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The real cost of training health professionals in Australia: it costs as much to build a dietician workforce as a dental workforce

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Abstract

Objectives: We explored the real cost of training the workforce in a range of primary health care professions in Australia with a focus on the impact of retention to contribute to the debate on how best to achieve the optimal health workforce mix.

Methods: The cost to train an entry-level health professional across 12 disciplines was derived from university fees, payment for clinical placements and, where relevant, cost of internship, adjusted for student drop-out. Census data were used to identify the number of qualified professionals working in their profession over a working life and to model expected years of practice by discipline. Data were combined to estimate the mean cost of training a health professional per year of service in their occupation.

Results: General medical graduates were the most expensive to train at $451,000 per completing student and a mean cost of $18,400 per year of practice (expected 24.5 years in general practice), while dentistry also had a high training cost of $352,180 but an estimated costs of $11,140 per year of practice (based on an expected 31.6 years in practice). Training costs are similar for dieticians and podiatrists, but because of differential workforce retention (mean 14.9 vs 31.5 years), the cost of training per year of clinical practice is twice as high for dieticians ($10,300 vs. $5200), only 8% lower than that for dentistry.

Conclusions: Return on investment in training across professions is highly variable, with expected time in the profession as important as the direct training cost. These results can indicate where increased retention and/or attracting trained professionals to return to practice should be the focus of any supply expansion versus increasing the student cohort.

Keywords

cost, health workforce, multidisciplinary care/primary care, training

Background

Apparent shortfalls between the supply of health professionals and demand for their services can be addressed in four main ways: (i) increasing training places; (ii) improving retention of qualified people in the workforce; (iii) improving productivity of the existing workforce and (iv) managing demand. In this study, we focus on the second of these avenues.

Leach et al.[1] published research, based on the Australian 2006 Census of Population and Housing,[2] on the gap between the number of persons qualified in a health care profession and the number working in that profession. This research showed varying levels of retention across health professions across the working life-span. For some professions, most of those qualified were working in the profession immediately post-graduation and were still employed in their occupation at age 60 (e.g. optometry 85% and 58%, respectively).

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While for others, a minority was employed immediately post-graduation and into their 60s (e.g. social work 40% and 21%, respectively). The Australian Health Workforce Advisory Committee (AHWAC) also identified large gaps between the number of people with qualifications and the number working in their occupation.[3]

Non-medical health professions are often collectively designated as 'allied health'.[3] Attrition in the allied health workforce has been attributed to various factors including family responsibilities, burnout, poor work environment, limited graduate or early career employment opportunities and absence of career paths with acceptable remuneration and opportunities to apply high level skills and capabilities.[4–6] A growing number of allied health graduates are entering expanding postgraduate medical programs.[6,7] While a valid pathway into medicine, this increases the effective cost of training the allied health workforce.

We define the 'real cost of training' the practitioner workforce as the total cost of training (incurred by the student, government and clinical facilities) averaged over the expected years in clinical practice, for each health profession. Losses to the health workforce during and following training increase the real cost of training per working health professional. The various resources put into training are spread over fewer professional years of service, reducing the return on the training dollars spent (all else equal). The traditional response to workforce shortfalls has been to increase training places, but for occupations with high student drop-out and poor workforce retention, this can prove an expensive way of delivering additional health professionals. Maintenance of a sufficient health workforce is an issue internationally. Recent Australian and Canadian health workforce modelling studies have found that improving retention is critical to reducing projected shortages of the nursing workforce.[8,9]

There is a large literature on issues relevant to health workforce retention, such as changes in working hours,[10] temporal changes in productivity,[11] explanations of intention to stay or leave,[12] factors predicting retirement[13] and strategies to improve skill mix.[14] While it is known that the cost of education and training varies across disciplines, what has not been reported is how student retention and time in the workforce affect the real cost of training the health workforce.

The aim of this research was to estimate the expected working life in selected health professions, using data on qualification and employment status collected in the 2011 Australian Census.[2] We also assess what this means for 'return on investment' in training the health workforce, expanding on research by Leach et al.[1] As far as we can ascertain, this is the first attempt in Australia, and possibly internationally, to model the expected length of a clinical career and relate this to training cost. The true cost of training per year of employment in each of 16 health professions is estimated and compared. This contributes to an understanding of how retention influences the cost of achieving a multidisciplinary workforce.

Method

We focus on those health professions involved in community-based multidisciplinary care for common chronic conditions (Table 1). The allied health professions included are those identified as 'core allied health' in the 2006 AHWAC report[3] and allow for qualifications to be mapped onto a health occupation.

The gap between reported qualifications and workforce participation was derived from the Australian Bureau of Statistics (ABS) 2011 Census of Population and Housing, using the Table Builder Pro tool.[15] The Census provides almost total coverage of the population, with employment and education questions having response rates of 95–99%.[16] The Census asks respondents the main field of study of their highest non-school qualification and the occupation in their main job in the week prior to Census night, also coded into industry classifications. The proportion of persons with a qualification in a healthcare field who were identified as working in the occupation with the same name was extracted (see Table 1 note (a) for explanation). Employment by sector was established from the variable 'public or private employer' (options – private sector; government national, state/territory or local; employer type not stated). It does not account for practice across both sectors. Self-employment was assessed from employment type 'owner/manager of an incorporated or unincorporated business'.

Undergraduate costs were estimated from 2015 course fees for domestic full-fee paying university students in Victoria (obtained from university websites). Student attrition rates for 2012 were obtained from the Australian Government Department of Education and Training (DET) for this study. Mean university education costs per completing student by profession were calculated by applying DET completion rates to the multiple possible education pathways, weighted by enrolment.

Estimating the costs of undergraduate clinical training in hospitals and other health services is part of the work of the Independent Hospital Pricing Authority Teaching, Training and Research inquiry,[17] yet to be completed. In its absence, we took published daily payment rates by discipline[18,19] multiplied by the mean discipline-specific clinical placement days.[20]

Three professions must complete an internship following graduation to practice independently – audiology,

Table 1. Percent of persons with a non-school qualification in selected health occupations who were employed in that occupation, by age group.[a] Australia, 2011.

	20–24 (%)	25–29 (%)	30–34 (%)	35–39 (%)	40–44 (%)	45–49 (%)	50–54 (%)	55–59 (%)	60–64 (%)	65–69 (%)	70–74 (%)	75+ (%)
Allied oral health[b]	51	45	46	46	42	45	42	44	37	23	13	4
Audiology	54	72	64	65	51	58	49	47	17	16	0	0
Dentistry	48	58	63	65	65	61	63	65	58	46	24	6
General nursing	61	63	59	56	54	50	48	44	33	13	4	1
General medicine/ general practice[c]	65	66	52	49	50	55	58	58	54	44	31	12
Nutrition and dietetics[d]	35	44	39	33	34	33	33	27	26	19	8	0
Occupational therapy	76	76	63	56	55	56	49	45	27	12	2	0
Optometry	84	82	77	74	81	74	78	75	66	49	27	7
Pharmacy	78	75	66	65	64	62	65	59	48	29	16	4
Physiotherapy[e]	85	77	67	66	69	73	67	62	44	22	9	3
Podiatry	92	89	84	81	79	73	80	72	42	23	7	5
Radiography	85	85	80	76	74	75	69	63	45	24	8	1
Speech pathology	88	83	70	65	61	65	60	55	32	23	6	0

Data source: ABS 2011 Census of population and housing.

[a]Persons in Australia who reported a non-school qualification in a field of study whose main occupation in the previous week matched the field of study. Australian Standard Classification of Education (ASCED), Field of Education Classifications were mapped to Australian and New Zealand Standard Classification of Occupations (ANZSCO) as follows: Audiology – Speech Professionals and Audiologists; Dentistry – Dentist; General Nursing – Registered Nurse; General Medicine/General Practice – Generalist Medical Practitioner; Nutrition and Dietetics (only including those with degree qualifications)–Dietician (this category includes both dieticians and nutritionists); Occupational Therapy – Occupational Therapist; Optometry – Optometrist and Orthoptist, Pharmacy – Pharmacists, Physiotherapy – Physiotherapists, Podiatry – Podiatrists, Radiography – Medical imaging professional; Speech pathology – Speech Professional and Audiologist.

[b]Census data cannot separate allied oral health occupations presenting them jointly as dental hygienists, technicians and therapists; this group has been mapped to combined qualification data of persons who identify a non-school qualification in dental technology, dental studies not further defined/not elsewhere classified.

[c]Combined data of persons who identify a non-school qualification in general medicine and general practice. Due to Census coding limiting to a general practice qualification would underestimate the general practice workforce. When the two qualification categories are combined, the number of generalist medical practitioners is similar to the total of registered hospital non-specialists and GPs in the 2011 NHWDS registration data.

[d]Limited to pharmacy qualification at bachelor level and above, to exclude non-registrable qualifications of pharmacy assistant roles – expanded with the opening of new pharmacy schools in Australia in recent years. Dietetics and nutrition qualifications are grouped together in the Census. Included nutrition and dietetics qualifications were limited to bachelor degree level and above for the purposes of this table.

medicine and pharmacy (plus medical radiation under some education pathways). There is debate about whether interns provide a valued service or simply represent a cost in salary, supervision and training. A recent report of the Australian Health Ministers Advisory Council[21] treats interns as a cost with no compensating contribution, which we also adopt. The cost is thus calculated as the sum of intern salaries (including wage on-costs), plus a premium to cover the costs of supervision, education and training facilities.

The cost of education and training of an entry-level health professional is thus the sum of university fees, undergraduate clinical training and graduate internship (where required for independent practice).

To estimate the expected mean number of years in the health profession, we created a model using Census data. The model draws on the change over the working life span (from age 20 to 80 years) in the proportion of persons with qualifications in a field still working in their occupation. Although the Census data are cross-sectional, the model in effect treats the distribution of those in an occupation as if it were a cohort based on a well-established technique used by the ABS to calculate life expectancy.[22] The reduction in the proportion working in an occupation across age groups is assumed in the first instance to represent 'retirement'. The percent 'retiring' is multiplied by the estimated average years of service, from mid-20 s which shows that the vast majority of students graduate by age 30.[23] The weighted sum of each age group's contribution to years of service as they retire provides the estimate of the expected mean number of years of service for that

profession. Temporary exits are dealt with in a secondary analysis, drawing on the census data and implied return to work in the peak child bearing years (30 to 40 years) to adjust downwards expected years in the profession.

The total estimated cost of education and training, accounting for student attrition is then divided by the expected years of service to provide an estimated cost of training per year working as a health professional.

Independent testing of core assumptions and model outputs was conducted using the National Health Workforce Dataset (NHWDS), collected routinely as part of national registration of health practitioners. The NHWDS was not the primary data source in this study as the data are limited to the registered allied health professions and there are only three years of data. These data were used to test the assumed age of first entering the professional workforce and the mean time lost to temporary exits.

Results

There was considerable variability across the health professions in the proportion of people who work in the health professions for which they are qualified, both immediately post-graduation and across a working life span. The proportion of qualified professionals working in their occupation soon after graduation varied – from less than 45% of graduate dieticians, 76% of occupational therapists and 92% of podiatrists. Retention of older workers similarly varied with 66% of optometrists and 58% of dentists still working in the 60 to 65 year age range compared to only 17% of audiologists (Table 1).

The cost of educating and training a new health professional varies across disciplines. University fees for nursing and allied health pathways cost between $100,000 and $176,000 per person, while as expected, medicine and dentistry are the most expensive at over $350,000 per completing student. The high clinical training costs of a paid internship, in addition to clinical placements, added significantly to the cost of creating an audiologist, pharmacist and medical practitioner (Table 2).

The estimated expected mean time working in the occupation also varied considerably across professions, generally estimated at between 20 and 30 years, but with dietetics and nutrition lower at 14.9 years and optometry higher at 36 years (Table 2). The high cost of training in dentistry is thus in part offset by longer periods in the workforce with an estimated cost per year of service at $11,158. Compared with the real cost of training allied health practitioners, the differential is considerably less than the training cost differential (Table 2). On the other hand, the cost of medical training per year in the profession is still very high at an estimated $18,432. For most allied health professions and registered nurses, the cost per year of working life to train was estimated at between $5000 and $10,000. The annualized cost was lower for allied oral health workers, due to a modest training cost and good workforce retention. Speech pathologists, medical radiation practitioners, optometrists and podiatrists all with more than 30 years expected practice implied a good return on investment in their training. The dietetics workforce, due to low retention, had one of the higher costs of training per year of practice (Figure 1).

We sought to explore possible reasons for the highly divergent retention rates across health professions that we could test with the Census data. A possible explanation for variation in expected professional working life was opportunity for private practice and self-employment. We tested both of these and found a significant positive association between the proportion of the workforce located in the private sector and the expected time in their occupation (Figure 2). Working in the private sector explained 58% of the variance in expected working years ($R^2 = 0.5795$, $p = .006$). The likelihood of being self-employed was also positively related to time in the occupation ($R^2 = 0.334$, $p = .043$) and to remain in the occupation past the age of 65 years ($R^2 = 0.323$, $p = .041$).

Discussion

Gaps between the numbers of qualified health professionals and those working continue to be observed in a range of professions since originally observed by Leach et al.[1] When graduates do not work in the profession in which they are trained, it does not necessarily mean the training was wasted, but it does mean that the cost of training the workforce is increased.

Using the Census as our primary data source has some limitations. The Census only records field of study for the highest level of qualification. Individuals who switch disciplines and practice in the field of the lower qualification will be identified as not working in their field of study (defined by the higher qualification). For some professions, the mapping between qualification and occupation is not tight, in which cases, level of qualification and job description were used to assist. In other fields such as occupational therapy, podiatry and physiotherapy, the educational pathways and occupational match are precise giving perhaps greater confidence in our modelled estimates. Psychology was excluded from our study, as from the Census data we were unable to establish whether a qualification was consistent with clinical registration.

Qualifications may have been obtained overseas and may or may not be recognized for clinical practice

Table 2. Estimated cost per year of clinical practice – selected health professions, Australia, $2015.

	University education cost per completing student, $	Clinical training cost per health professional, $	Estimated total training cost/ completing professional, $	Mean expected years of service[a]	Estimated Cost per year of clinical practice, $
Audiologists	173,870	99,276	273,146	26.5	10,304
Dental hygienists[b]	28,965	4199	33,164	25.6	1295
Dental prosthetists[b]	41,896	4199	46,095	25.6	1799
Dentists	321,425	30,759	352,184	31.6	11,158
Dieticians[c]	145,105	7934	153,039	14.9	10,277
General medical practitioners	317,473	134,256	451,729	24.5	18,432
Medical radiation practitioners	158,486	13,432	171,918	30.3	5672
Nutritionists	111,120	0	111,120	13.2	8398
Occupational therapists	144,802	10,974	155,776	21.5	7239
Optometrists	167,892	7550	175,442	36.0	4870
Oral health therapists[b]	129,404	8397	137,801	25.6	5379
Orthoptists	167,462	5306	172,768	na	na
Orthotists and prosthetists	155,733	6949	162,682	na	na
Pharmacists[c]	129,134	68,927	198,061	28.3	7004
Physiotherapists	162,658	10,598	173,256	27.0	6419
Podiatrists	153,590	9461	163,051	31.5	5170
Psychologists	176,040	13,023	189,063	na	na
Registered nurses	96,270	10,435	106,705	19.7	5406
Speech pathologists	134,143	8180	142,323	30.3	4695

Data sources: Created using data from websites of Victorian Universities, Department of Education and Training, Health Workforce Australia, Department of Health and Human Services of Victoria, Victorian Clinical Training Council and ABS Census of Population and Housing.

Notes

na = insufficient granulation of Census data prevented analysis of expected years in the occupation for a number of health professions.

[a]The average age of graduation for each discipline, based on DET graduate data was used in the model to estimate number of years in that occupation. We note that most (85%) of new graduates across the subject disciplines are aged 20–29 years (range from 70% for nursing to 97% for pharmacy). Years of service rounded to the one decimal place.

[b]Allied oral health professions are grouped together in the Census as dental hygienists, technicians and therapists. Thus dental hygienists, prosthetists and oral health therapists were grouped together in estimating the expected mean years of service.

[c]Dietetics and nutrition qualifications are grouped together in the Census. Bachelor level and above were used to delineate dietetics qualifications, while all qualifications were included in nutrition models – acknowledging that there is likely much overlap between the two professions among bachelor and above qualifications captured in the Census. Expected mean years of service model for pharmacy was also limited to qualifications bachelor level and above in line with course costs used and to avoid data being skewed by non-registrable qualifications.

in Australia,[24] potentially accounting for some of the observed gap between qualifications and employment (rather than retention). Conversely, practitioners who train in Australia and then leave, will contribute to training costs, but will not be captured as losses to the workforce since they will not appear in the Census. International movement of health professionals is a complex supply issue and would be a desirable extension to this analysis.

A set of simplifying assumptions has been adopted. For example, retention patterns have been inferred from cross-sectional data, as is the convention in life expectancy calculations. Longitudinal data are an alternative approach, but require many decades of data and still rely on assumptions in modelling forward. Age upon entering the profession and loss to temporary exits were estimated based on the age distribution of students and the pattern of workforce participation over time. The underpinning logic was tested using registration data[25] where available (for optometry, physiotherapy, medical radiation practice, occupational therapy, pharmacy and podiatry). This alternative analysis, which allowed a more precise estimate of mean time in temporary exits and age of entry, estimated expected professional years lost to temporary exits within 2% of the estimate using the Census data. Given results are based on the Australian Census, estimates can be updated every five years.

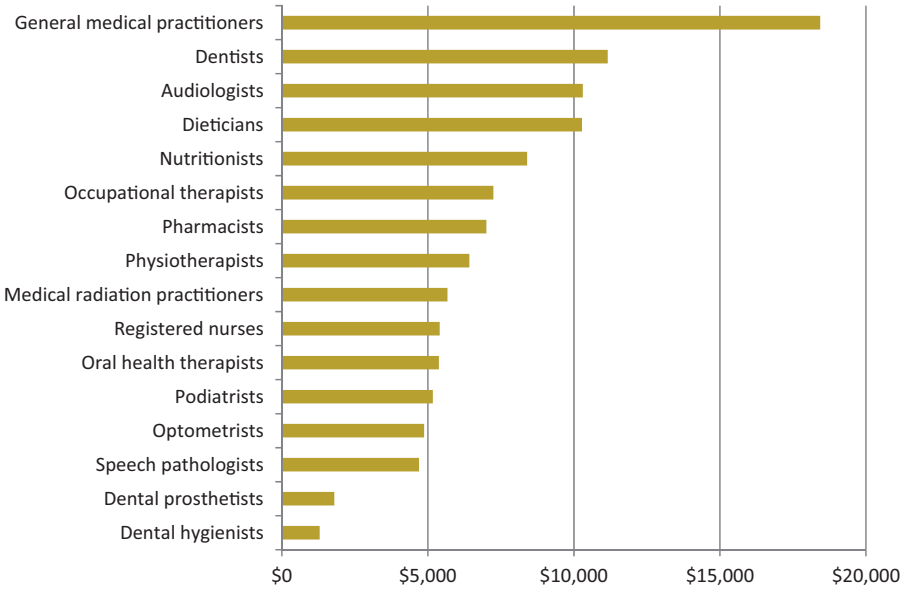

Figure 1. Cost of training and education per expected year of clinical of practice, selected professions.
Data source: Estimated total training cost per completing professional divided by mean expected years of service, from Table 2 above.

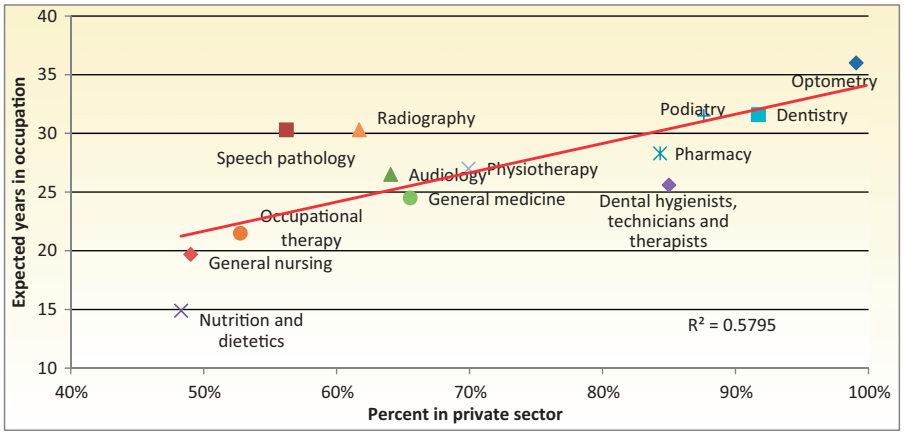

Figure 2. Expected years of service in selected health occupations by percent employed in the private sector, Australia in 2011.
Data source:
(a) Percent of persons with a non-school qualification working in the relevant occupation, who reported working in private sector employment in the 2011 ABS Census.
(b) Adjusted average years of service from Table 2.

Our model does not incorporate productivity or hours worked, which are presumed to be exogenous. The efficiency of delivering healthcare is a much larger question, of which workforce retention is just one component, but one which is separable and as such capable of independent analysis.

In terms of the cost of training, in the absence of comprehensive costing estimates for the clinical component of training, which is inherently complex, cost was based on fees charged.

Conclusions

The findings of this research could be used to inform health workforce planning and policy, in particular workforce retention across occupations. To illustrate with dietetics, there are 450 graduates annually from dietetics courses across Australia.[26] With an expected period in their occupation of 14.9 years, this is an expected 6705 dietician workforce years from the graduating cohort. If an increase in the workforce of practising dieticians of 25% is sought to address the large

and increasing burden of diet-related disease, this could be achieved by training an additional 112 students annually, at a cost of ~$150,000 per graduating student, an on-going investment of nearly $17 million per year. Alternatively, the government and industry could implement retention strategies to increase expected time in the dietetic workforce by 3.7 years (up to 18.6 years) to achieve the additional 25% workforce capacity. This could potentially be achieved in a shorter time frame, at lower cost and create a more experienced workforce. Just the government share of the training cost estimate (~50% of $17 m on-going) could fund an extra 85 + dietician positions across Australia – a strategy that would certainly promote retention and create much needed additional service capacity. If those resources went into additional training, that would not fund a single additional dietician service.

The cost of poor retention has relevance internationally. It is likely to be high in countries with high health workforce losses to emigration. Such losses will increase the cost of training per working health professional and possibly result in health workforce shortages. Our model could be replicated in a range of settings and countries.

Better knowledge about the drivers of poor workforce retention and translation into strategies that would extend working life as a health professional are needed. The finding that those occupations based more in the private sector work longer in their occupation points to links between retention and features of private practice, such as potentially an attractive salary, flexibility and greater control over one's career. While calls for more research into the causes of poor retention across much of allied health are not new,[1,7,27] this study adds weight to the need for more research in this area, but more particularly action to enhance retention, specifically in those occupations where it is low.

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