



ORIGINAL ARTICLE

Spatial inequities of mental health nurses in rural and remote Australia

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ABSTRACT: *Despite an increased burden from chronic mental health conditions, access to effective mental health services in rural and remote areas is limited, and these services remain spatially undefined. We examine the spatial availability of mental health nurses across local government areas in Australia and identify gaps in mental health service delivery capacity in a finer-grained level than the state/territory data. A spatial distribution of mental health nurses was conducted. We utilized the 2017 National Health Workforce Dataset which was aggregated to LGA level based on the 2018 Australian Bureau Statistics (ABS) Data. The availability of mental health nurses was measured using the full time equivalent (FTE) rates per 100 000 population. We calculated the proportion of LGAs with zero total FTE rates based on remoteness categories. We also compared the mean of total FTE rates based on remoteness categories using analysis of variance. A spatial distribution of mental health nurses was visualized using GIS software for total FTE rates. Our analysis included 544 LGA across Australia, with 24.8% being defined as remote and very remote. The mean total FTE for mental health nurses per 100 000 populations is 56.6 (± 132.2) with a median of 17.4 (IQR: 61.8). A wide standard deviation reflects unequal distribution of mental health nurses across LGAs. The availability of total FTE rates for mental health nurses per 100 000 populations is significantly lower in remote and very remote LGAs in comparison with major cities. As many as 35.1% of LGAs across Australia have no FTE for mental health nurses with 46% are remote and very remote. Our study reflects the existing unequal distribution of mental health nurses between metropolitan/urban setting and rural and remote areas. We suggest three broad strategies to address these spatial inequities: improving supply and data information systems; revisiting task-shifting strategies, retraining the existing health workforce to develop skills necessary for mental health care to rural and remote communities; and incorporating the provision of mental health services within expanding innovative delivery models including consumer-led, telemedicine and community-based groups.*

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INTRODUCTION

The burden of mental health problems in Australia continues to rise. It is estimated that at least 20% of Australians (aged 16–85 years old) had experienced a common mental health disorder during a 12-month period, costing the government about \$9.9 billion in 2017–2018 (Australian Institute of Health & Welfare 2019a). The reported prevalence of mental health problems in rural and remote areas (22%) appears similar to major cities (21%) (Australian Institute of Health & Welfare 2019b). However, access to mental health services in rural/remote areas is substantially lower than major cities (National Rural Health Alliance 2017).

In 2017–2018, there were 286 985 public hospital emergency department (ED) presentations with a mental health-related principal diagnosis. The rate (per 10 000 populations) for patients living in major cities was the lowest (101.3) while that for patients in remote and very remote areas was the highest (203.6) (Australian Institute of Health & Welfare 2018). People seek mental health services in EDs often as an initial point of contact or for after-hours care (Morphet *et al.* 2012). Furthermore, a high proportion of hospital emergency presentations of people with psychotic disorders (Morgan *et al.* 2012) indicates inadequate management in primary care and community-based settings. These data signal that people with chronic mental health conditions who reside in remote and very remote areas continue to experience problems accessing community-based mental health services (Highet *et al.* 2004).

Access to community-based mental health services is influenced by: spatial factors such as physical availability and geographical distance, non-spatial determinants which include economic, cultural and social forces, and factors associated with the organization and arrangement of mental health systems (Wang & Luo 2005). Studies have consistently shown that the utilization of mental health services is reduced with increasing spatial distance and travel time (Almog *et al.* 2004; Stulz *et al.* 2018; Zulian *et al.* 2011). These studies signal that people with mental health conditions in rural and remote areas are less likely to access mental health services due to distance and spatial availability.

Spatial access emphasizes the importance of geographical factors, including uneven distribution of health facilities, health providers and populations. Spatial distribution of health professionals is an independent factor for service utilization (Zulian *et al.* 2011). Spatial distribution can best be measured using geospatial analysis to assist service planning and delivery. Spatial distribution provides visualization and serves as a policy making tool for resource allocation, prediction of patterns of service utilization and assessing shortage of health professionals in the primary healthcare settings (Kim *et al.* 2016, McLafferty 2003). Geographic measures of accessibility can quantify inequitable distributions of health services and health workforce.

Over the last three decades, Australia has promoted a nationally coordinated approach to mental health service delivery. It strongly encourages the provision of mental health care in community settings (Department of Health and Ageing 2013). This is also a critical element of the continuum of mental healthcare provision (World Health Organisation 2008). Mental healthcare services are provided through the mix of services involving various health providers (Perkins *et al.* 2019); however, the AIHW mental health data only report about psychiatrists, psychologists and mental health nurses (Australian Institute of Health & Welfare 2019a).

Nurses form the largest component of the public mental health workforce in Australia, regardless of the remoteness categories (Australian Institute of Health & Welfare 2019a). Mental health nurses have considerable contributions in the delivery of community mental health care, which include: case management (Burns *et al.* 2007), health education related to mental health, networking with various internal and external stakeholders (Zeeman *et al.* 2002) and providing comprehensive assessment and crisis response (Wallace *et al.* 2005; Zeeman *et al.* 2002). About 76% of total FTE for mental health nurses were employed in major cities (Australian Institute of Health & Welfare 2019b). The FTE rate for mental health nurses in major cities were almost three times higher than very remote areas (Australian Institute of Health & Welfare 2019b). The availability of mental health nurse other than ASGS-RA classification is not currently available or reported in

Australia. In this study, we examined the spatial availability of mental health nurses across 544 LGAs in Australia and identify the uneven distribution of mental health nurses in a finer-grained level, which can be considered as a proxy for access to specialist mental health services.

METHODS

Design, setting and data sources

We conducted a cross-sectional analysis of spatial distribution of mental health nurses in Australia. We used the publicly available 2017 National Health Workforce Dataset (NHWDS). The Australian Health Practitioner Regulation Agency (AHPRA) is responsible for the national registration process for 14 health professions, including mental health nurses (Australian Institute of Health & Welfare 2017). Data from this annual registration process, together with data from a workforce survey that is voluntarily completed at the time of registration, formed the NHWDS. It includes demographic and employment information for registered health professionals, including mental health nurses (Australian Institute of Health & Welfare 2017). All mental health nurses recorded in the 2017 NHWDS were included in the analysis.

Variables and measurements

Total number of individuals, total hours and clinical hours for mental health nurses were extracted. FTE were calculated based on a standard working week of 38 hours. The NHWDS data have been obfuscated for reporting regions where the total number of individuals are less than three (Australian Institute of Health & Welfare 2017). In order to incorporate these regions in the analysis of individual counts, we used a value of 3. FTE rates, both total and clinical, per 100 000 populations was calculated using the 2017 ABS estimated residential population data for each LGA (544 LGAs; Australian Bureau of Statistics 2017).

There are alternative approaches that can be used to explore the distribution of the health workforce across remoteness categories in Australia such as the Modified Monash Model (MMM) of remoteness categories (Department of Health of Australia 2020) and the Accessibility and Remoteness Index of Australia (ARIA+) (Department of Health of Australia 2011). In this study, we used the ARIA + to allow spatial analysis

at the LGA level – the most granular data using a readily understandable and policy relevant region type. The ABS Remoteness Areas (RA) data set divides Australia into five classes of remoteness on the basis of a measure of relative access to public services. Relative access to health services are measured using the Accessibility and Remoteness Index of Australia (ARIA+), produced by the Hugo Centre for Migration and Population Research at the University of Adelaide (Department of Health of Australia 2011). To allow comparisons with the NHWDS, we assigned a RA score from 0 (major cities) to 4 (very remote) for each of the remoteness classes within the ABS 2016 RA dataset. We then used the relevant ABS Mesh Block (Australian Bureau of Statistics 2016) population weighted correspondence to generate a RA score for each ABS 2018 LGA region. Finally, we re-assigned a single RA class to each LGA using the following RA score break points: major cities (RA score 0.0–<0.5); inner regional (RA score 0.5–<1.5); outer regional (RA score 1.5–<2.5); remote areas (RA score 2.5–<3.5); and very remote areas (RA score ≥ 3.5).

Data analysis and statistical methods

We used three indicators for our analysis: total number of mental health nurses per 100 000; total FTE per 100 000 populations; and clinical FTE per 100 000 populations (Australian Institute of Health & Welfare 2019a). Rates per 100 000 populations were used to account for the population size of each LGA. These indicators were reported against the LGA boundaries to allow analysis of trends and were presented against the remoteness area data to observe spatial availability of mental health nurses based on remoteness index. A spatial distribution of mental health nurses was visualized using GIS software for total FTE per 100 000 populations. The excel data set generated from the NHWDS was imported to SPSS software (Landau & Everitt 2004) to perform data analysis. We calculated the proportion of LGAs with zero total FTE for mental health nurses per 100 000 populations based on remoteness categories. We also compared the mean of total FTE rates per 100 000 populations based on remoteness categories using analysis of variance. The total FTE rates per 100 000 populations is a useful indicator to measuring adequate staffing, workforce capacity and workforce cost, in comparison with the headcount (total number) per 100 00 populations (Australian Public Service Commission 2018).

RESULTS

The estimated total population in 2017 across LGAs is varied, ranging from 61 to 1.2 million people, with an average of 45 224 ($\pm 87\ 315$) and the median of 12 899 (IQR: 40 924). We found that the estimated population decreases with the increase in remoteness score ($r = 0.503$, $P < 0.001$), indicating that population is concentrated in major cities and inner regional areas. About 10.8% of LGAs have population size of ≤ 1000 people, and 14.5% LGAs have a population size of $>100\ 000$ people. Our analysis included 544 LGAs across Australia, with 24.8% being remote and very remote areas. These are considered as difficult to reach areas which may result in spatial inequities and reduced access to mental health services. Table 1 depicts the distribution of remoteness of LGAs aggregated at the state/territory level.

The average number of mental health nurses per 100 000 populations is 68.1 (± 152.4) with median of 24.6 (IQR: 75.3). The average of total and clinical FTE per 100 000 populations are 56.6 (± 132.2) and 51.9 (± 123.2) with median of 17.4 (IQR: 61.8) and 16.1 (IQR: 56.9), respectively. We found a wide standard deviation for all health workforce indicators for mental health nurses indicating unequal distribution of mental health nurses across LGAs. Our findings also suggest that mental health nurses are concentrated in major cities and inner regional areas.

Table 2 shows that the mean of total FTE rates for mental health nurses in very remote areas is higher than remote and inner regional areas. However, we found a downward trend of the total FTE rates per 100 000 populations for mental health nurses across remoteness categories ($r: -0.235$, $P < 0.0001$). Furthermore, our analysis of variance showed that the mean difference of total FTE rates for mental health nurses between remoteness categories is only significant when major cities used as a reference. These findings suggest that the availability of total FTE rates for mental health nurses is lower in LGAs located in remote and very remote areas in comparison with those located in major cities.

Table 3 presents the distribution of zero total FTE rates per 100 000 populations based on remoteness categories. It shows that 35.1% of LGAs across Australia have no FTE for mental health nurses. Additionally, as many as 21.1% of LGAs in Australia have only 25.0 or less total FTE for mental health nurses per 100 000 populations. Only about 22% of LGAs in Australia have

total FTE rates for mental health nurses of >75.0 FTE per 100 000 populations. It shows that remote and very remote LGAs have higher proportion of zero total FTE rates than major cities and regional areas. Of 191 LGAs that have no total FTE for mental health nurses, 88 (46%) are located in remote and very remote areas. Spatial availability of total FTE rates per 100 000 populations for mental health nurses is depicted in Figure 1.

DISCUSSION

Spatial inequities of mental health nurses: implications for access to mental health care

Research on spatial determinants and access to mental health services has consistently demonstrated a pattern of reduced service utilization with increasing time-related distance (Almog *et al.* 2004; Stulz *et al.* 2018; Wang & Luo 2005). Our findings corroborate these results and reflect the inequitable distribution of mental health nurses to provide quality and timely mental health services. About 35% of all LGAs in Australia have zero FTE for mental health nurses, 46% of these being remote and very remote areas.

Over the last two decades, the Australian Government has implemented a national mental health workforce plans which has a specific section on the rural health workforce. Additionally, since 2014, new mental health strategic plans have been developed in every state and territory of Australia which have implications for rural mental health workforce. However, rural factors are considered in only 3.5% of occasions when workforce is mentioned (Roberts & Maylea 2019). The government has significantly improved the availability of total FTE for mental health professionals at the national and state/territory levels. Between 2003 and 2017, total FTE rates for mental health nurses have increased from 64.8 to 85.8 per 100 000 populations (Australian Institute of Health & Welfare 2019a, Department of Health and Ageing 2013).

However, the mal-distribution of mental health nurses between major cities/inner regionals and remote/very remote areas has persisted during the same period. For example, in 2003, total FTE for mental health nurses in major cities was 65.7 per 100 000 populations while it was only 12.7 per 100 000 populations in remote and very remote areas (Department of Health and Ageing 2013). A similar trend can also be observed in 2017 where the total FTE rates for mental

TABLE 1 Proportion of remote and very remote LGAs across Australia in 2017

State/Territory	Remoteness categories (n = 544)					Total
	Major Cities	Inner Regional	Outer Regional	Remote	Very Remote	
New South Wales	40 (31.0%)	46 (35.7%)	34 (26.4%)	6 (4.7%)	3 (2.3%)	129 (100%)
Victoria	33 (41.3%)	33 (41.3%)	14 (17.5%)	0 (0%)	0 (0%)	80 (100%)
Queensland	8 (10.3%)	14 (17.9%)	17 (21.8%)	9 (11.5%)	30 (38.5%)	78 (100%)
South Australia	19 (26.8%)	12 (16.9%)	23 (32.4%)	9 (12.7%)	8 (11.3%)	71 (100%)
Western Australia	32 (23.4%)	15 (10.9%)	40 (29.2%)	28 (20.4%)	22 (16.1%)	137 (100%)
Tasmania	0 (0%)	12 (41.4%)	13 (44.8%)	2 (6.9%)	2 (6.9%)	29 (100%)
Northern Territory	0 (0%)	0 (0%)	3 (16.7%)	6 (33.3%)	9 (50%)	18 (100%)
Australian Capital Territory	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)
Other Territories	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)
Total	133 (24.4%)	132 (24.3%)	144 (26.5%)	60 (11.0%)	75 (13.8%)	544 (100%)

TABLE 2 Analysis of variance of total FTE rates for mental health nurses across remoteness categories in 2017

Indicators	Remoteness categories**				
	Major cities (Ref)	Inner regional	Outer regional	Remote areas	Very remote areas
Mean (±SD)	118.4 (227.7)	58.4 (89.5)	22.9 (46.6)	25.1 (56.4)	33.7 (67.1)
Mean difference		59.9*	95.5*	93.4*	84.7*
P-value		0.001	0.0001	0.0001	0.0001
Confidence interval (95%)		15.9–104.1	52.3–138.6	37.6–149.1	32.9–136.4

**Independent between groups ANOVA is significant: $F(4, 539) = 11.9 (P < 0.001)$.

*The mean difference is significant at the 0.05 level.

health nurses is significantly higher in major cities than very remote areas (91 and 36.3 per 100 000 populations) (Australian Institute of Health & Welfare 2019a).

Australian Institute of Health & Welfare (2019a) reports that nurses, including mental health nurses, form the largest proportion of the public mental health workforce in Australia. In fact, the majority of nurses practicing in the mental health sector work in public mental health services. Our study found that 15.2% of LGAs located in major cities and inner regional areas have zero total FTE rates. It might be due to the distribution of the secondary health services across LGAs, which cannot be mapped using the national health workforce data set. The geospatial mapping of the present study does not correspond to the locations of public mental health facilities across LGAs in Australia.

The ongoing shortages of mental health nurses can disrupt the continuum of mental health care for those who reside in rural and remote areas. In this context, the term ‘shortage’ refers to a comparison between settings using an index of relative remoteness. In 2017–2018, there were 51.1 Medicare-subsidized mental health specific services (MBS) encounters per 100 people in major cities compared to only 17 and 8 per 100 populations in remote and very remote areas (Australian Institute of Health & Welfare 2019a). Hospitalization rates and a hospital emergency presentation for chronic mental health conditions are higher within remote and very remote areas (National Rural Health Alliance 2017). Despite the higher burden of chronic mental health conditions in rural and remote Australia (Caldwell *et al.* 2004; National Rural Health Alliance 2017), our findings signal a chronic shortage of health workforce to provide mental health services. Alongside this, as many as 58% of mental health nurses in Australia are aged ≥ 45 years and 33% are aged ≥ 55 years (Australian Institute of Health & Welfare 2019a). The pending loss of nursing health workforce is an imminent challenge for the mental health sector which has significant implication for people with chronic mental health conditions living in rural and remote areas. Failing to address the uneven distribution of the mental health workforce, rural communities will continue to face challenges accessing mental health services.

Strategies to promote equitable access to mental health care for rural and remote communities

The current mental healthcare delivery models are based upon urban centric models. Rural residents experience a series of interconnected geographical,

TABLE 3 Proportion of LGAs with zero total FTE rates for mental health nurses in 2017

Remoteness categories	Total FTE of mental health nurses per 100 000 populations					Total
	Zero FTE	0.1–25.0	25.1–50.0	50.1–75.0	>75.0	
Major Cities	5 (3.8%)	37 (27.8%)	20 (15.0%)	13 (9.8%)	58 (43.6%)	133 (100%)
Inner Regional	24 (18.2%)	41 (31.1%)	27 (20.5%)	8 (6.1%)	32 (24.2%)	132 (100%)
Outer Regional	74 (51.4%)	34 (23.6%)	19 (13.2%)	3 (2.1%)	14 (9.7%)	144 (100%)
Remote Area	42 (70.0%)	0 (0%)	9 (15.0%)	4 (6.7%)	5 (8.3%)	60 (100%)
Very Remote	46 (61.3%)	3 (4%)	7 (9.3%)	8 (10.7%)	11 (14.7%)	75 (100%)
Total	191 (35.1%)	115 (21.1%)	82 (15.1%)	36 (6.6%)	120 (22.1%)	544 (100%)

social, demographic and environmental challenges which are not addressed adequately by the current models of mental healthcare delivery (Perkins *et al.* 2019). The spatial inequities of mental health nurses signal the need for innovative strategies to maintain adequate mental health care for rural and remote communities in Australia. We suggest three overarching strategies: improving supply and data information systems; revisiting policies around training/retraining and current task-shifting strategies; and incorporating the provision of mental health services within expanding innovative delivery models.

Firstly, the mental healthcare delivery in rural and remote areas can be improved through introducing placement in rural/remote communities for nursing students (Armitage & McMaster 2000). Introducing placement programmes in rural and remote communities for mental health practice is critical to counter the dominance of mental health training programmes which are geared towards urban models. These approaches must be organized within the broader state and territory health policies to improve recruitment, retention, education and leadership for rural health workforce. The emergence of Primary Health Networks (PHNs) with greater emphasis on a localized approach to service planning and delivery provides opportunities to improve access to mental health services for rural and remote communities. We argue that there is an urgent need for better health workforce data, including its spatial availability beyond the state/territory boundaries to guide political decisions. These data can be used by smaller management entities such as PHNs or local government councils to address these shortages within their jurisdictions. These data can be used to generate a designation of shortage areas (see Fig. 1) – making those who work within the areas are eligible for differential reimbursement under Medicare or scholarships for further trainings, credentials and continuing education programmes.

However, mental health is an optional specialty practice area within nursing that continues to rank low

in nursing students preferred choice (Patterson *et al.* 2018). The incentive to specialize is not reinforced by a requirement any more than a general nursing degree across Australia. The current placement options are designed to meet the demand from metropolitan and urban settings (e.g., acute inpatient settings; Patterson *et al.* 2018). This can detract students from choosing mental health practice area and will continue to limit the quantum who may consider rural or remote practice. Therefore, attracting nursing students to consider mental health practice remains a challenge.

Secondly, the scope of practice, supervision, support and professional development for rural mental health workforce in Australia are all problematic (Perkins *et al.* 2019). Retraining programme, including in-service training, to develop skills necessary for mental health care is essential to provide adequate access to mental health services for rural communities (Kakuma *et al.* 2011). Similarly, the Orange Declaration highlights the importance of ‘skills escalation’ to address specific rural mental health workforce in Australia (Perkins *et al.* 2019). For example, providing continuing education opportunities for registered nurses to improve their mental health knowledge and skills in rural and remote areas (Chang *et al.* 2002). Rural health clinics and community health centres can implement ‘task-shifting’ strategy by using non-clinical or community roles with effective supervision to provide mental health services for rural communities (Perkins *et al.* 2019).

Lastly, several innovative strategies have been introduced to address inequitable distribution of health providers such as telephone counselling, self-help, e-mental health initiative and web-based support programs (Department of Health and Ageing 2012). While these initiatives could facilitate better access for people living in remote and very remote areas, the potential benefits of this initiative will mainly be enjoyed by people living in urban settings. Implementation of the e-mental health initiative for rural and remote

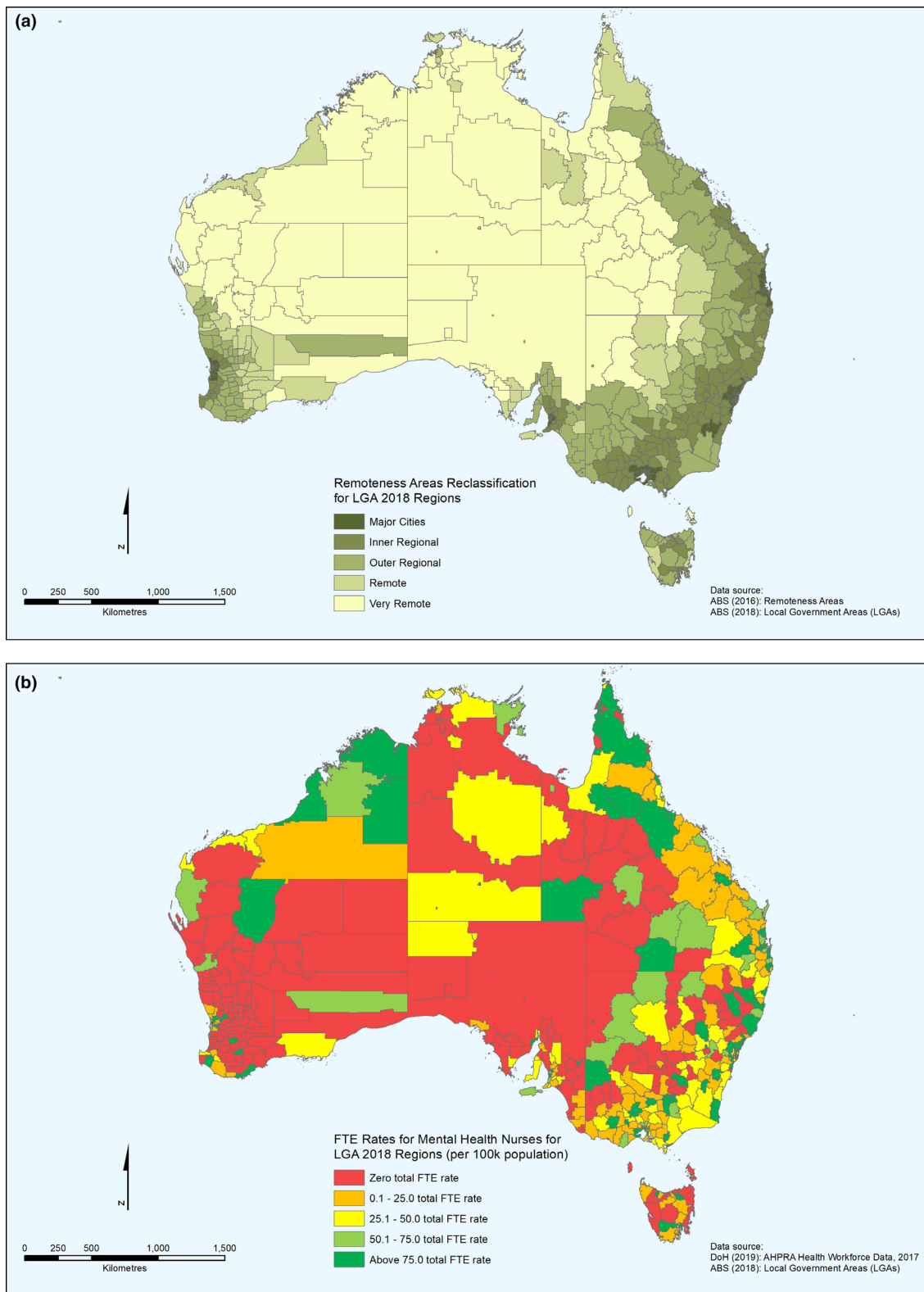


FIG. 1 (a) Remoteness categories across LGAs in Australia in 2017. (b) Spatial availability of mental health nurses across LGAs in Australia in 2017.

communities is impeded by infrastructure issues such as access to reliable broadband internet, institutional barriers for example exclusion from Medicare benefit, and other social issues including digital health literacy (Department of Health and Ageing 2012, Perkins *et al.* 2019).

The extensive consumer movement has resulted in the introduction of peer and community workers for mental health services globally (Kakuma *et al.* 2011). Implementation of peer-based model in rural/remote settings could be impeded by a strong stigma towards mental health (Gulliford *et al.* 2002, Corrigan 2004). This new mental health workforce landscape requires further discussion within the state and territory mental health plans. Different models of care existing within rural and remote communities, for example using existing social organizations or other community systems including Indigenous models of care are warranted for further exploration to complement community-based mental health services provided by health professionals.

Future research

Actual utilization of mental health services is influenced by factors other than spatial availability, including affordability, acceptability, stigma and discrimination (Gulliford *et al.* 2002; World Health Organisation 2015). Stigma has been identified as a key barrier to utilization of mental health services (Corrigan 2004, Mak *et al.* 2007). Moreover, a strong stoicism culture within rural and remote communities, different ways of caring, social networks, education level, infrastructure, decision making processes, income levels and health-seeking behaviour models all contribute to utilization of community-based mental health services (Boyd *et al.* 2006). Further research should directly measure the actual utilization of community-based mental health services and how this utilization is related with the spatial and non-spatial determinants.

CONCLUSION

Our study reflects the existing unequal distribution of mental health nurses to provide mental health services for people living with mental health conditions in remote and very remote areas. Our study signals that people with chronic mental health conditions living in rural and remote Australia will continue to experience access barriers to appropriate and timely mental health services. We suggest three overarching strategies to improve the practice of mental health care in rural and

remote areas: improving supply and data information systems; revisiting policies around training/retraining and current task-shifting strategies; and incorporating the provision of mental health services within expanding innovative delivery models. These strategies must be incorporated into the broader national, state/territory, and local mental health service and workforce planning.

RELEVANCE FOR CLINICAL PRACTICE

This study provides a critical insight into the spatial inequities of mental health nurses and inequitable distribution of access to mental health services in rural and remote Australia. This finding calls for innovative strategies to address these inequities which includes revisiting task-shifting strategies and streamlining mental health care within expanding innovative delivery models such as telemedicine, consumer-led and community-based groups.

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