HealthWorkforce AUSTRALIA

Australia's Future Health Workforce – Oral Health

Overview Report

August 2014

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The Australia's Future Health Workforce – Oral Health Overview report was developed by Health Workforce Australia with the input of key stakeholders for the consideration of Commonwealth, State and Territory Health Ministers.

Health Workforce Australia was abolished on 8 October 2014.

The Australia's Future Health Workforce – Oral Health Overview report was approved for publication by the Commonwealth and all State and Territory Health Ministers on 10 October 2014.

The recommendations contained in the Australia's Future Health Workforce – Oral Health Overview report will be the subject of further consideration.

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Preface

Australia's Future Health Workforce – Oral health

Demand for oral healthcare services is expected to continue to grow in response to population growth, increased tooth retention into older age, greater awareness of the importance of oral health, and more advanced restorative procedures and technologies.[1] Recent federal funding can also be expected to have flow-on implications for the oral health workforce.

It is therefore timely for Health Workforce Australia (HWA) to examine the oral health workforce, with a focus on workforce planning projections. In particular, this work will complement the *National Oral Health Plan 2014-2023*, providing a strong evidence-base for recommendations made on the oral health workforce.

Australia's Future Health Workforce – Oral Health (AFHW – Oral Health) provides the results of the oral health workforce planning projections conducted by HWA. It is presented in two publications.

1. **AFHW – Oral Health – Overview**. This publication presents HWA's workforce planning projections for the total oral health workforce, along with a brief description of Australia's oral health services and demand for those services, particularly among specific population groups (children, older people, low income and socially disadvantaged people, people with special needs, Aboriginal and Torres Strait Islander people, and people living in rural and remote areas).
2. **AFHW – Oral Health – Detailed**. This publication supports the overview, and provides:
    - Information on the methodology used to generate the workforce projections for individual oral health workforces.
    - Workforce planning projection results for dentists, oral health practitioners (comprised of dental hygienists, dental therapists and oral health therapists) and dental prosthetists.
    - Workforce profiles for each oral health workforce, including a brief overview of their role and training pathway, presentation of information describing the number and characteristics of the existing workforce, a summary of issues expected to impact supply and/or demand for the workforce, and an assessment of existing workforce position (whether workforce supply matches demand for services or not).

Summary

Workforce planning projections conducted by HWA, and based on current utilisation patterns, indicate that extra capacity exists within the oral health workforce.

However a particular problem in assessing the balance between workforce supply and service demand in the dental sector is assessing the underlying level of demand.

Australia's broader health system is underpinned by universal access to public hospitals and Medicare funded services. While there are some problems with access to medical services in some geographical areas, it is reasonable to assume that the level provided is close to the level of demand, and this assumption can underpin estimates of demand for medical services and the workforce supply. By contrast, dental care is largely privately based and funded principally by individuals and to a lesser extent, private health insurance funds and government.

Many people who are unable to access private dental care largely rely on the public system, although some low income earners without concession cards will be ineligible for these services. The Report of the National Advisory Council on Dental Health highlighted the significant barriers for public patients where limited funding constrained access and led to significant waiting times for general treatment. These long waiting times may discourage some people from seeking care, with the result that they do not appear on waiting lists. As a result, it is not valid to assume that workforce supply and underlying demand for services are currently in equilibrium.

Research from the AIHW provides some insight into the potential level of unmet demand. Low income households are more likely to avoid dental care due to cost, have poor visiting patterns and access care less often than high income households. Survey results for different age groups show that between 20 and 37 per cent of people (depending on age) avoided or delayed dental care due to cost2.

Some 11.9 per cent of people aged 15 years and over (or over 2.1 million people) had not visited a dental practitioner in the last 2 years, and a further 8.2 per cent (estimated at around 1.5 million people) had not made a visit to a dental practitioner in the last 5 years3. In other words, almost one fifth of adults visit a dentist less often than necessary for optimum dental care.

In addition, there is a maldistribution of dentists across geographical areas, with most dentists employed in Major Cities (79.7% of all employed dentists), while only 0.9% were employed in Remote/Very remote areas4.

It is therefore important to note that where the report refers to a “supply in excess of demand” it is a reference to supply exceeding the current demand, not unmet demand.

Key points of the Report

- Good oral health is an integral part of good general health, and is essential in being able to participate in daily activities without limitation.
- States and territories provide most public dental services, however private practitioners provide most dental services in Australia.
- The private sector is the only place non-concession card holding adults, and those ineligible for other Commonwealth programmes can access dental care; and these services need to be funded by individuals and families.
- Demand for oral healthcare services is expected to grow for reasons including population growth, an ageing population, increased tooth retention, consumer expectations and changing dental service offerings.
- Seven alternative workforce planning projection scenarios were developed, examining changes in demand, immigration, the number of graduates, productivity, an existing workforce supply in excess of demand, and existing workforce demand in excess of supply. All scenarios presented the same result – that across the projection period the supply of the oral health workforce is projected to exceed demand.
- Differences exist in access to oral health services. Certain populations were identified for specific action in the *National Oral Health Plan 2004 – 2013.* These were children and adolescents, older people, low income and socially disadvantaged people, people with special needs, Aboriginal and Torres Strait Islander people, and people living in rural and remote areas.
- Linkages exist between oral health and dental visiting patterns, with adults who usually made a dental visit at least once a year having fewer missing teeth on average than those who visit less frequently, and individuals who visit regularly more likely to report that their oral health has a positive effect on their quality of life.
- It can be assumed if the number of oral health services accessed by those identified populations increased, this would result in improved oral health.
- Workforce planning analysis, where expressed demand levels were increased by an arbitrary amount (to reflect potential existing unmet need) for the populations of interest, still results in the supply of the oral health workforce exceeding demand.
- This analysis indicates there is scope to effect change and support better oral health outcomes for populations of interest, within the scope of the projected new entrants to the workforce (through domestic education or immigration).
- Workforce planning projections were also conducted for dentists (including dental specialists), oral health practitioners (comprised of dental hygienists, dental therapists and oral health practitioners) and dental prosthetists,

however it should be noted data limitations exist in assigning demand to individual workforces.

Introduction

Australia's Future Health Workforce Reports

Australia's Future Health Workforce (AFHW) provide medium to long-term national workforce planning projections for different professions and sectors. Workforce planning projections identify potential gaps between the future supply of, and demand for, the workforce in scope under a range of scenarios. A scenario represents a particular vision of future healthcare delivery, and in the health workforce context, scenarios are often developed to reflect potential government policy decisions, higher education/training sector activities, employer practices, trends within the existing health workforce and trends within service demand.

The identification of potential workforce gaps through workforce planning projections provides government, professional bodies, employers, and higher education and training providers the opportunity to develop and implement plans to minimise such gaps. Such plans can involve workforce reform, changes to training intakes or pathways, changes to immigration levels, or a combination of all factors. It is this step that is essential in the delivery of a sustainable health workforce.

AFHW focuses on workforce planning at the national level. It is at this level that questions of aggregate supply and demand can be separated from issues of allocation and distribution – the principal aim being to ensure an appropriate pool of professionals is available to meet aggregate demand in Australia.

Oral health in Australia

The importance of oral health

Having good oral health means being able to eat, speak and socialise without discomfort or embarrassment and without active disease that affects overall wellbeing. Good oral health is an integral part of good general health, and is essential to being able to participate in daily activities without limitation, or without physical or psychological discomfort as a result of poor oral health.[5]

Oral health disease can have wide-ranging impacts on people's everyday lives, the health system and society. Individual impacts can include pain and discomfort and difficulty eating, broader impacts on general health through to concerns about appearance and self-esteem issues – all influencing eating, sleeping and work. System costs include health costs through the high cost of oral health disease treatments, and costs associated with absenteeism and reduced productivity.[6]

In terms of expenditure, dental services costs are significant, particularly for individuals. In 2011-12, approximately $8.3 billion was spent on dental services alone, accounting for approximately 6.3 per cent of total health expenditure. Individuals were responsible for funding over half of all dental services expenditure, $4.7 billion or 56.8 per cent. This is unlike many other areas of health expenditure, for example, medical services, where individuals funded only 12.4 per cent of expenditure in 2011-12.[7]

For both the health and economic impacts of oral health on Australians, a sustainable oral health workforce providing effective services to the Australian community is essential.

Oral health services in Australia

Understanding how oral health services are delivered provides important contextual information for developing recommendations or policy considerations that are best able to influence provision of services and workforce outcomes. Oral health services in Australia are provided in both the public and private sectors. This section provides a brief summary of those services.

Public services

Public services can be provided directly through public dental services or by funding private practitioners to provide services. This can include dental services provided through University dental schools, or teaching practices. In these practices, for example JCU Dental in Queensland (at James Cook University) senior dental students provide services to the public under clinical supervision.

States and territories

States and territories are the current providers of most public dental services. They provide emergency dental care and general dental treatment to eligible adults and school aged children. Adult eligibility is largely determined by eligibility for concession cards, with the type of concession card allowing access to public dental services varying across states and territories. Waiting times for public dental services are significant.[8]

For children, models of service delivery vary state to state, ranging from dedicated school dental programmes to community-based clinics, and hybrid models that use both school-based clinics and community-based services. Clinical services provided to children also vary state to state, however children are seen as a matter of priority for emergency and general services.[9]

States and territories also provide funding to private practitioners to provide services to eligible consumers, for example the New South Wales Oral Health Fee for Service Scheme.

Commonwealth Government

The Commonwealth focuses on funding programmes to provide services to children and low income adults. From 2007 to 2012, Medicare's Chronic Disease Dental Scheme (CDDS) provided up to $4,250 over two calendar years in Medicare benefits for dental services for people with a chronic medical condition and complex care needs and whose oral health was impacting on their general health. To be eligible for the CDDS, patients must have had a GP Management Plan and Team Care Arrangements in place to manage their condition, and must have been referred to a dentist by their GP.[10] The CDDS closed from 1 December 2012.

The Commonwealth funds the Child Dental Benefits Schedule (CDBS), which provides eligible children with up to $1,000 in benefits for basic dental services, with benefits capped over two consecutive calendar years. The CDBS commenced on 1 January 2014 and replaced and expanded the Medicare Teen Dental Plan (which covered those aged 12 to 17 years), by also covering children aged between two to 11 years and expanding the range of services. The CDBS provides access to individual benefits for basic dental services including examinations, x-rays, cleaning, fissure sealing, fillings, root canals and extractions for children aged two to 17 years.

The Commonwealth is providing $344 million to the states and territories through the National Partnership Agreement (NPA) on Treating More Public Dental Patients to alleviate pressure on public dental waiting lists. The Government is committed to a second NPA on Adult Public Dental Services, which will provide funding to the states and territories for services to adult public dental patients.

The Commonwealth also funds the Dental Relocation and Infrastructure Support Scheme, the Voluntary Dental Graduate Year Programme and the Oral Health Therapy Graduate Year Programme.

Further details on public dental programmes are provided in Appendices A to C.

Private services

Private practitioners in Australia provide most dental services. The private sector is the only place non-concession card holding adults, and those ineligible for other Commonwealth programmes, can access dental care. A full range of services is provided, from emergency and general dental to orthodontic and endodontic services.[11] Services provided have to be funded by individuals and families. For people with private health insurance, a proportion of dental costs may be covered, but consumers face relatively high out-of-pocket costs for dental services.[12]

Table 1 shows data from the Australian Research Centre for Population Oral Health National Dental Telephone Interview Survey (ARCPOH NDTIS) on the type of practice people reported visiting at their last dental visit. It clearly shows the predominance of private practice – most people (88 per cent) reported their last dental visit was to a private dental practice in 2010, compared with six per cent at a public dental service and five per cent at a school dental service (SDS). The only variation to this across age groups was for school-aged children (five to 14 years), where a substantially higher percentage reported visiting a SDS.

Table 1: Type of practice visited at last dental visit by age, percentage of dentate people aged two and over who visited in last 12 months, 2010

	Type of practice visited at last dental visit			
Age (years)	**Private**	**Public**	**SDS**	**Other**
2–4	76.7	12.5	6.0	4.8
5–14	68.2	8.6	22.8	0.3
15–24	87.7	5.8	5.1	1.2
25–44	94.6	4.0	–	1.4
45–64	95.3	3.8	–	0.9
65+	87.9	11.6	–	0.5
All people 2+	**88.2**	**6.1**	**4.8**	**1.0**
All people 5+	**88.3**	**6.0**	**4.8**	**0.9**

Source: AIHW, Chrisopoulos S & Harford JE 2013. Oral health and dental care in Australia: key facts and figures 2012. Cat. no. DEN 224. Canberra: AIHW

What workforces deliver oral health services?

Australia's oral health workforce is comprised of a broad mix of care providers and support workers providing services to consumers through the public and private sectors. The following registered[1] and unregistered occupations provide oral health services in Australia.

Registered workforces:

- Dentists – which includes general dentists and dental specialists
- Dental hygienists
- Dental therapists
- Oral health therapists
- Dental prosthetists

Unregistered workforces

- Dental assistants
- Dental technicians.

A detailed description of oral health workforce roles is provided in Appendix D.

Policy context

Health Mouths, Healthy Lives – Australia's National Oral Health Plan 2004 – 2013 guided efforts to improve oral health in Australia. This plan was supported by Commonwealth, State and Territory Health Ministers, and aimed to 'improve health and wellbeing across the Australian population by improving oral health status and reducing the burden of oral disease'. The Plan identified workforce development as an action area, calling for consistent national planning across all states and territories and an understanding of the appropriate aggregate number and mix of oral health professionals. Additionally, it identified the following as specific action areas: children and adolescents, older people, low income and socially disadvantaged people, Aboriginal and Torres Strait Islander peoples, those with special needs and people living in rural and remote areas.

With the current plan reaching the end of its lifespan, the Standing Council on Health, through the Australian Health Ministers' Advisory Council, has tasked the National Oral Health Plan Monitoring Group to develop a new national plan for the period 2014-2023. This is currently underway, and is expected to be signed off in 2014.

1 On 1 July 2010 the National Registration and Accreditation Scheme commenced, which saw a number of health professions become national regulated by a corresponding Board. The Dental Board of Australia registers dentists, students, dental specialists, dental therapists, dental hygienists, oral health therapists and dental prosthetists.

In 2009, the National Health and Hospitals Reform Commission (NHHRC) report *A healthier future for all Australians* identified improved access to dental healthcare as a priority under the reform goal to tackle 'major access and equity issues that affect health outcomes for people now'. Recommendations from this report included a new universal scheme for access to basic dental services, internships for graduating dentists and oral health professionals to provide broader clinical experience and training, as well as to expand the public dental workforce, and the national expansion of preschool and school dental programmes.

In 2011, the National Advisory Council on Dental Health was established to provide strategic, independent advice on dental health issues. This informed the development of new dental measures in the 2012-13 Budget and the measures announced in August 2012 by the then Minister for Health (outlined in the Mid-Year Economic and Fiscal Outlook 2012-13).

In the 2012-13 Budget, $344 million was allocated to the NPA on Treating More Public Dental Patients. The programme runs over three years from 2012-13 until 2014-15 and has a national target to treat an additional 400,000 public dental patients.

The Government also committed to the NPA on Adult Public Dental Services, which will provide public dental services to adult public dental patients, as announced in August 2012 by the then Minister for Health (outlined in the Mid-Year Economic and Fiscal Outlook 2012-13). The Child Dental Benefits Schedule was implemented from 1 January 2014.

How does HWA assess oral health workforce requirements?

This section presents HWA's workforce planning projections for the total oral health workforce. Firstly, summary information on the projection methodology and planning scenarios used to generate the results is presented, along with an outline of the workforces included in the oral health projections. This is followed by the workforce planning projection results.

Workforce planning methodology

Workforce projections require two components – estimating future workforce supply and estimating future demand for the workforce.

A detailed discussion of the methodology used in AFHW – Oral Health is contained in the HWA publication *Health Workforce 2025 – Oral Health, Supply and Demand Methodology*[13]. This is followed by a brief summary of the methodology used to generate the oral health workforce planning projections.

Projecting future workforce supply

AFHW – Oral Health used a dynamic stock and flow model to estimate future workforce supply at national level in Australia. The four key inputs in the dynamic stock and flow model were:

- Workforce stock (in five-year age and gender cohorts)
- Domestic new entrants
- Migration (permanent and temporary)
- Net exits, which included all permanent and temporary flows out of the workforce.

In the stock and flow method, the number and characteristics of the current workforce (stock) are identified, along with the sources and number of workforce inflows and outflows. Trends or influences impacting on the stock and flows are also identified, including the effect of people ageing.

To project future workforce supply, the initial workforce stock is moved forward based on expected inflows and outflows, allowing for the impact of identified trends and influences on the stock. This is an iterative calculation for each year over the projection period, and provides for a more realistic representation of labour market dynamics.

Projecting future workforce demand

Demand projections employed the utilisation method – which measures expressed demand – and are based on utilisation patterns as they currently exist for population five-year age and gender cohorts. Any potential unmet need is not accounted for in the demand projections.

Utilisation data was matched against age and gender cohorts, and once mapped, was projected against future demographic structures.

For the total population, the expressed demand rate for the comparison scenario was calculated based on the growth in the number of visits between 1994 and 2010, using data from the ARCPOH NDTIS. This was calculated to be 2.55 per cent. It should be noted that in calculating this rate, demand attributable to the CDDS (which closed from 1 December 2012) was, as much as possible, removed from the calculation. This was done to provide a more realistic representation of future workforce demand, and this approach was supported by HWA's Oral Health Clinical Advisory Group and Project Advisory Group.

Using the methods above, it is possible to project the relationship of supply and demand in future periods.

Data limitations

The methods used to produce the workforce planning projections rely on two key inputs:

1. The set of assumptions about future conditions
2. The data from which the model's parameters inputs and starting position are derived.

The assumptions underpinning the workforce projections are outlined in Appendix E.

In terms of data, as HWA is conducting national workforce planning, national datasets are used. For workforce supply, reliable, national datasets exist that are used to establish the existing workforce and workforce inflows.

The National Health Workforce Dataset (which combines data from the annual registration process, together with data from a workforce survey completed at the time of registration) provides extensive, reliable, national information on the number and characteristics of the registered oral health workforces, forming a strong basis for the workforce projections.

For workforce inflows, Department of Immigration and Border Protection visa grant data is used, while for graduates, Australasian Council of Dental Schools data (for dentists), and Department of Education and National Centre for Vocational Education Research (for oral health therapists, dental hygienists and dental

therapists) provide national data for use in the workforce projections. The use of Australian Health Practitioner Regulation Authority student registration information will also be investigated as a potential future national data source on graduate numbers.

The primary limitation on the supply side for the workforce planning projections is that the unregistered component of the oral health workforce (dental assistants and dental technicians) is not included. For these two workforces, the Australian Bureau of Statistics Census of Population and Housing (the Census) is the only data source available. From the Census, the number and characteristics of people who self-report as dental assistants and dental technicians can be identified. However for workforce planning purposes, limitations with Census data include that information is self-reported, responses provided depend on an individual's understanding and interpretation of the questions asked, and of particular importance, it is only conducted every five years. While this is useful for identifying long-term workforce trends, the information is quickly out-of-date for workforce planning purposes. Therefore, for these two workforces, there was no systematic collection of workforce data able to be used to establish workforce supply.

Limitations also exist in the availability of reliable, national datasets to measure workforce demand. Following are the primary options available, and a brief outline of their limitations.

- Information from the Commonwealth Government (collected by Medicare and the Department of Veterans Affairs) and State and Territory departments. This covers services provided under Commonwealth funded schemes and by states and territories, which only account for a small percentage of all oral health services provided.
- Private Health Insurance Administration Council (PHIAC) data. While this covers private sector services (where the majority of dental services are provided), there are coverage concerns in that it is only those services able to be claimed through private health insurance. Additionally, for detailed workforce planning by practitioner type, information is not readily available on which practitioner type provided which service.
- Information from individual insurance funds. This information could identify the practitioner type providing services, however access to data is not readily available. Additionally, as for PHIAC, there are coverage concerns, as this only covers those people who hold extras cover and claim dental through their private health insurance.
- ARCPOH NDTIS. The NDTIS is the only source to provide information on private and public services accessed on a consistent, national basis.. However the NDTIS is a sample survey designed to produce population level estimates for the most common dental services received only (that is, information on all dental services received is not collected). Therefore for some specific sub-

populations of interest, there are an insufficient number of records to provide stable estimates for service use, and there is also the likelihood that the total count of services is conservative. Additionally, for detailed workforce planning by practitioner type, information is not readily available on which practitioner type provided which service.

In considering data availability and associated limitations of each data source, HWA decided to use the ARCPOH NDTIS for measuring workforce demand in this workforce planning exercise. This was on the basis that it is the only available source that provides a consistent, national measure on dental services received and dental visits in the private and public sectors, with time-series information also readily available.

While the limitations highlighted above do need to be considered when interpreting the workforce planning projection results, having used the best available data, HWA is confident in the workforce planning projections presented in this publication, and in the findings resulting from those projections for the overall oral health workforce. Given questions raised by some stakeholders regarding the accuracy of attributing oral health activity to specific practitioners, care should be taken in the interpretation of the results for individual professions (with these results contained in *AFHW – Oral Health – Detailed*).

Appendix F contains the list of data sources used in generating the oral health workforce planning projections.

Planning scenarios

Scenario modelling is used to demonstrate the impact of potential policy options on future workforce supply and demand. A scenario represents a particular vision of future healthcare delivery, and in the health workforce context, scenarios are often developed to reflect potential government policy decisions, higher education/training sector activities, employer practices, trends within the existing health workforce and trends within service demand.

The impact of these scenarios is measured by comparing their workforce projection results with the comparison scenario – a technical construct where current trends are assumed to continue into the future. The comparison scenario is not a prediction of the future; it is based on utilisation patterns as they currently exist; and should be interpreted as a 'do nothing' scenario, which assumes known policy settings are held constant as their future levels cannot be predicted. This allows an assessment of the effects of other changes, which may impact the workforce.

Seven alternative scenarios were developed for AFHW – Oral Health. It is important to note the scenarios are not predictions of what will happen over the period to 2025 – each provides an estimate of a likely outcome given the set of conditions upon which it is based.

1. **Medium self-sufficiency** – showing the impact of reducing net international migration and international students graduating from Australian dental programmes.
2. **Productivity** – showing the impact of a five per cent productivity gain over the projection period.
3. **Low demand** – showing the impact of a reduction in demand for the oral health services.
4. **High demand** – showing the impact of an increase in demand for oral health services.
5. **Undersupply** – showing the impact on the workforce planning projections of a commencing workforce supply gap, that is, workforce demand exceeds workforce supply.
6. **Oversupply** – showing the impact on the workforce planning projections of a commencing workforce supply excess, that is, workforce supply exceeds workforce demand.
7. **Graduate reduction** – showing the impact of a reduction in the number of graduates (both domestic and international) from Australian dental programmes.

Details of how the scenarios were constructed are provided in Appendix E.

What workforces are included in AFHW – Oral Health?

As noted earlier, Australia's oral health workforce is comprised of a broad mix of care providers and support workers delivering services to consumers. For the workforce planning projections, only those occupations which form the registered oral health workforce – dentists, oral health therapists, dental hygienists, dental therapists, and dental prosthetists – have been included.

Workforce planning projections were not able to be conducted for the unregistered component of the oral health workforce (dental assistants and dental technicians) due to data limitations – there is no systematic collection of workforce data able to be used to establish workforce supply. A description of the number and characteristics of the unregistered oral health workforce is provided in *AFHW – Oral Health – Detailed*.

In this publication, workforce planning projections are presented for the total registered oral health workforce, that is, the combined total of dentists, oral health therapists, dental hygienists, dental therapists, and dental prosthetists.

More detailed projections for dentists (including dental specialists), oral health practitioners (comprised of oral health therapists, dental hygienists and dental therapists) and dental prosthetists are presented in *AFHW – Oral Health – Detailed.*

We have extra capacity in the oral health workforce

Table 2 provides a summary of the scenario modelling results for the oral health workforce. The intention of the scenarios presented is to illustrate policy alternatives and their effects. The scenarios presented are not directly representative of real policies.

The comparison scenario, or 'do nothing' scenario, where known settings are held constant into the future, shows the supply of the oral health workforce is projected to exceed demand (which is based on utilisation patterns as they currently exist) across the entire projection period to 2025. While the size and direction of the movement relative to the comparison scenario varies according to each scenario, all present the same result as the comparison scenario – that across the projection period the supply of the oral health workforce is projected to exceed demand. This clearly indicates capacity exists within Australia's oral health workforce to provide an increased number of services, in the absence of any other changes.

Table 2: Oral health workforce, summary of workforce supply and demand projections, 2020 and 2025

Scenario	2020 (headcount) – Supply	2020 (headcount) – Demand	2020 (headcount) – Difference	2025 (headcount) – Supply	2025 (headcount) – Demand	2025 (headcount) – Difference
Comparison	22,314	19,021	3,293	26,140	20,496	5,644
Medium self-sufficiency	21,827	19,021	2,806	24,782	20,496	4,286
Productivity	22,314	18,410	3,904	26,140	19,471	6,669
Low demand	22,314	18,054	4,260	26,140	18,919	7,221
High demand	22,314	21,442	872	26,140	24,443	1,697
Initial undersupply	22,314	19,873	2,441	26,140	21,351	4,789
Initial oversupply	22,946	19,021	3,925	26,638	20,496	6,142
Graduate reduction	21,677	19,040	2,637	24,903	20,529	4,374

Figures 1 to 4 graphically represent the workforce supply and demand projections for the comparison and alternative scenarios for the oral health workforce.

Figure 1 shows the effect of changes in demand on the workforce gap relative to the comparison scenario. The low demand scenario extends the amount by which supply exceeds demand, while the high demand scenario reduces the amount by

which supply exceeds demand. Of all the scenarios, the high demand scenario results in the greatest movement relative to the comparison scenario. This scenario also has the greatest impact in reducing the gap between supply and demand into the future.

Figure 1: Oral health workforce supply and demand projections, high and low demand scenarios

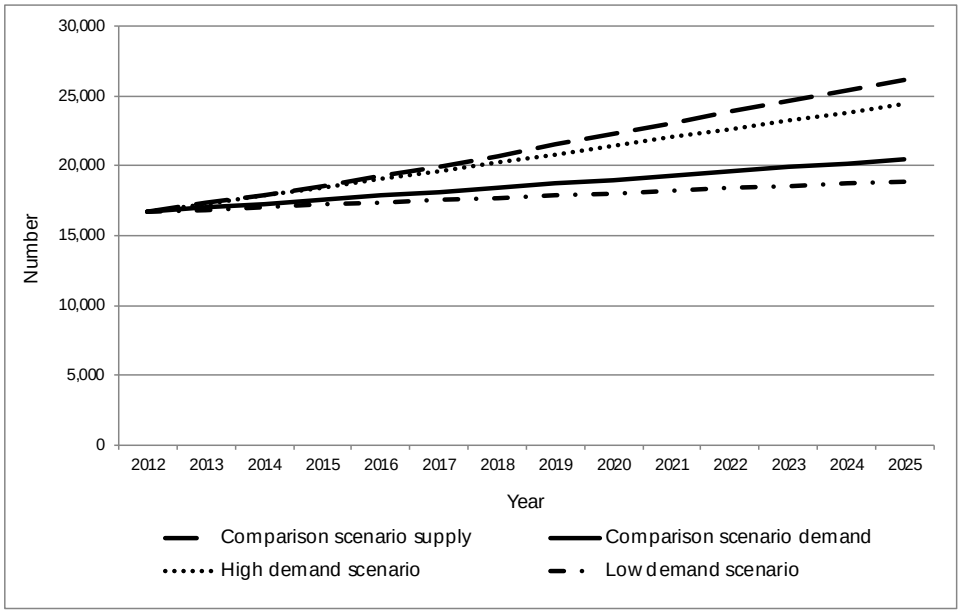


Figure 2 shows the effect of changing oral health workforce supply, through reducing immigration (by 50 per cent in net international migration and a 50 per cent reduction in the number of international students graduating Australian dental programmes, by 2025); and through reducing dental graduates (by a ten per cent reduction in the projected number of graduates to 2017, which was then held constant to 2025). While both scenarios result in reduced future workforce supply, supply is still projected to exceed demand across the projection period (in the absence of any other changes).

The revised workforce supply under both scenarios is almost identical. This indicates a 50 per cent reduction in net international migration and in the number of international students graduating Australian dental programmes by 2025 (the medium self-sufficiency scenario) has almost the same effect as a ten per cent reduction in the projected number of graduates to 2017 (the graduate reduction scenario).

Figure 2 Oral health workforce planning projections, medium self-sufficiency scenario and graduate reduction scenario

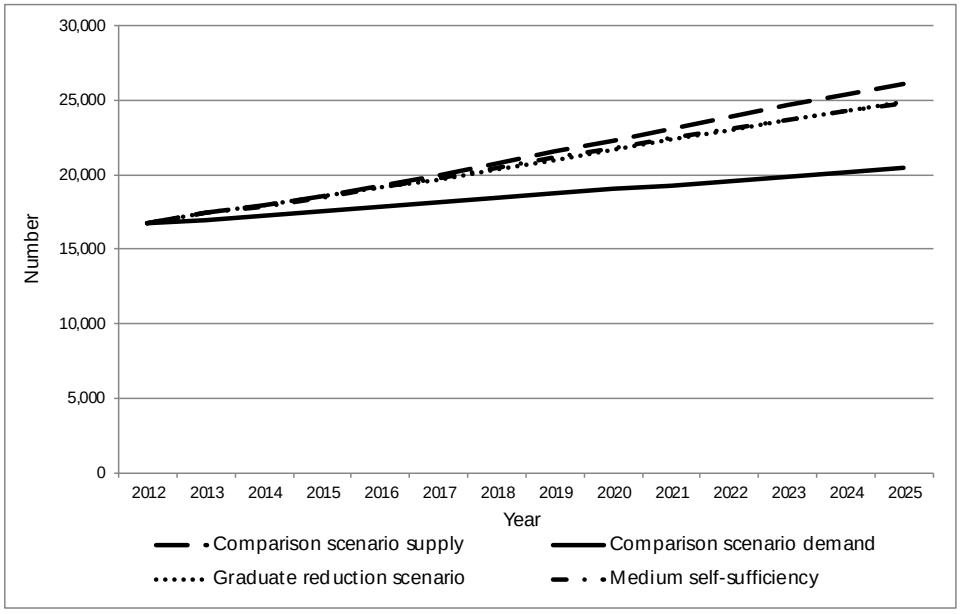
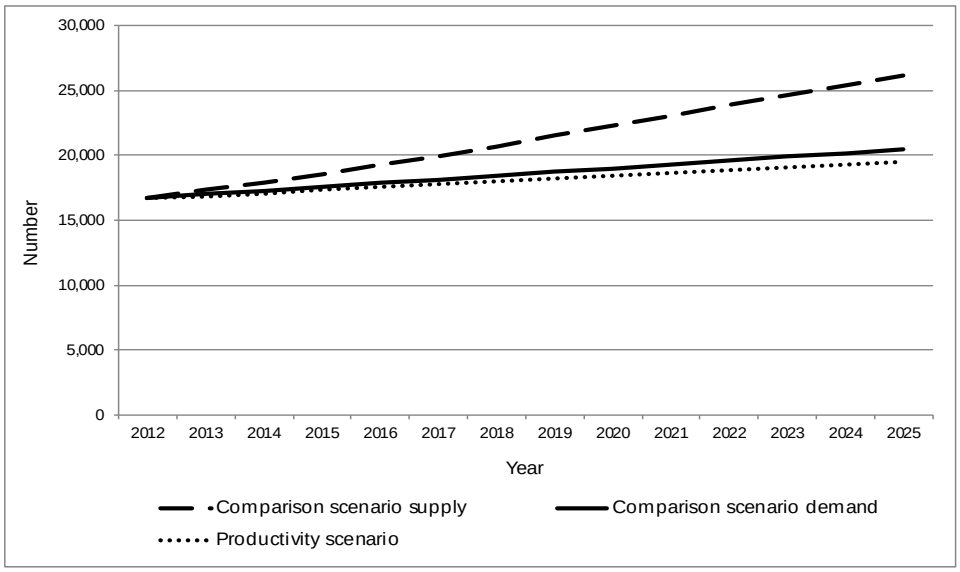


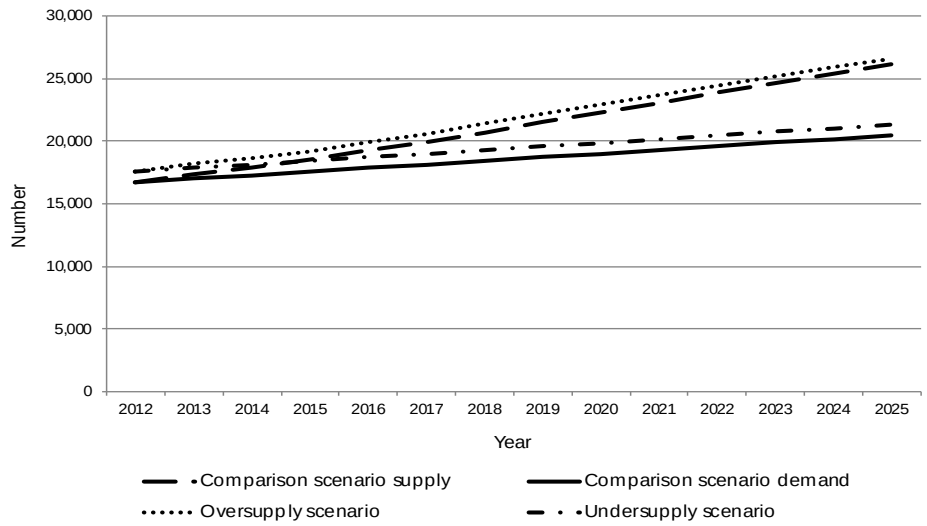
Figure 3 shows the results of the productivity scenario – increasing the workforce gap relative to the comparison scenario.

Figure 3: Oral health workforce planning projections, productivity scenario



There is no quantitative measure of the pre-existing oral health workforce position (whether it is in shortage, balance or supply exceeds demand), so the workforce projections are developed on the assumption that workforce supply and demand are 'in balance' in the first year. Figure 4 presents the results of two scenarios developed that assess the impact of an arbitrary undersupply and oversupply in the starting year. In both scenarios, oral health workforce supply exceeds demand across the projection period.

Figure 4: Oral health workforce, oversupply and undersupply scenarios



Appendix G contains more detailed tables of the oral health workforce planning scenario projections, including the input parameters on inflows and exits that were used to generate the supply projections.

Differences in oral health outcomes and services

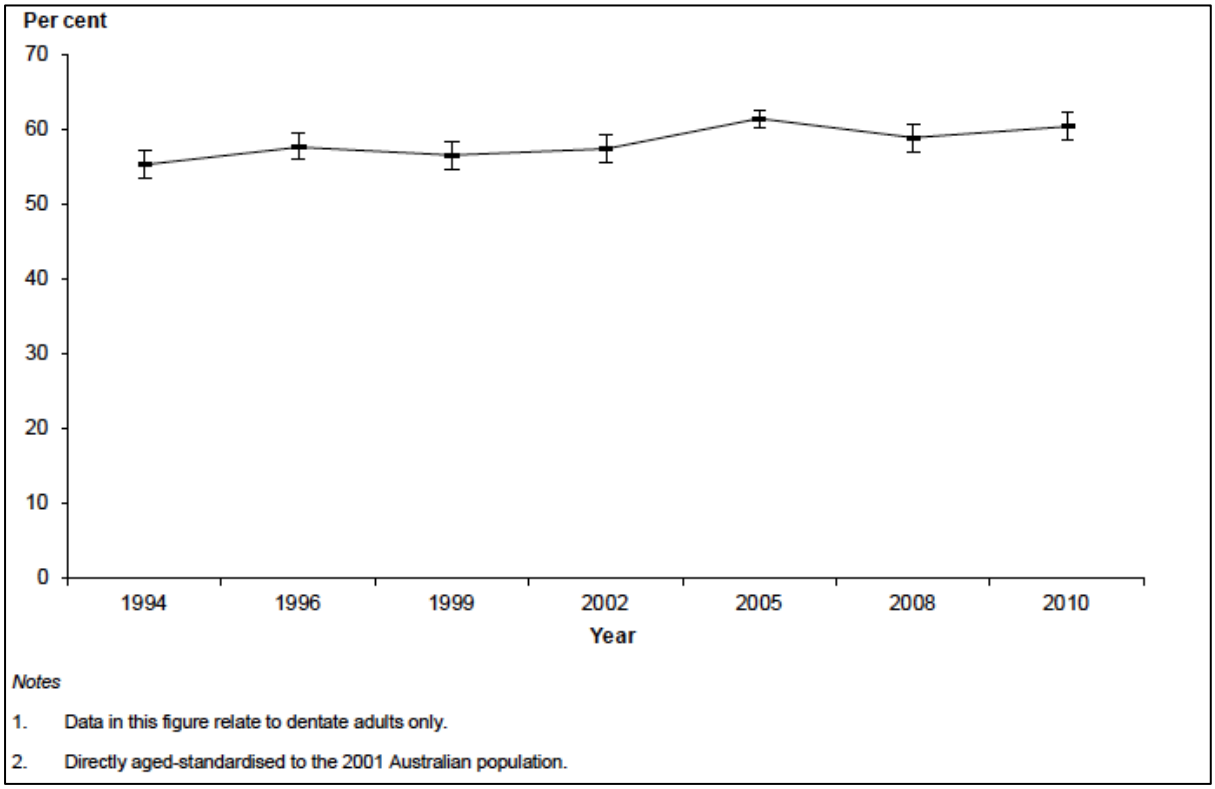
The workforce planning projections demonstrate extra capacity exists within the oral health workforce. This section briefly outlines demand for oral health services and barriers that describe inequalities in service access. This is not a comprehensive review or discussion. More detailed analysis and discussion can be found in references cited in this publication, and work published by the Australian Institute of Health and Welfare's Dental Statistics Unit and the Adelaide University's ARCPOH.

Demand for oral health services

Demand for dental care reflects people's want or desire for dental care and willingness to pay at market prices. Demand is expressed through the use of dental services and hence can be measured in dental visits made and services received in a year.[14]

Figures 5 and 6 demonstrate increasing demand for oral health services. Figure 5 shows the proportion of adults making a dental visit in the previous 12 months increased from 55.4 per cent in 1994 to 60.5 per cent in 2010.

Figure 5: Adults who made a dental visit in the previous 12 months, 1994-2010

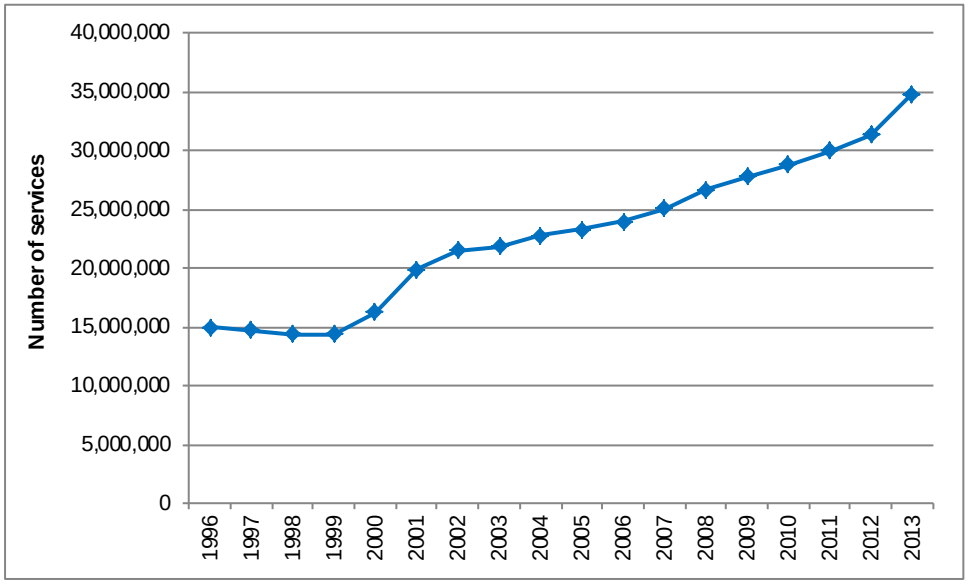


Source: AIHW, Harford JE & Islam S 2013. Adult oral health and dental visiting in Australia: results from the National Dental Telephone Interview Survey 2010.

Individuals can purchase dental insurance, either by private patient hospital cover combined with an extras option that includes dental services or the extras option only. Figure 6 shows annual information on the number of dental services for which private health insurance providers paid benefits. This clearly shows an increasing number of dental services provided – more than doubling (up 132 per cent) from 15.0m services in 1996 to 34.8m services in 2013.

The substantial increase in services for which benefits were paid from 2000 (16.2m) to 2001 (19.9m) likely reflects changes to Australia's private health insurance system. In July 2000, Lifetime Health Cover was introduced to encourage Australians to take out private insurance earlier in life and to maintain their cover. Under this, people aged 30 years or more who joined private health insurance after July 2000 are required to pay a loading on their base rate premium for each year that they were older than 30, up to a maximum 70 per cent loading.

Figure 6: General Treatment, Dental Services paid by private health insurers, 1996 to 2013



Source: Private Health Insurance Administration Council, Benefits Trends Australia, December 2013

Demand for oral healthcare services is expected to continue to grow[15], with drivers of demand including:

- the ageing population
- rising incomes
- educational attainment
- consumer expectations
- changing dental service offerings
- the extent to which the population is covered by health insurance

- the availability of and access to public dentistry.[16]

A number of demand drivers are financially-related – reflecting the nature of oral health service provision, which is primarily provided through the private sector and funded by individuals and families. As noted earlier, this is relatively unique for health service provision in Australia, and gives rise to a number of barriers to accessing oral health services.

Barriers to access

The National Oral Health Plan 2004 – 2013, the NHHRC report A healthier future for all Australians and the Report of the National Advisory Council on Dental Health all highlighted access and equity issues as a major factor for oral health service provision in Australia. Barriers to accessing oral health services can be both financial and non-financial.

Financial burden reflects the cost of oral healthcare services to the individual, the disposable income of a household and the number of people dependent on that income[17], and is regularly cited as a reason why people do not seek regular oral healthcare. Financial burden as a barrier can be reflected by people avoiding or delaying dental care due to cost, cost preventing recommended dental care, and dental visits being a large financial burden.[18]

Table 3 shows the prevalence of financial barriers to dental visiting between 1994 and 2010. The proportion of people who have natural teeth (dentate people) who avoided or delayed dental visiting because of cost has increased between 1994 and 2010. Of those dentate people who made a dental visit in the previous 12 months, approximately two in ten reported that cost prevented recommended treatments in almost each selected survey year.

Table 3: Prevalence of financial barriers to dental visiting, 1994 to 2010 (per cent)

Financial barrier	1994	1996	1999	2002	2005	2008	2010
Avoided or delayed visiting due to cost	25.8	27.9	27.8	28.3	31.7	34.4	31.4
Cost prevented recommended treatment[(a)]	19.0	22.0	22.3	14.1	21.6	20.3	21.8
Dental visits in previous 12 months were a large financial burden[(a)]	10.2	10.7	14.3	10.3	14.1	13.5	11.1

(a) Dentate people who made a dental visit in the previous 12 months.
Notes:
Estimates are age-standardised to the 2010 Australian population.
Data relate to dentate people.
Source: AIHW, Harford JE & Islam S 2013. Adult oral health and dental visiting in Australia: results from the National Dental Telephone Interview Survey 2010.

Non-financial barriers to accessing oral health services also exist, and can include extended waiting lists for services (both public and private); accessibility barriers, in terms of being able to attend a clinic during opening hours, physically being able to get to a clinic, and being able to visit a practitioner or clinic of choice; communication or cultural barriers; awareness of existing services; and dental fear.

Link between oral health and access to services

Patterns of dental visiting can have an important influence on an individual's oral health.[19] Regular dental visits and check-ups provide the opportunity for preventive care, early detection and treatment/management of disease, as well as monitoring and treatment of known problems. Individuals who visit regularly are more likely (than those who do not) to report that their oral health has a positive effect on their quality of life.[20]

Adults who usually made a dental visit once a year or more have fewer missing teeth on average (five) than those who usually visited once every two years (six) or less than once every two years (seven).[21] There is also evidence to support that adults are increasingly making dental visits for check-up purposes. Data from the 2010 ARCPOH NDTIS shows that the proportion of adults making a dental visit in the previous 12 months increased from 55.4 per cent in 1994 to 60.5 per cent in 2010. Additionally, of those adults who made a dental visit, the proportion who last visited for a check-up increased from 46.3 per cent in 1994 to 59.8 per cent in 2010. Given the link between oral health and dental visiting, this can be expected to positively affect oral health outcomes.

Populations for specific action

The *National Oral Health Plan 2004 – 2013* identified the following populations for specific action for improving oral health outcomes:

- Children and adolescents
- Older people
- Low income and social disadvantage
- People with special needs
- Aboriginal and Torres Strait Islander peoples
- People living in rural and remote areas.

Children and adolescents

Regular dental visits in childhood are shown to be associated with better oral health in adulthood.[22] The *National Oral Health Plan 2004 – 2013* highlights that good oral health for children underpins good oral health throughout life – hence the focus on this group as a specific action area. Australian children overall enjoy high levels of oral health and access to dental care[23], however there is room for improvement:

- Untreated decay can be used as an indicator of a need or dental treatment, and in 2005 more than 40 per cent of Australian children aged five to six years had untreated decay, and nearly one-quarter (24.8 per cent) of children aged 12 years had untreated decay.[24]
- In 2005 children aged five to six years living in lower socioeconomic status (SES) areas had more untreated decay than those from higher SES areas, and a mean number of decayed, missing and filled deciduous teeth about 70 per cent higher than those from the highest socioeconomic status areas.[25]
- In 2005 children aged 12 years living in lower SES areas also had more untreated decay than those from higher SES areas, and a mean number of decayed, missing and filled permanent teeth about 70 per cent higher than those from the highest socioeconomic status areas.[26]
- In 2010, the prevalence of dental visiting increased with age, with just over one-quarter of pre-school age children (those aged two to four years) having made a visit in the previous 12 months, compared with over three-quarters of school aged children (75.7 per cent of children aged five to 11 and 81.8 per cent of children aged 12 to 17).[27]

Older people

Australia's population is ageing, and the trend to the retention of natural teeth brings a greater need for dental maintenance. For quality of life, older people need good oral health to be able to eat, speak and socialise, yet they are also shown to have poorer oral health outcomes compared with other age groups. For example, information shows:

- While those aged 65 and over were most likely to have made a dental visit in the previous 12 months (66.9 per cent), they were the second most likely to have visited for a problem (44.0 per cent) and second least likely to have visited for a check-up (56.0 per cent).[28]
- Those aged 65 and over had the highest average number of missing teeth (11.91) and the highest rate of inadequate dentition (fewer than 21 teeth).[29]
- Those aged 65 and over were most likely to have had a tooth extraction than any other age group, with the most common reason for tooth extraction being decay and periodontal disease.[30]

Low income and socially disadvantaged people

Oral health services are primarily provided in the private sector, and it is the only place non-concession card holding adults, and those ineligible for other Commonwealth programmes, can access dental care. Private services have to be funded by individuals and families, and even for people with private health insurance, consumers can face relatively high out-of-pocket costs for dental services.[31] Oral health outcomes for people with low income and at social

disadvantage, which can include some people from non-English speaking backgrounds, homeless people, people in institutions or correctional facilities, can therefore be compromised. This is supported by information which showed:

- The proportion of adults who made a dental visit in the previous 12 months reduced as annual household income reduced, and was lower for cardholders than non-cardholders.[32]
- Of those who made a dental visit, lower income households were more likely to have visited for a problem, rather than a check-up.[33]
- The average number of missing teeth was highest for adults from the lowest income households, and on average cardholders had more missing teeth than non-cardholders.[34]
- Those in lower household income groups and cardholders were more likely to report they would have difficulty paying a $150 dental bill, that they had avoided or delayed visiting a dentist due to cost, that cost had prevented recommended treatment and that dental care had been a large financial burden.[35]

People with special needs

In the *National Oral Health Plan 2004 – 2013,* special needs refers to people with intellectual or physical disability, or medical or psychiatric conditions, that increase their risk of oral health problems or increase the complexity of healthcare. Good oral health for this population is important in supporting their overall health, independence and quality of life.[36] Limited information exists on oral health outcomes for this population as a whole.

Some information is available from the 2010 ARCPOH NDTIS on people with a chronic condition (including asthma, cancer, heart disease, diabetes, arthritis, stroke, kidney disease, high blood pressure and depression). This showed people with a chronic condition were more likely to experience toothache, be uncomfortable with their oral appearance, to avoid certain foods due to oral problems and to experience orofacial pain. They were also more likely to have inadequate dentition (fewer than 21 teeth), which makes it difficult to chew food, than people with no chronic condition.[37]

The Australian Dental Association have also noted that special needs patients receive predominantly emergency care, rather than general dental care, access to care may be further limited as treatments required can be beyond the capacity of a private surgery setting, so treatment can often be through hospital admission or under general anaesthesia.[38]

Aboriginal and Torres Strait Islander people

The *National Oral Health Plan 2004 – 2013* highlighted that with changes in lifestyle and dependence on new introduced foods, oral diseases are now common in most Aboriginal and Torres Strait Islander communities.

As for people with special needs, there is limited information on the oral health of Aboriginal and Torres Strait Islander people. The Australian Institute of Health and Welfare report *Australia's Health 2012* noted 'although there have been a number of local studies of the oral health of Aboriginal and Torres Strait Islander people, there are a number of gaps in nationally representative data on their oral health. Methods used to collect data on adult oral health tend to under-represent Indigenous Australians, especially those living in remote locations. However, all comparisons point to poorer oral health among Indigenous Australians than other Australians. (Williams et al. 2011)

People living in rural and remote areas

People living in rural and remote areas are likely to experience poor access to dental services. With a positive link between dental visits and oral health, this poor access can result in poorer oral health outcomes. Less access to services and poorer oral health for people living in rural and remote areas is evidenced through a range of information.

- Remote/very remote residents were the least likely to have made a dental visit in the previous 12 months (45.8 per cent) compared with 63.1 per cent in major cities, 55.7 per cent in inner regional areas and 54.1 per cent in outer regional areas.[39]
- Of those who had a dental visit, as remoteness increased they were less likely to have visited for a check-up, and more likely to have visited for a problem.[40]
- Remote/very remote residents had the highest number of missing teeth on average.[41]

ARCPOH's 2008 report *Improving Oral Health and Dental Care for Australians* highlighted the rates of untreated caries in rural residents is 31.7 per cent compared with 24.8 per cent in urban residents, and the rate of moderate to severe periodontal disease is 32.8 per cent in rural residents compared with 26.1 per cent in urban residents.[42]

Additionally, the Australian Institute of Health and Welfare's publication *Dental Workforce 2012* highlights that for almost all of the registered oral health workforces (except dental therapists), the full-time equivalent rate per 100,000 population for each practitioner type is lowest in remote and very remote areas.

Dental visiting patterns of populations identified for specific action

Information above indicates the different populations identified for specific action have different oral health outcomes. Further information was examined to compare the dental visiting patterns of the specific populations for action with the dental visiting pattern of the total population. Different data sources were used for children compared with the other identified populations. Due to data limitations, the dental visiting patterns of people with special needs and Aboriginal and Torres Strait Islander people were not able to be examined.

Using the information available, existing utilisation patterns for the specific populations for action were identified, and this was then translated into an expressed demand rate and projected into the future based on population projections from the Australian Bureau of Statistics (ABS) population series B (ABS Cat No. 3222.0, Population Projections, Australia).

Children (aged two to 12 years)

For children, data on the number of public oral health services provided to children aged two to 12 years over the period 2009 to 2012 (existing utilisation) was supplied to HWA by New South Wales, Tasmania and Western Australia. Using this as a basis, a national expressed demand rate of oral health services for all children aged two to 12 years was extrapolated. This was calculated to be 0.37 services per person per annum.

Data analysis also showed that children aged two to six years and children aged seven to 12 years had different oral health utilisation patterns, with those aged seven to 12 years accessing a greater number of services. This likely reflects the availability of publicly provided school dental schemes.

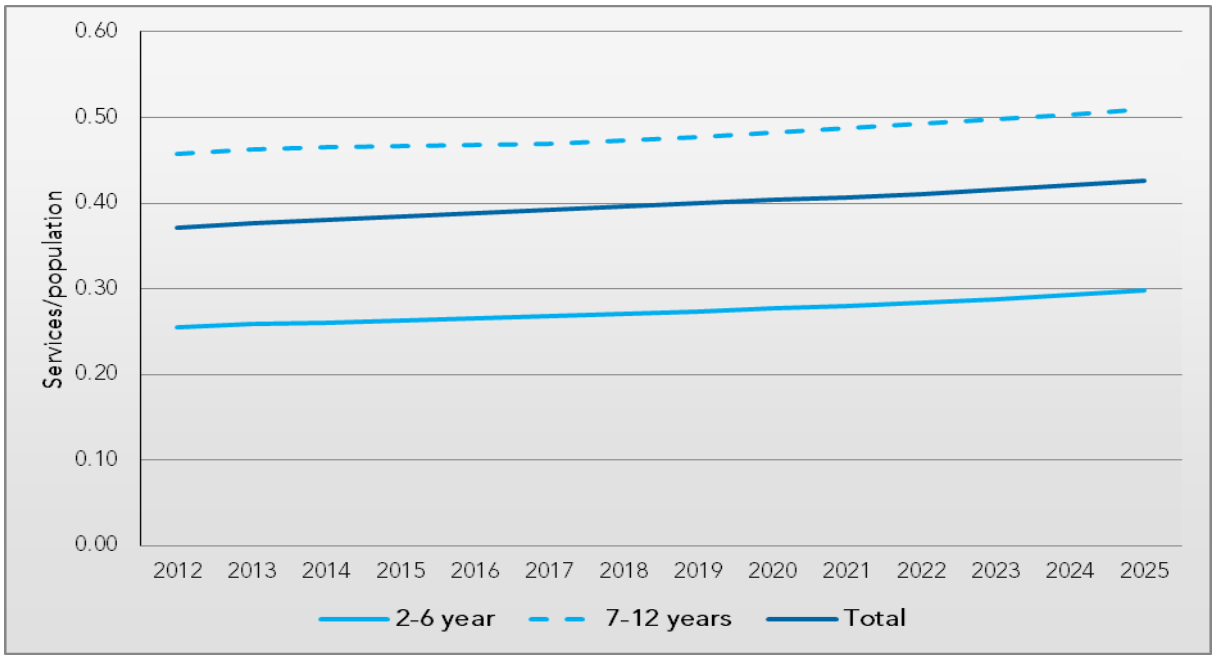
As a result, separate expressed demand rates (using the data of the three jurisdictions as a basis, again extrapolated to a national rate) were calculated for those aged two to six years, and those aged seven to 12 years. The calculated rates were:

- 0.26 services per person for two to six year olds
- 0.46 services per person for seven to 12 year olds.

Figure 7 shows the projected number of services per person (expressed demand) for children aged two to six years, seven to twelve years and two to 12 years (total) to 2025. It clearly shows the different expressed demand rates for each of the age groups. A future consideration will be any impact of recent investments in child services, such as the Child Dental Benefits Schedule (refer Appendix C).

Please note, the expressed demand rates were projected into the future based on population projections for the relevant age ranges (using ABS population series B).

Figure 7: Projected number of services per person, by age, 2012 to 2025



Please note, while *Australia's National Oral Health Plan 2004 – 2013* identified children and adolescents as the population for specific action, which generally encompasses those aged two to 17 years, data was not available on services provided to those aged 13 to 17 years. Therefore the expressed demand projection was restricted to children aged two to 12 years.

Other populations identified for specific action

For the other populations identified for specific action, information from the 2010 ARCPOH NDTIS was used to identify utilisation patterns, which was then translated into an expressed demand rate and projected into the future based on population projections.

Older people

Expressed demand for oral health services for those aged 65 years and over is estimated to be 2.16 services per person, compared with a demand rate of 2.85 services per person for the total population.

This was calculated using data on the number of services accessed by those aged 65 years and over from the 2010 ARCPOH NDTIS, with this rate being held constant throughout the projection period.

This rate was projected into the future based on population projections (for those aged 65 years and over) from the ABS population projection series B.

Low income and social disadvantage

The *National Oral Health Plan 2004 – 2013* identified improving the oral health of people with low income and at social disadvantage as a specific action area. To be able to generate an expressed demand rate for this population, HWA used 2010 ARCPOH NDTIS data on the number of services categorised by Socioeconomic Indexes for Areas (SEIFA) Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD) quintiles, where quintiles 1 and 2 were used to represent those people with low income and at social disadvantage.

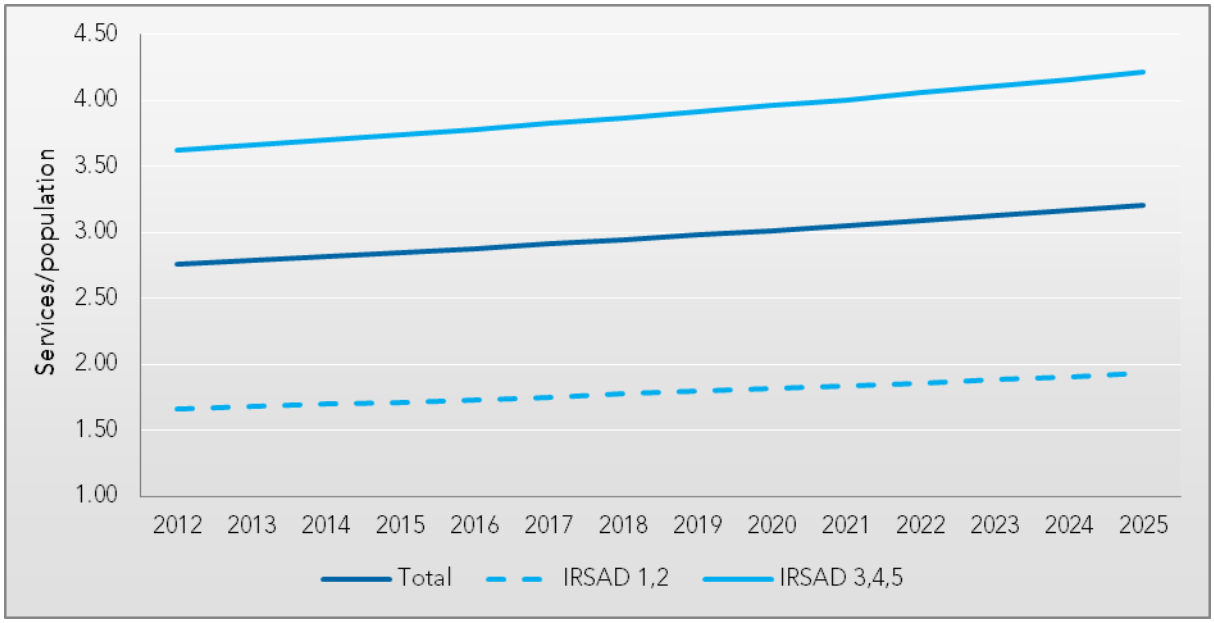
The SEIFA IRSAD is produced by the ABS, and classifies areas of Australia by socioeconomic status. It is a general socioeconomic index that summarises a range of information about the economic and social conditions of people and households within an area, such as income, level of education, occupation, level of unemployment and dwelling type.

For this project, the number of oral health services accessed were examined by SEIFA IRSAD quintiles, and ranked by the socioeconomic status from the most disadvantaged (lowest quintile) to most advantaged (highest quintile).

Expressed demand for oral health services for those with low income and at social disadvantage, represented by the number of services categorised in IRSAD quintiles 1 and 2, was estimated to be 1.8 services per person, compared with 3.9 services per person for IRSAD quintiles 3, 4 and 5. This rate was held constant throughout the projection period. It was projected into the future based on population projections from the ABS population projection series B (with the proportion of people living in those areas included in IRSAD quintiles 1 and 2 being applied to the population projections).

Figure 8 shows expressed demand as the number of services per person for the total population compared with those most disadvantaged (IRSAD quintiles 1 and 2) and those more advantaged (IRSAD quintiles 3, 4 and 5). It can clearly be seen those most disadvantaged receive fewer services per person than those more advantaged, and the total population.

Figure 8: Projected number of services per person, by IRSAD quintiles, 2012 to 2025



People living in rural and remote areas

Improving oral health outcomes for people living in rural and remote areas was also identified by the *National Oral Health Plan 2004 – 2013* as a specific action area.

To be able to generate expressed demand projections for this population, HWA used 2010 ARCPOH NDTIS data on the number of services categorised by the ABSs Remoteness Area (RA) structure. The RA structure is a geographic classification system used to present regional data, with RA categories defined in terms of the physical distance of a location from the nearest urban centre (access to goods and services) based on population size.

There are five RAs in the classification:

1. Major cities
2. Inner regional
3. Outer regional
4. Remote
5. Very remote.

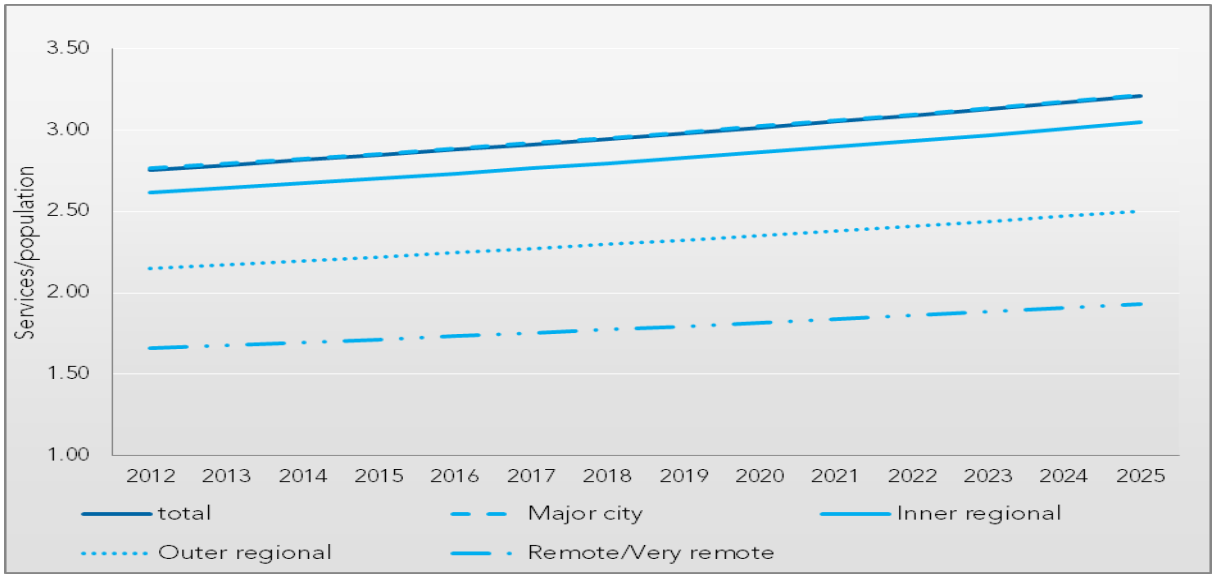
Using the ARCPOH NDTIS data, expressed demand for people living in metropolitan areas (RA 1) was estimated to be 2.98 services per person, compared with rates of 2.82 (RA 2), 2.32 (RA 3) and 1.79 (RAs 4 and 5). Please note, a combined total for RAs 4 and 5 is presented as the NDTIS is a sample survey and information for each RA was not reliable on its own.

These rates were held constant throughout the projection period. They were projected into the future based on population projections from the ABS population

projection series B (with the proportion of people living in each RA being applied to the population projections).

Figure 9 shows oral health services received per person for the total population compared with those living in major cities, inner regional, outer regional and remote/very remote areas. It clearly shows that those living outside of major cities are projected to access fewer oral health services per member of population than the total population.

Figure 9: Projected number of services per population by remoteness areas, 2012 to 2025



What would happen if we increased services to populations identified for specific action?

The sections above clearly show dental visiting patterns for those populations identified for specific action for improving oral health are generally lower than that of the total population. HWA's overall oral health workforce planning results show extra capacity exists within the workforce. Additionally, evidence exists to suggest dental visiting patterns influence oral health outcomes. For example, individuals who visit regularly are more likely (than those who do not) to report that their oral health has a positive effect on their quality of life[43], and adults who usually made a dental visit once a year or more have fewer missing teeth on average (five) than those who usually visited once every two years (six) or less than once every two years (seven).[44] Therefore, it can be assumed that if the number of oral health services accessed by those identified populations increased, this would result in improved oral health.

Recognising that a sustainable health workforce is about services being provided where they are most needed to prevent poorer health outcomes (as well as having the right number of oral health professionals providing services), HWA has examined the impact on the workforce planning projections of increasing workforce demand, to represent increased services accessed by those identified populations.

In this section, information and caveats relating to how this was conducted is presented first, followed by the workforce planning projection results.

Projecting workforce supply

There is no change in the workforce supply projections contained in this analysis from those presented in the comparison scenario earlier in this publication. This is because the analysis of those populations identified for specific action only focuses on changing utilisation rates, which are then transferred into expressed demand measures. Therefore only workforce demand is affected.

Projecting workforce demand

Demand projections for the oral health workforce employed the utilisation method – which measures expressed demand, and is based on utilisation patterns as they currently exist for population five-year age and gender cohorts (with any potential unmet need not accounted for).

The information above clearly shows expressed demand rates for each population identified for specific action vary substantially, and is generally lower, than that of the total population.

The purpose of *Australia's National Oral Health Plan 2004 – 2013* was to improve health and wellbeing across the Australian population by improving oral health status and reducing the burden of oral disease, with specific action areas identified.

For the purpose of this workforce planning projection exercise, and recognising a link exists between oral health and dental visiting patterns, it is assumed that increasing the number of oral health services accessed per member of the population will result in improved oral health. Therefore, this was the basis upon which the alternative scenarios for each of the identified populations were developed.

For those identified populations, the alternative expressed demand scenario was calculated as equivalent to 25 per cent of the number of services provided to the existing identified population. This was then added to the total oral health workforce demand in the comparison scenario, to generate an alternative expressed demand.

Please note, this was not conducted for children, people with special needs and Aboriginal and Torres Strait Islander people due to data limitations.

Caveats

In interpreting the following workforce planning exercise, the following caveats must be noted:

- The use of 25 per cent in the alternative scenario (increasing expressed demand by an amount equivalent to 25 per cent of the number of services provided to the existing population of interest) is an arbitrary figure. It is not based on specific advice, it does not represent, and should not be interpreted as, policy advice or a recommendation on an appropriate level of oral health services for the populations identified for specific action.
- Double counting is likely to occur across the identified populations. For example, someone may be in the older people cohort, and live in a rural and remote area that also falls in ISRAD quintiles 1 or 2. Due to data constraints, this double counting was not able to be accounted for, and the magnitude of its impact on the workforce planning projections is unknown. Any double counting would have the effect of overstating the modelled increase in workforce demand.

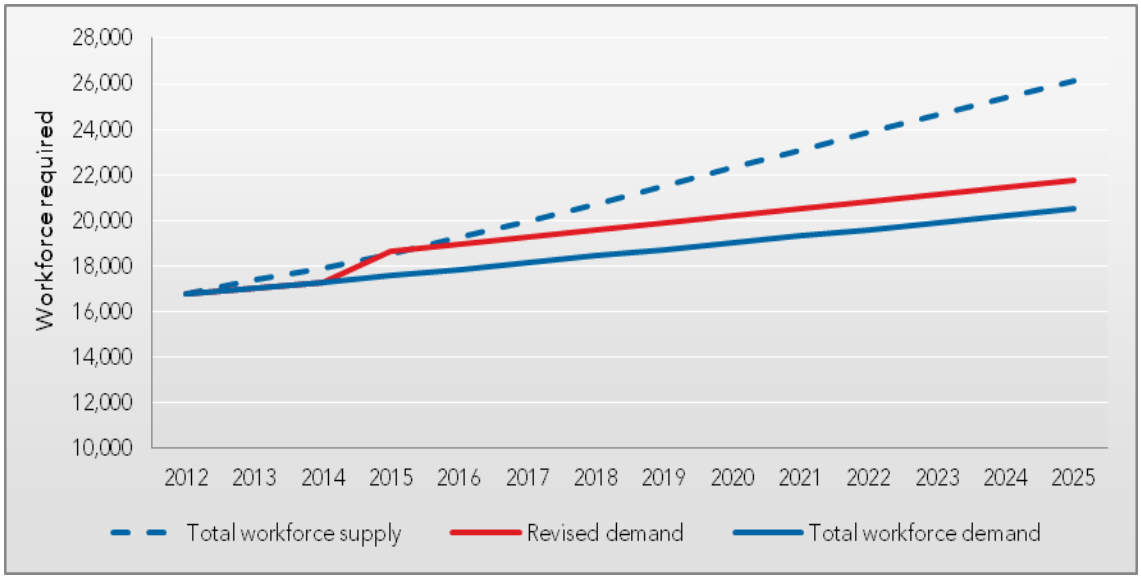
Given these caveats, this workforce planning projection is **for illustrative purposes only** – to show the potential workforce impact of increasing the number of oral health services accessed for the populations of interest.

Older people

Figure 10 presents the results of the alternative expressed demand scenario for those aged 65 years and over. It can clearly be seen that a 25 per cent increase in services results in workforce supply and demand being almost in balance in 2015,

after which the increase in demand can be managed within the existing projected workforce supply.

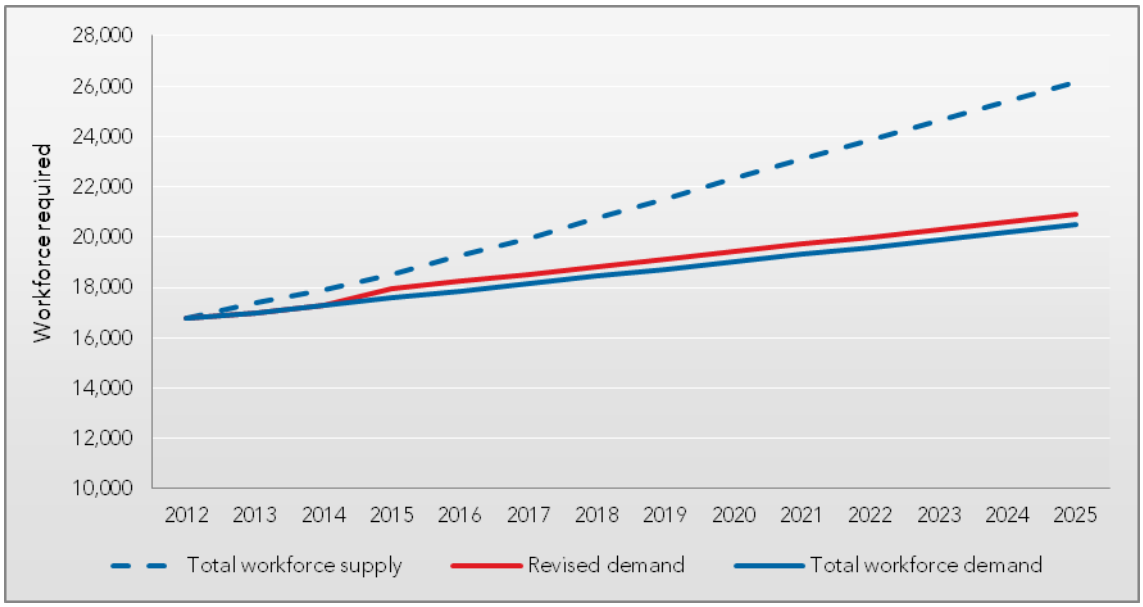
Figure 10: Oral health workforce, workforce supply and revised demand for those aged 65 years and over, 2012 to 2025



Low income and social disadvantage

Figure 11 shows the alternative expressed demand scenario for those with low income and social disadvantage, represented by IRSAD areas 1 and 2. It can be seen that the projected workforce supply has the capacity to cater for the additional demand created by a 25 per cent increase in services.

Figure 11: Oral health workforce, workforce supply and revised demand for low socioeconomic and at social disadvantage, 2012 to 2025

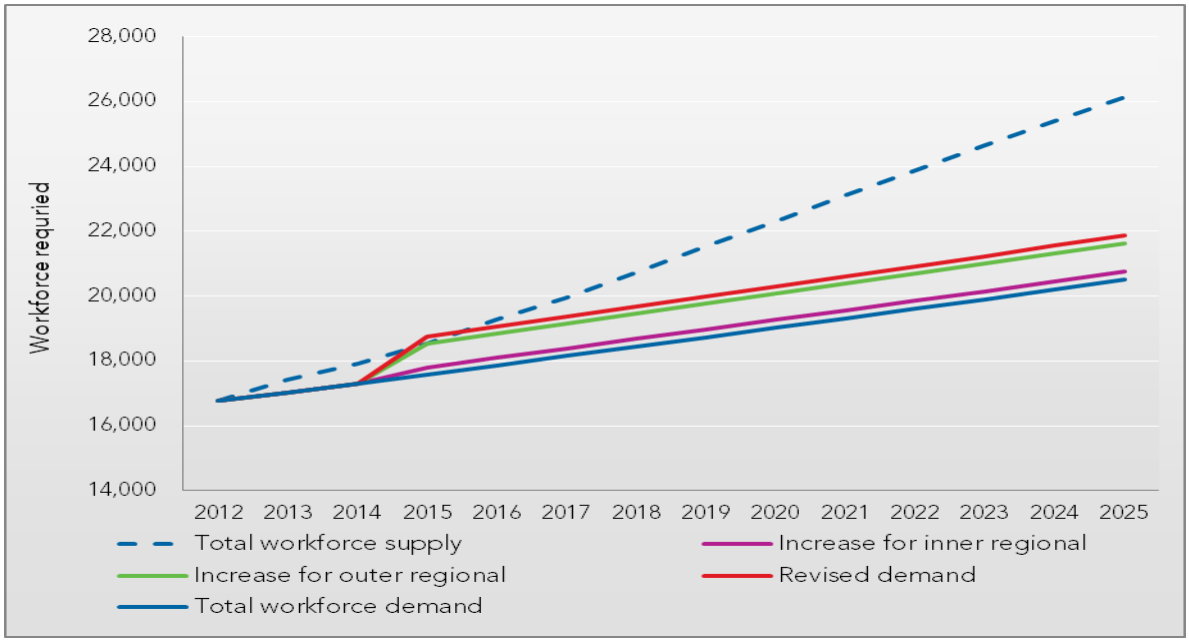


People living in rural and remote areas

Figure 12 presents the alternative expressed demand scenario for population by remoteness area. Demand was increased for all RAs outside of major cities (which were clearly shown to access fewer oral health services per member of population than the total population, refer Figure 9), except remote and very remote areas. While Figure 5 shows those in remote and very remote areas also access fewer oral health services per member of the population, a number of programmes already exist which are designed to improve access to oral health services for this population, for example the James Cook University rural outreach programme, the Royal Flying Doctor Service TOOTH programme in New South Wales, and Mobile Dental Care in Victoria. The decision was therefore made to only show an increase in demand for services for those in inner regional and outer regional areas only.

It can be seen that apart from 2015 where the demand marginally exceeds supply, the additional demand created by a 25 per cent increase in services can be managed by the projected workforce supply.

Figure 12: Oral health workforce, workforce supply and revised demand by selected remoteness areas, 2012 to 2025



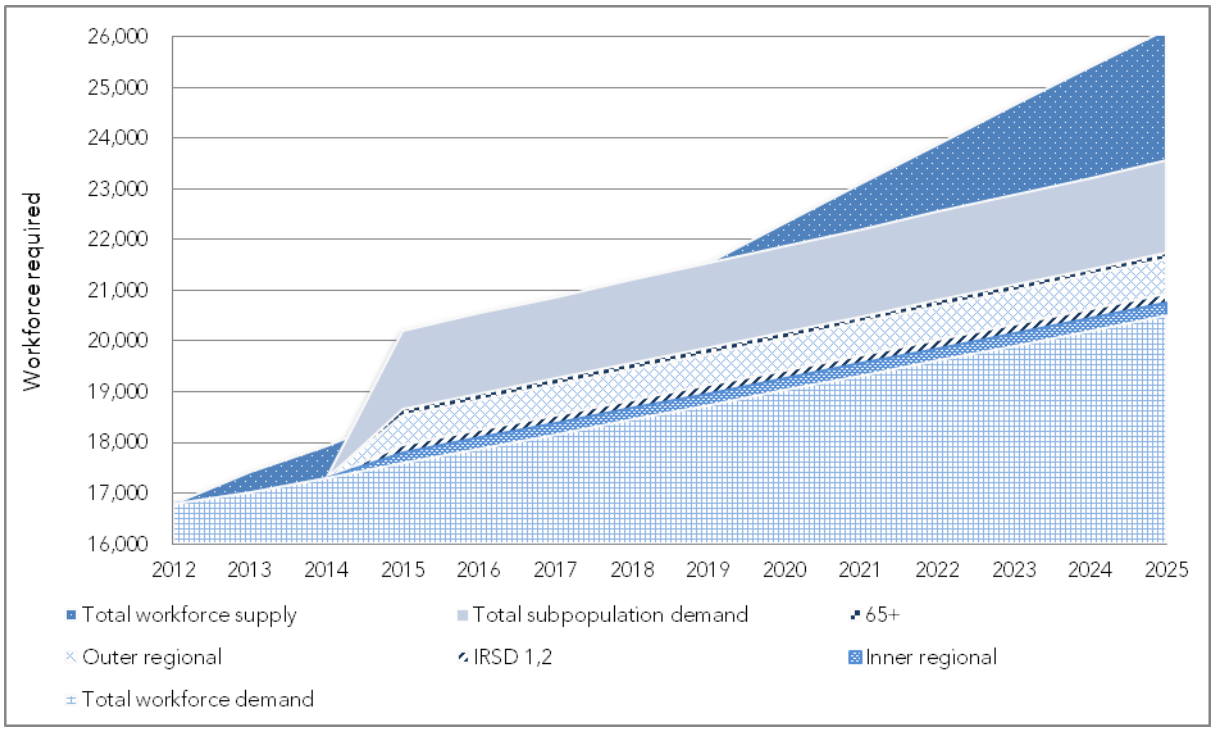
Aggregate population of interest workforce planning projection results

The results of the alternative scenarios for older people, those with low income and at social disadvantage, and people living in non-metropolitan areas are able to be added to the total population comparison scenario workforce projections, as they are all calculated using the same data source (the ARCPOH NDTIS).

Figure 13 presents the results of this aggregation, which shows a targeted increase in services to those selected populations identified for specific action to improve oral

health outcomes. It can clearly be seen that, after a short period of demand exceeding supply (from 2015 to 2019), the additional demand created by increasing services the identified populations can be managed within the existing projected workforce – without a need to introduce new entrants (through domestic education or immigration, beyond what is already included in the projections).

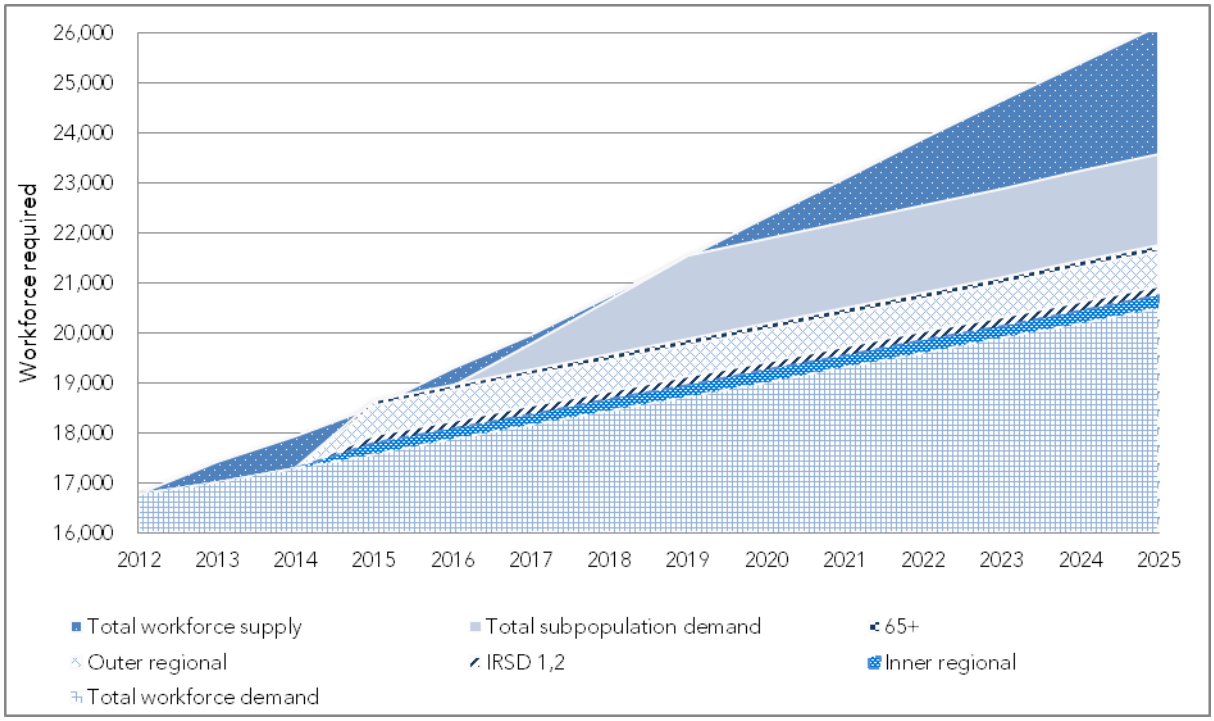
Figure 13: Oral health workforce, workforce supply and aggregate revised demand, 2012 to 2025



The revised aggregate demand shown in Figure 13, which results in workforce demand exceeding supply in the short-term, assumes that the full amount of additional demand (services accessed) is experienced immediately.

The additional demand created by increasing services to populations of interest could be managed within the existing workforce through an incremental increase in services. Figure 14 shows workforce demand modelled on an incremental increase in services (of five per cent per annum) in the short-term (from 2015 to 2019). This results in that additional demand being managed within the projected workforce supply. From 2019, the full additional demand created by increasing services to the selected populations of interest can be managed within the existing projected workforce.

Figure 14: Oral health workforce, workforce supply and incremental aggregate revised demand projections, 2012 to 2025



Conclusion

Workforce planning projections for the oral health workforce, based on current utilisation patterns, clearly demonstrate extra capacity exists within the current and future workforce. Extensive literature exists highlighting inequalities in access to oral health services, focused around specific populations of interest.

The workforce planning analysis conducted by HWA, where those populations of interest have an increased level of expressed demand applied, still results in the supply of the oral health workforce exceeding expressed demand for services in 2025. This analysis clearly indicates there is scope to effect change and support better health outcomes for those populations of interest, within the scope of the projected new entrants to the workforce (through domestic education and immigration).

Appendix A – Current adult oral health services provided by the States and Territories

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card holders and other	Services	Co-payment
QLD	Above the age of completion of Year 10.	• Health Care Card • Pension Concession Card • Pensioner Concession Card (Department of Veterans' Affairs) • Queensland Seniors Health Card • Commonwealth Senior Health Card	General and emergency dental care – check-ups, oral hygiene, fillings, endodontics, extraction, dentures, oral surgery and dentures. Limited specialist dental services are available.	No cost to patient.
NSW	18 years of age and older.	• Health Care Card • Pensioner Concession Card • Commonwealth Seniors Health Care Card • Must normally be a resident within the boundary of the providing Area Health Service.	General and emergency dental care – check-ups, oral hygiene, fillings, endodontics, extraction, dentures, oral surgery and dentures. Limited specialist services are available through two teaching hospitals (Westmead Centre for Oral Health and the Sydney Dental Hospital), including paediatric dentistry, oral and maxillofacial surgery, endodontics and periodontics.	No cost to patient for emergency and general dental care in public dental clinics. Co-payments may apply for patients of some teaching services, specialist dental services and denture services.

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card holders and other	Services	Co-payment
VIC	18 years of age and older.	• Health Care Card • Pensioner Concession Card • Refugees and asylum seekers are also eligible for public dental services.	• General dental care – including check-ups and advice, cleaning, fillings and extractions. Emergency care and dentures. Specialist services available – orthodontics, oral and maxillofacial surgery, endodontics, periodontics, prosthodontics, paediatric dentistry, and oral medicine. • Care is also available to adults with special needs, including a domiciliary service for homebound patients.	• Fee schedule effective from 1 September 2013: • General dental - $26 per visit, up to $104 for a complete course of care • Emergency care - $26 flat fee • Dentures - $63 per denture capped at $126 for a full upper and lower denture • Specialist services – dependent on treatment, up to a maximum of $312 for a course of care • Fee exemptions apply for the following groups: • Aboriginal and Torres Strait Islander people • Homeless people and people at risk of homelessness • Refugees or asylum seekers • Registered clients of mental health and disability services • Those experiencing financial hardship • Those receiving dental treatment from undergraduate students

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card holders and other	Services	Co-payment
TAS	18 years of age and older.	• Health Care Card • Pensioner Concession Card	• Priority care for urgent dental needs. General care – includes check-ups, fillings, extractions and other dental services. Denture services. • Special care dental units at the Royal Hobart Hospital and North West Regional Hospital provide services for patients who have medical conditions that impact their oral health, or who due to health conditions require routine dental treatment to be provided in a hospital setting.	• Fee schedule effective until 30 June 2014: • Single urgent dental problem - $44 • General dental care - $44 per appointment • Dentures – upper or lower - $215; full upper and lower - $381; partial denture and other denture services – cost varies • Additional co-payments may apply for high cost treatments.
SA	18 years of age and older.	• Health Care Card • Pensioner Concession Card • Pensioner Concession Cards (Department of Veterans' Affairs)	General, emergency, and denture care. Specialist services including oral and maxillofacial surgery, orthodontics, specialist restorative care, and special needs dentistry are provided at the Adelaide Dental Hospital.	• Fee schedule effective 1 July 2013: • Emergency care - $54 • General care - $152 • Dentures – fee varies according to type (new or repair), number of dentures, and provider (different fees for dentist and prosthetist). Ranges from $54 to $304.50 for new dentures and $20.65 to $77.40 for repairs and replacements. • Specialist care – varies according to treatment

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card holders and other	Services	Co-payment
NT	18 years of age and older.	• Health Care Card • Pensioner Concession Card	• General and emergency dental care, including pain and trauma management, restorative fillings and repairs, endodontics, extractions, oral hygiene, oral health promotion, and denture services. • Specialist services, including orthodontics, oral surgery, and treatment in hospital under general anaesthetic, are also available.	No cost to patient.
WA	18 years of age and older.	• Health Care Card • Pensioner Concession Card • Veterans' Affairs Gold Card (remote locations only). • In remote locations where public dental health services are the only dental health providers, all patients are able to access these services. However, patients without eligibility for the above concession cards are required to pay the full service fee.	• General and emergency dental care. Specialist services are provided by the Oral Health Centre at the University of Western Australia, and include endodontics, oral medicine and oral pathology, oral surgery, orthodontics, paediatric dentistry, periodontics, and prosthodontics. • Residents of aged care facilities are eligible for a free annual dental examination and care plan. • In metropolitan areas, patients eligible for public dental services may be referred to private dental practitioners for treatment (at the subsidised rate) through the Metropolitan Patient's Dental Subsidy Scheme. • The Country Patient's Dental Subsidy Scheme allows persons eligible for public dental services who live in an area where there are no public dental clinics to access care through private dental services at a subsidised rate.	Varies according to treatment. All dental charges are in line with the Department of Veterans' Affairs schedule of dental fees, and treatment obtained through a public dental clinic is subsidised up to a maximum of 75 per cent of the cost of treatment.

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card holders and other	Services	Co-payment
ACT	18 years of age and older.	• Health Care Card • Pension Concession Card	General restorative services, emergency dental care, and denture services (including repairs, relines, and new dentures).	• Emergency care – minimum charge of $38.50 per visit. • Restorative treatment – maximum of $300 in any year (excluding molar endodontics, general anaesthetic, and dentures). • Dentures – minimum charge of $35 for a course of treatment. No annual cap.

Appendix B – Current child oral health services provided by the States and Territories

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card Holders	Services	Cost
QLD	• All Queensland residents aged four and over who have not completed year 10 of secondary school • Queensland residents aged below four years, if eligible	• Children under four years of age are eligible for public oral health services if they are concession card holders or dependents of current concession card holders, or under the guardianship of the Director-General, Child Care Services, Department of Communities. • Specialist services are only available to concession card holders or dependents of concession card holders.	• Queensland Health's Child and Adolescent Oral Health Services provides oral health care services to school aged children. Services include dental check-ups, information on oral health and nutrition, x-rays, cleaning teeth, fluoride applications, fissure sealants, fillings, extractions, and referrals to dental specialists where necessary. Services are usually provided on-site at schools through fixed or mobile dental clinics, but in some districts oral health services are centralised at larger dental clinics. • Emergency care is provided through public dental clinics. Public dental clinics also provide oral health services to eligible children below school age.	No cost to patient.
NSW	All children under 18 years of age who are eligible for Medicare	N/A	General and preventative dental care for children is delivered by Local Health Districts. Each Local Health District provides service through clinics, which may be located in schools, community health centres, hospitals, or (in rural districts) through mobile dental clinics.	No cost to patient

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card Holders	Services	Cost
VIC	• All children aged 12 years and younger • Young people aged 13 – 17 years, if eligible	Teenagers (13 – 17 years) are eligible for public oral health services if they are concession card holders or dependents of concession card holders or members of a priority group (including Aboriginal or Torres Strait Islander teenagers, refugees or asylum seekers, in the care of the Children Youth and Families Division of the Department of Human Services, or attendees of a special or special development school)	• General and emergency dental treatment (including check-ups and advice, cleaning, fillings and fissure sealants, extractions, and x-rays) is provided to children and teenagers through community dental clinics. • Specialist dental services are mostly provided through the Royal Melbourne Dental Hospital.	• Emergency dental care is provided with no cost to the patient for: • All children 12 years and younger • Teenagers (13 – 17 years) who hold a valid concession card or are a dependent of a concession card holder or who are a member of a priority group. • General dental treatment is provided with no cost to the patient for: • All children who are treated by an undergraduate dental student at the Royal Melbourne Dental Hospital or at a teaching dental clinic • All children who hold a concession card or are a dependent of a concession card holder or who are a member of a priority group. • General dental treatment for children aged 12 years and younger who do not meet the concession card or priority group eligibility criteria attracts a fee of $31 per child for a cost of general care (with a maximum of $124 per family per year).

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card Holders	Services	Cost
TAS	All children under 18 years of age	N/A	Dental check-ups and any necessary treatment determined by the check-up; x-rays, dietary advice, oral hygiene instruction and referral for further assessment or treatment are provided. Services are provided at community dental clinics, which may be located in hospitals or health centres.	• No cost to patient for general or emergency dental care. • Some treatments and devices (such as replacement mouth guards and tooth mousse) attract a small fee.
SA	All children under 18 years of age	N/A	• The School Dental Service provides general oral health care, including check-ups, information on oral health and healthy food, x-rays, cleaning teeth, fluoride treatments, fissure sealants, fillings, extractions, and referrals. • Emergency dental treatment for children is provided by the SA Dental Service through community dental clinics.	• All dental care is free for children below five years of age. • For children between five and 17 years of age, dental care is free if eligible for the Medicare Child Dental Benefit Schedule. For children who are not eligible, care is still provided by the School Dental Service but a fee of $42 for each course of care is payable.

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card Holders	Services	Cost
NT	All school aged children (up to completion of high school) and all children below school age.	N/A	• General dental care is provided to children from infancy to the completion of primary school through the Child Oral Health Service, with services provided at primary school based clinics, community health centres, and mobile vans. • For young people attending middle school and high school, free oral health services are provided through community dental clinics and community health services. • General dental care provided through these services and clinics includes examinations, extractions, fluoride treatment, fissure sealants, oral hygiene instruction, fillings, and cleaning. • Orthodontic services are provided to children with significant problems; referrals to private dentists or orthodontists are provided for children with less severe problems.	• No cost to patient for general or emergency dental care. • For orthodontic treatment, there is no cost to the patient if the child is a concession card holder or a dependent of a concession card holder.
WA	All children from the year they turn five until the end of year 11 or their 17th birthday, whichever comes first.	N/A	• General dental care is provided by School Dental Services throughout the state, through fixed and mobile clinics located at schools. This service has a focus on prevention and education; treatment is limited to general practice care and there are a number of exclusions, including specialist services and anaesthesia. • Emergency dental care is available through school dental therapy clinics. If emergency care is required outside of working hours, the public after hours emergency service can be accessed.	• General dental care - no cost to patient. • Emergency care – no cost to patient if care is provided during business hours through a school dental therapy clinic. if required outside of business hours, fees apply.

State / Territory	Eligibility Criteria – Age	Eligibility Criteria – Card Holders	Services	Cost
ACT	• All children aged less than five years who live in the ACT • All children aged five to 13 years who live or attend school in the ACT • Young people aged 14 – 17 years, if eligible	Young people aged 14 – 17 years who live or attend school in the ACT and are covered by a current concession card (health care card or pensioner concession card) – either own card or as a dependent on a parent/guardian's card.	• Comprehensive assessment, oral health plans, general preventative and restorative treatment, and emergency treatment. Services are provided through ACT Health's clinics and health centres. • Orthodontic appliances and dentures are available to children and young people who are covered by a concession card.	• Children five to 13 years – $58.50 per course of care • Children under 5 years – $58.50 per course of care if treatment is required • Additional fees apply for treatments such as orthodontic appliances and dentures. • Emergency care is free for children and young people aged under 18 years, if covered by a concession card

Appendix C – Commonwealth oral health programmes

Program/service	Description
NPA on Treating More Public Dental Patients	The NPA on Treating More Public Dental Patients commenced on 1 January 2013 and will run until 30 June 2015. Over the length of the Agreement, the Commonwealth will provide $344 million to the states and territories to provide services to 400,000 public dental patients (see Appendix A and B for eligibility for public oral health services in each state and territory). The programme is implemented by the states and territories.
NPA on Adult Public Dental Services	The NPA on Adult Public Dental Services will provide funding to the states and territories to deliver services to adult public dental patients (see Appendix A for eligibility for public adult oral health services). The programme will be implemented by the states and territories.
Dental Relocation and Infrastructure Support Scheme (DRISS)	The Dental Relocation and Infrastructure Support Scheme (DRISS) provides relocation and infrastructure grants to encourage and support dentists to relocate to regional and remote areas. DRISS has two linked components: Part A: Relocation grants up to $120,000, determined from locations as classified under the Australian Standard Geographical Classification – Remoteness Areas (ASGC-RA) system Part B: Dentists deemed eligible for Part A can also apply for infrastructure grants of up to $250,000 to assist in the purchase of dental equipment and other equipping of dental facilities. Eligible areas are those classified as ASGC RA 2-5, noting that priority is given to areas most in need. Funding of $76.0 million has been allocated over four years (2012-13 to 2015-16) for the programme. Rural Health Workforce Australia administers DRISS, and Rural Workforce Agencies in each state and the Northern Territory support the dentists following their relocation into rural practice.
Voluntary Dental Graduate Year Programme	The Voluntary Dental Graduate Year Programme provides 50 placements for dental graduates to undertake a structured programme to gain practice experience. Graduate placements are directed towards the public sector and areas of need, including rural areas. Further information about this programme is at: https://www.aitec.edu.au/vdgyp.
Oral Health Therapy Graduate Year Programme	The Oral Health Therapy Graduate Year Programme provides 50 placements for oral health therapist graduates to undertake a structured programme for enhanced practice experience and professional development opportunities, whilst increasing oral health workforce capacity, particularly in the public sector.
Child Dental Benefits Schedule	The Child Dental Benefits Schedule (CDBS) commenced on 1 January 2014, replacing the Medicare Teen Dental Plan (which provided vouchers for preventative dental checks to teenagers aged 12-17 years). The CDBS provides eligible children with up to $1,000 in benefits for basic dental services, with benefits capped over two consecutive calendar years. Benefits are processed through the Medicare system. The benefit covers basic dental services, including examinations, x-rays, cleaning, fissure sealing, fillings, root canals, extractions, and partial dentures. The benefit does not cover orthodontic or cosmetic dental work. Services can be provided in a public or private setting, but the benefit does not cover any services

Program/service	Description
	provided in a hospital. Children and teenagers are eligible if they are aged 2–17 years for any one day of the calendar year, are eligible for Medicare, and meet the means test for the program: • the child is receiving either Family Tax Benefit Part A, ABSTUDY, Carer Payment, Disability Support Pension, Parenting Payment, Special Benefit or Youth Allowance; or • the child's family/carer/guardian is receiving either Family Tax Benefit Part A, Parenting Payment or the Double Orphan Pension in respect of the child; or • the child's partner is receiving Family Tax Benefit Part A or Parenting Payment; or • the child is receiving financial assistance under the Veterans' Children Education Scheme (VCES) or Military Rehabilitation and Compensation Act Education and Training Scheme (MRCAETS) (if the child is 16 or over).
Veterans' Affairs	Veterans who have served in the Australian Defence Force are eligible for free dental treatment (including general and emergency treatment and dentures) but entitlements vary between Department of Veterans' Affairs (DVA) White Card and Gold Card holders. The DVA Gold Card is also issued to dependents and widows/widowers who have access to these services. For most DVA beneficiaries, an annual limit of $2,488 (2014 limit) applies for dental benefits.
Armed Forces and Army Reserve Dental Scheme	Members of the Australian Defence Force and the Army Reserve are provided with free access to a full range of dental services.
Cleft Lip and Cleft Palate Schemes	Adults and children with cleft lip or cleft palate conditions are eligible for the Cleft Lip and Cleft Palate Scheme. The Scheme provides Medicare benefits for a range of dental treatment including oral and maxillofacial surgery, simple and surgical extraction of teeth, a limited range of orthodontic work, and some general and prosthodontic services. To be eligible for the Scheme, a person must be enrolled in Medicare, registered with the Scheme before turning 22, and have treatment before turning 28.
Aboriginal Community Controlled Health Services and Aboriginal Medical Services	Community Controlled Health Services across Australia provide culturally appropriate dental care to Aboriginal and Torres Strait Islander people. The type, level, and availability of dental services varies between health services.
Oral health services in the Christmas and Coco Islands, and asylum seekers in community detention	Persons in detention facilities have access to free oral health care, although they may face long waiting times. Asylum seekers in community detention may have access to public dental services (for example, dental care is provided with no charge to asylum seekers living in Victoria).

Appendix D – Oral health workforce roles and definitions

Title	Definition
Dentist	Dentists work as independent practitioners and may practice all parts of dentistry. They provide assessment, diagnosis, treatment, management and preventative services to patients of all ages.
Oral health therapist	Oral health therapists are dual-qualified as a dental therapist and dental hygienist. They provide oral health assessment, diagnosis, treatment, management and preventative services for children and adolescents and, if educated and trained in a programme of study approved by the National Board, for adults of all ages. Their scope may include restorative/fillings treatment, tooth removal, oral health promotion, periodontal/gum treatment, and other oral care to promote healthy oral behaviours. Oral health therapists may only work within a structured professional relationship with a dentist.
Dental hygienist	Dental hygienists provide oral health assessment, diagnosis, treatment, management, and education for the prevention of oral disease to promote healthy oral behaviours to patients of all ages. Their scope may include periodontal/gum treatment, preventative services and other oral care. Dental hygienists may only work within a structured professional relationship with a dentist.
Dental therapist	Dental therapists provide oral health assessment, diagnosis, treatment, management and preventative services for children, adolescents and young adults and, if educated and trained in a programme of study approved by the National Board, for adults of all ages. Their scope may include restorative/fillings treatment, tooth removal, additional oral care and oral health promotion. Dental therapists may only work within a structured professional relationship with a dentist.
Dental prosthetist	Dental prosthetists work as independent practitioners in the assessment, treatment, management and provision of removable dentures and flexible, removable mouthguards used for sporting activities. Dental prosthetists who are educated and trained in a programme of study approved by the National Board may provide various types of splints, sleep apnoea devices, anti-snoring devices, immediate dentures and immediate additions to existing dentures. These procedures require written referrals to and from dentists and any appliance or device manufactured under such arrangement must be planned, issued and managed by the treating dentist.
Dental assistant	A dental assistant prepares patients for dental examination and assists dentists, dental specialists, dental hygienists, dental therapists and/or oral health therapists in providing care and treatment.
Dental technician	A dental technician constructs and repairs dentures and other dental appliances.

Dental specialty	Definition
Dental-maxillofacial radiology	The branch of dentistry that deals with diagnostic imaging procedures applicable to the hard and soft tissues of the oral and maxillofacial region, and to other structures that are relevant for the proper assessment of oral conditions.
Endodontics	The branch of dentistry concerned with the morphology and pathology of the pulpo-dentine complex and peri-radicular tissues. Its study and practice encompasses the basic clinical sciences including the biology of the normal pulp, and the aetiology, diagnosis, prevention and treatment of diseases and injuries to the pulp and associated peri-radicular tissues.
Oral and maxillofacial surgery	The part of surgery that deals with the diagnosis and surgical and adjunctive treatment of diseases, injuries and defects of human jaws and associated structures.
Oral medicine	The branch of dentistry concerned with the oral health care of patients with chronic and medically related disorders of the oral and maxillofacial region and with their diagnosis and surgical management.
Oral pathology	The branch of pathology that deals with the nature of diseases affecting the oral, maxillofacial and adjacent regions.
Oral surgery	The branch of dentistry concerned with the diagnosis and surgical management of conditions affecting the oral and dento-alveolar tissues.
Orthodontics	The branch of dentistry that is concerned with the supervision, guidance and correction of the growing and mature dentofacial structures; it includes the diagnosis, prevention, interception and treatment of all forms of malocclusion of the teeth and associated alterations in their surrounding structures.
Paediatric dentistry	The branch of dentistry that is concerned with preventative and therapeutic oral health care for children from birth through to adolescence and those with special needs. It includes management of orofacial problems related to medical, behavioural, physical or developmental disabilities.
Periodontics	The branch of dentistry that is concerned with the prevention, diagnosis and treatment of diseases or abnormalities of the supporting tissues of the teeth and their substitutes.
Prosthodontics	The branch of dentistry that deals with the restoration and maintenance of oral health, function and appearance by coronal alteration or reconstruction of the natural teeth, or the replacement of missing teeth and contiguous oral and maxillofacial tissues with substitutes.
Public health dentistry	The branch of dentistry that is concerned with oral health education of the public, applied dental research and administration of dental care programmes including prevention and control of oral diseases on a community basis.
Special needs dentistry	The branch of dentistry that is concerned with the oral health care of people with an intellectual disability, medical, physical or psychiatric conditions that require special methods or techniques to prevent or treat oral health problems or where such conditions necessitate special dental treatment plans.
Forensic odontology	The branch of dentistry that is involved with the examination and evaluation of dental evidence, which may then be presented in the interests of justice.

Sources: Dental Board of Australia and Australian Bureau of Statistics, Australian and New Zealand Standard Classification of Occupations, Cat no. 1220.0

Appendix E – Methodology

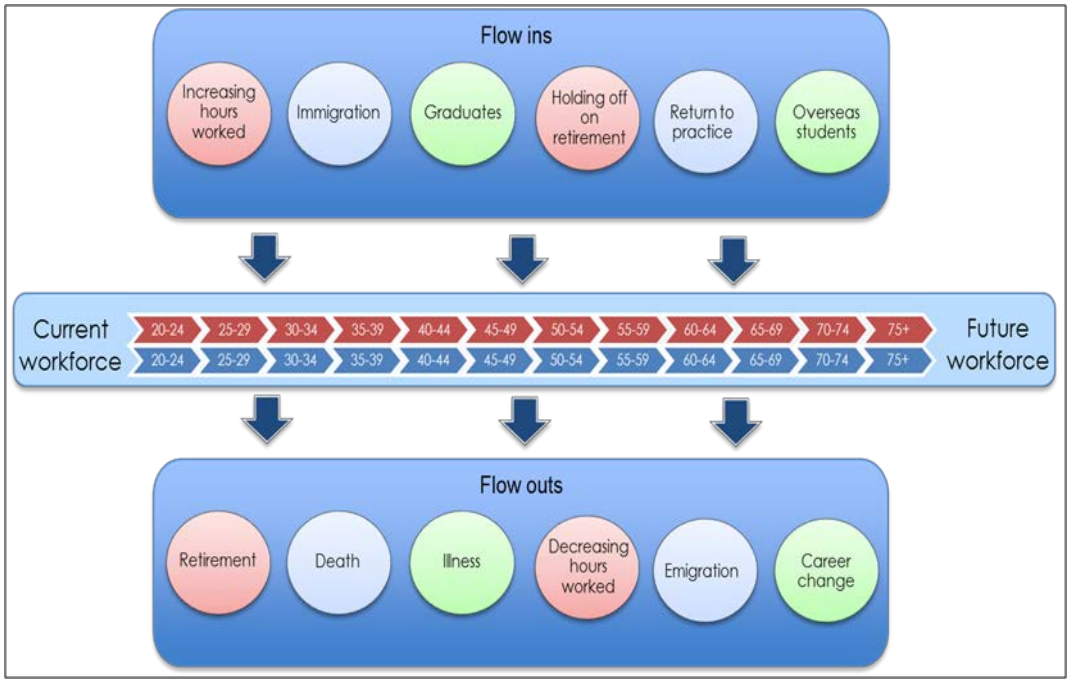
Supply methodology

The principal method used to develop the oral health workforce projections is mathematical simulation modelling, using the National Health Workforce Tool. The simulation model employed to generate the workforce supply projections is a dynamic stock and flow model.

A stock and flow model involves identifying the size and activity of the current workforce (stock) and sources of inflows and outflows from the stock (people entering and exiting the workforce), as well as looking at trends or influences on the stock and flows. To project future supply, the initial stock is moved forward based on expected inflows and outflows, allowing for the impact of trends and influences in the stock. The workforce is broken down into age and gender cohorts, and different flow rates are calculated by cohort and year for each of the input and output factors.

The oral health workforce projections used a dynamic version of the stock and flow approach. This means the stock of the workforce is affected by inflows and outflows to adjacent age cohorts within the stock, as well as external inflows and outflows. That is, each age and gender cohort receives inflows not just from graduates and migration (external flows), but also from people ageing within the model that move from one age cohort into the next. For example, someone moves from the 30 to 34 cohort into the 35 to 39 cohort. Similarly, each age and gender cohort has exits applied – exits as people leave the workforce altogether, and exits as a person moves into the next age cohort. This is an iterative calculation in each year over the projection period, and provides for a more realistic representation of labour dynamics. This provides for a more realistic representation of labour force dynamics. This process is represented in Figure 15.

Figure 15: Stock and flow process



Key inputs in the stock and flow model

There are four key inputs in the dynamic stock and flow model:

- Workforce stock
- New graduates
- Migration (permanent and temporary)
- Exits, which includes all permanent and temporary flows out of the workforce.

Workforce stock

Calculation of the workforce 'stock' in the base year (2012) used the National Health Workforce Dataset (NHWDS): Dental practitioners data. The NHWDS combines data from the annual registration process for registered oral health practitioners, together with data from a workforce survey that is voluntarily completed at the time of registration.

The workforce stock is categorised into five-year age and gender cohorts.

New graduates

Data from the Australasian College of Dental Schools (ACODS), the Department of Education, and the National Centre for Vocational Education Research (NCVER) was used to estimate the anticipated number of new and completing graduates, based on recent trends in the number of graduating students, the number of trainees currently in the system and their expected years of completion.

Table 4 shows the number of domestic and international graduates (current and projected) for each practitioner group to 2017. From 2017, graduate numbers are held constant in the model.

Table 4: Projected Graduates 2012- 2017

Year	Dentist – Domestic	Dentists – International	Oral health Practitioner – Domestic	Oral health Practitioner – International	Dental Prosthetist – Domestic	Dental Prosthetist – International
2012	441	111	259	10	104	2
2013	627	138	287	17	104	2
2014	653	94	324	12	104	2
2015	737	89	388	13	104	2
2016	656	74	388	13	104	2
2017	749	87	388	13	104	2

Migration

Table 5 shows data from the Department of Immigration and Border Protection used to estimate migratory inflows. Both temporary and permanent migration numbers in 2012 are held constant to 2025. To avoid double counting, the number of permanent migrants who had not previously held a working visa was used as the input into the workforce projections.

Table 5: Temporary and Permanent migrants, 2012

Oral health practitioner	Temporary Migration	No previous working visa
Dental Specialist - Dentist	177	118
Oral Health Practitioners	2	19
Dental Prosthetist	0	0
Total	179	137

Source: Department of Immigration and Border Protection

Exits

Estimates of exits are based on the number of permanent departures (retirements, resignations, deaths and migration) and temporary departures (absences from the workforce on a medium to long term basis, including leave without pay and maternity leave) from national registrations.

Demand methodology

Demand projections employed the utilisation method – which measures expressed demand, and are based on service utilisation patterns as they currently exist for five-year age and gender cohorts. The utilisation approach makes no assumptions about potential (or unmet) demand.

Utilisation patterns were calculated based on ARCPOH NDTIS data on visits and services provided between 1994 and 2010. This was matched against age and gender cohorts, and once mapped was projected against future demographic structures.

Table 6 shows the demand rates based on visits, services and services per visit used in the modelling.

Table 6: Utilisation patterns for oral health

Item	1994-1996	1996-1999	1999-2002	1994 - 2002	2002-2008	2002-2010	2008-2010	1994-2010
Total visits	-1.99%	7.44%	-0.63%	1.97%	3.24%	3.13%	2.80%	**2.55%**
Total services	0.65%	5.47%	12.56%	6.82%	5.07%	4.89%	4.36%	**5.85%**
Services per visit	2.70%	-1.84%	13.27%	4.75%	1.77%	1.70%	1.51%	**3.22%**

Source: HWA analysis of ARCPOH data

Scenarios

Scenario modelling is used to demonstrate the impact of potential policy options on future workforce supply and demand. These 'alternative futures' are modelled and measured by varying input parameters. The general method used is to present a comparison scenario, where current trends are assumed to continue into the future, and use this to compare with a range of alternative scenarios. The alternative scenarios are generated by altering parameters in the model, with the flow through effect to the future workforce measured through the impact relative to the comparison scenario.

The impact of these scenarios is measured by comparing their workforce projection results with the comparison scenario – a technical construct where current trends are assumed to continue into the future. The comparison scenario is not a prediction of the future; it is based on utilisation patterns as they currently exist; does not account for any unmet need; and should be interpreted as a 'do nothing' scenario, which assumes known policy settings are held constant as their future levels cannot be predicted. This allows an assessment of the effects of other changes which may

impact the workforce. In the comparison scenario, the total growth in visits between 1994 and 2010 (2.55 per cent, see Table 6) was used to calculate baseline projections for demand for oral health services.

Eight alternative scenarios were developed for AFHW – Oral Health. It is important to note the scenarios are not predictions of what will happen over the period to 2025 – each provides an estimate of a likely outcome given the set of conditions upon which it is based. The scenarios were developed based on consultation with stakeholders, and follow the similar vein as those in *Health Workforce 2025 – Doctors, Nurses and Midwives Volumes 1 to 3.*[xlv,xlvi,xlvii]

These scenarios reflect potential policy options for the government, industry and education sectors to influence health workforce outcomes, as well as possible external shocks to the oral health workforce.

Medium self-sufficiency

This scenario presents the results of moving towards a 50 per cent reduction in net international migration (both temporary and permanent), and a 50 per cent reduction in the number of international students graduating Australian dental programmes, by 2025 (starting from the number of migrants and international graduates in the base year, 2012).

Productivity

This scenario presents the impact on workforce supply and demand projections of a five per cent productivity gain over the projection period. In this scenario, the productivity gain is not attributed to any particular measure, but could include gains achieved through workforce reforms such as changing models of care, adjustments to skill mix, health professionals working to their full scope of practice and technology changes. In the modelling, an increase in productivity is represented by reducing demand, because the ability to produce more with less requires fewer people to deliver a given quantum of services. Given the nature of oral health service delivery in Australia, a five per cent productivity gain may sound low to some stakeholders, but this needs to take into account improvements in both the public and private sectors.

Low demand

This scenario models the impact of a reduction in demand that may stem from the effects of health reform measures and other systemic changes that would lower the use of oral health services by the general population, or a reduction in the demand for particular categories of oral health practitioners. For the purposes of modelling, one per cent was used (which is less than the comparison scenario demand).

High demand

This scenario models the impact of increase in demand for oral health services or an increase in demand for particular categories of oral health practitioners by the general population. The level of growth in oral health services provided between 1994 and 2010, 5.85 per cent (Table 6), has been used as the growth rate to model this scenario.

Undersupply

An assumption in the workforce projections is that supply and demand are in balance in the first year. There is no quantitative measure of the pre-existing workforce position (whether it is in shortage, balance or supply exceeds demand), however the consensus among stakeholders is that the oral health workforce is in undersupply in some areas, such as the public sector and in rural and remote areas.

Therefore, this scenario was developed to illustrate the impact on the workforce where a five per cent undersupply is assumed in the initial year of modelling.

Oversupply

Similar to the undersupply scenario, as there is no quantitative measure of the pre-existing workforce position (whether it is in shortage, balance or supply exceeds demand) of the oral health workforce, this scenario models the assumption that there is an existing workforce imbalance in the base year of the projections, with workforce supply higher than demand. There was consensus among stakeholders that, despite any geographic and sectoral mal-distribution in the oral health workforce, some areas of oral health practitioners' supply exceeds demand.

The scenario demonstrates the impact on the workforce where a five per cent oversupply is assumed in the initial year of modelling.

Graduate reduction

This scenario models the effects of a ten per cent reduction in the number of graduates (both domestic and international) of Australian dental programmes. In the comparison scenario, the number of graduates was projected to 2017, based on recent trends in the number of graduates, the number of students currently enrolled in dental programmes, and their expected years of completion. This number was then held constant from 2017 to 2025. In the graduate reduction scenario, a ten per cent reduction in the projected number of graduates to 2017 was calculated, and the reduced number of expected graduates in 2017 was held constant to 2025.

In this scenario, the reduction in graduate numbers is not attributed to any particular measure, but could include a reduction due to a cap in student numbers or a reduction in the number of students electing to enter or complete dental programmes.

Assumptions

The simulation modelling techniques used to produce the projections rely on two key inputs:

- The set of assumptions about future conditions; and
- The data from which the model's parameters inputs and starting position are derived.

The assumptions are important as they affect the interpretation of workforce projection results. The projections provide likely outcomes given the assumptions on which they are based, so if any of the assumptions are not applicable or cease to reflect real world situations, the projections will not provide an accurate indication of future outcomes. For the input data, any inaccuracies that may exist will directly impact on the accuracy of the modelled results.

Major assumptions and data treatments underlying the scenarios are outlined in the following sections. These are critical to understand as the interpretation of the modelled outputs needs to be done in the context of the underpinning assumptions.

Supply assumptions

- The base oral health workforce is set at 2012 levels.
- Workforce entrants enter the model as graduates or as internationally-trained oral health professionals through either temporary or permanent migration streams.
- Dental graduates entering the workforce are grown through to 2017 based on ACODS data and held constant thereafter. For the other workforces, graduates are grown through to 2015, and held constant thereafter.
- The inflow of oral health professionals via migration is obtained from the Department of Immigration and Border Protection. The model holds constant 2012 levels of international migration.
- The proportion of graduating international students entering the workforce is calculated at 70 per cent for dentists.
- Hours worked are calculated and applied separately for each age/sex cohort within each oral health workforce (dentists, dental prosthetists, oral health therapists, dental hygienists, dental therapists). The data from which hours worked is calculated is taken from the National Health Workforce Dataset for 2012.
- Exit rates are calculated separately for dentists, dental prosthetists and for oral health practitioners (comprised of oral health therapists, dental hygienists, dental therapists). They are calculated for each five year age/sex cohort.
- Exit rates are a composite measure including all forms of removal from the workforce, permanent or temporary.

- All graduating oral health professionals are assumed to remain in the workforce, even in situations of workforce supply exceeding demand. That is, exit rates are not adjusted to take account of possible movements away from a profession in an oversupply situation

Demand assumptions

- For the total population, the expressed demand rate for the comparison scenario was calculated based on the growth in the number of visits provided between 1994 and 2010, using data from the ARCPOH NDTIS. This was calculated to be 2.55 per cent. A constant, linear growth rate is then applied to the various age/sex cohorts. This provides for variation in demand as a result of different sizes of age/sex cohorts over time, but not due to different demand patterns within an age/sex cohort.
- Demand and supply start from an 'in balance' position. This is for the purposes of modelling only and should not be taken to imply that the workforces are (or are not) currently in balance.

Accuracy of workforce projections

It should be noted that projections become less accurate as the period of time over which they are applied increases. This is due to the inherent error in any projection methodology, and/or changes in technology (or other factors) which over an extended period are likely to change the relationship between type and number of services provided per practitioner. Another factor that influences the projection period is the changes and reliability in data sets used. For example, over a long period of time the population projections applied to the modelling may change. However, it is the graduate numbers over the projection period that could change most dramatically. Both will alter the workforce projections. In summary, the relevance of long term projections generated will in part depend on the quality of the data inputs for those projections, while less robust data will limit the projection period.

Appendix F – Data sources

Data sources available to HWA vary significantly in terms of their frequency, source and length of time series available. Many sources are only newly available, are only partially complete (due to the need to collect data over an extended period) or are collected infrequently. The extent to which HWA can accurately model the future oral health workforce is entirely dependent on the quality and availability of relevant data.

In preparing this report, potential data sources were assessed to determine the availability, coverage and quality of those data items which are essential for estimating the current workforce and projecting the future workforce. Appropriate data sources which have been used in the modelling in this report are listed in the tables below.

Where the process of selecting input data identified data gaps, options for addressing the gaps were considered and assessed on the basis of the:

- type of data required
- collection methods used
- tool and infrastructure required
- resource cost and time requirements
- potential analysis in the future, such as developing a survey to conduct annually or longer intervals to provide ongoing information.

HWA will continue to augment and refine the capabilities of the model over time to reflect the accumulation of additional datasets, changes in underlying demand and supply factors, and finer levels of detail (for example, modelling regional versus metropolitan service levels).

Workforce supply data sources and data items

Data Source	Data items	Modelling purpose	Limitation
Australian Health Practitioner Regulation Agency	2012: Registration data, Labour force survey data • Profession • Age • Gender • Hours worked	• Workforce supply • Workforce profiles • Exit rates	Reporting of distinct categories due to multiple registration

Data Source	Data items	Modelling purpose	Limitation
Australian Institute of Health and Welfare / Australian Research Centre for Population Oral Health	2006 and 2012: Registration data, Labour force survey data • Profession • Age • Gender • Hours worked	Exit rates	• Reporting of distinct categories due to multiple registrations. • This is at 5 year age groups.
Australian Bureau of Statistics	Census data: • Profession • Total Employed Persons • Average hours worked	Workforce profiles	Self-reported census data.
Department of Education	2006 to 2012 Commencements and completions for course names • Age • Gender	• Inflows • Exit rates • Profile	–
Australasian Council of Dental Schools	2006 to 2012 Commencements and completions for course names • Age • Gender	• Inflows • Exit rates • Profile	The retention rate of International students is often based on an assumption in modelling previously done.
National Centre for Vocational Education Research	2006 to 2012 (annual) Commencements and completions for course names • Age • Gender	• Inflows • Profile	–
Department of Immigration and Border Protection	2006 to 2012 (annual) Permanent and temporary visa subclasses • Age • Gender	• Inflows • Exit rates	–
Australian Dental Council	2006, 2009, 2012 Permanent and temporary migrants • Age • Gender	• Inflows • Exit rates	–

Data Source	Data items	Modelling purpose	Limitation
Public dental sector workforce scheme	Number of dentists that enter Australia through this stream instead of through ADC based on an eligibility listing in each jurisdiction.	Inflows	–

Workforce demand data sources and data items

Data Source	Data items	Limitation
Australian Bureau of Statistics	Population projections 2006 – 2025: • 5 year age cohorts • Gender	–
Australian Bureau of Statistics	Patient Health Survey 2011-12: • Visit to dental professionals • Sought a dental professional by age/gender (15 and over) • Use of dental services for own health in the last 12 months (15 and over)	Based on overall population rather than dentate population only
Australian Research Centre for Population Oral Health	Longitudinal Survey of Dentists' Practice Activity • Supply of visits • Hours and services	It is a logbook of dentists' practice activity
Australian Dental Association	2006 – 2012 services items numbers • Costs • Services	–
Australian Dental Association	Practice survey data: • Question 8: usual working hours • Question 9: patient appointments • Question 10: practice 'busyness' • Question 12: dental practice • Question 2.1: details of private practice Unit record data is currently being requested	This will give an indication of private practice activity. This data is intended to be utilized as an implied private practice at a national level.
Australian Institute of Health and Welfare	Hospital morbidity data (dental care is one of the most common reasons for hospital admission for children under the age of 10 years).	–

Data Source	Data items	Limitation
Medicare	• Chronic Disease Dental Scheme (CDDS) and teen dental Medicare data 2007 – 2012: • Services by category and item numbers • Benefits paid by Medicare • Category 4 – oral and maxillofacial services • Medicare services for dentists, dental prosthetists, dentistry-oral surgery/ other dental specialist, dentistry-registered and orthodontistry	Medicare data focuses primarily on the public sector, and records the number of services and the benefits paid by Medicare (with an upper limit that is paid). The types of treatment services provided are similar to those that are identified in table 4. The benefits paid per service grew at 1.44 per cent between 2007 and 2011.
Department of Veteran's Affairs	2006 – 2012 services by Medicare category and service item numbers	–
Public Dental Directors/ Jurisdictions	• Public sector utilization patterns and typical service usage. • Child dental health data	–

Data Source	Data items	Limitation
National Dental Telephone Interview Survey (ARCPOH)	Total population, 65+ population, geographical distribution by remoteness area, index of relative socio-economic advantage and disadvantage, gender and age cohorts for: • Exams • X-rays • Scale and cleans • Extractions • Fillings • Crowns • Bridges • Gum treatments • Orthodontic services.	• Self-report survey with a relatively small sample size (~7,000) collected every three years. • NDTIS captures data on dental visiting by asking respondents about the number of visits made in the previous 12 months. Data on services received at those visits were collected by asking respondents to recall the number of exams, x-rays, scale and cleans, extractions, fillings, crowns, bridges, gum treatments and orthodontic services received in the last 12 months. The NDTIS services received questions were primarily designed to gain an understanding of the orientation of dental care within the community. While these service types represent the large majority of services received, the data does not necessarily reflect all dental services received. As such there is a high likelihood that the total count of services is conservative, and that services per visit applied in the dental demand projection is likely to be highly conservative.
Private Health Insurance Administration Council (PHIAC)	Private insurance quarterly report on the number of services and their cost from 2006 to present	Data from PHIAC provides the number of services, benefits paid and fees charged per quarter. The number of services from 2006 to 2011 has grown at 4.54 per cent over this five- year period. The type of services provided under the Dental category under general treatment include: comprehensive examination or consultation, dental x-ray, clean, polish, fluoride treatments, scale and clean, custom-made mouth guards, tooth fillings, crowns and bridges, full upper or lower denture, major dental work, periodontics, endodontics, dentures and surgical extraction of teeth. However there is no breakdown of the general treatments for dental.

Data Source	Data items	Limitation
Hardes data	Hospital inpatient data for public and private, by jurisdiction, Remoteness Area, age and gender.	This data is only for inpatient activity.

Appendix G – Workforce planning scenario results

Tables 7 to 14 show the supply and demand for the oral health workforce for selected years to 2025, as well as the input parameters on inflows and exits that were used to generate the supply projections. All results are also presented in terms of headcount. This allows for an estimation of the required number of students or practitioners at each stage of the pipeline to be generated. However it should be noted that underlying the headcount results is a full-time equivalent measure that represents the current and projected reported hours of work of each age cohort in the relevant workforce. Because of the process to generate these results, the headcount demand figures can vary from those presented in the comparison scenario (although not by a material amount).

Table 7: Oral health workforce, comparison scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,280	22,314	26,140
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.65%	3.12%	2.91%
Demand	16,776	17,869	19,021	20,496
Excess/Shortfall	SP	1,411	3,293	5,644

SP: starting point

Table 8: Oral health workforce, medium self-sufficiency scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,177	21,827	24,782
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	78	72	51
Skilled Migration	137	120	97	69
Temporary Migration	179	157	127	90
Exits (%)	5.45%	3.67%	3.19%	3.07%
Demand	16,776	17,869	19,021	20,496
Excess/Shortfall	SP	1,308	2,806	4,286

SP: starting point

Table 9: Oral health workforce, productivity scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,280	22,314	26,140
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.65%	3.12%	2.91%
Demand	16,776	17,550	18,410	19,471
Excess/Shortfall	SP	1,730	3,904	6,669

SP: starting point

Table 10: Oral health workforce, low demand scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,280	22,314	26,140
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.65%	3.12%	2.91%
Demand	16,776	17,386	18,054	18,919
Excess/Shortfall	SP	1,894	4,260	7,221

SP: starting point

Table 11: Oral health workforce, high demand scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,280	22,314	26,140
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.65%	3.12%	2.91%
Demand	16,776	19,077	21,442	24,443
Excess/Shortfall	SP	203	872	1,697

SP: starting point

Table 12: Oral health workforce, undersupply scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,280	22,314	26,140
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.65%	3.12%	2.91%
Demand	17,628	18,720	19,873	21,351
Excess/Shortfall	-852	560	2,441	4,789

SP: starting point

Table 13: Oral health workforce, oversupply scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	17,614	19,967	22,946	26,638
Domestic Graduates	804	1,148	1,241	1,241
International Graduates	123	89	102	102
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.39%	3.59%	3.08%	2.94%
Demand	16,776	17,869	19,021	20,496
Excess/Shortfall	838	2,098	3,925	6,142

SP: starting point

Table 14: Oral health workforce, graduate reduction scenario, selected years, headcount

Category	2012	2016	2020	2025
Supply	16,776	19,148	21,677	24,903
Domestic Graduates	804	1,034	1,118	1,118
International Graduates	123	81	92	92
Skilled Migration	137	137	137	137
Temporary Migration	179	179	179	179
Exits (%)	5.45%	3.67%	3.17%	2.97%
Demand	16,776	17,871	19,040	20,529
Excess/Shortfall	SP	1,277	2,637	4,374

SP: starting point

Glossary

Clinician – A person who spends the majority of their time working in the area of clinical practice, that is, the diagnosis, care and treatment (including recommended preventative action) of patients or clients. Clinical practice may involve direct client contact or may be practiced indirectly through individual case material (for example, a dental technician).

Comparison scenario – A scenario where current trends are assumed to continue into the future. This is compared with a range of alternative scenarios.

Employed – a practitioner who reported working in their profession in the week before the survey. In this report, data on employed practitioners include those who:

- Worked for a total of one hour or more in the week before the survey in a job or business (including own business) for pay, commission, payment in kind or profit.
- Usually worked, but were on leave for less than three months, on strike or locked out, or rostered off.

Full-time equivalent (FTE) – The model calculates FTE on a per role basis based on the initial headcount in these workforces, multiplied by their reported hours worked. This is then divided by a standardized assumption about what constitutes a single FTE across the workforces modelled (38 hours per week) to generate the FTE quantity.

International dental graduate (IDG) – Dentists whose basic dental qualifications were acquired in a country other than Australia

International students – Private or sponsored students in an Australian university who are not Australian citizens or permanent residents.

Registered workforce – Those dental professions which are regulated under the National Registration and Accreditation Scheme – dentists, dental specialists, oral health therapists, dental hygienists, and dental therapists.

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