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Author Address: sverdon@csu.edu.au/ liwilson@csu.edu.au

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An investigation of equity of rural speech-language pathology services for children: A geographic perspective

SARAH VERDON¹, ², LINDA WILSON¹, MICHELLE SMITH-TAMARAY¹, AND LINDY McALLISTER¹: ³

¹Charles Sturt University, New South Wales, Australia
²Spectrum Speech Pathology Services, Melbourne, Australia
³The University of Queensland, Brisbane, Australia

Correspondence: Dr Linda Wilson, School of Community Health, Charles Sturt University, P.O. Box 789, Albury, New South Wales, AUSTRALIA, 2640. Phone: +61 2 6051 9257. Email: liwilson@csu.edu.au

Key words: equity, accessibility, availability, speech-language pathology services, rural
Abstract

The World Health Organization’s equity objective states that there should be equal access to health care for equal need, regardless of location. Disparities between health services and challenges to achieving the equity objective have been documented both in Australia and around the world. However, little is known about the extent to which this objective has been met in the field of speech-language pathology in Australia.

This study used structured interviews with 74 speech-language pathologists working in rural areas of New South Wales and Victoria. The data obtained were used to develop maps to describe the availability of paediatric speech-language pathology services through consideration of location and frequency. The findings show that 98.60% of localities are unserviced at the ideal frequency of weekly or more often. It is important to note that these percentages include all localities in the represented rural areas of New South Wales and Victoria, some of which are minimally populated. The maps also depict travel and distance as barriers to the accessibility of services and have been used to suggest a critical maximum distance for paediatric outpatient speech-language pathology services in rural New South Wales and Victoria. From the data collected, 50km was suggested as the critical maximum distance past which consumers become unable or unwilling to travel to access weekly rural speech-language pathology services in rural New South Wales and Victoria. Thus, people living in almost one third of rural localities in rural New South Wales and Victoria lie beyond what is considered by rural speech-language pathologists to be a reasonable travel distance to weekly speech-language pathology services. These results highlight barriers to the achievement of equitable services in rural areas. The results also provide an essential foundation to inform policy development and assist health service planning to meet the needs of rural consumers.
Equity of rural speech-language pathology services

Introduction

Inequity in the provision of health services in rural areas is an issue that has been documented in Australia and throughout the world (e.g., see Australian Institute of Health and Welfare (AIHW), 2005; Duplantie, Gagnon, Fortin, & Landry, 2007; Eberhardt, Ingram, & Makuc, 2001; O’Callaghan, McAllister, & Wilson, 2005; Wakerman, 2008). The World Health Organization defines equity as resources being allocated and received according to need (Braveman, Tarimo, Creese, Monasch, & Nelson, 1996). The aim of the equity objective is to achieve equal access to quality health services for equal need, regardless of consumers’ locations or socioeconomic status (Braveman et al., 1996). The term inequity is defined as a lack of equality in opportunity, treatment or status (Carter-Prokras & Baquet, 2002). It involves making a judgement about the unjust or unfair state of discrepancies between two states as opposed to simply identifying a difference between the two (Merriam-Webster Dictionary, 2009).

Three major types of barriers to achieving equity in the provision of and access to health services have been identified. These are structural, geographical and financial barriers (Alston, 2007; AIHW, 2005; Gregory, Green, & McLaren, 2008; O’Callaghan et al., 2005). The geographical barriers to health service equity are the focus of this paper. Research regarding the geographical barriers to equitable rural health care focuses on the availability of services in rural areas, access to these services and distance decay.

Availability of services
Availability of services is concerned with the actual existence of a health service in a particular location. Inequities in the availability of health services have been documented around the world. This is particularly apparent in studies which have explored the availability of medical services. For example, in Canada it is reported that 22% of the population reside in rural areas with just 10% of physicians servicing these areas (Duplantie et al., 2007). Similarly, in the United States of America, it is noted that just 9% of physicians practice in rural areas that contain 20% of the population (Eberhardt et al., 2001). Achieving equity between health services in Australia is particularly challenging, given its vast geographical landscape and sparsely distributed population (Alston, 2007). These issues have led to the centralisation of health services away from rural areas for the purpose of financial efficiency (Alston, 2007). As a result, the 35.2% of Australia’s population living outside of areas of greater than 100,000 people are faced with the challenges of inadequate health service availability (Alston, 2007). The trend of centralisation of health services has also been reported as a barrier to access for rural consumers in the UK (Mungall, 2005).

Currently, data describing the availability of speech-language pathology services in rural Australia are limited. One study, by Wilson, Lincoln and Onslow (2002), found that, while speech-language pathologists working in rural New South Wales reported providing outreach services to some outlying towns within their service areas, other towns were unserviced. In other words, local services were not always available. However, the findings of this study are limited in their generalisability, as the perspectives of only 11 speech-language pathologists were considered, all of whom were working in the same state. These data do highlight, however, the need for further
investigation and documentation of speech-language pathology service provision in rural areas.

**Accessibility of services**

While availability covers issues concerning the provision of services, issues of accessibility are concerned with consumers’ abilities to utilise these services and the barriers that impact upon this. The issue of rurality as a barrier to access has been reported in a number of developed nations. In the United States, travel and distance have been found to affect not only access to treatment, but also the types of treatment accessed by rural people (Blumenthal et al., 2002; Eberhardt et al., 2001; Meden et al., 2002). These studies reveal that a rural consumer is less likely to receive preventative treatment for illness due to the fact that they visit health care facilities less often and their health is not as closely monitored. Commonly reported geographic barriers to rural consumers accessing services include travel and distance (Blumenthal & Kagen, 2002; O’Callaghan et al., 2005).

Australian-based research by O’Callaghan et al. (2005), suggested that 63% of respondents to a questionnaire (rural parents, with a child needing speech-language pathology services), in the state of New South Wales faced problems when accessing speech-language pathology services. The most commonly reported barriers to rural consumers accessing speech-language pathology services were travel and distance barriers, waiting lists and expenses.

**Distance, distance decay and critical maximum distance.**

Distance to services presents a number of challenges to rural consumers, including socioeconomic, travel and transport barriers. Related to these is *distance decay*, a phenomenon by which the likelihood of a person accessing a service varies inversely with the distance from their home (Eyles & Woods, 1983). The trend of
distance decay has been widely discussed in the literature dedicated to understanding barriers to obtaining equity in rural health (e.g., Payne, Jarrett & Jeffs, 2000; Strauss, MacLean, & Littenberg, 2006; Wilson et al., 2002). Payne et al., (2000) in studying travel by patients with cancer, found that as distance to a service increases, travel to services can be linked to negative health outcomes such as psychological distress and reduced compliance with treatment.

However, there has been little consensus on a critical maximum distance beyond which people are unwilling to travel to access health services. This lack of consensus is because studies of distance decay have considered different health professions and services, each of which has a unique priority to consumers, thereby impacting on the distances they are willing to travel to access the service. This variation in findings is supported by Eyles and Woods (1983) who stated that a consumers’ willingness to travel to access a service is impacted by how important they perceive a service to be.

Wilson et al. (2002) reported that distance decay appears to operate in rural speech-language pathology services. Their study suggested 65km as a critical maximum distance for paediatric speech-language pathology services in rural New South Wales. However, this figure was an estimate only, which the authors suggested should be further investigated. One aim of the current study is to provide further perspective on critical maximum distances to services from the viewpoint of the rural speech-language pathologists who provide these services, and to consider the effect of service frequency on perceptions of distance decay.

**Frequency of services.**

When discussing availability of speech-language pathology services, it is important to not only consider whether a service is available to consumers but also how frequently it is available. In speech-language pathology, many of the therapies
that are provided are based on programs and/or evidence. The evidence-base for these therapies often provides a recommended frequency at which effectiveness of treatment has been measured. For example, one therapy for childhood apraxia of speech is recommended on a daily basis (Penelope, Jordan, & Robin, 2007), while phonological interventions such as Parents and Children Together (PACT) (Bowen, 1998) and stuttering interventions such as the Lidcombe Program, recommend weekly sessions with a speech-language pathologist (Bowen, 1998; Jones et al., 2008). Therefore the frequency of a service plays an important role in determining whether the service will be able to meet the needs of its clients.

**Scope and Aims of the Current Study**

Minimal research has been undertaken to determine to what extent the World Health Organization’s equity objective is being achieved by speech-language pathology services in rural Australia. However, this limited research suggests that equity in service availability and accessibility of rural speech-language pathology services is not being achieved (Wilson et al., 2002). The purpose of the current study was to contribute to what is currently known about the availability and accessibility of rural speech-language pathology services. It is important to note that the scope of this study only extends to rural New South Wales and Victoria and not all of rural Australia. In addition, it does not attempt to make comparisons with metropolitan service availability.

The data collected aimed to answer the following research questions.

1. What is the availability of publicly accessible paediatric speech-language pathology services in rural New South Wales and Victoria?
2. How frequently are these services available and how do these compare to ideal service frequencies identified by speech-language pathologists practicing in rural areas?

3. What is the critical maximum distance to services as identified by speech-language pathologists in rural areas?

Method

Ethical Approval

This research was approved by the Charles Sturt University Human Research Ethics Committee (protocol no. 2003/184) and the Charles Sturt University School of Community Health Ethics Committee (protocol no. 504/2009/03), and was conducted in accordance with the ethical standards of these committees and the Helsinki Declaration of 1975, as revised in 1983.

Informants

Informants were 74 speech-language pathologists representing rural, publicly accessible, generalist speech-language pathology services for children aged 0 to 6 years in New South Wales and Victoria. In Australia, ‘public services’ are those available in government funded facilities, such as community health centres, hospitals and early intervention services, which are usually free at the point of contact. Specialist or disability-based services were excluded due to study resource limitations. The study followed the principles of population sampling, with the aim of interviewing a representative from each publicly accessible, generalist speech-language pathology service of rural New South Wales and Victoria. The purpose of this was to produce data that could be used to describe a snapshot the overall availability of services within these states at the time of data collection. Where
possible, the most senior speech-language pathologist at each department was interviewed.

For the purpose of this study, the term rural was defined as all non-metropolitan regions. In Victoria, this encompassed all regions outside of greater Melbourne, as identified by boundaries on the Victorian Department of Human Services website (http://www.health.vic.gov.au/maps/). For NSW, the rural health regions were those defined as rural by the NSW Department of Health website in 2003 (now altered), and excluded greater Sydney, Wollongong, and Newcastle.

In all, 88 rural speech-language pathology departments were identified for participation in the study, 74 of which were recruited. This gave a response rate of 84%.

**Procedure**

**Data collection.**

Data collection for this study was undertaken as part of a larger study, between 2003 and 2006, by means of a structured telephone interview developed by the second, third and fourth authors. The telephone interviews were conducted by four qualified speech-language pathologist research officers. Interviews contained both closed and open ended questions and can be viewed at Wilson (2011).

The data that were analysed for this study were taken from questions 1 to 14 and 39 to 40 of the structured interview. These questions requested information about number and fulltime equivalent (FTE) of speech-language pathologists employed by the department, locations of base and outreach sites, service settings (e.g., hospital, community health centre, etc.), and frequency of services; along with informants’ opinions about frequency of paediatric outpatient services, and consumers’ travel
distances to access services of varying frequencies (vis. daily, weekly, monthly, and less frequently than monthly).

Each telephone interview was audiorecorded so that responses could be transcribed verbatim for later reference. This method was used to ensure a full and accurate record of data (Minichiello, Aroni, Timewell, & Alexander, 1995; Portney & Watkins, 2000).

**Data analysis.**

The data collected in the study were coded to allow for electronic presentation of results. Nominal and interval coding were used to analyse the data (Yang & Miller, 2007). These codes were then entered into a Microsoft Excel spreadsheet and stored for later data manipulation.

Before using the data to produce results, the accuracy of data coding and data entry of the entire data set was examined. Checking of data was completed by the co-authors, who re-coded data and compared their codes with the original set. Discrepancies between codes were identified on 6.7% of data points. These were discussed until consensus coding was reached and each discrepancy was resolved.

The Geocommunities Place Name Gazetteer Australia list data (2000) were used to identify the localities contained within the scope of the study. These localities were then linked with the data obtained by the study to create maps. The missing departments in the study were then identified from among these localities, and department regions were created to approximate the outreach areas covered by missing departments. This was done by using Thiessen polygon in ArcMap (Esri, 2009) to define the region of a missing department based on publicly available health data and the boundaries provided by bordering departments. Once missing department regions had been identified, the localities contained within them were removed from
the dataset. This left 13,237 localities within the regions serviced by a speech pathology department included in the study.

Data to be mapped were entered into ArcGIS ArcMap, Version 9.3.1 (Esri, 2009), a mapping program used to produce the maps which describe the findings of the research. (See Wilson, 2011 for a step by step guide to the process.) Other data are presented using tables.

Results

Description of Services

Table 1 describes the data collected regarding speech-language pathologists practising in rural areas. The data show that most departments were made up of one fulltime equivalent position, usually filled by a single speech-language pathologist (see mode figures). In fact, 26 of the 74 departments were operated by one speech-language pathologist. This equates to 35.1% of informants working as sole clinicians. Seventy four percent of departments were made up of three or fewer full-time equivalent (FTE) positions. The number of FTE speech-language pathology positions within a department ranged up to 15.

Availability of Publicly Accessible Paediatric Speech-language Pathology Services in Rural New South Wales and Victoria

Two types of sites were identified: base and outreach. Base sites are towns that have located in them a department from which the speech-language pathologist operates. Outreach sites were those with services that involve the speech-language
pathologist periodically travelling from a base site to the outlying site to provide
direct treatment (Humphreys, Matthews-Cowey, & Rolley, 1996). The provision of
outreach services requires the speech-language pathologist to travel, preferably during
work hours, to these locations. In some cases, travel to an outreach site entailed a 2-
hour journey one way, leaving 4 hours in the working day to service a community
which may receive the service only infrequently.

**Locations of paediatric outpatient services.**

The availability of paediatric outpatient services is presented in figure 1. The
availability of paediatric outpatient services was limited in many regions. Large areas
without local services were observed in western New South Wales, and north west
and eastern Victoria. Of the 13,237 rural New South Wales and Victorian localities
included in the study, 223 or 1.7% were found to have either a base or outreach
speech-language pathology service. Outpatient services made up 97.3% of base and
outreach sites identified by the study.

_______________________________________

Insert figure 1 around here

_______________________________________

Paediatric outpatient services were provided in a number of settings, including
hospitals, community health centres, preschools, homes, community centres (such as
Country Women’s Association rooms and town halls), Indigenous centres and special
needs centres. Some services operated in more than one setting within each locality.
Most services were provided from community health centres (135 of 279), but in less
populated localities a number of venues were utilised to provide a service.
Equity of rural speech-language pathology services

**Frequency of Speech-language Pathology Services and Perceptions of Ideal Frequency**

**Frequency of currently available services.**

Figure 2 depicts the frequency of services at each locality, as reported by informants. The frequency of outpatient services varied between daily and less than quarterly. Some services were provided at a certain locality only when the need arose (ad hoc), while others were delivered in outreach blocks of 10 weeks at a time. The map in figure 2 shows a large number of the services were provided less often than daily but up to and including monthly. These services are identified by the blue squares and green triangles. Most daily services, represented by pink circles, were found at base sites.

The information regarding frequency of services provided in rural New South Wales and Victoria was then used to calculate the number of localities within specified distances of services provided daily, weekly, monthly or less frequently. Table 2 presents the percentages of localities within each distance to a specified service frequency and also identifies the percentage of localities that are not within a 100km radius of any service. The data in table 2 demonstrate that the number of towns within a specified distance to a service increases as the frequency of the service decreases. However, even when considering services of any frequency, 13.5% of localities in the serviced areas of rural New South Wales and Victoria are more than 100 kilometres from a paediatric speech-language pathology service.
Insert table 2 around here

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**Ideal frequency of service.**

Informants were asked what they believed to be the ideal frequency of service for paediatric speech-language pathology services. Responses for ideal frequency ranged from daily (4.1%) to fortnightly (5.4%) but were overwhelmingly in favour of a weekly service frequency (74.3%) (with 2.7% ad hoc and 13.5% missing data). This ideal frequency was mapped against current frequencies of service to identify the number of services currently operating at the ideal frequency (see figure 3). Of the 217 paediatric outpatient services identified in the study, 116 (53.46%) were available at the ideal frequency of weekly or more often.

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Insert figure 3 around here

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**Critical Maximum Distance to Services**

**Maximum reasonable travel time to services.**

Informants were asked what, in an ideal world, they believed to be the maximum distance it was reasonable to expect rural consumers to travel when accessing a service offered daily, weekly, monthly and less frequently than monthly. Responses were given in time (82.4%), distance (10.8%) and both time and distance (6.8%). This difference in type of response became of interest in reflecting how distances to services are viewed. Given that a majority of responses were given in time, it was determined all distances would be coded according to time. Responses given in kilometres were converted to minutes at the rate of 100km/h. This conversion rate was chosen as the study aimed to find the critical maximum distance to services and
100km/h is the maximum state speed limit for driving on standard country roads, although it is acknowledged that travelling at this maximum speed is not always possible.

A range of travel time responses was given for each service frequency. A decision was made to use the mode score for each frequency in the analyses that follow as this reflected the most common perspective of informants for each question. The mode for maximum reasonable travel time to a daily service was 20 minutes; for a weekly service it was 30 minutes; for a monthly service it was 30 minutes; and for a less frequent service it was 60 minutes. The localities encompassed by informants’ recommended maximum travel times to services of each specified service frequency are presented in figure 4. This figure was developed using the network analyst tool of Arcmap 9.3.1 (Esri, 2009), which created rings of the localities within the recommended times by calculating travel time to services using road network data. These data are based on distance by road, not as the crow flies, and take into consideration road type and surface. It is important to note that the percentages are based on localities within each radius and not population data.

Figure 4a shows 20 minute radius around daily services (shaded area within ring). This time boundary incorporates 4,927 of the 13,237 or 37.2% of the localities within the serviced regions. In other words, 37.2% of rural localities in New South Wales and Victoria were within the maximum recommended travel time of 20 minutes to a daily service, leaving 62.8% of localities outside of this distance. Figure 4b (shaded area within ring) depicts the maximum reasonable travel time to a weekly and to a
monthly service (as these were the same, at 30 minutes). Using a 30 minutes radius around all identified services, 7596 of the 13 237 or 57.3% of localities were within the maximum recommended travel time to a weekly or monthly service, leaving 42.7% of localities outside of this distance.

Informants’ responses indicated that a travel time of up to 60 minutes would be reasonable for a service that needed to be accessed less often than monthly. Using this suggested travel time, a radius around currently available rural paediatric speech-language pathology services of this frequency reveals that 11 226 of 13 237 or 84.8% of localities fall within the maximum reasonable travel time for a service required less than monthly (see shaded area within ring in Figure 4c). However, some rural consumers would be required to travel much longer than 60 minutes to access an outpatient paediatric speech-language pathology service.

**Maximum reasonable distance to services.**

Although most informants responded to questions about reasonable travel expectations with times rather than distances, the data were also analysed using the parameter of distance. This was done in order to be consistent with the literature in this area, much of which addresses this concept using distance as the relevant parameter. Times were converted to distances using the assumption of 100km/hr. These data are available online, as supplementary materials at www.informahealthcare.com/ijslp. (S1,S2,S3,S4)

**A critical maximum distance to speech-language pathology services.**

The maximum recommended travel time (30 minutes), as perceived by informants, for the ideal frequency of paediatric outpatient services (weekly), was used to determine the critical maximum distance. This time was converted to kilometres at a speed of 100km/h, which is the state limit for both New South Wales and Victoria.
This calculation arrived at a critical maximum distance of 50km for rural paediatric outpatient speech-language pathology services. Figure 5 depicts the localities that are within and beyond this critical maximum distance to a weekly speech-language pathology service.

When considering 50km as a critical maximum distance to a weekly paediatric speech-language pathology service, 9,359 of the 13,237 or 70.7% of localities within the regions included in the study are deemed to be within this radius: 29.3% localities fall outside of this distance.

**Discussion**

The availability of rural speech-language pathology services is influenced by availability of speech-language pathologists in rural areas. Informants from the study by Wilson et al. (2002) believed that rural clinicians faced personal and professional challenges that differed from their urban counterparts. Professional issues that arise from being a sole clinician (35.1% of all informants) include feelings of professional isolation, fatigue and stress, heavy workloads, lack of professional support, little opportunity for continuing professional development and limited access to resources and equipment (Duplantie et al., 2007; Kurzydlo, Casson, & Shumack, 2005). These issues are known to have implications for the ability to recruit and retain health professionals to rural areas (Denham & Shaddock, 2004; Duplantie et al., 2007); and the inability to retain a rural workforce in speech-language pathology creates a significant challenge to achieving the equity objective of equal access for all (O’Callaghan et al., 2005). The fact that a high proportion (35.1%) of rural speech-
language pathology departments in the current study were made up of sole clinicians suggests that availability of rural services is likely to be strongly affected by recruitment and retention issues.

It is acknowledged that in recent times, a number of alternatives to accessing a specialist practitioner are being explored internationally, including the use of telehealth and generalist health professionals. However, research investigating the efficacy of non-traditional service delivery models is in its infancy.

**Availability of Publicly Accessible Paediatric Speech-language Pathology Services in Rural New South Wales and Victoria**

**Locations of paediatric outpatient services.**

The results of this study found that just 1.7% of localities have a base or outreach speech-language pathology service. Consumers living in other localities would therefore need to travel to access services. It is acknowledged that some localities have a minimal population and that some departments could not be represented, given the missing data in the study. Nevertheless, this number represents an extremely low percentage of localities with an available, local paediatric speech-language pathology service. The implications of not having an available local service upon accessibility are determined by the frequency with which the service is required and the distance consumers are required to travel to access the service.

The range of settings of the outpatient services suggested that, while some rural localities receive a service, speech-language pathology rooms may not exist for the provision of services. Subsequently, speech-language pathologists are providing services in makeshift venues such as town halls and community centres. Thus, they may not have adequate access to resources such as therapy tools, standardised
assessments, toys and games for play assessments, computers and the internet. This requires speech-language pathologists to either transport these resources from location to location, or operate the service without them. The implication of this issue with regards to the equity objective is that outreach services may not always be able to provide a level of care that is equitable with that provided in other locations.

**Frequency of Speech-language Pathology Services and Perceptions of Ideal Frequency**

**Frequency of currently available services.**

Information about service frequency is essential in determining whether a service meets the needs of its clients. For a service to be adequate, it must be available to clients at the required frequency for their specific need (Braveman et al., 1996). The recommended frequency for many outpatient speech-language pathology interventions is at least weekly (Bowen, 1998; Penelope et al., 2007; Jones et al., 2008). Just over 50% of outpatient paediatric speech-language pathology services identified in this study were available at this frequency. Even if a local service is available, it may or may not be available at the frequency required by the individual consumer. Thus further consideration of frequency of service is required.

**Ideal frequency of service.**

Previous speech-language pathology research has used a number of terms to describe the availability of rural speech-language pathology services. Wilson et al. (2002) classified towns as having either a frequent service (at least one day per fortnight), a limited service (underserviced), or being without a service (unserviced). In the context of the current study, these terms have been re-defined: all rural localities within New South Wales and Victoria were classified as either: (a) serviced
– (i.e. serviced at the suggested frequency); (b) underserviced –
(i.e. serviced, but less frequently than the suggested frequency); and (c) unserviced –
(i.e. not serviced at all).

This re-definition of terms is related to the concept of ideal frequency of
paediatric speech-language pathology services, as perceived by informants. The
findings of this study show that 0.75% of localities are serviced at the ideal frequency
of weekly or more often, another 0.65% are underserviced, and 98.60% are
unserviced. It is important to note that these percentages include all localities in the
represented rural areas of New South Wales and Victoria, some of which are
minimally populated. However, some people living in these areas will need a weekly
speech-language pathology service. If a weekly service is not available locally,
accessibility then depends on their ability or willingness to travel to a weekly service.

**Maximum Reasonable Travel Time to Services.**

It is acknowledged that not all localities can have a local service of the required
frequency and that some amount of travel to services is reasonable. It is also
acknowledged that the distance deemed reasonable for travelling to services depends
on how frequently the service is required. However, these data suggest that people
living in almost one third of rural localities in rural New South Wales and Victoria lie
beyond what is considered by rural speech-language pathologists to be a reasonable
travel distance to weekly speech-language pathology services. However, these figures
may understate the number of localities beyond the reasonable travel distance to
services: The lack of public transport in rural areas (Senate Rural and Regional
Affairs and Transport Committee, 2009) may make travel time to services longer for
consumers without access to a car.
One of the main aims of this study was to determine a critical maximum distance to outpatient paediatric speech-language pathology services in rural New South Wales and Victoria. From the data collected, 50km was suggested as the critical maximum distance past which consumers become unable or unwilling to travel to access weekly rural speech-language pathology services in rural New South Wales and Victoria.

Wilson et al. (2002) suggested a critical maximum distance of 65km to a frequent outpatient speech-language pathology service. This is the only recommendation of its kind in the Australian literature. Wilson et al. (2002) similarly focussed on paediatric services in rural New South Wales and findings were based on data gathered from speech-language pathologists servicing rural populations.

However, there are a number of differences between the present study and the study by Wilson et al. (2002). With regards to frequency, Wilson et al. (2002) determined a critical maximum distance on the basis of a consumer needing to access a service fortnightly. In contrast, the data gathered in this study, and the literature reviewed, suggested that the perceived ideal frequency of service for many paediatric speech-language pathology outpatients is weekly. Therefore, the critical maximum distance suggested by the current study was based on a weekly need for speech-language pathology services. Also, the number of informants in the two studies was increased from 11 to 74, meaning that a more diverse range of perspectives from speech-language pathologists working in localities across the two states was able to be incorporated into the formation of a critical maximum distance. The current study also provided geographical data regarding availability and accessibility of rural speech-language pathology services, in addition to the perceptions of speech-language pathologists.
The findings of this study reveal that the equity objective for rural speech-language pathology services in New South Wales and Victoria has not been achieved. Equity refers to equal access for equal need. This objective has been considered with regards to availability of services, frequency of services, and travel time and distance required to access services. What has been found is that there is a deficit in the number of outpatient paediatric speech-language pathology services available in rural areas, as well as a lack of available services provided at the required frequency to meet the needs of rural consumers. It has also been found that a large number of localities are outside of what is deemed to be a reasonable travel time and distance to services. The implications of these findings affect both the consumer and the speech-language pathologists providing these services.

For the consumers living in 98.3% of rural localities without an available local speech-language pathology service, travel is a requirement of accessing a service. This leads to a number of issues that impact upon their ability to utilise a service. These issues could include cost of travel, time for travel, cost of missing work to attend services, and inability to attend as frequently as required (Meden, St. John-Larkin, Hermes, & Sommerschield, 2002; O’Callaghan et al., 2005; Senate Rural and Regional Affairs and Transport Committee, 2009; Strauss et al., 2006). These issues can also impact upon the quality of the service received. For example, a child may become fatigued from travelling and be too tired for therapy when arriving at the service, meaning that a speech-language pathologist may need to implement therapy alternatives such as home programs which, in some cases, are sub-optimal. Other related challenges for speech-language pathologists when trying to implement the equity objective include long travel times to outreach sites, limited resources, time
taken for agent training, and limited time to meet the demands of servicing large catchment areas (Wilson et al., 2002).

It is important to acknowledge that the inequities found in rural areas do not reflect any fault by the speech-language pathologists working in these areas. In order for service provision to be effective it must also be addressed at the level of planning and funding of resources. This planning must address the needs of consumers in order to be successful in achieving the equity objective.

The data from the current study suggested that time is a more valid construct than distance for measuring travel to a service. By looking at time to a service rather than distance, rural service access becomes comparable to that of urban areas. However, the literature regarding urban travel barriers to services highlights transportation but not travel time (Ahmed, Lemkau, Nealeigh, & Mann, 2001). From this it can be suggested that, even if travel times to services are the same for urban and rural areas, only those in rural areas perceive time to be a barrier. The difference between these studies is difficult to reconcile. Nevertheless, the current findings suggest that travel time is a more valid construct than distance to measure travel in the context of rural service provision.

**Limitations and Suggestions for Further Research**

The findings of this study are not without their limitations. Firstly, findings regarding reasonable distances for travel to services are based only on the regions included in the study. Some of the missing data regions contain vast land masses and sparsely distributed localities. If these were included in the calculations presented, the data may be significantly different. In addition, how these data, based as they are on rural New South Wales and Victoria, reflect perceptions of travel in other Australian states is unknown.
It is also important to note that the data used in the formulation of a reasonable maximum distance for rural consumers travelling to access services were obtained from speech-language pathologists. These data may not reflect the actual behaviour of rural populations. In addition, these geographic data ignore the important issue of transport, a factor known to impact on accessibility of health services in rural areas (Meden et al., 2002; Senate Rural and Regional Affairs and Transport Committee, 2009). Even when consumers live within a reasonable travel time or distance of a required service, lack of appropriate transport may impede their ability to access that service. Thus, these data are likely to understate the difficulty consumers face in accessing speech-language pathology services.

In addition, the health workforce is not stagnant and therefore concrete, up-to-date evidence about the workforce and services is difficult to obtain. In the time since collecting data, changes to staffing, services and health service boundaries may have occurred. Therefore, these data may not reflect the current state of rural speech-language pathology service provision. Nevertheless, they reflect the first attempt to systematically document rural speech-language pathology service provision.

While the current study presented data that gives new insight into rural paediatric speech-language pathology service availability, accessibility and frequency, further research is still required. The data relate to rural New South Wales and Victoria but little is known about frequency and distribution of paediatric speech-language pathology services in the rural areas of other states and territories. As well as this, currently no data regarding the availability and frequency of adult speech-language pathology services in rural Australia have been published, although research in this field by Smith-Tamaray, Wilson and McAllister (in preparation) is currently in progress. Further research in this area might also seek to add to the discussion about a
critical maximum distance for speech-language pathology services. This could be
done by gaining consumers’ perspectives about travel time and by researching the
behavioural patterns of rural consumers’ utilisation of speech-language pathology
services. Given the findings of this study, it would be recommended that future
research be based on travel time to services, as it has been found to be a more valid
construct than distance and would allow comparison between rural and urban
accessibility.

Also it is important to note that the data presented with regards to critical
maximum distance are based on number of localities. How this relates to population
has not yet been explored. Further research could use population based data to
identify the extent of need in rural areas in terms of people affected. The need for
paediatric speech-language pathology could also be explored by comparing the
prevalence of childhood communication disorders in rural areas with the availability
of local speech-language pathology services to determine the impact of speech-
language pathology intervention.

Finally, the findings of this study provide valuable information for the planning
and funding of rural speech-language pathology services. At the micro level, the
conceptual approach taken could provide a framework upon which to base discussions
regarding the improvement of individual department planning. For example, speech-
language pathologists could consider these findings with regards to their own service
areas and determine whether localities are within a distance of 50km of a frequent,
preferably weekly, service. If this is not the case, these data provide guidelines for
geographically restructuring services to ensure that the resources available are being
used in the best possible way. This would enable departments to maximise the
availability and accessibility of their services to consumers. This would be a positive
step towards achieving the equity objective in rural speech-language pathology services in Australia.

At the macro level, the data presented can be used for advocacy, to inform policy, and to assist health service planning. The research has also shown that applying geographic concepts to analysis of service provision can lead to the generation of powerful data. With the concept now demonstrated, this methodology could be applied to research in both national and international contexts.

Acknowledgements

The authors would like to acknowledge Lucie Shanahan, who assisted with the development of the structured interview schedule used for data collection. We would also like to acknowledge and thank the 74 rural speech-language pathologists who participated in the research and the researchers who undertook data collection. Thanks are also due to Simon McDonald from the Spatial Analysis Network at Charles Sturt University, who trained and supported the first author to use the ArcGIS software. We also wish to thank the peer reviewers of this paper for their valuable feedback. This research was partially funded by a Community of Scholars grant from Charles Sturt University, for which the researchers are grateful.
References


Table 1

*Number of Speech-language Pathologists Working in Publicly Accessible Paediatric Services in Rural New South Wales and Victoria*

<table>
<thead>
<tr>
<th>Location</th>
<th>Fulltime equivalent jobs</th>
<th>Number of speech-language pathologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>84.9</td>
<td>108</td>
</tr>
<tr>
<td>Victoria</td>
<td>82.2</td>
<td>98</td>
</tr>
<tr>
<td>Total</td>
<td>167.1</td>
<td>206</td>
</tr>
<tr>
<td>Average no. per service</td>
<td>2.3</td>
<td>2.8</td>
</tr>
<tr>
<td>Mode(^a)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

\(^a\) Most frequently reported number of fulltime equivalent positions and speech-language pathologists per service.
Table 2

Percentage of Localities Within Specified Distances of Services of Various Frequencies

<table>
<thead>
<tr>
<th>Distance to service</th>
<th>Service frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily or more frequent</td>
</tr>
<tr>
<td>≤ 25km</td>
<td>16.9%</td>
</tr>
<tr>
<td>≤ 50km</td>
<td>39.6%</td>
</tr>
<tr>
<td>≤ 65km</td>
<td>51.1%</td>
</tr>
<tr>
<td>≤ 100km</td>
<td>73.7%</td>
</tr>
<tr>
<td>&gt;100km</td>
<td>26.3%</td>
</tr>
</tbody>
</table>
Figure captions

*Figure 1.* Availability of rural paediatric outpatient speech-language pathology services.

*Figure 2.* Frequency of rural paediatric speech-language pathology services.

*Figure 3.* Frequency of services: Actual vs. ideal.

*Figure 4.* Maximum reasonable travel times to daily, weekly, monthly and less frequent services.

*Figure 5.* Proposed critical maximum distance to rural paediatric speech-language pathology services.
SUPPLEMENTARY MATERIAL

**Maximum Reasonable Distance to Services**

The localities within and beyond specified (25, 50, 65 and 100 kilometres (km)) travel distances of daily, weekly, monthly and less frequent services are depicted in figures S1 to S4 respectively. Table S1 presents the percentages of localities within each distance to the specified service frequencies, along with the percentage of localities beyond a 100km radius of any service.

Insert table S1 around here

Figure S1 shows the rural localities that are within the specified distances of a daily service. It can be seen from this figure that consumers from a vast number of localities must travel greater than 65km to access a daily service. Figure S2 identifies rural localities within the specified distances to a weekly or more frequent service. It can be seen that more weekly services are available than daily services, and therefore more localities are encompassed within the 100km radius to a weekly service. However, there are still a large number of grey dots identified on the maps, representing towns without a service within 100km. These are especially evident in western New South Wales and north western and north eastern Victoria.

Insert figures S1, S2, S3 & S4 around here

Figure S3 shows localities within the specified distances to a monthly or more frequent service, while figure S4 shows localities with the specified distances of a service of any frequency. In these figures, it can be seen that the service gaps in Victoria have become significantly smaller. However, there are still a large number (14.0% and 13.5%) of
localities, particularly in western New South Wales, which are more than 100 kilometres from a paediatric speech-language pathology service.
Table S1

*Percentage of Localities Within Specified Distances of Services of Various Frequencies*

<table>
<thead>
<tr>
<th>Distance to service</th>
<th>Service Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily or more</td>
</tr>
<tr>
<td></td>
<td>frequent</td>
</tr>
<tr>
<td>≤ 25km</td>
<td>16.9%</td>
</tr>
<tr>
<td>≤ 50km</td>
<td>39.6%</td>
</tr>
<tr>
<td>≤ 65km</td>
<td>51.1%</td>
</tr>
<tr>
<td>≤ 100km</td>
<td>73.7%</td>
</tr>
<tr>
<td>&gt;100km</td>
<td>26.3%</td>
</tr>
</tbody>
</table>
Supplementary figure captions

Figure S1. Localities within specified distances of a daily service.

Figure S2. Localities within specified distances of a weekly or more frequent service.

Figure S3. Localities within specified distances of a monthly or more frequent service.

Figure S4. Localities within specified distances of a service of any frequency.