

Identifying maternity services in public hospitals in rural and remote Australia

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Abstract

Objective. This paper articulates the importance of accurately identifying maternity services. It describes the process and challenges of identifying the number, level and networks of rural and remote maternity services in public hospitals serving communities of between 1000 and 25 000 people across Australia, and presents the findings of this process.

Methods. Health departments and the national government's websites, along with lists of public hospitals, were used to identify all rural and remote Australian public hospitals offering maternity services in small towns. State perinatal reports were reviewed to establish numbers of births by hospital. The level of maternity services and networks of hospitals within which services functioned were determined via discussion with senior jurisdictional representatives.

Results. In all, 198 rural and remote public hospitals offering maternity services were identified. There were challenges in sourcing information on maternity services to generate an accurate national picture. The nature of information about maternity services held centrally by jurisdictions varied, and different frameworks were used to describe minimum requirements for service levels. Service networks appeared to be based on a combination of individual links, geography and transport infrastructure.

Conclusions. The lack of readily available centralised and comparable information on rural and remote maternity services has implications for policy review and development, equity, safety and quality, network development and planning. Accountability for services and capacity to identify problems is also compromised.

What is known about the topic? Australian birthing services have previously been identified for hospitals with 50 or more births a year. Less is known about public hospitals with fewer than 50 births a year or those with only antenatal and postnatal services, particularly in rural and remote locations, or how maternity services information may be identified from publicly available sources.

What does this paper add? This paper describes the process and challenges of identifying maternity services in rural and remote public hospitals serving towns of between 1000 and 25 000, and presents the findings of this process.

What are the implications for practitioners? Nationally accessible, reliable and comparable information is important for health planners, policy makers and health practitioners. This paper provides useful information on the variations in the capability and location of maternity services across Australia. Opportunities exist for consistent collection, collation and reporting of maternity services across rural and remote Australia. This will ensure quality and safety of services, contribute to policy review, support the development and maintenance of service networks, and assist in planning services and expenditure, as well as in the identification of problems. It is therefore key to providing equitable services across the country.

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Introduction

Accurate, reliable and current information on the location, level and networks of maternity services is fundamental to planning and delivering appropriate and effective maternity services. Currently, there is limited publicly available information on the location, level and networks of hospital maternity services across Australia, except for higher-level services. These are self-evidently located in cities and manage larger throughputs and more complex patients. This paper addresses the more problematic area of information about rural and remote services.

Homer *et al.*¹ articulate several reasons why accurate information on maternity service location, level and network is required, which we have expanded upon here. These are: (1) ensuring quality and safety of services, for example by identifying variation in services and outcomes across and between jurisdictions; (2) identifying problems, for example gaps where there are populations and no services, duplication of services, or where there are services that people cannot or do not access; (3) policy review, for example to establish whether Australia's National Maternity Services Plan² has been successful in its aims; (4) to contribute to network development and maintenance, such as ensuring providers understand one another's services and the limitations of those services, including accurately describing the relationships between lower- and higher-level services, and ensuring that referral pathways are appropriate (note, a network is defined here according to Goodwin *et al.*³ as a 'moderately stable' set of associations representing some degree of accountability between organisations and individuals); and (5) for planning services at both operational and strategic levels, including state-wide services, such as neonatal transfer services, and for planning expenditure (in Australia jurisdictions pay for services and therefore have to know which services are delivered where to ensure accountability).

Carefully planned maternity services improve responsiveness to need and ensure equitable and sustainable service delivery.^{4,5} The National Maternity Services Plan demonstrates a commitment to offering services that meet the needs of communities in rural and remote locations, including locating services close to where people live.² The plan identified the need for a rigorous methodology to assist in future planning for maternity care, including for rural and remote communities. A comprehensive review of the published literature identified one Australian study that documented birthing services,¹ but no planning tools that could assist with maternity services planning, other than a Rural Birthing Index from Canada.⁶ The grey literature contained reports of health service mapping exercises, although these were

in aged care and mental health. The grey literature also contained tools to assist maternity service planners in the form of capability frameworks or role delineation frameworks in South Australia,⁷ New South Wales (NSW),⁸ Western Australia,⁹ Victoria¹⁰ and Queensland,¹¹ and the recently developed National Maternity Services Capability Framework.¹² These are useful frameworks in that they describe levels of service, but cannot support planners and policy makers in deciding what level of service should be provided.

The urgency of providing such a tool for planning is underscored by substantial maternity service closures across rural Australia in recent years without evidence or a consistent rationale.^{13–16} In the past 15 years, 158 maternity facilities with fewer than 500 births per annum have been closed, the majority of these (130) in rural areas.^{2,17,18} At the same time there have been repeated reviews demonstrating hardship to women and families related to having to travel for maternity services.^{2,14,17,19–21} Recent Australian research has also highlighted that some remote living women and families actively avoid maternity service provision based a long distance from their homes because of the increased levels of social and cultural risk attached to birth.²⁰

More generally, over the past half a century there has been a trend towards the closure of rural and remote health services, not just maternity services, both in Australia and internationally.^{22–26} The benefits of this are argued to be increased efficiency and cost-effectiveness.^{24,27,28}

Our team is currently developing a tool to support planning rural and remote maternity services, based on the Canadian index.⁶ The first stage of development required detailed information on the location, level and networks of rural and remote services. This paper describes the process and challenges of identifying maternity services in rural and remote public hospitals serving towns of between 1000 and 25 000, and presents the findings of this process.

Methods

We started in 2012 by identifying public hospitals in Australia in populations of between 1000 and 25 000 with maternity services, and numbers of births.

Several sources of information were used to generate a comprehensive list of public hospitals. Jurisdictional Health Department web pages provided initial lists of 'rural' public hospitals, although these were defined differently for each jurisdiction. Public hospitals were also identified from the MyHospitals website.²⁹ These were reviewed against the Australian Institute of Health and Welfare's list of public hospitals for

2009–10.³⁰ Our findings were verified and supplemented by information from senior contacts in jurisdictions.

We defined public hospitals as rural or remote if they were in locations with an Australian Standard Geographical Classification Remote Area score³¹ of 2–5 (where 1 was ‘major city’, 2 was ‘inner regional’, 3 was ‘outer regional’, 4 was ‘remote’ and 5 was ‘very remote’).

Identifying public hospitals serving small (i.e. populations of 1000 or more) rural and remote towns was a challenge because population catchments for hospitals are difficult to define.³² We estimated population catchment as the Urban Centre and Locality (UCL) in which each hospital was located, gathered from the Australian Bureau of Statistics (ABS) 2006 Census (<http://www.abs.gov.au/websitedbs/censushome.nsf/home/census?opendocument&navpos=10>, verified 1 April 2014). The UCLs are groups of one or more contiguous whole census collection districts.³³ The UCL was used because it was publicly available for all jurisdictions and offered a simple assessment of ‘town’ (usually where the hospital is located) population.

In 2012, the Maternity Services Inter-Jurisdictional Committee, on behalf of the Australian Health Ministers’ Advisory Council, published the National Maternity Services Capability Framework¹² describing minimum standards for maternity services. We defined maternity services as any service providing at least a Level One service (antenatal and postnatal care only) according to the National Maternity Services Capability Framework (see Table 1). To identify hospital maternity services, we used published perinatal data and compared our list of hospitals against the Australasian Maternity Outcomes Surveillance System’s (AMOSS; a national system of surveillance) list of hospitals with more than 50 births providing a return to AMOSS.³⁴ Hospitals on our list were also checked against the

MyHospitals website²⁹ to ascertain whether they were listed as providing obstetric services. This is defined as ‘whether or not a specialised facility dedicated to the care of obstetric/maternity patients is provided within an establishment, as represented by a code’.³⁵ The MyHospitals website is provided by the Australian government and was launched in December 2010. Because data on hospitals are susceptible to change, we also used Internet sites for individual hospitals as a further check.

Jurisdiction perinatal reports were consulted to establish numbers of births by hospital. The average annual number of births from calendar years 2005–09 (financial years for Western Australia) was calculated for each hospital.

Identifying level of maternity services

To categorise the level of maternity service we used the National Maternity Services Capability Framework, which has six levels of maternity service describing minimum requirements for each level. A simplified version is given in Table 1.

Information on the level of individual services was not generally publicly available and had to be sourced through senior jurisdictional contacts and individual hospitals. Most jurisdictions had their own capability framework. These frameworks usually described six levels of maternity service. Level descriptors varied between these frameworks. Initially, all levels of maternity services were identified using the jurisdictional frameworks. We then correlated the jurisdictional levels with the National Maternity Services Capability Framework levels. Using the national levels of maternity service provided a common understanding of service provision and circumvented the problems associated with the naming conventions of facilities.

Identifying service networks

We identified service networks based on publicly available information contained in any health service policy directives available and from our senior jurisdictional contacts. Where this information was unavailable, we chose the simple mechanism of identifying nearest (in terms of road travel time) same and higher level hospitals to estimate the network that makes up a service.³⁶ For illustrative purposes, Fig. 1 offers a representation of the maternity services network in Queensland.

Results

In 2009, 294 540 women gave birth in Australia; of these approximately 30% resided in rural and remote locations³⁷ and 3.8% of women who birthed in 2009 identified as Aboriginal or Torres Strait Islander. The birth rate (births per 1000 population) for rural and remote locations with populations between 1000 and 25 000 ranged from an average of 12.8 in 2006 to 13 in 2010. Remote areas (15.5 in 2006; 17.4 in 2010) had a higher rate than rural areas (12.2 in 2006; 12.1 in 2010).

Nationally, 198 rural and remote public hospitals providing maternity services were identified and 139 of these (Levels Two to Five) provided birthing services. The aggregated national and state level results from the study are presented in Tables 2 and 3. These demonstrate that, across rural and remote Australia, the proportion of Level Two services (normal birthing) appears small (18%). In contrast, almost half (44%) of all rural and remote hospital maternity services were at Level Three of the National Maternity Services Capability Framework (where mother and

Table 1. Simplified description of levels of service in the National Maternity Services Capability Framework
GPs, general practitioners

Level	Simplified description
One	Antenatal and postnatal care only Midwives and GP obstetricians
Two	As for Level One plus birthing Midwife led with access to GPs with advanced obstetric training Mother and baby have normal care needs Babies at ≥ 37 weeks gestation
Three	As for Level Two plus emergency and elective Caesarean section (often by GPs with advanced obstetric training)
Four	As for Level Three, but where mother and baby have normal to moderately complex care needs Includes all staffing and facilities to care for babies delivered at ≥ 34 weeks gestation
Five	As for Level Four, but where mother and baby have normal to highly complex care needs Includes all staffing and facilities to care for babies delivered at ≥ 32 weeks gestation
Six	The most specialised maternity service (including neonatal intensive care) with workforce, clinical support services, and networks and integration to support women and babies with the most complex care needs Only located in cities

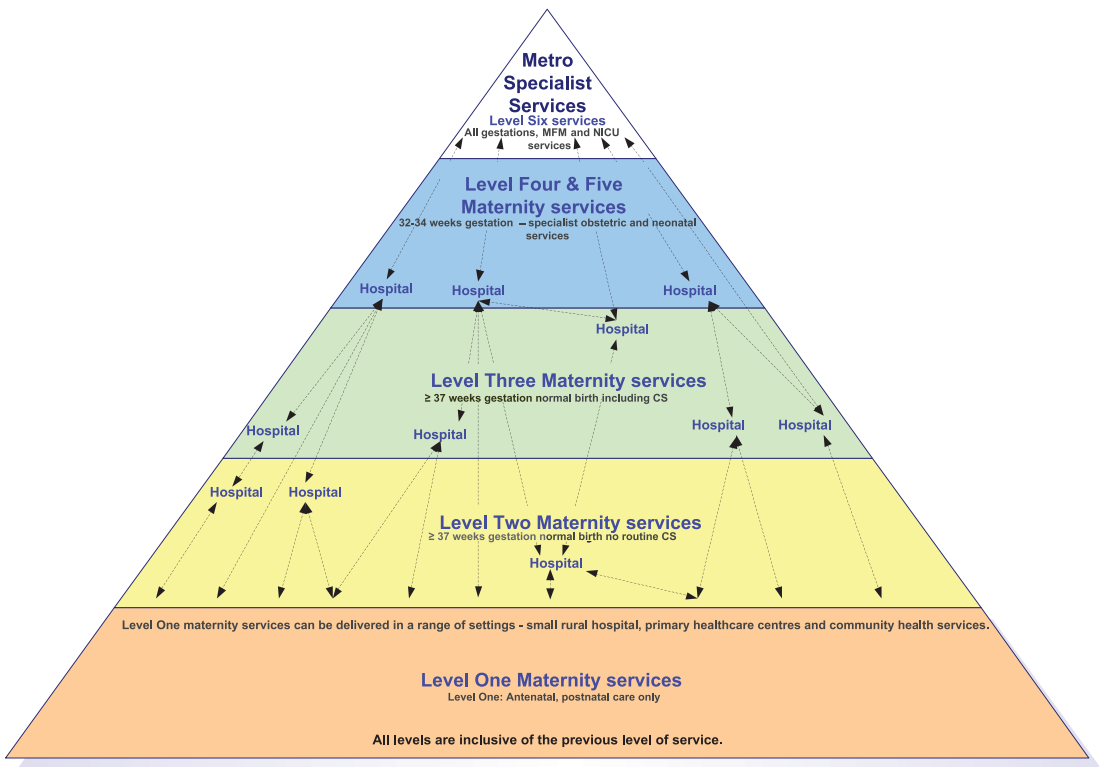


Fig. 1. Representation of a maternity services network in Queensland. MFM, maternal fetal medicine; NICU, neonatal intensive care unit; CS, Caesarean section.

Table 2. Public hospitals with maternity services in rural and remote Australia located in urban centres and localities with populations of 1000–25 000
NMSCF, National Maternity Services Capability Framework; NSW, New South Wales; NT, Northern Territory; SA, South Australia; WA, Western Australia

NMSCF level ^A	Number of hospital maternity services							Nationally ^B
	NSW	Victoria	Queensland	SA	WA	NT	Tasmania	
One	0 ^C	6	30	14	3	1	5	59 (30%)
Two	9	14	2	3	7	0	1	36 (18%)
Three	24	15	19	20	7	2	0	87 (44%)
Four	4	2	1	1	2	1	1	12 (6%)
Five	0	3	1	0	0	0	0	4 (2%)
Total	37	40	53	38	19	4	7	198

^ALevels of maternity services range from One to Six. Generally, Levels Four and Five services, and always Level Six services, are located in large population centres and hence do not meet the inclusion criteria of hospitals serving populations of between 1000 and 25 000. The population parameters also exclude many Level One services, which serve populations of <1000 (e.g. in the NT).

^BThere are two public hospitals in the Australian Capital Territory with births (one at Level Five and one at Level Six); both have a Remote Area score of 1 and are therefore not classified as rural or remote.

^CNSW has no Level One services because the information we had access to was based on the NSW Role Delineation Framework descriptors for hospitals that described Level One as postnatal only. Therefore, these hospitals did not classify as offering Level One services according to the NMSCF.

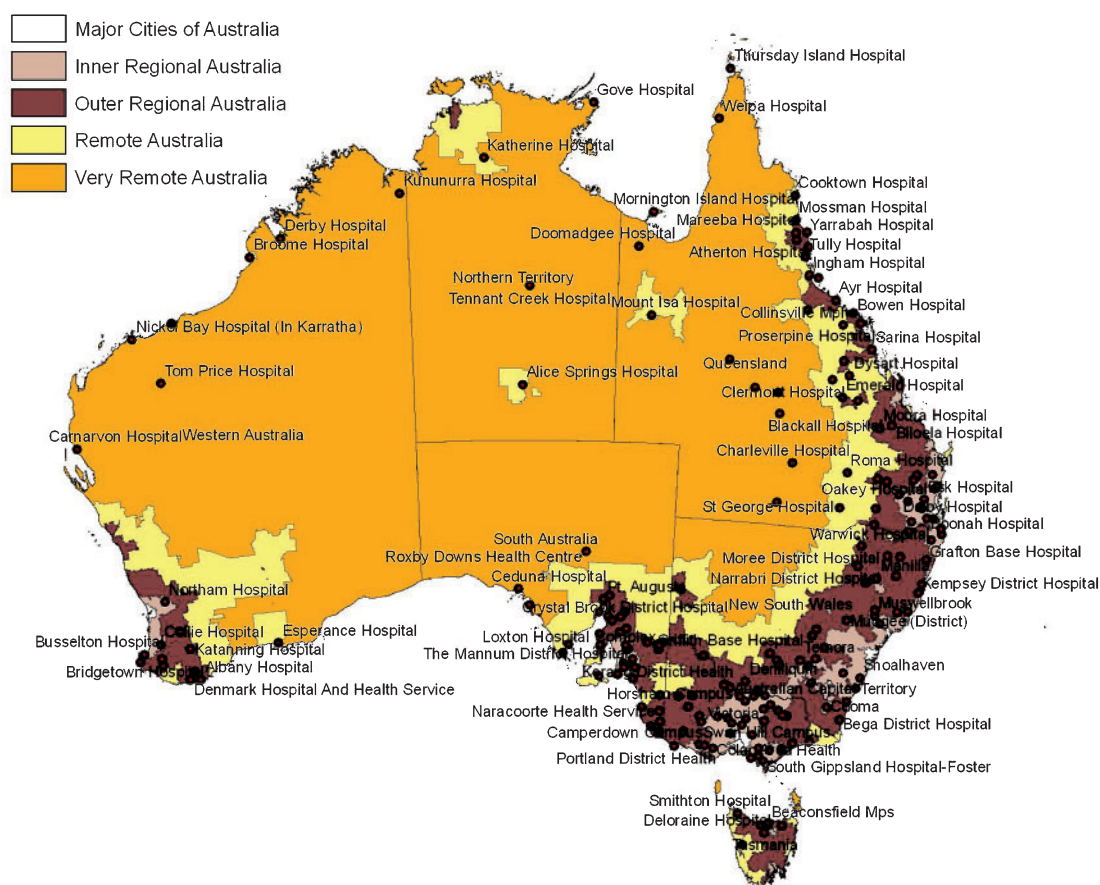
baby have normal care needs, babies are ≥ 37 weeks gestation and the service includes emergency and elective Caesarean section, often by GPs with advanced obstetric training). Victoria and NSW had the largest numbers of high-volume birthing services (>300 births per year) reflecting population density in these states.

Only 33 of the 198 (17%) public hospital maternity services identified were in remote or very remote areas (i.e. with a Remote Area score of 4 or 5). Of these 33 services, 14 (42%) were Level One services (i.e. no births), three had 50 or fewer births, four had 51–100 births, one had 101–150 births, three had 151–100 births, three had 201–250 births, one had 251–300 births and four had

Table 3. Rural and remote public hospital maternity services serving populations of between 1000 and 25 000 by births category (annual average 2005–09) by state

Birthing numbers per year	Number of hospital maternity services							Nationally
	NSW	Victoria	Queensland	SA	WA ^A	NT	Tasmania	
Not birthing	0	6	30	14	3	1	5	59 (30%)
≤50	2	5	1	6	1	0	1	16 (8%)
51–100	4	9	5	6	4	0	0	28 (14%)
101–150	8	6	5	3	3	0	0	25 (13%)
151–200	9	1	2	2	2	1	0	17 (9%)
201–250	3	4	3	1	4	0	0	15 (8%)
251–300	2	1	3	3	0	0	0	9 (5%)
>300	9	8	4	3	2	2	1	29 (15%)
Total	37	40	53	38	19	4	7	198

^AFor financial years 2005–09 (all other states and territories are calendar years).

**Fig. 2.** Location of rural and remote maternity services in Australia.

more than 300 births per year (averaged over 5 years from 2005 to 2009).

The location of maternity services in rural and remote Australia is shown in Fig. 2.

Data collection challenges

There were challenges in accessing comprehensive, current, reliable and accurate information about rural and remote maternity services, births, levels of service and service networks. There was significant variability between jurisdictions both in regard to

the type of information readily available and the jurisdictional frameworks that described levels of service.

Identifying rural and remote hospitals was complicated by variability of nomenclature between states (what counts as a 'hospital' differs from state to state), changes in hospital names and hospitals known by more than one name. It was challenging to establish which hospitals offered a maternity service at one time point because the date of data in perinatal publications varied between jurisdictions and website information may not have been current.

Perinatal reports varied in the level of detail on numbers of births. For example, the NSW Mothers and Babies publication³⁸ only reported hospitals with 200 or more births.

Obtaining information on the level of service was particularly challenging. Most jurisdictions had their own capability framework defining levels of services, which differed across jurisdictions. In some jurisdictions, level of service was publicly available for a subset of services only; in others it was possible to infer level from information publicly available. In some cases we drew on senior jurisdictional contacts for the information and in others the information was not held by the jurisdiction and was therefore sought by communicating with individual services by telephone or email.

In some cases the 'translation' between jurisdictional capability frameworks and the National Maternity Services Capability Framework was not simple. In NSW, for example, the level of service provided was in reference to the NSW Role Delineation,⁸ which defined the level of the facility rather than the service and had Levels Zero to Six rather than Levels One to Six. These challenges were resolved in consultation with senior jurisdictional contacts.

Level of maternity service in any particular hospital can vary, sometimes on a week-by-week basis. For example, some Level Two services could be described as a Level Three on particular days given workforce availability. Hospitals self-assessing their level of maternity service may also be difficult, with individuals claiming aspirational levels for their service.

Inevitably, some hospitals did not meet the criteria for any of the levels in the National Maternity Services Capability Framework (e.g. a hospital conducting elective but not emergency Caesarean sections and offering postnatal care but no antenatal care). These cases were unusual, but highlighted some of the difficulties of applying a capability framework nationally.

Establishing how services were networked using publicly available sources was challenging from a national viewpoint, although this information was readily available at local level. In searching for network information it became apparent that networks were dependent on the following patterns or principles: (1) individual links, both historical and personal (i.e. links between individual clinicians across hospitals); (2) historical precedence; (3) services that were geographically nearest (e.g. Broken Hill hospital was networked with a Level Six maternity service in Adelaide even though it was in a different jurisdiction); (4) transport availability; (5) ease of travelling from one place to another (e.g. road network, a river obstructing the route etc.); and (6) personal choice (i.e. where women chose to go, which may have been different to the formal or informal network between hospitals; this was assumed to be small numbers of women). This is overlaid by pragmatic considerations on the day, such as where there may be bed availability, exactly what the issue was with the mother or the baby and, on occasion, the weather (e.g. when flooding may render a road impassable).

Discussion

Identifying public hospitals in rural and remote Australia with maternity services using publicly available data was a complex and time-consuming exercise. Establishing the level of those services and how those hospitals were networked was particularly

difficult. This was due, in part, to data not being held at jurisdictional level and the fluidity of levels and networks, which were sensitive to changes in workforce, and local planning decisions to close, open, move or change services. Others have also commented on difficulties in accessing accurate, timely and consistent maternity services data across jurisdictions.^{1,39}

Given these caveats, we identified 198 public hospitals in rural and remote Australia offering maternity services recognisable as Levels One to Five of the National Maternity Services Capability Framework, 139 of which provided birthing services. Previous estimates (2009) for the whole country were of 394 maternity units, including private hospitals.³⁷ Homer *et al.* reported 278 maternity services in Australia with over 50 births, 102 of which were rural or remote.¹ These figures included private hospitals. Our work complements the study of Homer *et al.*, which identified and surveyed hospitals to establish levels of service and staffing.¹ Although their analysis is based on a credible response rate of 53% of units, it cannot provide a comprehensive national picture. This partial picture is compounded by the exclusion of facilities with fewer than 50 births a year. We identified 16 rural or remote public hospitals that had fewer than 50 births per annum. Our study offers a more comprehensive picture of maternity services in public hospitals in rural and remote Australia in places with populations of between 1000 and 25 000.

The proportion of Level Two services we identified appeared small in several jurisdictions, particularly those with greater distances between services, such as Queensland. The small number of Level Two services is interesting given the evidence that such services are safe,⁴⁰ associated with lower rates of intervention and Caesarean section,⁴¹ cost-effective⁴² and often meet women's needs for a local and consistent maternity service.⁴³

Having limited Level Two birthing services appears contrary to national and state policies, such as the 2010 NSW Ministry of Health policy directive 'Maternity—Towards Normal Birth in NSW',⁴⁴ which champions normal birth with minimal intervention and challenges the rising rate of Caesarean section, and the National Maternity Plan, which includes as a first principle coordinating care according to '...the woman's needs, including her cultural, emotional, psychosocial and clinical needs, *close to where she lives*'² (our emphasis).

The general trend of closure of rural and remote health services, at least in this example of maternity services, does not appear to have been accompanied by centralisation of knowledge and data at jurisdictional level, but rather with localised knowledge, data, planning and decision making. Lack of centralised knowledge and data may 'mask' important issues, such as a small proportion of Level Two maternity services. Therefore, there is an important policy and planning rationale for collecting information about maternity services at jurisdictional and national levels.

Lack of centralised knowledge and data may also hinder strategic direction setting and capacity for comparisons of outcomes and interventions, and so opportunities to learn from good practice may be lost. It may also exacerbate inequities in service provision. Most developed countries regard equity in health and access to health care as a fundamental principle in an effective health system. However, if it is not possible to specify where services are currently provided, then it is difficult to identify a

need and build a case to provide services, of what type and design, and to identify workforce issues, which may improve equity in health and access to care.

Nomenclature and minimum standards for levels of maternity service vary between (often neighbouring) jurisdictions, making comparison, communication, network development and continuity difficult. Homer *et al.* highlight the need for a national system for the classification of maternity services.¹ Such a national system now exists within the National Maternity Services Capability Framework, although its adoption across jurisdictions may not be uniform because it aims to '...complement and help to inform the review and development of individual jurisdictionally based documents'.¹² This work should be acknowledged for its importance in providing a common language and a focus on services; however, its legacy will depend on effective implementation. Without political and managerial investment in the concept, we will continue to experience disparity between jurisdictions that prevent effective evaluation, comparison, development and communication.

Cooperation between hospitals with different levels of service is necessary to ensure that service boundaries do not operate as barriers to the safe movement of patients across levels of service, according to their needs. It also avoids duplication, maximises effectiveness and minimises travel. The National Maternity Services Capability Framework highlights the importance of networks to facilitate the transfer and referral of women as a basic principle in providing safe and effective maternity services in Australia.¹² We found that networks were challenging to identify and were based on a variety of formal and informal practices. These challenges may limit the potential for effective planning at jurisdictional level.

Limitations

Catchment data were based on ABS 2006 census data (<http://www.abs.gov.au/websitedbs/censushome.nsf/home/census?opendocument&navpos=10>, verified 1 April 2014) and may not have accurately estimated the current population, and the spatial unit (UCL) used to define hospital catchment was likely to be an underestimation of the actual hospital catchment. By defining a small town in rural and remote Australia as having a population of 1000–25 000, we failed to include many Aboriginal communities that may have populations of <1000. These communities are critical to exploring the equitable provision of health services.

Results presented here are from public hospitals, but birthing also takes place in private hospitals (in 2009, 30.1% of women who gave birth did so in private hospitals).³⁷ However, the numbers of private hospitals in small rural or remote towns is very limited (one or two in each jurisdiction). In addition, Level One care is provided in non-hospital settings, such as general practice, primary healthcare centres and community health. This issue particularly affected the findings from NSW and the Northern Territory.

Although these limitations are significant, this work adds to an important emerging picture of maternity services in rural and remote Australia and provides current data on maternity services in rural and remote public hospitals serving towns of an estimated population of between 1000 and 25 000.

Conclusion

At present, it remains difficult to accurately describe rural and remote maternity services across Australia. Although there has been a trend towards localised planning and decision making about maternity services, there are compelling reasons for maintaining centralised information about location, level and network of maternity services.

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