PROFILE OF AUSTRALIAN DENTISTRY

Part one: Changes in the Australian dental workforce.
Part two: Private and government services in Australia.
Part three: Oral health status, prevention and utilisation of dental services in Australia.

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PART ONE

CHANGES IN THE AUSTRALIAN DENTAL WORKFORCE

ABSTRACT - The study evaluates changes in the dental workforce in Australia since 1983, although some data from earlier years has been included. The rapid increase in the dentist workforce during the 1970s has slowed since 1983. The majority of Australian dentists work in the private sector. The workforce is dominated by males but the numbers of female dentists have been increasing. There has been an increase in dental auxiliaries, decrease in graduates from dental schools in Australia and limited registration of dentists with overseas qualifications.

INTRODUCTION

The Australian dental workforce has been undergoing many transformations over the years mainly due to the oral health changes, community attitudes and demand for treatment, economic changes in the community and a wider use of dental auxiliaries.

Dental caries and resultant treatment needs have decreased considerably and there has been change in type of services provided, decrease in graduates from dental schools in Australia and limited registration of dentists with overseas qualifications.

There has been a continuing increase in the number of providers of dental services in Australia. In 1994 the Australian Active Dental Workforce was estimated at:

<table>
<thead>
<tr>
<th>Dentist Type</th>
<th>Number</th>
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<tbody>
<tr>
<td>Dentists</td>
<td>7000</td>
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<tr>
<td>School Dental Therapists</td>
<td>1100</td>
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<td>Dental Therapists</td>
<td>70</td>
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<td>Dental Chairside Assistants</td>
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The ACT had 54 dentists per 100,000 population compared with Tasmania 25 per 100,000 population. For Australia, an undersupply of dentists in rural areas is apparent with capital vs rest of state 51 to 29 per 100,000 population (Fig. 4).

The workforce is dominated by males, but female dentists have been increasing. There were 960 registered female dentists in 1983, but by 1992 this number had almost doubled (Fig. 5). At present female dentists comprise 21% of registered dentists, 17% of active dentists, 14% of dentists in private practices, 28% of dentists in government services and 40% of recent new graduates.

Specialists comprise 10% of the profession (795 in 1992); Orthodontists make up 50% and Oral surgeons 20% of the total number of active specialists. The number of specialists had been increasing since 1983 (344) and was about 800 in 1988. However, there were slightly fewer specialists in 1992 (795) than in 1988 (Fig. 6). Requirements for registration as a specialist have become more stringent in recent years.

The five dental faculties provide the majority of practising dentists to their respective state. In total, 86%, of practising dentists obtained their initial qualification after 5 years at an Australian dental faculty. The majority, (73%), of dentists practise in the state of their initial qualification. In 1980 approximately 274 students graduated from these five dental faculties but since 1981 the number of graduates has been declining and in 1987 was 213 graduates. Even though the number of graduates was still high at 259 in 1994, a decrease is projected for the future (Fig. 7).

Dentists in Australia are not only recruited from the Australian dental faculties. Foreign-trained dentists from the United Kingdom, Ireland and New Zealand can be registered by the Dental Boards in each state without passing the Australian Dental Examination Council examinations. Foreign-trained dentists from any other country are required to pass these
examinations in order to gain registration. The percentage of dentists with an initial overseas qualification (14%) is shown on Figure 8.

**SCHOOL DENTAL THERAPISTS**

In the 1960s some school dental therapists (trained in New Zealand) were employed by school dental services. The first school of dental therapy in Australia was established in Tasmania in 1966.

The introduction of the School Dental Scheme by the Commonwealth Government in 1973, evoked rapid expansion of school dental services. This scheme was established to provide free dental treatment and care for children in primary schools. During the period from 1973 to 1981 the number of school dental therapists increased rapidly, but in the period from 1982 to 1994 there was a decline in the number of school dental therapists from 1200 in 1982 to 1100 in 1994 (Fig. 9).

The State distribution of School Dental Therapists in 1987 is shown on Figure 10. In almost all states of Australia coverage of school children by school dental therapists is adequate for the needs. Only in NSW and Victoria is there an undersupply of school dental therapists.

With the exception of the program at the Western Australia Institute of Technology the 2 year education and training for school dental therapists is administrated by state dental health authorities. In 1990 there were 7 schools of dental therapy in operation with an output of 100 therapists per year. Recruitment is dependent on employment needs.

The duties of a school dental therapist are: oral and radiographic examination of children, oral prophylaxis, application of topical fluoride, filling cavities in deciduous and permanent teeth of children, extraction of deciduous teeth under local anaesthesia and maintenance of clinical records. A fundamental component of their duties is dental health education.

**DENTAL THERAPISTS**

All dental therapists are graduates of the Western Australia Institute of Technology and unlike school dental therapists, they can also perform treatment on adults.

Dental therapists are often employed by Government health authorities as school dental therapists, however in Western Australia dental therapists can be employed by private dental practitioners. To be eligible to work in the private sector, they must be registered with the Dental Board of Western Australia.

No male would be qualified under the Act in Western Australia and there is restriction on the number of dental therapists a dentist may employ (2 dental therapists per dentist).

The number of active dental therapists has been increased slightly since 1982 with a peak of 111 dental therapists in 1986. However, the number of dental therapists in comparison with school dental therapists is relatively small (Fig. 9).

**DENTAL HYGIENISTS**

The services of the dental hygienist are utilised in general and specialist dental practices, the Armed Forces, and in programs for research, professional education, public health, school health, hospitals and institutional care.

The only training course was established at the School of Para-Dental Studies, South Australia, in 1975. The course is full-time and conducted over 4 school terms (approximately 15 months). Intake is limited to a maximum of 14 students per course.

Dental hygienists are also trained in the Armed Forces in a 19 week course, but they are not eligible for civil registration. There are about 45 dental hygienists employed in the Armed Forces.

The hygienist works under the supervision of a dentist. Her duties include procedures of chairside assisting and practice management as well as removal of plaque from the teeth, scaling, root planing and polishing techniques, and topical application of fluoride. The dental hygienist works also as an oral health educator giving oral hygiene instruction to the patients and developing community awareness about oral diseases and prevention.

The number of dental hygienists in Australia is shown on Figure 11 and has increased since 1980. By 1990 there were 138 dental hygienists and by 1994 there were 217 dental hygienists in the active workforce.

Distribution of dental hygienists and legislation differs in each state. In Queensland, for example, there were 2 dental hygienists in 1989 and 27 by 1995. However, a dentist must apply to the Queensland Dental Board to register a particular hygienist.

In 1989, the Dental Board of Victoria had approved the legislation of dental hygienists and there were 7 hygienists employed but demand was increasing and by January 1995 there were 52 registered dental hygienists and about 44 in an active workforce.

In South Australia, in 1994, there were 117 Australian trained hygienists (registered) and 11 overseas trained
CONCLUSION

The number of dentists has increased significantly over the last three decades. The current active dentist/population ratio is considerably smaller than in the 1970s or 1980s but variations in supply between geographic regions indicate maldistribution of workforce. At present about 86% of dentists are from Australian dental faculties. Overseas trained dentists comprise only a minority of dentists in Australia. There is a growing number of female dentists in the Australian dental workforce. The majority of dentists are in the private sector and the number of dentists in government services remains stable. Preventive trends in Australian dentistry favour the expansion of the role of dental auxiliaries and will create an environment in dentistry where there will most likely be reduction in the requirement for dentists. Although, the available data on dentist workforce is quite satisfactory there is evident need for the collection and evaluation of more data on operating and non-operating dental auxiliaries in Australia.

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Canberra: NHMRC 1993.

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Consultations and personal communications (1995) with:
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- AIHW Dental Statistics and Research Unit,
- Australian Dental Faculty Offices.
Dentist : Population Ratios

Source: Facts & Figures, AIHW Dental Statistics & Research Unit.
Dentists in General Private Practices & Government Services

ADA Members - 1993, 1995

Thousands

1993

1995

Private

Government

Total Australia
1993=5542
1995=5833

Source: ADA
Dentists in General Private Practices by State
ADA Members - 1993, 1995

Source: ADA

Total Australia 1993=5051. 1995=5260
Dentists per 100,000 Population
Active by Location - 1992

Source: AIHW Dental Statistics and Research Unit.
Dentists by Gender & Year

Source: Facts & Figures, AIHW Dental Statistics & Research Unit.
Dentists in Specialist/Restricted Practice

1988, 1992

- Orthodontics
- Oral surgery
- Prosthodontics
- Endodontics
- Periodontics
- Paedodontics
- Other

Source: AIHW Dental Statistics & Research Unit.
Australian University Dental Faculties

Source: Facts & Figures.
Dentists with Initial Australian or Overseas Qualification

Australia 86.0%
Other 3.2%
Asia 2.6%
New Zealand 2.5%
The UK & Ireland 5.7%

School Dental Therapists and Dental Therapists

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<td>1177</td>
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</table>

Source: ADA.
School Dental Therapists by State

1987

NSW
Vic.
Qld
SA
WA
Tas.
NT
ACT

Source: Facts & Figures.

Total Australia 1987 = 1109
Dental Hygienists by Year

Source: Facts & Figures.
Dental Technicians and Dental Prosthetists by Year

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Source: Facts & Figures.
PART TWO

PRIVATE & GOVERNMENT DENTAL SERVICES IN AUSTRALIA

ABSTRACT - The private and public sectors are discussed in relation to the dental workforce, organisation and services provided in Australia. The private practice sector dominates in the structure of dental services in Australia. Dentists involved in government services comprise 18% of dentist in the active dentist workforce. Demand for publicly funded dental services is greater than provision of these services. Some government programs provided through private practices have improved the situation in the dental health care but do not solve the problem entirely.

INTRODUCTION

The present Australian dental services consist of two sectors: private and public. Both private and public dental practices are mostly located in urban areas. In Australia, there is an undersupply of dentists in rural areas and there are also differences in the distribution of services between states. The majority of Australian dentists work in the private practice sector and they are mainly involved in solo practices. The government sector provides treatment for disadvantaged adults and school children. Recently, the public sector work has been supplemented by treatment contracted through the private sector in order to improve access to dental treatment for dentate adults with low income.

PRIVATE SERVICES

The majority (82%) of Australian dentists work in the private sector. Although most are in general practice there are 10% specialists in dentist workforce of whom only a small number work in public sector. Orthodontists make up 50% and Oral surgeons 20% of the active specialists. Dentists are now providing a much wider range of more specialised services. The pattern of dental services continues to change with more preventive and endodontic procedures and less restorations, extractions and prosthodontics (Fig.1). A minority of dentists employ operating dental auxiliaries but there has been a trend towards increased employment of dental hygienists in the private sector.

In 1992, female dentists comprised 14% of dentists in private practices. A lower proportion of female than male dentists work in solo practice, 46% of males compared with 23% of females and much greater proportion of female than male dentists work as assistant dentists (Fig.3).

Productivity

The average Australian dentist who is self-employed in private practice worked 47 days per week or 1820 hours per year, saw 74 patients per week and generated a gross income of about $220,000 (1992). Figure 4 shows that most male dentists work more than 40 hours per week and female dentists between 30-39 hours per week.

Dental fees

Dental fees charged by private dentists are determined by the dentists themselves. The majority of dentists charge for services on a fee-for-service basis. The weighted average fee per item of service is $68 for all dentists, an increase of about 6% since 1991. These changes are mainly due to the increasing cost of dental materials and equipment, cost of infection control, professional insurance fee and asset prices. Dental fees differ in each state. For instance, the mean fee for an initial oral examination in ACT was $37 but in Vic $24, for topical application of fluoride in SA was $47 but in Tas $24 and one surface amalgam restoration in Tas was $58 but in Qld $44 (1993).

Since 1961 the NSW Branch of the ADA has been issuing Suggested Minimum Fee Schedule to its members. ACT fees are based on NSW advice. The Victorian Branch of the ADA provides advice on possible methods of fee determination and adjustment. The Members' Service Committee of the Queensland Branch of the ADA conducts a biannual fee appraisal. Since 1984, the South Australian Branch of the ADA has stopped the issuing of recommended fee. Instead, members are surveyed every 6 months, covering the fees charged for about 40 commonly used items. The results are given as information to members. The ADA Western Australian and Tasmania Branches have no
policy to produce a fee schedule. There is limited control of dental fees, this means that if patients are overcharged they can complain via certain systems which differ from state to state. In Vic, Qld, SA, Tas, NT branches of ADA are responsible for the control, but in other states different systems are available such as: in NSW - the Dental Care Assessment Committee, WA - the Dental Charges Committee of the State Government, ACT - Dental Board, Consumer Affairs Bureau.

**Dental Insurance**

Dental insurance improves a patient's financial access to dental care and consequently increased utilisation of dental services. Registered non-profit health benefits organisations offer dental benefit programs to an individual person and families. Premiums are paid by fund members directly to funds or through agencies. Fund member rebates are paid directly against receipts for dental services. In Australia, there were 59 dental funds in 1988.

**Government programs through private practice**

Some private dentists work in the public sector on a part time salaried basis but there are some government programs involving private practices directly. The majority of publicly funded dental treatment via private practices is restricted to the provision of dentures to Health Card holders through Pensioner Denture Schemes. However, since January 1994 the Emergency Dental Scheme of the Commonwealth Dental Health Program has been functioning. Dental care under the Emergency Dental Scheme is limited to the services set out in a schedule and to a maximum cost of $100 per emergency treatment. For the General Dental Program, that started in July 1994, the annual cost limit for services is $400.

The Department of Veterans Affairs provides funds for the treatment of eligible veterans in private practices. A fixed fee per scheduled items is paid directly to the dentist.

Some State and Commonwealth funds are also paid directly to dentists in private practice for provision of services to eligible patients in country areas (eg WA & NSW), to selected dentists treating cleft palate patients, and to approved dentists providing medicare surgical procedure under GA in hospitals.

**GOVERNMENT SERVICES**

The public sector consists of three major components:
- school dental services
- dental hospitals
- associated community clinics

These government services are placing increasing emphasis on primary prevention and employ trained auxiliaries to operate under the supervision of the dentist. Dentists involved in these services are becoming less providers of treatment and more instructors and communicators.

Non-private practice employment of dentist is small but has grown from practically nil in 1900 to 18% in 1994. Recently, Australian dentistry has been undergoing an increased feminisation. In government services, female dentists comprise 28% of dentists. A greater proportion of female dentists than male dentists work in the public sector and the number of female dentists employed in this sector has increased from 26% in 1988 to 28% in 1992 (Fig.4). Public clinics provide free of charge treatment for eligible people in almost all states of Australia with the exception of Western Australia and South Australia. In Western Australia most patient pay 20% of a particular fee for treatment. In South Australia patients are charged for dentures and more sophisticated treatment.

Public services provide treatment for both children and adults. Adults are eligible if they are holders of Health Care Card, Pensioner Concession Card or Health Benefits Card. However, in Australia there are about 4 million people who hold one of these cards but only approximately 20% of eligible patients would obtain treatment through existing public programs. Some of the people who could not receive any treatment in public clinics will seek treatment through private clinics but a significant number of eligible patients will remain helpless in overcoming barriers to improvements in their oral health. This will result in unnecessary loss of teeth and deteriorations of oral health. Demand for publicly funded dental services is greater than provision of these services. Thus most of eligible people encounter difficulties in the form of waiting lists. Differences in waiting times among states are reflections of state expenditure on dental services. The longest waiting time was reported at Community Clinics in Victoria from 6 to 30 months and the shortest in Western Australia for country areas from 1 to 3 months (Neesham, 1991).

**School Dental Services**

Introduction of the Commonwealth School Dental Scheme in 1973 together with fluoridation of many water supplies and use of topical fluorides dramatically reduced the prevalence of caries among children in Australia. Child dental care is provided through fixed or mobile school dental clinics. Services provided in these clinics are mostly of preventive and restorative nature. School dental therapists who are the major operating personnel in these clinics do not only provide treatment to children but also teach them oral hygiene procedures and greatly encourage their preventive behaviours. In most states
primary school age children are almost entirely covered by school services. However, in New South Wales school dental clinics there is no ideal recall systems thus utilisation of these services depends on involvement and interest of parents in oral health of their children. Additionally, Victorian school dental services provide treatment to children from pre-school to year 4 of primary schools but only some children in years 5 and 6 receive dental treatment according to their socio-economic status.

Health Fund Dental Clinics
This type of third party provides facilities and salaried dental staff for treatment of its members. Examples are the Government Employees Health Fund and H.C.F. which have established dental clinics at Sydney, Wagga Wagga, Lithgow, and Parramatta (NSW).

State characteristics
Within the public sector there are some variations among States and Territories.
In NSW public dental health care is provided through:
- the Community Dental Health Clinics and
- Dental Hospitals: the United Dental Hospital and the Westmead Dental Clinical School at the Westmead Hospital; some services are also provided at the Royal Newcastle Hospital and other hospitals. Adult dental services are provided in approx. 60 community adult clinics and 11 institutions (in-patients).

In 1995, there were 20 dentists involved in treatment of children, 189 dentists working with adult patients, 17 dentists providing oral care for institutionalised patients and 216 school dental therapists in child and community dental services.

The number of patient treatments carried out in United Dental Hospitals, Westmead Clinical School and Newcastle Hospital was 660,995 in 1987.

Victorian public dental services are provided through Government Dental Services, Royal Dental Hospital of Melbourne and other dental providers. Community Dental Programs provide care including prevention and education services to health card holders through 27 community health centres, 6 hospitals and 3 pilot private sector scheme.

School Dental Service provides dental care through 120 teams from fixed or mobile clinics at 144 locations.
In 1992, full-time employment of public dental operators was: 157 dentists, 163 dental therapists, one advanced dental technician.
There were 49 dentists and 161 therapists employed in Victorian school dental services in 1986.
In 1991/92, the Victorian public dental services provided treatment to 163,220 health card holders.

In Queensland there are 3 metropolitan dental hospitals, 130 dental mobile clinics and 127 hospital based dental clinics.
In 1993, there were employed 300 dental therapists providing services to 800-100 patients per year per therapist. In 1991/92 the School Dental Services reached approx. 87% of eligible children from pre-school to year seven. During 1991/92 there were 239,691 children treated in all 13 regions.

In the Central West Region dental treatment is provided by 4 dentists, 2 dental therapists, 2 dental technicians and 5 chair-side assistants; in Darling Downs Region by 10 dentists, 20 dental therapists, 16 chair-side assistants, 5 dental technicians; in Peninsula and Torres Strait Region by 15 dentists, 17 dental therapists, 12 dental technicians.
In remote areas people have access to the Royal Flying Doctor Service of Australia and the State's Flying Surgeon Service.

South Australian dental public health system consists of:
- the School Dental Service (85 fixed clinics and a number of mobile clinics in country areas),
- the Adelaide Dental Hospital,
- the Community Dental Service.
In the period of 1990-1992 9,497 patients received treatment through the Pensioner Denture Scheme.
In 1974, the South Australia Aboriginal Dental Program was launched by the Commonwealth Government to allow aboriginal people to receive dental treatment from participating private practices.

In Western Australia major dental services are provided through Perth Dental Hospital. However, there are many other government clinics that provide dental treatment for disadvantaged people. Workforce of government clinics consists of 70 dentists, 1 dental therapists, 145 chair-side assistants, 46 dental technicians.

School Dental Services consists of 114 fixed clinics and 41 mobile clinics for dental services in 235 location.
In 1993 School Dental Services were provided by 35 dentists, 163 dental therapists, 144 chair-side assistants, 2 dental technicians.
In 1993 approx. 240,000 school children received dental treatment. This is 90% of eligible primary school children and 65% of high school children.
In Tasmania there are three hospitals providing dental care: Royal Hobart, Launceston General, Mersey General. School Dental services provide dental care for school children up the school leaving age through fixed and mobile surgeries by dental therapists and dentists. In 1988 the services were reorganised and divided into 24 dental districts with a team of school dental therapists headed by a dental officer providing service in each district.

In North-West Region, for example, there are 10 fixed and 13 mobile school dental caravans with 4 dentists, 20 dental therapists. Dental services in community dental clinics are provided by 2 dentists, 2 dental attendants, 3 dental technicians, 2 prosthetists.

The ACT public dental services are part of the ACT Government Community Health Services, and are not a Commonwealth body. The ACT dental workforce consists of 10 dentists, 17 dental therapists, 5 dental technicians, supporting assistants, receptionists and administrative staff. There are four dental clinics for adults in ACT such as:
- City Health Centre
- Belconnen Health Centre
- Phillip Health centre
- Tuggeranong Health Centre.

School dental services operate in 13 dental clinics located at schools and equipped with 17 dental units. The ACT School Dental Service provide treatment for all children for primary schools and for high school students up to age of 16.

Students from low socio-economic groups can gain free of charge dental care irrespective of their age. Dental care for mentally and physically disabled people is provided by public dental services.

In Northern Territory health services operate in seven districts. Dental care is delivered via various community clinics and centres such as:
- school dental clinics
- general dental clinics
- community health centres
- urban and rural schools
- road and air mobiles.

The major dental clinics are in Darwin, Katherine, Tennant Creek, Alice Springs, Gove. In 1992 dental staff included 119 dentists, 15 dental specialists, 23 dental therapists, 1 dental hygienist. Data on the number of dental assistants, dental technicians and receptionists was not available.

Visiting private orthodontists and oral surgeons provide consultation and treatment at some community clinics. Primary school children utilise free of charge school dental clinics located in or near their schools. All Aboriginal adults can obtain simple treatment free of charge in dental clinics set up in or near their communities.

COMMUNITY DENTAL SERVICES

Community Dental Services provide treatment for those people who have difficulties to get access to normal dental care. These special groups are the aged people, physically or intellectually handicapped. In New South Wales, for example, Community Dental Health Unit (CDH) was established at the Westmead Hospital (the Western Sydney Area Health Services). This unit covers 9000 patients in 70 nursing homes, 50 workshops, 40 schools. The government finances totally all expenses of the unit.

AUSTRALIAN DEFENCE FORCE DENTAL SERVICES

Dental clinics are small single surgeries or complex units (with more than ten surgeries). The dentist to population ratio is one dentist per 650 personnel. The total number of full time dental officers in the ADF is about 110. There are 250 other dental personnel such as dental hygienists, dental technicians, chair-side assistants employed in the ADF. The Army has a number of field dental units which use portable equipment.

ABORIGINAL DENTAL SERVICES

Dental care for Aboriginal and indigenous people is available through Government Dental Service and Aboriginal Community Health Care Centres in each state. The first Aboriginal Medical Service was established in Redfern (NSW) in 1971. The Aboriginal Medical Services (AMS) in Redfern provides general oral care, orthodontic treatment, promotional and preventive programs. There are also available in-service staff training for Aboriginal dental nurses and mobile dental units that provide dental treatment in the country areas of NSW. At present, there are 29 federally funded community-controlled, and independent, Aboriginal Medical Services in Australia.

COMMONWEALTH DENTAL PROGRAM

The Commonwealth Dental Program is a Federal program providing funding for dental treatment of 18 year old and over dentate patients. The program was started in 1994 and consists of two components: the Emergency Program and the General Dental Program. The money is provided to States and States have used this additional funding to develop their own services and use the private practice sector to treat eligible patients.
CONCLUSION

Dental services in Australia are divided into two systems private and government. Generally, these systems work independently. However, there are some dental government programs involving both sectors in cooperative work. Private services are dominated by solo practice. Popularity of other types of practice differ among States.

Government services provide treatment for children and eligible adults. In recent years, these services have been undergoing further development and improvement in oral health care with strong emphasis on prevention and health promotion. Government services diverge among States and their development and organisation depend on state expenditure on the dental component of health services.

There are other services in Australia such as Australian Defence Force Dental Services, Aboriginal Services or Veterans Affairs that provide treatment to special groups of the Australian population.

REFERENCES:


Services Provided in General Practice

1983, 1988

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Source: AIHW Dental Statistics & Research Unit.
Dentists by Type of Private Practice

1988, 1992

Solo
Partnership
Associateship
Assistant
Locum

Source: AIHW Dental Statistics & Research Unit.
Dentists by Type of Practice & Gender

1992

Source: AIHW Dental Statistics & Research Unit.
Dentists in Government Services by Gender
1988, 1992

Source: AIHW Dental Statistics & Research Unit.
PART THREE

ORAL HEALTH STATUS, PREVENTION AND UTILISATION OF DENTAL SERVICES IN AUSTRALIA

ABSTRACT - The study presents changes in oral health status, prevention and utilisation patterns of dental services in Australia. Different groups of Australian people show a different degree of oral health improvement. Fluoridation of water and use of fluorides are among the most important factors responsible for decreased prevalence of caries among all age groups. Utilisation patterns of dental services differ between States and are mainly related to oral health status of a community and socio-economic factors.

INTRODUCTION

There has been evident improvement in oral health of the Australian population in recent years. The mean DMFT at 12 years old was reported to be as high as 9.3 in 1956 but a 1988 study showed that the DMFT for the same age group had fallen to 1.8. This is already below the WHO goal for oral health in the year 2000. The decrease in dental caries in children will shape the future of Australian dentistry. Among adults there is a decreased tooth loss which already directly influences utilisation patterns of dental services. A higher number of adults has been visiting dental services and there has been increase in treatment of a preventive nature. The Australian aged population also shows improvement in dental health. In 1979 almost two thirds of persons over 65 years of age were edentulous but by 1993 the percentage of totally edentulous people was 44 per cent. The marked improvement in oral health of Australian populations is attributed mostly to such factors as: fluoridation of many water supplies, the wide use of topical fluoride and the provision of preventive oral health services. Although there is remarkable improvement in oral health status of Australian people there is still an unsatisfactory situation among minority groups such as Aboriginal and Torres communities.

ORAL HEALTH STATUS

In 1973 the Australian School Dental Scheme was introduced through Commonwealth-State cooperation. In 1981, the scheme became fully funded by the state governments. The rapid expansion of school services in Australia greatly improved coverage of primary school children. The scheme and introduction of fluoridation of main water supplies were among the main factors changing oral health status of Australian societies.

The Australian communities can be divided into two groups, pre- and post-flouridated communities. The Australians under 30 years of age have been subjected to water fluoridation and topical fluorides thus they have post-fluoride dentition. Particularly, children and younger groups show remarkable improvement in oral health.

By 1987 the prevalence of active caries among Australian children decreased by 40% and ratio of decayed to filled teeth fell from 2:1 to 1:1. Caries experience in permanent teeth among 12 year old children was high but has declined by about 46% since 1977. In the 1960's the average DMFT for 12 year old children was 8-9 (Roder, 1971) but by 1989 DMFT declined to 1.5.

The profile of caries experience differs among States. In 1992, ACT and WA had the highest percentage of children who did not require restoration in deciduous teeth, DMFT=0 (Fig.1). In NSW, SA and ACT there were many who did not require restorations in permanent teeth, DMFT=0 (Fig.2). From 1989 to 1992 the percentage of children with d+D=0 increased in NSW from 56% to 64% and in SA from 71% to 79%. At the same time, the percentage of children with d+D=0 decreased in ACT from 80% to 73% and in Qld from 66% to 64% (Fig. 3). However, only 34% of Aboriginal children were free from caries by comparison with 64% of non-Aboriginals in Northern Territory for instance.

According to the National Oral Health Survey of Australia 1987/1988 (Barnard 1993) the level of caries experience for young adults remained high at 17 DMFT for 20 years old.

Those people who are 60 years of age or over have pre-fluoride dentition. They gained fewer advantages of fluorides thus they are in need for more reparative and replacement dentistry.

The level of caries experience in elderly groups is high, at 20 DMFT for people 65 year old and over (Barnard, 1993). However, in the future, decrease of caries experience is expected among the new generation of elderly.

A rate of edentulism among adults and elderly has remained high but there has been noticeable decrease since 1980 particularly in adults between 35 and 54.
years of age (Fig. 4).

Oral Health Objectives for the Year 2000
The WHO Oral Health Unit in conjunction with Federation Dentaire Internationale established specific world oral health goals for the year 2000. In 1981, the WHO World Assembly recognised as the first global indicator of oral health status, an average of not more than 3 DMFT at the age of 12 by the year 2000.

<table>
<thead>
<tr>
<th>AGE</th>
<th>GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6 yrs</td>
<td>50% should be free of caries</td>
</tr>
<tr>
<td>12 yrs</td>
<td>3 or less DMFT,</td>
</tr>
<tr>
<td>18 yrs</td>
<td>85% should retain own teeth,</td>
</tr>
<tr>
<td>35-44 yrs</td>
<td>50% reduction in number of persons with no teeth,</td>
</tr>
<tr>
<td>65+</td>
<td>25% reduction in number of persons with no teeth.</td>
</tr>
</tbody>
</table>

Australia has achieved the WHO goals for the year 2000 and set its own goals shown below:

<table>
<thead>
<tr>
<th>AGE</th>
<th>GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6 yrs</td>
<td>to reduce the prevalence of caries to 33% or less,</td>
</tr>
<tr>
<td>12 yrs</td>
<td>to reduce the mean index of DMFT of permanent teeth to 1 or less,</td>
</tr>
<tr>
<td>35-44 yrs</td>
<td>to reduce the proportion of people having no teeth to 70% or less,</td>
</tr>
<tr>
<td>65+</td>
<td>to reduce the proportion of people having no teeth to 40% or less.</td>
</tr>
</tbody>
</table>

The Australian goal for the year 2000 of 1.0 or less DMFT per child at the age of 12 year has been reached for Tasmania and ACT (PD Barnard 1993). However, all goals are expected to be reached by the year 2000.

PREVENTION IN AUSTRALIA
The benefits of fluoride for the prevention and reduction of dental caries has been proven scientifically. Many studies have shown that fluoridation of community water supplies and fluoride-containing dental products provide better oral health and economic benefits to all people regardless of age and socioeconomic status (Burt, 1989; Ripa, 1993).

In Australia, fluoridation of community drinking water at the level of 1.0 ppm was introduced between 1961 and 1978 to all capital cities except Brisbane. In 1990, about 65% of the Australian population was living in natural or artificial fluoridated areas. The proportion of people living in fluoridated areas is shown below:

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>82%</td>
</tr>
<tr>
<td>Vic</td>
<td>72%</td>
</tr>
<tr>
<td>Qld</td>
<td>6%</td>
</tr>
<tr>
<td>SA</td>
<td>73%</td>
</tr>
<tr>
<td>WA</td>
<td>86%</td>
</tr>
<tr>
<td>Tas</td>
<td>77%</td>
</tr>
<tr>
<td>NT</td>
<td>79%</td>
</tr>
<tr>
<td>ACT</td>
<td>100%</td>
</tr>
</tbody>
</table>

Effectiveness of fluoridated water in reduction of dental caries has been investigated in Canberra (Carr, 1976), Townsville (Vederson et al, 1976), Perth (Midalf, 1978), and Tamworth (Barnard, 1980). Those studies showed reduction of DMFT indices by 50-60 per cent after ten years of fluoridation of drinking water.

Data from 1987/88 demonstrated that 15-20% of people were using fluoride supplements, more than 40% had a topical application in the last twelve months and more than 96% used fluoride dentifrices.

The National Oral Health Survey of Australia (1987-88) revealed that about 17% of 5-9 year old children and 23% of 10-14 year old children have used fluoride tablets. The percentage of persons currently taking fluoride tablets was the highest in Queensland with 34% of 5-9 year olds having used fluoride.

Ingestion of dietary fluoride supplements has been linked to an increased prevalence of dental fluorosis (Burt, 1992). Recently, many different dosage schedules have been proposed to reduce the risk of fluorosis. Mostly they are related to a child's age but also there is weight-based dosing.

In Australia, the NHMRC guideline recommended that supplements should be used if water fluoridation is below 0.3 ppm and a new schedule was issued by the NSW Health Department in 1993. The recommended dosage per day is as follows:

<table>
<thead>
<tr>
<th>AGE</th>
<th>DOSAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 6 months</td>
<td>Nil</td>
</tr>
<tr>
<td>6 months - 4 years</td>
<td>0.25 mg</td>
</tr>
<tr>
<td>4 years - 8 years</td>
<td>0.50 mg</td>
</tr>
<tr>
<td>8 years and older</td>
<td>1.0 mg</td>
</tr>
</tbody>
</table>

UTILISATION OF DENTAL SERVICES

Utilisation patterns of dental services are strongly related to oral health status, demographic, socioeconomic and other factors thus analysis of this process is complex and sophisticated. Changes accruing in demography of the Australian population and continually improving oral health of children and adolescents have influenced a shift of increased utilisation of dental services from younger cohorts to adults. Socio-economic factors determine affordability of, and accessibility to, oral health care.
Utilisation of dental services according to age
The data collected over the last 14 years (1979-1993) showed that the proportion of people visiting a dental practice in the last 12 months remained constant among children and young adults but increased and maintained at higher levels among adults aged 35 and over.

Data from 1988 NOHSA showed that more people visited private dental services, (87% of those who made a dental visit in the previous twelve months) and less people visited government dental services (20%). The proportion of 65 year old people visiting a private dental practice fell to 77% but increased from 4% to 18% visiting dental hospitals. Those 35-44 year of age showed the highest rate in visiting a private dental practitioner, 93%. The 5-9 year age group visited mostly school dental services with only 33% visiting private dental practices. However, 50% of children 10-14 years of age, made a visit to a private dental practice and 48% used government services.

Utilisation patterns and social differences
Social inequalities also have a strong relationship with oral health status of, and utilisation of dental services by, Australian communities. The lowest income group aged 45-64 is eight times more likely to have no natural teeth and 1.7 times to wear a denture, compared to persons from higher socio-economic groups. About 92% of dentate adults who did not hold any benefit cards used private dental services. Health card holders without insurance were approximately twice as likely to have an extraction (Telephone Interview Survey 1992/93).

Utilisation patterns in relation to insurance
Dental insurance significantly reduces economic barriers, thus improving financial access to dental care and increased demand for care.

Data from the National Oral Health Survey of Australia (1987/88) indicated that 46% of respondents were covered by dental insurance and that the highest coverage was among age cohorts 10-14 (52%) and 35-54 (55%) (Fig. 5). The elderly showed the lowest proportion of persons with dental insurance (26%). However, a higher proportion (56%) of insured persons 65+ year old visited the dentist compared with 28% of non-insured.

According to a Telephone Interview Survey (1992/93) dental insurance had dropped by 1% among 12-17 year old groups and by 7% among adults in the three age groups from 18 to 64 year olds in the period between 1988-1993.

Treatment received
The National Oral Health Survey of Australia 1987/88 also investigated treatment received at last dental visit for all ages and showed that 31% of treatment received were dental examinations, 19% teeth cleaning or polishing, 25% dental fillings or crowns, and denture(s) construction, maintenance 5%.

The percentage of people receiving different types of services was as follows: 49% of persons received an examination, 38% filling(s) or crown(s), 29% teeth cleaning and polishing.

Differences among States
There were differences among States in location of the last dental visit. In NSW and Victoria children 5-14 years used less government services than in any other state. The proportion of adults and the elderly visiting government services was the highest in Qld and WA. The percentage of people with private dental insurance was higher in SA, WA, and Tas but the lowest in Qld (Fig. 6).

A comparison of state differences in treatment received at last dental visit indicated that there were more fluoride treatments in Qld, more X-rays in NSW and Vic, and fewer fillings, extractions and dentures in the ACT.

CONCLUSION
Continually improving oral health of the Australian population is a result of undertaking preventive measures and reducing barriers to dental care. Trends in the use of dental services depend directly on oral health status of a community. Decreased tooth loss among adults will increase demand for dental services and will direct treatment needs towards preventive and restorative dentistry. However, other factors such as private dental insurance or social benefits play an important role in reducing cost of dental care thus improving accessibility to oral health care. Differences in oral health status and utilisation patterns of dental services among States should be minimised to achieve equity in oral health for all members of our Australian society.
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Percentage of Children aged 5-12 yrs with dmft=0 by State

1989, 1992

% of children

NSW | Vic | Qld | SA | WA | Tas | NT | ACT

Source: AIHW Dental Statistics and Research Unit.

Total Australia
1989 = 60, 1992 = 64
Percentage of Children aged 5-12 yrs with DMFT=0 by State

1989, 1992

% of children

NSW  Vic  Qld  SA  WA  Tas  NT  ACT

1989 1992

Source: AIHW Dental Research and Statistics Unit
Total Australia 1989=62, 1992=68
Percentage of Children aged 5-12 yrs with $d+D=0$ by State

1989, 1992

% of children

Source: AIHW Dental Statistics and Research Unit.

Total Australia
1989=61,
1992=65
Prevalence of Edentulism for Australian Adult Cohorts
1979, 1989

Source: Australian Bureau of Statistics.
Percentage of persons covered by dental insurance by age group

Source: NOHSA 1987-88
Percentage of persons covered by private dental insurance by State

Persons 5 years and over

Source: NOHSA 1987-1988