

The Australian pharmacist workforce: distribution and predictors of practising outside of metropolitan and regional areas in 2019

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Abstract

Objective This study describes the distribution of the Australian pharmacists' workforce using a range of indicators and identifies predictors of practising outside of metropolitan and regional areas.

Methods A cross-sectional description of the 2019 pharmacy workforce. Pharmacists who completed the 2019 workforce survey as reported in the Australian National Health Workforce Dataset (NHWDS). The main outcome measures were the number of pharmacists per 100 000, the proportion working less than 35 h a week, the proportion with primary qualification from overseas (outside of Australia and New Zealand) and the proportion aged 65 years or older. Additionally, predictors of practising outside of metropolitan and regional areas were also identified.

Key findings Nationally, there were 102 pharmacists/100 000 with one-third working less than 35 h a week. About 10% of pharmacists obtained their primary qualification from overseas and 4% were 65 years old or older. Males were more likely to practise outside of metropolitan and regional areas [OR, 1.40 (1.30–1.50); $P < 0.001$], while younger people were less likely to practise outside of these locations [OR, 0.71 (0.66–0.76); $P < 0.001$]. Those who had obtained their primary qualification overseas were also more likely to practise outside of metropolitan and regional areas.

Conclusions Analysis of the 2019 NHWDS suggests an uneven distribution of the pharmacist workforce. Also, three predictors of practising outside of major cities and regional centres were identified.

Keywords: allied health; pharmacy; workforce; rural workforce issues; recruitment and retention.

Introduction

The maldistribution of healthcare professionals, including pharmacists is a well-known issue affecting rural and remote Australia.^[1] This has been found to have negative implications for healthcare services, thereby resulting in poor patient outcomes.^[1] Pharmacists play an essential role in delivering healthcare services^[2] and are rated as one of the most trusted professions in Australia.^[3] While many studies focus on the medical workforce, fewer reports have focused on the pharmacy workforce. The expanding role of pharmacists, including the role played during the Australia bushfire of 2020,^[4] the provision of vaccination,^[5] and involvement in the primary healthcare teams of Aboriginal Community Controlled Health Organisations,^[6] necessitates that more attention is paid to this group of healthcare professionals.^[1]

Although there have been reports of oversupply and maldistribution of pharmacists since the mid-2010s,^[7] several factors, such as the decline in the growth of the profession compared with other healthcare professions, a decline in the proportion of younger pharmacists (25–34 years) between 2013 and 2018, and an increased proportion of pharmacists in the 25–34 age group who do not intend to practice beyond

the next 10 years^[8] may result in a future undersupply. Consequently, this is likely to have dire implications for rural and remote areas, considering the known difficulty of attracting and retaining healthcare professionals in these locations.

The Australian Institute of Health and Human Welfare has provided a series of pharmacy workforce analyses.^[9–12] More recently, a publication by Jackson *et al.* has also provided an analysis of the pharmacist workforce between 2013 and 2018.^[8] However, this work did not include the 2019 dataset and only conducted descriptive analyses. Therefore, we aimed (i) to provide a description of the 2019 distribution of Australian pharmacists' workforce profile across states and territories using a range of indicators, (ii) to identify predictors of practising outside of metropolitan and regional areas, and (iii) provide recommendations on approaches to resolve the workforce maldistribution concern.

Methods

Study design

The study was conducted using data drawn from the National Health Workforce Dataset (NHWDS).

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Data source

This dataset comprises information gathered during the annual registration of healthcare professionals regulated by the Australian Health Practitioner Regulation Agency (AHPRA) through voluntary completion of an additional workforce survey.

Data extraction

The Department of Health, through the NHWDS, provides a free statistical tool that allows for mining of data to include a range of information, such as the name of health profession, geographic distribution of the workforce by the Modified Monash Model (MMM) as well as the deidentified demographic information for the 15 health professions regulated by AHPRA.^[13] The MMM categorises geographical areas based on their proximity to a large urban centre. This classification is based on the Australian Statistical Geography Standard – Remoteness Area and was developed to better target health workforce programmes to attract healthcare workers to more rural and remote communities. MMM1 refers to metropolitan areas, MMM2 refers to regional centres, through to MMM6 and 7 which refer to remote and very remote communities, respectively.^[14] MMM1 and 2 locations are densely populated areas compared with MMM3–7 with a more dispersed population. Australian major cities are classified as MMM1; places like Ballarat and Hobart as MMM2; Lismore is MMM3; Port Augusta is MMM4; Mount Buller is MMM5; Bruny Island is MMM6; and Longreach is MMM7. For this study, demographic information extracted included age, gender, Indigenous status, initial country of qualification and employment. Geographical location and hours worked per week were also captured.

Data management and analyses

The workforce profile was measured across the states and territories using four indicators: the number of pharmacists per 100 000 residents, the proportion with a primary qualification obtained overseas (outside of Australia and New Zealand), the proportion aged 65 years and older and those working less than 35 h a week. This study compared the densely populated locations (MMM1–2) with more population-dispersed areas (MMM3–7). To calculate the number of pharmacists per 100 000 population, we used the Australian Bureau of Statistics (ABS) figure of June 2019.^[15] To determine the predictors of working outside of a metropolitan location, simple logistic regression with odds ratio and confidence interval was calculated. All analyses were conducted using STATA version 16.1 and Microsoft Excel 2019.

Ethics and dissemination

Data were not directly obtained from human beings and only publicly available secondary data were used in this study. In accordance with the National Health and Medical Research Council's National Statement on Ethical Conduct in Human Research, ethics was not required.^[16]

Results

The workforce data recorded 25 847 pharmacists practising in Australia in 2019. More than 60% of pharmacists were females and more than 40% were between the ages of 20 and 34 (Table 1). About 90% of pharmacists obtained their

primary qualification in Australia or New Zealand and less than 1% identified as Indigenous Australians (Table 1). New South Wales recorded the highest number of pharmacists at 7756 while the Northern Territory had the lowest number of pharmacists at 213 (Table 2). Most pharmacists across the states and territories practised in MMM1 locations (86%) with the least in MMM6 and 7 locations. Additionally, there were more pharmacists per 100 000 population in MMM1 and 2 locations, and fewer in MMM6 and 7. In Tasmania and the Northern Territory (jurisdictions without MMM1 locations), most pharmacists practised in MMM2 locations.

The lowest number of pharmacists per 100 000 persons was in the Northern Territory, while the Australian Capital Territory recorded the highest proportion of pharmacists with primary qualification obtained from outside of Australia or New Zealand at 13.9%. New South Wales and Victoria had the highest proportion of pharmacists aged 65 years or older at 5.9% and 4.6%, respectively (Table 3). South Australia and Western Australia had the highest number of pharmacists working less than 35 h per week, while Tasmania and the Australian Capital Territory had the lowest (Table 3).

Analysis of the dataset showed that there were several predictors associated with practising outside of metropolitan and regional areas. Males were more likely to practise outside of metropolitan and regional locations [OR, 1.40 (1.30–1.50); $P < 0.001$], while younger people were less likely to practise outside of metropolitan and regional locations [OR, 0.71 (0.66–0.76); $P < 0.001$] (Table 4). Similarly, respondents

Table 1 Demographic characteristics ($n = 25\ 847$)

Characteristic	Frequency (%)
Gender	
Male	9910 (38.3)
Female	15 935 (61.7)
Age distribution	
20–34	10 934 (42.3)
35–44	7342 (28.4)
45–54	3799 (14.7)
55–64	2629 (10.2)
65–74	900 (3.5)
75–99	224 (0.9)
States and territories	
New South Wales (NSW)	7756 (30.0)
Victoria (VIC)	6804 (26.3)
Queensland (QLD)	5199 (20.1)
South Australia (SA)	1856 (7.2)
Western Australia (WA)	2861 (11.1)
Tasmania (TAS)	646 (2.5)
Northern Territory (NT)	213 (0.8)
Australian Capital Territory (ACT)	490 (1.9)
Country of primary qualification	
Australia and New Zealand	22 746 (88.0)
Others (overseas)	2463 (9.5)
Not stated	606 (2.3)
Indigenous status	
Indigenous	125 (0.5)
Non-Indigenous	25 701 (99.5)

Table 2 Geographical distribution of Australian pharmacists by MMM and states and territories ($n = 25\ 847$)

	MMM1	MMM2	MMM3	MMM4	MMM5	MMM6	MMM7	Total (Jurisdiction)
NSW	6203	137	756	312	332	12	4	7756
VIC	5619	377	326	243	236	3	0	6804
QLD	3783	867	98	189	181	47	34	5199
SA	1535	19	107	53	105	30	7	1856
WA	2434	96	117	23	89	67	35	2861
TAS	0	496	76	4	61	9	0	646
NT	0	152	0	0	0	49	12	213
ACT ¹	490	0	0	0	0	0	0	490
Number per 100 000 across MMM levels	109.5	95.5	93.2	85.1	57.4	77.0	43.3	101.8
Total (MMM)	20 064	2144	1480	824	1004	217	92	25 825

¹All locations in the ACT are classified as MMM1.

Table 3 Workforce indicators across the states and territories

	Number per 100 000 population	Proportion trained overseas (outside of Australia and New Zealand) (%)	Proportion older than 65 (%)	Proportion working less than 35 h per week (%)
State and territories				
New South Wales	95.9	10.3	5.9	34.9
Victoria	103.2	10.5	4.6	34.4
Queensland	102.0	7.8	3.2	31.2
South Australia	106.0	8.9	3.0	35.6
Western Australia	109.1	9.3	3.4	36.8
Tasmania	120.9	4.2	3.5	11.7
Northern Territory	86.6	7.9	1.4	28.5
Australian Capital Territory	113.7	13.9	3.1	17.6
Nation-wide	101.8	9.5	4.4	33.6

who obtained their primary qualification overseas were more likely to practise outside of metropolitan and regional areas (Table 4). The number of respondents who identify as Indigenous Australian was small ($n = 125$), and there was no statistically significant evidence to suggest that they were more likely to practise outside metropolitan and regional locations [OR, 1.31 (0.83–2.08); $P = 0.124$].

Discussion

This study has provided a recent descriptive profile of pharmacists practising across states and territories in Australia and identified predictors for practising outside of metropolitan and regional areas in 2019. Predictors of practising outside of metropolitan and regional centres include male gender, advancing age and achieving primary qualification outside of Australia or New Zealand. The workforce profile was varied across jurisdictions, with several states and territories reporting figures that deviated from the national average. Our study has limitations. It was not possible to obtain information on the marital status of pharmacists, a potential predictor of geographic positioning, and other personal factors that may affect work location. Also, other variables that could affect rural practices, such as level of specialisation, whether pharmacists have rural origin or rural exposure were

either not available or fully described in the dataset. Although the NHWDS survey is known to have a high completion rate of up to 96%, it is not known if the characteristics of non-respondent would affect the result of the analyses. As common with self-reported surveys, responses may have been subjected to recall, social desirability or confirmation biases. Lastly, a multivariate regression analysis could not be conducted due to the absence of individual-level data.

As reported elsewhere,^[17,18] females were less likely to work outside metropolitan or regional locations compared with males. This may be due to consideration for spouses, family and the need for optimal work–life balance.^[19,20] Although studies have suggested that younger people are less likely to practise in rural locations, there is evidence to suggest that they may go to places outside of metropolitan areas for vocational training and return to metropolitan areas when their training is completed.^[17] While strategies such as encouraging rural and remote placements for students and the establishment of pharmacy schools in regional/rural areas have been in place for many years, there is a need to consider additional strategies post-registration. The development of government-funded locum pharmacist positions in conjunction with community pharmacies and hospitals in rural and remote areas to encourage pharmacists to continue to practise in a rural setting for a few years post-registration could be a strategy

Table 4 Predictors of pharmacists practising outside of metropolitan and regional areas (MMM1–2)

Characteristics	MMM1–2 (%)	MMM3–7 (%)	Missing	OR (CI)	P-value
Gender					
Male	8264 (37.2)	1639 (45.3)	16	1.40 (1.30–1.50)	<0.001
Female	13 944 (62.8)	1982 (54.7)			
Age					
<45	15 944 (71.8)	2332 (64.4)	19	0.71 (0.66–0.76)	<0.001
45 and greater	6264 (28.2)	1288 (35.6)			
Country of primary qualification					
Overseas	2039 (9.4)	421 (11.9)	603	1.30 (1.16–1.45)	<0.001
Australia and New Zealand	19 635 (90.6)	3129 (88.1)			
Indigenous status					
Indigenous	103 (0.5)	22 (0.61)	16	1.31 (0.83–2.08)	0.124
Non-Indigenous	22 103 (99.5)	3598 (99.4)			

to attract newly registered graduate pharmacists in the short term. Conversely, although older healthcare professionals are more attracted to rural locations,^[21] there is a tendency for them to leave when they get to retirement or require expert medical attention often not available in rural areas.^[22, 23] The impact of country of primary qualification on practice outside of metropolitan and regional areas is less clear among healthcare disciplines. In contrast to the result of this study, studies on the medical workforce have reported that international medical graduates are less likely to remain in locations outside of metropolitan areas.^[23, 24] It may be that internationally trained pharmacists may be intentionally hired for jobs in rural areas if domestic trained pharmacists do not find these areas attractive. More research on the impact of country of primary qualification on practice location is needed.

There are other strategies from the broader health workforce literature that can be adapted to the pharmacy profession to improve workforce maldistribution and access to pharmaceutical services. Recruiting students from rural and remote areas has been shown to improve the medical workforce in these areas.^[25] Several health student tracking studies have also suggested that students from rural origin are more likely to choose to work rurally compared with those who spent their early years in a metropolitan location.^[26–28] However, these studies have mostly focused on medical students and there is a paucity of information regarding the outcomes of nursing, pharmacy and other allied health disciplines. Long-term tracking studies of pharmacy students are required to help provide a strong evidence base in understanding predictors of rural pharmacy practice and approaches to improving long-term retention in rural and remote communities.

The benefits of mentoring relationships and networks in retaining nurses in rural and remote areas have been reported severally.^[29–33] Among the goals of such mentoring relationships are the opportunity for work-related support and succession planning.^[32, 33] However, there is very little regarding the impact of mentorship in the pharmacy literature. The establishment of formal and informal mentorship networks among community pharmacists in rural areas may be helpful in retaining pharmacists too. Such mentorship arrangements can be between early career pharmacists and more senior pharmacists looking to retire a few years with a focus on succession planning. Furthermore, the use of telehealth is gaining popularity as a means of ensuring

equitable access to care in medicine.^[34] This can be well adapted and utilise in pharmacy too, to ensure that the population in rural and remote areas can access the service of a pharmacist with regard to medication management and related matters. A study by Hall *et al.* was designed to compare and contrast the feasibility, sustainability and efficacy of home medication reviews (HMRs) and the use of telepharmacy.^[35] The result showed that telepharmacy was offered to patients more frequently than HMRs. Additionally, 75% of patients attended their scheduled telepharmacy appointment and a net profit per service of \$167 was realised for telepharmacy compared with \$23 for HMRs.^[35] This suggests that telepharmacy is a more cost-effective approach for medication management reviews in remote locations compared with traditional HMR approach. Despite the benefits of telepharmacy models, there is a need to also exercise caution while instituting certain models that may exclude active pharmacist participation or introduce a level of risk to the patient. This includes the use of, Internet pharmacies, vending machines and scenarios that may partially or fully shift pharmacist's roles to other healthcare professionals.

Lastly, the World Health Organization is in favour of having more than 1 pharmacist per 1000 population (100 per 100 000 persons).^[36, 37] Using this criterion, the current national figure is on the borderline at 101.8 and even lower in jurisdictions like New South Wales and the Northern Territory. This may suggest a potential future undersupply, especially if more pharmacists exit the profession compared with new graduates beginning their career. It is, therefore, necessary to begin to consider wholistic strategies that both address pharmacists' supply and maldistribution concerns.

Conclusion

The analysis of the 2019 NHWDS suggests an uneven distribution of pharmacy workforce persists, with some states performing poorly compared with the national average across several workforce profiling indicators. Also, there were several predictors of pharmacists practising outside of major cities and regional centres, including male gender, older age and having obtained a primary qualification outside of Australia or New Zealand. Strategies are required to increase the number of pharmacists in rural and remote

locations to ensure more equitable access to pharmaceutical services.

Author Contributions

The authors confirm contribution to the paper as follows: KO, TB, and II did study conception and design, analysis and interpretation of results, and critical analysis; KO contributed to data collection and draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of Interest

The authors have no conflict of interest to declare.

Data Availability

Data availability: <https://hwd.health.gov.au/datatool/>

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