SHORT REPORT

Identifying priority areas requiring culturally appropriate care during a pandemic: A spatial study investigating the proximate availability of culturally appropriate care for ageing Aboriginal or Torres Strait Islander people in rural and remote New South Wales

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1 | INTRODUCTION

The rapid spread of the novel coronavirus (COVID-19) throughout Australia has raised concerns surrounding the ability for clinical services to support vulnerable populations, including ageing Aboriginal or Torres Strait Islander people (hereafter respectfully acknowledged in New South Wales (NSW) as Aboriginal people) residing remotely. The provision of culturally appropriate health services is imperative to ensure Aboriginal people's health.[1] It is important that culturally appropriate health services are proximately available during the time of a health crisis (for example a pandemic) as their availability can support favourable health outcomes. This is especially so for Aboriginal people residing in rural communities which may already have fewer health services proximately available.[2]

2 | METHODS AND RESULTS

A spatial analysis was undertaken to ascertain (a) priority areas with a considerably high number of Aboriginal people aged 45 and older in NSW and (b) the geographic distribution of Aboriginal Health Clinics (AHCs) relative to priority areas. ESRI's ArcMap 10.7[3] and IBM's SPSS[4] were, respectively, used throughout spatial and statistical analysis. First, the number of Aboriginal people aged 45 and above (identified via the 2016 Census of Population

and Housing[5]) per statistical area 2 (SA2) within NSW was mapped. (SA2s are the third smallest area within the Australian Statistical Geography Standard [ASGS][6] and represent a cohesive community in economic and social terms.) Then, to address the first aim, a hotspot analysis was conducted to ascertain SA2s with significantly, or close to significantly, high numbers of Aboriginal people aged 45 and older. A hotspot analysis calculates areas with a significantly high number of a domain relative to a geospatial mean.[7] For an area to be considered a hotspot, it needs to have a high value and surrounded by areas with high values.[7] The local sum of these areas are proportionally compared to the sum of all areas and when the difference is too large to be random, it is considered a hotspot.[7] For the current analysis, all SA2s within NSW were considered. Priority areas were characterised as SA2s which had significantly high numbers ($P < .05$), or trending towards significantly high numbers ($P < .10$)—comparable to the approach employed by Lakhani et al[8]—of Aboriginal people aged 45 and older. Seventy-two priority areas were identified. These areas belonged to the following ASGS remoteness structure[9] regional classifications (with number of priority areas in brackets): major cities within Australia (9), inner regional Australia (28) and rural and remote Australia (35). A one-way analysis of variance (ANOVA) was conducted to investigate whether significant differences in the numbers of Aboriginal people aged 45 and older existed between priority areas across the three regional classifications.

To address the second aim, a centroid was placed within each priority area and a network analysis was conducted to ascertain the travel time from these centroids to the closest AHC (identified via Health Direct's National Health Services Directory[10]). The Origin Destination Cost Matrix[11] network analysis geoprocessing tool was used to calculate travel time. The centroid for each priority area was entered as the start location or 'origin' and AHCs were entered as the destination. The tool calculated travel time via motor vehicle using ESRI's administered road network[12] for Australia. ESRI's Australian road network has the highest possible accuracy rating (characterised as predictive traffic) across a six-level scale.[12] After, a one-way ANOVA was conducted to investigate whether significant differences in travel time to the closest AHC existed between priority areas across the three regional classifications.

The number of Aboriginal people aged 45 and older for priority areas within each regional classification was (with mean [*M*], and standard deviation [*SD*] in brackets): major cities ($M = 185.78$, $SD = 72.29$), inner regional ($M = 256.25$, $SD = 134.54$) and rural and remote ($M = 228.97$, $SD = 136.22$). The one-way ANOVA confirmed that significant differences in the number of Aboriginal people aged 45 and older were not apparent between priority areas across the three regional classifications [$F_{(2, 69)} = 1.060$, $P = .352$]. Figure 1 is a box-and-whisker plot illustrating the distribution of Aboriginal people aged 45 and older for NSW priority areas across the three regional classifications.

The travel time in minutes to the closest AHC for priority areas within each regional classification was (with mean [*M*] and standard deviation [*SD*] in brackets): major cities ($M = 10.74$, $SD = 9.58$), inner regional ($M = 20.07$, $SD = 21.47$) and rural and remote ($M = 51.37$, $SD = 41.67$). The ANOVA confirmed that significant differences in travel time were apparent between priority areas across the three regional classifications [$F_{(2, 69)} = 9.96$, $P < .001$]. Pairwise

comparisons using the Tukey HSD test confirmed that areas classified as major cities or inner regional had significantly lower travel times to the closest AHC compared to areas classified as rural and remote (both at $P < .01$). Figure 2 illustrates travel times to the closest AHC across priority areas, where larger circles are indicative of longer travel times.

3 | COMMENT

This spatial study confirmed that NSW priority areas across three regional classifications—major cities, inner regional and rural and remote—did not have significantly different numbers of Aboriginal people aged 45 and older. However, significant differences in travel time to the closest AHC were apparent. The relationship was such that priority areas classified as rural and remote experienced significantly longer travel times to the closest AHC compared to areas classified as inner regional or major cities. The finding that priority areas classified as major cities experience significantly less travel time to an essential health service is expected and also confirmed by previous Australian research investigating the distribution of health services in relation to priority areas based on the number and per cent of people with disability.[8] However, the findings from this study confirm that priority areas across regional classifications have comparable numbers of Aboriginal people aged 45 and above, and consequently, the notion that remote areas do not have a population base which necessitates or justifies the proximate availability of services could be an unfounded assumption.

It is clear that priority rural regions in Australia with high numbers of Aboriginal people aged 45 and above may not have timely access to culturally appropriate clinical care and potentially face health service inequity. This is especially problematic during a health crisis where quick access to culturally appropriate health care is necessary. A potential
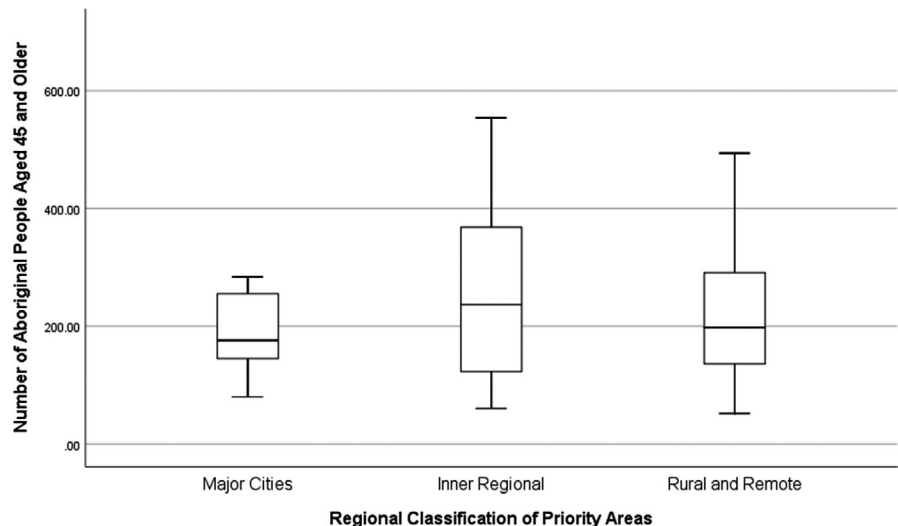

FIGURE 1 Box and whisker plot illustrating the number of Aboriginal people aged 45 and older across priority areas

Legend

Priority Area Travel Time to Closest Aboriginal Health Clinic
(in minutes)

○ 1.47 - 26.89
◯ 26.89 - 67.41
⬤ 67.41 - 154.71
▢ Major Cities
▢ Inner Regional
▢ Rural and Remote

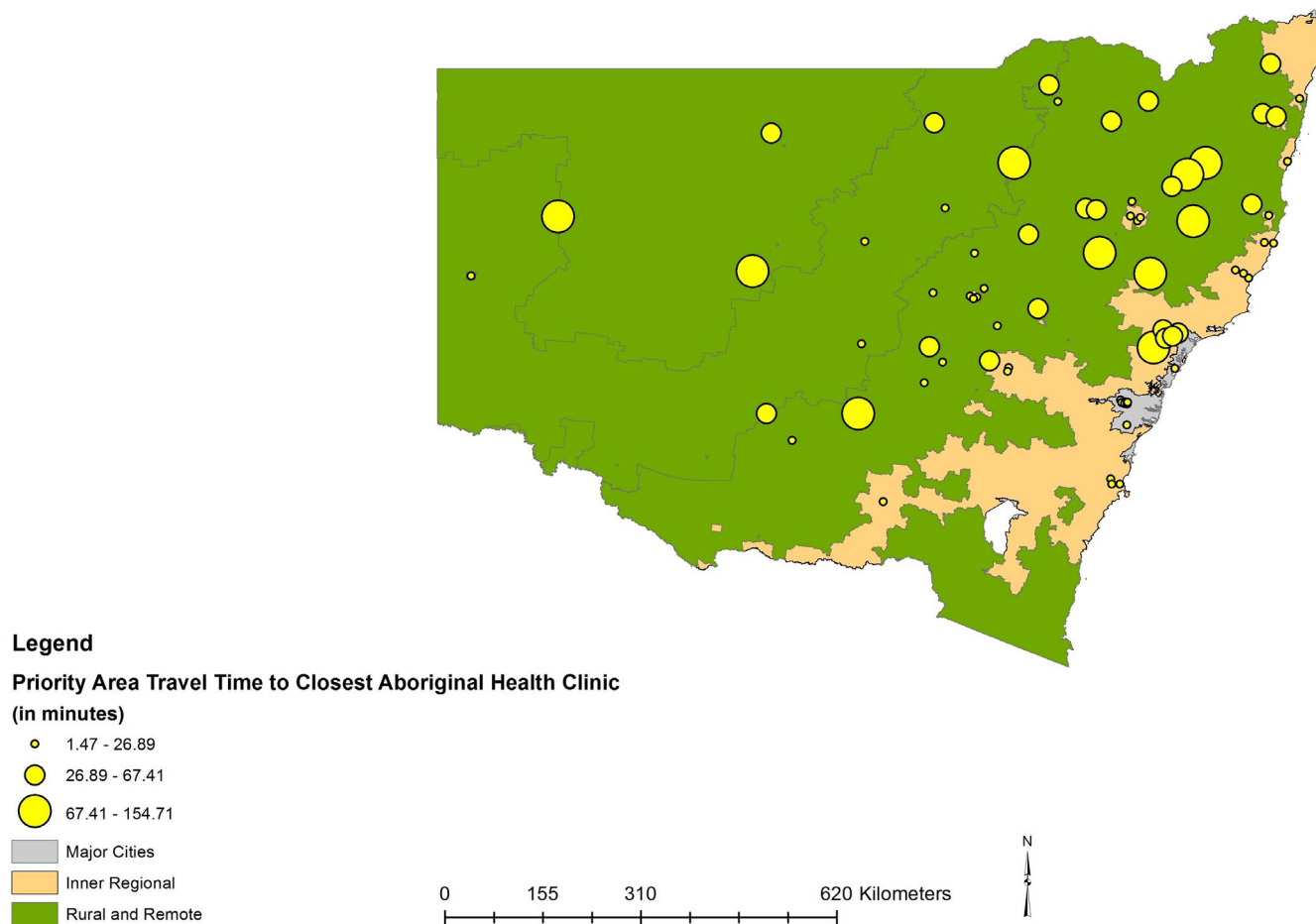0   155   310   620 Kilometers

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FIGURE 2   Travel times and regional classifications

feasible solution with a growing evidence base is the provision of telehealth services. A systematic review synthesising evidence published prior to January 2016[13] confirmed that delivering telehealth services to Aboriginal people has improved screening rates, potentially improved health outcomes, while also ensuring that recipients are able to stay in their community. The review suggested that an optimal delivery might involve the provision of telehealth services as a collaboration between Aboriginal Controlled Community Health Services and public hospitals. This approach could be especially advantageous during the time of a pandemic as public hospitals are amongst the first health services to develop experiential knowledge of how to address a novel virus. Establishing the effectiveness of the telehealth collaboration described is a justified area for future research.

It is essential that resources are dedicated to ensure culturally appropriate clinical services are readily available for Aboriginal people, in particular Aboriginal people residing in rural areas which may be under-serviced. These culturally appropriate services must be responsive to the needs of, and informed by, Aboriginal community members within priority areas. The current study highlighted that rural and remote communities with a sizable priority population, comparable to areas classified as major cities in NSW may experience a disparity in health service provision. This phenomenon may be unidentified yet existing in other Australian states. Thus, it is important that research continues to investigate disparities in health service provision that may exist between rural and urban areas.[14] Such research may highlight where inaccurate assumptions around (a) health service demand and (b) resource requirements exist.

and encouraged this type of work, particularly the need for this work in the light of COVID-19. Finally, Dr Ali Lakhani would like to thank Dr Ori Gudes, Dr Peter Grimbeek and Dr Dennis Wollersheim for their historical spatial, statistical and data visualisation advice.

CONFLICT OF INTEREST
None to declare.

AUTHOR CONTRIBUTIONS
AL led the following aspects of the CRediT taxonomy: conceptualisation, data curation, formal analysis, investigation, methodology, visualisation, writing—original draft and writing—review and editing.

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