Identifying maternity service catchments—a data gathering and mapping exercise

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This paper is part of an NHMRC funded Project that will develop and test an Australian Regional Birth Index (ARBI) which is a composite index of need for the provision of maternity services for rural and remote Australian communities. The methods are based on the Rural Birth Index (RBI) for British Columbia, Canada.[1] The Canadian model used a complex adaptive systems theory approach to develop a composite index of birthing service need for a population. The model used birth rates, social vulnerability and isolation, with the frequency of births in the population catchment being the driving element of the model. The ARBI will identify maternity service need in communities of 1,000 to 25,000 people in rural and remote Australia.

The National Maternity Services Plan (NMSP)[2] identified the need for the development of a rigorous methodology to assist in future planning for maternity care, including in rural and remote communities. It also identifies factors to be considered in planning, design and implementation of maternity services and these include: birth rates within communities, geographic factors such as remoteness, socioeconomic factors including community levels of social disadvantage, links to medical specialists, allied health, child and family health, and other services and resourcing and service capability.[2]

There are nearly 300,000 births in Australia each year with 18.1% from rural areas and 2.9% from remote areas.[2] Aboriginal or Torres Strait Islander women make up one tenth (10.4%) of women from rural areas giving birth and a third (33.5%) of the mothers from remote areas. Research into the impact of closing small maternity facilities highlights the subsequent loss of maternity care providers, the de-skilling of those maternity care providers who stay, and the shifting of costs to families who are travelling further for all maternity care (eg increased family costs of fuel, accommodation, childcare, takeaway food, mobile phone etc).[3, 4]

To develop the ARBI index of need, the first step is to locate the facilities, and then determine the catchment including the size of the population and the number of births.

**Location of facilities**

Initial identification of rural maternity services was based on: published reports by jurisdictional Perinatal Data Collections, the websites of each Health Department, hospital lists compiled by the Australian Institute of Health and Welfare (AIHW) and their ‘My Hospitals’ website and the Australasian Maternity Outcomes Surveillance System website. Data from these sources was cross checked with a range of other sources and compiled into jurisdictional lists.

Geographic locations (ie latitude and longitude) of these facilities were identified from the websites of their respective Health Departments, from ‘My Hospitals’ and from AIHW hospital lists.

**Catchment**

Developing these service catchments is complex task and requires mapping of facility, determining travel time catchment, and intersecting the catchment with ABS statistical areas, determining weighting parameters and aggregating data to obtain populations and births within the facility catchment.

The catchment of a facility includes the community in which the facility is situated plus the people in the surrounding areas. Geographic Information Systems (GIS) methods were used to identify a facility’s catchment area by using the distance that can be driven (road based) in a specified time (for example, 1 hour) in any direction from that facility. Maternity service catchment areas were identified from the facility’s geographic location and travel times estimated using the GeoScience Australia 1:250,000 road network, where average driving speeds are allocated by the types of road between locations.[5]
We used Australian Bureau of Statistics (ABS) data on Birth Registrations and estimated residential populations from 2005 to 2010. We estimated populations and births within the irregular shaped catchments using population weighted ABS geographical areas.

**Applying the Canadian RBI Model**

The Canadian Rural Birthing Index (RBI) comprises 3 major components, namely a birthing score derived from catchment birth numbers which is weighted by a measure of social vulnerability and an additive factor to take into account isolation. Corresponding Australian measures of vulnerability for the service catchment population were determined using ABS Socio-Economic Indexes for Areas (SEIFA). Isolation was assessed using road travel time to nearest facility offering surgical services. These together with a birthing score generated from the catchment area were used to apply the Canadian model in the Australian context.

The application of the Canadian model is the first step in developing an Australian Rural Birthing Index. An example of calculations for maternity facilities in South Australia will be presented to demonstrate the RBI.

**Conclusions**

The process of obtaining medical facility service catchments may seem straightforward however the data gathering which is required in order to undertake this task can be very complex and time-consuming.

Data identifying Australian hospitals with maternity services and service levels is only available from various dispersed sources. The identification of catchments requires high level GIS skills to combine data from many sources including ABS populations and birthing registrations, geographical boundaries, road network information.

Facility catchment determination and service population is a vital component in development of the Australian Rural Birthing Index. The Index will inform decision making around the level of service provision of maternity services in rural and remote Australia. The approach taken by the ARBI, and its components could be applied to other health services, and our Canadian colleagues are currently using similar approaches to assist in determining surgical service need.

**Recommendations**

This is phase one of a three year NHMRC funded project.

After validation maternity service need for communities as measured by the ARBI be used to inform the provision of maternity services in rural and remote areas of Australia.

**References**