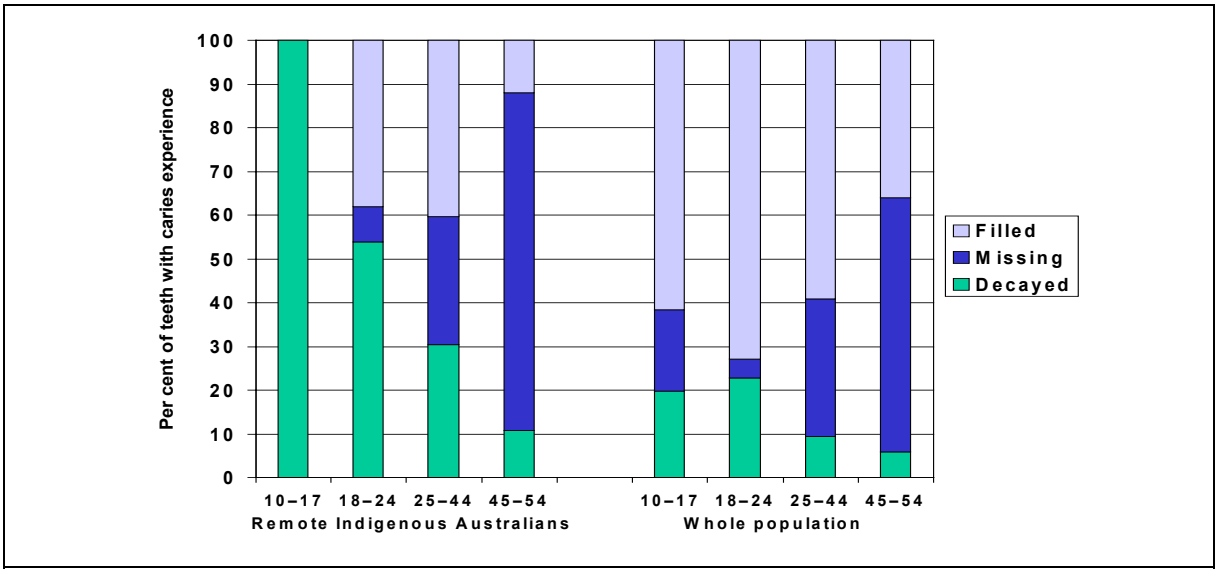
DMFT data for Indigenous Australians living in remote communities are compared with those for the whole Australian population in Figures 2.15 and 2.16.

Figure 2.15: DMFT for remote dwelling Indigenous Australians compared to the whole population



Source: AIHW DSRU (unpublished data); NOHSA, 1987–88 (unpublished data)

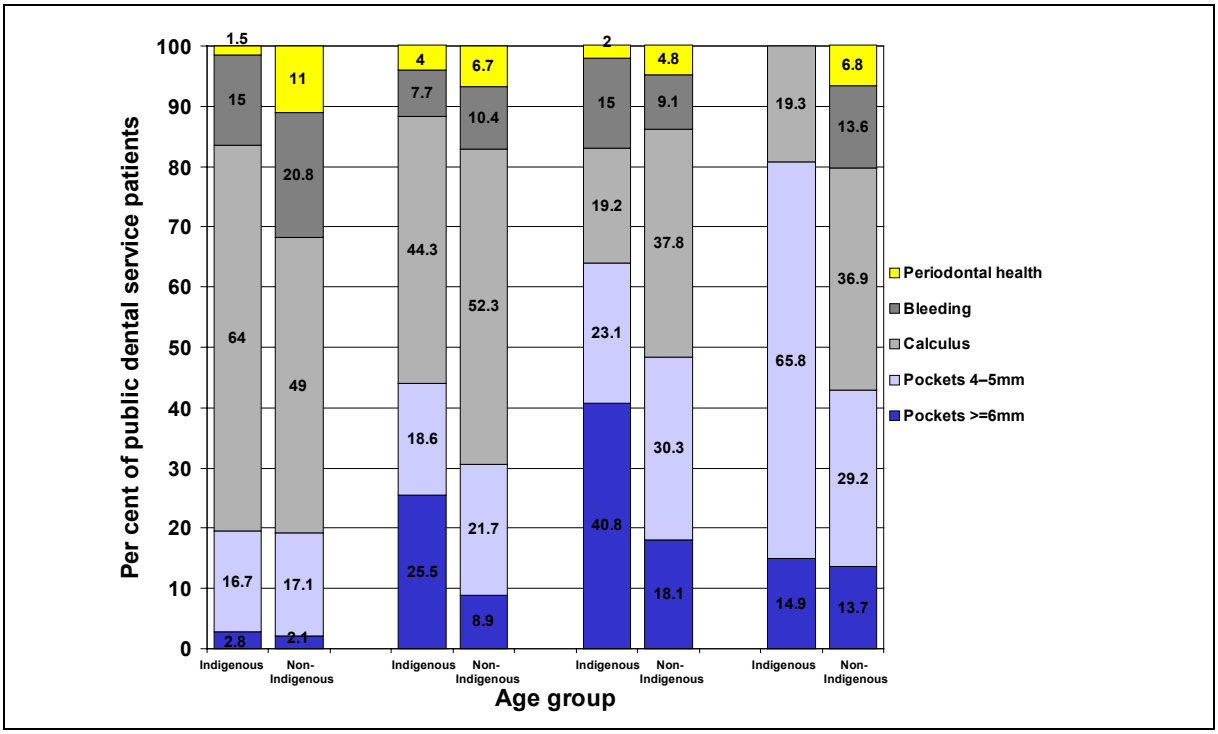
Figure 2.16: Share of DMFT for remote dwelling Indigenous Australians and the population as a whole



Source: AIHW DSRU (unpublished data); NOHSA,1987–88 (unpublished data)

Periodontal status is presented in Figure 2.17 as the worst sextant CPI score by Indigenous status and age. CPI scores range from a best score of periodontal health to a worst score of periodontal pockets 6mm and deeper. Overall, a higher percentage of Indigenous patients had periodontal pockets of 6mm and deeper (25.4 per cent) compared to non-Indigenous patients (11.6 per cent). Among 25 to 44-year-olds, 25.5 per cent of Indigenous patients had periodontal pockets of 6mm and deeper compared to 8.9 per cent of non-Indigenous patients. Indigenous Australians have worse periodontal health than the general population. Severe periodontal disease is more prevalent for Indigenous Australians at all ages above 35 years. The early stages of poorer periodontal health are evident in 18 to 24-year-old Indigenous Australians.

Figure 2.17: Periodontal disease (worst sextant CPI score) of public dental service patients by Indigenous status — dentate adults only, 1995–96



Source: Prospective Adult Dental Programs Survey, 1995–96 (unpublished data)

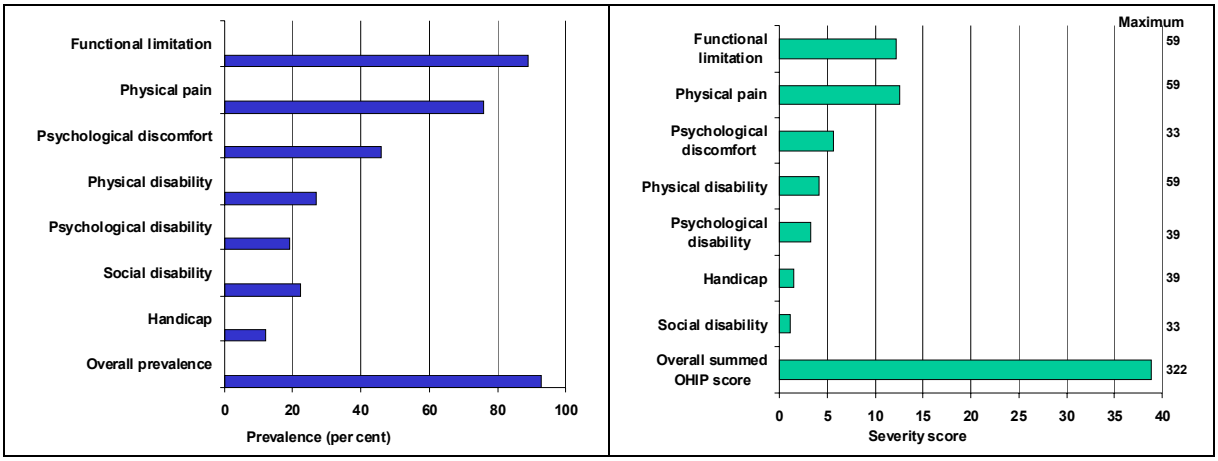
2.4 Social impact

The social impact of oral disease is felt in many facets of everyday living. The ability to eat, communicate and socialise are all directly affected by oral health. In addition, oral diseases and disorders can have a psychological impact. The Oral Health Impact Profile (OHIP) has been developed as a tool to capture these many facets of the social impact of oral disease (Slade & Spencer, 1994).

The OHIP is based on the concepts of impairment, disability and handicap and is derived from a 49-item questionnaire. It measures the impact of oral disease and disorders on functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, handicap and social disability.

OHIPs for working Australians serve as an indicator of the level of social impact of oral diseases and disorders in the community. Figure 2.18 summarises the OHIPs for a sample of Australian workers. The left hand graph shows the prevalence of particular problems and overall prevalence of oral health problems. Overall, 93 per cent of the sample reported experiencing symptoms 'occasionally', 'fairly often' or 'very often'. The most commonly reported set of impacts was the presence of functional limitation which was reported in 88.9 per cent of respondents. The right hand graph shows the severity of symptoms reported by respondents. Severity scores represent the sum of the mean score for each item in the subscale multiplied by its weighting (where never = 0, hardly ever = 1, occasionally = 2, fairly often = 3 and very often = 4). The most severe subscales were functional limitation and physical pain which, in this sample of workers, were at 20 per cent of the maximum possible severity score.

Figure 2.18: Oral Health Impact Profiles (OHIPs) for working Australians, 1998

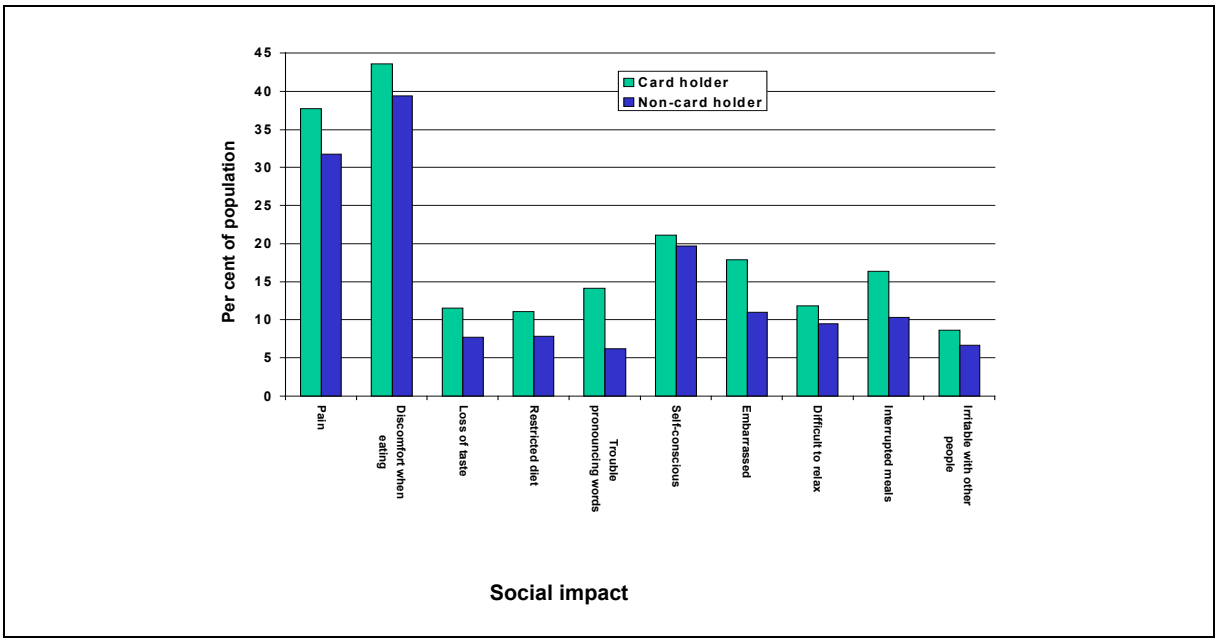


Source: Yanga-Mabunga, 1998

There is only limited evidence about variations in the social impact of oral diseases and disorders across the population. Two pieces of evidence that are available relate to card holder status and occupation.

Figure 2.19 shows the prevalence of reported social impact of oral diseases and disorders for card holders and non-card holders. Card holders report higher prevalences of all indicators of social impact. The difference is most marked in the prevalence of difficulty in pronouncing words, where card holders are more than twice as likely to report a problem, and embarrassment, interruption to meals and effect on ability to taste, for which card holders are at least 1.5 times more likely to report an impact.

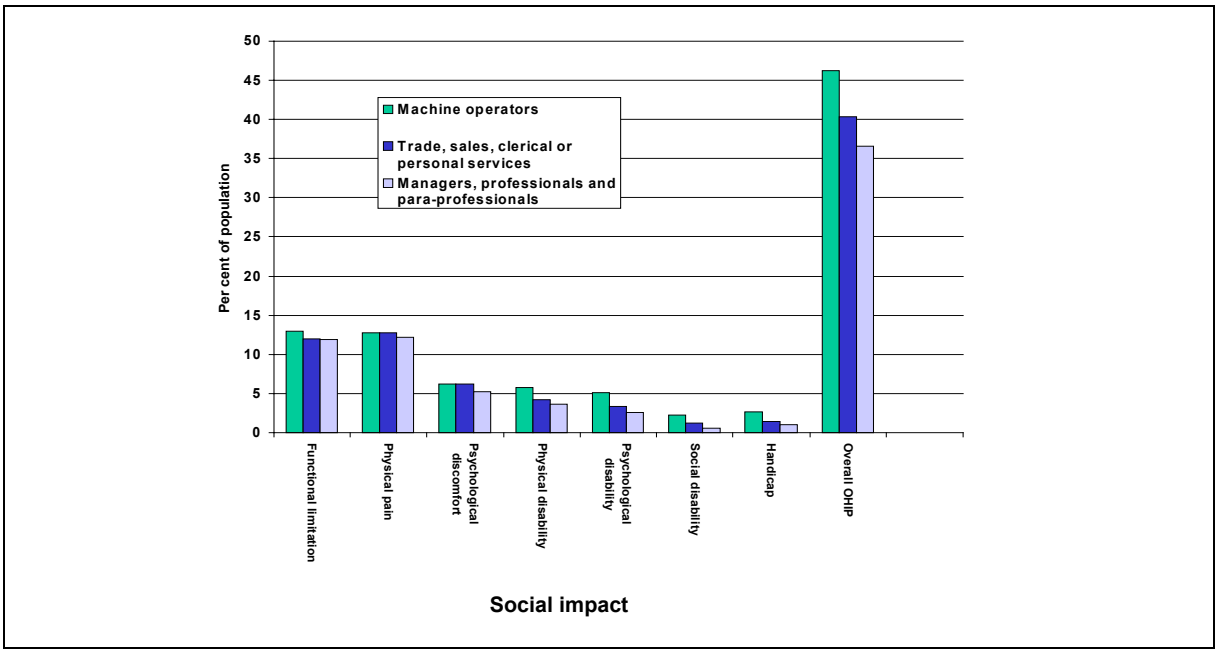
Figure 2.19: Prevalence of reported social impact of oral diseases and disorders, card holders and non-card holders, 1999



Source: Dental Health and Lifestyle Factors Survey ,1999 (unpublished data)

There is also a relationship between occupation and the impact of oral diseases and disorders. Figure 2.20 shows that when three occupational groups are compared, people in more highly skilled or highly paid occupational groups report less social impact of oral diseases and disorders overall (right hand column). A clear gradient of impact occurs across four of the seven aspects of the OHIP.

Figure 2.20: Oral Health Impact Profile (OHIP) scores for Australian workers, by occupation, 1998



Source: Yanga-Mabunga, 1998

2.5 Risks and protective factors

Variations in oral health reflect a complex interaction of threats to oral health and factors that protect oral health. These risks and protective factors are inherent in living, work, school and recreational environments and in genetic factors. Variations between groups in the community are due mainly to the environmental factors, and thus are amenable to change. Genetic factors cannot be changed at the present time. Table 2.2 summarises the risk settings and factors contributing to particular oral diseases and disorders. The variety of settings suggests that any approach to improving the oral health of Australians requires strategies which address a range of risks.

Table 2.2: Risk settings and factors for oral diseases and disorders

Risk setting/factor	Dental caries	Periodontal diseases	Tooth loss	Oral trauma	Mal-occlusion	Oral cancer
Community						
Non-fluoridated drinking water	✓		✓			
Home						
Lack of awareness/support for oral health	✓	✓				
Unfavourable expectations			✓			
School						
Unhealthy canteen offerings	✓					
Inadequate playground safety				✓		
Work						
Unhealthy canteen offerings	✓					
Stress		✓				
Sun exposure						✓
Inadequate safety				✓		
Recreational activity						
Inadequate mouthguard protection				✓		
Dental service delivery						
Lack of access to regular dental care			✓			
Individual behaviour						
High sugar diet	✓					
Inadequate oral hygiene		✓				
Toothpaste without fluoride	✓					
Smoking		✓				✓
Alcohol intake						✓
Individual genetic endowment	✓	✓			✓	

These risk settings provide the basis for thinking about how approaches to protecting oral health can be developed. It is the failure to provide sufficient protection against the risks to oral health that result in oral diseases and disorders.

Examples of successful strategies to protect against these risk settings include fluoridation of drinking water, changes to the offerings of school canteens, use of sunscreens and other strategies to reduce sun exposure, safer playground design, mouthguard use in contact sports, use of sugar substitutes, use of toothpaste and other fluoride products and anti-smoking campaigns.

2.6 Dental service needs

Definition of need

The concept of need is at the core of health planning. Donabedian (1973) describes need as a state of the client that creates a requirement for care and therefore creates a potential for service. Need does not always lead to use of services and use of services does not always result from need. However, the existence of disease and clinically (or normatively) defined need does create a potential for the use of services (Spencer, 1980). *Normative need* is that which the service provider defines as need; *felt* or *perceived need* is the individual's own assessment of his or her need for health care.

Other types of need include:

- *expressed need,* when perceived need is converted into action by seeking care;
- *comparative need,* assessed by comparing the health care received by different people with similar characteristics; and
- *unmet need,* the negative difference between those services deemed necessary to deal appropriately with defined health problems and those services being actually received.

Changes in dental service needs

There is a widely held perception that dentistry is undergoing rapid change, largely brought about by its successes in the prevention of dental caries. The perception, however, is both misleading in its generalisation and narrow in its view on contemporary oral diseases and their consequences. Although dental caries is a diminished burden in children and young adults, it still impacts greatly on some children, most adults and many older adults. In addition, dental caries is but one of several prevalent oral diseases or disorders, and other oral problems now attract greater attention both within the community and the dental profession.

The demography of the Australian population acts as the starting point for examining changes in dental service needs because the changes observed are specific to age cohorts. The changing demographic profile and oral health status also interact to alter the characteristics of groups at risk of oral diseases and disorders and in need of dental services.

The key aspects of the demography of Australia over the next several decades include:

- the moderate rate of population growth;
- minimal changes in numbers of children, adolescents and young adults; and
- the substantial absolute increase in numbers of middle-aged adults and, subsequently, older adults.

These changes will maintain the status quo in the pool of children and young adults at risk of oral diseases and disorders, but increase the pool of middle-aged and older adults at risk.

Dentistry has developed a wider perspective on oral health, encompassing all of the oral

cavity and its supporting tissues rather than just the teeth and their supporting tissues. However, information on changes in dental service needs is largely confined to:

- dental caries; and
- tooth loss and subsequent tooth replacement.

Other oral diseases and disorders are important, both in terms of their impact on people and in the provision of dental services. However, difficulties in measurement or lack of available data prevent trends over time being established.

Dental caries

Data from the Child Dental Health Survey reported in Figure 2.1 indicate that the caries experience of children has decreased markedly since its peak in the 1950s. Many children, now, have no experience of caries at the level where restorations (mainly fillings) are required. However, a minority, approximately one in eight, may be considered still at high risk with an unacceptably large number of teeth with caries. Some further small improvement in caries experience is projected.

Caries experience in adults has remained widespread and extensive. Data from the National Oral Health Survey of Australia 1987–88 indicate that the majority of teeth in adults have experienced caries. In younger adults this is expressed predominantly by filled teeth, but missing teeth dominate by middle age. Comparison of the caries experience of 35 to 44-year-olds between 1973 and 1987–88 indicates a negligible change in caries experience but an increase in filled teeth and decrease in missing teeth. Disease levels had not changed but the management of the disease had moved toward maintenance and repair of retained teeth. By 1995–96 caries experience had begun to fall among 35 to 44-year-olds, mainly expressed as a decrease in the number of missing teeth.

Even an optimistic cohort approach to possible future changes in caries experience in adults shows that further changes among adults will be slow. Each cohort will age to arrive at a position between their present caries experience and that of their next older age cohort. The most probable changes are both a decrease in caries experience in younger cohorts and a continued move to the maintenance of teeth with high past experience of caries, treated with restorations, across all adult cohorts. The available data on caries experience establish:

- decreased caries experience in children;
- a minority of children still at high risk;
- a projected small decrease in caries experience in children;
- widespread and extensive past caries experience in adults, with negligible change in caries experience in adults; and
- a gradual shift toward tooth retention in the management of caries in adults.

Tooth loss and tooth replacement

Tooth loss has been the dominant outcome of caries experience among middle-aged and older dentate adults, but is projected to decrease over the next decades. Edentulism is undergoing an even more dramatic decrease, with a majority of older adults now retaining

some teeth. It is, therefore, not surprising that wearing full dentures is decreasing. However, a sizeable minority still have some form of tooth replacement. More frequently this involves dentate people wearing partial dentures.

Other oral diseases and disorders

Periodontal diseases are increasingly significant in the practice of dentistry. However, there have been major changes in the measurement and interpretation of their extent and severity, natural history and consequences. Advanced periodontal diseases are not as prevalent, inevitable or tooth threatening as was once postulated. However, they are now assuming greater importance because of their associations and links with general health.

Malocclusions remain prevalent, while the rate of orthodontic treatment among adolescents has increased two-fold between 1973 and 1989. Oral mucosal conditions, including the incidence of oral cancers, appear to be relatively stable over time. However, viral infections which have oral manifestations or impact on the practice of dentistry are more common. All of the major viral infections — HIV, hepatitis B and hepatitis C — are influencing the practice of dentistry through the implementation of infection control procedures.

Current needs

The patterns of oral health described above translate to needs for specific types of dental services in each age group. These are outlined in Table 2.3. Preventive services are needed for all ages, and treatment and specialist care become increasingly important in older age groups.

Table 2.3: Dental service needs by age group

Service areas	Age groups						
	0–4	5–11	12–17	18–24	25–44	45–64	65+
Diagnostic services		✓	✓	✓	✓	✓	✓
Preventive services							
Fissure sealants		✓✓	✓✓				
Professionally applied fluorides		✓	✓	✓			✓
Scaling and cleaning		✓	✓	✓	✓	✓	✓
Mouthguards		✓	✓✓	✓✓	✓		
Other eg smoking cessation				✓	✓	✓	
Periodontal services					✓	✓✓	✓✓
Restorative services		✓	✓	✓	✓✓	✓✓	✓✓
Oral surgery							
Tooth extractions					✓	✓✓	✓✓
Impactions			✓	✓✓	✓		
Prosthodontic							
Full denture						✓	✓✓
Partial denture					✓	✓	✓
Endodontics					✓	✓✓	✓
Crown and bridge					✓	✓	
Orthodontics		✓	✓	✓			

Key: ✓ = Moderate need ✓✓ = High need

2.7 Achievements and needs in perspective

Oral health standards

By international standards, Australian children experience good oral health. However, adult oral health is comparatively poor and significant variation in oral health status exists within the Australian population. These variations are evident across age groups, social groups and geographic locations.

Oral health changes

Improvements in children are the starting point for future improvements in oral health among adults. While our children enter young adulthood with reasonably good oral health, the oral health behaviour that is encouraged in childhood does not follow them. There is a significant increase in DMFT scores between 12 and 15 years of age, and the decline in oral health status continues through adulthood.

Australian children and adolescents have enjoyed considerable oral health gains in the area of prevention and control of caries. These gains resulted from exposure to fluoride, the organisation and delivery of health and dental care, and the enactment of wider public health policies and activities.

The gains can be expected to flow through to improvements in oral health among adults as these children age. However, for existing cohorts of adults, the gains in oral health have not been as substantial as those achieved among children, and in those children the levels are not sustained as the children age. In addition, the reduction in edentulism has increased the opportunities for dental disease and tooth loss in adults.

Australians are now more likely to retain at least some of their natural teeth. In older age groups the cumulative experience of lifetime oral disease and dental practices of the past are evident. Australians aged 65 years and over have higher rates of both edentulism and DMFT, reflecting both longer exposure to disease and previous patterns of dental practice.

Future directions

Fluoride exposure has been demonstrated to reduce dental caries in children (AIHW, 1998a) and has been an important factor in the improvement in dental health in Australia over the last 30 years. In addition, provision of low cost dental services to school children has contributed to the more recent improvement in oral health seen in children and the control of oral disease at an early stage in its development. However, pockets of the population do not have access to fluoridated water, and the benefits of easy access to preventive and restorative dental services are not evident in the adult population.

Oral health-related behaviour continues to be problematic. Many Australians continue to visit dentists only when they perceive a need for treatment. Preventive behaviour is not as widespread as is needed for continued improvement in oral health status. Failure to maintain good oral health behaviour commences in adolescence and early adulthood, when oral health status declines dramatically and preventive use of dental services also

diminishes. The continued decline of oral health status with age reflects failure to use preventive dental care through all ages.

The extension of water fluoridation, the promotion of oral health behaviour and the use of preventive dental care are ongoing challenges.

2.8 Summary of issues

- Australians have made substantial gains in oral health, particularly in the reduced caries experience of children. Australian children and adolescents have comparatively good oral health but a minority show higher risk of dental decay. Nearly 40 per cent of 6-year-old children experience decay in their deciduous teeth, 60 per cent of which has not been treated. Children in the lowest socioeconomic quartile experience almost twice as much caries as those children in the highest socioeconomic quartile.
- Not all the gains in reduced dental decay are carried into adulthood. From mid-adolescence on there is a more rapid accumulation of decay experience and greater variation in oral health among groups in the Australian community. For example, the level of decay experienced increases four-fold from 12 to 21 years of age: 0.90 to 3.69 permanent teeth that are either decayed, missing or filled.
- Progress has not been as marked in adults and, compared to other countries, Australians aged 35 to 44 years have a greater number of teeth with decay experience. Decay experience in 35 to 44-year-olds decreased from 18.0 to 13.6 teeth from 1973 to 1995–96, but untreated, decayed tooth numbers rose from 1.0 to 2.4 and teeth with fillings increased from 8.3 to 8.8 teeth. Where substantial change has occurred in adult oral health, as in edentulism rates, the improvement reflects changes in professional dental practice as much as reduced oral disease.
- The improvement in oral health is not evenly distributed across the population. In the adult population edentulism rates vary, with high edentulism rates reflecting the distribution of poor general health in the population. Some 16.3 per cent of the Indigenous population is edentulous compared to 10 per cent of non-Indigenous Australians. Health Card holders are nearly 2.5 times more likely to be edentulous than non-Health Card holders.
- Adults have widespread past experience of oral disease, especially dental decay and periodontal diseases. While the management of this oral disease for most Australians has moved away from tooth loss to tooth maintenance (eg restorations), substantial differences in oral health outcomes emerge in adult age groups. Many Australian adults have fewer than the 20 natural teeth required for good oral functioning.
- Poor oral health is evident in the Indigenous community, Australians on low incomes, rural and remote area dwellers and the dependent elderly. They all experience a worse oral health status than the population as a whole, or have specific oral health service needs.
- Older adults used to have little active oral disease because most had lost all or many of their natural teeth. However, increased tooth retention is placing many older adults at risk of accumulated dental decay and periodontal diseases.

- Increased tooth retention in late middle-aged and older adults (lower edentulism and fewer missing teeth) has greatly increased the risk of recurrent and new decay. A range of hitherto unseen chronic degenerative problems are emerging among middle-aged and older adults including tooth wear, tooth fracture, root caries and pulp death.
- Functionally dependent older Australians have substantially poorer oral health than people living independently in the community. Older Australians in nursing homes have three times more untreated decay and less than half the number of filled teeth than their contemporaries living in the community.
- Risk of oral disease and disorder is shaped by the physical environment (eg water fluoridation); the socioeconomic environment including the home, school, work and neighbourhood; past access to dental services; individual behaviour; and genetic endowment.
- Through the interplay of these factors a number of groups in the population show poorer oral health and greater dental services needs. These include the less educated or less skilled occupational groups, socioeconomically disadvantaged people, Indigenous Australians, people who are functionally dependent, people born in non-English speaking countries, and people living in rural and remote areas of Australia.
- The continued prevalence and severity of oral diseases and disorders and the potential for them to be effectively prevented or treated establishes a need for dental services for all Australians.
- The existing, substantial burden of oral disease is addressed mainly through clinical dental services. Need for dental services is age-specific but all age groups require diagnostic, preventive and restorative services, while periodontal, oral surgical, prosthodontic and specialist services are targeted more to particular age groups.

Conclusion 2

Despite the reduction in decay experience in children and tooth loss in adults, oral diseases and disorders remain prevalent and a substantial burden on the Australian population. There is a continuing need for a robust service system that supports access across the community to basic preventive and treatment services, and specialist care for population sub-groups with particular needs.

3. Dental services

Overview

Costs

Oral diseases and disorders are among the most costly health problems of Australians. Unlike the people using most other health services, individuals paid most of that expenditure directly out-of-pocket, with little Commonwealth, State or Territory government subsidy. A portion of the recent tax rebate on health insurance represents the most substantial subsidy for dental services and is available to Australians with private health insurance coverage for dental services. It is therefore received by only a few socioeconomically disadvantaged people in the population.

Dental workforce

Dental services are provided by a workforce that is predominantly made up of dentists largely in private general dental practices. Dental therapists and dental hygienists and prosthetists are smaller groups in the workforce, but they are significant in the delivery of services to key sub-groups of the population. The capacity of the workforce is poorly distributed both geographically and strategically.

Style of service delivery

The predominant style of dental services has moved over time from the era of 'extract and replace' to an era of 'drill and fill' repair, and finally to an era of prevention and protection of oral health. However, progress through these eras has not been the same for all people.

Access to services

Oral health and oral well-being are important aspirations of all Australians. Access to dental services is a necessary condition for achieving oral health and well-being. However, access varies greatly. One minority segment of the community enjoys easy contact with dental providers and the latest technologies, consuming more and more dental resources, while another sizeable minority cannot access even basic services.

Reducing barriers to access

A range of barriers to accessing services exists. This has led to numerous proposals aimed at their reduction or removal, including making prevention a priority; increasing awareness of the importance of oral health, and the ability of individuals to contribute to their own health;

supporting population-wide oral health promotion strategies; improving experiences during dental visits; reducing financial barriers; establishing mobile or portable dentistry programs; updating dental provider knowledge and skills; and giving greater emphasis to patient-provider relationships and patient satisfaction in dental care.

Value for money

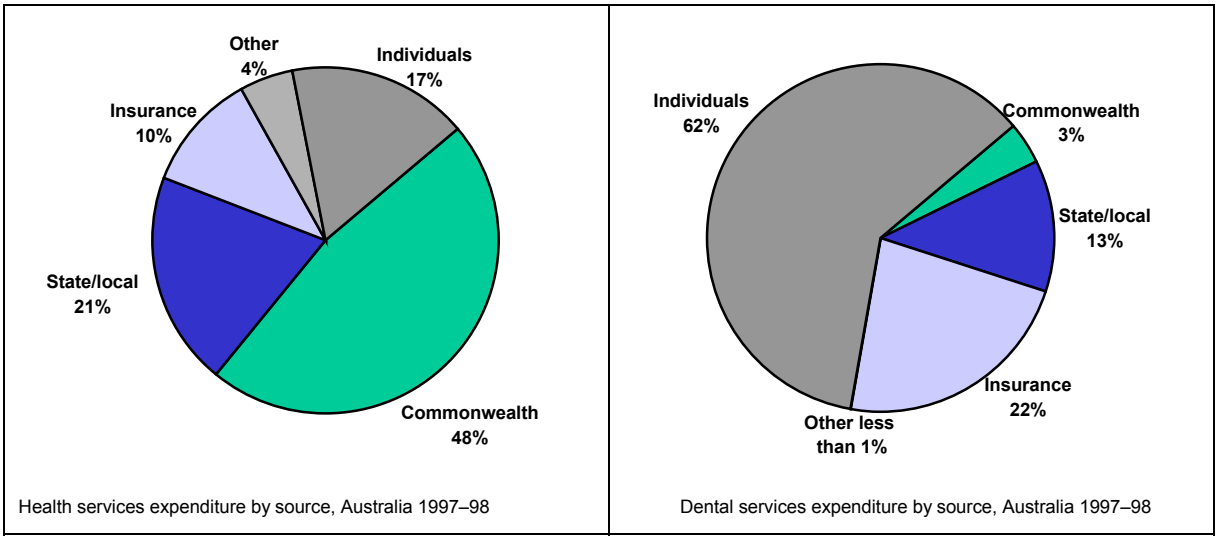
Good oral health and quality, accessible dental care are not possible without additional investment in preventive care and treatment services. However, value for money requires investment in the areas of greatest overall benefit. This supports an investment in oral health promotion and early diagnosis and preventive services; children, adolescents and young adults; and special target groups who are those with the greatest rate of disease development and most untreated oral disease.

3.1 Expenditure on services

Dental diseases and disorders are among the costliest of health problems. Approximately $2.6 billion were spent on dental services in 1997–98 accounting for 5.9 per cent of total health expenditure.

All health expenditure is funded by both Government and non-Government sectors. The primarily publicly funded health services receive the substantial proportion of 69 per cent of their expenditure (1997–98) from the Government. This provides a marked contrast to the more privately funded dental services. Out-of-pocket dental expenditure by individuals dominates at 62 per cent with only 16 per cent (1997–98) received from the Government. Figure 3.1 illustrates this point.

Figure 3.1: Comparison of expenditure by source for health services and dental services, 1997–98

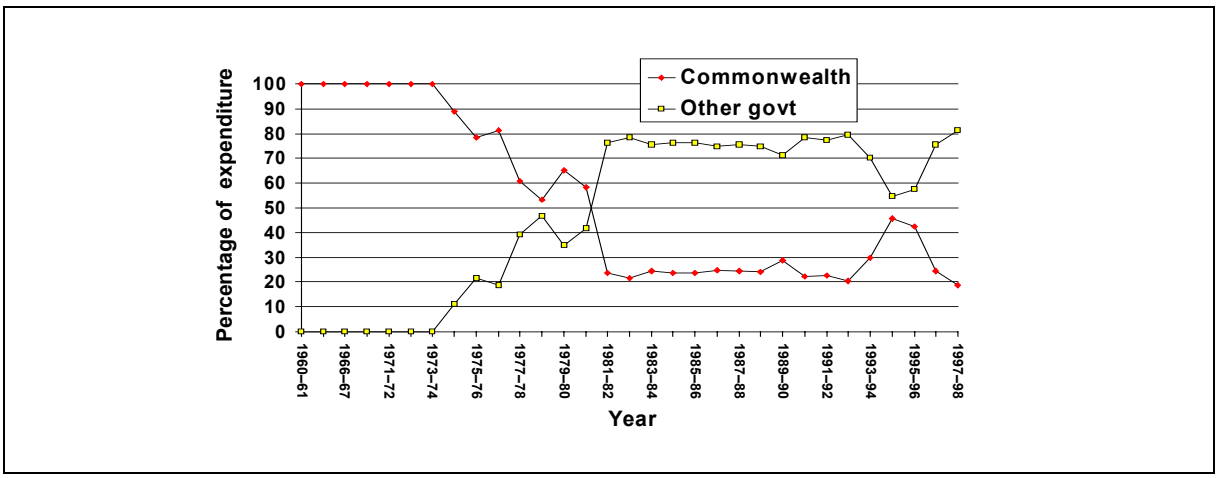


Source: AIHW, 2000b

The share of expenditure for dental services between levels of government has changed substantially since 1960–61. At that time, all public funding for dental services originated

from the Commonwealth Government. The Commonwealth's share fell steadily until 1982–83. It has remained constant since that time, except for a short-lived increase in the mid 1990s as a result of the Commonwealth Dental Health Program (CDHP). The changing share of public funding for dental services is illustrated in Figure 3.2.

Figure 3.2: Percentage share of public expenditure on dental services for Commonwealth and other government sources, 1960–61 to 1997–98



Source: AIHW Health Expenditure Database (unpublished data)

A significant issue in the 1990s was the surge and subsequent contraction in expenditure on dental services at the Commonwealth level. The Commonwealth contributed $245 million through the CDHP over the four financial years 1993–94 to 1996–97 inclusive. The CDHP focused on improving access to dental care for disadvantaged Australians, and the broader objectives of directing priorities from emergency care to general dental care and from treatment to prevention. In the 1996–97 financial year this funding was abruptly terminated, resulting in a reduction of overall dental services available to low-income Australians.

Through the 1980s and in the early 1990s, prior to the introduction of the CDHP, the Commonwealth Government's contribution to the funding of dental services consisted of funding for Department of Veterans' Affairs programs (approximately 88 per cent) and for oral and dental services through Medicare. Medicare funded oral and dental services include in-patient dental services and treatment under the Cleft Lip and Cleft Palate Scheme. Commonwealth expenditure on dental services not related to the CDHP has continued throughout this period.

Table 3.1 summarises the sources of funding for dental services over the period 1990–91 to 1997–1998.

Table 3.1: Recurrent expenditure on dental services, 1990–91 to 1997–98

	1990–91 ($m)	1991–92 ($m)	1992–93 ($m)	1993–94 ($m)	1994–95 ($m)	1995–96 ($m)	1996–97 ($m)	1997–98 ($m)
Commonwealth	33	37	38	58	105	152	97	76
State and local	117	127	146	137	126	205	297	328
Health insurance funds	503	528	535	539	546	564	596	568
Individuals	887	957	984	1,089	1,143	1,444	1,551	1,611
Other	16	4	6	6	8	10	9	8
TOTAL	**1,556**	**1,652**	**1,944**	**2,051**	**2,179**	**2,373**	**2,551**	**2,591**

Source: Health Expenditure Bulletin No 16: Australia's health services expenditure to 1998–99 (AIHW, 2000c)

The Commonwealth Government initiated the Private Health Insurance Incentives Scheme (PHIIS) in 1997, initially targeted to those on low and middle incomes. It provided a 30 per cent tax rebate on expenditure for private health insurance premiums. At the beginning of 1999 this was expanded to all people with private health insurance, followed by the 'lifetime' health insurance scheme in 2000. In 1997–98 the PHIIS represented a subsidy for dental services of approximately $26 million (Senate Community Affairs Committee, 1998). It is estimated that by the beginning of 1999 the subsidy for dental services through the PHIIS had reached $290.2 million per year.

The Commonwealth Government has seen these steps as critical in stopping the steady fall in private health insurance membership. The 30 per cent tax rebate means that those with private coverage effectively receive a significant subsidy on their premium. In the case of dental insurance, most adults with insurance are not eligible for public dental services. Therefore, the 30 per cent rebate represents a substantial subsidy to people with dental insurance without reducing the demand for public dental services. This is in marked contrast to the situation with general health insurance and Medicare subsidies.

Commonwealth funding has flowed from programs such as the CDHP, which aimed to assist disadvantaged groups, to schemes including the PHIIS and the tax rebate scheme, which subsidise higher income Australians and their families. Dental services are the least subsidised of all health services and what little subsidy exists is now directed predominantly toward higher income earners in the Australian population.

3.2 Dental fees

Fees for dental services are not regulated in Australia. Private dentists are free to set and adjust fees as they wish.

In general, inflation in health service prices measured by the Health Price Index (HPI) has followed closely the general level of inflation. Dental service prices, however, have increased 50.8 per cent over the 1989–90 to 1998–99 period while the increase in health prices over the same period was only 22.2 per cent.

As the total number of dental services has remained stable during the 1988–89 to 1998–99 period (LSDPA, unpublished data), the increased expenditure may be accounted for by an increase in the price of individual services, a change in the types of services offered, changes in technologies used to provide services (eg more expensive equipment or materials) and increases in costs associated with infection control measures.

One example of a change in the type of service and technology is treatment for an infected tooth. Traditionally, the treatment of choice was extraction of the tooth. Over the period in question the number of the alternative and superior option of root canal treatments has increased by 59 per cent. The simplest root canal treatment for a single rooted tooth allows the tooth to be retained but costs approximately five to six times more than an extraction (ADA, 2000).

Dental charges have consistently accounted for the highest average weekly household expenditure compared with expenditure on other health services.

Table 3.2 gives a few examples of price changes of routine dental procedures frequently delivered to patients.

Table 3.2: Price changes of routine dental procedures

	Dec 1989	Jul 1999	Increase
Initial oral examination	$22.60	$35.00	55%
Amalgam restoration — two-surface	$48.88	$81.00	66%
Extraction — permanent tooth	$45.34	$79.00	74%

Source: ADA, 1993; ADA, 2000

There have been marked percentage increases in the price of basic dental services of 55 per cent to 74 per cent when compared to the increase in the Consumer Price Index (CPI) over the same period of 20.3 per cent. With dental fees increasing at more than twice the rate of other health services, and averaging well above the CPI, private dental services will become progressively more out of reach for lower and middle income earning Australians.

3.3 Workforce

Composition

The dental workforce in Australia is made up predominantly of dentists. On a numerical basis, about 75 per cent of providers of services are dentists, 14 per cent dental therapists, 3 per cent dental hygienists and 8 per cent dental prosthetists (estimated from numbers of registered dentists, dental hygienists, dental therapists and dental prosthetists who reported that they were working in, or on extended leave from, positions as dental professionals in 1997 or 1998).

Dentists

The dentist workforce grew rapidly in the 1970s with expansion of professional course completion numbers. Its growth slowed in the early 1980s and is now less than that of the Australian population. Men have dominated the profession but there is a feminisation of the dentist workforce underway, with women projected to be nearly one quarter of all dentists in 2011 (AIHW DSRU, 1998).

The majority of dentists are general dental practitioners (84.6 per cent) and work in the private sector (81.4 per cent) (Szuster & Spencer, 1997).

There are difficulties in recruiting and retaining dentists in the public sector. Most dentists express high levels of satisfaction with their work. However, there are a number of areas of dissatisfaction expressed by dentists working in the public dental services which reflect excess demand, resource scarcity, resource allocation pressures and management practices like output-based funding which can influence dentist-client relationships and the professionalism of providers. Together with a lower income, these factors contribute to the recruitment and retention difficulties.

Dental hygienists, therapists and prosthetists

Although dental hygienists, therapists and prosthetists are a small minority of dental service providers, the restriction of the scope of their services and the target groups for their services make them more significant to the services required by sub-groups of the population such as school children and older edentulous adults.

Capacity

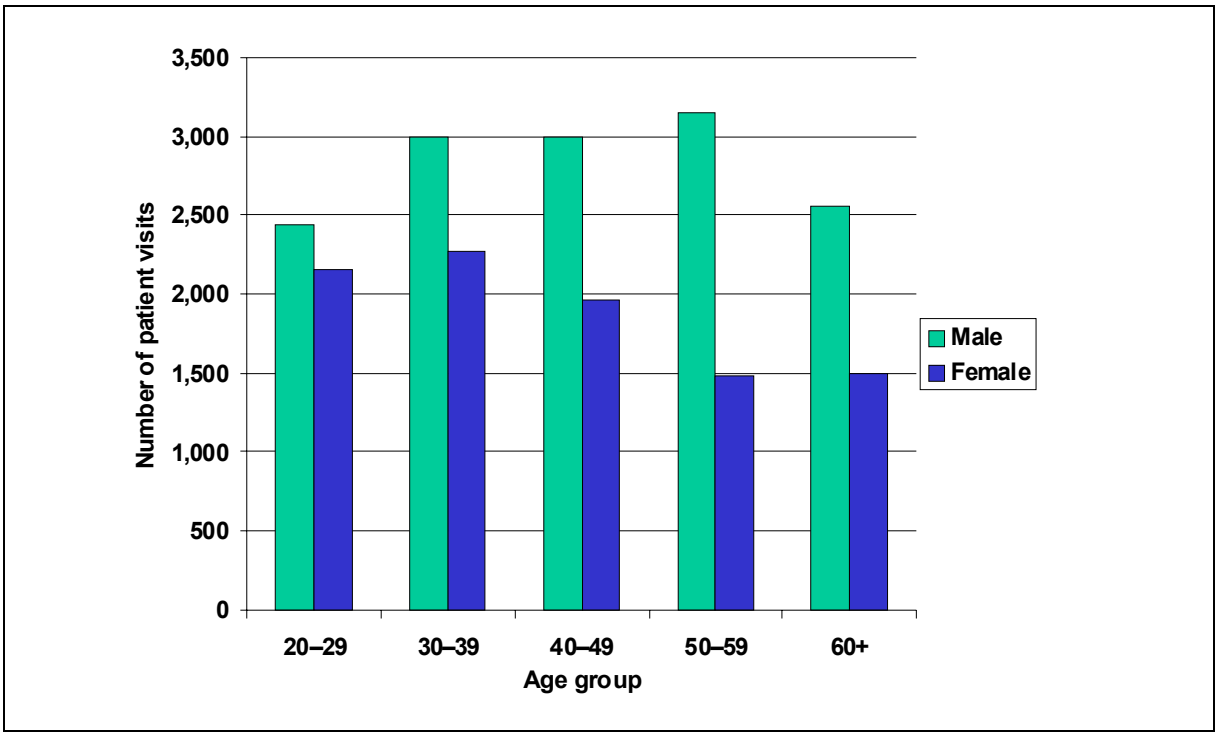
The dental workforce's capacity to supply dental services reflects the number of providers educated, registered and practising, and their time devoted to work and productivity. The current, reasonably stable capacity to supply dental services results from the slow growth in dentist numbers offset by reductions in patient visits per hour. However, that capacity is poorly distributed in two important ways.

- There is a marked variation in the rate of dentists per 100,000 population between urban and rural areas. Over 70 per cent of practising dentists in 1992 had their main practice located in a capital city. The rate of practising dentists per 100,000 population was 51.0 for capital cities and 28.6 outside capital cities (AIHW DSRU, unpublished data).
- There is also a marked variance between the percentage of Australians eligible for public dental services and the percentage of dentists working in the public dental services or receiving a substantial proportion of their private income for caring for eligible people. Up to 33 per cent (estimated from data provided to the Senate Community Affairs References Committee) of the adult population is eligible for public dental services, yet only 17.6 per cent of dentists work in or for public dental services (Szuster & Spencer, 1997).

Annual productivity

The number of patient visits per year within private general practice varies by age of dentist, with more visits provided by men than women (due mainly to higher rates of part-time work by women), and more visits provided in the middle age groups. This is illustrated in Figure 3.3.

Figure 3.3: Numbers of patient visits per dentist per year by age and sex of private practice dentist, 1997–98

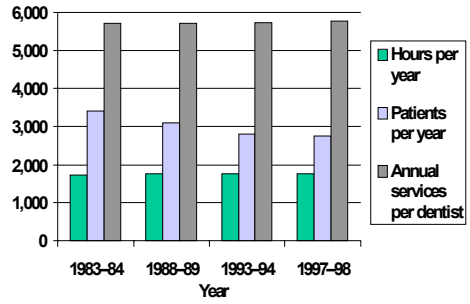


Source: AIHW DSRU SODS, 1997–98 (unpublished data)

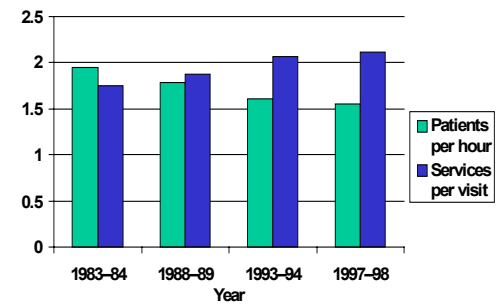
Trends

The number of patient visits per year to dentists within private general practice has decreased over time. The number of hours worked per year by dentists has remained stable. This means that dentists see fewer patients per hour. Despite the lower number of patients seen per hour, the total number of services provided by dentists has remained stable as the number of services per visit in private general practice has increased over time. These changes in practice are illustrated in Figure 3.4.

Figure 3.4: Trends in productivity in the dental workforce



Average hours worked, patients seen and services provided per dentist



Average patients per hour and services per visit for Australian dentists

Source: AIHW DSRU LSPDA, 1983–84, 1988–89, 1993–94; SODS, 1997–98 (unpublished data)

3.4 Service provision

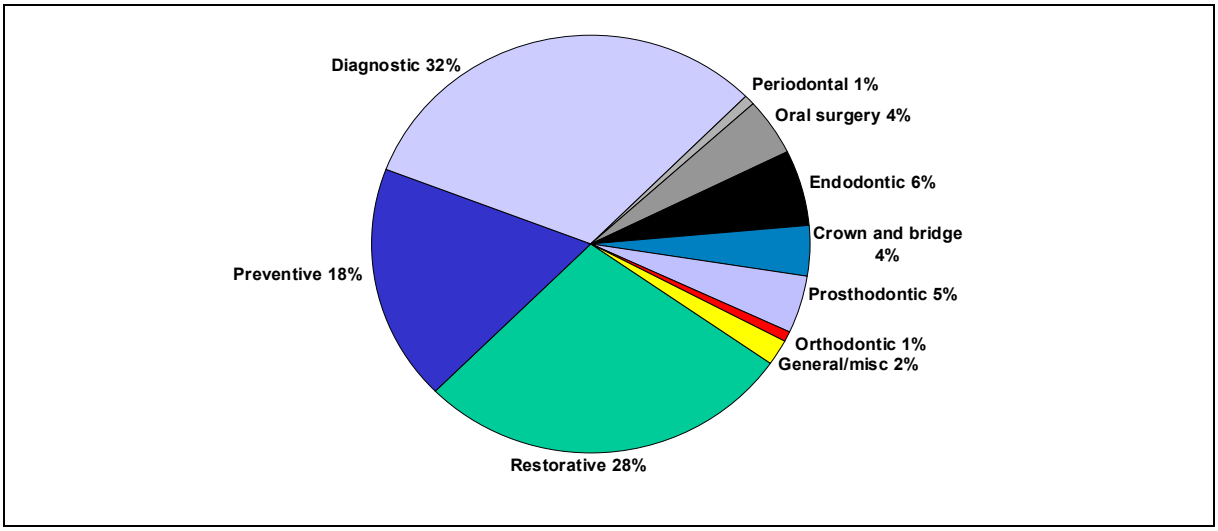
Dental services are effective in improving health status, treating illness and alleviating suffering. There is a well-developed and increasingly evidence-based practice of dentistry in Australia.

Dental services now involve high technology equipment, ranging from radiographic imaging to computerised milling of inlays and crowns. Science and technology have also opened up a wide range of specific preventive measures and underpin wider population oral health strategies.

Service mix

Service provision in private general practice is dominated by preventive, diagnostic and restorative services. Figure 3.5 shows this dominance in relation to the other dental services available.

Figure 3.5: Service mix for general practice dentists, 1997–98 (percentage of each type of service)

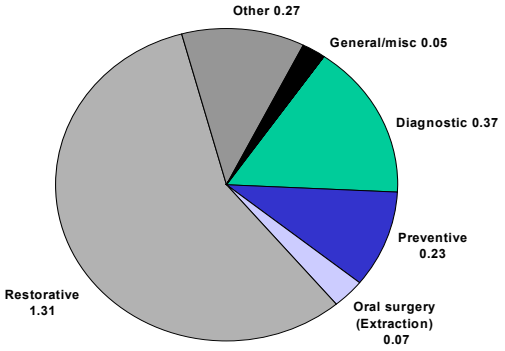
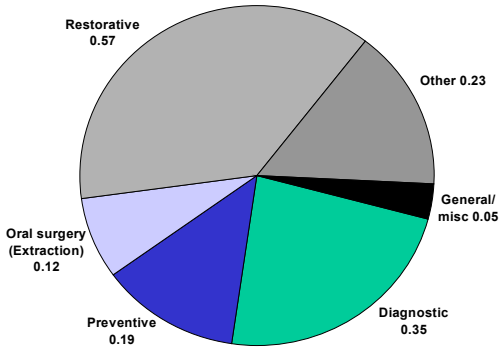
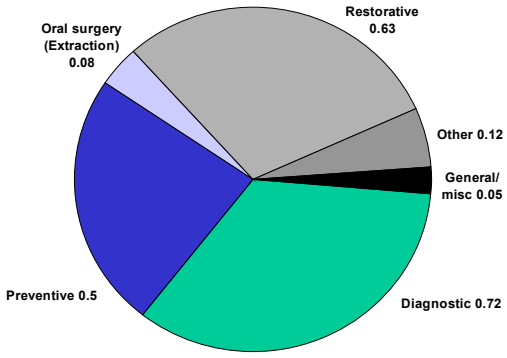


Source: AIHW DSRU, based on descriptive data from SODS, 1997–98

However, there is significant variation in service mix among dentists. Three styles of dental practice have been identified. These are described in Figure 3.6. In 1988, 'high restorative' practices averaged 2.3 services per visit, 'high diagnostic and preventive' practices averaged 2.1 services per visit, and 'low total rates' practices averaged 1.51 services per visit.

The service mix for an individual dentist depends upon the needs of patients who use the practice and the dentist's attitudes. While no differences were detectable according to the age of patients, other user characteristics need to be investigated before presuming that differences in provision reflect only differences in dentists' attitudes.

Figure 3.6: Styles of dental practice, 1988

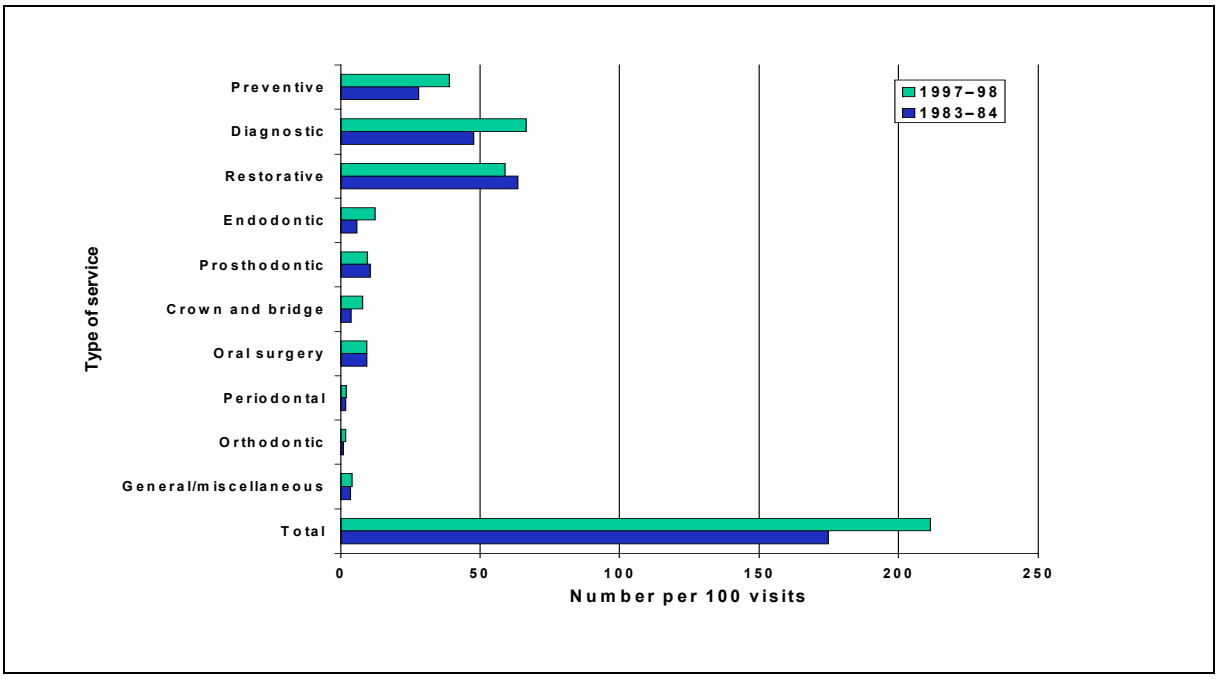
High restorative A 'high restorative' practice is characterised by high rates of restorative services. These practices averaged 2.3 services per visit. In 1983, these accounted for 27.9 per cent of practices. This had decreased to 16.6 per cent in 1988. (Numbers refer to average number of each service type per visit.)	
Low total rates A 'low total rates' practice is characterised by rates of restorative services approximately half that of a 'high restorative' practice, with similar rates of diagnostic and preventive services as 'high restorative' practices. The rates of oral surgery are higher compared to other clusters. These practices averaged 1.51 services per visit. In 1983, these accounted for 60.7 per cent of practices. By 1988, this had fallen to 49.2 per cent. (Numbers refer to average number of each service type per visit.)	
High diagnostic and preventive A 'high diagnostic and preventive' practice is characterised by restorative services at half the rate of a 'high restorative' practice, and diagnostic services at twice the rate of a 'high restorative' practice. Preventive services are twice the rate as other clusters. These practices averaged 2.1 services per visit. In 1983, these accounted for 11.4 per cent of practices. By 1988, this had increased to 34.2 per cent. (Numbers refer to average number of each service type per visit.)	

Source: Brennan et al, 1996

Trends

Trends in service provision within private general practice include increased rates of preventive, diagnostic, endodontic, crown and bridge, orthodontic and general or miscellaneous services. Figure 3.7 shows these trends for the period 1983–84 to 1997–98.

Figure 3.7: Trends in service provision, 1983–84 to 1997–98 (number of each type of service per 100 visits)



Source: LSDPA, 1983–84; SODS, 1997–98 (unpublished data)

Dentistry has moved from the era of 'pull out and replace' to an era of protection of oral health. While the service mix in dentistry is skewed to prevention, diagnosis and prompt, early intervention (ie primary care), a substantial range of intervention and rehabilitation services is provided. These services are lower in frequency but many are technically complex, time-consuming and expensive. The resources required for such services for one individual may equate to those required to provide for routine primary care for many others.

This is reflected in the limited available data regarding trends in individual practices. Between 1983 and 1988, membership in both the 'high restorative' and 'low total rates' practices declined (from 27.9 per cent and 60.7 per cent to 16.6 per cent and 49.2 per cent respectively), while membership of the 'high diagnostic and preventive' group increased (from 11.4 per cent to 34.2 per cent). The 'high diagnostic and preventive' group of practitioners was a slightly younger group in 1988 (average age was 43.2 years compared to 45.6 for 'high restorative' and 47.7 for 'low total rates') (Brennan et al, 1996).

3.5 Access patterns

Dental services are accepted as effective health care services (Layton, 1986) and accessing them is a basic aspiration of all Australians. Access is the opportunity for every person to visit a dental provider and receive dental services as a way of preventing and controlling oral disease, treating illness and alleviating suffering (Beck, 1984).

Access to dental services includes three components: the availability of dental providers, the obtainability of dental visits, and comprehensiveness of the dental services provided (Lewis, Fein & Mechanic, 1976).

General population

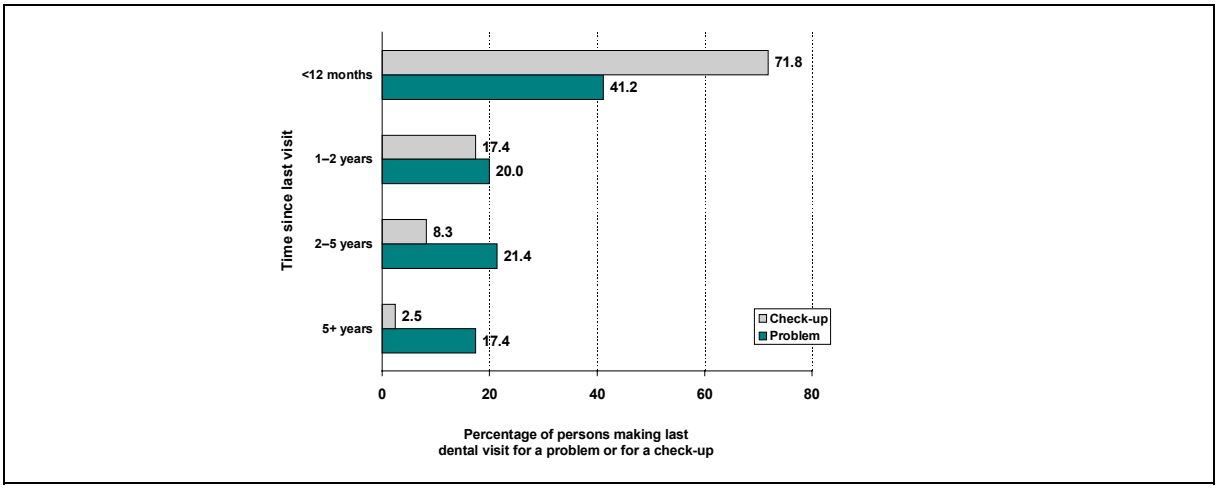
The Australian population shows evidence of a 'paradox of excess and deprivation' in access to dental services. One minority segment of the population, enjoying easy contact to dental providers and the latest technologies, consumes more and more dental care. On the other hand, another sizeable minority cannot access even basic services (Capilouto, 1991). While availability of dental providers and obtainability of dental visits show some variation across social groups, it is in the area of intention behind the dental visit and comprehensiveness of the dental services provided that more marked differences in access emerge.

The most significant issue is not an under-use of dental providers but an under-servicing of dental needs. Such under-servicing arises through substantial illness not being treated or suffering not being alleviated because of less than complete treatment or inappropriate dental services being provided (Restuccia et al, 1989). This is most clearly seen in reported differences in the prevalence of problem-oriented or emergency dental visits. These visits are single complaint oriented, not allowing for comprehensive care. They are also associated with many times higher probabilities of tooth extraction rather than the treatment of existing illness and prevention of future ill-health.

Emergency dental visits are not strictly the equivalent to accident and acute health service visits. Instead, they are a high throughput, highly rationed service where quicker (but 'sicker') patient visits occur. While such visits also occur in the private sector, they are a dominant feature of public dental services for adults.

Frequency of dental visits varies across the Australian population, and people who have a long period of time between visits are more likely to visit a dentist because they have a problem rather than for a check-up. Figure 3.8 shows that 71.8 per cent of people whose last dental visit was for a check-up had visited in the past year and only 2.5 per cent had visited more than five years ago. However, for people whose last dental visit was for a problem, only 41.2 per cent had visited in the past year, whereas 17.4 per cent had not made a dental visit for over five years.

Figure 3.8: Access to dental care — time since and reason for last dental visit, dentate adults, 1994–96

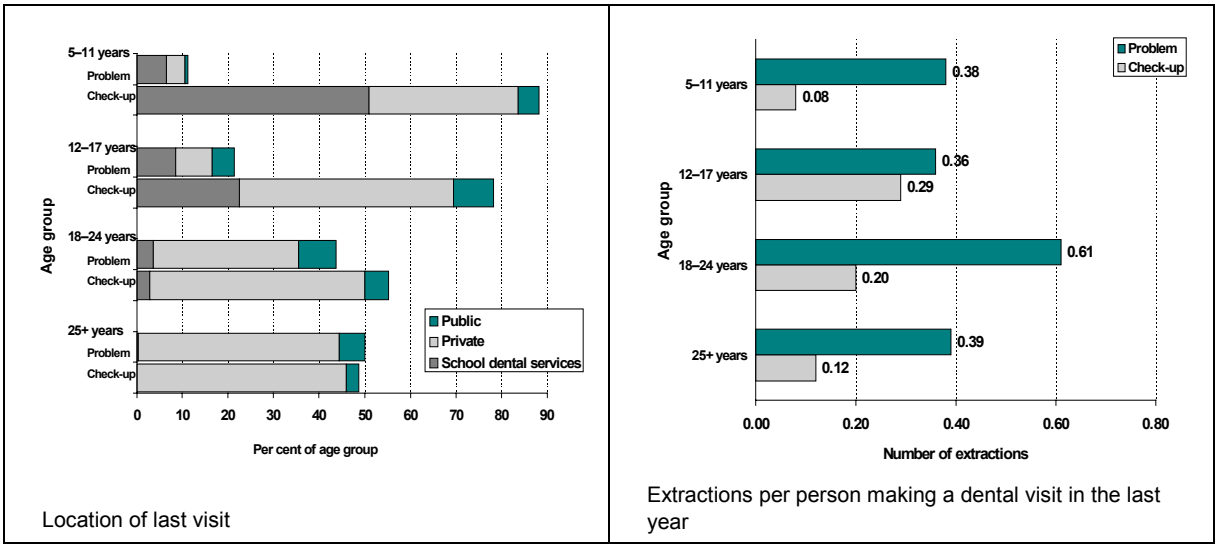


Source: AIHW DSRU National Dental Telephone Interview Survey, 1994, 1995, 1996 (unpublished data)

The reason for visiting is related to the type of dental care received. People making 'check-up' visits are more likely to receive preventive treatment and timely interventions, while others making 'problem' visits are more likely to result in unfavourable outcomes such as extractions. Problem-oriented visits have an extraction rate over three times that of check-up visits. This pattern occurs across all age groups and is illustrated in Figure 3.9.

Difference in access is illustrated by the sharp increase in visiting for a dental problem from adolescents (25 per cent for 12 to 17-year-olds) to young adults (over 40 per cent for 18 to 24-year-olds) after which the proportion of problem visits remains fairly constant. The proportion visiting for a check-up declines accordingly. In children, the greater use of dental services for check-up visits reflects availability of services through the school dental services. In Australia as a whole, only 5.5 per cent of 6 to 12-year-olds had not made a dental visit in the previous two years. This increased to 9.6 per cent for 13 to 16-year-olds (AIHW DSRU, 2000a).

Figure 3.9: Access to dental care — site of last visit, usual reason for dental visit and extraction rates, children and dentate adults, 1994–96



Source: AIHW DSRU National Dental Telephone Interview Survey, 1994, 1995, 1996 (unpublished data)

Socially disadvantaged groups

Access patterns in Australia are uneven across the population. A visit to a dentist for a problem rather than a check-up is usually an indicator of inadequate access and is associated with a lack of comprehensive dental services.

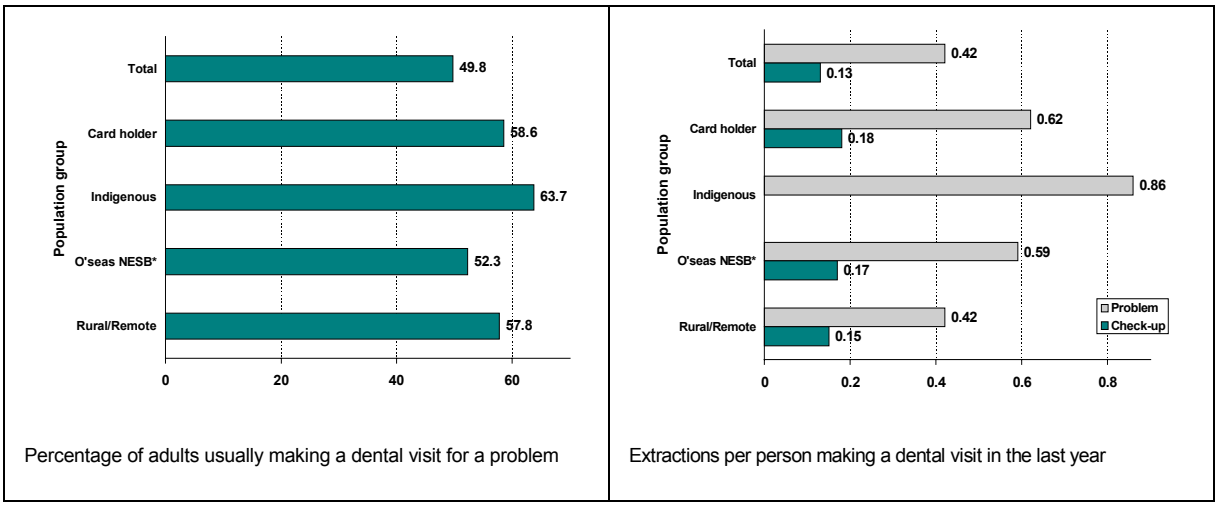
Socially disadvantaged groups in the community experiencing access problems include Health Card holders and other groups such as migrants, in particular non-English speakers, and Indigenous Australians. Problem-oriented dental visiting patterns and higher extraction rates among Health Card holders, migrant groups and Indigenous Australians are more pronounced than among the general population. The difference in access patterns, as recorded in 1994–96, are described below and summarised in Figure 3.10.

- The percentage of Health Card holders who 'usually make dental visits for a problem' was 58.6 per cent which was greater than that of the total population at 49.8 per cent.

Among Health Card holders who received their most recent care at a public dental clinic, over two-thirds (67.8 per cent) usually visited for a problem (not shown in graph).

- Almost two-thirds of Indigenous people reported that they usually made dental visits for a problem, compared to 49.8 per cent of the total population.
- A slightly higher proportion of migrants who speak a language other than English at home usually visited for a dental problem.
- The extraction rate among card holders who usually make dental visits for a problem was 1.5 times that of the total population. Among Health Card holders who made a visit to a public dental clinic (not shown in graph) within the previous year the extraction rate was 0.82, almost double the rate of the total population.
- The extraction rate among the Indigenous people who usually visit for a problem was 0.86, or almost one extraction per person, which is more than double the rate of the rest of the population who usually visit for a problem.
- People born overseas who speak a language other than English at home and who usually make a visit for a problem had an extraction rate 40 per cent higher than migrants from an English-speaking background and Australian-born people.
- Geographic inequalities in access to dental care among residents of rural and remote areas of Australia are shown by their greater problem-oriented dental visiting pattern.
- Rural and remote dwellers have 15 per cent more extractions than the rest of the population when they visit a dentist for a check-up, although the extraction rates among those who usually visit for a problem were similar to the total population.

Figure 3.10: Access to dental care — problem-oriented dental visiting patterns and extractions in the previous 12 months by Health Card holder status, Indigenous status, migrant status, and rural and remote dwellers, dentate adults, 1994–96



* O'seas NESB refers to people born overseas who speak a language other than English at home

Source: AIHW DSRU National Dental Telephone Interview Survey, 1994, 1995, 1996 (unpublished data); Adult Dental Programs Survey, 1995–96; Brennan & Carter, 1998

3.6 Barriers to access

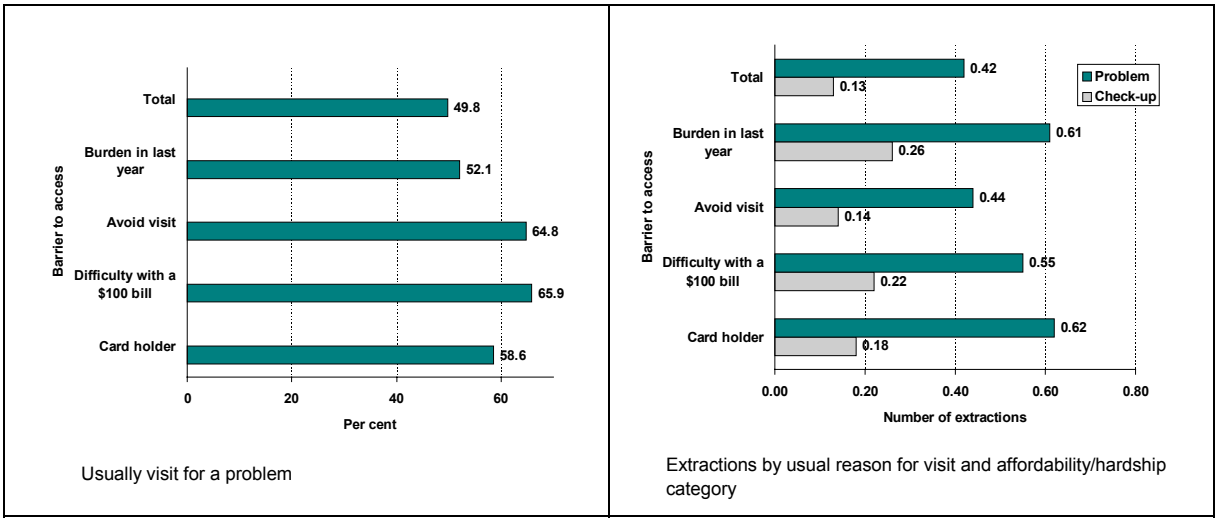
A range of barriers to accessing services exists. Even though visiting a dentist for any reason in the previous 12 months shows little variation across social groups, all groups include a minority of people who rarely visit. Not going to the dentist regularly or going only in particular circumstances are decisions based on a complex interaction of availability of services, previous experiences of dental services, perceptions and expectations of dental care. The barriers to accessing comprehensive care include additional factors involving the provider, the practice or clinic environment, power, and rewards and costs shared between providers and patients. A number of barriers to access on the service provision side of the relationship are dealt with in Chapter 4 which addresses issues in the delivery of dental services. Two important categories of patient factors that affect access are affordability and hardship, and perceptions.

Affordability and hardship

Financial affordability acts as a barrier to access and influences patterns of dental service use in Australia. For example, people who usually make a dental visit for a problem are more likely to report difficulty in paying for dental care than people who usually visit a dentist for a check-up. Figure 3.11 shows that indicators of low affordability and levels of financial hardship are more highly associated with visiting for a problem than for visiting for a check-up. Low affordability and higher levels of financial hardship, leading to problem visits rather than check-up visits, were associated with higher rates of tooth extraction.

Figure 3.11 summarises the affordability and hardship barriers to access.

Figure 3.11: Barriers to dental care — affordability and hardship in terms of dental visits being a financial burden in the last year, avoided or delayed visit due to cost, difficulty with a $100 dental bill, card holders, and problem-oriented dental visiting patterns and extractions, dentate adults, 1994–96



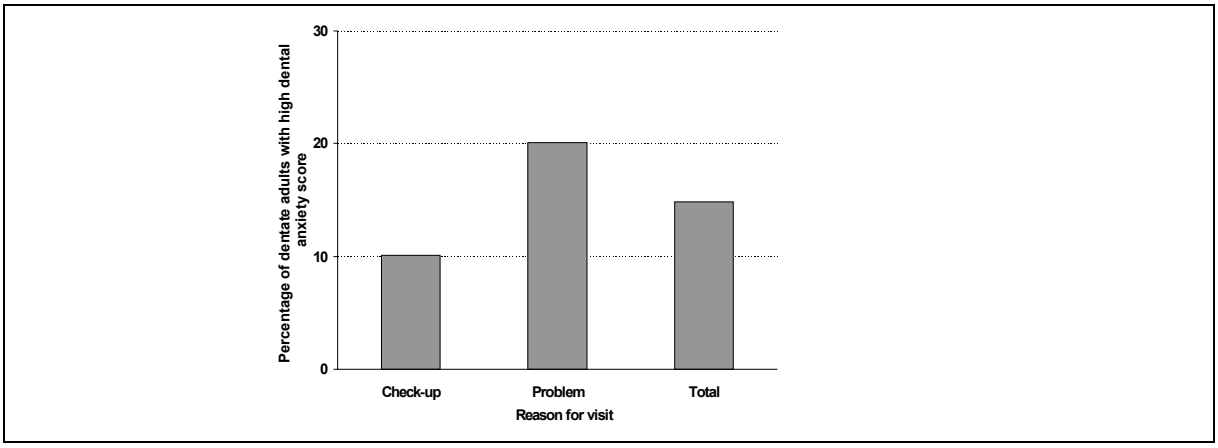
Source: National Dental Telephone Interview Survey, 1994, 1995, 1996 (unpublished data)

Perceptions of dental services

Perceptions of dental services, which may be based on prior experience of services or information about current practice in dentistry, may present a barrier to access.

'Dental anxiety' is a significant barrier to regular use of dental services. Dental anxiety is significantly more prevalent among people who usually make a dental visit for a problem (20.1 per cent) rather than for a check-up (10.1 per cent). This is illustrated in Figure 3.12. People who are anxious about visiting a dentist have been shown to be affected more by dental problems, with significantly more toothache, discomfort with dental appearance and avoidance of food (Thomson et al, 1996).

Figure 3.12: Barriers to dental care — dental anxiety by dental visiting, dentate adults who made a dental visit in the previous 12 months, 1996



Source: National Dental Telephone Interview Survey, 1996, Supplementary Survey (unpublished data)

Satisfaction with health care can be regarded as an intermediate outcome of the health care process which reflects the extent to which the care given meets the service user's needs and expectations and provides an acceptable standard of service. Care which is less satisfactory to the consumer is less likely to be effective. Delay in seeking care, non-compliance with instructions and poor retention of instructions have been shown to be associated with dissatisfaction with the outcome (Wilkin et al, 1993).

Satisfaction with dental services depends upon the complex interaction of the elements identified earlier. Generally, Australians express a high level of satisfaction with dental services (4.24 out of 5). The highest level of satisfaction is expressed by service users who make appointments for their next visit immediately, or who expect to be contacted by their dentist when the next appointment is due, suggesting that they have a regular source of dental care. However, lower levels of overall satisfaction are reported by people who usually make a dental visit for a problem, who experience affordability problems in accessing dental care, and who speak a language other than English at home. This suggests that satisfaction is linked to both ease of access to services and to the success of treatment in improving outcomes. It influences future use of dental services.

Strategies for removing barriers

While the complexity of factors influencing access should not be under-estimated, bodies such as the Federation Dentaire Internationale (FDI) (1986) have expressed support for a range of straightforward proposals aimed at removing barriers.

- Prevention of oral disease should be a priority in all health programs.
- Information needs to be conveyed to people about the importance of oral health, its positive effects on general health and the ability of individuals to contribute to their own oral well-being.
- Individuals' efforts to contribute to their own oral well-being need to be supported by population-wide oral health promotion strategies.
- Communication with, and empowerment of, patients and the creation of improved experiences during dental visits are important for allaying anxiety and fear in the dental setting.
- Financial barriers should be reduced through insurance or subsidy, especially for those special needs groups in the population.
- The special access problems existing for rural or isolated groups, or for those who are non-ambulatory, housebound or institutionalised, should be solved with mobile or portable dentistry programs and public support for facilities suitable to local conditions.
- Provider knowledge and skills need to be continually updated and incentives given to continually improve the provision of dental services.
- Processes in dental practices need to give greater emphasis to the quality of interactions between dentists and patients and patient satisfaction.
- Strategies to remove barriers need to be coordinated between, and sensitive to, national, State or Territory and regional variation.

3.7 Value for money

There are two aspects that should be dealt with when considering whether services are good value for money. The first is whether they address the oral health needs of the community. The second is whether they use only those resources that are necessary for providing the service. Any discussion of current dental services, especially one that includes the issue of access to dental care, is likely to conclude that additional money is required for improved oral health and good dental care. Most approaches to improving access to dental care will require additional expenditure, particularly from government sources. However, it is also apparent that the way in which any additional expenditure is allocated is important to improving oral health and dental care.

There is a fundamental challenge to ensure value for money spent. Several key issues are apparent.

- Increasing expenditure on dental care, especially raising the level of tertiary services (rehabilitating, and limiting further disease), faces diminishing returns to improvements in oral health. There is a need to consider what approaches would have the most favourable ratio of benefit to cost.
- Further, there is a need to confront and resolve the question of priorities, especially in the context of the limited public dental services available in Australia. Decisions need to be made about which special target groups have greater burdens of disease, dental needs and a propensity for oral health gains so that the greatest overall benefits can be achieved.
- Finally, efforts to improve access by increasing government expenditure will add to the trend in inflation of dental service prices if there is no corresponding growth in the capacity to provide dental services.

Neglect of prevention

Data on service use reported in earlier sections indicate that many Australians, particularly those who are traditionally recognised as being disadvantaged, do not have access to timely preventive and restorative care and have higher rates of problem visits and extraction of teeth. In such circumstances they do not access adequate levels of preventive oral health care. An investment in oral health promotion and early diagnosis and preventive services may offer a better and cheaper alternative for improving oral health than the expansion of tertiary dental services.

Such oral health promotion and specific preventive services could be concentrated on children and young adults as an investment in lifelong oral health gains, or on special target groups such as older adults whose pace of disease development creates the opportunity for more substantial oral health gains from preventive approaches. In some circumstances redeployment of resources could improve the overall level of care given. There is a need to examine what standards of dental care can be achieved for different levels of resources expended and how the resources available can be most effectively and efficiently employed. In terms of government expenditure on dental care in Australia, this involves a two-tiered approach to eligibility to public dental services: an overall eligibility of public subsidy through low income; and a priority for resource allocation based on a further set of criteria including age, social position, location, burden of disease, and propensity to achieve oral health gains.

Least-cost methods

Value for money is achieved when services are provided using 'least-cost' methods. Capacity to do so depends on the availability of information on both the clinical effectiveness and cost effectiveness of different interventions for similar oral health problems.

Cost effectiveness can depend upon the intervention used; for example, preventive strategies versus curative strategies. It also depends upon the methods used; for example, the types of equipment and materials as well as personnel.

Decisions about approaches to improving oral health should be underpinned by an understanding of the cost effectiveness of different approaches and of alternative methods of achieving improved oral health.

There are tasks currently undertaken by dentists which could be performed by auxiliaries such as dental hygienists, therapists and prosthetists, with equivalent outcomes for service users.

Increasing the appropriate use of dental auxiliaries is also in accordance with the principles of primary health care (WHO, 1986).

Duplication and inappropriate use of services

Duplication of services is perceived as a minor inefficiency in the provision of dental services. However, some examples deserve attention.

- Some parents of children in the school dental services seek private general dental care when benefits of additional care are doubtful.
- Increasing numbers of people present routine oral problems to emergency departments of general hospitals or to general medical practitioners (no waiting, little or no direct cost). Many eventually also go to dentists.

Such duplication may not involve a large expense, but could be important in indicating structural or process idiosyncrasies that warrant attention.

Inappropriate uses of medical services occur when medical practitioners are consulted for oral health problems which are most appropriately managed by a dental practitioner or dental auxiliary. This can occur due to lack of understanding by service users about the most appropriate source of care, or to greater ease of access to medical services. It is estimated that in Australia in 1998–99 there were over half a million encounters with medical practitioners for dental problems (Britt et al, 1999). This represents use of over $10 million of Medicare resources.

In addition, there were almost 21,000 operations performed in hospitals on teeth, gums and tooth sockets for children aged between 1 and 14 in 1998–99 (AIHW, 2000a). The majority of these operations involved children who required a general anaesthetic for multiple tooth extraction. This represents a failure of prevention of caries in children resulting in not only significant morbidity for those children, but substantial costs to the general health care system.

In total, patient bed-days for hospital admissions for dental and orthodontic procedures exceeded 200,000. In the 15 to 35 age group there were 47,231 hospital admissions for dental and orthodontic procedures. Of these, over 90 per cent were for surgical removal of a tooth. Many of these would have been for removal of third molars (wisdom teeth).

Among adults aged 35 years and over there were 14,195 hospital admissions for dental and orthodontic procedures. Of these almost 70 per cent were for surgical removal of a tooth. The majority of these would have been removal of teeth due to caries or periodontal disease.

3.8 Summary of issues

- Dental services in Australia have developed in a piecemeal fashion without overarching planning to address the needs of the community. Their separation from general health services and the fact that they are largely financed from private sources has resulted in the development of a set of independent services without any systematic coordination and with minimal formal linkages to general health services.
- Dental services in Australia are largely purchased as an individual out-of-pocket expense from private dentists with unregulated fees.
- Dental expenditure is the least subsidised area of health services and most of the limited subsidy for adult dental care is directed toward higher income earners in the Australian population through the PHIIS and 'lifetime' health cover.
- Dental fees are increasing at twice the rate of fees for other health services, progressively moving private dental services out of reach of lower and middle income earning Australians.
- Most dental services in Australia are provided by dentists, but dental auxiliaries play an important role in the provision of particular services to some target groups.
- The capacity to provide dental services is poorly distributed both geographically and between the private and public dental sectors.
- Geographically, capital cities in Australia have 51.0 dentists per 100,000 people, while the rest of the nation has only 28.6 dentists per 100,000 people.
- Strategically, approximately one-quarter of the adult population is eligible for public dental services, but only 11.7 per cent of dentists work in or for the public dental services.
- Dental services are polarising, with an increased rate of provision of diagnostic, preventive and technically advanced services. At the same time there are small reductions in restorative and prosthodontic service provision rates.
- Access to these services is very inequitable. Some Australians enjoy access to the latest diagnostic, preventive and treatment services, while others have limited access, with much higher probabilities of tooth extractions, largely associated with emergency visits. Nearly three-quarters of those who last visited for a check-up visited in the last year, while of those who last visited for a problem, just over 40 per cent visited in the last year.
- Limited access is seen among socially disadvantaged adults: Health Card holders; migrants, especially non-English speakers; and Indigenous Australians.
    - Over two-thirds of Health Card holders who received their most recent care at a public dental clinic usually visit for a problem compared with just under half of the total population.
    - Health Card holders who made a visit to a public dental clinic had almost double the rate of extractions of the total population.

- Affordability and hardship and perceptions of dentistry, including anxiety about and dissatisfaction with dental services, are barriers to access to dental services.
- Given the linkages between oral health and general health and the increasing recognition of the importance of coordination of services, especially for people who have multiple health conditions, it is unlikely that dental health services are working for optimal oral health in Australia.
- Strategies for removing barriers to dental services have been proposed by many organisations and represent straightforward means of improving dental care for all Australians:
  - making prevention a priority;
  - conveying information on the importance of oral health, and the ability of individuals to contribute to their own health;
  - supporting population-wide oral health promotion strategies;
  - improving experiences during dental visits so as to allay anxiety and fear in the dental setting;
  - reducing financial barriers;
  - establishing mobile or portable dentistry programs for rural or remote, and non-ambulatory people;
  - updating dental provider knowledge and skills and providing incentives that positively shape the provision of preventive dental services; and
  - giving greater emphasis to interpersonal relationships and patient satisfaction in dental care.
- Ways of improving dental care should incorporate achieving value for money by addressing the neglect of prevention, using least-cost methods of delivery of dental services and avoiding duplication and inappropriate use of health services.

Conclusion 3

Dental services in Australia are delivered in a pluralistic and fragmented system which does not achieve efficient use of resources. Maximising the oral health improvement from dental service provision requires removal of incentives which favour treatment at the expense of prevention, and concerted effort to address the dental care needs of those with the poorest oral health.

4. Delivery of dental services

Overview

Development of services for children and adults

Dental services are mostly delivered through independent solo or group private dental practices. A limited number of larger groups and organisations exist, mainly in the public sector. Thus, dental care is seen as a matter of private responsibility. However, the two exceptions to this reflect the goal of equity and acceptance of community responsibility for the provision of dental care. They are the school dental services and public dental services.

Private dental practices are organised around dentists as providers, responding to demand for dental services, financed by out-of-pocket payment, and providing a wide scope of general and specialist services. Public dental services for children are organised around supervising dentists and dental therapists as providers, responding to need for dental services, financed by indirect payment through taxation, and delivering preventive and routine general dental services. In contrast, public dental services for adults are organised around dentists as providers, responding largely to acute need, financed by indirect payment through taxation and providing emergency and limited general dental services.

Innovative programs

A smaller number of innovative programs for delivery of dental services include the highly tailored individual risk assessment and management approach of school dental services, rural placements for undergraduates, bonded studentships or internships, publicly subsidised dental services for rural dwellers via private practices, domiciliary dental services and mobile dental services to remote Indigenous communities and to residential care institutions.

Quality assurance

Dental practice is controlled and services organised at a State or Territory level, leading to significant structural differences between jurisdictions. Within States and Territories, public dental services vary from centralised to highly regionalised models.

These fragmented arrangements mean that maintenance of quality standards depends upon self-regulation. Activities for quality assurance that are not sufficiently widely undertaken include monitoring and evaluation, policy development, and assurance of minimum standards or benchmarks being achieved and maintained. At a national level, there is neither a capacity nor a system in place to lead toward better oral health and good dental care for all Australians.

Organisational issues

Fragmentation and lack of planning and coordination arise from a number of organisational issues including the lack of a formal agreement between the Commonwealth and the States and Territories about their respective roles and responsibilities for oral health; the lack of leadership, coordination and cooperation; poorly developed relationships between dentistry and other areas of health; boundaries between and within services and programs which fragment care and impede people's movement between services; professional demarcations; and geographical maldistribution of resources.

4.1 Development of dentistry

Dentists

The history of dentistry has determined to a great extent how services are delivered. Dentistry, as it is practised today, emerged out of guilds of the 19th century. The practice of dentistry was learnt under preceptorships and was organised as a cottage industry. In the early part of the 20th century the education of dentists was formalised, most frequently within the university sector. With the formalisation of the education of dentists, and a fledgling dental research and scholarship effort, dentistry began to emerge as a largely self-governing autonomous profession. The organisation of the profession has retained much of its cottage industry roots, with independent solo or group private practices dominating the delivery of dental care, with only a limited number of larger groups or organisations, predominantly in the public sector. Half of all dentists describe themselves as being in solo practice, and the average number of dentists in private practices in Australia is 2.5 per practice (SODS, unpublished data).

Dentistry has tended to be a service offered by a private practitioner to anyone who has a need and who can pay for the service. In the main, the profession and the community have supported such arrangements, valuing individual responsibility and choice of provider ahead of equity and collective and community responsibility.

Today's dentists are highly educated professionals who have completed a minimum of five years of tertiary education. Dentists in general practice offer a wide range of preventive, diagnostic and restorative services. Specialist dentists, who usually complete a minimum of a further two years of study, offer highly specialised services. The most commonly practised specialties in the community are orthodontics, oral and maxillofacial surgery, prosthodontics, periodontics and endodontics.

Dental hygienists, therapists and prosthetists

The practice of dentistry is augmented by the activities of auxiliaries, including dental hygienists, therapists and prosthetists, who provide a small minority of services to the Australian population. However, they play important roles in the dental care delivery system and can be both complementary to, and a substitute for, dentists under particular circumstances.

Dental hygienists are employed mainly in private dental practices. They are permitted to practise in all States. Their role is mainly in preventive and periodontal services. These are growth areas in dentistry, with growth in preventive services the fastest. Growth in the demand for dental services might be met by hygienists to the extent that they are a substitute for dentists in some circumstances. However, to the extent that they complement dentists by providing services which would otherwise not have been provided, expansion of their numbers and thus their complementary role will have limited impact on the shortfall in capacity to supply dental services.

Dental therapists are restricted to practise with children aged up to 18 years in the public sector, in which they have a substantial substitution role. Registration is a prerequisite to practise in Victoria, Western Australia and the Northern Territory. The pressure of National Competition Policy is pushing for their extension into the private sector (Hilmer, 1993). This will happen in Victoria in the year 2000 and is likely to follow in other States and Territories in the future. Whether this leads to an increase in the demand for dental therapists depends upon the extent to which dentists in private practice will want to employ them. Considerable uncertainty surrounds this issue. Tasmania has legislated to allow dental therapists to practise with adults in public dental services. Implementation and evaluation of this change in roles is at the planning stage.

Dental prosthetists are registered in all States and the ACT, but not in the Northern Territory. Dental prosthetists practise as independent dental providers, largely in the private sector. However, within private practice, they provide services to eligible patients under State-based pensioner denture schemes. Their role is limited to making and fitting full and partial dentures. Needs for full dentures will decline as the edentulism rate in Australia falls. However, many older Australians will continue to need partial dentures. In combination with the ageing of the population, this will lead to a modest increase in demand for dental prosthetic services.

Dental assistants

Dental assistants are numerically the largest group employed in dentistry. They do not supply dental services directly, but play an important complementary role to dentists, thus contributing to the number of services that dentists are able to provide.

Their main responsibilities are in infection control and radiography and they make an important contribution to the quality of services provided and to patient satisfaction with dental care.

There are difficulties with recruitment and retention of dental assistants in both public and private services, especially in urban areas. In particular, dental assistants express dissatisfaction with levels of remuneration and with the lack of a career path.

These difficulties should be addressed as a matter of importance because of the pivotal role of dental assistants in the delivery of dental services.

4.2 Dental services for children

One area of dentistry where a higher value on equity of opportunity and community responsibility has been placed is the oral health of children and delivery of dental care to children. The rationale for such a service rests largely on the desire to prevent or control oral disease among children, to introduce and educate children and their parents or carers to regular dental care, and to provide a platform for improved adult oral health. Children have received priority because they are dependent on others, represent an investment in the nation's future and are least expensive to cover (Davis & Schoen, 1998).

In the 1970s the Commonwealth Government funded the development of infrastructure and the education of dental therapists as the workforce for the school services. The school dental services achieved high coverage of the target primary school population in all States and Territories other than New South Wales and Victoria. Having done so, most services have been extended through the secondary school population. The school dental services are distinctive in their employment of dental therapists, needs-based allocative framework, preventive orientation and funding coming largely out of consolidated taxation revenue.

In 1994–96, approximately 62 per cent of the Australian child population aged 6 to 12 years old reported their last visit was to a school dental service. The remainder, largely in New South Wales and Victoria, have visited private dentists. At the same time, 33 per cent of 13 to 16-year-olds visited the school dental service, and 10 per cent went to other public providers for their last dental visit (AIHW DSRU, 2000a). Co-payments, in the form of a capitation fee on enrolment each year, have been introduced by some States.

The range of care provided throughout Australia in the school dental services is similar, covering basic restorative and preventive care and some limited orthodontic care.

The school dental services have shown themselves to be effective in reaching a high percentage of children. The unit cost of the services is very low and the health outcomes continue to improve, providing an excellent base on which the oral health of Australians can be built.

4.3 Dental services for adults

The delivery of dental services to adults is largely provided by private dentists. About 85 per cent of Australians aged 15 years and over report that their last dental visit was to a private dentist. Even in the population that is eligible for public dental services, 60 per cent report using a private dentist for their last dental visit. These services are mainly for preventive, diagnostic and restorative care. Provision of these services is demand-based and financed by individuals either directly or through dental insurance on a fee-for-service basis. Smaller percentages of services are higher level interventions, but these are time-consuming and costly (for example, endodontic, crown and bridge and prosthodontic services). Approximately 12 per cent of Australian dentists are specialists (for example, orthodontists and oral and maxillofacial surgeons) working predominantly in the private sector, significantly elevating the provision of higher level interventions in private dental practice.

All Australian States and Territories provide public dental services, directed at means-tested, eligible adults and their adult dependents. Means testing by social services and the

holding of a Health Card are accepted as evidence of eligibility in most public dental services. These services are largely provided by publicly employed dentists at minimal or no cost to the patient. Several States and Territories have introduced patient co-payments, the impact of which is being evaluated. The services are predominantly emergency ones, with a mix of diagnostic, oral surgical (extraction) and miscellaneous (temporary filling) services. Less than half of all courses of care involve general dental care, specialist services being restricted to larger institutions and teaching clinics for undergraduate or postgraduate dental students.

Table 4.1 provides a summary of the main dental services for both children and adults.

Table 4.1: Summary of main dental services

Group	Service	Provider	Allocative framework	Payment	Service orientation
Children	School dental services	Dental therapists (under the direction of dentists)	Needs-based	Indirect through taxation or minimal direct cost	Preventive and routine general dental care
	Private practices	Dentists	Demand-based	Direct out-of-pocket (or through dental insurance)	General dental care and specialist orthodontic services
Adults	Private practices	Dentists	Demand-based	Direct out-of-pocket (or through dental insurance)	General dental care, restorative and rehabilitative services
		Specialists	Referral	Direct out-of-pocket (or through dental insurance)	Rehabilitative services
	Public dental services	Dentists	Demand-based	Indirect through taxation or minimal direct cost	Emergency dental services (oral surgical) and limited general dental care

Two other distinct but related groups in the Australian population have access to specific dental services (Senate Community Affairs References Committee, 1998). Eligible Department of Veterans' Affairs (DVA) beneficiaries are entitled to the full range of dental services for war-caused conditions and for all conditions for some beneficiaries. These are provided by private dentists and specialists on a demand-based, fee-for-service reimbursement. This represents the main area where an established, recognised schedule of fees for dental services exists that governs payment to dentists.

Finally, the Armed Forces and Army Reserve Dental Scheme provides members of the Australian Defence Force with the full range of dental services at no charge. This program aims to maintain oral health as part of overall health required for active deployment.

4.4 Dental services for disadvantaged and special groups

A large majority of the Australian community receives dental services from private dental practices. However, a minority of people are in situations where dental services are not reasonably available to them.

A number of groups within the Australian population have been identified as having either greater or particular needs for oral health services. These needs are related to issues such as co-morbidity, disability, social disadvantage, geographical isolation and life stage.

Public general dental services are provided in all States in government staffed clinics. These clinics are generally located in major regional centres and are often associated with district hospitals or health centres. These clinics provide access to a very restricted level of care and generally do not include all aspects of dental treatment. Some government services do not provide dentures where these are provided by a pensioner denture subsidy scheme. In some States, government services provide visiting services to remote communities on a fee-for-service basis for those not eligible for assisted care. Some public dental services now require a co-payment by users.

Public general dental services are also available to specific population groups. These include services to Indigenous Australians through the Aboriginal health services, refugees through ad hoc dental care programs, and offenders through prison health services.

Government funded general dental care is not accessible to many people in the community due to limited resources and small numbers of public dental clinics remote from population growth centres. This is compounded by the need for multiple visits for patients wishing to access anything other than emergency care. Costs of access in both time and transport are excessive. The only option available to many people who are eligible for public dental services is to access private sector services at the full cost of treatment.

Most States provide access to orthodontic and oral and maxillofacial surgical care in the major centres or capital cities. Limited other specialist care is also available, often associated with dental teaching. Some States have contracted orthodontic care for eligible children to private practices, or provide travel assistance to orthodontists servicing remote country areas.

Functionally dependent older Australians have unique and specialised oral health needs. They experience substantial barriers to accessing general dental services (Chalmers, 1997). Services that cater to this growing group are limited. However, some important examples exist.

- Within the public sector, community dental health departments targeting geriatric and special care patients offer domiciliary and boarding house dental services.
- Private dental professionals provide services to nursing homes on an ad hoc and individual basis, generally restricting care to emergency and palliative services. One State has a scheme to link local private practitioners with nursing homes and hostels, and another has a coordinated service to provide oral health assessments for nursing and hostel residents.

Dental services have been provided to refugees on an ad hoc basis. As part of the 'safe haven' program, dental checks and treatment were made available to Kosovar evacuees by the Commonwealth as part of its overall health programs for this group.

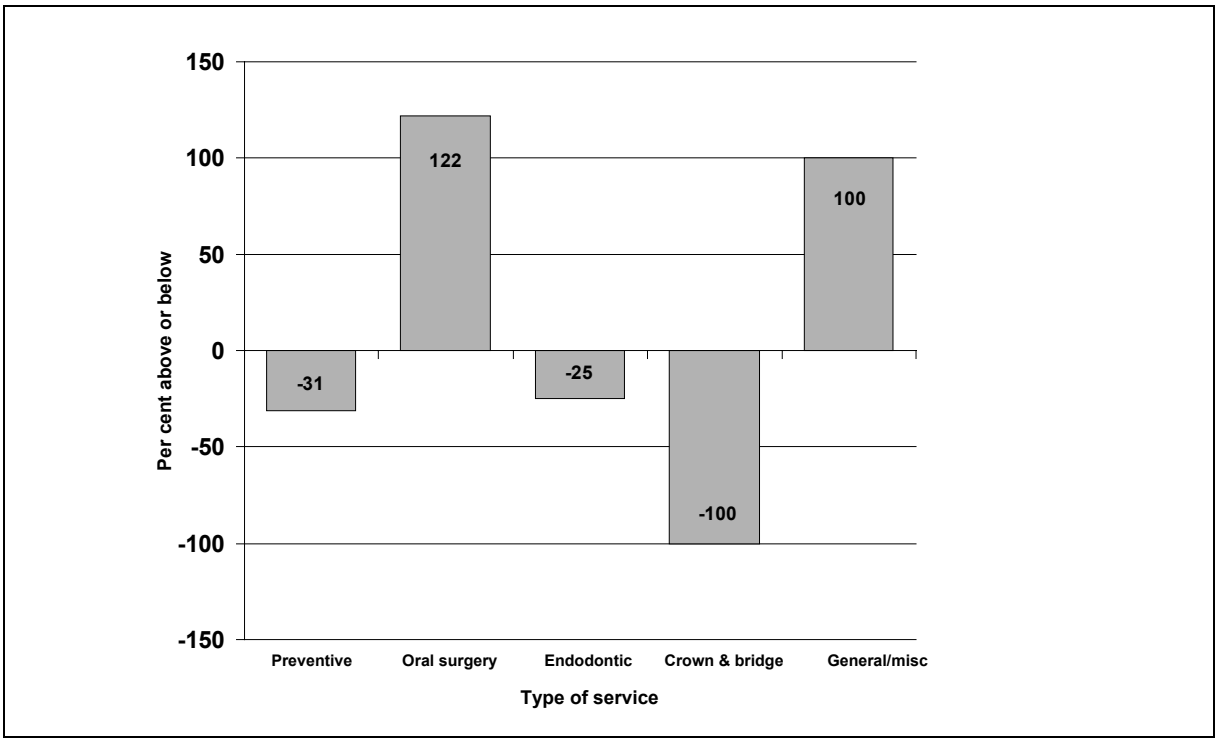
Dental services for disadvantaged groups and groups with special needs have a potentially important role in promoting and maintaining oral health in these groups. However, these services tend to have both limited resources and uneven coverage of the target populations.

Service mix

Provision of services by public dental services to disadvantaged groups shows a different pattern of service mix when compared to services provided by private sector dentists. Lower rates of preventive, endodontic and crown and bridge services are provided in public dental services. The rate of provision of preventive care is 30 per cent less in public clinics. A striking difference is the very high rate of oral surgery in public dental services. Oral surgery is performed 122 per cent more in public clinics than in private clinics. This represents a rate of tooth extraction that is more than twice as high as that in private clinics. Crown and bridge services were an insignificant proportion of public dental services. The rates of service provision are compared in Figure 4.1.

These differences in service mix reflect the pressure on public dental services from the high number of emergency and problem visits and the lack of opportunity for dentists within public services to provide basic preventive dental care. These service mix differences are reflected in the patterns of service use and services received that are reported in the earlier section on access to services.

Figure 4.1: Rates of service provision in public dental services (presented as a percentage above or below the rate of provision in private dental services)



Source: *AIHW Adult Dental Programs Survey, 1996 (cross-sectional survey); AIHW Longitudinal Study of Dentists' Activity, 1993–94 (unpublished data)*

Waiting lists and times

A survey of waiting lists for general dental care indicates that there is a large number of people waiting for general dental care at public dental services. In mid 2000, the number was estimated to be in excess of 500,000 (State Dental Services, unpublished data). The size of

waiting lists varies among States and Territories, and these variations do not necessarily reflect differences in population size.

Waiting lists for services reflect the interaction of perceived need for a dental visit, perceived likelihood of accessing a visit once on a waiting list, the cost of using the service, the availability of alternatives to public dental services and the level of provision of services.

The size of waiting lists does not necessarily reflect the adequacy of services. Growth in waiting lists can be slowed by the introduction of co-payments (which can both deter people from using the service and be applied to increasing the capacity of services), by tightening the criteria for eligibility for services, and by adverse publicity about waiting lists and waiting times that reduce people's expectations about the value of going onto a waiting list for care. Thus, waiting lists are not a simple measure of the adequacy of service provision or improvements in oral health status. A better indicator of the adequacy of services is waiting times.

Average waiting time for general dental services has remained relatively stable over the last few years. In the year 2000, waiting time is estimated to be between 10 and 54 months. Within States and Territories, regional differences in waiting times also exist. Some clinics report very short waiting times. However, especially in rural areas, waiting times can be extensive. Most States and Territories report very short waiting times for emergency care.

The time that people spend waiting for general dental services indicates that, in some regions, there is inadequate provision of services to meet the expectations of even the minority of eligible people who seek care from public dental services. It is unlikely that a wait of four-and-a-half years to see a dentist for a check-up would be considered acceptable by most Australians. This highlights the failure to ensure access to basic dental services for this sizeable minority of the population.

4.5 Innovative programs

A range of innovative approaches to dental services in Australia addresses specific issues. These include financial barriers to access, geographical and social isolation, social and cultural barriers to access, increasing the capacity of existing services and improvement of the quality of existing services.

Programs that reduce financial barriers to access include:

- a small number of dental clinics run by employers, which operate at reduced out-of-pocket expense to members and lower cost to insurers; and
- privately provided, but publicly subsidised (in proportion to income), care for rural dwellers in Western Australia.

Programs that improve access by reducing the effects of geographical or social isolation or the effects of social or cultural barriers include:

- mobile dental services and consulting sessions in youth centres in the southern Adelaide suburbs, using minimally invasive oral screening (with a fibre-optic oral camera) (SADS et al, 1998);

- portable dental services for people who are housebound or in residential care, with an emphasis on education for caregivers and basic oral hygiene; and
- mobile dental services provided with community control and cultural awareness to remote Aboriginal communities in central Australia.

Programs that increase the capacity of existing services include:

- rural placements (eg Whyalla and Port Augusta in South Australia) for later year dental students in under-serviced communities, providing desirable experience and service; and
- a voluntary intern program through the Royal Dental Hospital of Melbourne which has the potential to provide a supervised transition from graduand to autonomous dental practitioner as well as the required dental services to adults eligible for public dental services.

A program that improves allocation of resources in existing services is provided by the SA School Dental Service which takes a highly tailored, individual risk assessment and management approach to providing personalised dental care.

4.6 Quality assurance

As the delivery of dental care involves many contexts in both private and public sectors, there is a need for monitoring and evaluation, policy development and assurance of minimum standards or benchmarks being achieved and maintained. Insufficient quality assurance activities take place currently.

It is in these areas of quality assurance that the Commonwealth Government needs to lead, while States and Territories implement delivery programs.

Variation in State and Territory priorities and approaches to delivery of dental services provide a natural experiment in what works or does not work and why. However, this variation can be learnt from only if there is an emphasis on evaluation and research and a national sharing and comparison of outcomes in oral health and well-being.

4.7 Organisational issues

A number of organisational issues have an impact on the effectiveness of the delivery of dental services.

Inter-governmental arrangements

Foremost among the organisational issues which should be considered is Commonwealth and State responsibilities for oral health and dental services. The State governments play a major role in oral health and dental services as the direct providers of these services and as the regulators of the dental care industry. However, the Commonwealth, through its involvement in a range of service provision, direct and indirect funding of oral health and

dental services, and funding of university training of dentists and dental auxiliaries, also plays an important role. Indeed, 'these are significant contributions and illustrate not only the role of the Commonwealth, but the importance of partnership approaches to health care between the different levels of government' (Senate Community Affairs References Committee, 1998:49).

Responsibilities for oral health and dental services should be outlined in a formal agreement between the Commonwealth and the States and Territories in the same manner as for health care and public health. At present such responsibilities are ill-defined, leading to policy by default. National planning for better oral health and good dental care must be a purposeful, deliberate activity. This applies to a range of important areas.

- Oral health promotion activities should be planned nationally, including targeted programs of dental care for children and adolescents, low income Australian adults and most older adults in Australia.
- Dental workforce planning should be a national concern because the national university system and immigration policy set the ceiling with regard to recruitment, and mutual recognition between jurisdictions means that no State or Territory can act in isolation. Workforce policy on capacity and occupational and geographic distribution must be national in scope.
- Professional education of dental providers should be reviewed nationally to ensure that it meets the needs and requirements for services of the future Australian population. Nowhere is this more urgently required than in the area of geriatric oral health. As the population ages and retains more teeth, people have to live with more co-morbidity and disability.
- The inclusion of oral health activities within the wider general health sector could have a significant impact on oral health and dental care. Agreed responsibilities need to make it easier to include rather than exclude dental care from national health programs. An example of a missed opportunity is the recent rural health service centre program which failed to include dental services. Further responsibilities and guidelines for dental care in general hospitals, general medical practitioner surgeries, and specialist programs for disorders like cleft palate and cleft lip, refugees or assessments upon entering residential care all need to be recognised, defined and integrated into national policy and a formal agreement on oral health and dental care. Such an agreement must leave scope for innovation and demonstration programs to emerge from any jurisdiction. The Commonwealth's seeding support for the school dental services and, more recently, the expansion of dental care for low-income Australian adults have been pivotal in shaping dentistry, and such flexibility must be preserved in future programs.

Intersectoral arrangements

Agreement on inter-governmental arrangements is a necessary prerequisite for clarification of intersectoral arrangements. Relationships between dentistry and other areas of health care also require attention. A small percentage of all dental care is delivered in public general hospitals, general medical practitioner surgeries and other sites. Referral arrangements and arrangements for comprehensive care involving dental practitioners need to be considered.

Clinical services

Within State and Territory dental services, organisational boundaries between teaching hospitals, community clinics, school dental services and the private dental professions may compartmentalise dental care and impede a person's movement between them. Boundaries also exist between oral health promotion units and service delivery areas, and emergency and general dental care delivery. Approaches to prioritising dental care within an integrated service delivery program are being developed and need support. Once these priority systems are evaluated, additional resources may also be used to increase the emphasis given to positive interventions that improve oral health and well-being for the most people.

Professional demarcations need to be reduced. Dental hygienists and dental prosthetists, who practise largely in the private sector, could be involved more extensively in team approaches to improve dental care in the public dental services.

Attempts also need to be made to address the geographic maldistribution of dental resources, private and public. Demonstration programs in professional education are required for rural or remote placements as well as specific recruitment incentives including educational debt relief, financial incentives and professional development support. Such developments might be linked to specific targeted programs for special care groups. Recent announcements by the Commonwealth Government of programs to increase the provision of medical services to rural areas may provide useful models for consideration in oral health.

Many of the issues of role clarification and coordination of activities have parallels in general health care. Some of the issues highlighted in this chapter arise in part from the separation of oral health from general health in both public health and health care policy, as well as in the provision of services. There are a number of areas in which leadership for oral health improvement could benefit both from the experience of, and closer cooperation with, general health services.

Research and public health

The improvement of oral health and delivery of good dental care would also be aided by the stimulation and support of professional development of public health and public administration skills and competencies among dental providers. A national effort to increase the numbers of well-qualified and experienced researchers and managers of the delivery of dental services would contribute to the national leadership on efforts to achieve better oral health and good dental care. Programs such as the Public Health Education and Research Program have achieved this in other domains and may provide useful models for oral health.

4.8 Summary of issues

- Dental services in Australia are delivered mostly by dentists working in solo or small group practices. Their work is supported and supplemented by that of dental therapists, hygienists and prosthetists.
- The retention of much of dentistry's cottage industry roots, with small, independent private dental practices dominating the delivery of dental care, has been consistent with an emphasis on the values of individual responsibility and choice of provider ahead of

equity and community responsibility. Greater value has been placed on equity of opportunity and community responsibility for the oral health of children, leading to the development of school dental services.

- Australian children have secure access to dental care through publicly provided and funded school dental services where general dental services are provided at minimal or no cost to parents.
- About 85 per cent of dental services for adults are provided by private dentists. A small residual public dental service is available to means-tested, eligible adults. The services provided by the public dental services safety net are predominantly emergency ones with a mix of diagnostic, oral surgical (extraction) and miscellaneous (temporary filling) services. Less than half of all public dental service courses of care involve general dental care.
- Approximately half a million eligible adults are waiting for access to general dental care in public dental clinics. Waiting times are unacceptably long — over three years in many clinics of most States and Territories. This waiting time is longer than the accepted standard of time interval between dental visits.
- A number of doubly disadvantaged groups exist within those eligible for public dental services. These include Indigenous Australians, non-English speaking migrants, and functionally dependent older Australians (housebound and in residential care). A range of small-scale programs across the States and Territories illustrate innovative ways in which better dental care can be provided to adults eligible for public dental services so as to improve their oral health.
- There are currently no national means for addressing issues of quality assurance, organisational problems including inter-governmental and intersectoral arrangements, or for addressing oral health at a public health level.
- Variation in delivery of public dental services calls for an emphasis, led by the Commonwealth Government, on evaluation and research and a national sharing and comparison of outcomes in oral health and well-being.
- National planning for better oral health and good dental care must be a purposeful, deliberate activity. Several issues stand out for national attention including oral health promotion, dental workforce planning, professional education and inclusion of oral health activities within wider general health programs like the rural health service centre program.
- Responsibilities for oral health and dental services should be clarified in an agreement between the Commonwealth and the States and Territories in the same manner as for health care and public health.
- Inter-governmental issues in oral health and dental care need to be addressed so that a coordinated and integrated approach to oral health and dental care can be pursued.
- Intersectoral arrangements need to be developed to address organisational boundaries with general health service provision and within public dental services. Much could be gained by learning from the experience of, and closer cooperation with, general health services.

- Improvements in oral health and delivery of good dental care would be aided by the stimulation and support of professional development of public health and public administration skills and competencies among dental providers through initiatives such as the Public Health Education and Research Program.

Conclusion 4

Fragmentation of services and policy development reflect a need for national leadership to support and sustain planning for better oral health and good dental care. This could include clarification between the Commonwealth, States and Territories on principles, roles and responsibilities, aspects for reform in clinical approaches, financial arrangements and supply of data and performance information.

5. Projections of dental service requirements

Overview

Oral health trends

A key to understanding more about the future for dental services is information on the supply of, and requirements for, dental services.

Future requirements for dental services can be modelled using historical trends adjusted for major oral health changes and subsequent need for dental services. The most significant trends in dental service needs among children are decreased restorative services, but increasing need for preventive, diagnostic and some specialty services. Among adults, increased tooth retention is leading to a changing pattern of dental needs across most service areas. In particular, more teeth retained means a greater need for preventive, diagnostic and restorative care.

The number of teeth requiring restoration or extraction because of dental decay is projected to increase from 29.3 to 31.6 million between 1999 and 2009. Among people eligible for public dental services, teeth requiring restoration or extraction because of dental decay are projected to increase from 5.9 to 7.2 million, or 22.0 per cent, between 1999 and 2009 (Spencer, 1999).

Requirements for services

Need for dental services is increasing because of population growth, increased tooth retention and rising awareness and expectations of the population. Requirements for dental visits are expected to increase by 25 per cent between 1998 and 2010, and even more among those adults eligible for public dental services (33 per cent) (Spencer et al, 2000).

Capacity to supply services

The capacity of the dental workforce to provide services is expected to remain largely unchanged by 2010 (AIHW DSRU, 1998).

Implications

The faster growth of requirements over capacity to supply dental services projected for Australia will result in scarcity of the dental workforce, leading to increases in dental fees with low-income population sub-groups being less able to afford private dental services; private dentists' incomes increasing, leading to a greater differential between private and public sector dentist incomes; and difficulties in recruiting and retraining dentists in the public dental services.

Resolution

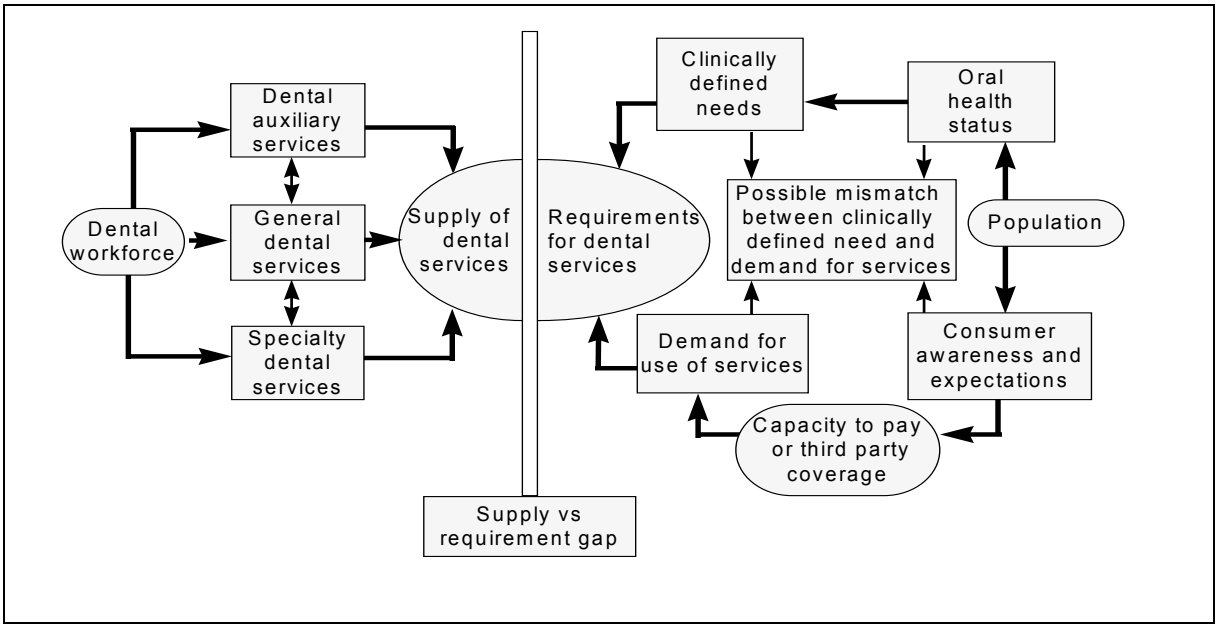
The capacity to satisfy the requirements for dental services could be increased through expanded dental professional education. Retraining of overseas qualified dentists may boost recruitment, and retraining of Australian dental personnel to re-enter practice on favourable conditions may reduce losses to the workforce. Dental workforce mobility arising from mutual recognition of dental qualifications by States and Territories and trans-Tasman agreements mean that no Australian State or Territory can act in isolation. Projected shortfalls in the dental workforce cannot be addressed without a coordinated national approach.

5.1 Planning framework

As oral health services have been undergoing considerable change, there has been heightened interest in national planning in a number of countries. Such planning has also been prominent in Australia in the 1990s. Two important outcomes are the *NHMRC Expert Panel report on the impact of changing oral health status on dental education, workforce practices and services in Australia* (NHMRC, 1993) and the *Victorian Oral Health Services Labour Force Project 1999–2000* (AIHW DSRU, 2000b).

Effective planning requires an awareness of all the issues involved. A framework for relating the key conceptual issues in projecting supply of dental services and requirements for dental services is presented in Figure 5.1.

Figure 5.1: Model relating the key conceptual issues in supply of dental services and requirements for dental services



Source: Adapted from DeFriese & Barker, 1982

The model emphasises the desirability of understanding more about the supply of, and requirements for, dental services rather than just looking at the numbers in the dental workforce and the population.

5.2 Oral health trends

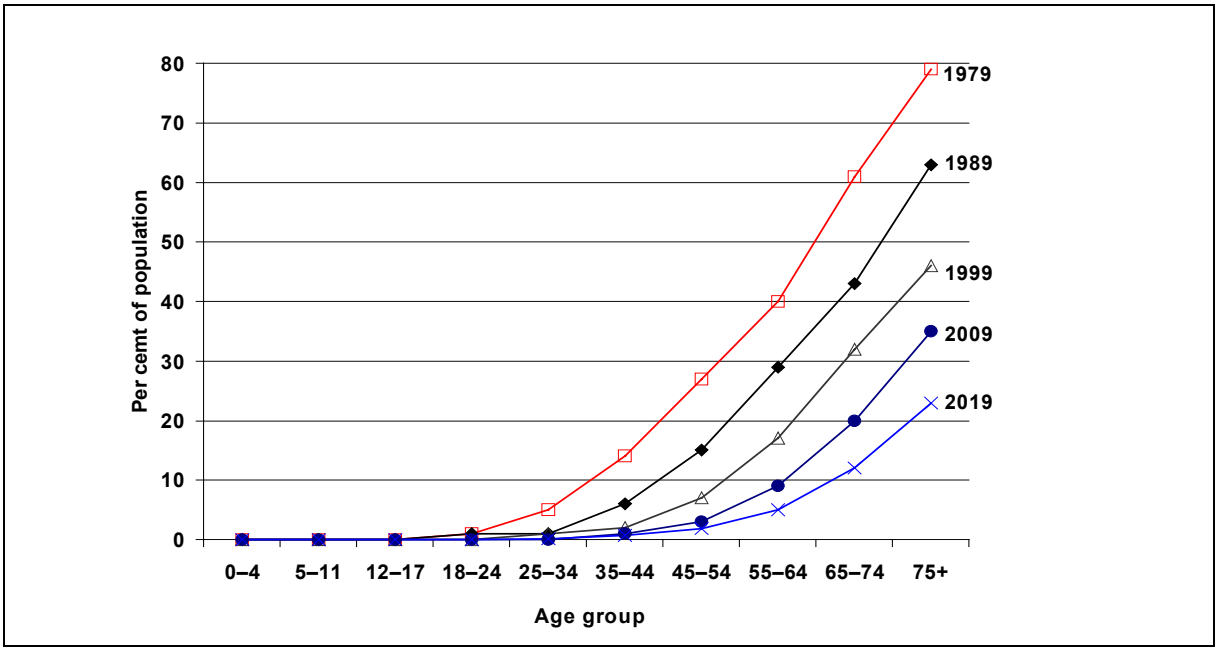
Oral health status and dental needs are important influences on requirements for dental services. Three substantial oral health trends are occurring in the Australian population and shaping needs.

The first trend concerns children and adolescents who are now experiencing less tooth decay. However, awareness of oral health issues and expectations of better oral health have increased, resulting in the need for more preventive and diagnostic services and some specialty services. A significant issue in connection with this is whether, and to what extent, these changes among children and adolescents will move into young adults.

The second trend is revealed as young Australians reach young adulthood with relatively healthy mouths. There will be more 'healthy' teeth in this age group which will be at risk of disease if preventive care that was received in childhood is not maintained. Therefore, the need for preventive services will increase and preventive care needs will continue on through middle and old age.

The third major trend is a marked reduction in total tooth loss (edentulism) and the loss of individual teeth (missing teeth) in middle-aged and older adults in Australia. While this is seen as an oral health improvement, it usually reflects altered treatment decisions negotiated between providers and patients more than altered experience of oral disease. As people retain teeth, further services will be required. The oral health needs of middle-aged and older adults illustrate 'the paradox of success' when reduced tooth mortality in childhood and early adulthood leads to an increased burden of disease and need for treatment in adulthood. Projected rates of edentulism, summarised in Figure 5.2, show the extent of changes in edentulism that are expected in the Australian community.

Figure 5.2: Projected edentulism rates for Australians



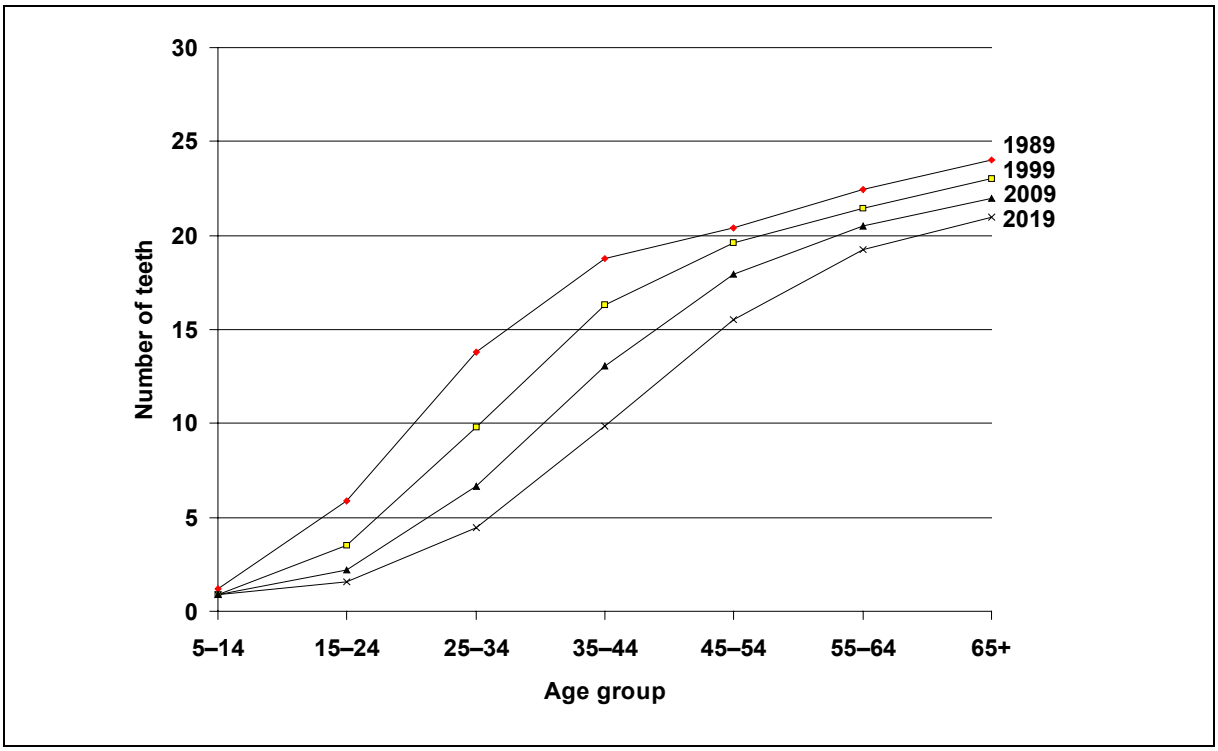
Source: Dooland, 1992

Changing needs

The change in oral health among Australians can be illustrated using the projected mean DMFT index. Figure 5.3 presents the age-specific DMFT for the years 1989, 1999, 2009 and 2019. The base year, 1989, links with data on edentulism for which 1979 and 1989 are two key times for observations. NOHSA data from 1987–88 have been used to represent 1989. Changes in DMFT have been projected using a synthetic cohort approach, so that each age group in 1989 is followed as it ages through time. The DMFT of each age cohort at a successive time is projected to be at a midpoint between that of the cohort and the next older cohort at baseline. This is a reasonably simple projection, but comparisons with available data in the late 1990s show that it captures the direction and magnitude of changes.

The DMFT of adolescents and young adults falls rapidly between 1989 and 1999; then further gains begin to diminish. Overall the DMFT for 15 to 24-year-olds falls from 5.86 to 1.55 across 1989 to 2019. Young adults show very marked declines in caries experience, the DMFT falling from 13.79 to 4.45 teeth. Middle-aged adults show substantial declines, especially later in the time period, falling from 18.80 to 9.88 teeth. The falls are less substantial in late middle-aged adults and older adults. Actual numbers of teeth with caries experience remain at high levels. However, these data are somewhat sensitive to whether all missing teeth are included or only those thought to be missing due to dental decay.

Figure 5.3: Projected mean DMFTs for Australia, 1989–2019

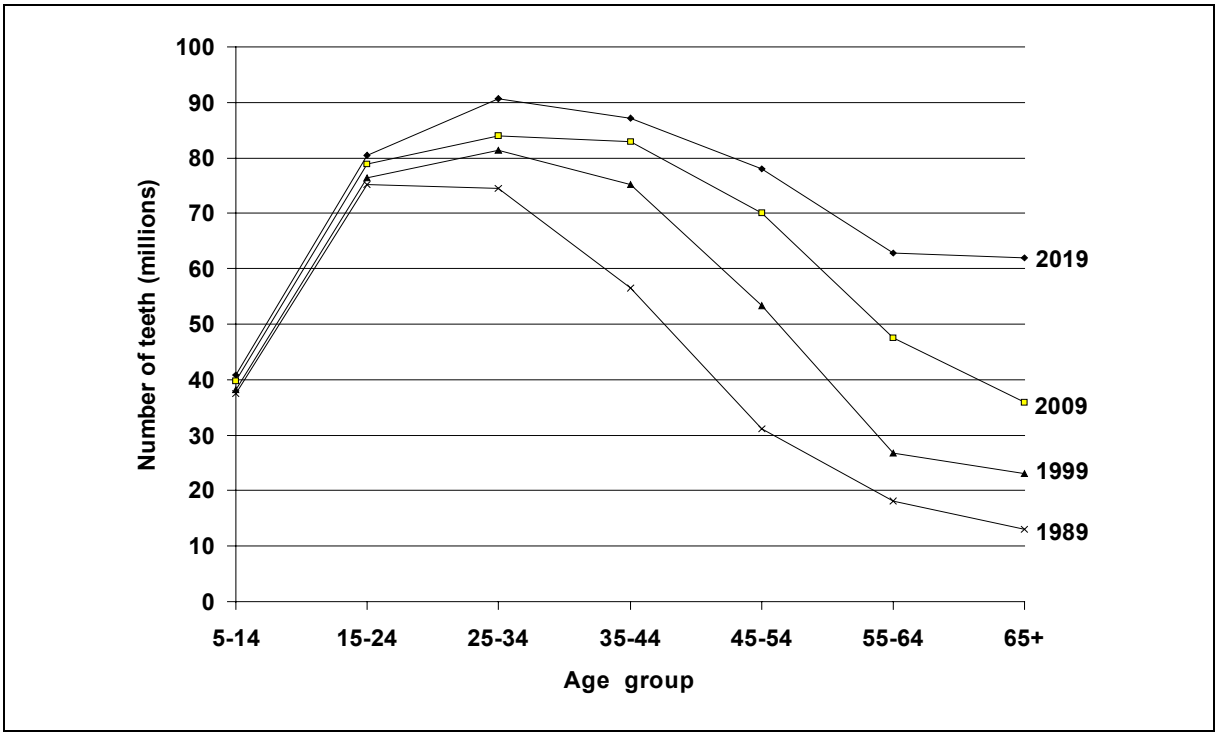


Source: AIHW DSRU (unpublished data)

As a consequence of the reduced experience of dental decay, the average number of permanent teeth changes. The average number of teeth present in specific age groups has again been projected using a synthetic cohort approach. The average number of teeth present in each age cohort at a successive time is projected to be at a midpoint between that of the cohort and the next older age cohort at baseline. This is likely to be a conservative

estimate, because the trend to retain teeth in the wider population is reducing the proportion of teeth with decay treated by extraction. The average number of teeth for each age group at each time can then be multiplied by the Australian population estimate or projections as available from the Australian Bureau of Statistics. The estimated number of teeth in each age group in 1989 and projected number of teeth up to 2019 for the Australian population are illustrated in Figure 5.4. The total number of teeth for the whole population increases from 308 to 376 million, then 441 and finally 498 million. Most of the increases in the total number of teeth occur first in middle-aged adults, then later in older adults.

Figure 5.4: Projected total number of permanent teeth for the Australian population, 1989–2019



Source: AIHW DSRU (unpublished data)

Whether these teeth need treatment depends on the rate of new disease (incidence), the occurrence of disease or failure of treatment. This is most readily illustrated again with treatment for dental decay. The number of decayed teeth and filled teeth have again been projected using a synthetic cohort approach. The number of decayed teeth and filled teeth present in each age cohort at a successive time is projected to be at a midpoint between that of the cohort and next older age cohort at baseline. The need for treatment arising from dental caries equals the number of untreated decayed teeth and a proportion of the existing filled teeth which require replacement (because of recurrence of disease or failure of the restoration). This proportion has been set at 0.10, reflecting a flat 10 year average longevity for all restorations. As illustrated in Figure 5.5, there are two changes occurring in the need for treatment of permanent teeth as a result of dental caries: total numbers of teeth, and the age distribution of those teeth requiring treatment.

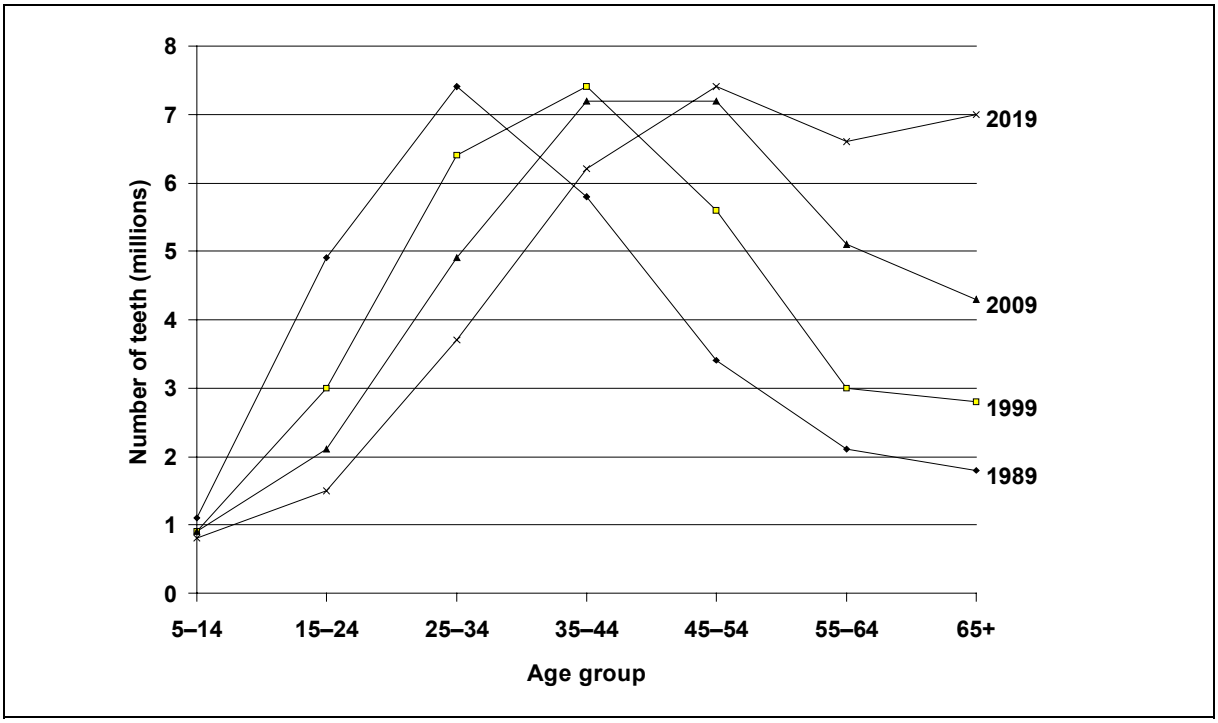
When the numbers of permanent teeth requiring treatment in each age group are added together, the total number of teeth requiring treatment increases from 26.5 to 29.3 million, then 31.6 and finally 33.1 million. Most dramatically, the number of teeth requiring treatment in children and young adults decreases (eg for 15 to 24-year-olds it decreases from

4.9 to 1.5 million) but in middle-aged and older-aged adults it increases (eg for 55 to 64-year-olds it increases from 2.1 to 6.6 million). While all age groups have reduced numbers of teeth with experience of dental decay, the increased number of teeth present and especially the move to manage decay with fillings increases the need of the Australian population for dental care.

Among people eligible for public dental services, teeth requiring restoration or extraction because of dental decay are projected to increase from 5.9 to 7.2 million, or 22.0 per cent, between 1999 and 2009 (Spencer, 1999). The increasing need for dental care seen in the Australian population is also present in this group. However, the percentage growth of teeth needing treatment is almost three times greater in the population eligible for public dental service (22 per cent compared to 7.8 per cent).

The data in Figure 5.5 use dental decay to illustrate the possible changes in disease and needs over the next two decades. Similar trends most likely apply to the other widespread dental diseases such as periodontal diseases. Further, the retention of teeth into older age will create a plethora of chronic degenerative problems including root caries, tooth wear, abrasion, cuspel fractures and pulp death. How the incidence of these problems changes over time will mirror the underlying changes in the number of teeth present in the Australian population.

Figure 5.5: Projected numbers of permanent teeth requiring treatment as a consequence of dental decay



Source: AIHW DSRU (unpublished data)

In addition to needs changing as a response to these oral health changes, needs are constantly being redefined through the expansion of treatment modalities and changing community expectations. Examples of new treatments include dental implants, jaw surgery and tissue regeneration procedures for periodontal diseases.

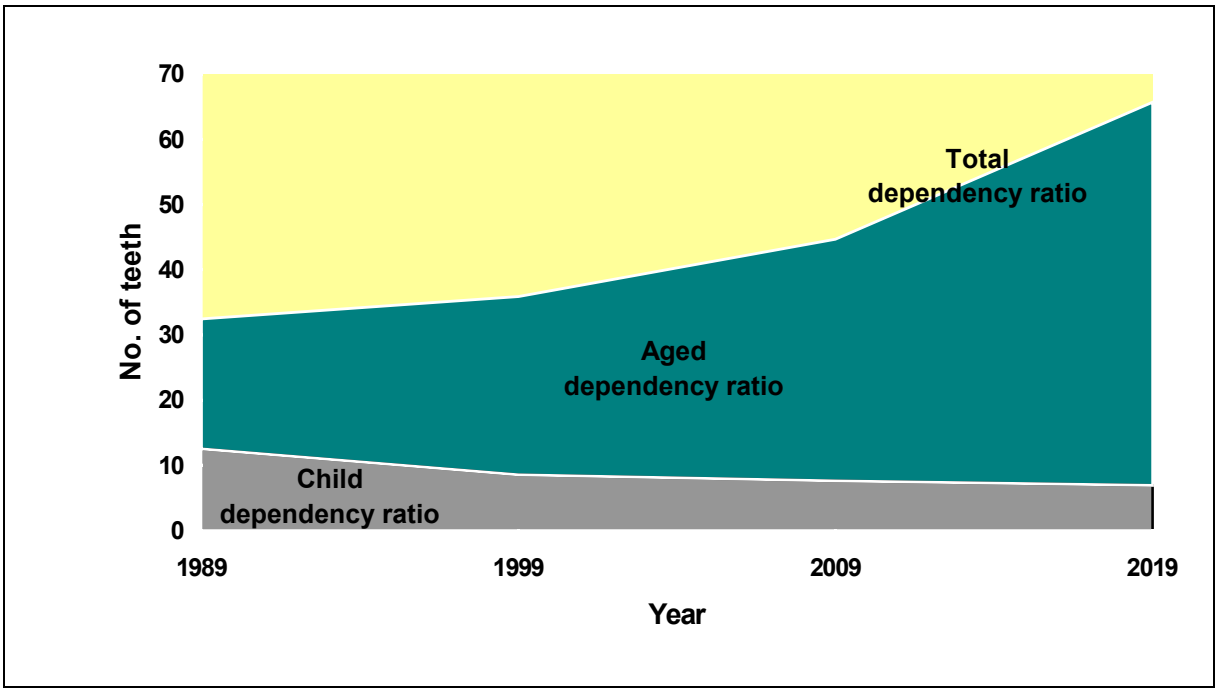
Dental dependency

'Dental dependency' is an expression of the requirement for public subsidy for dental care. The dental dependency ratio estimates the number of teeth in the dependent population (ie children up to 15 years — child dependency, males aged 65 and over and females aged 60 and over — aged dependency) for each 100 people in the working-age population. It is analogous to expressions of dependency that reflect public outlays for education and welfare. Children between birth and 17 years of age continue to be the focus of much public subsidy for dental care through public health programs and the school dental services. Older adults are a focus of public subsidy for dental care through either their high eligibility for public dental services (59 per cent of 65-year-olds and older are eligible) or the more limited extent to which they have taken out dental insurance and receive tax rebates.

Figure 5.6 illustrates the changing dental dependency. The dental dependency of children is decreasing, approximately halving across the period of 1989 to 2019. At the same time, the dental dependency of older adults is increasing, roughly trebling across the period. While dental dependency among older adults represented 62 per cent of the total in 1989, as a result of the two trends, dental dependency among older adults increases to 89 per cent of the total in 2019.

While investment in oral health among children is money well spent on the future oral health of adults, it is clear that there will need to be increased expenditure to meet the increased dependency among older adults. The decade 1989 to 1999 has seen little of either the overall increase in dependency or its changing proportion between children and older adults. The more substantial changes are yet to come and will call for a new level of policy response.

Figure 5.6: Projected dental dependency for Australia, 1989–2019



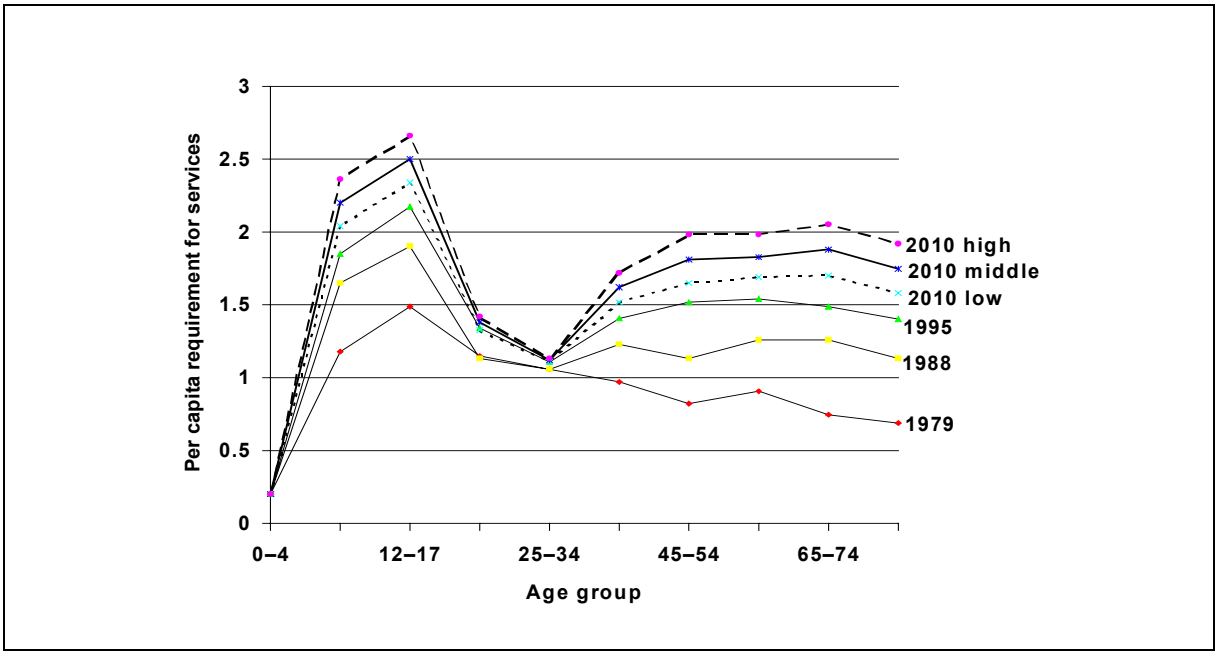
Source: AIHW DSRU (unpublished data)

5.3 Projected requirements for dental services

Requirements for dental services are projected to increase. Figure 5.7 shows the trend to more dental visits by the dentate Australian population. The number of dental visits has been increasing among 5 to 11 and 12 to 17-year-olds. This is despite the reduced caries experience described above, and reflects greater awareness of the benefits of preventive dental care. The rate of dental visits has also been increasing among adults aged 35 years and over. For example, among dentate 45 to 54-year-olds, the average number of visits per annum has increased from 0.82 in 1979 to 1.52 in 1995.

The combined effect of increasing population size, shifts in population distribution, changing dentate-edentulous status, and underlying trends in per capita use of services will produce an increase in dental visit requirements between 1998 and 2010. If per capita requirement continues to increase at only half the rate which has been observed historically, there will be a projected increase in requirement for dental visits of 29.3 per cent. Need for visits will increase faster among people eligible to use public dental services (39.0 per cent) than among those people not eligible (26.4 per cent).

Figure 5.7: Per capita requirement for visits, dentate Australians, 1979–2010



Note: 'Low' per capita growth assumes 25 per cent per capita growth of requirements for dental visits, 'middle' and 'high' assume 50 per cent and 75 per cent growth respectively.

Source: 2010 projection AIHW DSRU (unpublished data); NDTIS, 1994, 1995, 1996 (unpublished data); NOHSA 1987–88 (unpublished data); ABS, 1979a, 1979b

A very conservative projection of future use of services is attained if per capita service use is assumed to remain constant from 1995 onwards, despite the historical increases. This would result in a projected increase in requirements for dental visits of 15.3 per cent. This equates to the total number of dental visits per year increasing from 24.95 million visits in 1998 to 28.76 million visits in 2010. The Australian population is projected to grow by 11.8 per cent over the same period.

Whether this growth in requirements for visits will be met will be determined by the location and supply capacity of the services in both the private and public sectors.

5.4 Projected capacity to supply dental services

Projections of the growth in capacity to supply dental services are affected by estimates of recruitment to all provider groups and their productivity. Australia has approximately 240 people completing dental courses each year from its five university dental schools. Of these, 220 are Australians and 20 are overseas students. This rate of course completion is about one-third lower than during the 1970s and at its lowest since the Second World War. A further 60 dentists are recruited to practise in Australia from net migration gain, giving a total recruitment of approximately 300 each year.

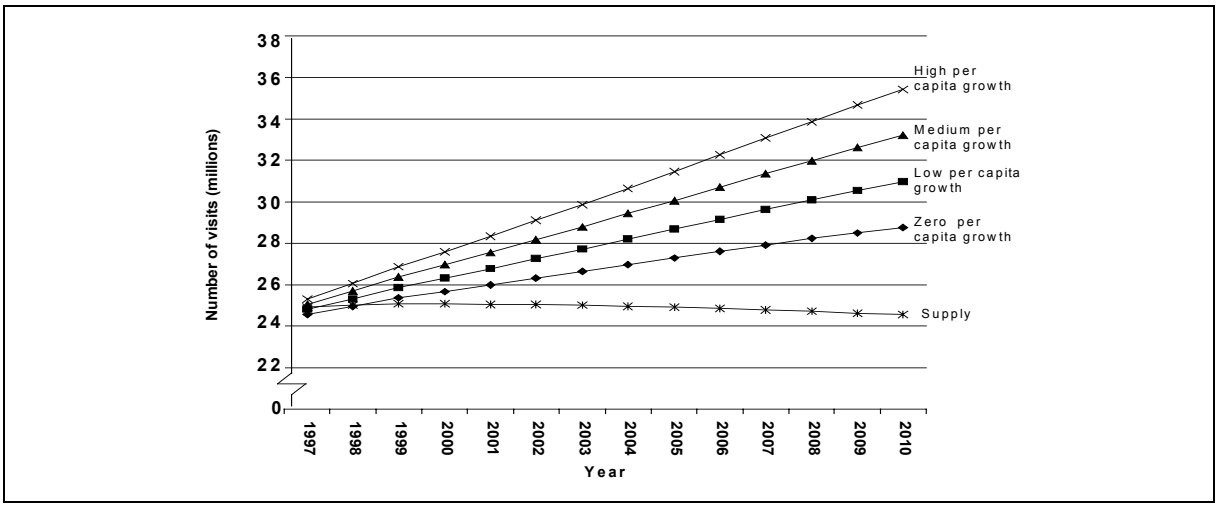
Projections indicate that while absolute numbers of dentists will increase marginally by 2010, the rate of dentists per 100,000 population will decrease from 43.1 to 35.0 per 100,000 population. The most recent comparable data show that in 1994–95 the average provision in OECD countries was 56.6 dentists per 100,000 (Szuster & Spencer, 1997). The only OECD countries with a rate lower than 35.0 dentists per 100,000 population were Spain (33.8), Portugal (25.8) and Turkey (19.0). The rate in Spain is now likely to exceed 35.0 due to recent dramatic increases in the number of dentists in that country.

In addition to the limited growth in provider numbers, there are other influences reducing those providers' capacity to provide dental services. These include:

- a trend to longer appointment times and fewer dental visits per hour in general dental practice; and
- slightly lower annual hours devoted to work by female dentists compared with male dentists, with females becoming a larger proportion of the workforce.

As a result, a marginal reduction in the capacity to supply dental visits of about 1 per cent is projected through to 2010. This is shown in Figure 5.8 in which projections of total requirements for dental visits are compared to projections of capacity to supply dental visits. These projections are for the whole population, including edentulous adults.

Figure 5.8: Comparison of requirements for visits with capacity to supply, 1997–2010



Note: 'Low' per capita growth assumes 25 per cent per capita growth of requirements for dental visits, 'middle' and 'high' assume 50 per cent and 75 per cent growth respectively.

Source: AIHW DSRU (unpublished data)

Current projections for Australia indicate that requirements for dental visits will outpace capacity to supply them over the next decade. Under the lowest projections of future requirements, which assume no change in per capita requirements for visits, there is a shortfall of 4.2 million dental visits, and assuming that per capita requirements continued to increase at half the historical rate (the middle estimate), there is a projected shortfall of approximately 8.6 million dental visits, which is equivalent to the workload of 3,300 dentists.

Further, the contribution that dental therapists, hygienists and prosthetists make to the capacity to supply visits is unlikely to alter. In 1997, therapists, hygienists and prosthetists were approximately 23.6 per cent of the dental workforce and dentists accounted for 76.4 per cent. However, it is estimated that of the 25 million dental visits made in 1997, 15.2 per cent were supplied by therapists, hygienists and prosthetists and 84.8 per cent by dentists. This is a result of the lower visits per year to hygienists, prosthetists and therapists compared with dentists, and substantially lower visits per year to prosthetists. Increases in the numbers within these groups will make a relatively smaller contribution to the capacity to supply services than will changes in the number of dentists.

Projections of dental therapist numbers indicate a relatively stable number through the next decade. The low number of dental hygienists may show a relative increase, but dental prosthetist numbers are more likely to decrease. In addition, the contribution that these practitioners make to the capacity to meet requirements is limited by the extent to which they complement, rather than substitute for, care provided by dentists.

5.5 Implications

The faster growth of requirements for services over supply projected for Australia has a number of important implications.

This reduction in capacity means that requirements will not be met by available services, and there will be limited opportunity to increase supply through increased course completion rates for dentists. Thus, the full potential for improved oral health from better awareness and higher expectations will not be met by available dental services.

Scarcity of the dental workforce to meet the requirements for visits is likely to lead to increases in fees. This in turn will mean that people from low-income groups will be less able to afford private dental services.

This is especially important for the majority of adults eligible for public dental services but who seek their care privately. Their ability to meet the costs of private care may decrease, leading to additional demand on the public dental services.

Private sector dentists' incomes are also likely to increase, leading to a greater differential between dentist incomes in private and public sectors. Public sector dentists may be even more difficult to recruit and retain, diminishing the public dental services' capacity to service the growing requirement for its services. Dental officer vacancies in public dental services already run as high as 10 per cent. The level of vacancies is sensitive to the level of services that public dental programs plan to offer. Vacancies can also be affected by the extent to which services for eligible patients are offered by salaried dental officers or 'contracted out' to the private sector. However, it is clear that the salaried public dental officer model is under pressure.

Attempts to overcome the difficulties of recruitment in public dental services by contracting out will also reduce the capacity to limit costs and maximise the benefit, in terms of improved oral health, for public expenditure on services. Contracting out will be subject to projected fee increases and it can be more difficult to maintain accountability for expenditure under such programs.

Requirement for public dental services from eligible adults is projected to grow faster than requirement in the private sector. This is particularly so among older adults. The targeting of priority groups within those eligible may be more crucial and there will be a greater need for the definition of acceptable minimum standards, targets and benchmarks for public dental care, especially frequency of courses of treatment.

5.6 Resolution

Capacity to satisfy the requirement for dental services could be increased by expanding the number of dental providers completing courses. Dental therapists, hygienists and prosthetists require shorter educational courses and therefore have a shorter delay to their active involvement in dental care. However, their numbers are generally low, and even substantial increases in course completions are likely to only marginally reduce the gap by which requirement is expected to exceed supply.

Some increase in course completions might be possible for dentists, but this has a long lag time. The current rate of recruitment of dentists of approximately 300 per year would need to be increased by 50 per cent to meet the projected requirement for services from population growth, population ageing and lower rates of edentulism alone. The recruitment rate would need to nearly double to meet requirements if the per capita requirement for services grows at only half the rate that is has done in previous years.

Other alternatives exist for increasing supply above projected levels. Retraining of overseas trained dentists could boost recruitment, and retraining and favourable conditions for female dental providers re-entering the workforce might reduce losses to the workforce.

Dental workforce mobility arising from mutual recognition of dental qualifications by States and Territories and trans-Tasman agreements mean that no Australian State or Territory can act in isolation. Projected shortfalls in the dental workforce cannot be addressed without a coordinated national approach. Currently no arrangement exists under which this can be achieved.

In addition, resource allocation issues will need to be addressed. Priority and targeting need to be explored in the public dental services. Some initial efforts are already underway and their evaluation will prove essential to the expansion of non-clinical and clinical approaches to priority setting. While it is less obvious that resource allocation can be influenced among private sector dentists, two approaches might be considered. First, apparent truisms with regard to the frequency of dental visiting might be challenged. Six monthly visiting is not appropriate for the majority of Australians. Tailoring visiting frequency to individual needs would include longer intervals between visits for many persons and potentially longer average intervals. This could be approached through an organised professional campaign. Second, the frequency of certain services could be reduced and dental services of marginal benefit to oral health eliminated from dental care. This might be hastened by financial incentives to patients through rebates from dental health insurers.

5.7 Summary of issues

- Past improvements in oral health have not translated into reduced need for dental services. Improvements in oral health and the ageing of the population both contribute to a greater need for dental services. Lower caries experience among children has been more than matched by increased awareness of and expectations for maintaining improved oral health. A lower rate of tooth loss in middle-aged and older Australians illustrates 'the paradox of success' when it leads to an increased burden of disease and need for treatment.
- Patterns of dental service use indicate that the requirements for dental services are increasing, reflecting changing expectations about oral health. Projections depict rapid decreases in dental decay experience among adolescents and then young adults. Middle-aged adults also show substantial decreases, but somewhat lagging behind in time. Decreases in dental decay experience are less substantial for late middle-aged and older Australians.
- Numbers of teeth present is a robust indicator of the potential risk of oral diseases and disorders. Numbers of teeth are increasing with population growth and reduced caries experience and tooth loss. Most of this increase is occurring in middle-aged and older Australians. Overall, numbers of teeth are projected to increase from 308 to 441 million across 1989 to 2009.
- Estimates of treatment needs show substantial increases in teeth needing restorations despite the underlying improvements in oral health. Teeth in need of treatment decrease in adolescents and young adults, but increase in middle-aged and older Australians. Overall, teeth in need of treatment are projected to increase from 26.5 to 31.6 million across 1989 to 2009.
- Dental dependency (teeth requiring treatment in children and older Australians per 100 working-age adults) changed little between 1989 and 1999, but increases gradually through to 2009.
- Requirements for dental visits and services have increased between 1979 and 1995. Requirements for dental visits are projected to rise by 29.3 per cent between 1998 and 2010. The increase is expected to be greater among older Australians, most of whom are eligible for use of public dental services.
- A projected shortfall in capacity to supply services is likely to put pressure on dental fees and reduce the capacity of public dental services to retain dentists. This is likely to exacerbate the current inequalities in oral health in Australia.
- Capacity to supply dental services, predominantly by dentists but also by other dental professionals, is projected to marginally decrease, leaving a widening gap between potential requirements for services and service delivery.
- This will have a negative impact on the contribution of dental services to oral health and especially for access to public dental services for people on low incomes.
- Options for increasing the capacity to deliver dental services or to rationalise resource allocation across the community need to be considered.

Conclusion 5

Both need and demand for dental services are projected to increase, without equivalent increases in capacity to supply services. This has negative implications for dental services to continue to contribute to the health of the whole population and for access to services for people on low incomes.

6. Approaches to improving oral health

Overview

Improving oral health requires action at various points in the process of disease development, and involves activity in a wide range of areas by a number of players with diverse skills, knowledge and experience. The extent to which each one of these interventions is appropriate depends on the community's resources and expectations about oral health. Minimum standard benchmarks have been suggested for access to oral health services in Australia, but not for oral health status. A number of opportunities exist within this framework to address the barriers to improving oral health in Australia that have been identified in this report.

Interventions

Oral health promotion may be defined as the process of seeking to improve or protect oral health through a range of activities including behavioural, socioeconomic and environmental policy change.

Early diagnosis and prompt treatment needs to be supported by access to a regular source of dental care so that subtle changes can be detected and risks assessed. This needs to be followed by provision of advice on personal preventive skills and initiation of specific preventive services.

Limiting disability and rehabilitating teeth is much of the substance of dental treatment. These treatments are dominated by restorative services, but include tooth extraction and replacement, endodontics, periodontal treatment, orthodontic treatment, oral and maxillofacial surgery, oral medicine and oncology.

Minimum standard benchmarks

The appropriate balance between oral health promotion, early diagnosis and prompt treatment on the one hand, and disability limitation and rehabilitation on the other, has not been articulated, and minimum standards expected at a population level, which focus on health outcomes, have not been developed. There is an urgent need to extend the work in this area.

Opportunities for improving approaches

There is a requirement for available dental resources to be used well to improve oral health and dental care. There needs to be a shift in focus from tertiary level 'care' to primary and secondary level 'cure' involving oral health promotion and early diagnosis and prompt treatment.

Incentives in services agreements and reimbursement systems can discourage health promotion and specific preventive services. These perverse incentives can be associated with purchaser-provider agreements, and the focus in public dental services on outputs rather than health outcomes. In private dental services dental insurance rebates and fees charged by dentists mean that health promotion and prevention do not get the attention they should.

Within the fragmented public dental services, especially for adults, there can be a lack of clearly defined responsibility for global funding, resource allocation and the monitoring of processes and outcomes. Therefore, it is not always clear that optimum use of scarce resources is achieved. Choices in priorities and strategies are judgments that need to be supported by information and rigorous analysis and interpretation.

6.1 Framework

Improving oral health requires action at various points in the process of disease development, and involves activity in a wide range of areas by a number of players with diverse skills, knowledge and experience. Oral health can be improved by health promotion, disease prevention, treatment and rehabilitation. Strategies to improve oral health in these areas should be underpinned by broadened research and appropriate balance in professional education. The extent to which each one of these interventions is appropriate depends on the technology that is available, the resources with which the community is equipped and the community's expectations about oral health and access to services. Minimum standard benchmarks have already been suggested for access to oral health services in Australia, and targets have been developed for oral health. A number of opportunities exist within this framework to address the barriers to improving oral health in Australia that have been identified in this report.

6.2 Interventions

Earlier chapters have demonstrated that there is scope to improve oral health in Australia, especially in some groups in the population. This can be done at various points in the oral health-disease continuum. Interventions can be categorised as primary, secondary and tertiary depending on the timing in relation to this health-disease continuum.

Primary interventions are concerned with the prevention of oral disease. Approaches employed in the prevention of oral disease involve the concept of oral health promotion which has been extensively reviewed and discussed in several recent reports (Wright et al, 2000; Rudd, 1999). Once disease has become established, secondary interventions are concerned with stopping the progression of oral disease or preventing its recurrence. Approaches are centred on early detection and prompt treatment. If, however, disease has continued and functional limitation or disability has occurred, then tertiary interventions are required. Tertiary interventions aim to limit or rehabilitate physical, psychological or social dysfunction. Table 6.1 summarises the levels of intervention.

Table 6.1: Conceptual distinctions between approaches to oral health and well-being

Level of intervention	Primary	Secondary	Tertiary
Role	Prevention of disease initiation	Prevention of disease progression and recurrence	Prevention of loss of function
Intervention	Oral health promotion	Early diagnosis and prompt treatment	Disability limitation and rehabilitation

Oral health promotion

Oral health promotion may be defined as the process of seeking to improve or protect oral health through a range of activities including behavioural, socioeconomic and environmental policy change (World Health Organization, 1984).

Determinants of oral health

While the oral health of Australians has improved considerably, specific groups continue to experience extensive disease (Nutbeam et al, 1993). For example, people living in disadvantaged circumstances experience more dental disease and are more likely to have lost their natural teeth. In addition, when seeking dental treatment, they are more likely to undergo an extraction than are people living in more affluent circumstances (Dooland, 1992). The link between health status and social environments has long been recognised, and several explanations for this relationship have emerged. While such explanations have been developed in order to explain differences in life expectancy and health conditions such as cardiovascular disease, it is reasonable to expect that similar pathways operate to produce inequalities among oral health outcomes.

Prominent among explanations is that relative living standards, rather than absolute ones, are important in understanding the link between resources and health (Wilkinson, 1996). Thus, the most egalitarian societies, more so than the most affluent, benefit from a greater investment in supportive social infrastructure and ultimately produce better levels of health.

An alternative, but not opposing, direction in research has shown that adverse social circumstance during childhood, particularly in the absence of opportunities for promotion on entering the workforce, produces socioeconomic variations in health in adulthood (Power et al, 1996). In addition to effects accumulating over time, levels of privilege in one aspect of life (eg housing) are likely to be matched in other aspects such as income, with follow-on implications for health.

The 1994 AIHW report on general health differentials identified a range of health determinants including family composition, income and education levels, occupational prestige, and locational disadvantage (Mathers & Merton, 1994). Linked to these are psychosocial determinants including social support (House et al, 1988), stress (McEwen & Seeman, 1999), and characteristics of the work environment (Landsbergis et al, 1998). From a biological perspective, other research has emphasised the influence of the intrauterine environment (Barker et al, 1989). Together, deficits in these hereditary, social, material, structural and environmental factors impact negatively on belief systems and, through complex pathways, impair physiological functioning, leading to measurable levels of morbidity.

As with many other contemporary illnesses, oral diseases are produced by a complex interplay of social, political and economic factors that extend beyond simple risk behaviour. In fact, research in this area has shown that behavioural risk factors are less explanatory of oral health outcomes than are social and economic factors (Locker et al, 1997).

Given the linkages between general and oral health and propensity to co-morbidity discussed earlier, it is reasonable to expect that many of these determinants will be shared. Indeed, many associations have already been established. However, the extent to which these determinants might explain oral health outcomes, and underpin the development of an explanatory model, remains to be investigated.

Goals of oral health promotion

In Australia the goals of oral health promotion (NHMRC Health Advancement Standing Committee, 1996), modelled on those for general health promotion, might be:

- developing settings and structures that promote and sustain oral health;
- improving the physical environments where people live, work and play;
- improving people's capacity to become and stay orally healthy;
- reducing risk of oral illness, injury or premature loss of teeth, and mortality; and
- improving the oral health and oral quality of life of people who experience oral disease, injury or disability.

Approaches to oral health promotion have been developed against the five action areas for health promotion guided by the Declaration of Alma-Ata (World Health Organization, 1978) and the Ottawa Charter for Health Promotion (World Health Organization, 1986).

- Building healthy public policy
  Healthy public policy puts health on the agenda of policy makers in all sectors and at all levels. It combines diverse and complementary approaches including legislation, fiscal measures, taxation and organisational change. It contributes to ensuring safer and healthier goods and services, healthier public services, and cleaner, more enjoyable environments. Healthy public policy requires attention to obstacles to good health in non-health sectors and development of strategies to remove them.

- Creating supportive environments
  The inextricable links between people and their environment constitutes the basis for a socio-ecological approach to health. Health cannot be separated from other goals, and the way society organises work and leisure should be a source of health for people. Health promotion generates living and working conditions that are safe, stimulating, satisfying and enjoyable.

- Strengthening community action
  Healthy communities are empowered to be involved in setting priorities, making decisions, planning strategies and implementing them to achieve better health. Community action is strengthened by community development, which draws on existing human and material resources in the community to enhance self-help and social support, and to develop flexible systems for strengthening public participation and direction of health matters.

- Developing personal skills
  Personal and social development increases options available to people to exercise more control over their own health and over their environments, and to make healthy choices. This lifelong process of learning for health is facilitated through educational, professional, commercial and voluntary bodies and within social and political institutions. It occurs in schools, homes and community settings.

- Reorienting health services
  The role of the health sector should move increasingly in a health promotion direction, beyond its responsibility for providing clinical and curative services. This entails an expanded mandate that supports the needs of individuals and communities for a healthier life, opens channels between the health sector and broader social, political and economic and physical environmental forces. It requires attention to health research as well as changes in professional education and training.

Recently the Victorian Department of Human Services, Public Health Division, published an evidence base for oral health promotion and strategic directions and framework for action (Wright et al, 2000; Rudd, 1999). Table 6.2 shows approaches to oral health promotion drawn from those reports and adopting those approaches which were thought to have at least some evidence beyond expert advice, and for which the potential oral health gains were definitely or likely to be beneficial (Health Evidence Bulletin, 1998; Bandolier, 1999; Enkin et al, 1995).

Table 6.2: Oral health promotion

Domain or approach	Oral health impact	Comments
A. Building healthy public policy		
This area of activity is explicitly concerned with health and equity and an accountability for health impact in all areas of government policy, and is the only area in which approaches are not well developed. It is the most difficult area in which to work, but is necessary for the success of approaches in the other four.		
B. Creation of supportive environments		
Water fluoridation	Prevention and control of dental caries	Community knowledge of effectiveness and support for water fluoridation
Fluoride toothpaste	Prevention and control of dental caries	Diversification of market to maximise benefits for different population sub-groups Community knowledge to ensure use of appropriate fluoride products
Sucrose substitutes	Prevention and control of dental caries	Work with food and confectionery manufacturers to make healthy choices, easy choices
Safe sport and leisure	Prevention of dental trauma	Playground safety and requirements for mouthguards in sport
Settings approach — using school, work or social settings to promote health	Influential in health behaviour change	Primary socialisation in schools needs to be supported by family and other environments Unknown benefits in adults
C. Strengthening community action		
Group health education intervention with:		
Preschool children and parents or caregivers	Influential in health behaviour change, and prevention and control of dental caries	Interventions involving new parents or caregivers, focusing on infant feeding practices and early childhood caries
Adolescents	Influential in health behaviour change	Need for information about oral health and autonomy in oral health decision making
Carers of older adults	Influential in health behaviour change	
D. Development of personal skills		

Oral hygiene instruction on:		
Plaque control (including flossing)	Influential in health behaviour change, and prevention and control of periodontal diseases	Primary socialisation and habitual behaviour needs to be positioned as an aspect of personal hygiene and grooming
Toothbrushing with a fluoride toothpaste	Prevention and control of dental caries	Community knowledge and support of effective fluoride treatments is necessary to ensure use of appropriate fluoride products, especially toothpastes
Self-applied fluorides (eg mouth rinses)	Prevention and control of dental caries	Community knowledge and support for use where appropriate
E. Reorientation of oral health services		
Education and continuing education	Influential in dental provider behaviour change	
Financial incentives toward preventive services and minimum intervention philosophies	Influential in dental provider behaviour change	

Early diagnosis and prompt treatment

All early diagnosis and prompt treatment seeks to 'cure' oral disease and relies on contact with dental providers. Access to timely clinical examinations is necessary, but the length of time between visits and intention behind the visit may also determine whether contact with dental providers is sufficient to achieve this end. Access to timely clinical examination may be aided by targeted outreach programs to under-served sub-groups of the population, and recall once contact is established.

A regular source of dental care is influential in early diagnosis. A lack of continuity with a dentist limits the detection of subtle changes in oral disease activity and reduces the opportunity for accurate risk assessment. These are necessary steps in the appropriate provision of advice on personal preventive skills and the initiation of specific professional preventive services. Such services should include fissure sealants, professionally-applied fluoride treatments, scaling and cleaning, orthodontic measures to discourage thumb-sucking, sequential extraction of deciduous and (possibly) permanent teeth, and provision of mouthguards.

Disability limitation and rehabilitation

Limiting disability and rehabilitating the form and function of teeth, their supporting tissues and surrounding oral structures is the substance of much dental treatment. This tertiary level of treatment seeks to 'care' for the individual by removing or reducing functional limitations, discomfort or pain and disability.

A very wide range of dental treatments have emerged to contribute to restoring function. Table 6.3 summarises the main tertiary level treatments available.

Table 6.3: Summary of tertiary level treatments

A.	Placement/replacement of restorations Fillings Crowns	D.	Orthodontic treatment Removable appliances Fixed bands
B.	Tooth extraction and replacement Partial dentures Bridges Implants Full dentures	E.	Oral and maxillofacial surgery
		F.	Oral medicine, including treatment of oral infections, oral mucosal conditions and the oral effects of systemic diseases
C.	Periodontal treatment Subgingival scaling and cleaning Periodontal surgery	G.	Oral oncology

6.3 Minimum standard benchmarks

In order to be able to say that one approach to improving oral health is better than another, there must be an evidence base and benchmarks against which interventions can be measured.

Minimum standard benchmarks can be set in a number of areas, including oral health status, oral health promotion and disease prevention, access to services, and clinical practice for disease prevention and restorative care.

At the clinical practice level, clinical examinations and dental treatments are based on an extensive dental scientific literature, predominantly with a pathobiological orientation. There is also a limited evidence base for the efficacy of dental treatments. This is more extensively developed in the area of oral preventive products than tertiary interventions.

Progress towards understanding what constitutes quality dental care has been similar to that in medical practice and underpins peer review, complaint resolution and litigation.

What is far less well developed is understanding about the ideal balance between the three levels of intervention and the minimum standards expected at a population level in the provision of each level of intervention.

Some proposed minimum standards

Some minimum standards for access to public dental services have been described at national forums or in State or Territory reviews. These include the following standards for children:

- All eligible children should receive at least one course of general dental care including appropriate oral health promotion every two years, with a suggested average recall period of about 15 months. Children with greater dental needs should be recalled more frequently, while those at low risk of dental disease should be recalled less frequently.
- All eligible children should receive emergency dental care within 24 hours.

Standards for adults are the following:

- All eligible adults should receive at least one course of general dental care every three years on average.
- All eligible adults who require denture services should have access to a set of dentures once every eight years on average, with dentures being approved more frequently only when indicated by clinical parameters.
- All eligible adults should receive emergency dental care within 24 hours.

These standards for children and adults were taken from the SA Ministerial Review and apply to eligible children and adults in public dental services.

Additional standards that have been proposed by Dental Health Services Victoria (1998) include the following:

- Decayed teeth and other oral disease should be treated in time to prevent expensive, complicated dental care or tooth loss.
- Australians receiving dental care should be provided with the information to enable them to prevent further dental disease.
- Dental care should be provided within the local community in a socially and culturally acceptable manner.

There is an urgent need to extend such minimum standards. A wider set for consideration might include population coverage standards for oral health promotion approaches, outreach and recall, risk assessment, specific prevention, and balance between restorations and tooth extractions.

The National Public Health Partnership (NPHP) has proposed that National Public Health Indicators be developed at the following levels (AIHW & NPHP, 1999):

- the overall health of the population;
- the structural determinants of health;
- the specific determinants of health,
- priority health outcomes, including oral health; and
- public health infrastructure, including expenditure, workforce, information and capacity benchmarks.

Indicators for evaluating the oral health of Australians have been proposed. However, no standards have been identified for these indicators. For example, although low DMFT scores have been achieved for many children in Australia, the balance between decayed, missing and filled components is not subject to a standard, when each component has different implications for dental function. There has been no attempt to consider how inequalities in dental health status might be addressed at the level of oral health standards. Work in this area could be complemented by activities under a national planning framework for oral health that deal with benchmarking for oral health.

Targets to reduce dental disease in Australia were proposed in 1988 by the Health For All Committee (Health Targets and Implementation Committee, 1988). These targets

concentrated on caries in children and edentulism in adults. Table 6.4 outlines these targets and the extent to which they were achieved in the year 2000.

Table 6.4: Targets for oral health in Australia for the year 2000 set down by the Health For All Committee in 1988, and Australia's performance in achieving them

Population	Target for year 2000	Actual achievement (year)		
Children aged 5–6 years	Prevalence of dental caries ≤ 35%	37.8%		(1997)
Children aged 12 years	Mean DMFT ≤ 1	0.86		(1997)
Adults aged 35–44 years	Proportion with no natural teeth ≤ 7%	2%		(1996)
Adults aged 65 years and older	Proportion with no natural teeth ≤ 40%	65–74 75+	32.7% 48.7%	(1996) (1996)

Source: Child Dental Health Survey 1997; NOHSA, 1987–88; NDTIS, 1996; Young Adult Study of Oral Health, 1999

The targets set by the Health For All Committee were not formally adopted, and by 1993, when the goals and targets set in 1988 were reviewed, the focus shifted from targets for oral health status to targets for oral hygiene behaviour. The review document (Nutbeam, 1993) identified three areas for improvements in oral health behaviour. Two of these related to health behaviour, and the third to oral health status. However, no targets were set for these. The three targets were:

- to increase the proportion of all children (5 years old and over) and adults from non-English speaking backgrounds who brush their teeth daily (using an effective technique) with fluoride toothpaste;
- to increase the proportion of all children and young people (5 to 18 years and who do not have access to fluoridated water) who rinse their teeth daily with a fluoride mouthwash; and
- to reduce the proportion of the whole population whose plaque index reading is greater than 2.

However, the next generation of documents about the National Health Priority Areas do not include explicit reference to oral health.

Detailed targets for oral health have been proposed by the New Zealand Dental Association. These are specific targets for access to oral care, caries, periodontal disease (including tooth loss), oral cancer, workforce composition, distribution, and training and monitoring. The targets provide a framework for developing goals in the areas of oral trauma, orofacial developmental abnormalities, health delivery systems and for monitoring targets (New Zealand Dental Association Goals Committee, 1999).

One State in Australia has set targets for dental caries experience at age 12, functional dentition in young adults, access to emergency treatment and waiting times for general services (Queensland Health, 1998).

Any attempt to set benchmarks will need to be underpinned by a commitment to strengthening monitoring and surveillance activities in oral health. The current level of support for activity in this area does not ensure that important gaps do not exist in data. Fragmentation of data collection across a range of agencies and incompleteness of data collection can be dealt with only at a national level and should be one element of a national planning framework.

Global targets

In 1981 the World Health Organization set a global target for oral health for the year 2000 of not more than three decayed, missing and filled teeth at the age of 12. This was followed by the adoption by the FDI of a further four goals (Greene, 1983). The five goals and Australia's performance against each one are outlined in Table 6.5.

Australia had already reached most of these targets well before 2000. The exception was the reduction in edentulism rates for people aged 65 years and over. The reason for failing to reach this target may lie in the fact that life expectancy at age 65 has increased and there is less natural decrease in this group than might be anticipated internationally. Both this fact and the ease with which Australia appears to achieve these targets provide an example of why global comparisons may be inappropriate. Comparing oral health improvements in countries which already have a relatively high standard of both oral and general health against developing countries fails to take account of major differences in populations and general health dynamics between those two groups of countries. A more appropriate level for target setting would be a national one, and comparisons should be with other high living standard countries such as, for example, OECD countries.

Table 6.5: Federation Dentaire Internationale targets for oral health in 2000, and Australia's performance in achieving them

Population group	Indicator	Baseline (year)			Target for 2000		Actual achievement (year)		
Children aged 5–6 years	50% to be caries free	na			50%		63.2%		(1997)
Children aged 12 years	DMFT of less than 3	2.37			3.00		0.86		(1992)
Adults aged 18 years	85% to retain all teeth	na			85%		92.3%*		(1999)
Adults aged 35–44 years	50% reduction in edentulism	14%		(1979)	7%		2%		(1996)
Adults aged 65 and over	25% reduction in edentulism	65–74 75+	60.7% 78.6%	(1979) (1979)	65–74 75+	45.5% 59%	65–74 75+	32.7% 48.7%	(1996) (1996)

* This figure is for 20 to 24-year-olds in South Australia.

Source: CDHS, 1997; NOHSA, 1987–88; NDTIS 1996; Young Adult Study of Oral Health, 1999 (all from unpublished data)

6.4 Opportunities for improving approaches

While improvements in oral health have been achieved in Australia, need and demand for dental care are likely to increase as knowledge, skills and technology extend what can be achieved and community awareness and expectations increase. Given that resources, especially the dental workforce, are likely to expand little, there is a requirement for scarce resources to be used well. It places a premium on any opportunities to improve approaches to oral health and dental care.

Reorientation of dental services

A range of opportunities need to be considered. As has already been discussed, there needs to be a shift in focus from tertiary 'care' to 'cure' through oral health promotion and specific prevention as part of early diagnosis and prompt treatment. The focus should rest on population oral health gains that can be made through an emphasis on oral health promotion and prioritised dental care to special target groups.

There are a number of false incentives discouraging both oral health promotion and specific prevention. These include purchaser-provider arrangements for the provision of public dental services with associated output targets that discount activities such as oral health promotion and specific prevention. Pressure is needed to maximise the productivity of such services in terms of the number of eligible people treated, but this can rob the community of the opportunity to promote oral health or prevent recurrence of oral disease. Not dissimilar false incentives exist in fees charged in the private sector and dental insurance rebate arrangements.

Intersectoral cooperation

Oral health promotion activities require intersectoral cooperation because numerous sectors have to be involved in technical aspects of activities like water fluoridation. Further, identifying settings in which oral health promotion can take place as part of creating a supportive environment requires intersectoral cooperation; for instance, education and health areas in a school-based behaviour change program. Other examples exist where cooperation is required to identify and support prevention of oral disease; for example, older adults with increasing dependence seem to be at high risk of deteriorating oral health. District nurses and Meals on Wheels workers could help identify older adults with growing dependence and support preventive oral health activities by carers.

Definition of responsibilities

Responsibilities need to be clearly defined within the public dental services. This is essential as health services become increasingly regionalised or fragmented by multiple purchaser-provider arrangements. Responsibilities for global funding and resource allocation need to be articulated, and processes and outcomes monitored. Resources need to be available at the right place at the right time to prevent or alleviate pain, infection or disability. This is ultimately linked to the management of resources — choosing priorities, developing strategies by which priorities are to be implemented, and improving efficiency.

Management of resources

Choosing priorities is a matter of good judgment supported by information and rigorous analysis and interpretation. There is considerable room for improvement in the public dental services sector. When there is no deliberate action to set priorities they are set by default by clinicians and other decentralised workers. These priorities will reflect attempts to operate optimally in a system where funding arrangements and organisational issues do not necessarily reflect local community needs for oral health improvement. The processes may be fragmented, funding limits may be unclear, frameworks for choice too narrow, necessary

supporting information and specific skills to interpret it nearly totally absent. Making appropriate choices about priorities would flow more readily from an oral health leadership rich in knowledge and skills in public health and administration.

With the resource scarcity in the public dental services and projected excess of community requirements over supply of dental care, there is a need to work 'smarter' not harder. This would involve shifts in strategy to oral health promotion and primary care with a strong, specific prevention focus. It is likely that investment in these areas will return more value for money.

With an ever-increasing range of treatments, the challenge is to use resources to achieve maximum oral health gains. Since resources, especially in the public dental services, will be inevitably limited, the question is whether they are being used to the best effect.

6.5 Summary of issues

- Health and oral health result from heredity and social, material, structural and environmental factors which shape belief systems and affect physiological functioning.
- The threats to continued oral health improvement in Australia include failure to address inequalities in oral health status and failure to reorient dental health services to primary intervention, which includes addressing the determinants of oral health, rather than secondary and tertiary intervention.
- Goals for oral health promotion might include:
    - developing settings and structures that promote and sustain oral health;
    - improving the physical environments where people live, work and play;
    - improving people's capacity to become and stay orally healthy;
    - reducing risk of oral illness, injury or premature loss of teeth, or mortality in the population; and
    - improving the oral health and oral quality of life of people who experience oral diseases, injury or disability.
- A range of approaches that can provide oral health gains and are supported by evidence of their effectiveness are available and need to be pursued.
- Attempts to improve oral health could be underpinned by benchmarks for health status or for service access and delivery. Benchmarks, or minimum standards, and targets against which interventions can be measured need to be more fully developed. These should include all significant oral diseases and disorders, dental workforce composition and distribution, and dental service system performance.
- Currently, most activity for oral health is in clinical services. Opportunities exist for working 'smarter' not harder in improving oral health and dental care through:
    - reorientation of dental services from 'care' to 'cure' with a focus on population oral health gains;

- intersectoral cooperation;
- defining responsibilities so that management of resources, choosing priorities and development of strategies are coordinated; and
- monitoring processes and outcomes.

Conclusion 6

Better oral health can be pursued through coordinated oral health promotion activities and good dental care. These can be provided to more Australians through a process of setting priorities for, and targeting services to, those who are most in need and who have the greatest propensity for oral health gains.

7. Future directions

Overview

Strategies for achieving better oral health

Important public health and economic gains can be achieved if the current opportunities for better oral health and good dental care are considered and acted upon.

Better oral health can be realised through health promotion including strategies such as the extension of water fluoridation, the availability of a wider range of fluoride products, the promotion of healthy nutrition, health education, collaboration and cooperation between health professionals and departments or agencies that address risks which influence oral health, and support for reorientation of dental services towards health promotion.

Good dental care contributes both to the prevention of oral diseases and their recurrence and to oral well-being through the reduction of functional limitation and disability. The significance of pursuing better oral health and good dental care lies both with their inherent value to the population and their association with general health, well-being and economic prosperity.

Professional education

Success in achieving better oral health requires a highly educated, up-to-date dental profession. Key considerations include integration of professional dental education programs, innovation to prepare dental professionals for learning throughout life, and clear knowledge and skill competencies and accreditation processes.

Services

The current nature of dental services limits the ability to address oral health needs. WHO's model for primary health care can be applied to oral health services to address many of their current limitations and achieve improvements in the oral health of Australians.

Research

Approaches to better oral health and good dental care must be underpinned by a strong and relevant national oral health research agenda covering public health, clinical practice and basic biology.

Significant gaps need to be filled in monitoring and surveillance information on oral health and needs, access to dental care, service delivery and the dental workforce. Opportunities

exist to improve the monitoring of links between oral health and its determinants in children, and the oral health of adult users of public dental services.

The development of minimum standards, target setting and benchmarking is required as part of accountability at all levels of government involved in oral health and dental care.

Policy

Approaches to oral health and dental care are currently uncoordinated, fragmented and incomplete. There is an urgent need for national leadership and direction involving all jurisdictions. Issues that must be considered include:

- a national advisory or coordinating structure for oral health;
- a process for prioritising issues to achieve better oral health for Australians; and
- a process for dealing with priority oral health issues.

7.1 Strategies for achieving better oral health

Important public health and economic gains can be achieved if the current opportunities for better oral health and good dental care are considered and acted upon. Better oral health can be realised through oral health promotion and strategies such as:

- the extension of water fluoridation;
- the provision and promotion of a wider range of fluoride products (eg fluoride mouthrinse and gels, appropriately formulated fluoride toothpaste) targeted to population sub-groups;
- the promotion of healthy nutrition, including extension of the use of sugar substitutes and labelling of food to reflect sugar content;
- group health education interventions among preschool children, adolescents and carers of older adults;
- collaboration and cooperation between health professionals and departments or agencies that address risks which influence oral health; and
- support for reorientation of dental services towards health promotion.

Good dental care contributes both to the prevention of oral diseases and their recurrence and to oral well-being through the reduction of functional limitation and disability. The most important approaches to good dental care are:

- continued development of population-based strategies to promote the routine use of dental services;
- access to timely clinical examinations;

- increased provision of specific preventive services (eg fissure sealants, fluoride varnish); and
- continued development and assessment of interventions for established disease, disorders and their impairments.

Overall oral health improvement cannot continue if there is insufficient attention to improving the oral health of those in the Australian community who have the worst oral health. The WHO recognises the importance of addressing poverty and inequalities in health status as a strategy for improving health overall (World Health Organization, 1995). Thus, where systematically poorer oral health outcomes exist in groups in the Australian community, special attention should be paid to addressing their need for improved oral health. These groups include Indigenous Australians, those on low incomes and migrants from non-English speaking backgrounds.

In addition, important 'life-stage' groups include high risk, preschool children whose poor oral health is reflected in the uneven improvement in oral health in school aged children, young adults who 'drop out' of dental care as they leave the school dental services and who represent a period of substantial oral health decline, and the functionally dependent elderly, who are also likely to be poor and institutionalised.

The significance of pursuing better oral health and good dental care lies both with their inherent value to the population and their linkages with general health, well-being and economic prosperity. Strengthening activity in these areas must be underpinned by strategies in professional education, services, research and the inclusion of oral health considerations in government policy development across all sectors including health, education and housing.

7.2 Professional education

Successful oral health promotion, good dental care and appropriate linkage to general health require a highly educated, up-to-date dental profession. Changing community needs and the environment in which all dental occupational groups practise demand flexible and innovative professional education programs. Several key considerations have been apparent for some time.

- The integration of the various educational programs for dentists, dental therapists, dental hygienists and dental prosthetists, in particular (but also dental technicians and dental chairside assistants), would give direct support to the concept of team dentistry and has perceived academic and economic advantages.
- Innovation in professional education programs should be encouraged as they attempt to move towards preparation for continued learning throughout life. Several different models — ranging from highly vertically integrated five-year problem-based programs to shorter postgraduate degree programs — have emerged and need support and evaluation of their education strengths.
- All education programs require clear knowledge and skill competencies and accreditation processes. The Australian Dental Council promotes such basics.

Oral health can also be promoted by the activities of non-dental health care providers. Training in aspects of oral health for other health professionals and for personal care providers has the potential for improving oral health by:

- increasing awareness of oral health issues;
- increasing the opportunities for caring for oral health as part of caring for general health;
- improving the prospects for appropriate referral between the health professions for oral health problems; and
- increasing access to skills in oral health care for carers of people with a high risk of oral disease (for example, local health workers in remote communities where dentists come and go).

7.3 Services

The uncoordinated and fragmented nature of dental services limits the ability to address the oral health needs of Australians. Oral health can be improved by addressing organisational issues within the dental services and between dental and other health services; in particular, a reorientation of oral health services. The WHO declaration on primary health care provides a model for guidance.

Primary health care is essential health care based on practical, scientifically sound and socially acceptable methods and technology (see Figure 7.1). Data presented in Chapter 3 of this report indicate that essential oral health care, such as regular preventive checks and timely restorative care, is not available to all Australians. However, primary health care is not simply about defining 'essential care'. Primary health care is a set of activities and a philosophy based on the belief that social, economic and environmental determinants are more important for the health of people than is clinic care (Mautsch & Dickson, 1997).

Figure 7.1: Primary health care

Primary health care:

1. reflects and evolves from local conditions and applies sociological, biomedical, health services, and public health experience to address the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly
2. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs
3. involves, in addition to the health sector, all related sectors and aspects of national and community development, including food, industry, education, housing, communications and other sectors; and demands the coordinated efforts of all those sectors
4. requires and promotes maximum community and individual self-reliance and participation in the planning, organisation, operation and control of primary health care, making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate
5. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need
6. relies, at local and referral levels, on a range of suitably trained health workers working as a health team and to respond to the expressed health needs of the community.

Source: Adapted from WHO, 1978

The application of primary care principles to oral health services has the potential to deal with a number of issues outlined in Figure 7.1 and elaborated upon in previous chapters.

The first point (Figure 7.1) supports investment in research into a broad range of disciplinary areas to improve understanding of the determinants of oral health in Australia and opportunities for oral health promotion and treatments that are both effective and cost-effective (see section below on research for elaboration); the provision of a range of strategies for improving oral health; and continued attention to ensuring that knowledge from this broad range of disciplines is incorporated into dental and health workforce education and training, including continuing education.

Point two (Figure 7.1) supports continuing education of the community at all ages to increase awareness of the range of threats to oral health and of the importance of oral health both for its own sake and for its relationship to general health. Point two also supports the continued provision of services for endemic oral diseases such as caries and gum disease.

The third point (Figure 7.1) supports oral health activity in sectors such as food production, water provision, education and industry for health promotion, disease prevention and injury prevention and control.

Point four (Figure 7.1) supports a change in perception that oral health is managed simply by private activities such as hygiene and visiting a dentist, and that broad citizen activity is as important to oral health as it is to general health. It also supports recognition in oral health activity of the importance of developments in other health sectors for improvements in oral health. For example, efforts to develop community participation and individual skills for health in other sectors can be built upon for oral health improvement.

The fifth point (Figure 7.1) supports the development of a national framework for planning of oral health to reduce fragmentation of the system and isolation of practitioners; for improving integration with other health care services; and for developing strategies to address barriers to access to oral health care services.

The final point (Figure 7.1) supports extension of the national framework for planning for oral health to include the development of a workforce planning strategy that addresses both the size of the dental workforce and its composition. Such a framework should pay particular attention to the balance of dentists, dental therapists, dental hygienists and dental prosthetists required to best meet the oral health needs of the community.

The goals of primary health care cannot be achieved by dentists and other practitioners in isolation. Linkages with other sectors that influence the determinants of oral health are necessary. Evaluation and research must be broadly based to include the concerns of the community and to ensure that recommendations of research are viable within the community. Effective primary health care also requires a change in the focus of professional education to incorporate the idea that oral health is something to be achieved rather than something to be delivered (Mautsch & Dickson, 1997).

7.4 Research

Agenda

Approaches to better oral health and good dental care need to be underpinned by a strong and relevant national oral health research agenda. Such an agenda should address the oral health needs of those groups in the community with the poorest oral health, with research activity in a wide range of disciplinary areas, and aim for a balance in research between the areas of:

- public health;
- health services;
- clinical practice; and
- basic biology.

There is a particular need to strengthen clinical research as commercial interests and technology rapidly generate a growing number of clinical interventions. All dental care should be subject to assessment of costs, benefits and risks, and the research should be drawn together to give a new emphasis on the evidence base for dental care.

In addition, research in areas where the output is in the form of a public good through improved oral health, when few or no commercial opportunities are generated, needs to be supported to ensure that these opportunities to develop strategies to improve oral health are seized.

Monitoring and surveillance

Oral epidemiological and dental health services activity should monitor oral health needs, access to dental care, service delivery and the oral health workforce. At present significant gaps exist in the information database on dentistry. These gaps need to be filled. This can be achieved by extending monitoring and surveillance of oral health through delivery programs to periodic representative national surveys of the population. In times of rapid change, the interval between national surveys should not exceed ten years — hence, the support for a National Oral Health Survey program, alternating between adults and children, with the initial emphasis on adults. Such a survey program will need to be augmented by targeted surveys among special population groups such as Indigenous people, older adults in residential care, and people living in shelters and hostels.

The development of minimum standards and benchmarking of programs for achieving set targets is a crucial aspect of an accountability shared by governments, the dental profession and the community for progress toward better oral health and good dental care. Australia's limited oral health targets are inadequate, inaccurate and now outdated. A national effort in the development of standards, target setting and benchmarking needs to be undertaken.

Other research needs

Wider oral health research issues need discussion and the setting of a coordinated agenda. Priorities should reflect the oral health needs of the community, especially for oral health promotion and disease prevention. Issues for inclusion should be:

- the effectiveness and safety of water fluoridation;
- the prevention of dental fluorosis;
- effective methods for promoting and improving personal oral heath preventive practices;
- the health assessment of dental restorative materials including amalgam;
- appropriate oral health interventions that can improve system health; and
- effective methods for translating new and established methods of effective dental prevention and treatment into 'best practices', used routinely in dental care delivery.

7.5 Policy

The delivery of dental services has been a State and Territory responsibility. While this is likely to continue, there is a requirement at a national level for assessment, policy development, evaluation, and assurance that agreed standards are being met. The funds available for services are ultimately determined by Commonwealth-State agreements. Such agreements in the health area should explicitly include recognition of the funding of oral health services. Assessment of the delivery of dental services needs to be inclusive, moving to strengthen information available on other sectors to the public dental services, especially on the role and impact of dental insurance through which one-third of all dental services expenditure is managed. Policy directions need to consider:

- the greater integration of dental with other health services, especially with rural or remote and other special populations, including strategies to address the serious mal-distribution issues which Australian health and dental services face;
- the boundaries for public-funded dental care, including eligibility defined by age, socioeconomic status, geographic location or other factors, and scope of benefits defined by emergency versus general dental care and the extent of specialist service provision; and
- ways of optimising the input to service delivery through professional education programs of all occupational groups providing dental services. Special consideration needs to be given to residencies and other transitional arrangements between graduation and autonomous practice, overseas trained dentists and women re-entering the workforce.

Evaluation of service delivery needs to be an integral component of informing policy supported by inclusion in the dental public health research agenda.

Approaches to oral health and dental care are currently uncoordinated, fragmented and incomplete. There is an urgent need for national leadership and direction involving all jurisdictions. Three levels of activity should be considered:

- a national advisory or coordinating structure;
- a process for prioritising issues to achieve better oral health and good dental care for Australians; and
- a process for dealing with specific oral health issues that have been identified as a priority.

7.6 Summary of issues

- A number of issues raised in this report reflect the lack of leadership in, and coordination of, oral health at a national level. In particular, the development of strategies for improving oral health, including attention to inequalities, professional education, workforce planning, reorientation of services to prevention and the need for broad-based, multidisciplinary research on oral health, are best dealt with at a national level.
- Insufficient attention has been paid to improving the oral health of those in the Australian community who have the worst oral health and receive the least adequate dental care. Important public health and economic gains can be achieved if the current opportunities for better oral health and good dental care are considered and acted upon.
- Success in addressing oral health promotion, good dental care and appropriate linkage to general health require a highly educated, up-to-date dental profession which can be flexible and innovative in response to changing community needs and the environment. Increasing the role of other health professionals and personal care providers also has potential for improving oral health.
- Organisational issues, including uncoordinated and fragmented dental services and a reorientation toward primary health care, need to be addressed. This requires more attention to investment in research; community education; intersectoral activity; broad community activity; and national frameworks for planning for oral health, services and the workforce.
- Better oral health and good dental care need to be underpinned by strong and relevant national oral health research. Wider oral health research issues need discussion and setting within a coordinated agenda.
- Gaps in the routine monitoring of oral health needs, access to care, service delivery and the workforce should be filled. The information gained should be used to develop minimum standards and benchmarking of programs for achieving set targets.
- Periodic national surveys, alternating between adults and children and augmented by targeted surveys of special population groups, should be used to extend routine monitoring activities.

- Approaches to oral health and dental care are currently uncoordinated, fragmented and incomplete. There is an urgent need for national leadership and direction through a national advisory or coordinating process for prioritising issues and dealing with them.

Conclusion 7a

Opportunities exist to establish a national advisory capacity to guide and coordinate the development of approaches to oral health and dental care. The lack of national coordination limits the possibility of continued improvements in oral health. This is particularly evident in the areas of:

- **the integration of education for dental professionals;**
- **the recruitment and retention of dental personnel in the public dental services; and**
- **the maldistribution of dental resources.**

- Any attempt to undertake national planning for oral health must be underpinned by a solid understanding of the state of oral health, of deficiencies in either oral health status or the service delivery system, and of opportunities to rectify them. Substantial gaps in our understanding of each of these three elements exist and these represent an impediment to planning guided by a sound knowledge base.

Conclusion 7b

There are opportunities to enhance policy formulation for oral health by addressing current deficiencies such as the limited monitoring and surveillance activities, especially the lack of periodic national surveys. Further opportunities exist to develop an agreed research agenda, including evaluation research.

Acronyms and abbreviations

ABS	Australian Bureau of Statistics
ADA	Australian Dental Association
AIHW	Australian Institute of Health and Welfare
CDHP	Commonwealth Dental Health Program
CDHS	Child Dental Health Survey
CPI	Community Periodontal Index
CPI	Consumer Price Index
DALY	Disability Adjusted Life Year
DETE	Department of Education, Training and Employment
DHFS	Department of Health and Family Services
dmft	Total number of decayed, missing and filled deciduous teeth
DMFT	Total number of decayed, missing and filled permanent teeth
DSRU	Dental Statistics and Research Unit
FDI	Federation Dentaire Internationale
HPI	Health Price Index
LOA	Loss of Attachment
LSDPA	Longitudinal Study of Dentists' Practice Activity
NDTIS	National Dental Telephone Interview Survey
NOHSA	National Oral Health Survey of Australia
NPHP	National Public Health Partnerships
OECD	Organisation for Economic Cooperation and Development
OHIP	Oral Health Impact Profile
PHIIS	Private Health Insurance Incentives Scheme
SADS	South Australia Dental Services
SODS	Study of Dental Services

Glossary of terms

Auxiliaries	Allied health professionals, including dental hygienists, therapists and prosthetists.
Calculus	A calcified deposit that forms on the teeth above or below the gum line.
Caries	Bacterial disease which causes the demineralisation and decay of teeth and can involve inflammation of the central dental pulp.
Cavitated decay	Decay of the teeth caused by caries and progressing to cavities in the enamel or cementum and the dentine.
Cognitive dysfunction	Impaired or disturbed mental abilities.
Co-morbidity	Co-existence of diseases or disorders in the one individual, usually resulting in a worse outcome than when each disease or disorder is experienced separately.
DALY	Disability Adjusted Life Year — calculated as years of healthy life lost through premature death or living with disability due to illness or injury.
Demand (see also Requirement)	Demand for services is the requirement for services which can be paid for.
Dental dependency	A ratio which indicates a requirement for public subsidy for dental care. The ratio expresses the number of teeth in the dependent population (eg children) for each 100 people in the working-age population.
Dentate	Having some natural teeth.
Edentulism/edentulous	Having no natural teeth.
Endodontics	The study, treatment and prevention of diseases of the pulp of teeth — a major part of treatment is root canal treatment.
Gingivitis	Inflammation of the gums.
Impaction	Non-emergence of a tooth due to lack of space in the jaw.
Incidence	Measurement of new sickness arising in a population over a given period.
Inter-governmental	Relating to the interactions between governments (eg State, Territory and Commonwealth governments).
Intersectoral	Relating to the interactions between the various sectors offering health services (eg dentists and general medical

	practitioners), or between health and non-health sectors (eg transport, housing and water provision).
Malocclusion	Imperfect alignment of teeth.
Maxillofacial	Relating to the jaw and middle third of the face.
Orofacial	Relating to the mouth and the middle third of the face.
Orthodontics	The branch of dentistry which is concerned with the growth and development of the face and jaws and the treatment of irregularities of the teeth.
Periodontics	The branch of dentistry which is concerned with the tissues that support and attach the teeth and the treatment and prevention of periodontal diseases.
Periodontitis	Inflammation of the gums and deeper tissues in the tooth socket.
Prevalence	The current sickness rate measured by person or episode of sickness, per 1,000 individuals.
Prosthetist	A trained dental professional (but not a dentist) who makes dentures, bridges and implant-retained prostheses.
Prosthodontics	The branch of dentistry which is concerned with the provision of dentures, bridges and implant-retained prostheses.
Requirement (see also Demand)	Requirement for services is the need for treatment regardless of whether or not it can be afforded.
Sextant	One of six divisions used for mapping the teeth in the oral cavity.

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