Medically underserved communities of Queensland

Denis Lennox, Queensland Health, Bryan Kennedy, Department of Aboriginal and Torres Strait Islander Policy, Nathan Domrow, Queensland Treasury

BACKGROUND

In achieving its mission, “helping people to better health and well-being,” Queensland Health strives (among other things) to maintain a high quality of health care and to priorities resource allocation to meet demonstrated demand and principles of equity1. An appropriate supply of general practitioners to all communities is essential to this goal.

Few dispute that an excess of demand for general practitioners exists in rural and some regional communities of Queensland. Few dispute inequity in supply of general practitioners between urban and rural Queensland. A lack of doctors is readily identified in qualitative manner. However, measurement of the supply and particularly of the demand by a reliable quantitative method is fraught.

A rural community is unable to recruit an Australian graduate applicant to a practice opportunity. It applies for “area of need” approval to sponsor an overseas-trained doctor for special purpose registration by the Medical Board of Queensland. How does the delegate of the Queensland Minister for Health grant “area of need” approval by provision of the Section 135 of the Medical Practitioner’s Act 2001? When does the rural community commit scarce resources to recruit and retain a medical practitioner to permanent resident practice within the community? How does a postgraduate trainee in rural practice assess the viability of medical practice in a developing rural community where no medical practice exists?

A simple, inexpensive yet accurate methodology to model demand for and supply of general practitioners in Queensland communities promises benefit. Benefit accrues to the state jurisdiction, communities and medical practitioners alike.

This paper presents “Medically Underserved Communities of Queensland” (MUCs-Q) devised in year 2000 as a standardised model for determining the expected level of need for general practitioner services in rural and remote Queensland. It describes MUCs-Q methodology, application and future development.

METHODOLOGY

Four requirements underpinned development MUCs-Q:

• it is easily understood and replicated, and transparent
• it satisfies the requirements of both Commonwealth and State jurisdiction’s interests to determine “districts of medical workforce shortage” and “areas of need” respectively
• it takes into account demographic and socioeconomic variation in determining the level of need—it responds to community need for medical services
• it is applicable at relatively small geographic levels.

The MUCs-Q methodology consists of seven stages:

- estimate base populations at a small area level
- apply age/sex weights that reflect general practitioner use
- apply weight of socioeconomic status and Indigenous status to reflect differential need for primary health care services
- generate expected number of consultations given the size and characteristics of the population served
- calculate the expected number of Full Time Equivalent (FTEs) numbers of general practitioners
- estimate the FTE number of general practitioners actually available to the GAI by survey of the general practices as well as hospital practices within the community
- calculate the excess of demand or supply of general practitioners in FTEs for GAI by comparison of the actual and expected FTE general practitioner numbers.

DEMAND-SIDE METHODOLOGY

Estimate base populations for geographical areas of interest

The basis of any model of need is to estimate the base level population for each geographical area of interest.

Population data for rural and remote areas at a level smaller than Local Government Area (LGA) was available only for Australian Bureau of Statistics Population and Housing Census years. The latest available data from this source was 1996.

The MUCs-Q model used 1996 Census data to determine population numbers and the age/sex distribution for each Urban Centre Locality (UCL) and the balance of each Local Government Area. Application of a correction factor allowed for the projected population growth at an LGA level. Projected population estimates for 2001 form the basis of the correction factor. The projected estimates for 2001 were used to quantify
the population for the next one to 2 years and provide a more accurate estimate of current populations than using 1996 Census counts.

The model assumes that population growth is equally distributed across LGAs. This may lead to inconsistencies in population estimates for geographic areas of interest within LGAs, as population growth across any LGA may not be evenly distributed. The authors assumed Local Government Authorities under study might be able to provide local information on the areas of growth within their jurisdiction to derive more accurate estimates at a small area level.

**Develop age/sex weightings to reflect general practitioner use**

Data obtained from Medicare statistics provided the variation in general practitioner use by age and sex. Figure 1 shows the average number of general practitioner consultations per year per person for Australia by age and sex in 1998.

![Figure 1](image)

From these data, the MUCs-Q model developed weights for each age group by sex. It applied these weights to the base population by age and sex to create a single age/sex weighting applicable to a geographic area of interest. Table 1 shows the age/sex weightings derived from Australia wide Medicare data used in the analysis.

The MUCs-Q model used national weightings rather than State or more local weightings because the former provide a more substantive standard accounting for all regional variances. MUCs-Q did not assume Australia to be a homogenous nation. However, when it is not possible to propose an ideal level of medical service utilisation as the standard, the national average provided a clear point of reference for measurement of deviation on the basis of equity of access.

Because of the age profile of Aboriginal and Torres Strait Islander communities, application of the weighting probably disadvantaged these communities. However, the model developers accepted this disadvantage in the interests of maintaining a
standard process for all communities, knowing that later adjustments for mortality and Indigenous status compensated more than adequately.

Table 1 Age/sex weightings used in the analysis

<table>
<thead>
<tr>
<th>Age group</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–4</td>
<td>1.25</td>
<td>1.16</td>
</tr>
<tr>
<td>5–14</td>
<td>0.58</td>
<td>0.59</td>
</tr>
<tr>
<td>15–24</td>
<td>0.54</td>
<td>0.93</td>
</tr>
<tr>
<td>25–44</td>
<td>0.67</td>
<td>1.06</td>
</tr>
<tr>
<td>45–64</td>
<td>0.99</td>
<td>1.32</td>
</tr>
<tr>
<td>65–74</td>
<td>1.50</td>
<td>1.64</td>
</tr>
<tr>
<td>75+</td>
<td>1.68</td>
<td>2.25</td>
</tr>
<tr>
<td>All ages</td>
<td>0.84</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Apply Socio-economic Index for Areas—index of socioeconomic disadvantage weightings

The Socio-economic Index for Areas (SEIFA) scores of social disadvantage provided a method of comparing levels of relative social disadvantage at a small area level. MUCs-Q developers derived the index from 1996 Census data and used a selection of variables such as income, work status, housing characteristics and education levels to arrive at a single index score for each Australian Bureau of Statistics Collection District (CD). It is possible to aggregate Collection Districts to Urban Centre Locality level or Local Government Area level. The Index is usually applied by summarising the Scores into five broad groups based on Quintiles ranging from Quintile 1 (areas of least Social Disadvantage) to Quintile 5 (areas of most Social Disadvantage).

MUCs-Q developers created a profile of each geographical area of interest, based on the distribution of the population based on the 5 categories. Figure 2 provides an example of the distribution of the population across the SEIFA Quintiles for the Urban Centre Locality of Kingaroy and the South Burnett Health District. The Figure shows that Kingaroy and the South Burnett District have high levels of social disadvantage with 64% and 76% of the population respectively residing in Quintile 4 and Quintile 5 areas compared to 40% for Queensland overall.
Expected general practitioner consultations by SEIFA quintiles

MUCs-Q developers examined data from the Social Health Atlas of Australia (1999) to ascertain its suitability for determining a weight to apply to the SEIFA distribution of the areas under study. These data have comprehensive information on differentials of general practitioner use by SEIFA.

Figure 3 shows a considerable variation in the number of general practitioner consultations across the SEIFA Quintiles in metropolitan areas—areas of low social disadvantage having lower consultation rates than areas of high social disadvantage. However, in non-metropolitan areas there is no significant difference in consultation rates between areas of low social disadvantage and areas of high social disadvantage. MUCs-Q did not apply the non-metropolitan weight, as current usage patterns across the SEIFA Index in non-metropolitan areas appear to be unrelated to need. The metropolitan weighting better approximates differential need across the SEIFA Quintiles. The developers applied it to MUCs-Q.

2 A range of factors may be responsible for this difference between metropolitan and non-metropolitan areas. People in less advantaged groups in metropolitan areas may be more used to accessing welfare services and systems with good public transport, while those in non-metropolitan areas face access hurdles, may be more stoical, more independent and resourceful.
Mortality differentials by SEIFA quintiles

A large body of literature demonstrates that mortality rates increase with decreasing socioeconomic status. Mortality differentials by socioeconomic status have wide use as a surrogate measure of the relative need for the allocation of resources for health services both within Australia and other countries. For example, resource allocation models for distributing funding resources by State health authorities often incorporate into their model a weighting of need based on indirect age standardised mortality ratios (SMRs). These weights are usually applied to relatively large populations and areas. However, for the purposes of this model where a weight is required to reflect differential need at a small geographical area level, the developers considered it not feasible to generate an SMR weight for each small area. Mortality data are available only at a Local Government Area level in rural areas. Large random variations occur from year to year in areas with small populations.

MUCs-Q developers considered an alternative approach to generate weights from SMRs at an Australia wide level based on SEIFA Quintiles of socioeconomic disadvantage. These can then be applied proportionally at a small area level based on the SEIFA population distribution of that small area. The Social Health Atlas of Australia 1999 provides SMRs for each SEIFA Quintile. Figure 4. shows the SMR gradient across the SEIFA Quintiles for socioeconomic disadvantage.
Considerable debate continues on the relationship between differentials in SMRs and socioeconomic status. For example, does a population group with 20 per cent excess mortality require a 20 per cent higher need for health care services? Generally resource allocation formulae which use an SMR weight discount the weight. For example, NSW Health discounts the SMR by 40 per cent before application while the United Kingdom RAWP Capitation model applies the square root of the SMR. Both methods of adjustment effectively compress the range and therefore reduce the effect of the direct SMR differentials (see Figure 4).

For the purposes of the MUCs-Q model, the developers applied the square root of the SMR for each SEIFA Quintile as the preferred weight—preferred because it mirrors closely the differentials by SEIFA of general practitioner use in metropolitan areas.

**Adjust for the Indigenous component of the population**

MUCs-Q developers gave separate consideration to weights to adjust for Indigenous health status in recognition of the significantly higher rate of need of Indigenous populations for health services in general and primary health services in particular.

Queensland mortality data includes an Indigenous identifier since 1996 only. Levels of identification of Indigenous status significantly underestimate the number and therefore the rate of Indigenous mortality. Estimates of levels of the completion of the Indigenous identifier improved dramatically since 1996 and the Australian Bureau of Statistics estimated that identification levels in 1998 (the latest available year) were approximately 70 per cent complete.

The Health Information Centre, Queensland Health used for a number of years a surrogate measure for estimating Indigenous health differentials by using place of usual residence information rather than relying on the Indigenous identifier. The Centre aggregated localities known to have a high proportion of Indigenous
population (approximately 90 per cent or more) and compared standardised mortality ratios (SMRs) for these areas to the Queensland population as a whole. The derivation of these SMRs is largely derived from remote Indigenous communities. However, one of the developers had mounting evidence that mortality rates amongst Indigenous populations were relatively similar regardless of place of usual residence—Indigenous mortality rates in major urban areas, major rural areas and minor rural areas are similar to those of remote Indigenous communities.

For the period 1994 to 1998, SMRs for the remote Indigenous communities were 3.8 times the Queensland population overall. For the purposes of the model, developers applied an Indigenous weight based on the square root of the SMR (1.95).

Developers calculated the proportion of the population that was Indigenous according the 1996 Census for each locality and GAI, and then applied the weight to the Indigenous share of the population.3

Developers accepted that application of this adjustment represented a “double weighting” for Indigenous communities as a much higher proportion of Indigenous people reside in low socio-economic areas than the non-Indigenous population. However, given the disadvantage of the adjustment for sex and given the enormously greater burden of illness and shorter life expectancy experienced Indigenous people, they considered the additional adjustment reasonable and just. Moreover, the developers considered evidence that Census counts, at least in remote Indigenous communities, significantly undercount the population in many communities.

### Generate expected number of consultations and expected number of general practitioner FTEs

Data from Medicare statistics showed that the average number of general practitioner consultations per head of population per year for Australia was 5.78. MUCs-Q calculated the expected number of general practitioner consultations therefore by multiplying the age/sex-weighted population for each area by 5.78.

The Australian Institute of Health and Welfare estimated that an average FTE general practitioner undertakes 7,047 consultations per year. This was based on an average of 3.8 consultations an hour and 41.1 clinical hours worked per week.45. Thus, MUCS-Q calculated the expected number of general practitioner FTEs by dividing the expected number of general practitioner consultations per year by 7,047. Table provides a

---

3 For example, for a geographic area of interest with an overall population of 1000 and 5 per cent Indigenous population the following calculation was applied:

\[ \left[ \frac{(\text{Overall population}) \times (\text{per cent Indigenous population} \times \text{SMR sqrt})}{(\text{overall population - (overall population} \times \text{per cent Indigenous population})} \right] = \text{Indigenous adjusted population} \]

or

\[ \left[ \frac{(1000} \times (0.05 \times 1.95)}{1000 - (1000 \times 0.05)} \right] = 1048 \]

4 Australian Medical Workforce Advisory Committee (1996), Australian Medical Workforce Benchmarks, p22, AMWAC Report 1996.1, Sydney

5 This compares with the Royal Australian College of General Practitioners’ proposal that a full-time workload is considered to be 108 consultations per week – that is, 4,968 consultations per year for a 46-week year. This is based on a GP working 36 hours per week spending 75 per cent of this time in consultations with patients and averaging 15 minutes per consultation. (General Practice in Australia:2000)
worked example of how populations of an area are age/sex weighted and the calculations required for deriving general practitioner FTEs.

Rural practitioners argue that their consultations are longer and involve more procedures than their urban colleagues and therefore average consultations per FTE rural practitioner is a number less than the national average. This is eminently justifiable. However, in the absence of alternative reliable and widely accepted benchmarks, the developers preferred to adopt the more conservative standard, and hence conservative result. They considered qualification of the results upwards rather than downwards gained greater acceptance and credibility. However, they welcomed better benchmarks becoming available.

**SUPPLY-SIDE METHODOLOGY**

**Estimate the FTE number of doctors engaged in general practice**

The MUCs-Q model surveys local general practices including Aboriginal Medical Services as well as hospital medical services within a geographic area of interest to determine the FTEs of general practitioners providing general practice services. Telephone survey is preferred to ensure accuracy and completeness of information recorded and to obtain additional subjective information.

**Survey methodology**

The survey questions obtain amongst other things, the sessions and hours per week of general practice consultation provided by each practitioner by locality of practice.

On call work is not included in the sessions and hours. In a hospital practice, only that time spent by a doctor in general outpatient practice is included. Emergency Department practice is not included, despite the fact the many Emergency Department presentations may be general practice type services—the logic being that Emergency Department medical cover must be provided regardless of the volume of general practice type presentations.

The survey obtains other subjective information used only to qualify the survey results to permit valid qualification of the objective data:

- Seasonal variations in population numbers occasioned by tourism and work.
- Patient flow information. What are the origins of the practice’s patients? From what areas does the practice draw its patients?
- Alternative services available.
- Any other information that may qualify the objective data obtained.

From the survey, the FTEs of general practitioners providing general practice services to each community within the geographic area of interest is estimated. The following standards apply to these estimations:

- One session is at least three hours of general practice consultation.
• More than eight sessions per week of more than three hours each comprises one FTE general practitioner.

• More than thirty-eight hours per week comprises one FTE general practitioner.

• One doctor may provide no more than one FTE of general practice service per week. (Doctors often work up to 70 hours per week or more. However, for these estimations, any time worked in excess of thirty-eight hours per week is reckoned as one FTE only. The logic being that a community cannot expect a doctor to provide more than thirty-eight hours per week of general practice consultation services.

• Group practices providing services in more than one locality have FTEs allocated proportionately to each locality.

• Hospital contribution to general practice consultation is obtained by calculation of the total number of general practice consultation hours and division by forty, e.g., seven sessions of three hours per week attended to by an average of two and a half doctors provides \(7 \times 3 \times 2.5/40 = 1.1\) FTE.

Finally, but most importantly, the methodology involves feedback to general practices and District Health Services and other relevant organisations such as Shire Councils for validation of the results.

**Calculate the excess of demand for or supply of general practitioners in FTEs for a geographic area of interest**

Finally, comparison of the expected demand and actual supply of general practitioners within a geographic area of interest provides an indication of the excess of demand or supply. The objective result stands to be qualified by locally available information about net patient flows, seasonal fluctuations in population and other issues.

**APPLICATION**

Figure 5, appended to the paper provides a worked example of MUCs-Q, applied to the South Burnett community in 2000. In two years, MUCs-Q has received wide application in Queensland.

All communities in the Accessibility and Remoteness Index of Australian categories Remote and Very Remote have received at least one audit of general practice capacity within this period using MUCs-Q as a tool. Audits of other geographic areas of interest were conducted upon demand.

---

6 Section 2.1.4 of “General Practice in Australia: 2000” provides three definitions of casual, part-time and full-time work patterns. The two relevant definitions of full-time work in this context are:

1. The Australian Bureau of Statistics/International Labour Organisation definition—35 paid hours per week or more.
2. Royal Australian College of General Practices definition—36 or more hours per week and 46 weeks per year = full time general practice.
## South Burnett Need and Supply of General Practitioners

**Nov-00**

<table>
<thead>
<tr>
<th>LGA_Name</th>
<th>UCL_Name</th>
<th>2001 Pop Project</th>
<th>2001 Weight pop proj &amp; age sex weight</th>
<th>2001 pop age/sex, Seifa, ATSI weighted</th>
<th>Expected Cons.</th>
<th>Expected FTEs</th>
<th>Current FTEs</th>
<th>Doctors Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kilkivan (S)</td>
<td>Goomeri (L)</td>
<td>500</td>
<td>545</td>
<td>564</td>
<td>3,260</td>
<td>0.46</td>
<td>1.08</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>Kilkivan (L)</td>
<td>388</td>
<td>422</td>
<td>442</td>
<td>2,555</td>
<td>0.36</td>
<td>2.06</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>LGA Balance</td>
<td>2,388</td>
<td>2,479</td>
<td>2,506</td>
<td>14,845</td>
<td></td>
<td></td>
<td>2.06</td>
</tr>
<tr>
<td>Kilkivan (S)</td>
<td></td>
<td>3,275</td>
<td>3,447</td>
<td>3,512</td>
<td>20,299</td>
<td>2.88</td>
<td>1.08</td>
<td>1.80</td>
</tr>
<tr>
<td>Kingaroy (S)</td>
<td>Kingaroy</td>
<td>7,381</td>
<td>7,536</td>
<td>7,639</td>
<td>44,153</td>
<td>6.27</td>
<td>9.00</td>
<td>2.73</td>
</tr>
<tr>
<td></td>
<td>LGA Balance</td>
<td>4,056</td>
<td>4,034</td>
<td>4,047</td>
<td>23,923</td>
<td>3.32</td>
<td></td>
<td>3.32</td>
</tr>
<tr>
<td>Kingaroy (S)</td>
<td></td>
<td>11,437</td>
<td>11,570</td>
<td>11,686</td>
<td>67,545</td>
<td>9.58</td>
<td>9.00</td>
<td>0.58</td>
</tr>
<tr>
<td>Murgon (S)</td>
<td>Cherbourg</td>
<td>952</td>
<td>1,038</td>
<td>1,973</td>
<td>11,404</td>
<td>1.62</td>
<td>2.00</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>LGA Balance</td>
<td>1,171</td>
<td>1,183</td>
<td>1,200</td>
<td>6,936</td>
<td>0.98</td>
<td></td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>Murgon</td>
<td>2,183</td>
<td>2,272</td>
<td>2,528</td>
<td>14,612</td>
<td>2.07</td>
<td>2.69</td>
<td>0.62</td>
</tr>
<tr>
<td>Murgon (S)</td>
<td></td>
<td>4,306</td>
<td>4,492</td>
<td>5,701</td>
<td>32,952</td>
<td>4.66</td>
<td>4.69</td>
<td>0.01</td>
</tr>
<tr>
<td>Nanango (S)</td>
<td>Blackbutt (L)</td>
<td>596</td>
<td>650</td>
<td>657</td>
<td>3,797</td>
<td>0.54</td>
<td>1.20</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>LGA Balance</td>
<td>4,827</td>
<td>5,229</td>
<td>5,290</td>
<td>30,576</td>
<td>4.34</td>
<td></td>
<td>4.34</td>
</tr>
<tr>
<td></td>
<td>Nanango</td>
<td>2,909</td>
<td>3,097</td>
<td>3,172</td>
<td>18,334</td>
<td>2.60</td>
<td>3.00</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Yarraman*</td>
<td>896</td>
<td>941</td>
<td>963</td>
<td>5,566</td>
<td>0.79</td>
<td>1.00</td>
<td>0.21</td>
</tr>
<tr>
<td>Nanango (S)</td>
<td></td>
<td>9,228</td>
<td>9,917</td>
<td>10,082</td>
<td>52,708</td>
<td>8.27</td>
<td>5.20</td>
<td>3.07</td>
</tr>
<tr>
<td>Wondai (S)</td>
<td>LGA Balance</td>
<td>2,457</td>
<td>2,612</td>
<td>2,678</td>
<td>15,481</td>
<td>2.20</td>
<td></td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>Proston (L)</td>
<td>195</td>
<td>213</td>
<td>213</td>
<td>1,230</td>
<td>0.17</td>
<td>0.54</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Wondai</td>
<td>1,447</td>
<td>1,558</td>
<td>1,737</td>
<td>10,039</td>
<td>1.42</td>
<td>3.69</td>
<td>2.27</td>
</tr>
<tr>
<td>Wondai (S)</td>
<td></td>
<td>4,100</td>
<td>4,383</td>
<td>4,628</td>
<td>26,750</td>
<td>3.80</td>
<td>4.23</td>
<td>0.43</td>
</tr>
<tr>
<td>South Burnett</td>
<td></td>
<td>32,346</td>
<td>33,808</td>
<td>35,609</td>
<td>205,820</td>
<td>29.21</td>
<td>24.20</td>
<td>5.01</td>
</tr>
</tbody>
</table>

* Outside Sth. Burnett District though Yarraman service is used by Sth. Burnett residents and vice versa
** Some doctors not permanent residents or progressing to permanent residence possibly 3.
# Number should be increased by the number of temporary resident doctors not seeking permanent status

**Note A:** South Burnett assessed in survey to experience a net inflow of patients from northern, western, southern, and eastern neighbouring districts.

**Note B:** Kingaroy assessed in survey to experience a net outflow of patients to Wondai, Murgon and Nanango general practice.

**Note C:** This analysis is based upon the use of Australian averages. Evidence suggests that in rural communities such as these, the methodology produces conservative estimates of need. Therefore, it is appropriate so say that in comparison with the Australian average utilisation of general practitioners, these communities need at least the numbers shown in the final column.
The results of these audits support the process of determining Area of Need for purposes of special purpose registration of overseas-trained doctors.

Two applications of MUCs-Q supported Communities Building Capacity—a program in which rural communities develop their own strategy to build medical workforce capacity. In fact the pilot of this program in Kingaroy and the South Burnett prompted development of MUCs-Q. In both instances, the audits received strong local validation by general practice, health services, local government, business and community members.

In a few instances, MUCs-Q audits were applied in response to appeals of “area of need” and “district of medical workforce shortage” determinations. The appellants accepted the outcome of the audit though unfavourable to their cause.

One regional Division of General Practice conducted a MUCs-Q audit in the largest application of the tool since its development. The Division performed a thorough validation of the result and is now proceeding to re-audit at a twelve-month interval as well as to extend its application to two regional communities recently added to the Division. This Division is developing a very sophisticated approach to medical workforce planning in consultation with its community and local governments. A second and larger regional Division is currently conducting an audit.

**FUTURE DEVELOPMENT**

MUCs-Q Mark 2 is in development. This is necessary to incorporate data from the 2001 Census. Mark 2 will also incorporate refinements of the tool based upon evidence of its application in the last two years.

**Defining and mapping systems of general practice**

Early application of MUCs-Q identified the need to define functioning and perhaps potential systems of general practice.

Application of any standard of medical practitioner supply at regional and local level requires definition of the system of medical practice. Without acknowledgment of the practical factors that determine sustainable medical practice, application of workforce standards produces unreliable results. This applies to both general and specialist practice.

It is a principle factor limiting application of the workforce standards established by the Australian Medical Workforce Advisory Committee (AMWAC). AMWAC’s standards provide valuable information when applied at national and state level. However, the more local the application, the more it becomes necessary to define the boundaries of the medical practice systems operating or potentially operating within the geographic area of interest. This occurs because application of a standard of population demand for doctors requires at least one relatively closed system of medical practice for valid application. Therefore, the smaller the population of the geographic area of interest, the greater the need for definition of the system of medical practice that operates in the area.
Knowledge of the location of general practices and some local intelligence about the movement of patients to access general practice services is necessary to define relatively closed systems of general practice. The MUCs-Q telephone survey of general practice and the local validation process provide intelligence permitting reasonable definition of systems of general practice. MUCs-Q Mark 2 will refine the processes of obtaining this intelligence.

MUCs-Q Mark 2 will also map systems of general practice by Census Collection Districts—the basic geographic unit of Census information.

Application to whole state
MUCs-Q Mark 1 excluded Major Urban Centres (large regional centres and the whole of Brisbane) since its primary application was rural and remote Queensland. However, demand requires MUCs-Q Mark 2 to be extended to the whole of Queensland, permitting application to any community within Queensland. However, application in the conurbation of Southeast Queensland will require definition of more complex systems of general practice and greater resources to perform surveys of supply.

Base population/geographic unit
MUCs-Q applied population weights to Urban Centre Localities as the base population or geographic unit. However, Mark 2 will apply the weights by Census Collection District of which Queensland has about 7,000. The advantage gained is that weighted population estimates for census collection districts can be rolled up to any geographical entity required, e.g., Health District, post code, Urban Centre Locality, suburb, Local Government Area, electorate, Division of General Practice etc.

This capacity represents a significant improvement on MUCs-Q Mark 1, in which population growth for a particular locality was based upon growth of the total local government area.

Extension to specialist medical practice
While application to specialist practice poses significant challenges—not least of which is inability to differentiate Medicare data by specialty discipline—the developers wish to trial an application of the tool to the specialist disciplines of General Medicine and Anaesthetics. In particular, a significant attempt will be made in collaboration with the Specialist Colleges through the Medical Workforce Advisory Committee of Queensland to define and map the systems of General Medical and Anaesthetic practice throughout the state.

CONCLUSION
MUCs-Q has provided reliable and locally validated evidence to support decision making at Commonwealth, State and Local level to general practice workforce planning and management. Its application over two years received strong support. Opportunity exists to improve value of the tool and to extend its application to specialist medical practice.