Projections of the Australian dental labour force

Population Oral Health Series NO. 1

DN Teusner and AJ Spencer

December 2003

ARCPOH
Australian Research Centre for
POPULATION ORAL HEALTH

THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

POPULATION ORAL HEALTH SERIES

Number 1

Projections of the Australian dental labour force

Dana N Teusner
Research Officer
Australian Research Centre for Population Oral Health
The University of Adelaide

Professor A John Spencer
Director
Australian Research Centre for Population Oral Health
The University of Adelaide

2003

Suggested citation

Contents

List of tables

List of figures

Abbreviations

ABS	Australian Bureau of Statistics
ADC	Australian Dental Council
AIHW	Australian Institute of Health and Welfare
DETYA	Department of Education, Training and Youth Affairs
DSRU	Dental Statistics and Research Unit
ERP	Estimated resident population
FTE	Full-time equivalent

Place abbreviations

ACT	Australian Capital Territory
Aust	Australia
Eire	Ireland
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
Qld	Queensland
SA	South Australia
Tas	Tasmania
UK	United Kingdom
Vic	Victoria
WA	Western Australia

Symbols

. .	not applicable
n.a.	not available
%	percentage
—	zero or rounded to zero

Acknowledgements

Editorial team

Projections of the Australian dental labour force

1 Introduction

The primary focus of this paper is to estimate future growth in the Australian dental labour force and subsequently model the future capacity of the dental labour force to supply dental visits in Australia. Projections to the year 2015 of the dentist, dental therapist, dental hygienist and dental prosthetist labour forces are presented. Projections are supported by an examination of the recruitment (or inflow) and attrition (or outflow) of dentists and allied dental practitioners to the stock of practising dentists and allied dental practitioners in Australia. Projected estimates of numbers of practitioners are utilised to produce estimates of capacity to supply dental visits.

2 Projection model

The framework that underlies the projection of numbers of practising dental professionals in Australia conceives the labour force as a dynamic system of stocks and flows. The stock of dental service providers is equivalent to the estimated number of practising dentists, therapists, hygienists and prosthetists. It also includes those practitioners who work in related non-clinical fields such as research, teaching and administration. Movement into the stock of dental practitioners (recruitment) consists of practitioners who were educated in Australian educational institutions, practitioners who have migrated into Australia, and practitioners who return to practice after a period of cessation from practice. Attrition (wastage) from the stock of practitioners is associated with migration out of Australia, retirement, death and cessation of practice. Cessation of practice may be permanent in order to pursue another career or short-term (e.g. prolonged parental leave, study leave).

In order to represent the stock of practitioners in Australia, dentists were categorised into sex and age groups, and allied dental professionals were categorised into age groups only. Each element of the inflows and outflows were followed through each age/sex group, as shown in Figure 1.

Figure 1: **Framework of the labour force projection model**
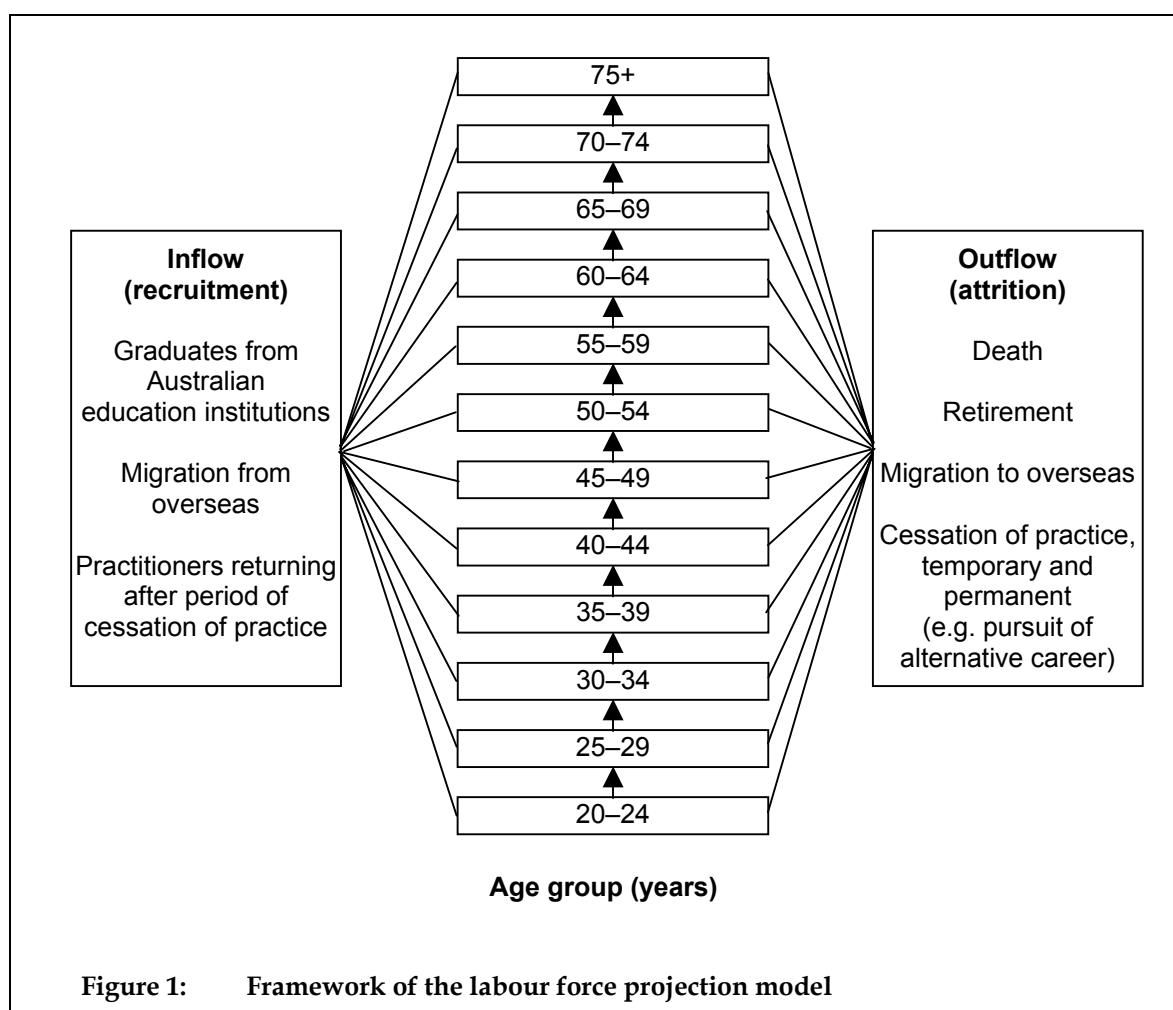
The baseline stock of dentists was divided into male and female dentists, and then grouped into 12 age categories I (I = 1,2,…I). The baseline stock of allied dental professionals was divided into 10 age categories due to negligible numbers in the older age groups. There was no categorisation by sex as these groups are highly gendered, the prosthetists are dominated by males and the therapists and hygienists are dominated by females. A basic Markov chain model was adopted; the model assumes that dentists flow in and out of age categories independently and with identical probabilities that do not vary over time (Bartholomew & Forbes 1979). Each dentist with the passage of time has a given probability of staying in the same age group (P_{ii}) or of making a transition into an older age group ($P_{i,i+1}$). The transitional probabilities between each of the age groups is set out in an array as follows:

P_{11}	P_{12}	…	…	…	W_1
…	P_{22}	P_{23}	…	…	W_2
…	…	P_{33}	P_{34}	…	W_3
…	…	…	P_{II}	P_0	W_I

Each element P_{ii} is the probability that a member of the age category i at the start of the time interval remains in the age category i at the end, and $P_{i,i+1}$ is the probability that a member of age category i at the start of the time interval is in age category i+1 at the end. W_i is the probability that a member of age category i at the start would no longer contribute to the stock of dentists at the end of the time interval. Since each dentist must either stay in the same age group, move to the next age group, or no longer contribute to the stock of dentists, then each row sums to 1:

$$P_{ii} + P_{i,i+1} + W_i = 1$$

(Note: as there are only 12 age categories, dentists that are 75 years or older cannot move into the next age category—they can only stay in the current age category or be wasted out of the stock of dentists).

The matrix **P** is called the transition matrix and the row vector **W** (W_1, W_2…W_I) is the wastage vector. It is implicit in this model that time is discrete, typically one year. The elements of **P** and **W** are assigned numerical values by estimating the probabilities from past data.

The Markov chain model is completed by an estimation of the flow of new recruits. The number of recruits at year T and for age category i is denoted by $R_i(T)$, referred to as the recruitment vector. The recruitment vector is set out in an array as follows:

$R_1(2001)$	$R_1(2002)$	…$R_1(T)$
$R_2(2001)$	$R_2(2002)$	…$R_2(T)$
…	…	…
$R_I(2001)$	$R_I(2002)$	…$R_I(T)$

The following notation specifies the calculation for each age category, with the total number of practising dentists in an age category for year T denoted by $D_i(T)$:

$$D_i(T) = R_i(T) + D_i(T-1) \times P_{ii} + D_{i-1}(T-1) \times P_{i-1,i}$$

$$I = 12, T > 2000$$

For example, the notation for the calculation of the number of practising dentists in age category 2, (i = 2, 25 to 29 years) in 2003 would be:

$$D_2(2003) = R_2(2003) + D_2(2002) \times P_{22} + D_1(2002) \times P_{12}$$

3 Dentist labour force

3.1 Previous labour force projections

DSRU has previously published dental labour force projections (AIHW DSRU 1998). These projections were calculated using 1992 baseline data and a total recruitment vector of 377 dentists per year. The projections estimated a 4.3% increase, from 7,493 practising dentists in 1992 to 7,818 dentists in 2000. The actual increase was far greater, with a 20.0% increase in the number of practising dentists to a total of 8,991 in 2000 (Table 1).

Table 1: **Baseline data for 1992 and comparison of previous projections with actual practising dentists by sex, 2000**

	1992 baseline data*	2000 projection**	2000 actual†	Projected % change	Actual % change
Males	6,256	6,234	6,932	–0.4	10.8
Females	1,237	1,584	2,059	28.0	66.5
Persons	7,493	7,818	8,991	4.3	20.0

Source: †Teusner & Spencer, 2003
   *AIHW DSRU1994
   **AIHW DSRU, 1998

In order to understand why the previous projections underestimated the growth in the dental labour force, the wastage vector, recruitment vector and the actual and projected age distributions for the previous projections were examined. Although several contributing factors were identified, including the possible overestimation of the 2000 dental labour force numbers (see 'Baseline data: 2000 dentist labour force' page 6), the primary explanation appears to be the underestimation of the return to practice component of the recruitment vector.

The recruitment vector used in the previous projection was developed from estimates of dentistry course completions, net migration and Australian Dental Council (ADC) accreditations. Also included in the recruitment vector was an estimate of the number of dentists that would return to practice in Australia after a period of cessation of practice. This return to practice component was estimated to be 75 to 80 dentists per year. The estimates for course completions, net migration and ADC accreditations were very similar to actual numbers, but the return to practice component may have been more than double what was previously anticipated. In addition to limited availability of suitable data, there are numerous reasons why this component was difficult to predict. The issues are discussed at greater length below, (see 'Return to practice', page 12).

Although it is suspected that underestimation of recruitment was the main explanation for low projections, current data provides evidence that actual wastage from the stock of dentists may also have been less than anticipated. For the purposes of the current projections, revised wastage rates (percentage of dentists ceasing practice) were calculated. Although the new wastage rates display the same patterns of attrition as the wastage rates applied in the previous projections, the new rates indicate that the previous wastage rates for dentists aged 35 to 55 years may have been too high. This

was further supported by the differences in the projected and actual age distribution, as the projections underestimated the numbers in those same age groups.

3.2 Baseline data: 2000 dentist labour force

Table 2 presents the dental labour force estimates for 2000 by sex, age group and State/Territory; these data provide the baseline for the labour force projections. Projections are based on the numbers of practising dentists rather than registered numbers, in order to avoid complications of multiple registration. Overall, the practising rate was 46.9 dentists per 100,000 population. Female dentists comprised 22.9% of all practising dentists. Just over half (53.4%) of the male practitioners were 45 years or older. In comparison, only a quarter (24.7%)of female dentists were 45 years or older.

Table 2: **Practising dentists by age group, sex and State/Territory, and practising rate per 100,000 population, 2000**

Age group (years)	NSW	Vic	Qld	SA	WA	Tas	NT[a]	ACT	Total	% Total
					Males					
20–24	24	14	31	3	15	2	—	1	90	1.3
25–29	173	131	109	58	43	7	5	5	531	7.7
30–34	230	154	118	39	64	6	3	7	621	9.0
35–39	331	193	137	42	73	8	5	15	804	11.6
40–44	428	251	212	107	131	18	8	28	1,183	17.1
45–49	366	232	166	137	119	17	6	33	1,076	15.5
50–54	295	252	163	130	97	21	7	19	984	14.2
55–59	210	175	129	61	94	6	5	8	688	9.9
60–64	137	125	94	20	48	8	3	10	445	6.4
65–69	110	56	49	17	17	3	1	4	257	3.7
70–74	76	39	29	15	8	2	—	7	176	2.5
75+	37	21	5	6	7	1	—	—	77	1.1
Total	**2,417**	**1,643**	**1,242**	**635**	**716**	**99**	**43**	**137**	**6,932**	**100.0**
					Females					
20–24	24	8	17	1	10	—	1	—	61	3.0
25–29	116	106	62	37	49	4	3	13	390	18.9
30–34	136	107	55	24	28	5	3	8	366	17.8
35–39	125	120	75	29	34	—	3	8	394	19.1
40–44	139	78	54	33	23	2	1	9	339	16.5
45–49	91	80	31	31	25	4	3	6	271	13.2
50–54	44	35	14	20	11	3	2	2	131	6.4
55–59	15	16	7	7	10	1	1	1	58	2.8
60–64	13	8	3	2	5	1	—	—	32	1.6
65–69	1	1	2	—	—	—	—	—	4	0.2
70–74	1	1	2	—	2	—	—	—	6	0.3
75+	4	1	—	2	—	—	—	—	7	0.3
Total	**709**	**561**	**322**	**186**	**197**	**20**	**17**	**47**	**2,059**	**100.0**
					Persons					
20–24	48	22	48	4	25	2	1	1	151	1.7
25–29	289	237	171	95	92	11	8	18	921	10.2
30–34	366	261	173	63	92	11	6	15	987	11.0
35–39	456	313	212	71	107	8	8	23	1,198	13.3
40–44	567	329	266	140	154	20	9	37	1,522	16.9
45–49	457	312	197	168	144	21	9	39	1,347	15.0
50–54	339	287	177	150	108	24	9	21	1,115	12.4
55–59	225	191	136	68	104	7	6	9	746	8.3
60–64	150	133	97	22	53	9	3	10	477	5.3
65–69	111	57	51	17	17	3	1	4	261	2.9
70–74	77	40	31	15	10	2	—	7	182	2.0
75+	41	22	5	8	7	1	—	—	84	0.9
Total	**3,126**	**2,204**	**1,564**	**821**	**913**	**119**	**60**	**184**	**8,991**	**100.0**
Practising rate[b]	**48.4**	**46.3**	**43.9**	**54.8**	**48.5**	**25.3**	**30.5**	**59.2**	**46.9**	**. .**

(a) Sex and age data were not available for respondents of the Northern Territory 2000 labour force questionnaire. The numbers of dentists in each age group were estimated by multiplying the percentage of all registered dentists in that age group by the total number of estimated practising dentists.

(b) Practising rate: number of dental practitioners per 100,000 ERP. See Appendix A for ERP at 30 June 2000.

Note: Includes dentists practising solely or mainly in this State/Territory. Adjusted to take account of non-response.

Source: Teusner & Spencer, 2003.

The response rate to the dental labour force survey represented 81.3% of total dental registrations in all States and Territories.

Estimations of the number and characteristics of practising dental practitioners in each State and Territory were based on the responses of those practitioners practising solely or mainly within that State or Territory. Practitioners who were on leave for three or more months were excluded from tables of practising dentists.

For all estimates it was assumed that non-respondents to the survey had the same labour force characteristics as respondents. Survey data were weighted up to the registrations by distributing non-response numbers on the basis of this assumption. Consequently the estimation process may overestimate the numbers of practising dentists if non-respondents are more likely to be those with multiple registrations, working overseas, no longer working as a dentist or permanently retired. Furthermore, some dental boards did not forward a survey to practitioners registering for the first time; these practitioners were most likely to be new graduates yet to commence working.

3.3 Previous growth in the dentist labour force

Since the last national labour force data collection in 1994 there has been a 17.3% increase in the number of practising dentists in Australia (Table 3). The rate per 100,000 population has also increased by 9.2%. The growth in the labour force was not experienced uniformly across the States and Territories. The smaller States experienced negligible increases in the practising rate and the Northern Territory experienced a decline in the practising rate per 100,000 population. Of the larger States, Western Australia experienced the greatest increase in the practising rate, (22.1%). It appears that interstate migration was a major contributing factor to growth of the labour force in that State as the majority of recent recruits to the Western Australia dental register had qualified in other States of Australia.

Table 3: **Practising dentists, practising rate per 100,000 population and percentage by State/Territory, region, 1994 and 2000**

| State/Territory | Practising dentists | | | Practising rate per 100,000 population [a] | | | | | | | | |
| | | | | Capital city | | | Rest of State | | | Total | | |
	1994	2000	Per cent change	1994	2000	Per cent change	1994	2000	Per cent change	1994	2000	Per cent change
NSW	2,733	3,126	14.4	54.8	58.4	6.5	29.6	31.2	5.4	45.2	48.4	7.0
Vic	1,867	2,204	18.1	48.2	52.4	8.7	25.5	29.9	17.3	41.7	46.3	10.9
Qld	1,314	1,564	19.0	50.2	52.3	4.2	33.5	36.7	9.7	41.1	43.9	6.7
SA	731	821	12.3	59.4	64.6	8.8	23.4	28.1	19.9	49.7	54.8	10.2
WA	675	913	35.3	45.8	55.6	21.3	23.4	29.0	23.8	39.7	48.5	22.1
Tas	119	119	–0.1	31.9	34.6	8.4	20.5	18.7	–8.7	25.2	25.3	0.2
NT	55	60	8.4	42.3	48.7	15.1	20.5	15.0	–27.0	32.1	30.5	–5.0
ACT	173	184	6.5	57.5	59.2	2.9	—	—	—	57.5	59.3	3.1
Aust	7,667	8,991	17.3	51.2	55.7	8.8	28.7	31.4	9.5	43.0	46.9	9.2

(a) Practising rate: number of dental practitioners per 100,000 ERP. See Appendix A for ERP at 30 June 2000.

Source: AIHW DSRU Dental labour force data collection, 2000. Includes dentists practising solely or mainly in this State/Territory. Adjusted to take account of non-response.

4 Projections of the dentist labour force

4.1 Dentist labour force recruitment

The first step in projecting the future dental labour force is the development of a 'likely' recruitment vector for the years 2001 to 2015. Inflow of dentists to the stock of practising dentists can be determined by examining four key areas of recruitment. As discussed below, there are varying degrees of confidence in estimating these areas of recruitment. Development of an accurate recruitment vector is hindered by availability of suitable data and by the potential overlap between the key areas of recruitment.

Australian university graduates

In 2000 there were five Bachelor of Dental Surgery Science courses available in Australian universities. Data on course completions for the years 1989 to 1999 were obtained from the Department of Education, Training and Youth Affairs and are presented in Table 4. It can be seen that the number of course completions fluctuates from year to year. The average number of male course completions for the period 1989 to 1999 was 130.9 graduates per year, and the average number of female course completions was 86 graduates per year.

Course completions are expected to remain stable in the short term; however, the age distribution of graduates is expected to change slightly, with decreasing numbers of graduates in the 20 to 24 years age group. This change is expected to occur as a result of the University of Sydney recently altering course entrance criteria.

The Australian educated dentists component of the recruitment vector was estimated using average course completion numbers for the years 1989 to 1999, with adjustments to the numbers in the 20 to 24 and 25 to 29 years age groups. The 20 to 24 years age group was reduced to 80% and the remaining 20% was included in the 25 to 29 years age group.

Table 4: **Dentistry course completions from Australian universities by age group and sex, 1989 to 1999**

Age Group (years)	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total	Average completions per year
							Males						
20–24	109	89	113	79	103	112	116	85	106	76	88	1,076	97.8
25–29	29	26	19	26	29	25	20	25	18	24	20	261	23.7
30–34	3	7	6	2	4	5	6	8	3	7	12	63	5.7
35–39	1	1	3	3	4	4	1	3	1	4	3	28	2.5
40–44	—	—	1	—	1	1	1	—	2	2	2	10	0.9
45–49	1	—	—	—	—	1	1	—	—	—	—	4	0.3
Total	**143**	**123**	**142**	**110**	**141**	**148**	**145**	**121**	**130**	**113**	**125**	**1,441**	**130.9**
							Females						
20–24	58	59	50	65	57	65	70	73	73	65	63	698	63.5
25–29	18	4	20	8	15	20	20	22	16	11	23	177	16.1
30–34	5	3	2	1	5	3	3	5	1	1	5	34	3.1
35–39	3	2	1	—	—	3	2	2	3	3	3	22	2.0
40–44	—	1	—	—	2	1	1	—	2	1	1	9	0.8
45–49	—	—	—	—	2	—	1	1	1	—	—	5	0.5
Total	**84**	**69**	**73**	**74**	**81**	**92**	**97**	**103**	**96**	**81**	**95**	**945**	**86.0**
							Persons						
20–24	167	148	163	144	160	177	186	158	179	141	151	1,774	161.3
25–29	47	30	39	34	44	45	40	47	34	35	43	438	39.8
30–34	8	10	8	3	9	8	9	13	4	8	17	97	8.8
35–39	4	3	4	3	4	7	3	5	4	7	6	50	4.5
40–44	—	1	1	—	3	2	2	—	4	3	3	19	1.7
45–49	1	—	—	—	2	1	2	1	1	—	—	8	0.7
Total	**227**	**192**	**215**	**184**	**222**	**240**	**242**	**224**	**226**	**194**	**220**	**2,386**	**216.9**

Notes

1. Overseas student course completions were excluded.
2. Students graduating with Honours as a separate course award have been excluded (The University of Adelaide).

Source: DETYA unit record files, unpublished data.

Migration

Dentists who obtained their dental qualifications in the United Kingdom, Ireland or New Zealand are granted registration on the basis of mutual recognition of qualifications. Dental practitioners from all other countries gain registration after being awarded a certificate from the Australian Dental Council (ADC).

There were a total of 294 dentists who qualified for an ADC certificate in the years 1990 to 2001, averaging approximately 27 accreditations per year. Of the certificates awarded in that time, 44.8% were awarded to female dentists; age data for those gaining accreditation were unavailable. Although the numbers of dentists applying for assessment fluctuates considerably, the ADC informally reports that there is likely to be an increase in the number of certificates awarded. Pass rates in the final examination have been rising progressively. It is suspected that preparation of candidates has improved, and consequently the ADC anticipates that there will be approximately 35 to 40 accreditations per year for the next 5 to 10 years. The ADC accreditations component of the recruitment vector is a conservative 'best guess' based on the available information and is presented in Table 5.

Table 5: **Estimated numbers of ADC accreditations of overseas dentists per year, by age group and sex, for the period 2001 to 2015**

Age group (years)	Males	Females	Total
25–29	1	1	2
30–34	3	3	6
35–39	6	4	10
40–44	6	4	10
45–49	3	3	6
50–54	1	1	2
Total	20	16	36
Total %	55.6	44.4	100.0

Source: Personal communication, Dr R King, ADC, June 2002.

There were several difficulties in determining the numbers of dentists who had gained registration in Australia via mutual recognition of qualifications in the past decade. In addition to gaps in available data, not all registration boards were able to provide qualifications data for registered dentists. However, data of overseas arrivals to Australia were analysed in order to determine the numbers of dentists arriving in Australia from New Zealand, United Kingdom and Ireland who intended to live and work in Australia for periods of 12 months or longer. Unpublished data supplied by the Australian Bureau of Statistics is presented in Table 6. These numbers should be viewed as indicative only, as those overseas arrivals that stated dentistry as their occupation may not necessarily apply for mutual recognition of qualifications and may not practice dentistry while in Australia. Furthermore, those arrivals with United Kingdom, Irish or New Zealand citizenship may not have gained their dentistry qualification in those countries, and hence may not be eligible for mutual recognition.

Table 6: **Long-term overseas arrivals with United Kingdom, Ireland and New Zealand citizenship by age group and sex, 1998, 1999 and 2000**

Age group (years)	1998			1999			2000 (YTD 30th June)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
20–29	11	7	18	6	9	15	8	7	15
30–39	5	3	8	13	3	16	7	6	13
40–49	—	—	—	—	—	—	3	—	3
50–59	—	—	—	3	—	3	—	—	—
60+	—	—	—	—	—	—	—	—	—
Total	16	10	26	22	12	34	18	13	31

Notes

1.   A 'long-term arrival' is a visitor intending to stay for 12 months or longer.
2.   YTD denotes year to date.

Source: Overseas arrivals data are collected by the Department of Immigration, & Multicultural & Indigenous Affairs (DIMIA). Unpublished data were made available via the Australian Bureau of Statistics; due to necessity to maintain confidentiality, only limited data were made available.

It is believed that the number of long-term arrival dentists to Australia varies considerably from year to year. Predicting numbers of long-term arrivals in the future is further complicated by influences such as unforseen world events and changes in government migration policy. With these issues in consideration, a conservative recruitment estimate for the migration of dentists from United Kingdom, Ireland and New Zealand was developed. The numbers of overseas arrivals were averaged for the

available years of data and multiplied by the participation rate (the percentage of registered dentists practising, 2000 labour force data collection, 84.7%). The resulting estimate is presented in Table 7.

Table 7: **Estimated number of dentists with United Kingdom, Ireland and New Zealand citizenship arriving in Australia per year, estimated participation in dentistry by age group and sex, for the period 2001 to 2015**

Age group (years)	Males		Females	
	Averaged long-term arrivals[a]	Estimated participation[b]	Averaged long-term arrivals[a]	Estimated participation[b]
20–24	5.0	4.2	4.6	3.9
25–29	5.0	4.2	4.6	3.9
30–34	5.0	4.2	2.4	2.0
35–39	5.0	4.2	2.4	2.0
40–44	0.6	0.5	—	—
45–49	0.6	0.5	—	—
50–54	0.6	0.5	—	—
55–59	0.6	0.5	—	—
60+	—	—	—	—
Total	**22.4**	**19.0**	**14.0**	**11.9**

(a) United Kingdom, Ireland and New Zealand citizen dentists arriving in Australia intending to stay for 12 months or more, numbers averaged for 1998, 1999 and 2000 (YTD 30th June).

(b) Estimated participation: the estimated number of arrivals commencing practice of dentistry in the year of arrival ('averaged long-term arrivals' x 'participation rates for the year 2000', 84.7%).

Return to practice

In any given year there are a number of dentists who recommence the practice of dentistry after a temporary cessation of practice. Those who cease practice for more than 12 months are typically treated as labour force attrition. Hence, those returning to practice after a break of more than 12 months need to be accounted for in the recruitment vector. This component of the recruitment vector is referred to as the 'return to practice' component, and is estimated to be approximately 40% of total recruitment.

Recent research by Newton, Buck and Gibbons (2001), investigating the frequency and duration of career breaks taken by dental health care professionals practising in the United Kingdom, indicates that the temporary cessation of practice is not uncommon. Of those surveyed, 3.6% of male dentists and 6.0% of female dentists were currently on a career break. Nearly half of those currently on a break expected to return to employment as a dentist (46.3% of male dentists and 48.6% of female dentists). Of those dentists who were currently practising, 60.9% of female and 26.8% of male dentists had taken a career break at some point in their working lives. The average total duration of all career breaks taken by a dentist was 13.26 months for male dentists (median, 4 months) and 19.44 months for female dentists (median, 9 months).

An Australian study of dentist's career pathways identified several reasons for the temporary cessation of practice. These included overseas practice and travel, extended maternity/parental leave, extended study leave, illness and the pursuit of an alternative career (Szuster, 1999). It is also anecdotally reported that some dentists have returned to the practice of dentistry after retirement, due to economic or lifestyle reasons.

There are great difficulties in determining accurate 'return to practice' rates for dentists from currently available data. There is only a limited ability to track the practice activity of individual dentists over time, as not all registration boards provide data to DSRU that contains a consistent key or ID number (i.e. registration number). When it has been possible to link consecutive data sets, tracking practice activity was impeded by gaps in the data. Either dentists did not respond to the labour force questionnaire in consecutive collections, or annual consecutive collections of labour force data were not conducted.

Given the difficulties cited above, an estimate of the 'return to practice' percentage was derived from the labour force data by examination of reported changes in practice status. The available data sets were linked to determine the percentage of dentists in each age and sex group who reported not practising in Australia in 1998 or 1999, but reported practising in Australia in the following year. The number determined for each age and sex group was weighted to account for non-response and divided by the total number practising in that age/sex group to determine the return to practice rate for that age/sex group. The estimated percentages are presented in Table 8.

Table 8: **Estimated percentage of dentists returning to practice in Australia by age group and sex, 1999 and 2000**

Age group (years)	Per cent males			Per cent females		
	1999	2000	Total	1999	2000	Total
20–24	3.8	—	2.2	—	—	—
25–29	1.5	3.3	2.4	2.4	2.4	2.4
30–34	2.5	1.4	2.0	3.7	3.1	3.4
35–39	1.0	1.0	1.0	3.1	2.2	2.6
40–44	1.0	1.1	1.0	4.8	2.0	3.3
45–49	0.6	1.0	0.8	1.9	0.6	1.2
50–54	0.4	0.5	0.5	—	1.2	0.7
55–59	1.1	0.6	0.8	—	—	—
60–64	0.9	2.6	1.8	—	—	—
65+	3.5	2.2	2.9	—	11.7	5.3
Total	**1.3**	**1.3**	**1.3**	**2.8**	**2.0**	**2.4**

Note: These estimates were calculated using the AIHW DSRU dentist labour force data sets: Victoria 1998, 1999, 2000; South Australia 1998, 1999, 2000; New South Wales 1998, 1999, 2000.

As can be seen in Table 8, similar patterns of return to practice could be observed in the two years of available data. The overall higher rates of return to practice for female dentists is consistent with research by Newton, Buck and Gibbons (2001) which found that a larger proportion of female dentists take a career break at some point during their working lives.

There was no evidence of female dentists aged 55 to 64 years returning to practice. This is perhaps a function of the low numbers of female dentists in those age groups, and not necessarily indicative of the working patterns of female dentists.

Obviously the number of dentists returning to practice cannot be determined from observed alterations in reported practice status alone. As only registered dentists are surveyed, an assessment of the number of dentists who have been restored to a register after a period of non-registration is also required.

Some dental boards maintain data items that reflect the registration type of an individual dentist. For these registers it is possible to differentiate between dentists

restoring registration, renewing registration or registering for the first time. However, for other dental registers, where these items are not maintained, it is not possible to make the distinction between these types of registration. This presents a problem in determining numbers of dentists who have effectively 'returned to practice' after a period of non-registration and who consequently would not be accounted for in the above 'return to practice' estimation.

Furthermore, many dentists maintain registration in multiple States/Territories. Currently it is not possible to cross-reference State/Territory data sets to determine whether a dentist who appears to have returned to practice in one State/Territory has actually returned after cessation of practice in Australia or has simply migrated from interstate.

Consequently, due to this incapacity to account for non-registered dentists returning from a period of cessation of practice, it is probable that the rates cited in Table 8 underestimate the actual rates of dentists returning to the practice of dentistry.

To address this issue, other data sources were examined in order to achieve a more likely recruitment vector. As it is suspected that a large proportion of return to practice recruitment is a result of overseas travel, and that those ceasing practice for the purpose of overseas travel are less likely to maintain registration in Australia during their time abroad, it was suspected that these dentists were unlikely to have been included in the estimations above (Table 8). Hence, in order to more accurately estimate a likely recruitment vector, an estimate of the numbers of Australian citizen dentists returning from a long-term stay abroad should be a component of recruitment.

To capture ex-patriot dentists returning home, a quota for Australian resident dentists arriving in Australia was included in the migration component of the recruitment vector. Long-term arrivals data were examined to estimate this quota. The available data on Australian dentists (i.e. holding Australian citizenship) arriving in Australia after being overseas for 12 months or more is presented in Table 9.

Table 9: **Australian citizen dentists returning to Australia after long-term stay abroad by age group and sex, 1998, 1999 and 2000**

Age group	1998			1999			2000 (YTD 30th June)		
(years)	Male	Female	Total	Male	Female	Total	Male	Female	Total
20–29	10	11	21	8	15	23	10	12	22
30–39	14	5	19	13	9	22	7	4	11
40–49	16	7	23	13	5	18	13	3	16
50–59	9	3	12	11	3	14	4	3	7
60+	—	—	—	—	—	—	3	—	3
Total	**49**	**26**	**75**	**45**	**32**	**77**	**37**	**22**	**59**

Notes

1.   A 'long-term stay overseas' is a visitor who was abroad for 12 months or longer.
2.   YTD denotes year to date.

Source: Overseas arrivals data are collected by the Department of Immigration & Multicultural & Indigenous Affairs (DIMIA). Unpublished data were made available via the Australian Bureau of Statistics; due to necessity to maintain confidentiality, only limited data were made available.

Although the data presented in Table 9 can be averaged to achieve an estimate of the numbers of Australian dentists returning from a long-term stay abroad, it is not possible

to determine whether an arriving dentist will re-register or actually practice dentistry in that year. Furthermore, by including the dentists returning from a long-term stay abroad in the recruitment vector, there is the possibility of double counting those dentists who maintained registration while abroad and then reported in labour force surveys that they had returned to practice in Australia. Therefore, for the purposes of developing a likely recruitment vector, a conservative estimate of Australian dentists returning to practice after a long-term stay abroad was determined by averaging arrivals data. The average was then multiplied by the 2000 dentist participation rate (the percentage of registered dentists practising, 2000 labour force data collection, 84.7%). The resulting estimate is presented in Table 10.

Table 10: **Estimated number of Australian citizen dentists returning to practice after long-term stay abroad per year, by age group and sex, for the period 2001 to 2015**

Age group (years)	Males			Females	
	Averaged long-term arrivals[a]	Estimated participation[b]		Averaged long-term arrivals[a]	Estimated participation[b]
20–24	5.6	4.7		7.6	6.4
25–29	5.6	4.7		7.6	6.4
30–34	6.8	5.8		3.6	3.0
35–39	6.8	5.8		3.6	3.0
40–44	8.4	7.1		3	2.5
45–49	8.4	7.1		3	2.5
50–54	4.8	4.1		1.8	1.5
55–59	4.8	4.1		1.8	1.5
60+	1.2	1.0		—	—
Total	**52.4**	**44.4**		**32.0**	**27.1**

(a) Australian citizen dentists arriving in Australia after being overseas for 12 months or more, numbers averaged for years 1998, 1999 and 2000 (YTD 30th June).

(b) Estimated participation: the estimated number of arrivals commencing practice of dentistry in the year of arrival ('averaged long-term arrivals' x 'participation rates for the year 2000', 84.7%).

Summary of recruitment components

In summary, the recruitment vector applied in the following projections is calculated by the addition of several components. Those components and the total numbers for each are presented in Figure 2.

Figure 2: **Components of the recruitment vector for projection of dentists for the period 2000 to 2015**
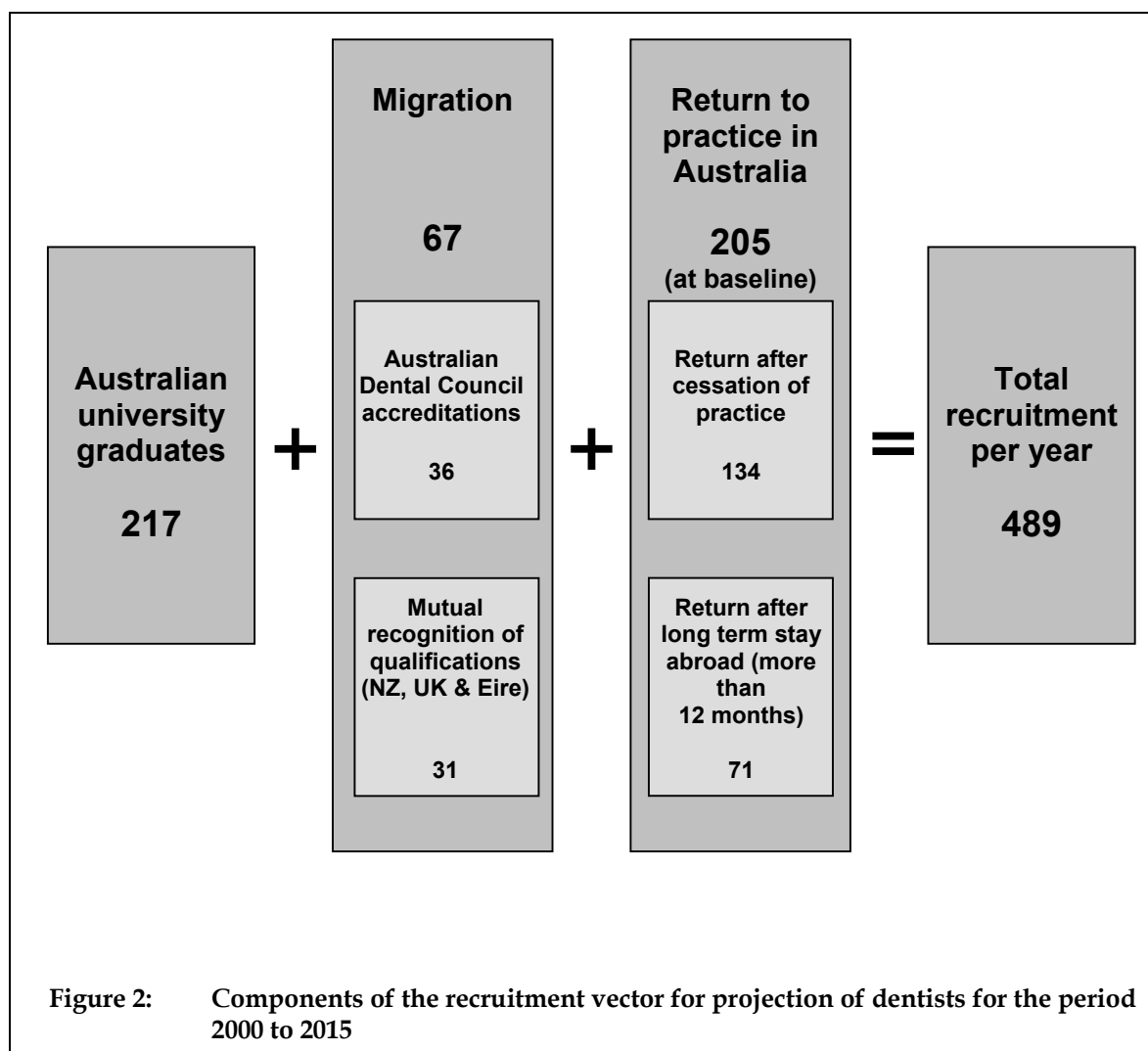
4.2 Dentist labour force attrition

Labour force attrition from the stock of practising dentists can be attributed to death, retirement, overseas migration and the temporary (12 months or more) or permanent cessation of the practice of dentistry. Attrition is represented in the projection model by the input of sex/age specific wastage rates.

Calculation of wastage rates for previously conducted State labour force projections (i.e. NSW) were developed by examining the wastage from the State register. Wastage rates observed from registers were appropriate for the State projections, as these projections used the total number of registered dentists as the baseline and then projected the number of practitioners registered in the future. Following the projection of registered dentists, the number of practising dentists was imputed and the projected number of

registered dentists was multiplied by the average participation rates for each age/sex group.

Due to issues relating to multiple registrations and the inability to cross reference State/Territory dental registers, national projections were based on numbers of practising dentists; consequently, wastage rates previously determined for State based projections are not useful indicators of wastage rates at a national level. Firstly, the wastage rates from State registers include a large proportion of dentists migrating interstate, hence State wastage rates are generally higher than the total national wastage. Secondly, a dentist may cease practice but not necessarily cease the maintenance of their registration, hence in certain sex/age groups wastage from practising numbers may be greater than observed wastage from the register.

Consequently, the development of a national wastage vector that reflected the numbers of dentists who cease to practice in Australia, as opposed to the numbers who cease to maintain registration, was required. In order to determine this wastage vector, labour force collection data sets, where possible, were linked from year to year, and the following dentists were identified as having ceased practice in Australia:

- Dentists who were practising in Australia in 1998 and 1999 and were not practising in Australia in the following year (numbers were weighted up to account for non response).

- Dentists who became unregistered in a given year and had reported practising in the previous year. In order to limit the number of dentists migrating interstate being included in this group, only dentists working solely or mainly in the State of registration were included as wastage. For those dentists whose work status was mainly or solely in another State and then became unregistered, it was assumed that their un-registered status was a result of permanent interstate migration and therefore they were included as wastage.

The resulting wastage rates are presented in Table 11.

Table 11: **Practising dentists, wastage rates by age group and sex, 1999 and 2000**

Age group	Per cent males				Per cent females		
(years)	1999	2000	Total		1999	2000	Total
20–24	6.1	3.7	5.4		4.7	8.1	5.7
25–29	4.3	4.0	4.2		6.1	3.2	5.0
30–34	3.0	2.5	2.8		5.3	5.2	5.3
35–39	2.3	1.0	1.8		5.2	4.9	5.0
40–44	0.9	0.9	0.9		3.5	1.4	2.6
45–49	0.5	1.1	0.7		2.5	5.3	3.7
50–54	1.5	2.5	1.9		5.0	2.5	3.9
55–59	4.9	3.3	4.2		6.0	9.5	7.3
60–64	6.9	10.0	8.1		8.1	10.2	9.1
65–69	11.2	14.6	12.5		42.8	—	30.1
70–74	7.4	18.0	12.1		28.4	—	21.7
75+	21.1	27.8	24.2		—	—	—
Total	**3.2**	**3.8**	**3.5**		**5.1**	**4.1**	**4.7**

Note: These wastage rates were calculated using the AIHW DSRU dentist labour force data sets: Victoria 1998, 1999; South Australia 1998, 1999, 2000; New South Wales 1998, 1999, 2000.

As can be seen from Figure 3, the highest wastage rates were observed in the 60 years and older age groups. This is consistent with the expectation that the majority of labour force attrition can be related to retirement. Wastage rates overall were higher for female dentists than for male dentists. This was also to be expected as other research has found that female dentists are more likely to take career breaks, the primary reason being maternity leave (Newton, Buck & Gibbons 2001). Wastage rates were lowest in the 35 to 54 years age group for male dentists and the 40 to 54 years age group for female dentists, indicating that these are particularly stable times in a dentist's career, when they are less likely to pursue alternative careers, take parental leave or travel overseas.

Note: These wastage rates were calculated using the AIHW DSRU dentist labour force data sets: Victoria 1998, 1999; South Australia 1998, 1999, 2000; New South Wales 1998, 1999, 2000.

Figure 3: Practising dentists, wastage rates by age group and sex, 1999 and 2000
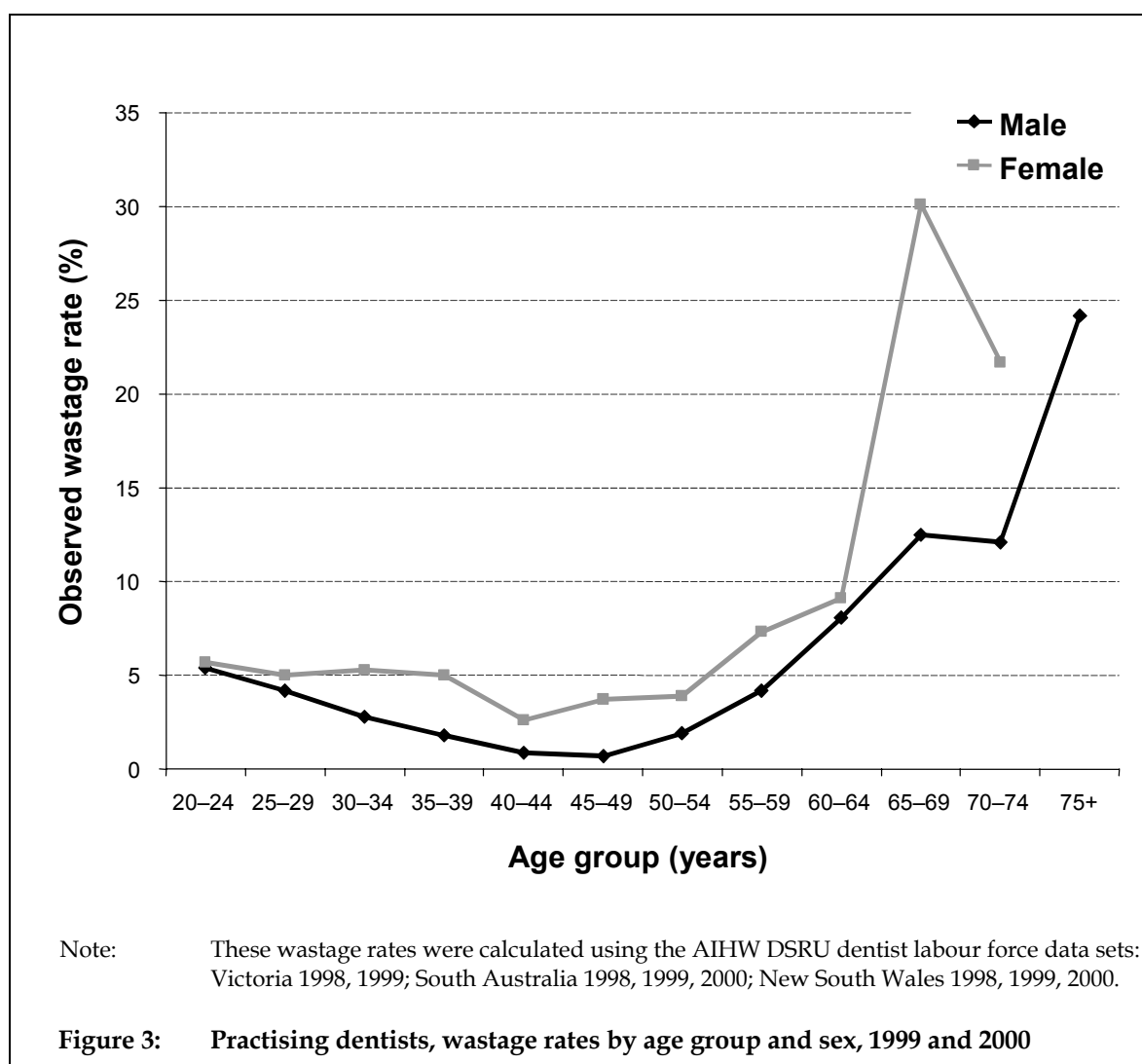
4.3 Projections of practising dentists

The matrices of transitional probabilities for female and male dentists were calculated using the observed wastage rates (see 'Dentist labour force attrition', page 16) and the age distribution of practising dentists in 2000. In order to assess the impact of slightly higher or slightly lower wastage rates on the future labour force, additional matrices of transitional probabilities were calculated. The 'high' matrix was calculated from observed wastage increased by 5% and the 'low' matrix was calculated from observed wastage decreased by 5%. The medium, high and low probabilities are presented in Table 12 and Table 13.

Table 12:   **Transitional probabilities matrix, male dentists**

Males	Wastage rates (W)	Probability of staying in same age group (Pii)	Probability of moving to the next age group (Pi,i+1)	Transitional probabilities ('medium', W proportionally applied)			Transitional probabilities ('high', W increased 5%)			Transitional probabilities ('low', W decreased 5%)		
				Pii	Pi,i+1	W	Pii	Pi,i+1	W	Pii	Pi,i+1	W
20–24	5.45%	0.2000	0.8000	0.1891	0.7564	0.0545	0.1886	0.7542	0.0572	0.1897	0.7586	0.0517
	4.21%	0.7800	0.2200	0.7472	0.2107	0.0421	0.7455	0.2103	0.0442	0.7488		0.0400
30–34	2.80%	0.7800	0.2200	0.7582	0.2138	0.0280	0.7571		0.0294	0.7593	0.2142	0.0266
35–39	1.81%	0.7800	0.2200	0.7659		0.0181	0.7652	0.2158	0.0190	0.7666	0.2162	0.0172
40–44	0.91%		0.1900	0.8026	0.1883	0.0091	0.8022	0.1882	0.0096	0.8030	0.1883	0.0087
	0.73%	0.8100	0.1900	0.8041	0.1886	0.0073	0.8038	0.1885	0.0077		0.1887	0.0070
50–54	1.89%	0.8100	0.1900	0.7947	0.1864	0.0189		0.1862	0.0198	0.7955	0.1866	0.0179
55–59	4.21%	0.8300	0.1700		0.1628	0.0421	0.7933	0.1625	0.0442	0.7968	0.1632	0.0400
60–64	8.06%	0.8500	0.1500	0.7815	0.1379	0.0806	0.7781	0.1373	0.0846	0.7849	0.1385	0.0765
	12.54%	0.8200	0.1800	0.7172		0.1254	0.7120	0.1563	0.1317	0.7223	0.1586	0.1191
70–74	12.10%	0.8700	0.1300	0.7647	0.1143	0.1210	0.7595	0.1135	0.1271	0.7700	0.1151	0.1150
75+	24.18%	1.0000	0.0000	0.7582	0.0000	0.2418	0.7461	0.0000	0.2539	0.7703	0.0000	0.2297

Note: Wastage is proportionally applied to P_{ii} and $P_{i,i+1}$, e.g. $P_{11} = 0.2 - (0.2 \times 0.0545)$, $P_{12} = 0.8 - (0.8 \times 0.0545)$.

Table 13:   **Transitional probabilities matrix, female dentists**

Females	Wastage rates (W)	Probability of staying in same age group (Pii)	Probability of moving to the next age group (Pi,i+1)	Transitional probabilities ('medium', W proportionally applied)			Transitional probabilities ('high', W increased 5%)			Transitional probabilities ('low', W decreased 5%)		
				Pii	Pi,i+1	W	Pii	Pi,i+1	W	Pii	Pi,i+1	W
20–24	5.69%	0.2000	0.8000	0.1886	0.7545	0.0569	0.1880	0.7522	0.0598	0.1892	0.7567	0.0541
25–29	5.00%	0.7800	0.2200	0.7410	0.2090	0.0500	0.7390	0.2084	0.0525	0.7429	0.2095	0.0475
30–34	5.29%	0.7800	0.2200	0.7388	0.2084	0.0529	0.7367	0.2078	0.0555	0.7408	0.2089	0.0502
35–39	5.04%	0.7800	0.2200	0.7407	0.2089	0.0504	0.7387	0.2083	0.0530	0.7426	0.2095	0.0479
40–44	2.59%	0.8100	0.1900	0.7890	0.1851	0.0259	0.7880	0.1848	0.0272	0.7901	0.1853	0.0246
45–49	3.71%	0.8100	0.1900	0.7799	0.1829	0.0371	0.7784	0.1826	0.0390	0.7814	0.1833	0.0353
50–54	3.92%	0.8100	0.1900	0.7782	0.1825	0.0392	0.7766	0.1822	0.0412	0.7798	0.1829	0.0373
55–59	7.33%	0.8300	0.1700	0.7691	0.1575	0.0733	0.7661	0.1569	0.0770	0.7722	0.1582	0.0697
60–64	9.10%	0.8500	0.1500	0.7726	0.1363	0.0910	0.7687	0.1357	0.0956	0.7765	0.1370	0.0865
65–69	30.10%	0.8200	0.1800	0.5732	0.1258	0.3010	0.5608	0.1231	0.3161	0.5855	0.1285	0.2860
70–74	21.73%	0.8700	0.1300	0.6810	0.1018	0.2173	0.6715	0.1003	0.2282	0.6904	0.1032	0.2064
75+[a]	21.73%	1.0000	—	0.7827	—	0.2173	0.7718	—	0.2282	0.7936	—	0.2064

(a)   There was no observed wastage in the 75 years or older age group for female dentists. It is suspected that this was due to the extremely low numbers of female dentists in that age group. Hence the wastage rate for the 70 to 74 years age group was applied to the 75 years or older group (21.73%).

Note: Wastage is proportionally applied to P_{ii} and $P_{i,i+1}$, e.g. $P_{11} = 0.2 - (0.2 \times 0.0545)$, $P_{12} = 0.8 - (0.8 \times 0.0545)$.

As discussed above, a likely recruitment vector was estimated by consideration of overseas dentists migration into Australia, numbers of Australian educated dentists and the number of dentists anticipated to return to practice after a period of cessation of practice. These vectors are presented in Table 14 and Table 15. Estimated recruitment for graduates, ADC accreditations and migration were maintained for all years in the vector (2001 to 2015). However, as the return to practice component of the recruitment vector is based on a percentage of practising dentists, the number of dentists in this component changes as the numbers of practising dentists in each age and sex group change over time. Table 14 and Table 15 present the return to practice numbers for 2001 only. For complete recruitment vectors for the years 2001 to 2015, see Appendix B.

The male dentists recruitment vector totalled 300 dentists per year. New graduates comprised 43.6% of the total vector, the return to practice component accounted for 43.5%, while migration only accounted for 13% of the total vector.

Table 14:   Estimated male dentists recruitment vector, 2001

Age group (years)	Aust University Course completions	Return to practice 2001 Ex-patriots return to Aust	Within Aust	Migration NZ, UK & Eire	ADC certificates	Total 2001
20–24	97.8	4.7	2.0	4.2	—	108.7
25–29	23.7	4.7	12.8	4.2	1.0	46.4
30–34	5.7	5.8	12.3	4.2	3.0	31.0
35–39	2.5	5.8	8.3	4.2	6.0	26.8
40–44	0.9	7.1	11.9	0.5	6.0	26.4
45–49	0.3	7.1	8.4	0.5	3.0	19.3
50–54	—	4.1	4.5	0.5	1.0	10.1
55–59	—	4.1	5.6	0.5	—	10.2
60–64	—	1.0	8.0	—	—	9.0
65+	—	—	12.4	—	—	12.4
Total	**130.9**	**44.4**	**86.2**	**18.8**	**20.0**	**300.3**

The female dentists recruitment vector totalled 189 dentists per year. New graduates comprised 45.6% of the total vector, the return to practice component accounted for 39.6%, while migration only accounted for 14.8% of the total vector.

Table 15:   Estimated female dentists recruitment vector, 2001

Age group (years)	Aust University Course completions	Return to practice 2001 Ex-patriots return to Aust	Within Aust	Migration NZ, UK & Eire	ADC certificates	Total 2001
20–24	50.8	6.4	—	3.9	—	73.8
25–29	28.8	6.4	9.4	3.9	1.0	36.8
30–34	3.1	3.0	12.5	2.0	3.0	23.6
35–39	2.0	3.0	10.4	2.0	4.0	21.4
40–44	0.8	2.5	11.3	0.0	4.0	18.6
45–49	0.5	2.5	3.2	0.0	3.0	9.2
50–54	—	1.5	0.9	—	1.0	3.4
55–59	—	1.5	—	—	—	1.5
60–64	—	—	—	—	—	—
65+	—	—	0.5	—	—	0.5
Total	**86.0**	**26.8**	**48.2**	**11.8**	**16.0**	**188.8**

The transitional probabilities and estimated recruitment vectors were used to calculate the projected stock of practising dentists to the year 2015, as presented in Table 16 and Table 17.

The number of practising male dentists is projected to increase from 6,932 dentists in 2000 to 7,481 in 2015, representing an increase of 7.9%. The annual increase in the number of male dentists steadily declines as the projection progresses. As the numbers of male dentists in the older age groups increase, so does the projected wastage, effectively reducing overall growth in the labour force (see Figure 4).

Table 16: **Projected number of practising male dentists by age group, 2000 to 2015**

Age group (years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	90	106	110	110	110	110	110	110	110	110	110	110	110	110	110	110
25–29	531	531	543	555	564	572	578	582	586	589	591	592	593	594	595	596
30–34	621	614	608	606	607	610	614	618	622	626	630	633	636	639	641	643
35–39	804	775	751	732	716	704	695	689	686	684	683	683	684	686	687	689
40–44	1,183	1,150	1,116	1,084	1,053	1,025	1,000	977	958	941	927	915	906	899	893	889
45–49	1,076	1,107	1,126	1,136	1,137	1,132	1,123	1,111	1,097	1,082	1,066	1,051	1,037	1,023	1,011	1,000
50–54	984	995	1,010	1,025	1,039	1,051	1,059	1,064	1,065	1,064	1,060	1,054	1,046	1,038	1,028	1,018
55–59	688	741	785	823	857	887	913	935	954	969	982	991	997	1,000	1,001	1,001
60–64	445	469	496	526	555	585	613	639	664	688	709	727	744	758	770	780
65–69	257	253	253	257	264	274	285	297	310	323	335	348	360	371	381	390
70–74	176	180	183	185	187	190	194	199	204	211	218	226	234	242	251	259
75+	77	78	80	82	83	84	86	87	89	91	93	95	98	101	104	108
Total	**6,932**	**6,999**	**7,062**	**7,120**	**7,174**	**7,224**	**7,269**	**7,310**	**7,345**	**7,377**	**7,404**	**7,427**	**7,446**	**7,461**	**7,472**	**7,481**
Per cent increase[a]		1.0%	0.9%	0.8%	0.8%	0.7%	0.6%	0.6%	0.5%	0.4%	0.4%	0.3%	0.3%	0.2%	0.2%	0.1%

(a)   Per cent increase over previous year.

Note: Projections based on medium wastage vector.

The age distribution of male dentists is projected to shift to an older distribution, with the number of dentists over 50 years of age increasing from 37.9% in 2000 to 47.5% in 2015.

Note: Projections based on medium wastage vector.

Figure 4:   **Percentage of practising male dentists by age group, 2000 and 2015**
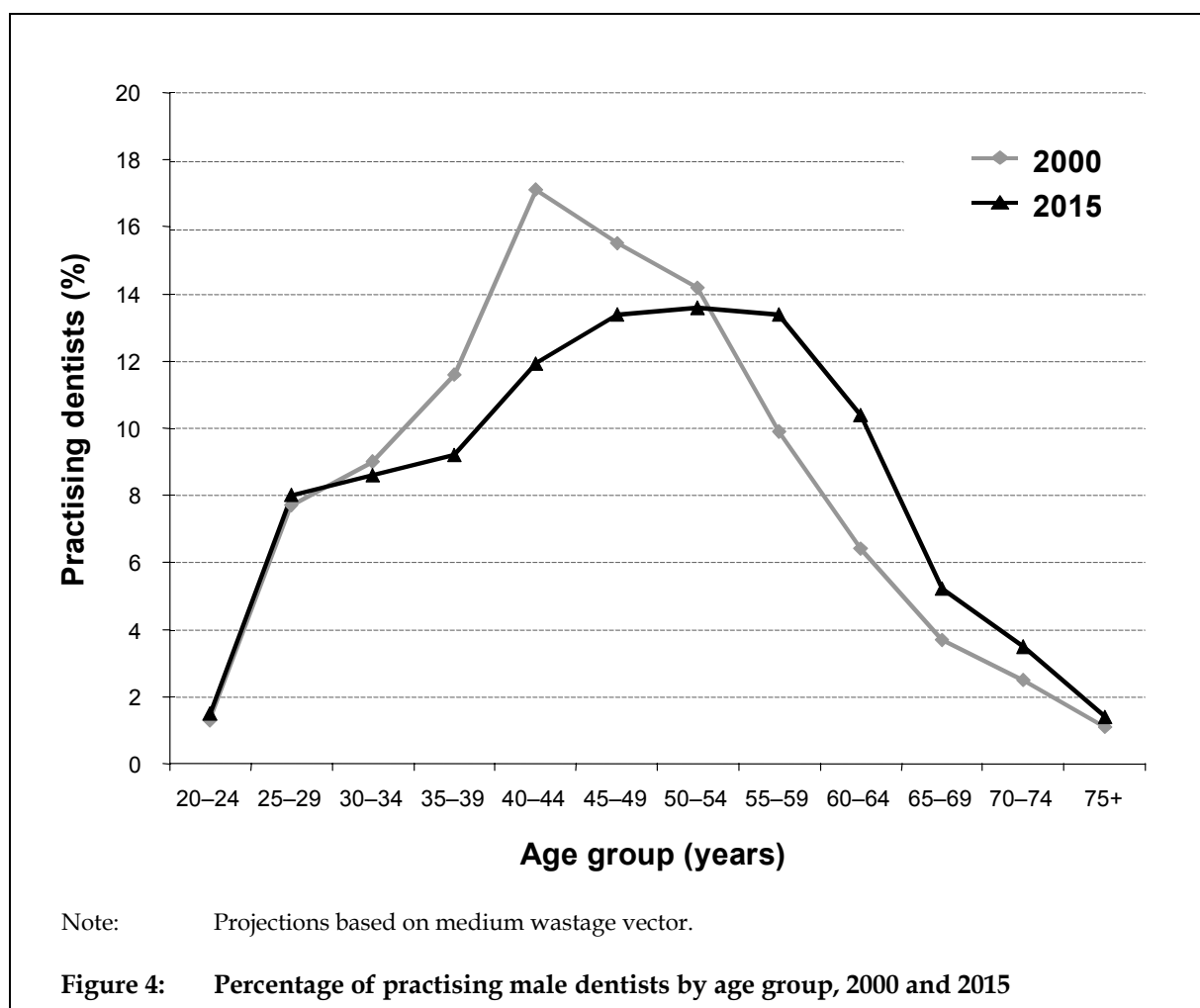
The number of practising female dentists is projected to increase from 2,059 dentists in 2000 to 3,102 dentists in 2015, representing an increase of 50.7%. The annual increase in the number of female dentists, like the male dentists, also steadily declines as the projection progresses. As the numbers of female dentists in the older age groups increase, so does the projected wastage, effectively reducing overall growth (see Figure 5).

Table 17: Projected number of practising female dentists by age group, 2000 to 2015

Age group (years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	61	73	75	75	75	75	75	75	75	75	75	75	75	75	75	75
25–29	390	384	389	394	398	402	404	406	408	409	410	410	411	411	411	412
30–34	366	376	382	387	393	398	403	407	410	414	416	418	420	422	423	424
35–39	394	389	388	388	389	392	394	397	401	404	407	410	412	415	417	419
40–44	339	368	392	410	426	439	450	460	469	476	483	490	496	501	506	511
45–49	271	283	299	315	331	347	362	376	389	401	411	421	430	438	446	453
50–54	131	155	176	195	213	231	247	263	277	291	305	317	328	339	349	358
55–59	58	70	84	98	112	127	141	155	169	182	195	207	218	229	240	250
60–64	32	34	37	42	48	55	62	70	79	87	96	105	114	122	131	139
65–69	4	7	9	11	12	14	16	19	21	24	27	30	33	36	39	43
70–74	6	5	4	4	5	5	5	6	7	8	9	10	11	12	14	15
75+	7	6	5	5	4	4	3	3	3	3	3	3	4	4	4	5
Total	**2,059**	**2,150**	**2,239**	**2,325**	**2,408**	**2,488**	**2,564**	**2,638**	**2,708**	**2,774**	**2,837**	**2,897**	**2,953**	**3,006**	**3,056**	**3,102**
Per cent increase[a]		**1.8%**	**1.7%**	**1.6%**	**1.5%**	**1.4%**	**1.3%**	**1.2%**	**1.1%**	**1.0%**	**0.9%**	**0.8%**	**0.7%**	**0.7%**	**0.6%**	**0.5%**

(a)   Per cent increase over previous year.

Note: Projections based on medium wastage vector.

The age distribution of female dentists is projected to shift to a slightly older distribution, with the number of dentists over 50 years of age increasing from 11.6% in 2000 to 26.1% in 2015.
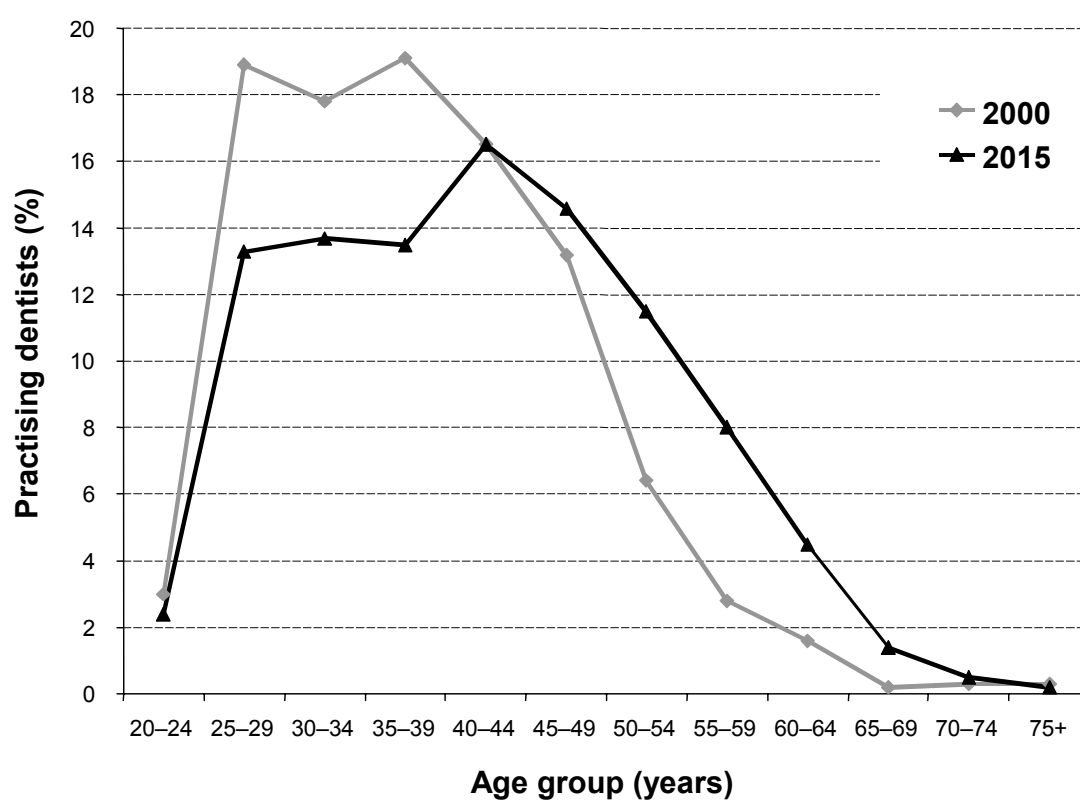
Note: Projections based on medium wastage vector.

Figure 5:   Percentage of practising female dentists by age group, 2000 and 2015

Overall, under the medium wastage vector, it is projected that in 2015 the number of practising dentists will be 10,583, representing an increase of 17.7% (Figure 6).

Note: Allowance for variability in future wastage rates was accommodated by the calculation of an error margin for the projection. This margin was calculated by applying the high and low wastage transitional probabilities. For complete tables of all projections see Appendix C.

Figure 6:   Projected number of practising dentists, 2000 to 2015
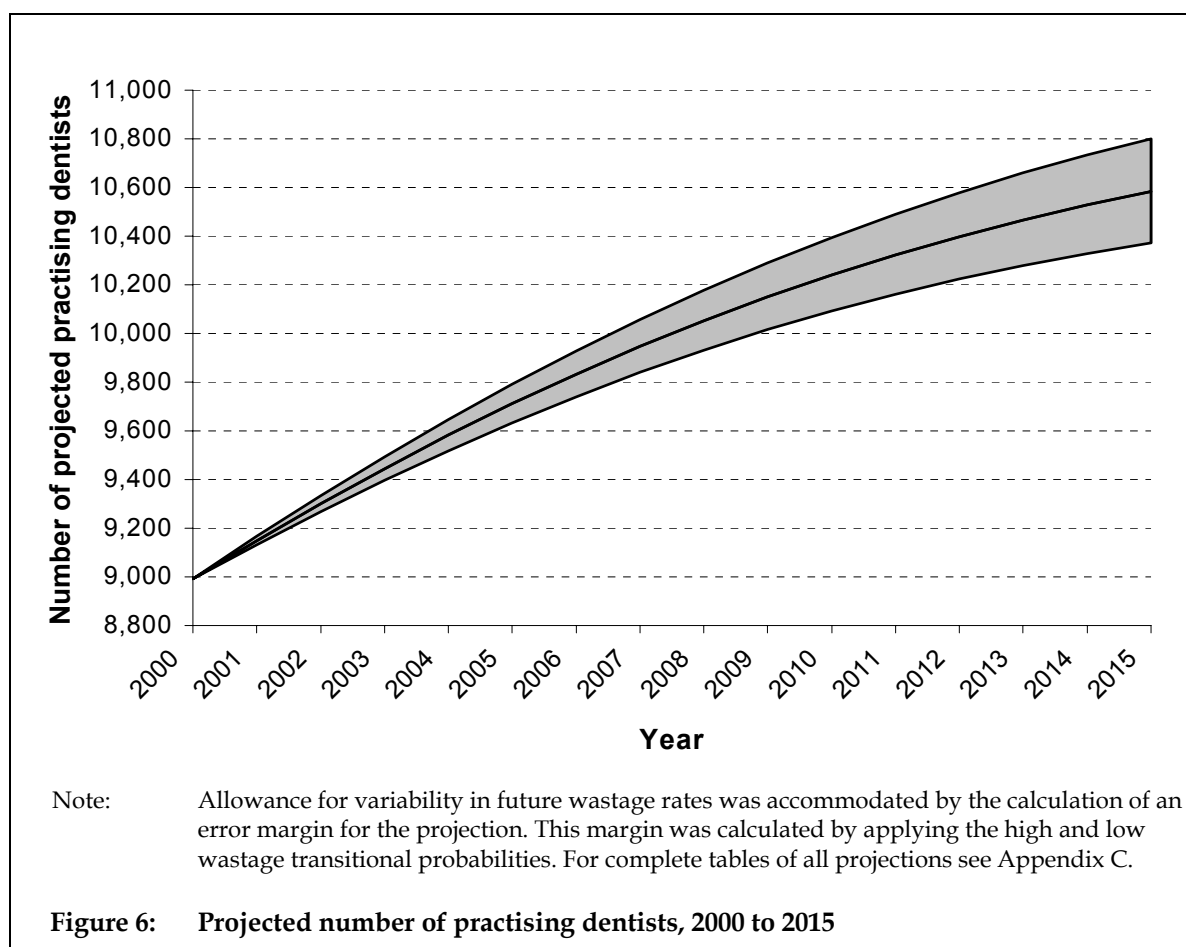
Growth in the dentist labour force up to the year 2009 is projected to slightly out pace population growth, with the practising rate per 100,000 population increasing from 46.8 to 48.5 dentists under the medium wastage vector (Figure 7). However, by 2013 the practising rate per 100,000 population starts to decline, indicating that projected growth in the labour force will not keep pace with population growth in the longer term.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
High wastage	46.8	47.0	47.2	47.4	47.6	47.7	47.8	47.8	47.8	47.8	47.8	47.7	47.6	47.5	47.4	47.2
Med wastage	46.8	47.1	47.4	47.7	47.9	48.1	48.2	48.3	48.4	48.5	48.5	48.5	48.5	48.4	48.3	48.2
Low wastage	46.8	47.2	47.6	47.9	48.2	48.5	48.7	48.9	49.0	49.1	49.2	49.3	49.3	49.3	49.2	49.2

Year

Note: Calculated using Australian Bureau of Statistics ERP projection series 'q' (see Appendix D).

Figure 7: **Projected number of practising dentists per 100,000 population, 2000 to 2015**
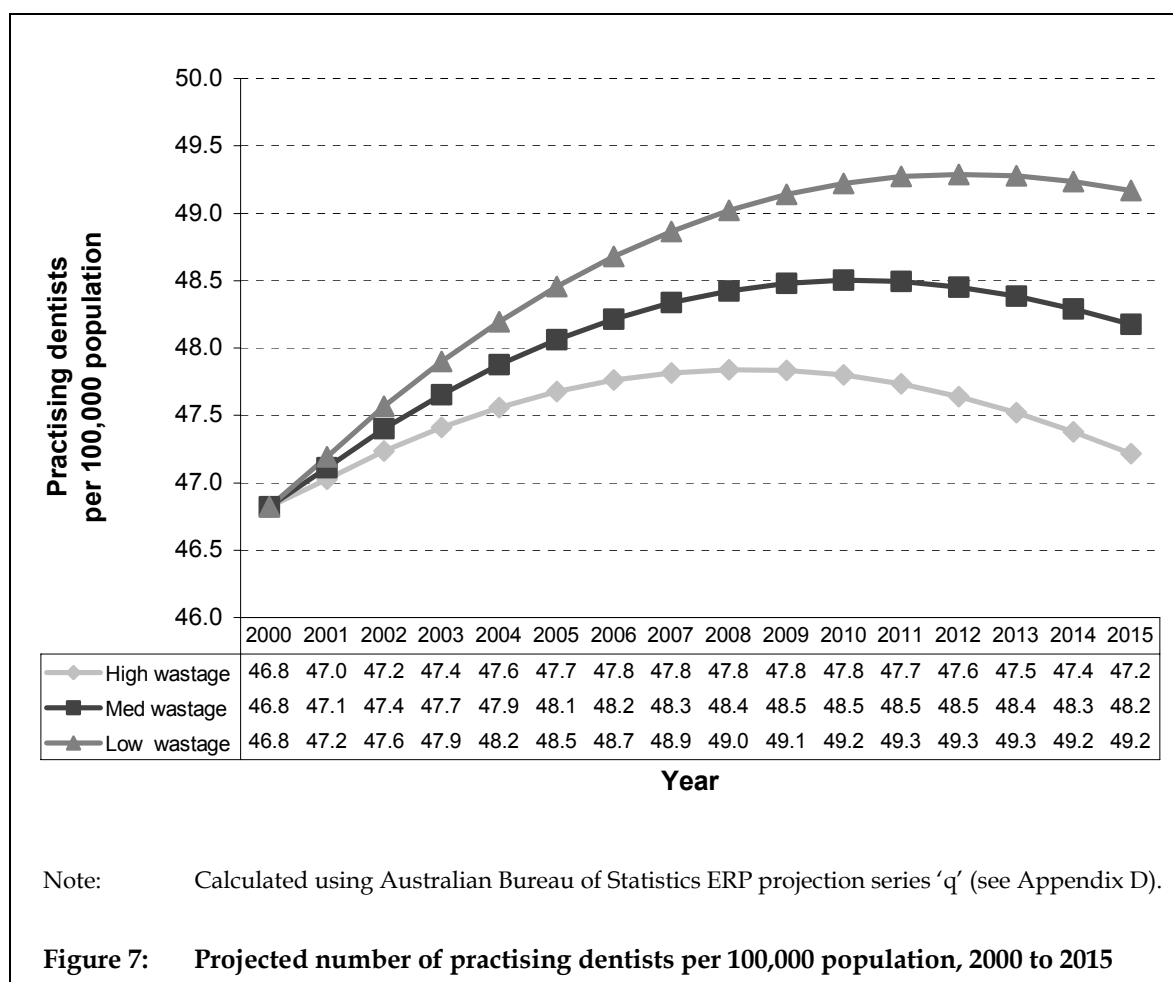
Sensitivity analysis

To explore the impact of different recruitment levels on the dentist labour force, a series of projections were developed. The projected practising rates per 100,000 population attained as a result of a series of hypothetical recruitment vectors are presented in Table 18. It can be seen that, in order to attain a practising rate above 50 dentists per 100,000, a recruitment vector totaling over 540 dentists per year would need to be maintained. Very similar rates are achieved if the recruitment is not constant and the average recruitment over the projection period, 2000 to 2015, is equivalent to the annual total of the recruitment vector. (This applies only because of the short time frame of the projections and probably would not hold true for projections greater than the year 2015.)

Table 18: **Projected practising dentists per 100,000 population by total average recruitment per year, 2010 and 2015**

	Average recruitment per year							
	420	**440**	**460**	**480**	**500**	**520**	**540**	**560**
Practising rate per 100,000 population in 2010	45.4	46.1	46.9	47.7	48.5	49.3	50.1	50.9
Practising rate per 100,000 population in 2015	43.8	44.8	45.9	47.0	48.0	49.1	50.1	51.2

Notes

1. Calculated using Australian Bureau of Statistics ERP projection series 'q' (see Appendix D).
2. The age and sex distribution of dentists in the recruitment vectors were maintained at the percentages of the total recruitment for 2001. Unlike the projections presented in Figure 7, the recruitment vectors were static and did not fluctuate as the numbers in each age and sex group altered over the period of the projection.
    (See Appendix B for details of recruitment vectors).
3. Projections based on medium wastage vector.

Analysis of the sensitivity of the recruitment vector is shown in Figure 8. The total recruitment per year is shown in the values of the x axis. The 2010 and 2015 lines show, respectively, the projected practising rates per 100,000 population attained if the level of recruitment indicated by the x axis is maintained for the 10 or 15 years of projection. The 2000 line shows the practising rate per 100,000 at baseline, 46.8 dentists. In order to maintain the baseline practising rate, average annual recruitment would need to be approximately 475 dentists per year.
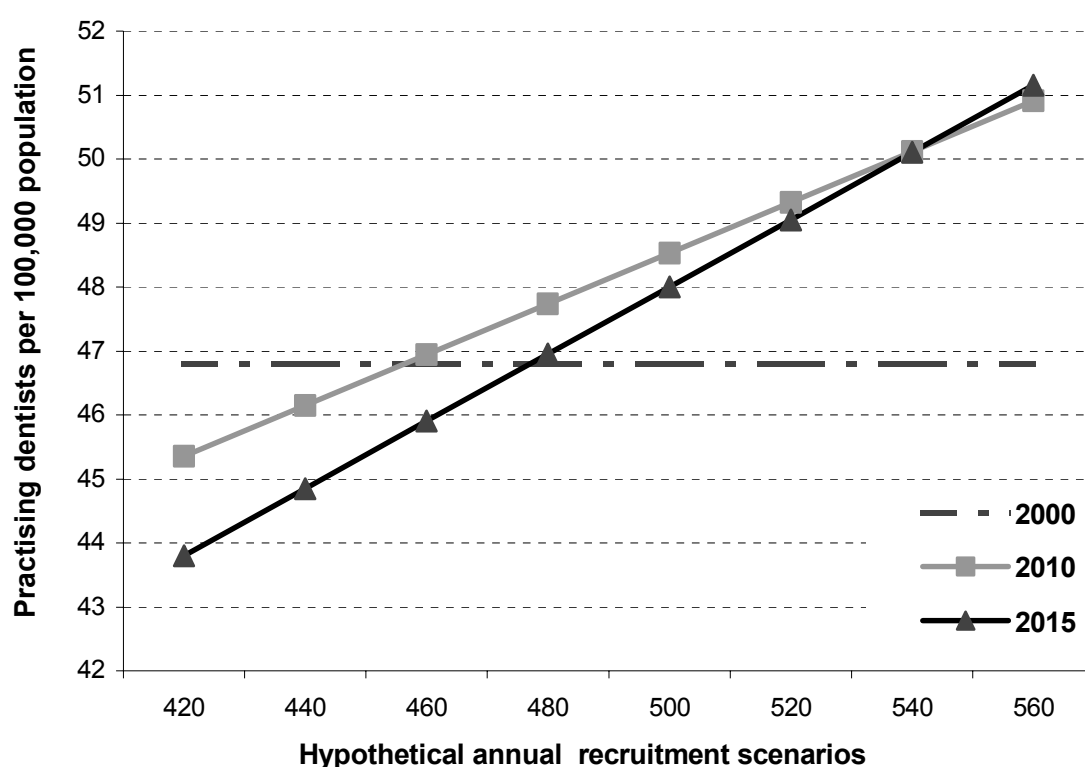
Notes

1. The projected practising dentists rate per 100,000 population in 2010 and 2015 if the total recruitment per year is *x* (or average recruitment over the 10-year period 2000 to 2010 is *x*).
2. Australian Bureau of Statistics ERP projection series 'q', (see Appendix D).
3. The practising dentist rate per 100,000 population in 2000 was 46.8 dentists.
4. The age and sex distribution of dentists in the recruitment vectors were maintained at the percentages of the total recruitment for 2001. Unlike the projections presented in Figure 7, the recruitment vectors were static and did not fluctuate as the numbers in each age and sex group altered over the period of the projection. (See Appendix E for details of recruitment vectors). Projections based on medium wastage vector.

Figure 8: **Projected practising dentists per 100,000 population by total average recruitment per year, 2000, 2010 and 2015**

4.4 Capacity of the dentist labour force to supply dental visits

Annual productivity is the product of total hours worked per year multiplied by the rate of visits per hour. Annual productivity measured in number of visits supplied each year is an alternative expression of full time equivalence, the amount of work characteristically performed by different age and sex groups.

In 1998–99 male dentists aged 30–39, 40–49 and 50–59 years supplied the highest number of dental visits per year. Female dentists aged 20 to 29 and 50 to 59 years were the next most productive in terms of visits supplied. Female dentists aged 30 to 49 and aged 60 years or older provided the fewest number of visits per year (Table 19).

Table 19: **Annual productivity (number of visits supplied per year per dentist) of practising dentists by sex and age group, 1998–99**

Age group (years)	Male dentists 1998–99	Female dentists 1998–99
20–29	2,248	2,393
30–39	2,883	2,163
40–49	3,396	2,085
50–59	3,083	2,367
60+	2,339	2,200[a]

(a) No available data, 'guess' estimate for purpose of calculating productivity projections.

Source: 1998–1999 Longitudinal study of dental practice activity, practising dentists. D Brennan & AJ Spencer unpublished data.

The capacity of practising dentists to supply dental visits is generated by multiplying the number of projected practising dentists (Table 16 and Table 17) by the percentage of practising dentists working in clinical practice (96.6%) by the 1998–99 annual productivity rates for each age and sex group (Table 19).

The capacity to supply dental visits in 2000 (baseline supply) and the projected capacity to supply dental visits under the medium wastage vector are shown in Table 20. It is projected that the total number of visits supplied by dentists will increase by 13.6 % from 24.26 million visits in 2000 to 27.56 million visits in 2015.

Table 20: **Projected number of dental visits supplied (millions) by sex and age, 2000 to 2015**

Age group (years)	Projected number of dental visits supplied (millions)															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male dentists																
20–29	1.35	1.38	1.42	1.44	1.47	1.48	1.49	1.50	1.51	1.52	1.52	1.53	1.53	1.53	1.53	1.53
30–39	3.97	3.87	3.79	3.73	3.69	3.66	3.65	3.64	3.64	3.65	3.66	3.67	3.68	3.69	3.70	3.71
40–49	7.41	7.40	7.36	7.28	7.19	7.08	6.96	6.85	6.74	6.64	6.54	6.45	6.37	6.30	6.25	6.19
50–59	4.98	5.17	5.34	5.50	5.65	5.77	5.87	5.95	6.01	6.06	6.08	6.09	6.08	6.07	6.04	6.01
60+	2.16	2.22	2.29	2.37	2.46	2.56	2.66	2.76	2.86	2.96	3.06	3.15	3.24	3.33	3.40	3.47
Total	**19.87**	**20.04**	**20.19**	**20.33**	**20.45**	**20.55**	**20.64**	**20.71**	**20.77**	**20.82**	**20.86**	**20.89**	**20.91**	**20.92**	**20.92**	**20.92**
Female dentists																
20–29	1.04	1.06	1.07	1.08	1.09	1.10	1.11	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.13
30–39	1.59	1.60	1.61	1.62	1.63	1.65	1.67	1.68	1.69	1.71	1.72	1.73	1.74	1.75	1.76	1.76
40–49	1.23	1.31	1.39	1.46	1.53	1.58	1.64	1.68	1.73	1.77	1.80	1.84	1.87	1.89	1.92	1.94
50–59	0.43	0.51	0.59	0.67	0.75	0.82	0.89	0.96	1.02	1.08	1.14	1.20	1.25	1.30	1.35	1.39
60+	0.10	0.11	0.12	0.13	0.15	0.16	0.19	0.21	0.23	0.26	0.29	0.32	0.34	0.37	0.40	0.43
Total	**4.40**	**4.59**	**4.78**	**4.97**	**5.15**	**5.32**	**5.48**	**5.64**	**5.79**	**5.94**	**6.07**	**6.20**	**6.32**	**6.44**	**6.54**	**6.64**
All dentists																
20–29	2.39	2.44	2.49	2.53	2.56	2.58	2.60	2.62	2.63	2.64	2.64	2.65	2.65	2.65	2.66	2.66
30–39	5.56	5.47	5.39	5.35	5.32	5.31	5.31	5.32	5.34	5.36	5.38	5.40	5.42	5.44	5.45	5.47
40–49	8.64	8.72	8.75	8.74	8.71	8.66	8.60	8.53	8.47	8.40	8.34	8.29	8.24	8.20	8.16	8.14
50–59	5.41	5.68	5.94	6.18	6.39	6.59	6.76	6.91	7.03	7.14	7.22	7.29	7.34	7.37	7.39	7.40
60+	2.26	2.33	2.41	2.50	2.61	2.72	2.85	2.97	3.10	3.22	3.35	3.47	3.59	3.70	3.80	3.90
Total	**24.26**	**24.63**	**24.97**	**25.29**	**25.59**	**25.87**	**26.12**	**26.35**	**26.56**	**26.76**	**26.93**	**27.09**	**27.23**	**27.35**	**27.46**	**27.56**

Note: The projection of the number of practising dentists was based on the medium wastage vector.

The projected increase in supply of dental visits (13.6%) is less than the projected increase in numbers of practising dentists (17.7%). The projected growth in dental visits does not parallel the projected growth in practitioners due to demographic changes

within the dentist labour force. It is projected that the percentage of female dentists will increase from 22.9% to 29.3% by 2015, and that the percentage of dentists over 60 years of age will increase from 11.1% to 16.4%. As these subgroups, on average, provide substantially fewer dental visits per annum, these demographic changes have a combined effect of limiting the growth in visits supplied.

The projected number of dental visits supplied per capita is presented in Figure 9. The number of visits per capita under the medium wastage vector appears to keep pace with population growth for the period of the projection. The number of visits per capita marginally increases from 1.26 in 2000 to 1.28 in 2003, then remains stable but later declines to 1.25 visits by 2015.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
High wastage	1.26	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.23
Med wastage	1.26	1.27	1.27	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.27	1.27	1.26	1.26	1.25
Low wastage	1.26	1.27	1.28	1.28	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.28	1.28

Note: Calculated using Australian Bureau of Statistics ERP projection series 'q', (see Appendix D).

Figure 9: Projected number of dental visits supplied per capita, 2000 to 2015

Impact of declining annual productivity

Dentist practice activity studies have shown that while the total hours worked by dentists has altered little, the number of visits per hour has been declining for 35 years (Spencer & Lewis, 1986). There has been both an increase in the duration of a visit and an increase in the number of services provided per visit. While the total number of services produced annually per year per dentist has remained more stable, those services are delivered across fewer visits. This decline in number of visits supplied per year is shown in Table 21, which summarises the average number of visits supplied per annum from the longitudinal studies of dental practice activity conducted between 1983 and 1999.

Table 21: Annual productivity (number of visits supplied per year per dentist) of practising dentists by sex, age group and year of study

Age group (years)	Male dentists					Female dentists			
	1983–84	1988–89	1993–94	1998–99		1983–84	1988–89	1993–94	1998–99
20–29	3,195	2,828	2,959	2,248		2,611	2,638	2,724	2,393
30–39	3,964	3,707	3,081	2,883		2,530	2,303	2,413	2,163
40–49	3,897	3,753	3,723	3,396		2,876	2,444	2,691	2,085
50–59	3,614	3,972	3,083	3,083		2,704	2,036	3,091	2,367
60+	3,003	2,744	2,413	2,339		1,936	2,427	2,160	2,200[a]

(a)   No available data, 'guess' estimate for purpose of calculating productivity projections.

Source: Longitudinal study of dental practice activity, practising dentists. D Brennan and AJ Spencer, unpublished data.

Taking into account the observed trends, it appears unlikely that the number of visits provided per annum is going to stabilise and remain static. Intuitively we may suspect that productivity rates must stabilise at some stage. However, the impact on projections, if historical productivity trends continue, should be explored.

Based on this premise, a range of supply scenarios were developed. In addition to the projection presented above in Table 20, perceived to be the 'best case scenario' and hence referred to as the high supply projection, two other supply projections were calculated.

The assumptions of the three supply projections are as follows:

- High supply projection — assumes that the number of dental visits supplied per annum will remain static and historic decline in annual productivity is ignored.

- Medium supply projection — assumes that supply rates will continue to decline at half the rate that was observed between 1983–84 and 1998–99.

- Low supply projection — assumes that supply rates will continue to decline at the same rate that was observed between 1983–84 and 1998–99.

It is suspected that both the high and low supply projections are unlikely to occur; however, they serve to illustrate the breadth of potential outcomes.

The three supply projections are represented in Figure 10. The high supply projection results in a 13.6% increase in visits supplied by 2015. The medium supply projection results in a 2.9% increase, and the low supply projection calculated a 6.6% decrease in total dental visits supplied per annum.

Notes

1.   The centre lines within the bands represent each projection. The upper and lower lines of the bands
      represent projections calculated by using +5% and –5% wastage vectors.
2.   For complete tables of the three supply projections see Appendix F, Appendix G, and Appendix H

Figure 10:   Dentists' projected capacity to supply dental visits, 2001 to 2015
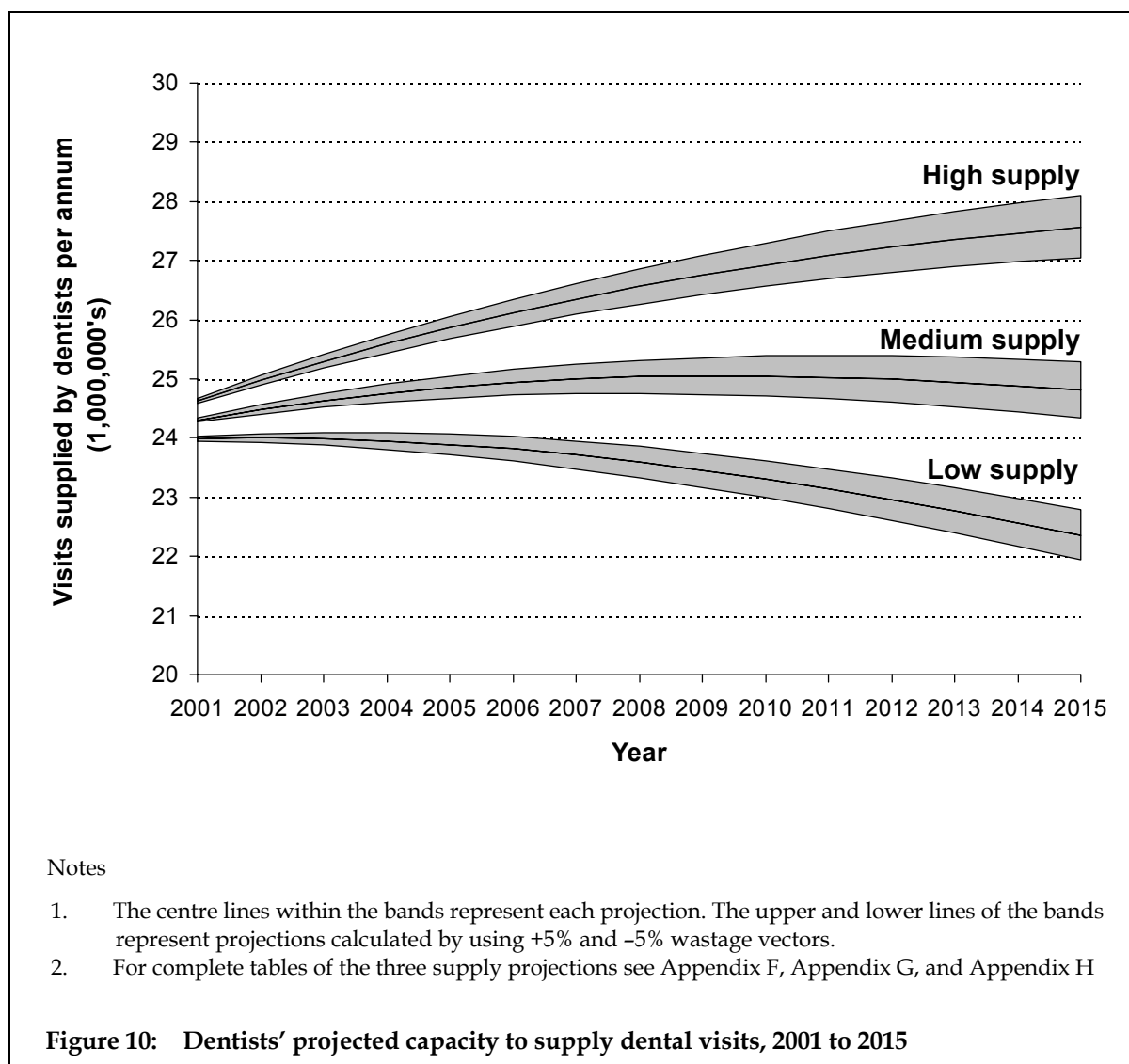
5 Projections of the allied dental practitioner labour force

5.1 Recruitment and attrition of allied dental practitioners

Projection of the allied dental practitioner labour force is a more uncertain process than for dentists. Firstly, the numbers of practising dental therapists, hygienists and prosthetists are relatively small, increasing the potential for error. Secondly, accurate baseline supply data is difficult to obtain; the ability to determine accurate practising numbers is dependent on formal registration of practitioners, but not all allied practitioner groups are registered in all States and Territories. In particular, it is suspected that labour force estimates for hygienists and therapists are understated.

The development of likely recruitment vectors is hindered by inconsistency in the training and education policies of allied dental practitioners. Course intakes can vary greatly from year to year, and some courses have been placed on indefinite moratoriums. In the case of hygienists and therapists, future practice activity is particularly difficult to anticipate due to the recent emergence of a hybrid course, Bachelor of Oral Health Therapy. Graduates of this course can practice as either a hygienist or a therapist. The degree to which graduates move between the professions or specialise remains to be seen.

The impact of migration on the allied dental labour force varies between the professions. Nearly one-fifth (18.8%) of the practising hygienist labour force was trained overseas, this comparatively high proportion was primarily due to a lack of training courses available in Australia prior to 1998–99. In contrast, only 2.9% of practising dental therapists were trained overseas and the vast majority (89.8%) gained their initial therapy qualification in the State where they currently practiced. Similarly, only a small percentage (5.4%)of prosthetists were trained overseas.

Due to the difficulties of developing a likely recruitment vector, a series of constant recruitment vectors for each professional group was developed and a range of projections were calculated. The age distribution of the recruitment vectors approximated the age distribution of recent graduates, as reported in the 2000 dental labour force data collection.

Estimating attrition of allied dental practitioners was limited by lack of consecutive data collections. Consecutive annual data collections for allied dental practitioners only commenced in 2000, and at the time of this publication only 1997 and 2000 data were available, greatly limiting the capacity to calculate wastage rates. Hence, for the purposes of producing labour force projections the observed dentist wastage rates were applied as a proxy. For dental prosthetists, as the percentage of female prosthetists was only 8.6 %, the projections were calculated using the observed male dentist wastage rates. For dental hygienists and dental therapists, as the percentage of male practitioners in these professions was negligible, the female dentist wastage rates were applied. However, as has been shown in other studies (Newton, Buck & Gibbons 2001), the wastage rates for therapists and hygienists are typically higher than the wastage rates of

female dentists. Hence, the wastage rates applied in the projections of dental therapists and dental hygienists were increased by 50%.

5.2 Dental therapist labour force

As can be seen in Table 22, the estimated number of practising dental therapists in 2000 was 1,260, and the overall practising rate per 100,000 population was 6.6 therapists. This estimate provides the baseline for projections to the year 2015.

Table 22:   **Dental therapists by practice status and States and Territories, 2000**

Practice status	NSW	Vic[a]	Qld	SA	WA	Tas	NT	ACT	Total
Working as dental therapist	216	140[b]	361	128	331	50	16	19	1,260
Working, on 3+ months' leave	11	n.a.	14	7	12	2	—	—	46
Overseas	—	n.a.	—	—	2	—	—	—	2
Working, but not in dental therapy	19	n.a.	17	12	23	2	—	—	73
Working, but not in dentistry	11	n.a.	23	4	23	—	—	—	61
Not working	3	n.a.	50	—	31	1	—	—	85
Total	**260**	**260**	**465**	**151**	**422**	**55**	**16**	**19**	**1,648**
Practising rate per 100,000 ERP	**3.3**	**2.9**	**10.1**	**8.5**	**17.6**	**10.6**	**8.2**	**6.1**	**6.6**

(a)   Victoria was not included in the 2000 labour force collection; total number registered known but practice status unknown.

(b)   The estimated number of therapists practising in Victoria was imputed by multiplying the number registered as at December 2000 (260) by the 1997 participation rate (53.9%).

Notes

1.   Not all rows and columns sum to totals due to the rounding of estimates to whole integers, and missing data.

2.   Practising solely or mainly in the cited State/Territory. Adjusted to take account of non-response.

Source: Teusner & Spencer 2003

Projections of practising dental therapists

Figure 11 shows the projected practising rate per 100,000 population attained as a result of a series of hypothetical recruitment vectors which total between 50 and 120 dental therapists per year. The total average recruitment per year is shown in the values of the *x* axis. The 2010 and 2015 lines show, respectively, the projected practising rates per 100,000 population attained if the level of recruitment per year indicated by the *x* axis is maintained for the 10 or 15 years of projection. The 2000 line shows the practising rate per 100,000 at baseline, 6.6 dental therapists. Very similar results are achieved if the recruitment is not constant and the average recruitment over the projection period, 2000 to 2015, is equivalent to the *x* axis value. (This applies only because of the short time frame of the projections and probably would not hold true for projections greater than the year 2015).

It can be seen from Figure 11 that an average recruitment of 110 dental therapists per year is required in order to maintain the 2000 practising rate of 6.6 therapists per 100,000 population in 2015.
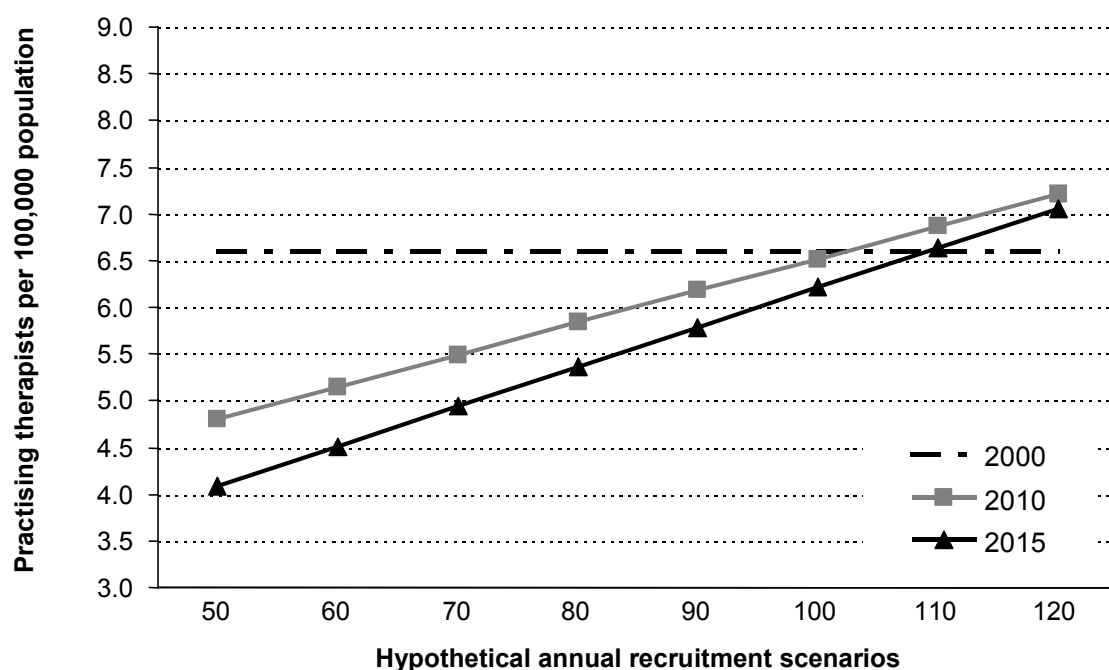
Year	Practising rate per 100,000 population							
2010	4.8	5.2	5.5	5.8	6.2	6.5	6.9	7.2
2015	4.1	4.5	4.9	5.4	5.8	6.2	6.6	7.1

Notes

1. The projected practising dental therapists rate per 100,000 population in 2010 and 2015 if the total recruitment per year is *x* (or average recruitment over the 10-year period 2000 to 2010 is *x*).
2. Australian Bureau of Statistics ERP projection series 'q', (see Appendix D).
3. The practising dental therapist rate per 100,000 population in 2000 was 6.6 therapists.
4. Projections based on constant recruitment vectors, see Appendix I for recruitment vectors by age group.

Figure 11:   Projected practising therapists per 100,000 population by total average recruitment per year, 2000, 2010 and 2015

For the purposes of projecting the future number of practising dental therapists, a 'best guess' projection was calculated. Application of a recruitment vector totalling 75 dental therapists projected that there would be 1,131 practising therapists in 2015, representing a 10.2% decrease. The annual rate of decline in practising numbers is projected to increase year to year as the number of dental therapists in the older age groups increases.

Table 23: Projected number of practising dental therapists by age group, 2000 to 2015

Age group (years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	37	32	31	30	30	30	30	30	30	30	30	30	30	30	30	30
25–29	182	181	178	175	172	170	168	167	166	165	165	164	164	164	164	164
30–34	185	188	191	192	193	193	192	191	190	190	189	188	188	188	187	187
35–39	271	246	228	215	205	199	194	190	187	184	183	181	180	179	178	177
40–44	433	383	340	303	273	248	227	211	197	186	177	170	164	159	156	153
45–49	129	181	220	231	233	229	220	210	199	188	178	169	160	152	146	140
50–54	24	42	56	84	107	124	137	145	149	150	148	145	141	136	132	127
55–59	—	4	8	16	27	39	52	62	72	79	84	88	90	91	90	89
60–64	—	—	—	1	4	7	12	18	23	29	34	38	42	45	47	49
65+	—	—	—	—	—	1	2	3	5	7	9	11	12	14	16	17
Total	**1,260**	**1,258**	**1,250**	**1,248**	**1,244**	**1,239**	**1,233**	**1,226**	**1,217**	**1,207**	**1,196**	**1,184**	**1,172**	**1,158**	**1,145**	**1,131**
Per cent change[a]		**–0.2%**	**–0.6%**	**–0.2%**	**–0.3%**	**–0.4%**	**–0.5%**	**–0.6%**	**–0.7%**	**–0.8%**	**–0.9%**	**–1.0%**	**–1.1%**	**–1.1%**	**–1.2%**	**–1.2%**

(a) Per cent change over previous year.

Note: Based on a constant recruitment vector of 75 dental therapists per year.

5.3 Dental hygienist labour force

As can be seen in Table 24, the estimated number of practising dental hygienists in 2000 was 405, and the overall practising rate per 100,000 population was 2.1 dental hygienists. This estimate provides the baseline for projections to the year 2015.

Table 24: Dental hygienists by practice status and States and Territories, 2000

Practice status	NSW	Vic[a]	Qld	SA	WA	Tas[b]	NT	ACT	Total
Working as dental hygienist	58	86[c]	45	82	110	. .	2	22	405
Working, on 3+ months' leave	—	n.a.	2	2	5	. .	—	1	10
Working, but not in dental hygiene	2	n.a.	5	11	9	. .	—	1	28
Not working	1	n.a.	1	2	8	. .	—	—	12
Overseas	—	n.a.	1	—	5	. .	—	—	6
Total	**61**	**107**	**54**	**97**	**137**	**. .**	**2**	**24**	**482**
Practising rate per 100,000 ERP	**0.9**	**1.8**	**1.3**	**4.4**	**7.3**	**. .**	**1.0**	**7.1**	**2.1**

(a) Victoria was not included in the 2000 labour force collection; total number registered known but practice status unknown.

(b) In 2000 dental hygienists were not able to register or practice in the State of Tasmania.

(c) The estimated number of hygienists practising in Victoria was imputed by multiplying the number registered as at December 2000 (107) by the 1997 participation rate (80.6%).

Notes

1. Not all rows and columns sum to totals due to the rounding of estimates to whole integers, and missing data.
2. Practising solely or mainly in the cited State/Territory. Adjusted to take account of non-response.

Source: Teusner & Spencer 2003.

Projections of practising dental hygienists

Figure 12 shows the projected practising rate per 100,000 population attained as a result of a series of hypothetical recruitment vectors totaling between 30 and 65 dental hygienists per year. The total average recruitment per year is shown in the values of the x axis. The 2010 and 2015 lines show, respectively, the projected practising rates per 100,000 population attained if the level of recruitment per year indicated by the x axis is maintained for the 10 or 15 years of projection. The 2000 line shows the practising rate per 100,000 population at baseline, 2.1 dental hygienists. Very similar results are achieved if the recruitment is not constant and the average recruitment over the projection period, 2000 to 2015, is equivalent to the x axis value. (This applies only because of the short time frame of the projections and probably would not hold true for projections greater than the year 2015).

It can be seen from Figure 12 that an average recruitment of 35 hygienists per year is required in order to maintain the 2000 practising rate of 2.1 dental hygienists per 100,000 population in 2015.
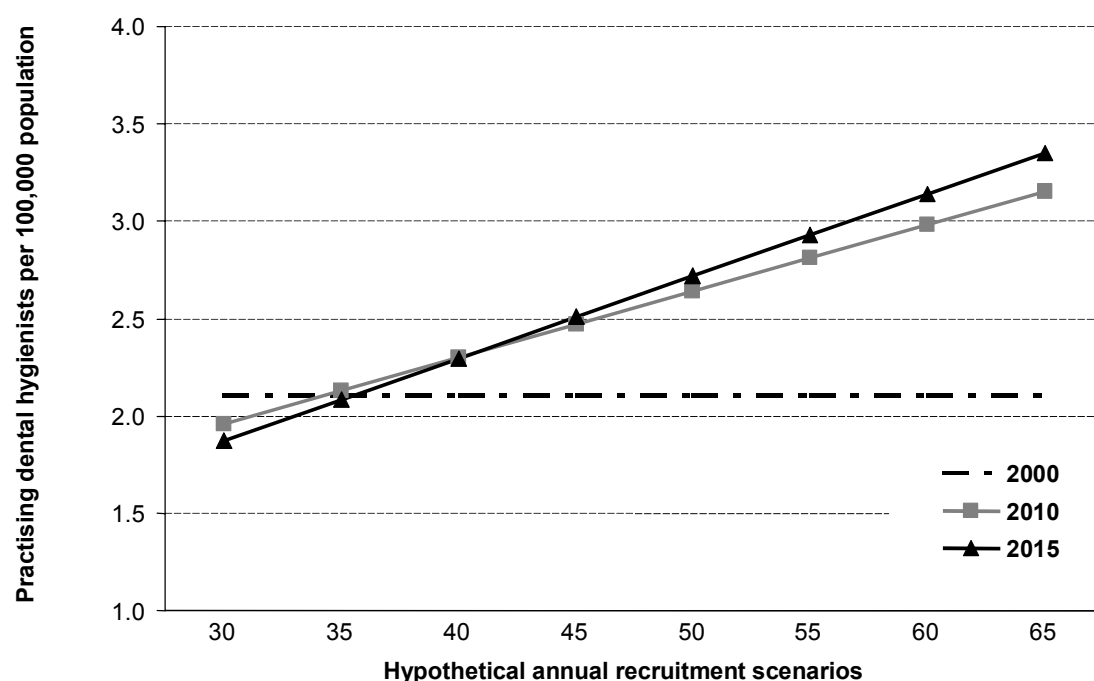
Year	Practising rate per 100,000 population							
2010	2.0	2.1	2.3	2.5	2.6	2.8	3.0	3.2
2015	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.4

Notes

1. The projected practising dental hygienists rate per 100,000 population in 2010 and 2015 if the total recruitment per year is x (or average recruitment over the 10-year period 2000 to 2010 is x).
2. Australian Bureau of Statistics ERP projection series 'q', (see Appendix D).
3. The practising dental hygienist rate per 100,000 population in 2000 was 2.1 hygienists.
4. Projections based on constant recruitment vectors, see Appendix J for recruitment vectors by age group.

Figure 12: Projected practising hygienists per 100,000 population by total average recruitment per year, 2000, 2010 and 2015

For the purposes of projecting the future number of practising dental hygienists, a 'best guess' projection was calculated and is presented in Table 25. Application of a recruitment vector totalling 45 dental hygienists projected that there would be 551 practising dental hygienists in 2015, representing a 36% increase. The annual rate of increase in practising numbers is projected to decline year to year as the number of dental hygienists in the older age groups increases.

Table 25: **Projected number of practising dental hygienists by age group, 2000 to 2015**

Age group (years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	51	35	28	26	25	25	25	25	25	25	25	25	25	25	25	25
25–29	65	92	103	108	110	111	111	112	112	112	113	113	113	113	113	113
30–34	97	92	94	97	101	103	106	107	109	110	111	111	112	112	113	113
35–39	75	78	79	80	82	83	85	87	89	90	91	92	93	94	95	95
40–44	61	61	61	61	62	63	64	65	66	67	68	69	70	71	72	73
45–49	35	38	41	43	44	45	46	47	48	49	50	51	52	53	53	54
50–54	17	19	21	24	26	28	29	31	32	33	34	35	36	37	38	39
55–59	3	5	7	9	11	13	14	16	17	18	19	20	21	22	22	23
60–64	1	1	1	2	3	4	5	6	7	8	9	9	10	11	11	12
65+	—	—	—	—	1	1	1	2	2	2	3	3	3	3	4	4
Total	**405**	**422**	**436**	**450**	**464**	**476**	**487**	**497**	**506**	**515**	**522**	**529**	**535**	**541**	**546**	**551**
Per cent increase[a]		4.1%	3.3%	3.3%	3.0%	2.6%	2.3%	2.1%	1.9%	1.6%	1.5%	1.3%	1.2%	1.1%	0.9%	0.8%

(a) Per cent change over previous year.

Note: Based on a constant recruitment vector of 45 dental hygienists per year.

5.4 Dental prosthetist labour force

As can be seen in Table 26, the estimated number of practising dental prosthetists in 2000 was 836, and the overall practising rate per 100,000 population was 4.4 dental prosthetists. This estimate provides the baseline for projections to the year 2015.

Table 26:   **Dental prosthetists, practice status by States and Territories, 2000**

Practice status	NSW	Vic[a]	Qld	SA	WA	Tas	NT[b]	ACT	Total
Working solely in this State/Territory or mainly in this State/Territory	304	260[c]	117	27	60	52	. .	16	836
Working only in another State/Territory	6	n.a.	4	3	—	—	. .	2	15
On extended leave (3+ months)	2	n.a.	2	—	—	—	. .	—	4
Working overseas	2	n.a.	2	2	—	—	. .	—	6
Not working	38	n.a.	9	2	22	—	. .	—	71
Working in dentistry but not in prosthetics	25	n.a.	11	—	3	—	. .	—	39
Working, but not in dentistry or prosthetics	8	n.a.	2	2	3	—	. .	—	15
Total registered	**385**	**306**	**147**	**36**	**88**	**52**	**. .**	**18**	**1,032**
Practising rate per 100,000 population	**4.7**	**5.5**	**3.3**	**1.8**	**3.2**	**11.1**	**. .**	**5.1**	**4.4**

(a)   Victoria was not included in the 2000 labour force collection; total number registered known but practice status unknown.

(b)   Dental prosthetists are not able to register to practice in the Northern Territory.

(c)   The estimated number of prosthetists practising in Victoria was imputed by multiplying the number registered as at December 2000 (306) by the 1998 participation rate (85.1%).

Notes:

1.   Not all rows and columns sum to totals due to the rounding of estimates to whole integers, and missing data.
2.   Practising solely or mainly in the cited State/Territory. Adjusted to take account of non-response.

Source: Teusner & Spencer 2003.

Projections of practising prosthetists

Figure 13 shows the projected practising rate per 100,000 population attained as a result of a series of hypothetical recruitment vectors totalling between 15 and 50 dental prosthetists per year. The total average recruitment per year is shown in the values of the x axis. The 2010 and 2015 lines show, respectively, the projected practising rates per 100,000 population attained if the level of recruitment per year indicated by the x axis is maintained for the 10 or 15 years of projection. The 2000 line shows the practising rate per 100,000 at baseline, 4.4 dental prosthetists. Very similar results are achieved if the recruitment is not constant and the average recruitment over the projection period, 2000 to 2015, is equivalent to the x axis value. (This applies only because of the short time frame of the projections and most likely would not hold true for projections greater than the year 2015).

It can be seen from Figure 13 that an average recruitment of 35 dental prosthetists per year is required in order to maintain the 2000 practising rate of 4.4 dental prosthetists per 100,000 population in 2015.
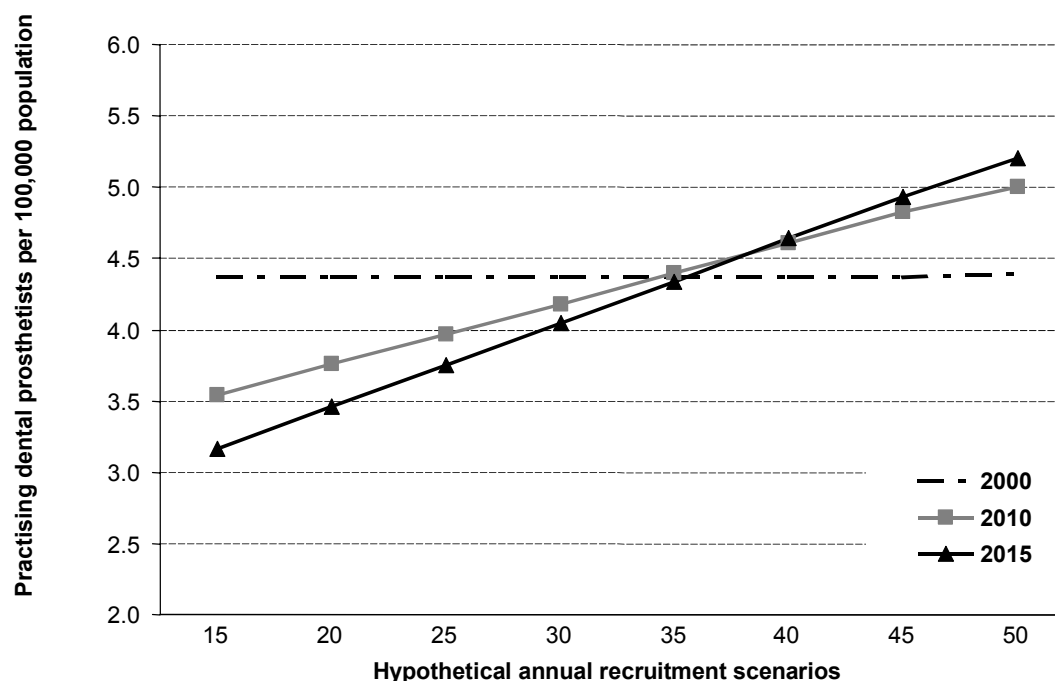
Year	Practising rate per 100,000 population							
2010	3.5	3.8	4.0	4.2	4.4	4.6	4.8	5.0
2015	3.2	3.5	3.8	4.1	4.3	4.6	4.9	5.2

Notes

1. The projected practising dental prosthetists rate per 100,000 population in 2010 and 2015 if the total recruitment per year is x (or average recruitment over the 10-year period 2000 to 2010 is x).
2. Australian Bureau of Statistics ERP projection series 'q', (see Appendix D).
3. The practising dental prosthetist rate per 100,000 population in 2000 was 4.4 prosthetists.
4. Projections based on constant recruitment vectors, see Appendix K for recruitment vectors by age group.

Figure 13: Projected practising dental prosthetists per 100,000 population by total average recruitment per year, 2000, 2010 and 2015

For the purposes of projecting the future number of practising dental prosthetists, a 'best guess' projection was calculated and is presented in Table 27. Application of a recruitment vector totalling 20 dental prosthetists projected that there would be 757 practising dental prosthetists in 2015, representing a 9.4% decrease. The annual rate of decline in practising numbers is projected to increase year to year as the number of dental prosthetists in the older age groups increases.

Table 27:   **Projected number of practising dental prosthetists by age group, 2000 to 2015**

Age group (years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25–29	27	26	25	25	25	24	24	24	24	24	24	24	24	24	24	24
30–34	81	73	67	62	58	55	53	51	50	49	48	48	47	47	46	46
35–39	154	139	126	115	105	97	90	84	80	76	72	70	68	66	64	63
40–44	199	197	192	185	177	169	161	152	145	137	130	124	119	114	110	106
45–49	125	138	148	155	160	162	162	161	158	154	150	145	140	135	130	125
50–54	99	103	105	112	118	124	129	133	136	138	139	138	137	136	133	130
55–59	47	56	63	70	76	83	89	95	100	105	109	113	115	117	119	119
60–64	40	39	38	40	43	46	49	53	57	61	64	68	72	75	78	80
65+	65	61	59	56	54	52	51	51	51	52	53	55	57	59	61	63
Total	**836**	**831**	**823**	**819**	**816**	**812**	**808**	**804**	**800**	**795**	**790**	**784**	**778**	**771**	**764**	**757**
Per cent change[a]		–0.6%	–1.0%	–0.5%	–0.4%	–0.4%	–0.5%	–0.5%	–0.5%	–0.6%	–0.7%	–0.7%	–0.8%	–0.9%	–0.9%	–1.0%

(a)   Per cent change over previous year.

Note: Based on a constant recruitment vector of 20 prosthetists per year.

5.5 Capacity of the allied dental practitioner labour force to supply dental visits

The allied dental labour force provide a relatively small proportion of the total dental visits supplied. The services provided by dental therapists, dental hygienists and dental prosthetists tend to be concentrated, both in the range of services delivered and/or the age groups treated. Consequently, the services provided are more significant in relation to specific target groups in the population. The services provided by the allied dental labour force can be viewed as largely complementary to those provided by dentists; however, substantial overlap between the professional groups in terms of services provided does exist.

Table 28 presents productivity information for dental therapists, dental hygienists, and dental prosthetists. The mean number of hours worked per week is highest for prosthetists at 43.6 hours, followed by hygienists at 30.0 hours and then therapists at 28.8 hours per week. Patient visits per year are calculated for each group based on the information available. (Dentist data was cited where no profession specific data was available). These figures show that practising therapists provide 1,969 visits per year, compared with dental hygienists who provide 2,154 visits per year, and dental prosthetists who provide 3,345 visits per year.

Table 28: **Estimated annual productivity (estimated number of dental visits): dental hygienists, dental therapists and dental prosthetists**

		Dental therapists	Dental hygienists	Dental prosthetists
Hours per week [a]		28.80	30.00	43.60
Weeks per year [b]		43.26	43.26	44.60
Hours per year [c]		1245.89	1,297.80	1,944.56
Patient visits per hour [d]		1.58	1.66	1.72
Patient visits per year [e]		1968.50	2,154.35	3,344.64
	[a]	2000 Therapist Labour Force Collection	2000 Hygienist Labour Force Collection	2000 Prosthetist Labour Force Collection
	[b]	1998–99 Longitudinal Study of Dentists' Practice Activity, practising female dental practitioners	1998–99 Longitudinal Study of Dentists' Practice Activity, practising female dental practitioners	1998–99 Longitudinal Study of Dentists' Practice Activity, practising male dental practitioners
	[c]	[Hours per week] x [Weeks per year]	[Hours per week] x [Weeks per year]	[Hours per week] x [Weeks per year]
	[d]	1998–99 Longitudinal Study of Dentists' Practice Activity in Australia, practising female dental practitioners	1998 Dental Hygienist Labour Force Practice Activity in Australia	1998–99 Longitudinal Study of Dentists' Practice Activity in Australia, Practising male dental practitioners
	[e]	[Hours per year] x [Patient visits per hour]	[Hours per year] x [Patient visits per hour]	[Hours per year] x [Patient visits per hour]

Due to the limited availability of appropriate annual productivity data, additional caution needs to be exercised when interpreting the projections of the allied dental labour force to provide dental visits. It should be noted that not all practising allied dental professionals are principally involved in the delivery of clinical services. This is particularly relevant for dental prosthetists, the majority of who do not work in clinical practice but in laboratory settings. Hence, the calculation of visits supplied by allied dental professionals was multiplied by an estimate of the number practising whose principal practice location was clinical. The projected capacity of the allied dental labour force to provide visits is presented in Table 29. It is projected that the overall number of visits supplied by the allied dental labour force will only decline by 0.9%, from a total of 4.32 million visits in 2000 to 4.28 million dental visits in 2015.

Table 29:   Capacity of the allied dental labour force to supply dental visits, 2000 and 2015

	2000		2000 (baseline supply)		2015 (projected supply)	
	Patient visits per year[a]	Percentage Clinical practice[b]	Number practising	Capacity to supply visits ('000)[c]	Projected number practising[d]	Capacity to supply visits ('000)[c]
Dental therapists	1,968.50	95.1%	1,260	2,359.62	1,131	2,118.72
Dental hygienists	2,154.35	97.6%	405	851.72	551	1,157.74
Dental prosthetists	3,344.64	39.6%	836	1,107.80	757	1,002.28
Total capacity to supply dental visits	. .	. .	. .	**4,319.15**	. .	**4,278.74**

(a) Estimated visits supplied per year (Table 28).

(b) Percentage of practising dental auxiliaries that reported their type of main practice was clinical or mainly clinical, Labour force data collection, 2000

(c) [Patient visits per year (Table 28)] x [% Clinical practice] x [Number practising].

(d) Projected number practising based on constant recruitment vectors totalling 45 hygienists per year, 75 therapists per year and 20 prosthetists per year.

6 Overview

Projections of the dentist and allied dental practitioner labour forces are summarised in Table 30. Calculated using a total annual recruitment of 489 dentists per year and the medium age/sex specific wastage rates, the dentists labour force was projected to increase by 17.7% by the year 2015. The projected growth, up to the year 2010, is expected to slightly out pace population growth, however, by 2013 the practising rate per 100,000 population starts to decline, indicating that projected growth in the labour force will not keep pace with population growth in the longer term.

Projections of the therapist and prosthetist labour force resulted in decreases in the number of practitioners (10.2% and 9.4% respectively). In contrast, a substantial increase was projected for the hygienist labour force, 36.0%, although this increase was calculated from a low base.

Table 30:   Projections of the dental labour force, 2000, 2005, 2010 and 2015

	Professional group			
Year	**Dentists**	**Therapists**	**Hygienists**	**Prosthetists**
	Number of practitioners			
2000 (baseline)	8,991	1,260	405	836
2005	9,712	1,239	476	812
2010	10,241	1,196	522	790
2015	10,583	1,131	551	757
Per cent change,2000 to 2015	17.7%	−10.2%	36.0%	−9.4%
	Practising rate per 100,000 population			
2000 (baseline)	46.8	6.6	2.1	4.4
2005	48.1	6.1	2.4	4.0
2010	48.5	5.7	2.5	3.7
2015	48.2	5.1	2.5	3.4
Per cent change,2000 to 2015	3.0%	−21.5%	18.9%	−20.8%

Notes

1. Projected number of dentist visits supplied based on practising dentists projections calculated under the medium wastage vector.
2. Projected number of allied dental visits supplied based on practising allied practitioners calculated by applying constant recruitment vectors totalling 45 hygienists per year, 75 therapists per year and 20 prosthetists per year.

Dentist projections calculated using a range of recruitment scenarios illustrated that projected practising rates were not particularly sensitive to alterations in the total average annual recruitment. An increase in annual average recruitment from 489 to 560 dentists per year (a 14.5% increase) only resulted in a small increase in the projected practising rate in 2015. An average recruitment level of 489 resulted in 48.2 dentists per 100,000 population, as compared to 51.2 if recruitment totalled 560, (an increase of 6.2%).

Table 31 summarises the projected capacity of both dentists and the allied dental practitioners to supply dental visits to the year 2015. While the capacity of the dentist labour force is projected to increase by 13.6%, from 24.26 million visits in 2000 to 27.56 million visits by 2015, the capacity of the allied dental labour force to provide dental visits is projected to decline by 0.9%, from a total 4.319 million visits in 2000 to 4.279 million visits in 2015.

In 2000 it was estimated that the combined capacity of the allied dental labour force to supply dental visits was 15.1% of all visits supplied. By 2015 this percentage is expected to decline slightly, with the allied dental practitioner labour force providing 13.4% of all dental visits.

The projected total capacity to provide dental visits in 2015 is 31.84 million visits, an increase of 11.4%. It appears that this growth will not keep pace with projected growth in the population, as the visits per capita will decline from 1.49 visits per capita in 2000 to 1.45 in 2015.

Table 31: **Capacity of the dental labour force to supply dental visits, 2000, 2005, 2010 and 2015**

| | Dental visits supplied ('000) | | | |
Year	Dentist labour force	Allied dental labour force	Total	Visits per capita
2000 (baseline)	24.261	4.319	28.580	1.49
2005	25.866	4.396	30.263	1.50
2010	26.931	4.385	31.316	1.48
2015	27.563	4.279	31.841	1.45
Per cent change, 2000 to 2015	**13.6%**	**−0.9%**	**11.4%**	**−2.6%**

Notes

1. Projected number of dentist visits supplied based on practising dentists projections calculated under the medium wastage vector.
2. Projected number of allied dental visits supplied based on practising allied practitioners calculated by applying constant recruitment vectors totalling 45 hygienists per year, 75 therapists per year and 20 prosthetists per year.

Alternate dentist supply projections were calculated in order to examine the impact on supply if previously observed trends of declining visits per annum continued in the future. Table 32 summarises the projected change in the entire dental labour force under the dentist supply projections based on three different assumptions. These results illustrate the sensitivity of projections of capacity to supply dental visits to differing assumptions of the visits supplied per annum by dentists.

The long-term trend has been a decline in visits supplied per annum. While historically some of the decrease was a result of reduced hours per year, most of the decrease was due to an increase in the length of time per visit. One possible reason for the increased length of time per visit is the impact of science and technology on dental practice. In more recent times factors like infection control may have contributed to the lengthening of visits and the consequent reduction in visits supplied per annum.

The low dentist supply projection presented in Table 32 reflects the full continuation of the decrease in visits supplied per annum by dentists and results in a decrease of 17.6% in visits supplied per capita. A cautious approach would be to place emphasis on the medium dentists supply projection. This indicates a marginal growth in capacity to supply visits between 2000 and 2015 of some 2.4%, however this growth fails to keep pace with population growth and results in a decrease in visits per capita by 10.5%. Population growth is a major driver of the burden of disease, demand and use of dental services. Hence, the projections of the dental labour force and capacity to supply visits may potentially be at odds with trends in demand for dental services.

Table 32: Capacity of the dental labour force to supply dental visits: high, medium and low supply projections, 2000, 2005, 2010 and 2015

| | Capacity to supply dental visits by total dental labour force | | | | | |
| | High dentist supply projection | | Medium dentist supply projection | | Low dentist supply projection | |
Year	Visits ('000)	Visits per capita	Visits ('000)	Visits per capita	Visits ('000)	Visits per capita
2000 (baseline)	28.580	1.49	28.419	1.48	28.258	1.47
2005	30.263	1.50	29.257	1.45	28.290	1.40
2010	31.316	1.48	29.430	1.39	27.687	1.31
2015	31.841	1.45	29.087	1.32	26.643	1.21
Per cent change, 2000 to 2015	**11.4%**	**−2.6%**	**2.4%**	**−10.5%**	**−5.7%**	**−17.6%**

7 References

Australian Bureau of Statistics (ABS) 2000a. Population projections Australia 1999–2101. Canberra: ABS Cat. No. 3222.0.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, New South Wales, 30 June 2000. Canberra: ABS Cat. No. 3235.1.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Victoria, 30 June 2000. Canberra: ABS Cat. No. 3235.2.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Queensland, 30 June 2000. Canberra: ABS Cat. No. 3235.3.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, South Australia, 30 June 2000. Canberra: ABS Cat. No. 3235.4.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Western Australia, 30 June 2000. Canberra: ABS Cat. No. 3235.5.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Tasmania, 30 June 2000. Canberra: ABS Cat. No. 3235.6.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Northern Territory, 30 June 2000. Canberra: ABS Cat. No. 3235.7.

Australian Bureau of Statistics (ABS) 2000. Estimated Resident Population, Australian Capital Territory, 30 June 2000. Canberra: ABS Cat. No. 3235.8.

Australian Institute of Health and Welfare Dental Statistics and Research Unit 1994. Dental Practitioner statistics, Australia, 1992. AIHW DSRU (Dental Statistics and Research series No. 6). Adelaide: The University of Adelaide.

Australian Institute of Health and Welfare Dental Statistics and Research Unit 1998. Australia's Oral Health and Dental Services. AIHW Cat. No. DEN 13. (Dental Statistics and Research series No. 18). Adelaide: The University of Adelaide.

Bartholomew DJ & Forbes AF 1979, Statistical Techniques for Manpower Planning, London: John Wiley & Sons Ltd.

Newton JT, Buck D and Gibbons DE 2001. Workforce planning in dentistry: The impact of shorter and more varied career patterns. Community Dental Health, Volume 18: 236–41.

AIHW DSRU: Szuster FSP & Spencer AJ 1997. Dental Practitioner statistics, Australia, 1994. AIHW/DSRU (Dental Statistics and Research Series No. 11). Adelaide: The University of Adelaide.

Spencer AJ & Lewis JM 1986. Workforce participation and productivity of dentists in Australia. Melbourne: Department of Preventive and Community Dentistry, University of Melbourne.

Szuster FSP 1999.Dentists' career study, Master of Social Science thesis, University of South Australia.

AIHW DSRU: Teusner DN & Spencer AJ 2003. Dental Labour Force Australia, 2000. AIHW Cat. No. DEN 116. (Dental Statistics and Research Series No. 28). Canberra: AIHW.

Appendix A: Estimated resident population, Australian States and Territories, 30th June 2000

ABS Cat. No. 30th June 2000	State	Total	Capital city	Capital city population	Other regions population
3235.1	**NSW**	6,463,455	Sydney	4,085,578	2,377,877
3235.2	**Vic**	4,765,856	Melbourne	3,466,025	1,299,831
3235.3	**Qld**	3,566,357	Brisbane	1,626,865	1,939,492
3235.4	**SA**	1,497,634	Adelaide	1,096,102	401,532
3235.5	**WA**	1,883,860	Perth	1,381,127	502,733
3235.6	**Tas**	470,376	Greater Hobart	194,228	276,148
3235.7	**NT**	195,463	Darwin	90,011	105,452
3235.8	**ACT**	310,839	Canberra	310,839	. .
	Aust	**19,153,840**		**12,250,775**	**6,903,065**

Appendix B: Complete recruitment vectors, low, medium and high wastage projections

Recruitment vector, low wastage, male dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	89.1	89.5	89.5	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6
25–29	66.0	66.0	66.3	66.6	66.8	67.0	67.2	67.3	67.4	67.5	67.5	67.6	67.6	67.6	67.6
30–34	31.0	30.9	30.8	30.7	30.8	30.9	30.9	31.0	31.1	31.2	31.3	31.4	31.4	31.5	31.6
35–39	26.8	26.5	26.2	26.0	25.9	25.8	25.7	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.7
40–44	26.4	26.1	25.8	25.5	25.1	24.9	24.6	24.4	24.2	24.1	23.9	23.8	23.7	23.7	23.6
45–49	19.3	19.6	19.8	19.8	19.8	19.8	19.7	19.7	19.5	19.4	19.3	19.2	19.1	19.0	18.9
50–54	10.1	10.2	10.2	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.5	10.4	10.4	10.4
55–59	10.2	10.6	11.0	11.3	11.6	11.9	12.1	12.3	12.4	12.6	12.7	12.8	12.8	12.9	12.9
60–64	9.0	9.5	10.0	10.5	11.1	11.7	12.2	12.7	13.2	13.6	14.0	14.4	14.7	15.0	15.2
65–69	7.3	7.3	7.3	7.5	7.7	8.0	8.4	8.8	9.2	9.6	10.0	10.4	10.7	11.1	11.4
70–74	5.0	5.2	5.3	5.4	5.5	5.6	5.8	5.9	6.1	6.3	6.6	6.8	7.1	7.4	7.6
Total	**300.3**	**301.2**	**302.2**	**303.3**	**304.4**	**305.5**	**306.6**	**307.8**	**308.9**	**309.9**	**311.0**	**311.9**	**312.8**	**313.7**	**314.4**

Recruitment vector, low wastage, female dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1
25–29	49.5	49.4	49.5	49.6	49.7	49.8	49.9	49.9	50.0	50.0	50.0	50.0	50.1	50.1	50.1
30–34	23.6	24.0	24.2	24.4	24.7	24.9	25.0	25.2	25.3	25.5	25.6	25.7	25.7	25.8	25.8
35–39	21.4	21.3	21.3	21.3	21.4	21.5	21.5	21.6	21.8	21.9	22.0	22.0	22.1	22.2	22.3
40–44	18.6	19.6	20.4	21.1	21.6	22.1	22.5	22.9	23.2	23.5	23.8	24.0	24.2	24.4	24.6
45–49	9.2	9.4	9.6	9.8	10.0	10.2	10.3	10.5	10.7	10.8	11.0	11.1	11.2	11.3	11.4
50–54	3.4	3.6	3.7	3.8	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.8	4.9
55–59	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
60–64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60–64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65–69	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.4	1.5	1.7	1.9	2.1	2.3
70–74	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8
Total	**188.8**	**190.4**	**192.0**	**193.5**	**194.9**	**196.1**	**197.3**	**198.5**	**199.5**	**200.6**	**201.5**	**202.4**	**203.3**	**204.1**	**204.8**

Recruitment vector, medium wastage, male dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	89.1	89.5	89.5	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6
25–29	66.0	65.9	66.2	66.5	66.8	66.9	67.1	67.2	67.3	67.3	67.4	67.4	67.5	67.5	67.5
30–34	31.0	30.8	30.7	30.7	30.7	30.8	30.8	30.9	31.0	31.1	31.2	31.2	31.3	31.3	31.4
35–39	26.8	26.5	26.2	26.0	25.8	25.7	25.6	25.6	25.5	25.5	25.5	25.5	25.5	25.5	25.6
40–44	26.4	26.1	25.8	25.4	25.1	24.8	24.6	24.4	24.2	24.0	23.8	23.7	23.6	23.6	23.5
45–49	19.3	19.6	19.7	19.8	19.8	19.8	19.7	19.6	19.5	19.4	19.3	19.2	19.0	18.9	18.8
50–54	10.1	10.2	10.2	10.3	10.4	10.4	10.5	10.5	10.5	10.5	10.5	10.4	10.4	10.4	10.3
55–59	10.2	10.6	11.0	11.3	11.6	11.8	12.0	12.2	12.4	12.5	12.6	12.7	12.7	12.7	12.8
60–64	9.0	9.4	9.9	10.4	11.0	11.5	12.0	12.5	12.9	13.4	13.7	14.1	14.4	14.6	14.8
65–69	7.3	7.2	7.2	7.4	7.6	7.8	8.1	8.5	8.9	9.2	9.6	9.9	10.3	10.6	10.9
70–74	5.0	5.1	5.2	5.3	5.4	5.4	5.5	5.7	5.8	6.0	6.2	6.5	6.7	6.9	7.2
Total	**300.3**	**301.0**	**301.8**	**302.7**	**303.7**	**304.6**	**305.6**	**306.6**	**307.5**	**308.5**	**309.4**	**310.2**	**311.0**	**311.7**	**312.3**

Appendix B(continued): Complete recruitment vectors, low, medium and high wastage projections

Recruitment vector, medium wastage, female dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1
25–29	49.5	49.3	49.4	49.6	49.7	49.7	49.8	49.9	49.9	49.9	49.9	50.0	50.0	50.0	50.0
30–34	23.6	23.9	24.1	24.3	24.5	24.7	24.9	25.0	25.1	25.2	25.3	25.4	25.5	25.5	25.6
35–39	21.4	21.3	21.2	21.2	21.3	21.3	21.4	21.5	21.6	21.7	21.7	21.8	21.9	21.9	22.0
40–44	18.6	19.6	20.4	21.0	21.5	22.0	22.3	22.7	23.0	23.2	23.5	23.7	23.9	24.1	24.2
45–49	9.2	9.4	9.5	9.7	9.9	10.1	10.3	10.5	10.6	10.8	10.9	11.0	11.1	11.2	11.3
50–54	3.4	3.5	3.7	3.8	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.6	4.7	4.8	4.9
55–59	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
60–64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65–69	0.2	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4	1.6	1.8	1.9	2.1
70–74	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
Total	**188.8**	**190.3**	**191.8**	**193.1**	**194.4**	**195.6**	**196.7**	**197.7**	**198.6**	**199.6**	**200.4**	**201.2**	**202.0**	**202.7**	**203.4**

Recruitment vector, high wastage, male dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	89.1	89.5	89.5	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6	89.6
25–29	66.0	65.9	66.2	66.5	66.7	66.9	67.0	67.1	67.2	67.2	67.3	67.3	67.3	67.4	67.4
30–34	31.0	30.8	30.7	30.6	30.6	30.7	30.7	30.8	30.9	31.0	31.0	31.1	31.1	31.2	31.2
35–39	26.8	26.4	26.2	26.0	25.8	25.7	25.6	25.5	25.5	25.4	25.4	25.4	25.4	25.4	25.5
40–44	26.4	26.1	25.7	25.4	25.1	24.8	24.5	24.3	24.1	23.9	23.8	23.7	23.5	23.5	23.4
45–49	19.3	19.6	19.7	19.8	19.8	19.8	19.7	19.6	19.5	19.4	19.2	19.1	19.0	18.9	18.8
50–54	10.1	10.2	10.2	10.3	10.3	10.4	10.4	10.5	10.5	10.4	10.4	10.4	10.4	10.3	10.3
55–59	10.2	10.6	11.0	11.3	11.5	11.8	12.0	12.1	12.3	12.4	12.5	12.6	12.6	12.6	12.6
60–64	9.0	9.4	9.9	10.4	10.9	11.4	11.8	12.3	12.7	13.1	13.4	13.8	14.0	14.3	14.5
65–69	7.3	7.2	7.2	7.2	7.4	7.6	7.9	8.2	8.6	8.9	9.2	9.6	9.9	10.2	10.4
70–74	5.0	5.1	5.2	5.2	5.2	5.3	5.3	5.4	5.6	5.7	5.9	6.1	6.3	6.5	6.7
Total	**300.3**	**300.8**	**301.5**	**302.2**	**303.0**	**303.8**	**304.6**	**305.4**	**306.3**	**307.0**	**307.8**	**308.5**	**309.2**	**309.7**	**310.3**

Recruitment vector, high wastage, female dentists, 2001 to 2015

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1	61.1
25–29	49.5	49.3	49.4	49.5	49.6	49.7	49.7	49.8	49.8	49.8	49.8	49.9	49.9	49.9	49.9
30–34	23.6	23.9	24.1	24.2	24.4	24.6	24.7	24.8	24.9	25.0	25.1	25.2	25.2	25.3	25.3
35–39	21.4	21.2	21.2	21.2	21.2	21.2	21.3	21.3	21.4	21.4	21.5	21.6	21.6	21.7	21.7
40–44	18.6	19.6	20.3	20.9	21.4	21.8	22.2	22.5	22.7	23.0	23.2	23.4	23.5	23.7	23.8
45–49	9.2	9.4	9.5	9.7	9.9	10.1	10.3	10.4	10.6	10.7	10.8	10.9	11.0	11.1	11.2
50–54	3.4	3.5	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.7	4.8
55–59	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
60–64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65–69	0.2	0.4	0.5	0.6	0.6	0.7	0.8	1.0	1.1	1.2	1.4	1.5	1.7	1.8	2.0
70–74	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7
Total	**188.8**	**190.2**	**191.5**	**192.8**	**193.9**	**195.0**	**196.0**	**196.9**	**197.8**	**198.6**	**199.3**	**200.0**	**200.7**	**201.3**	**201.9**

Appendix C: Projected number of practising dentists, high and low wastage, sex and age groups, 2000 to 2015

Projected number of practising male dentists, age groups, 2000 to 2015 (low wastage)

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	106	110	110	110	111	111	111	111	111	111	111	111	111	111	111
25–29	532	545	557	568	576	582	587	591	593	596	597	599	600	601	601
30–34	615	610	609	611	614	619	624	629	633	637	641	644	647	649	651
35–39	776	753	734	719	708	700	695	692	691	691	691	693	695	697	699
40–44	1,150	1,117	1,086	1,056	1,029	1,004	982	963	947	934	923	915	908	903	899
45–49	1,108	1,127	1,137	1,139	1,135	1,126	1,115	1,101	1,087	1,072	1,058	1,044	1,031	1,019	1,009
50–54	996	1,011	1,027	1,042	1,054	1,063	1,069	1,071	1,070	1,067	1,061	1,054	1,046	1,037	1,028
55–59	742	788	827	862	893	920	944	964	980	993	1,003	1,010	1,014	1,016	1,016
60–64	471	500	531	562	593	623	651	678	703	725	745	763	779	792	803
65–69	255	256	262	270	281	293	306	320	334	348	362	375	387	399	409
70–74	181	185	189	192	196	201	207	214	222	230	239	248	258	267	277
75+	80	82	85	87	89	91	93	96	98	101	104	108	112	116	120
Total	**7,011**	**7,085**	**7,154**	**7,219**	**7,278**	**7,333**	**7,383**	**7,429**	**7,469**	**7,505**	**7,536**	**7,564**	**7,587**	**7,606**	**7,622**

Projected number of practising female dentists, age groups, 2000 to 2015 (low wastage)

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	73	75	75	75	75	75	75	75	75	75	75	75	75	75	75
25–29	385	391	396	401	405	407	410	411	413	414	414	415	415	416	416
30–34	376	384	390	397	402	408	413	417	420	423	426	428	430	431	432
35–39	390	390	391	393	396	400	404	408	412	415	419	422	425	428	430
40–44	369	393	413	429	443	455	466	475	484	492	500	506	513	519	524
45–49	284	300	316	334	350	366	381	394	407	418	429	439	448	457	464
50–54	155	177	196	215	233	250	266	281	296	310	323	335	347	357	367
55–59	70	84	99	114	129	143	158	172	186	199	212	224	236	247	258
60–64	34	38	42	49	56	64	72	81	90	99	109	118	127	136	145
65–69	7	9	11	13	15	17	20	22	25	29	32	35	39	42	46
70–74	5	5	5	5	5	6	7	7	8	9	11	12	14	15	17
75+	6	5	5	4	4	4	3	3	3	4	4	4	5	5	6
Total	**2,155**	**2,249**	**2,340**	**2,428**	**2,513**	**2,595**	**2,673**	**2,748**	**2,820**	**2,888**	**2,953**	**3,015**	**3,073**	**3,127**	**3,179**

Projected number of practising male dentists, age groups, 2000 to 2015 (high wastage)

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	106	109	110	110	110	110	110	110	110	110	110	110	110	110	110
25–29	530	541	552	561	568	574	578	581	584	586	587	588	589	590	590
30–34	613	606	603	603	605	609	612	616	619	622	625	628	630	632	634
35–39	775	750	729	713	700	691	684	680	677	676	675	676	677	678	679
40–44	1,149	1,115	1,082	1,051	1,022	996	973	952	935	920	907	897	889	883	878
45–49	1,107	1,125	1,134	1,135	1,130	1,120	1,107	1,093	1,077	1,061	1,045	1,030	1,016	1,003	991
50–54	994	1,008	1,023	1,036	1,047	1,055	1,059	1,060	1,058	1,054	1,047	1,039	1,029	1,019	1,008
55–59	739	782	819	852	880	905	926	944	959	970	978	984	986	987	985
60–64	467	493	520	548	576	603	628	651	673	692	710	725	738	749	757
65–69	251	250	253	259	267	277	288	299	311	323	334	345	355	364	373
70–74	179	180	181	182	184	187	191	195	201	207	213	220	228	235	242
75+	77	78	79	79	80	80	81	82	84	85	87	89	91	94	97
Total	**6,987**	**7,039**	**7,087**	**7,131**	**7,170**	**7,206**	**7,237**	**7,264**	**7,287**	**7,305**	**7,320**	**7,331**	**7,339**	**7,343**	**7,344**

Projected number of practising female dentists, age groups, 2000 to 2015 (high wastage)

Age group (years)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
20–24	73	75	75	75	75	75	75	75	75	75	75	75	75	75	75
25–29	384	387	392	396	399	401	403	404	405	406	406	407	407	407	407
30–34	375	380	385	389	394	398	401	404	407	409	411	413	414	415	416
35–39	388	386	385	386	387	389	391	394	396	399	401	403	405	407	409
40–44	368	390	408	423	435	445	454	462	469	475	480	485	490	494	498
45–49	283	298	313	329	344	359	372	384	395	404	413	421	429	435	441
50–54	155	175	194	212	229	244	259	274	287	299	311	321	331	340	349
55–59	70	83	97	111	125	139	153	166	178	190	202	213	223	233	242
60–64	34	37	41	47	54	61	69	77	85	93	102	110	118	126	133
65–69	7	9	10	12	14	16	18	20	23	26	28	31	34	37	40
70–74	5	4	4	4	5	5	6	6	7	8	9	10	11	12	13
75+	6	5	4	4	3	3	3	3	3	3	3	3	3	4	4
Total	**2,146**	**2,229**	**2,310**	**2,388**	**2,463**	**2,535**	**2,603**	**2,668**	**2,729**	**2,787**	**2,842**	**2,893**	**2,941**	**2,986**	**3,028**

Appendix D: Australian Bureau of Statistics, projected estimated resident population, series 'q', 2000 to 2015, Australia

Year	Estimated resident population
2000	19,202,671
2001	19,421,345
2002	19,622,082
2003	19,819,854
2004	20,014,601
2005	20,206,197
2006	20,394,485
2007	20,579,409
2008	20,760,455
2009	20,938,534
2010	21,114,601
2011	21,288,783
2012	21,461,193
2013	21,631,670
2014	21,800,280
2015	21,967,115

Source: Australian Bureau of Statistics (ABS) 2000a

Appendix E: Recruitment vectors for sensitivity analysis of dentist labour force projections (see Figure 8)

	Average number of recruits per year															
	420		**440**		**460**		**480**		**500**		**520**		**540**		**560**	
Age group (years)	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
20–24	93	62	97	65	102	68	106	71	111	74	115	77	120	80	124	83
25–29	40	31	42	32	44	34	46	35	48	37	50	38	52	40	53	41
30–34	26	20	28	21	29	22	30	23	32	24	33	25	34	26	35	27
35–39	23	18	24	19	25	20	26	20	27	21	29	22	30	23	31	24
40–44	23	16	24	17	25	18	26	19	27	19	29	20	30	21	31	22
45–49	16	8	17	8	18	8	19	9	19	9	20	10	21	10	22	10
50–54	9	3	10	4	10	4	11	4	11	4	12	4	12	4	13	5
55–59	9	2	10	2	10	2	11	2	11	2	12	2	12	2	13	2
60–64	8	—	8	—	8	—	9	—	9	—	10	—	10	—	10	—
65–69	10	1	11	1	11	1	12	1	12	1	13	1	13	1	14	1
70+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	**259**	**161**	**271**	**169**	**283**	**177**	**296**	**184**	**308**	**192**	**320**	**200**	**333**	**207**	**345**	**215**

Appendix F: Projected number of dental visits supplied (millions) by sex and age, high supply scenario, 2000 to 2015

Age group (years)	Projected number of dental visits supplied (millions)															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male dentists																
20–29	1.35	1.38	1.42	1.44	1.47	1.48	1.49	1.50	1.51	1.52	1.52	1.53	1.53	1.53	1.53	1.53
30–39	3.97	3.87	3.79	3.73	3.69	3.66	3.65	3.64	3.64	3.65	3.66	3.67	3.68	3.69	3.70	3.71
40–49	7.41	7.40	7.36	7.28	7.19	7.08	6.96	6.85	6.74	6.64	6.54	6.45	6.37	6.30	6.25	6.19
50–59	4.98	5.17	5.34	5.50	5.65	5.77	5.87	5.95	6.01	6.06	6.08	6.09	6.08	6.07	6.04	6.01
60+	2.16	2.22	2.29	2.37	2.46	2.56	2.66	2.76	2.86	2.96	3.06	3.15	3.24	3.33	3.40	3.47
Total	**19.87**	**20.04**	**20.19**	**20.33**	**20.45**	**20.55**	**20.64**	**20.71**	**20.77**	**20.82**	**20.86**	**20.89**	**20.91**	**20.92**	**20.92**	**20.92**
Female dentists																
20–29	1.04	1.06	1.07	1.08	1.09	1.10	1.11	1.11	1.12	1.12	1.12	1.12	1.12	1.12	1.13	1.13
30–39	1.59	1.60	1.61	1.62	1.63	1.65	1.67	1.68	1.69	1.71	1.72	1.73	1.74	1.75	1.76	1.76
40–49	1.23	1.31	1.39	1.46	1.53	1.58	1.64	1.68	1.73	1.77	1.80	1.84	1.87	1.89	1.92	1.94
50–59	0.43	0.51	0.59	0.67	0.75	0.82	0.89	0.96	1.02	1.08	1.14	1.20	1.25	1.30	1.35	1.39
60+	0.10	0.11	0.12	0.13	0.15	0.16	0.19	0.21	0.23	0.26	0.29	0.32	0.34	0.37	0.40	0.43
Total	**4.40**	**4.59**	**4.78**	**4.97**	**5.15**	**5.32**	**5.48**	**5.64**	**5.79**	**5.94**	**6.07**	**6.20**	**6.32**	**6.44**	**6.54**	**6.64**
All dentists																
20–29	2.39	2.44	2.49	2.53	2.56	2.58	2.60	2.62	2.63	2.64	2.64	2.65	2.65	2.65	2.66	2.66
30–39	5.56	5.47	5.39	5.35	5.32	5.31	5.31	5.32	5.34	5.36	5.38	5.40	5.42	5.44	5.45	5.47
40–49	8.64	8.72	8.75	8.74	8.71	8.66	8.60	8.53	8.47	8.40	8.34	8.29	8.24	8.20	8.16	8.14
50–59	5.41	5.68	5.94	6.18	6.39	6.59	6.76	6.91	7.03	7.14	7.22	7.29	7.34	7.37	7.39	7.40
60+	2.26	2.33	2.41	2.50	2.61	2.72	2.85	2.97	3.10	3.22	3.35	3.47	3.59	3.70	3.80	3.90
Total	**24.26**	**24.63**	**24.97**	**25.29**	**25.59**	**25.87**	**26.12**	**26.35**	**26.56**	**26.76**	**26.93**	**27.09**	**27.23**	**27.35**	**27.46**	**27.56**

Note: Projection of the number of practising dentists was based on medium wastage vector and the projection of the number of visits was based on high supply scenario.

Appendix G: Projected number of dental visits supplied (millions) by sex and age, medium supply scenario, 2000 to 2015

Age group	Projected number of dental visits supplied (millions)															
(years)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male dentists																
20–29	1.33	1.35	1.37	1.38	1.38	1.38	1.38	1.37	1.36	1.35	1.34	1.33	1.31	1.30	1.29	1.27
30–39	3.93	3.79	3.67	3.57	3.50	3.43	3.39	3.35	3.31	3.28	3.26	3.23	3.21	3.18	3.16	3.13
40–49	7.38	7.34	7.26	7.15	7.02	6.89	6.75	6.60	6.47	6.34	6.22	6.11	6.01	5.91	5.83	5.76
50–59	4.95	5.11	5.26	5.39	5.50	5.59	5.66	5.71	5.73	5.74	5.74	5.72	5.68	5.64	5.58	5.52
60+	2.14	2.18	2.23	2.29	2.36	2.44	2.51	2.58	2.66	2.73	2.79	2.86	2.91	2.96	3.00	3.04
Total	**19.73**	**19.77**	**19.78**	**19.78**	**19.76**	**19.73**	**19.68**	**19.61**	**19.53**	**19.44**	**19.34**	**19.23**	**19.12**	**18.99**	**18.86**	**18.73**
Female dentists																
20–29	1.04	1.05	1.06	1.07	1.08	1.08	1.09	1.09	1.09	1.09	1.09	1.08	1.08	1.08	1.08	1.07
30–39	1.58	1.58	1.58	1.59	1.59	1.60	1.61	1.61	1.62	1.62	1.62	1.63	1.63	1.63	1.62	1.62
40–49	1.22	1.28	1.35	1.40	1.45	1.49	1.52	1.55	1.57	1.59	1.60	1.61	1.62	1.63	1.63	1.64
50–59	0.43	0.51	0.59	0.66	0.73	0.80	0.86	0.92	0.98	1.04	1.09	1.14	1.18	1.22	1.26	1.29
60+	0.10	0.11	0.12	0.13	0.15	0.17	0.19	0.22	0.24	0.27	0.30	0.33	0.36	0.39	0.43	0.46
Total	**4.37**	**4.54**	**4.70**	**4.85**	**5.00**	**5.13**	**5.26**	**5.38**	**5.50**	**5.60**	**5.70**	**5.79**	**5.87**	**5.95**	**6.02**	**6.08**
All dentists																
20–29	2.37	2.40	2.43	2.45	2.46	2.47	2.46	2.46	2.45	2.44	2.42	2.41	2.40	2.38	2.36	2.35
30–39	5.51	5.37	5.25	5.16	5.09	5.03	4.99	4.96	4.93	4.90	4.88	4.86	4.83	4.81	4.78	4.75
40–49	8.59	8.62	8.60	8.55	8.47	8.37	8.26	8.15	8.04	7.93	7.82	7.72	7.63	7.54	7.46	7.39
50–59	5.38	5.62	5.85	6.05	6.23	6.39	6.52	6.63	6.72	6.78	6.82	6.85	6.86	6.86	6.84	6.82
60+	2.24	2.29	2.35	2.43	2.51	2.60	2.70	2.80	2.90	3.00	3.10	3.19	3.27	3.36	3.43	3.50
Total	**24.10**	**24.31**	**24.48**	**24.63**	**24.76**	**24.86**	**24.94**	**25.00**	**25.03**	**25.05**	**25.045**	**25.03**	**24.99**	**24.94**	**24.88**	**24.81**

Note: Projection of the number of practising dentists was based on medium wastage vector and the projection of the number of visits was based on medium supply scenario.

Appendix H: Projected number of dental visits supplied (millions) by sex and age, low supply scenario, 2000 to 2015

Age group (years)	Projected number of dental visits supplied (millions)															
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Male dentists																
20–29	1.32	1.32	1.32	1.31	1.30	1.29	1.27	1.25	1.22	1.20	1.18	1.15	1.13	1.10	1.08	1.05
30–39	3.89	3.71	3.55	3.42	3.31	3.22	3.14	3.07	3.01	2.95	2.90	2.84	2.79	2.74	2.69	2.64
40–49	7.34	7.27	7.16	7.02	6.86	6.70	6.53	6.37	6.21	6.05	5.91	5.78	5.66	5.54	5.44	5.35
50–59	4.93	5.06	5.18	5.28	5.36	5.41	5.45	5.47	5.47	5.45	5.41	5.36	5.30	5.23	5.16	5.07
60+	2.12	2.14	2.18	2.22	2.27	2.32	2.37	2.42	2.46	2.51	2.55	2.58	2.61	2.63	2.65	2.66
Total	**19.59**	**19.50**	**19.38**	**19.25**	**19.10**	**18.94**	**18.76**	**18.57**	**18.37**	**18.16**	**17.94**	**17.72**	**17.49**	**17.25**	**17.02**	**16.78**
Female dentists																
20–29	1.04	1.04	1.05	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.05	1.05	1.04	1.04	1.03	1.03
30–39	1.57	1.57	1.56	1.55	1.55	1.55	1.55	1.55	1.54	1.54	1.53	1.53	1.52	1.51	1.50	1.49
40–49	1.20	1.26	1.30	1.34	1.37	1.39	1.41	1.42	1.42	1.43	1.42	1.42	1.41	1.40	1.39	1.38
50–59	0.43	0.51	0.58	0.65	0.71	0.78	0.83	0.89	0.94	0.99	1.04	1.08	1.11	1.15	1.18	1.21
60+	0.11	0.11	0.12	0.14	0.15	0.17	0.20	0.22	0.25	0.28	0.32	0.35	0.38	0.42	0.45	0.49
Total	**4.34**	**4.48**	**4.62**	**4.74**	**4.85**	**4.96**	**5.05**	**5.14**	**5.22**	**5.29**	**5.36**	**5.42**	**5.47**	**5.51**	**5.55**	**5.59**
All dentists																
20–29	2.35	2.36	2.37	2.37	2.37	2.35	2.33	2.31	2.28	2.26	2.23	2.20	2.17	2.14	2.11	2.08
30–39	5.46	5.27	5.11	4.98	4.87	4.77	4.69	4.62	4.55	4.49	4.43	4.37	4.31	4.25	4.19	4.13
40–49	8.55	8.53	8.46	8.36	8.23	8.09	7.94	7.78	7.63	7.48	7.33	7.20	7.07	6.95	6.83	6.73
50–59	5.36	5.57	5.76	5.92	6.07	6.19	6.29	6.36	6.41	6.44	6.45	6.44	6.42	6.38	6.33	6.28
60+	2.23	2.25	2.30	2.35	2.42	2.49	2.56	2.64	2.72	2.79	2.86	2.93	3.00	3.05	3.10	3.15
Total	**23.93**	**23.98**	**24.00**	**23.99**	**23.95**	**23.89**	**23.81**	**23.71**	**23.59**	**23.45**	**23.302**	**23.14**	**22.96**	**22.77**	**22.57**	**22.36**

Note: Projection of the number of practising dentists was based on medium wastage vector and the projection of the number of visits was based on low supply scenario.

Appendix I: Recruitment vectors for sensitivity analysis of the dental therapist labour force projections (see Figure 11)

Age group (years)	Average number of recruits per year							
20–24	15	18	20	23	25	28	30	33
25–29	21	25	28	32	35	39	42	46
30–34	15	18	20	23	25	28	30	33
35–39	9	11	12	14	15	17	18	20
40–44	—	—	—	—	—	—	—	—
Total	**60**	**70**	**80**	**90**	**100**	**110**	**120**	**130**

Appendix J: **Recruitment vectors for sensitivity analysis of the dental hygienist labour force projections (see Figure 12)**

Age group (years)	Average number of recruitment per year							
20–24	11	12	14	16	18	19	21	23
25–29	11	12	14	16	18	19	21	23
30–34	6	7	8	9	10	11	12	13
35–39	3	4	4	5	5	6	6	7
40–44	—	—	—	—	—	—	—	—
Total	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**

Appendix K: Recruitment vectors for sensitivity analysis of the dental prosthetist labour force projections (see Figure 13)

Age group (years)	Average number of recruitment per year							
20–24	—	—	—	—	—	—	—	—
25–29	5	6	8	9	11	12	14	15
30–34	5	6	8	9	11	12	14	15
35–39	3	4	5	6	7	8	9	10
40–44	3	4	5	6	7	8	9	10
Total	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**