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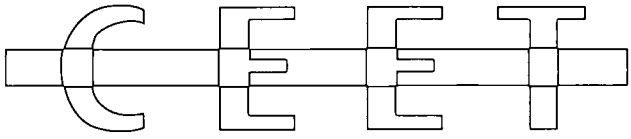
ABSTRACT

Analysis of Australian Bureau of Statistics data from 1987-2001 identified patterns in nursing employment. Overall, the Australian labor force increased 29%; nursing occupations increased only 18%. The number of nursing workers per 100,000 population has steadily declined. The average age of nursing workers increased significantly; the proportion aged 45 and over rose from 20% to 37%. In contrast to the overall labor force, the average hours per week of work in nursing occupations declined in the 1990s. Three of four nursing workers are professionals; employment in this group increased 30%, with managers, educators, researchers, and midwives experiencing the most growth. The demand for nursing workers was weak overall but very strong for those caring for aged or disabled persons, driven by population aging and a policy change to provide care in community settings. A shift of nursing education to universities, restructuring of the nursing work force, and fiscal constraints on hospitals have affected the nursing labor market. Growth projections to 2008 using a general equilibrium model suggest the average annual growth of nursing workers will be only 0.4%. The aging of both the population and the nursing work force and wider occupational choices for women will increase demand for nursing workers. (Contains 47 references.) (SK)



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Chandra Shah and Gerald Burke

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Abstract

There are growing concerns of nursing shortages in a large number of countries. In developed countries the ageing of the population is fuelling the demand for nurses while the supply is being affected by the wider occupational opportunities available to women. This paper describes the changes in the nursing workforce in Australia over the last decade and a half. It shows that in spite of ageing of the population and a substantial increase in the number of patient separations, the numbers of Nursing Workers employed per 100 000 population declined in the 1990s from around 1 400 to 1 300. At the same time numbers of Aged Carers employed has increased massively. The paper also provides data on the differences in nursing skill-mix employed, and thus the differences in human resource policies, across different States and Territories. Finally, the paper provides projections of the number of job openings for new entrants, resulting from growth and replacement needs, for the 2002-06 period. This information could be useful in assessing likely shortages, for planning education and training capacity and making budgetary decisions.

1 Introduction

The delivery of quality health services depends critically on the health workforce. As is typical in most service industries, such as education, labour accounts for a substantial part of the total health budget (80 per cent according to Duckett (2000)). The total private and public expenditure on health services in Australia was estimated to be about A$ 54 billion in 1999-2000, or 8.5 per cent of gross domestic product (AIHW 2001b).

Most of this expenditure is made on personnel of whom the largest group are nursing workers. This paper is concerned with reviewing the past growth of employment of nursing workers and the projection of job openings for them. The work is undertaken in the context of the current concern that there will be insufficient nurses to meet the expected demand.

Numerous reports point to the global growth of nursing shortages (Buchan and Edwards 2000; Buchan 2000; Kingma 2001). In some countries and jurisdictions general shortages of nurses are predicted, in others the shortages are in specific specialist areas or geographical locations.

Only few studies have attempted to quantify shortages and fewer have done it rigorously. A recent review of the international and Australian research on the subject can be found in Department of Human Services (2001).

Shortage is usually taken to mean the excess of the quantity demanded at the going wage over the quantity supplied. Not all the studies of shortages make clear the assumptions made about wages. A further issue is whether the estimate of the quantity demanded refers to some desired need for staffing or to the quantity which the can be engaged within allocated budget— the lack of nursing staff in public hospitals can reflect the lack of funds to employ them as well as a lack of supply of persons willing to take employment.

Some of the common factors identified as responsible for shortages were ageing of the population, greater demand for health services, ageing of the nursing workforce, greater career choices for women and nurses' dissatisfaction with their work and pay conditions. In some countries like New Zealand an added factor was emigration. Active overseas recruitment of nurses is happening on a large scale in many countries. Developed countries can offer better living standards in terms of relatively higher pay, better career structures and opportunities for further education to lure nurses from developing countries. This means that developing countries bear the initial cost of training and education of the recruited nurses, an investment for which there may be little or no return for them. Over-recruitment has also the potential to damage the labour market in these countries (Buchan 2002).

Buchan and Edwards (2000) attribute variable and often poor quality of workforce planning, its lack of coherence or relation to other plans, the failure to consider the private sector, and changes in workload to be contributory factors to the problem of nurses' shortages in Britain. They consider a further problem to be the tendency to focus on the costs of training and education, without considering the costs associated with staffing shortages. The greatest concern they raise is the requirement of year on year 'efficiency gains', which has led to a cycle of increasing

pressure, often in the form of unpaid and unrecognised overtime. The efficiency gain is usually a reduction in real funds without a change in the level of service provided. In some instances the search for more efficiency has become simple cost cutting, resulting in higher workload and skill mix dilution. According to Buchan and Edwards, evidence is emerging suggesting that a dilution in skill mix, level of workload and other aspects of the environment have implications on service quality.

As part of the neo-liberal market driven reforms of the National Health Service (NHS) in Britain in the early 1990s, there was a move towards letting the local NHS trusts determine the intakes to nurse training. The trusts with, and not surprisingly, a narrow focus, varying capacity of local training and education consortiums and without national oversight meant that training demand was underestimated (Buchan and Edwards 2000). In its response to the Health Committee, the UK Government recognised that a long term strategy to avoid staffing shortage would involve abandoning local pay arrangements, in favour of centralised, industry-wide pay reviews, and would hinge on effective forward planning of the workforce (Department of Health 1999a). Buchan and Edwards also advocate development of a systematic and integrated approach to nurse workforce planning to avoid future shortages. Workforce plans require consideration of supply and demand together.

To counter the perceived problem of shortages a number of governments around Australia commissioned reports to identify strategies for recruitment and retention of nurses (Department of Health 1999b; Department of Human Services 2001; Department of Human Services 1998; Ministry of Health 1998; NSW Health 2000; Queensland Health 1999; Biztrac Edith Cowan University 1997). The reports identified a number of strategies to tackle the problem. These included a career and pay restructure for nurses, ways of attracting back into the workforce nurses who had left, recruitment of overseas nurses, flexible working hours and child care facilities.

Estimates of shortages vary across different countries; see for example Buerhaus, Staiger and Auerbach (2000) for the United States; Coffman and Spetz (1999) for California; and Ryten (1999) for English-speaking Canada. Many of the estimates indicate future large shortages which, if realised represent an enormous challenge for the health authorities.

As reported in Department of Human Services (2001), Australia lacks definitive national data on the extent of future potential nurse shortages. Some States, notably Queensland and Victoria, have undertaken nurse labour force projections. In Queensland no state-wide shortages were projected (Queensland Health 1999), while in Victoria the population growth, ageing and a lack of adequate supply was likely to result in a *shortfall* of 5 500 nurses[1] by 2008 (Department of Human Services 1999). The Department of Employment, Workplace Relations and Small Business (DEWRSB) have updated lists of occupations with a skill shortage (DEWRSB 2001). The lists provide only indications of shortage without any numerical measure of the extent. The latest such list includes Registered Nurses in a number of specialities. The complexities of both estimating shortages and policy solutions in Australia are increased by the federal arrangements whereby the training and education and migration, for at least the registered nurses, is largely the

[1] Includes registered nurses (Division 1), enrolled nurses (Division 2) and registered psychiatric nurses (Division 3).

responsibility of the Commonwealth government while employment of nurses is determined to a large extent by the State and Territory governments.

This paper provides an analysis of the changes in employment of nursing workers from 1987 to 2001 and estimates of future job openings under certain assumptions[2]. It does not provide estimates of the supply of nursing workers and therefore does not offer any estimates of shortages (or surpluses). It does however provide part of the information essential for assessing it. The information on job openings is also useful for career advice as it can provide indications of job outlook in different occupations for those on the cusp of making decisions about education and training options. Similarly planning in education and training, including resource allocation and setting of priorities may find it useful to have some objective forecasts of the likely demand rather than rely solely on previous year's enrolments.

Job openings are a result of growth and turnover. The forecasts of growth in nursing occupations are from the Centre of Policy Studies (CoPS), Monash University, and are based on the MONASH model. MONASH is a computational general equilibrium model. It takes macro forecasts of the economy and incorporates known policy changes and a range of other economic data to forecast production by industry. It uses this information to produce forecasts of employment by occupation for 340 occupation groups. The modelling factors in changes in the economic outlook as soon as data become available but the impact of more recent policy decisions such as new agreements on staffing ratios are not incorporated until implemented and reported in employment and other economic data.

There are two main concepts of replacement or turnover. The first, gross replacement provides information on job openings arising from individuals leaving the occupation and needing to be replaced over a given time period. This concept is useful for those providing career advice because when estimates of gross replacement are added to growth estimates they indicate all job opportunities in the occupation. The second concept is that of net replacement which attempts to capture leavers from an occupation net of those re-entering. The sum of net replacement and growth provide information on job openings for new entrants into an occupation. This concept is useful for education and training planners as it approximates *minimum* training needs in occupations.

The main focus of this paper is the analyses of growth and replacement needs in nursing occupations at the national level. No attempt is made to analyse shortages though the data provided is an essential input to such analyses. The structure of the paper is as follows. In the next section the historical employment patterns in nursing occupations, spanning the period 1987[3] to 2001, are described. Next, analyses and projections of replacement needs, growth and job openings are presented for the five-year period ending 2006. The final section contains some concluding comments.

[2] The numbers actually employed in the past represent demand if there is a balance of supply and demand or a surplus of supply. It is an underestimate of demand if there is a shortage

[3] Refers to the financial year ending June 1987. This will be the convention used in the rest of the report.

2 Employment and demographic patterns 1987-2001

This paper adopts the Australian Institute of Health and Welfare's (AIHW) definition of nursing workers. According to AIHW (2001a), Nursing Workers comprise the following occupations:

1. Directors of Nursing;
2. Nursing Professionals (includes Nurse Managers, Nurse Educators and Researchers, Registered Nurses, Registered Midwives, Registered Mental Health Nurses and Registered Developmental Disability Nurses);
3. Enrolled Nurses; and
4. Personal Care and Nursing Assistants (PCNA).

A fifth occupation that is not included in the above list but that would be of interest is that of Aged or Disabled Person Carer (ADPC). The roles of nurses and carers are to a certain extent blurred, particularly in the aged care industry, which has been growing rapidly in recent times. Therefore some analyses in this paper include this occupation.

The following sections contain analyses of employment and demographic trends of different groups of nursing workers and carers. First, data issues are briefly discussed. Second, analysis is presented on Nursing Workers as a group. ADPCs are excluded from this group in order to be consistent with AIHW's use of terminology. Then brief analyses are presented on each of the occupations that make up this group as well as on ADPCs. Finally, the results are summarised.

Data sources

Although the AIHW hold considerable registration data on both registered and enrolled nurses in Australia they are unsuitable for constructing reliable and consistent time series. This is because the data are collected every two years and as the survey is voluntary there is significant non-response that varies considerably across States and Territories and time. Other problems with these data include the possible exclusion of nurses registering for the first time, nurses registering across multiple jurisdictions and the different timing of data collection in each State and Territory (AIHW 2001c). Therefore the analyses in this paper rely on unpublished data collected in the Australian Bureau of Statistics (ABS) *Labour Force* surveys for the financial years ending 1987 to 2001[4]. The analyses are by States and Territories, by gender, age and hours worked.

[4] The original data were adjusted in two ways. First, the pre-August 1996 data were converted to Australian Standard Classification of Occupations (ASCO), second edition, using a concordance. Second, the implementation of a redesigned of the *Labour Force* survey questionnaire and some definitional changes have resulted in an increase in the number of people who are employed which has meant a retrospective change in the number of employed people.

Nursing Workers

Table 1 shows the employment level in 2001, change in employment between 1987 and 2001 and the annual growth rate for the 1987-2001 period for each group of occupations. The increase in employment of Nursing Workers has been considerably less than the increase in total employment in the Australian economy. Overall employment in Australia increased by 29 per cent to over 9 million in 2001, while employment of Nursing Workers increased by only 18 per cent to number 248 000. The annual growth rate for Nursing Workers was 0.8 percent, which is half the rate for all workers. Nursing workers have been mostly female, with only, on average, 11 per cent male. This proportion has changed little over the last decade and a half.

Table 1 Changes in employment in nursing occupations, Australia, 1987-2001

Occupation	Employment 2001 ('000)	Change 1987 to 2001 (%)	Annual growth rate (%)
All Occupations	9 090.4	29.3	1.6
Nursing Workers	248.4	17.5	0.8
Directors of Nursing	2.7	74.3	5.4
Nursing Professionals	183.9	29.9	1.4
Enrolled Nurses	22.5	-20.6	-1.2
PCNAs	39.3	-1.7	-0.2

In Figure 1 the trend in employment of Nursing Workers is compared to that of all workers. Three broad features characterise the patterns in this figure. First, Nursing Workers were affected by the recession of 1991-92, as were other workers, but the period over which they were affected appears to be slightly shorter. Second, there was an unusually large contraction in their employment in 1995. According to AIHW (2001c) the number of nurses working in nursing homes fell quite sharply after the introduction of the policy encouraging elderly people to be cared for in their own homes rather than in institutions in 1992. The policy changes were introduced via the Home and Community Care (HACC) program and community aged care packages. It is difficult to tell if the lagged effect of this policy caused a temporary fall in employment in 1995. Third, the second half of the nineties has seen a virtual stagnation in the employment of Nursing Workers.

Figure 1 Changes in employment of Nursing Workers, Australia, 1987-2001

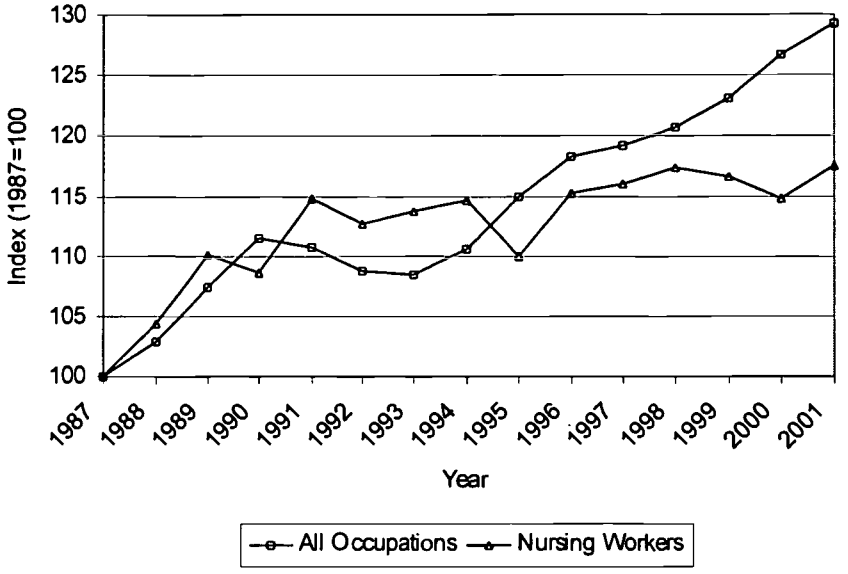
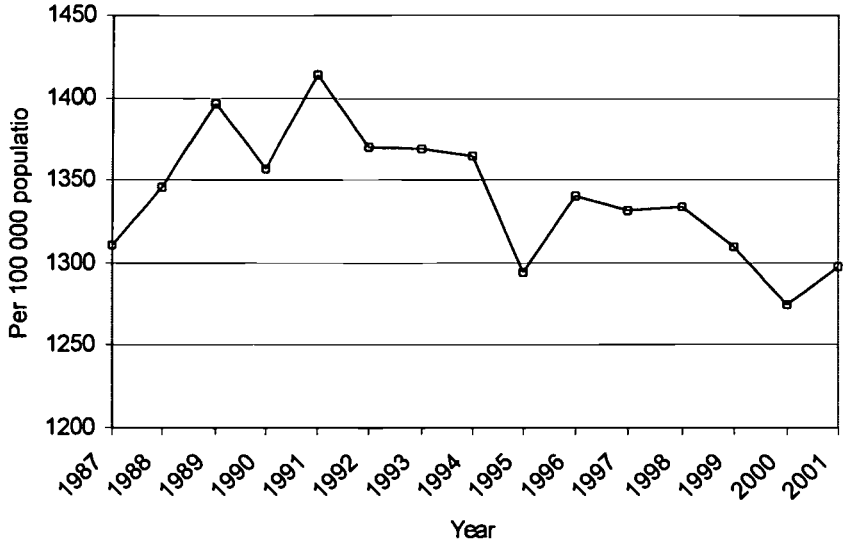


Figure 2 shows, the number of Nursing Workers employed per 100 000 population steadily declining in the 1990s. This decline occurred despite an ageing of the Australian population and increased treatment of patients. Between 1987 and 2001[5] the proportion of the Australian population aged 50 and over increased by 3.6 percentage points to 27.9 per cent (ABS 2000b). There was a 75 per cent increase in hospital *patient separations* between 1986 and 1999 (AIHW 1999; 2001c).

There is no doubt there have been innovations in patient care and technological advances, such as keyhole surgery, that have resulted in shorter stays in hospital for a number of procedures. However other technical advances in medicine has allowed treatment of a wider range of ailments resulting in an increase in the demand for health services. Since there continues to be persistent reports in the press about waiting lists for elective procedures and emergency departments in public hospitals across Australia, there must be substantial unmet need for health care and for Nursing Workers.

[5] The ABS publishes estimated resident population data as at June of a given year. The data for consecutive years have been averaged to give an estimate on a financial year basis. Since the estimate for June 2001 is unavailable, the June 2000 estimate is assumed for the 2001 financial year.

Figure 2 Nursing Workers per 100 000 population, Australia, 1987-2001



Figures 3 and 4 show the number of Nursing Workers employed per 100 000 population by States and Territories. The ratios for New South Wales, Queensland, Western Australia and the Australian Capital Territory show the least amount of variation over time and seem to track each other reasonably well around a mean of 1 300. Second, the ratios for Victoria, South Australia and Tasmania, after having increased initially in the late 1980s and early 1990s, have been steadily declining ever since to the same level as that of the other states. The pattern for Victoria is characterised by a distinct sustained period of increase in the ratio—1987 to 1991—followed by two distinct sustained periods of decline—1991 to 1995 and 1996 to 1999. These periods coincide with the Kennett Government incumbency and the reforms instigated by it. Third, even the ratios for the two territories are generally showing signs of convergence to the common 1 300 limits. These patterns may reflect benchmarking of human resource policies, at least at the macro level, in nursing care across different jurisdictions.

Figure 3 Nursing Workers per 100 000 population, New South Wales, Victoria, Queensland and South Australia, 1987-01

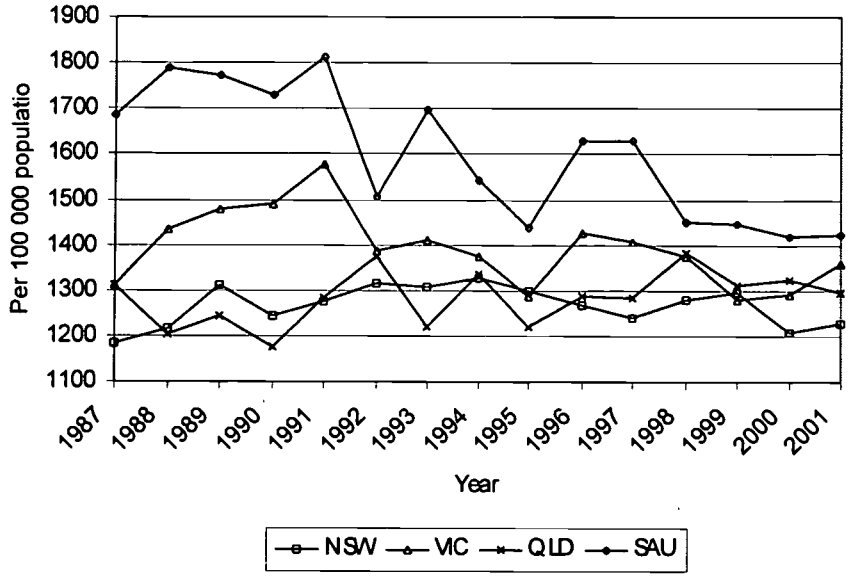
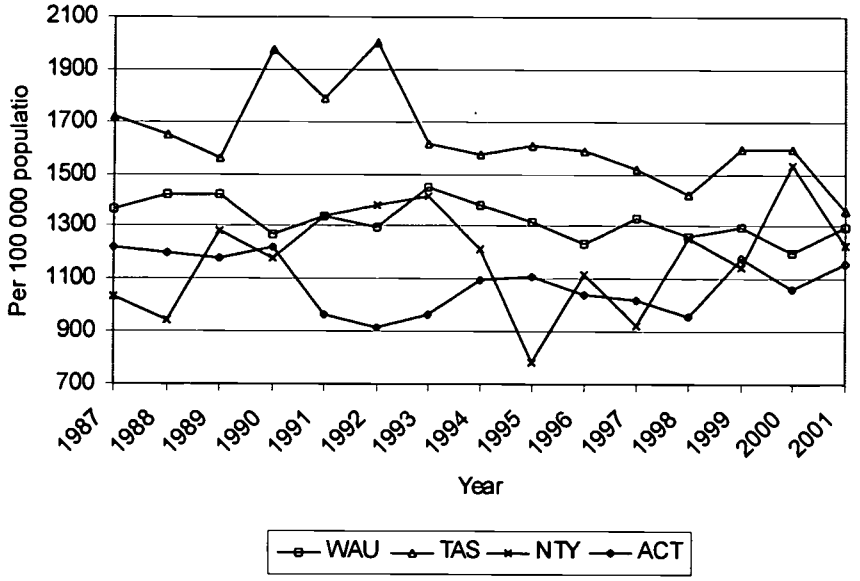


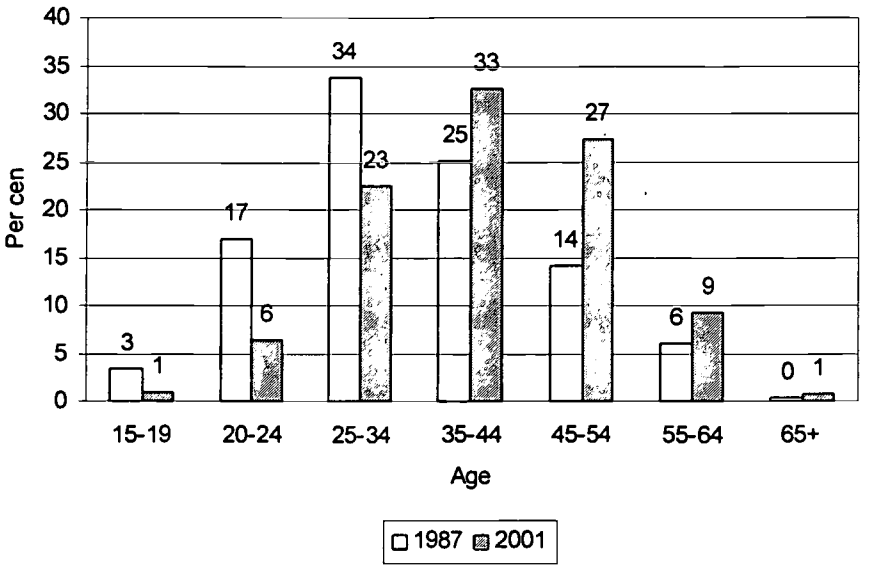
Figure 4 Nursing Workers per 100 000 population, Western Australia, Tasmania, Northern Territory and Australian Capital Territory, 1987-01



Change in age structure

The changing age profile of Nursing Workers is shown in Figure 5. The average age of Nursing Workers has increased significantly between 1987 and 2001. In 1987 a majority were under 35 years of age but in 2001 this group made up only 30 per cent of the total. The proportion in the 45 and over age group increased from 20 to 37 per cent. As will be discussed later the ageing of Nursing Workers has ramifications in terms of future replacement needs.

Figure 5 Age profiles of Nursing Workers, Australia, 1987 and 2001



Note: The percentages for each year may not add to 100 because of rounding errors.

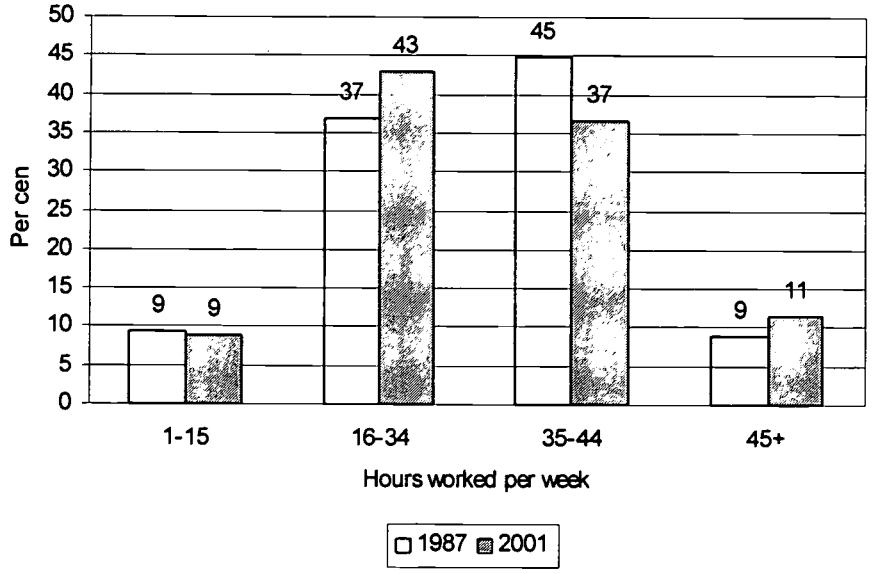
Change in hours of work

A number of studies have reported full-time jobs disappearing at an alarming rate with a corresponding rapid growth in part-time and casual work (ACCIRT 1999; Campbell 2000). Overlaying this has been a concern for an increasing number of people working longer and longer hours that are often unpaid. The proportion[6] of Australian workers who reported working 1-15 hours increased by three percentage points between 1987 and 2001 and those working 45 hours or more increased by five percentage points. At the same time the proportion reporting working the *normal* full-time hours declined by eight percentage points. The hours of work for Nursing Workers also changed over this time (Figure 6). However, unlike for all workers, the change for them has been largely a re-distribution of the proportions in the middle of the hours of work spectrum. The proportion working 15-34 hours per week increased by six percentage points and the proportion working the *normal*

[6] The proportions are calculated with a base that includes only those who reported working one hour or more per week. This means that those who reported zero hours because they were, for example on leave, are not included in the calculation.

full-time hours declined by eight percentage points. This suggests the average hours of work per Nursing Worker declined in the 1990s, and consequently the number of equivalent full time Nursing Workers is likely to have declined as well.

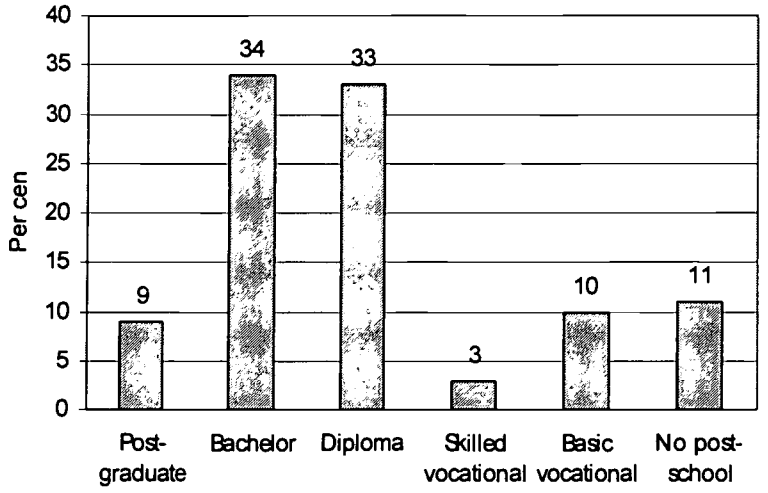
Figure 6 Hours worked by Nursing Workers, Australia, 1987 and 2001



Qualification profile

A snap shot of the qualification profile of Nursing Workers as at May 2000 is shown in Figure 7. Although over 80 per cent of them have attained a diploma or higher qualification, 11 per cent have no post-school qualification. However a quarter of this latter group is engaged in some sort of tertiary education. A number of those with a diploma could also be engaged in upgrading that to a Bachelor's degree.

Figure 7 Qualifications profile of Nursing Workers, Australia, 2000



Note: The Post-graduate category includes higher degrees and post-graduate diplomas; the Diploma includes undergraduate diplomas and associate diplomas. Source: ABS (2000c).

Directors of Nursing

There are relatively small numbers of people working as Directors of Nursing, and therefore it is difficult to be precise about their employment situation at a particular point in time. However some general observations about the trends in the data can be made. The employment of Directors of Nursing has seen strong growth over the last 15 years, growing at an average annual rate of 5.4 per cent. Even though most of them are female, the average proportion of males has been higher than for Nursing Professionals as a whole. On average, two out of every three Directors of Nursing have been 45 years of age or older. The proportion of this group who reported working 45 hours or more, more than doubled between 1987 and 2001. Over the same period the proportion working the *normal* full-time hours dropped by 28 percentage points.

Nursing Professionals

Three out of every four Nursing Workers were Professionals in 2001. It is thus the predominant group among Nursing Workers. Apart from Nurse Managers, Educators and Researchers all Nurse Professionals have to register with the relevant State or Territory councils in order to practice. However most Nurse Managers are registered and so are some Nurse Educators and Researchers. Table 2 shows the employment changes of Nursing Professionals between 1987 and 2001 and Table 3 includes some summary statistics on the change in the age structure and hours of work.

Table 2 shows that employment of Nurse Professionals increased by 30 per cent between 1987 and 2001, to 184 000 in 2001. The annual growth rate for them was estimated to be 1.4 per cent, a rate that is higher than that for Nursing Workers (0.8

per cent) but lower than for Health Professionals (2.0 per cent). Males comprise only eight percent of Nurse Professionals.

Table 2 Changes in employment in Nursing Professional occupations, Australia, 1987-01

Occupation	Employment 2001 ('000)	Change 1987 to 2001 (%)	Annual growth rate (%)
Nursing Professionals	183.9	29.9	1.4
Nurse Managers, Educators & Researchers	6.0	53.0	3.1
Registered Nurses	163.5	29.3	1.3
Midwives	10.1	56.3	2.5
Mental Health Nurses	4.2	-4.3	-0.2
Mental Health & Dev. Disability Nurses	4.4	-9.2	-0.5

Note: Estimates for the smaller occupations should be viewed as indicative only because of large standard errors.

Table 3 Summary statistics on Nursing Professionals: age and hours worked per week, Australia, 1987 and 2001

	Per cent 45 years of age and over		Per cent who worked full-time hours	
Occupation	1987	2001	1987	2001
Nursing Professionals	20	37	55	49
Nurse Managers, Educators & Researchers	23	41	47	65
Registered Nurses	20	38	55	49
Midwives	20	25	53	31
Mental Health & Dev. Disability Nurses	17	35	67	69

Nurse Managers, Educators and Researchers

Employment of Nurse Managers, Educators and Researchers increased by 53 per cent between 1987 and 2001. Most of this group consists of Managers. In 1987, 23 per cent of this group were under 45 years of age compared to 47 per cent in 2001. There has also been a significant shift towards working full-time among this group. A more detailed examination of the hours worked shows a trend towards working longer hours, with over a third reporting working 45 hours or more in 2001.

With the transfer of professional nurse education to universities some Nurse Educators and Researchers' main occupation may be that of a university lecturer. This makes it difficult to interpret employment data for them. In due course the

occupation of a Nurse Educator and Researcher may disappear or may only apply to those who are exclusively based in hospitals.

Registered Nurses

Nearly 90 per cent or 163 000 of Nurse Professionals were employed as Registered Nurses in 2001. The 1990s was largely a period of stagnation in the employment of Registered Nurses. Only in the late 1990s has there been some growth occurring. A significant jump of 12 000 occurred in 2001, with 60 per cent of this increase just in Victoria. The large increase in employment in Victoria has been a result of the new policies adopted by the Labour minority government that came in to power in 1999, and the rebuilding of capacity that was considerably reduced by the previous Kennet government reforms.

The average age of Registered Nurses has increased significantly between 1987 and 2001. The proportion 45 years and older doubled over this period. Far fewer of them were under the age of 25 in 2001 than in 1987, largely because of the shift to university-based training.

The largest change in the hours of work of Registered Nurses has been a shift from normal full-time to part-time (over 15 hours per week), reflecting the change for Nursing Workers as a whole. The proportion of them working full-time declined by six percentage points between 1987 and 2001.

Registered Midwives

Employment of Registered Midwives increased gradually between 1987 and 1999. The last two years, however, has seen a very substantial growth in their employment, reaching 10 000 by 2001. The number of births in Australia increased by less than 0.1 per cent per anum on average between 1987 and 2000, and has generally been declining since the mid-1990s (ABS 2001). The number of Registered Midwives employed per 1 000 births increased from 26 to 30 between 1987 and 1999, but it has jumped to about 40 since then. According to AIHW (2001c), of the 135 000 Registered Nurses who had a post-initial qualification in 1997, 39 000 had it in midwifery. All this suggests the role of the Registered Midwife has been going through a process of reassessment in recent times. This is the most feminised of all nursing occupation with, on average, only 2 per cent males.

Registered Midwives are relatively young compared to Nursing Professionals as a whole. In 2001, the proportion 45 years of age or older was only 25 per cent. The proportion of Registered Midwives working part-time increased substantially from 47 per cent in 1987 to 69 per cent in 2001. Thus the equivalent full time numbers may not have changed as much.

Registered Mental Health and Developmental and Disability Nurses

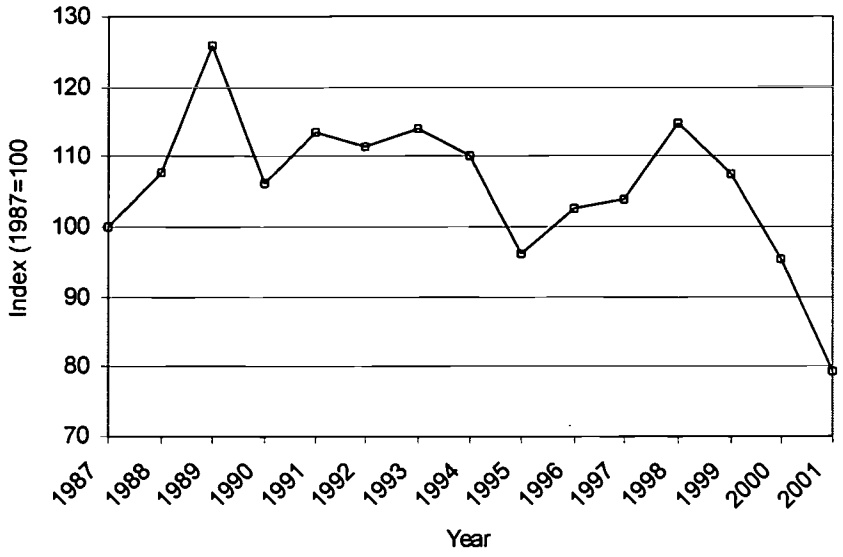
Most of this group consists of Mental Health Nurses. Mental Health Nurses are also known as Psychiatric Nurses in some jurisdictions. The employment of this group declined by 9.2 per cent between 1987 and 2001. The restructure of delivery of mental health and disability services in the 1990s saw these services either integrated into general hospital services or community care services. This has resulted in a blurring of the roles of Registered Nurse, Mental Health Nurse, Developmental and Disability Nurse and other community nurses and carers. In Victoria Mental Health Nurses are no longer registered as a separate group. They are on the registered nurses (Division 1) roll (Department of Human Services 2001). This is the only nursing occupation with a substantial number of males working in it.

Enrolled Nurses

The employment of Enrolled Nurses reached a peak of 35 600 in 1989. Since then it has gradually declined to 22 500 in 2001, with only a partial reversal in the downward trend between 1995 and 1998 (Figure 8). Part of the decline in the early 1990s was probably due to the significant restructuring of the nursing workforce during that period (AIHW 2001a). The proportion of males in the occupation has averaged 6 per cent, which is lower than for Registered Nurses.

Only 15 per cent of Enrolled Nurses were 45 years of age or older in 1987 compared to 35 per cent in 1987. A shift towards working shorter hours, similar to that among Registered Nurses, is also evident among Enrolled Nurses. In May 2000, 57 per cent of Enrolled Nurses' highest attained qualification was basic vocational, 24 per cent had attained a diploma and 12 per cent had no post-school qualification (ABS 2000c).

Figure 8 Changes in employment of Enrolled Nurses, Australia, 1987-01

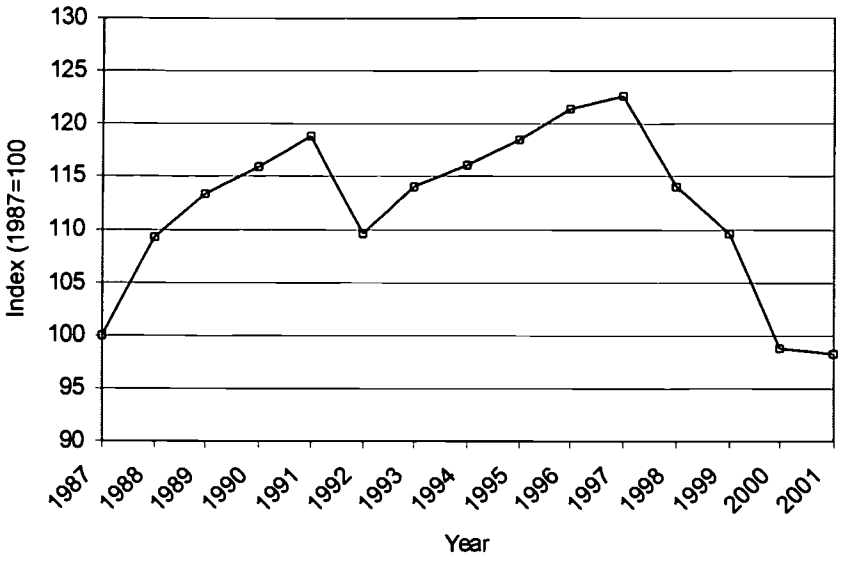


Personal Care and Nursing Assistants

There are three clear phases in the employment trend of PCNAs (Figure 9). The first phase, 1987-91, is a period of growth, which got interrupted by the 1991-92 recession. The second phase, 1992-97 is also a period of growth at the end of which employment reached its highest level of 49 000. The third phase, 1997-01 is period of sustained decline by the end of which employment had dropped to a level below that in 1987. There were 39 000 working in 2001, one in four of whom were male. In the 1996 Census just over 60 per cent of them were Nursing Assistants and the rest Personal Carers (AIHW 2001a).

The age profile of PCNAs has changed too, with the proportion 45 years or older increasing by 11 percentage points between 1987 and 2001. However this is only about half the increase for Enrolled Nurses. The trend towards working shorter hours is also evident for this occupation. For example, those working full-time declined by 10 percentage points. Unlike other nursing occupations, however, there was a more substantial increase in the proportion working very short hours (1-15 hours per week). A large majority (60 per cent) of PCNAs had no post-school qualifications (ABS 2000c).

Figure 9 Changes in employment of Personal Care and Nursing Assistants, Australia, 1987-01



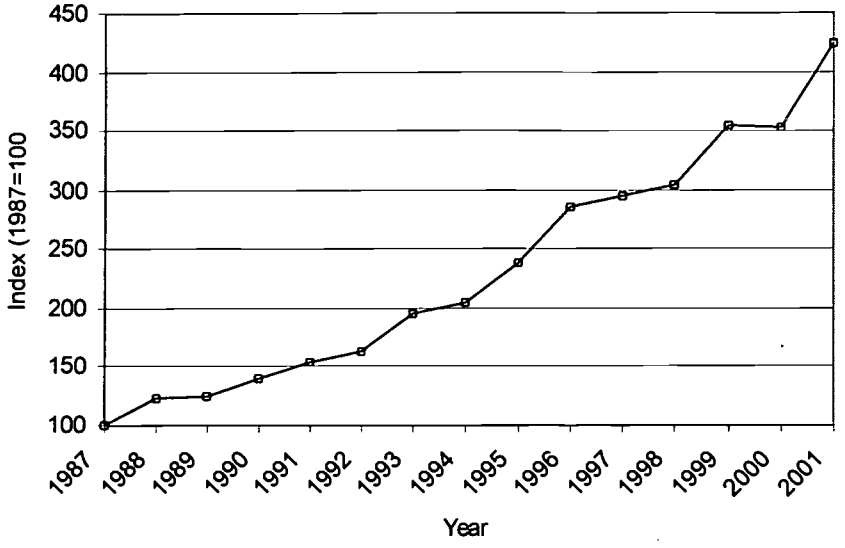
Aged or Diasabled Person Carers

In contrast to the changes in the employment of Nursing Workers as discussed above, employment of ADPCs has increased at a phenomenal annual average rate of 10 per cent to reach 71 000 in 2001 (Figure 10). There is a slightly higher representation of males among them than among Nursing Workers. About 80 per cent of them are Aged Person Carers.

The age profile of the ADPCs has changed significantly between 1987 and 2001. Fewer young people work in this occupation than they used to, for example, in 1987, only 19 per cent were 45 years or older but in 2001 45 per cent were in this age group.

There has been a small increase in the proportion of ADPCs working the *normal* full-time hours between 1987 and 2001. The highest increase of 9 percentage points has been in the proportion working 16-34 hours per week. Overall two out of every three workers worked part-time in 2001. Just over half of them had no post-school qualification, which is a lower proportion than for PCNAs (ABS 2000c).

Figure 10 Changes in employment of Aged or Disabled Person Carers, Australia, 1987-01



Summary remarks

The analyses presented above show differing trends in employment in different nursing and caring occupations between 1987 and 2001. The main finding is that the demand for Nursing Workers has been weak overall but that of ADPCs has been very strong. The differing demand patterns for the two groups suggest some substitution of Nursing Workers with ADPCs in the labour intensive and growing aged care industry. The growth in demand for ADPCs has been assisted by the ageing of the population, but perhaps more so by the introduction of the policy to care for the aged and the disabled in community settings in the early 1990s. The ADPCs are largely unregulated and their basic training is short. They are not well organised industrially and are preferred by the large number of small to medium employers who operate in the aged care sector because they cost less to employ.

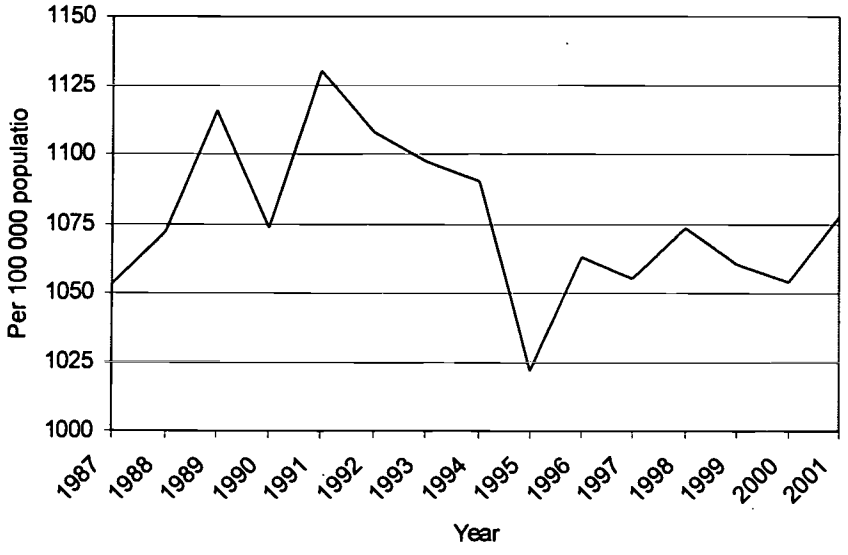
The labour market for Nursing Workers has been affected by a number of other factors as well. These include the transfer of nurse education and training to a university based system in the late 1980s which was followed by restructuring of the nursing workforce in the early 1990s and tight fiscal constraints in the 1990s on public hospitals where a majority of the nursing workforce works. In the last couple of years the fiscal constraints have somewhat been loosened and the result has been an increase in demand for these workers.

The ratio of Nursing Workers per 100 000 population, which after initially increasing to about 1 400 in the second half of 1980s, has been steadily declining despite the ageing of the Australian population and large increases in hospital *patient separations*. The ratio currently stands at about 1 300 which is just below the level in 1987. The substitution of ADPCs for other Nursing Workers in the 1990s seems to have had a dampening effect on the ratio. If ADPCs are included as Nursing Workers then the ratio increases from about 1 410 in 1987 to 1 670 in 2001. On the

other hand the ratio of professional and enrolled nurses per 100 000 population seems to have generally declined in the late 1990s compared to its value in the early part of that decade (Figure 11).

It is interesting to note that the State and Territory ratios of Nursing Workers per 100 000 population varied widely in the mid-1980s but have been converging ever since to levels for New South Wales, Queensland and Western Australia for which they have remained relatively stable and close together. This indicates a convergence in some sense in the nurse staffing policies across jurisdictions, even though, as will be shown below, the skill mix employed has been quite different.

Figure 11 Nursing Professionals and Enrolled Nurses per 100 000 population, Australia, 1987-2001



The last decade and a half has seen a shift towards working shorter hours among Nursing Workers and ADPCs. Unlike for the labour force in general, in which the shift in hours has been from the *normal* full-time hours towards very short or very long hours, in the case of these workers the shift has been more from the *normal* full-time hours towards working 16-34 hours per week. This suggests that the ratio of equivalent full-time Nursing Workers per 100 000 has possibly declined more than what has so far been indicated.

Overall, Nursing Workers and ADPCs are older now than they were in 1987. This raises issues about replacement of those who are going to retire and succession planning, and the associated issues of supply and training capacity.

In general the proportion of Nursing Professionals among Nursing Workers has increased while the proportions of Enrolled Nurses and PCNAs have decreased. This suggests a high skill bias in the employment of Nursing Workers. However as Table 4 shows, the changes are not uniform across States and Territories. For example, the skill mix remains largely unchanged in Queensland and the Australian Capital Territory, while in New South Wales the proportion of Nursing Professionals increased with a corresponding decrease in the proportion of Enrolled Nurses. In Victoria, South Australia and Western Australia the

proportions of both type of low-skill workers has declined while that of Nursing Professionals increased.

Table 4 Proportions of Nursing Workers employed as Nursing Professionals, Enrolled Nurses and Personal Carers and Nursing Assistants by State and Territory, 1987 and 2001

	Nursing Professionals (%)		Enrolled Nurses (%)		Personal Care & Nursing Assistants (%)	
State/Territory	1987	2001	1987	2001	1987	2001
New South Wales	71	76	11	7	17	17
Victoria	70	83	15	4	15	11
Queensland	67	66	13	12	19	21
South Australia	56	65	16	22	27	11
Western Australia	54	65	17	14	28	19
Tasmania	69	79	11	6	20	14
Northern Territory	79	74	5	10	16	11
Australian Capital Territory	83	82	6	6	12	11
Australia	67	74	13	9	19	16

Note: The proportions for Directors of Nursing, who are part of Nursing Workers, are not shown above. Their exclusion from the table implies that the proportions for each year across the three occupations groups, for each State or Territory, may not add to 100.

Table 5 shows each State and Territory's share of employment in each major nursing and caring occupation group. Their shares of Nursing Professionals seem to have changed little over time, although Victoria's share is somewhat higher than what its share of the total population is.

In contrast employment shares in the other three occupation groups have changed substantially. Victoria's share of enrolled nurses has more than halved since 1987, while its share of ADPCs at 33 per cent is the highest. Queensland, South Australia and Western Australia have all increased their share of Enrolled Nurses. Nearly 60 per cent of all PCNAs worked in either New South Wales or Queensland in 2001. Finally, it appears that there is a preference for the employment of PCNAs in Victoria while in New South Wales there is a preference for ADPCs.

Table 5 State and Territory shares of employment in major nursing and caring occupations, 1987 and 2001

	Nursing Professionals (%)		Enrolled Nurses (%)		PCNAs (%)		ADPCs (%)	
State/Territory	1987	2001	1987	2001	1987	2001	1987	2001
New South Wales	33	33	26	23	28	34	31	21
Victoria	27	29	29	12	20	19	29	33
Queensland	16	17	15	25	17	25	18	18
South Australia	9	7	14	21	16	6	7	10
Western Australia	8	9	12	16	14	12	9	10
Tasmania	4	3	3	2	4	2	2	5
Northern Territory	1	1	0	1	1	1	1	1
Australian Capital Territory	2	2	1	1	1	1	3	1
Australia	100	100	100	100	100	100	100	100

Note: The percentages may not add to 100 due to rounding errors.

3 Forecasts of occupational growth

Growth projections are made using the MONASH model, a dynamic computational general equilibrium model, developed by CoPS. Full description of the model is beyond the scope of this paper, however, details of the methodology underpinning the model and its assumptions can be found in Adams et al. (1994), Dixon and Rimmer (1996), Meagher (1997) and Dixon and Rimmer (2000). An intuitive description of the model is contained in Appendix O of Industry Commission (1997).

In brief, MONASH is a sequence of single-period models, linked through time by the behaviour of capital and labour markets. It has three main elements— a database, theory and parameters— which are embodied in the model's system of equations. These equations describe how industries and consumers respond to changes in policy. The core of the database is a large input-output matrix showing how each sector of the economy is linked to every other sector. These linkages are only for a particular point in time. Behaviour responses of different groups to policy changes are determined on the basis of economic theory. The model provides specification of likely responses of producers, consumers, foreigners and investors to policy changes. It also includes a government sector, the revenue and expenditure behaviour of which is modelled separately. While theory guides the model's broad assumptions (which can be altered to accommodate different scenarios), actual numerical parameters are required to estimate the size of the responses. In MONASH these parameters are either derived from the input-output database or other external sources.

The latest available projections were made in December 2001 for the eight-year period ending 2008 and with the base period 2001. They incorporate, among other information, Access Economics' September 2001 quarter *Five Year Business Outlook* of the Australian economy and other recently released data from the Australian Bureau of Agricultural and Resource Economics (ABARE), the Tourism Forecasting Council (TFC), the Productivity Commission (PC). Importantly, as far as employment in nursing occupations is concerned, it is assumed that government spending grows at an annual rate of 2.6 per cent, and, within this, spending on health grows at 2.1 per cent.

MONASH converts the forecast for aggregate output to forecasts for output by industry. These are then converted to forecasts of employment by industry, which in turn are finally converted to employment by occupation. Employment growth for a particular occupation can be decomposed into three components:

- growth in aggregate employment;
- industry share effect (result of changes in distribution of employment across industries); and
- occupation share effect (result of changes in the distribution of employment across occupations within industries).

The first component is already known from earlier computations. The second can be computed from growth rates in employment by industry using an industry by occupation employment matrix. Occupation share effects are considered primarily due to technical change and are forecasted by extrapolating historical trends.

Table 6 includes employment forecasts for all nursing and caring occupations. The estimates for some of the smaller occupations should be viewed as indicative only. Below the main focus is on the larger occupations and only at the national level. Given that hospital staffing policies and the skill mix employed has varied from State to State in the past, it is therefore quite conceivable that forecasts at the State and Territory level may not follow the national trend.

Nursing Workers' numbers are projected to grow by 4 700 over the 2001-06 period, at an annual average rate of just 0.4 per cent. In contrast labour demand across all occupations is projected to grow at an average rate nearly three times this.

The forecasts suggest that the high skill mix bias among Nursing Workers is likely to increase. Although growth in Nursing Professionals is expected to be moderate, employment of Enrolled Nurses and PCNAs is expected to contract even more. This has implications for the Technical and Further Education (TAFE) sector where most persons who get employed in these two contracting occupations obtain their training. In contrast employment of ADPCs, who are also largely trained in the TAFE sector, is projected to grow strongly and makes up more than enough of the shortfall created in training demand in the sector.

The employment in both managerial occupations is projected to increase, and so is employment of Registered Midwives.

Table 6 Projected growths in nursing and caring occupations in Australia, from 2001 to 2006

Occupation	Employment 2001 ('000)	Growth	
		'000	Average annual rate (%)
All Occupations	9 090.4	570.9	1.2
Nursing Workers	248.4	4.7	0.4
Directors of Nursing	2.7	0.7	4.5
Nursing Professionals	183.9	9.0	1.0
Nurse Managers, Educators & Researchers	6.0	0.7	2.2
Registered Nurses	163.5	7.0	0.8
Midwives	10.1	1.7	3.1
Mental Health & Dev. Disability Nurses	4.4	-0.4	-1.8
Enrolled Nurses	22.5	-2.4	-2.2
PCNAs	39.3	-2.6	-1.3
ADPCs	71.0	21.0	5.2

Note: Growth forecasts are reproduced here with permission from CoPS, Monash University. Estimates for the smaller occupations should be viewed as indicative only.

4 Replacement needs

Various concepts of replacement needs have been put forward in the recent literature on the subject (Shah and Burke 2001b). Here we consider the two most commonly used concepts and the associated job openings that follow. Just as for growths, projections of replacement needs are also made for the five years ending 2006.

Before defining the two concepts of replacement needs it is, however, useful to map the flow of individuals between various states of the labour market. This is aided by Figure 12, which represents the gross flows of individuals in and out of an occupation O in a given period. Gross outflows from occupation O in period (t-n, t) are B, C, and D, while E, F, G, H, I and J represent inflows into it. A represents stayers in occupation O, those who did not move out of the occupation in this period. It includes those who may have changed jobs but not occupation. B represents all those who leave the occupation to a job in other occupations, C the numbers moving from occupation O to unemployment while D includes all flows out of the labour force including emigration and deaths.

Inflows to occupation O come from three major sources, from other occupations (E and F), from unemployment (G and H) and from outside the labour force including immigration (I and J). Individuals from each of these sources can be

either new entrants or re-entrants to occupation *O*. New entrants are persons entering the occupation for the first time. Re-entrants are those individuals who are returning to occupation *O*, after previously leaving it voluntarily or due to job termination.

Figure 12 Flows of individuals in and out of an occupation

	To at time *t*			
From at time *t-n*	Occupation O	Other occupations	Unemployment	Outside labour force
Occupation O	*A*	*B*	C	*D*
Other occupations (new entrants)	*E*			
Other occupations (re-entrants)	*F*			
Unemployment (new entrants)	*G*			
Unemployment (re-entrants)	*H*			
Outside labour force (new entrants)	*I*			
Outside labour force (re-entrants)	*J*			

Gross replacement needs

Gross replacement is a measure of the total number of job openings resulting from individuals leaving an occupation, including those who change occupations or leave employment. In terms of the component flows in Figure 11, gross replacement is the sum of the outflows *B*, *C* and *D* if employment expands or remains unchanged in an occupation. Otherwise it equals the sum of inflows *F*, *G*, *H*, *I* and *J*, or alternatively, it is the sum of the outflows *B*, *C* and *D* less the decline in employment because not all those who leave are replaced.

Gross replacement needs are estimated using mainly unpublished data from the *Labour Mobility* survey for 2000 (ABS 2000a). The method estimates inflow and outflow rates to and from each occupation by considering a person's occupation and labour force status at two points in time that are a year apart. Further details of the method can be found in Shah and Burke (2001a).

Net replacement needs

Net replacement needs in an occupation are job openings for new entrants as a result of individuals leaving the occupation net of those re-entering. In terms of the flows in Figure 11, net replacement is the sum of the outflows *B*, *C* and *D* less re-entrants *F*, *H* and *J* into the occupation. Just as for total replacement, if employment declines then net replacement equals the sum of the outflows less the

decline in employment and less the sum of re-entrants, because not all those who leave are replaced.

The necessary flows of individuals to and from an occupation needed to estimate net replacement can be derived from data on stock of employed persons by age at two points in time using the cohort-component method (Eck 1991; Willems and de Grip 1993). The method allows estimation of flow rates in or out of an occupation by considering the net changes in cohort sizes over a given period. It has been widely used for calculating survival ratios in demography (ABS 1992; Davenport and O'Leary 1992; Kippen and McDonald 2000; Pollard, Yusuf and Pollard 1974; Shryock and Siegel 1980). It has also been used to calculate student progression rates through courses in higher education (Shah and Burke 1999) and wastage rates in health manpower studies (Office of International Health 1979).

The methodology used to estimate net replacement in nursing occupations basically follows that developed in Shah and Burke (2001a, 2001b, 2002). It uses unpublished *Labour Force* survey data from 1986 to 2001.

Projections of replacement needs

Table 7 shows projections of gross and net replacement needs in nursing occupations for 2002-06. Aggregate gross replacement in all occupations is estimated to be 6.5 million over five years at an average annual rate of 13.8 per cent. Net replacement rates are much lower with an overall rate of 2.1 per cent per year.

Gross replacement rate for Nursing Workers at 7.9 per cent is much lower than the rate for all occupations. In general the rate for Nursing Professionals are lower than for the non-professional occupations of Enrolled Nurses, PCNAs and ADPCs.

The gross replacement rates reflect the average tenure of jobs in the different occupations and perhaps also the level of stress in some of them. For example, a lot more PCNAs and ADPCs are likely to be employed on temporary or casual contracts compared to Nursing Professionals. Thus the gross replacement rates for the former are relatively much higher than for the latter. Short average tenure in managerial occupations is more to do with the fact that individuals generally attain those positions towards the end of their careers.

Unlike gross replacement rate, the net replacement rate is higher for Nursing Professionals than it is for the other occupational groups shown in Table 7. The rate for ADPCs is only half the rate for Nursing Professionals. Part of the reason for the very low rate for this group may be to do with the exceptionally high growth rate it is experiencing. The high demand for workers in this occupation has had the effect of inflows into it of persons of all ages and not just those of younger ages, as it normally would occur in occupations going through standard growth patterns. The rate for Registered Nurses, the largest group within Nursing Professionals, is expected to be 1.8 percent. This is just above the most recent estimate of 1.7 per cent for them in the United States (Bureau of Labor Statistics 2000).

Table 7 Projected gross and net replacement needs in nursing and caring occupations in Australia, from 2001 to 2006

Occupation	Employment 2001 ('000)	Total replacement '000	Total replacement Average annual rate (%)	Net replacement '000	Net replacement Average annual rate (%)
All Occupations	9 090.4	6 498.5	13.8	993.7	2.1
Nursing Workers	248.4	99.5	7.9	21.9	1.7
Directors of Nursing	2.7	3.5	23.4	0.4	2.4
Nursing Professionals	183.9	60.4	6.4	16.7	1.8
Nurse Managers, Educators & Researchers	6.0	0.5	1.6	0.2	0.8
Registered Nurses	163.5	57.8	6.9	15.4	1.8
Midwives	10.1	1.6	3.0	0.8	1.5
Mental Health & Dev. Disability Nurses	4.4	0.5	2.4	0.3	1.4
Enrolled Nurses	22.5	11.1	10.2	1.9	1.8
PCNAs	39.3	24.5	12.7	2.9	1.5
ADPCs	71.0	54.4	13.4	3.1	0.8

Note: Estimates for the smaller occupations are subject to large standard errors and should be interpreted with caution.

The destinations of those who left nursing occupations between February 1999 and February 2000 are shown in Table 8 while Table 9 shows the sources of those who came into nursing occupations. While there are similarities in the outflow destinations of the three non-professional occupations, outflow destinations of Nursing Professionals are somewhat different. About a third of Nursing Workers, excluding Directors of Nursing, moved to other occupations during the year[7]. A much higher proportion of ADPCs moved to other occupations. The table also indicates that Enrolled Nurses, PCNAs and ADPCs are more likely than Nursing Professionals to become job seekers[8] when they leave. While about two-thirds of leavers from Nursing Professional occupations move out of the labour force only half the leavers from Enrolled Nurses do.

Apart from Directors of Nursing, sources of inflows into each occupation are similar, about a fifth coming from other occupations. Almost all Directors of

[7] The data for Nursing Professionals are an aggregation of the data for component occupations that make up Nursing Professionals. Thus the proportion moving into other occupations includes movements between these component occupations.

[8] In the *Labour Mobility* survey, an individual's labour force status is assigned as *working* or *looking for work* rather than the more precisely defined employed or unemployed as in the *Labour Force* survey. This is because of the different scope and other limitations of the *Labour Mobility* survey Australian Bureau of Statistics (ABS) (2000a). For this reason the term job seeker is used instead of unemployed.

Nursing come from other occupations, and most of these are likely to be from the Nursing Professional group of occupations.

Table 8 Occupational outflows (%) of Nursing Workers and ADPCs by destination between February 1999 and February 2000

	Destination				
	Other occupations	Job seekers	Out of labour force	Out of population	Total
Directors of Nursing	55	0	44	1	100
Nursing Professionals	29	4	65	2	100
Enrolled Nurses	34	11	51	4	100
PCNAs	30	11	58	1	100
ADPCs	41	12	47	0	100

Note: Estimates for the smaller occupations are subject to large standard errors and should be interpreted with caution. Other occupations include other nursing occupations.

Table 9 Occupational inflows (%) of Nursing Workers by source between February 1999 and February 2000

	Source		
	Other occupations	Job seekers	Total
Directors of Nursing	100	0	100
Nursing Professionals	17	83	100
Enrolled Nurses	19	81	100
PCNAs	15	85	100
ADPCs	28	72	100

Note: Estimates for the smaller occupations are subject to large standard errors and should be interpreted with caution. Other occupations include other nursing occupations.

A more detailed analysis of cohort components shows that the net replacement rate for male Registered Nurses is half the rate for females. Part of the reason for this is the younger age profile of males, 63 per cent of whom were aged 40 or below in 2001 compared to 37 per cent of females. The pattern of outflows for females is complicated by the fact that significant numbers of females leave either permanently or for extended periods for maternity part way through their career. This is reflected in a net outflow projection of 20 per cent from the 30-34 years age cohort over the next five years. Net outflows are also projected from the 35-39 years age cohort, but these are less substantial. Certain numbers of females return to the workforce at later years. This then reduces the net outflows of those aged 40-44 years. Most net outflows however are from older aged cohorts, mainly because many persons from these age groups are going into retirement.

The net outflow patterns for Enrolled Nurses, PCNAs and ADPCs are similar to those for Nursing Professionals in the sense that the largest net outflows occur from the older aged cohorts. However they are different with respect to the ages when females leave for maternity. In the first three occupations they tend to leave at younger ages than in the last group.

5 Job openings

Total job openings

Total job openings in an occupation are a result of gross replacement and growth. They provide indications of job opportunities for all those who are contemplating employment in the occupation, including those returning to it. If growth in an occupation is negative then total job openings are a result of gross replacement needs only.

Net job openings

Net job openings provide indications of job opportunities for new entrants into an occupation. Their calculation is similar to that for job openings, if job growth in an occupation is positive then net job openings are the sum of net replacement and growth, otherwise they are the same as net replacement. Just as before the estimate for a group of occupations is the aggregate of estimates for the four-digit occupations that make up the group.

Projections of job openings

Projections of job openings for the five years to 2006 are included in Table 10. The projected contraction in employment for Enrolled Nurses and PCNAs means that job openings in these occupations are only because of replacement needs.

In the Australian economy total job openings of about 7.3 million are projected for the five-year period ending 2006 (Table 10). This translates to an annual rate of 15.6 per cent. On the other hand job openings for new entrants are projected to be about 1.8 million.

Total job openings in Nursing Workers are projected to be 111 000, at annual rate of 8.8 per cent. Total job opening rates vary significantly across the different occupation groups.

Net job openings for Nursing Professionals are projected to be about 27 000. This means that at least 5 400 new Nursing Professionals would need to be trained per year. Similarly at least 4 800 new ADPCs would need to be trained per year.

Table 10 Projected total and net job openings in nursing occupations in Australia, from 2001 to 2006

Occupation	Employment 2001 ('000)	Total job openings '000	Total job openings Average annual rate (%)	Net job openings '000	Net job openings Average annual rate (%)
All Occupations	9 090.4	7311.3	15.6	1806.5	3.8
Nursing Workers	248.4	110.7	8.8	33.0	2.6
Directors of Nursing	2.7	4.2	27.9	1.0	6.9
Nursing Professionals	183.9	70.8	7.5	27.1	2.9
Nurse Managers, Educators & Researchers	6.0	1.2	3.8	1.0	3.0
Registered Nurses	163.5	65.8	7.9	23.4	2.8
Midwives	10.1	3.3	6.1	2.5	4.6
Mental Health & Dev. Disability Nurses	4.4	0.5	2.4	0.3	1.4
Enrolled Nurses	22.5	11.1	10.2	1.9	1.8
PCNAs	39.3	24.5	12.7	2.9	1.5
ADPCs	71.0	75.3	18.6	24.1	5.9

Note: Estimates for the smaller occupations are subject to large standard errors and should be interpreted with caution. The estimates for growth and replacement needs do not necessarily add to job openings because if growth is negative then replacement needs equal job openings.

6 Concluding comments

The analyses presented in this paper show substantial changes in the employment and demographic composition of Nursing Workers and ADPCs in Australia over the last decade and a half. These changes are likely to affect the demand and supply for these workers. The ageing of the workforce means that replacement needs are likely to increase further. The average annual rate of net replacement needs for nursing workers over the next five years is already nearly four times the growth rate. Policies need to be further developed for succession planning and building up of training capacity. Nursing has traditionally been, and continues to be, a predominantly female occupation but with women now able to exercise far greater choice in choosing careers the pool from which nurses have been recruited has been shrinking. This raises problems for future recruitment. One possible solution is to encourage more males into nursing, but to do this will require the new policies and incentives. Another alternative is through increased immigration, but Australia will have to compete with other developed countries including the UK, Ireland, USA and Canada, which are also facing similar problems and can offer larger pay incentives. Recruiting from developing countries is also problematic as it has the

potential to damage the labour market for health professionals in these countries and also put a strain their scarce training resources.

The ageing of the population is likely to put more pressure on the demand for health services. The four-fold increase in the employment of ADPCs is an indication of the high demand that can occur in the very labour intensive industry sector such as the aged care. The effect of technological change on the demand for Nursing Workers is more complex. Recent advances in micro- and keyhole surgery and other innovation in patient care have enabled earlier discharge of patients and consequently a higher throughput of patients. On the other hand technological advances enable treatment of a wider range of ailments resulting in a higher demand for services.

The supply and demand for nursing workers is also affected by policies regarding the appropriate skill mix employed to provide nursing and caring services. Even though employment of Nursing Workers per 100 000 population across States and Territories seem to be converging, there is considerable variation in the mix between Nursing Professionals, Enrolled Nurses and PCNAs that are employed across jurisdictions. This is compounded by the high but variable rates of employment growth of ADPCs across States and Territories. These trends reflect differences in employment policies, standards and the roles of different Nursing Workers across jurisdictions. If a nationally consistent system is desired then as Duckett (2000) argues, the role of different health workers in the provision of services will need to be reassessed. There are already moves to allow nurses with advanced training (nurse practitioners) to assume some of the roles that have been traditionally performed by medical practitioners. The roles performed by different types of Nursing Workers and carers, and the training they receive, are tied to questions of quality of nursing care being delivered. All these issues suggest a more holistic approach to the delivery of nursing care.

The results in this paper are subject to a number of limitations. The modelling does factor in data on changes in the economic outlook as soon as they become available but the impact of more recent policy decisions such as new agreements on staffing ratios are not incorporated until they are implemented and reported in employment and other economic data. There is a need to undertake sensitivity analysis of the effect on employment in nursing occupations of alternative scenarios on the growth of government spending, and in particular its expenditure on health.

On its own, information on demand is insufficient to determine if shortages are looming. Data on supply are also needed. Shortages are also difficult to analyse and determine because they vary enormously by regions and specialities. This paper does however provide part of the information essential for assessing it.

The information on growth and replacement needs contained in this paper is critical if rational policies on nurse workforce planning are to be developed and the mistakes made in the UK in the early 1990s are to be avoided. It can be used as baseline data to complement other qualitative and local area information for making policy decisions at the regional level. Job openings' information is also useful for career advice as it can provide indications of job outlook in different occupations for those making decisions about education and training options. Similarly those concerned with the planning of education and training, including resource allocation and setting of priorities, may find it useful to have objective forecasts of the likely demand rather than rely solely on previous year's enrolments.

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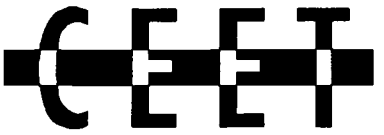

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