Quantifying Access Disadvantage and Gathering Information in Rural and Remote Localities:

The Griffith Service Access Frame

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This paper argues that a purely geographic classification is not the best way to determine objective measures of rural disadvantage in Australia. What is required is an objective, accurate, research-based and independently validated classification that can be used to inform policy decisions and strategies to improve the lives of rural and remote Australians, especially Indigenous Australians in these areas. The Griffith Service Access Frame (GSAF) was developed by the author, specifically to quantify the service access of population centres in rural and remote areas of Australia. The model allows any population centre in the nation to scored according to its Population Size; the Time, Cost and Distance factors associated with accessing a given level of services; and the Economic Resources that the population can apply to the task of overcoming access disadvantage.

Service delivery agencies in Australia work in an environment where expectations of improved service delivery by government and the public confront the constraining influences of limited resources and greater accountability for government service provision expenditure. Organisations such as the Council of Australian Governments (COAG) and a range of Ministerial Councils and their national committees collaborate in an attempt to improve efficiencies and outcomes. Although national, state and territory governments have increasingly demanded efficiencies and improvements in both service delivery and outcomes, relatively little effort has been expended in improving the mechanisms used to allocate resources or to or measure policy outcomes. The comparative needs and differing abilities of disadvantaged groups within the Australian community such as those with low language proficiency, low socioeconomic status or lack of access to mainstream services have to date not been accurately quantified.

If resources to implement government policy are poorly targeted a disproportionate share of resources allocated for the disadvantaged may be allocated to inappropriate groups: groups that are politically influential or that are less disadvantaged but who have the best prospects of achieving positive policy outcomes, thereby ensuring a perception of successful policy implementation. This approach has been referred to as "Triage" by Professor John Humphreys (Humphreys, 1988) and is a policy approach "that causes the partial exclusion of particular geographical areas and populations from comprehensive service by governmental programs, despite their needs".

The development, adoption and usage of classifications that understate the extent of disadvantage at the national, state or territory level can significantly distort the allocation of resources and the identification of needs groups. It also causes the misinterpretation of data for policy development and inaccurate measurement of performance outcomes.

Inaccurate or skewed classifications and formulae are a major problem in the realm of public policy implementation in Australia. Despite detailed and objective evidence being provided to the administrators and ministers responsible for public policy implementation by specialist researchers and independent review bodies like the Human Rights and Equal Opportunities Commission, these inaccurate classifications and funding allocations are still being used across a range of equity programs administered by the Commonwealth and State Governments. The focus of this paper will be the classifications used to define remote and rural, or more precisely, service access disadvantaged areas of Australia.

The Essential Components of a Service Access Classification

A national service access classification should be able to quantify the relative access to a service or level of service by all Australians. Each of the following components is essential.

A service access classification must be capable of quantifying access to a specific service or level of service.

A classification can be developed for a range of different services, but the level and type of each of the services included must be specifically identified. The level of service provision to be accessed must be uniform across each specific service to ensure that the classification is measuring relative access to the same thing. When developing a service access model the hardest thinking that has to be done is in determining precisely what type of services or level of service is required as the accepted norm for the model. This is then the benchmark to determine whether a population centre has the required level of access to that service. A population centre that has the required level of service, no matter what its population size, cannot be service access disadvantaged. If the level of service is not available in a population centre, no matter what its size, it must have some degree of service access disadvantage to that service.

The production of a classification without undertaking the initial step of specifically identifying and defining precisely what we are measuring access to will result in a generic classification that is little more than a measure of relative distance from a range of population centres. Such a classification will reveal nothing about the relative access disadvantage experienced in population centres, or the cost of providing services to them. Nor will it provide any meaningful demographic or outcomes data on the populations.

A service access classification must represent the real world in regard to the ability of people to access a service or level of service.

This requires that even the most extreme cases of access disadvantage have to be accommodated within the classification. Extreme cases and minor variations between similar population centres in all kinds of geographical locations have to be faithfully and accurately quantified. The classification must include all population centres that do not have access to the specific service and must be able to quantify the access disadvantage of each of those population centres relative to every other population centre in the classification. The method of calculating the relative degree of access disadvantage must be objective and use accepted, transparent and verifiable mathematical techniques to allow comparisons between the relative access disadvantage scores of all population centres within the classification.

A service access classification must be an objective representation of all of its component population centres, accurately reflecting their characteristics by way of population size, location and capacity to access services.

Only by including these fundamental elements can access disadvantage scores within any specific service access classification be determined and meaningful scores and groupings of scores generated. Further, when calculating relative access to services, real world external factors that impede service access need to be accommodated in the classification. In a federation, where the polities independently fund and provide service provision, the geo-political boundaries of states and territories have to be taken into account in any measure of service access if they prevent or impede access. For example, services provided by state departments or organisations are nearly always constrained by state and territory boundaries, whereas services provided by private enterprise are often not. However, even some large private companies have administrative structures and policies that differ within polities. The absence of geo-political boundaries in a national service access classification will significantly warp the classification and understate the access disadvantage of some population centres.

Key elements in a service access classification are population centre size, some measure of road distance or road distance equivalent and some measure of the economic capacity of people to *overcome the cost of accessing the service.*

In a service access context the size of the population centre is treated as an indicator of the degree of service provision in that centre.

Actual road distance is a common element in measures of distance disadvantage. However, in an access disadvantage classification road distance cannot be used by itself to make comparisons between population centres. Some comparisons can be sustained if both population centres are situated on sealed all-weather roads. However, direct comparisons cannot be made between population centres on islands or in remote locations where there are no roads or where there are only very poor quality roads. The existence of a road or the type of road, dirt or sealed, makes a significant difference to a community's relative access to services. A comparative method of calculating the relative access disadvantage of population centres on islands, or with no roads or with unsealed roads, with those on sealed roads is necessary. Factoring in the extra disadvantage caused by air or ferry schedules that increase the extent of the access disadvantage must be accommodated if there is no alternative means of access.

The economic capacity of the residents of a population centre to overcome the cost of accessing services is also a key element in a service access model. For example, if a bank withdraws services from a population centre and only provides those services at a larger centre some distance away, the cost of overcoming that distance has been transferred from the service provider to the service recipient. If the recipient wishes to access those services after the transfer they must fund the cost of covering the distance to access the services. If they do not have the economic resources to do this, they have no service access. The cost of service access is a major factor in that that cost has to be met either by the service provider or recipient or there will be no access to the services. A measure of a population centres' relative capacity to meet these costs needs to be incorporated in a service access classification.

A service access classification must have the capacity to incorporate the full magnitude of all the major factors that impact upon service access.

If a classification system is to be capable of quantifying access disadvantage Australia-wide, the capacity to accommodate the extreme and sometimes atypical profiles of population centres is fundamental. The parameters of a service access model must be determined by the sum of all its parts. If any of the elements are adjusted to fit within pre-determined categories or boundaries the classification cannot be a true representation of relative access disadvantage. Each service access model must be representative of the type and level of service or services for which relative access is to be calculated and will therefore be unique. In short, there are an infinite number of service access models that can be developed with the same construction techniques and elements.

A service access classification must be objective and robust enough to withstand independent validation across Australia.

Validation establishes the efficacy of the classification and quantifies the correlation between the degree of access disadvantage determined by the classification and the perceptions of the people who live, work and experience access disadvantage in those locations. The process would determine the classification's suitability for collecting and publishing data, allocating resources and measuring policy outcomes.

The Griffith Service Access Frame

The Griffith Service Access Frame (GSAF) was developed by the author, specifically to quantify the service access of population centres in rural and remote areas of Australia to either a specific service, level of specific service or specific grouping of services.

A service access model quantifies access to a specific service, a level of service or a clearly defined group of services from service access centres known to provide that service. This is unlike geographical approaches that use distance constructs to measure distance disadvantage to a hierarchy of other population centres used as surrogates for service provision. A service access classification is the over-arching methodology used for creating any number of different service models. The GSAF is the only service access classification in Australia at this time.

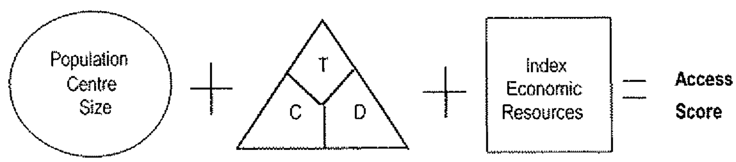
The GSAF Methodology

The GSAF assumes a continuum of access disadvantage from zero to infinity. It incorporates the elements of population centre size, distance, time and cost of travel, together with a measure of the economic capacity of the inhabitants of each population centre to overcome the cost of travel. The GSAF can differentiate access disadvantage down to one person, one minute, one cent, one kilometre and one unit of socioeconomic disadvantage.

The GSAF is based on three underlying assumptions, they are:

1. There is a relationship between population centre size and the level of services available, and;
2. Access to services is dependent upon the extent of the distance, time or cost barrier existing between the location of the client population and point of service, and;
3. Access to services is dependent upon the economic capacity of the client population to meet the costs of overcoming distance.

Elements of the Griffith Service Access Frame



Key

Size: Census population calculation derived from ABS census population data

Time/Cost/Distance: Time or cost capable of being converted into distance equivalent

IER: Index of Economic Resources calculation: derived from ABS census data

A service access score is calculated for each population centre in the following way:

1. A service, or specific level of services, is determined (e.g., full provision of primary and secondary education and support services or a hospital of a certain class that provides a range of services). Then the location from which the service or level of service can be accessed (Service Access Centre) is identified.
2. A score is then generated for each of the three GSAF elements for all the client population centres accessing services from the identified service access centres in the model.
3. A well-established mathematical technique known as Principal Component Analysis (PCA) is undertaken to relate each centre to every other centre to generate the relative weights of the elements in the model. PCA was chosen after investigating a number of multivariate statistical analysis methods. PCA is deployed to develop a linear relationship among the three chosen factors, population centre size, time/cost/distance and economic resources based on the variances within each factor and the correlation matrix of variables.
4. Element scores are generated for each client population centre.

5. The weighted sum of the element scores is calculated to derive a service access score, or MScore as it is known in the GSAF, for each population centre.
6. In the GSAF model each population centre is given an individual Service Access Score (MScore) generated across the three elements of the model.

How the GSAF Works

The GSAF is a three dimensional model. It uses data from the Australian Bureau of Statistics' smallest unit of population analysis within the Australian Standard Geographical Classification, the Census Collection District. From this it generates values in two of its three elements. In urban areas Collection Districts average about 300 dwellings, whilst in remote areas the number of dwellings in Collection Districts is often less than 300 due to decreasing population density. The use of Collection Districts allows detailed analysis of population and geographical areas.

The Three Elements of the Service Access Frame

The Service Access Scores (MScores) are developed using the three elements of the model which, when combined, produce a score that quantifies the relative access of the population centre.

1. Population Centre Size

Population centre size is the first leg of the frame. Population size is a well-established indicator of general service provision within a population centre (i.e., the larger the centre, the wider range of services available and the higher level of service provision). The use of population centre size as a general indicator of service provision in Australia has been established by research (Rose 1967), and in Tasmania (Scott 1964), South Australia (Smailes 1969) and Queensland (Dick 1971). All population centres in a GSAF model are ranked according to their population size from the largest to the smallest. This ranking by population centre size recognises that larger centres will have more services or service substitutes than smaller centres. This will narrow the service access disadvantage gap between the larger client service centre and smaller centres.

The size of the client community wishing to access services or a level of service is an important factor in determining that community's level of access disadvantage. This is because there will be some level of service provided, relative to the population size of the client community (although it will be less than the level available at the service access centre). For example, where two population centres are the same distance from a specific level of service provision, the one that has a larger population will usually have a level of service that is nearer to that available at the service access centre. There may be a health clinic, which is a lower level of service provision than the basic country hospital, but is a higher level of service than that provided by a sole GP in the smaller centre. The larger the client centre, the lower will be the contribution of the population disadvantage element to its score.

The GSAF uses population to distinguish relative disadvantage between the client population centres of different sizes whilst identifying which population centres actually provide a service.

2. Time/Cost/Distance Units

The time/cost/distance unit allows the relative time, cost and distance from the service centre to be calculated for each population centre. Time, cost and distance have significant influence on access (Morrill 1974; Vickerman 1980). The time/cost/distance element incorporates three sub-elements. By calculating the average distance travelled by the average motor vehicle on either a sealed or unsealed road or a combination of both in one hour provides the distance and time sub-elements.

The time element is one hour. Both the amount of distance and cost of travel for one hour have been calculated to make them interchangeable.

The cost of travel per hour is calculated by using an hourly rate of pay based on the national modal wage together with the standing and running costs of a motor vehicle for one hour. It has been established that there are two distance values in the distance sub-element. They are 75 kilometres for sealed roads and 68.8 kilometres for unsealed. These values have been established after exhaustive research into a multiplicity of journeys across and around Australia. The GSAF uses the average distance sub-element values of a motor vehicle calculated for either a sealed or unsealed road. These values are used to calculate the distance scores of client population centres. A kilometre travelled on unsealed roads is valued at 22% more than one on a sealed road and would generate a 22% higher value in the distance sub-element of the time cost distance unit. Where there are no roads one would measure the disadvantage in terms of time. For example if it took 3 hours 45 minutes to drive across country to the nearest dirt road one would convert the 3.75 hours into kilometres by multiplying the units of time by the standard road kilometre value and generate a distance equivalent in kilometres, and then add 22%. In the example given this would be 343 kilometres. The unsealed road kilometre value (22% loading) is used rather than the sealed as the wear and tear on the vehicle is more akin to that experienced on unsealed roads. Travel on unsealed roads is a constant for the inhabitants of rural and remote Australia in all polities.

These three sub-elements are combined into the time/cost/distance unit. This key element allows air, sea and all forms of travel, even where there are no roads, to be uniformly and objectively calculated and incorporated into the final access score.

The calculation of distance from islands can be achieved by determining the cost of the flight (or flights, if more than one plane is necessary) and then dividing that cost by the cost sub-element value to get a quotient. That quotient is then multiplied by the distance sub-element value (75 kilometres) to produce the road distance equivalent. Time spent in embarkation, flight exchange and luggage collection can be summed and divided by the time element (1 hour) to get a quotient and then that too can be converted to kilometres and added to the other kilometre figure to get the final distance value. Frequency of flights and time delays can also be factored into the final calculation.

The operation of the time/cost/distance unit can be illustrated by examining the journey of a client from Tasmania to a service on the mainland of Australia.

The Tasmanian client would first determine which mode of transport is most appropriate for her to use in accessing the service access centre that provides the specific service required. The distance she drives from her place of residence to the airport at Hobart or Launceston would be calculated in kilometres, or the cost of a taxi could be converted through the cost sub-element to a distance equivalent. The distance to the airport would be added to the cost of the airfare when converted into a distance equivalent. Likewise the taxi fare from the airport to the service centre could be calculated. All three stages of the journey would be added together to give a kilometre equivalent value. Added to this would be 30 minutes for embarkation and 15 minutes to collect luggage. The 45 minutes when converted into kilometres would be added to provide an accurate road distance total.

If it was necessary to take a motor vehicle to the mainland to access services and the client therefore has to travel by sea on the Spirit of Tasmania, this is calculated as follows. The time taken for the ferry trip would be converted from hours into a kilometre equivalent. The kilometre equivalent would be added to the actual kilometres driven from the client's population centre to the ferry and from the ferry terminus on the mainland to the point of service. The total kilometres, equivalent and actual, will be added to provide the final distance value.

The GSAF approach using the time/cost/distance element provides an objective, transparent, verifiable distance value based upon verifiable data and established mathematical techniques.

3. Economic Resources

The third element of the GSAF is the measurement of the economic resources of the client population centre. This element is used to establish the capacity of the inhabitants of a client population to overcome the cost of accessing services. The economic resource score is derived from the Australian Bureau of Statistics' Index of Economic Resources.

The Index of Economic Resources reflects the level of economic resources within a population centre. This index provides the base information from which the economic capacity of the inhabitants of a population centre to overcome the cost barrier of travel to their nearest service access centre is calculated.

The Australian mean established for the Index of Economic Resources by ABS is 1000. Therefore, all client population centres with a score of more than 1000 (i.e., that are above the mean) are considered to have no economic disadvantage and therefore accrue no disadvantage score in this element. Most population centres in rural and remote Australia have an index below 1000 and therefore receive a score under this element.

The economic resources element is the most contentious element of the GSAF, especially amongst supporters of a purely geographical approach to defining relative service disadvantage. They argue that

> while it is clear that socioeconomic disadvantage can greatly exacerbate locational disadvantage, it was considered preferable to adopt an unambiguously geographical approach to defining remoteness. [This decision was made because of concerns that] including locational and socioeconomic disadvantage in a single measure of remoteness means that one can never be sure of the extent to which an area is locationally disadvantaged versus the extent to which it is socioeconomically disadvantaged (DH& A 2001).

The Australian Bureau of Statistics in their information paper "Outcomes of ABS Views on Remoteness Consultation, Australia" (ABS 2001) in responding to their earlier consultation paper "ABS Views on Remoteness" stated that

> the GSAF is an analysis or classification of the population. It is not a candidate for a geographical classification because it includes socioeconomic variables. [It] measures impediments to accessibility such as time/cost/distance and the socioeconomic capability of the community to overcome those impediments (ABS 2001).

These comments serve to establish the differences between a geographic and an access approach to a national classification. Whilst there is consensus that socioeconomic status can greatly impact upon locational disadvantage it is not considered a factor that should be incorporated in a purely geographical classification. Geographical classifications quantify distance and the spatial distribution of population centres, whereas an access classification such as the GSAF, quantifies the relative impact of a range of impediments to the ability of population locations to access services.

The socioeconomic element of the GSAF is included precisely because it impacts greatly on locational disadvantage. In rural and remote areas public transport is extremely limited or non-existent. Inhabitants of those areas who cannot afford motor vehicles or have poor quality motor vehicles and limited money for fuel or airfares have fewer opportunities to travel and access services. The cost of motor vehicle travel is exacerbated by the wear and tear caused by unsealed roads in all rural and remote areas. For example, visiting a doctor can be very expensive if you have to travel long distances over indifferent roads to see one.

The impact of economic resources is well illustrated when one thinks of media mogul Kerry Packer sitting in his living room on one of his visits to his Newcastle Waters cattle station in the Northern Territory. He will have a jet plane on the airstrip at his disposal, while a few kilometres away members of the Marlinja Aboriginal Community are sitting in their camp. Both Kerry Packer and the Marlinja community members have the same the same geographic distance access but because of the difference in their respective economic resources they do not have the same access to service centres and services.

Mining towns and communities in the same geographical area often have very different access to services because of their different socioeconomic statuses and the subsidisation of travel often provided to those living in mining communities. Many farmers and inhabitants in country towns and communities throughout Australia have their access to service reduced because they have limited financial resources, especially in times of drought, to spend on travel. This is evidenced by statistics that rural people see a doctor far fewer times than their urban counterparts and that they generally leave it longer before they see them. In the far west of New South Wales 35% of the population between 25 and 54 has an income of less than $200 per week (UNSW Rural Health Data Base 2002) which must limit travel options.

Rural and remote communities not only have low income levels but are faced with the withdrawal of essential services. According to the Finance Sector Union (2001) New South Wales, Victoria, Western Australia and Tasmania have lost one third of their regional branches. In Victoria, according to Taylor (1998)

> [rural] schools, hospitals and social service offices are thinly scattered and poorly resourced and it is often difficult to attract professionals to rural areas [and] these rural infrastructure problems are exacerbated by many commercial enterprises closing down or scaling down their rural offices because of alleged poor financial returns, a development which reduces employment opportunities, results in a financial drain from the community and produces loss of community confidence. The simultaneous scaling down of local councils and the introduction of compulsory tendering reduced the size of the local government workforce and severely reduced the level of regional/rural services

It is evident throughout rural and regional Australia that the socioeconomic status of communities is affected by rural decline and that the withdrawal of services makes them more expensive to access. It is difficult to see how a service access classification can reflect relative service access without incorporating a socioeconomic element.

There is a further criticism of the GSAF that is of a more technical nature and challenges the legitimacy of using the ABS SEIFA Indices, of which the Index of Economic Resources is one, to generate a measure of disadvantage in the classification. The ABS SEIFA scores are an ordinal measure of disadvantage, not an interval measure, and as a result the relationships between the scores are not strictly arithmetically relative. For example a collection district (CD) with a score of 1000 is not necessarily twice as advantaged as a CD with a score of 500. Similarly the difference between two CDs with index values of 800 and 900, or 1050 and 1150, are not necessarily the same. They may be close but they are not exactly the same.

This is a valid technical criticism; however, the SEIFA indices are the only nationally accepted and comparable measures of socioeconomic status available. Further, the SEIFA indices have been subjected to independent external validation using subjective local knowledge and direct observation of the CDs. It was found that the gradings subjectively assigned corresponded closely with the rankings provided by the index values. Further validation and evaluation of the indices in 1996 ensured that the top and bottom CDs from each state compared favourably with 1991 data. Whilst the SEIFA indices are not mathematically perfect for generating relative socioeconomic disadvantage they are the best nationally available measure and their ability to differentiate between CD's on the basis of their score has been externally validated. On this basis, and in the knowledge that these scores would be incorporated with two other element scores that are interval measures, the IER scores were incorporated into the GSAF to produce the final disadvantage score.

Combining the Elements

The decision to combine the elements of population centre size, time, cost, distance and economic capacity did not occur by chance. Every element in the GSAF is there for the specific purpose of providing the most comprehensive, objective and accurate measure of access disadvantage possible. All the elements of the GSAF are objective. Population centre size is an objective element derived from ABS data. There is an abundance of research evidence that there is a hierarchy of service provision based on population centre size.

The Time, Cost and Distance element is based on the independent impact on service access of the three elements. They are combined in one element to accommodate the whole range of impediments on access to services.

The economic resources element is to accommodate the impact that socioeconomic status has on service access.

The three component elements of the Service Access Frame are combined to provide an access score for each population centre in Australia relative to a level of service access. By using Principal Component Analysis the three element scores are combined to produce the final service access score. The access profile provides a simple exposition of the impact that each of the three elements has upon a population centre's access to services. The combination of the three elements allows very precise measurement of service access disadvantage.

Application of the Model

The GSAF has been applied for quantifying access to primary and secondary education on a state-wide basis in Tasmania, Queensland, Northern Territory, South Australia and Western Australia. The

Queensland Transport Department and the New South Wales Road Traffic Authority have used the GSAF in projects for identifying road routes to maximise access to remote communities.

The GSAF is viewed favourably in the ABS Review of the Australian Standard Geographical Classification as an access classification. UNESCO, the Australian Human Rights and Equal Opportunities Commission (HREOC) and the Collins Review of Indigenous Education in the Northern Territory have all identified the GSAF as the most equitable remote area classification available.

Validation of the GSAF

The best test of any service access (or geographical) classification is independent validation by persons with local knowledge from regions representative of Australia as a whole including polities that have every kind of population centre, spatial distribution and population profile. Queensland, Tasmania and the Northern Territory combined provided a valid representation of Australia as a whole, having Brisbane as a major city and suburbs, a range of middle order cities, Gold Coast-Tweed Heads, Townsville-Thuringowa, Hobart, Darwin and a full range of population centre sizes. The population centres that were validated were distributed through suburbs, rural areas, and remote areas. Some were clustered together; others evenly dispersed or widely scattered across the regions. External validation over this diversity of settings would test the classification thoroughly and demonstrate if the elements of the model combined to produce scores that had face validity across all of Australia. A GSAF service access model of access to full primary and secondary education was produced and GSAF scores generated for all the schools in the three polities.

School community members, local residents, school teachers and education support and administrative staff who had detailed knowledge of the schools in individual regions throughout the Northern Territory, Queensland and Tasmania (in 17 education regions across the three polities) were surveyed. The survey was carried out independently by the education department statistical officers in those three polities. The aim was to test the validity of the GSAF scores against the detailed local knowledge and experience of the local population of the relative remoteness or access disadvantage of schools in their regions.

The questionnaire asked them to rank schools in their region on the basis of their access to the nearest service access centre that provided their students with full primary and secondary educational services and specialist support. The respondents ranked the schools according to their perceptions of the schools' relative access to the service access centre. They were asked to take into account the size of the population centre in which the school was located and the actual distance, travel time and cost disadvantage experienced by each school. The respondents' responses and rankings were collected by the state statisticians and compared to the rankings generated by the GSAF, these having been provided to the departmental statistics officers prior to the questionnaires being distributed. The respondents' rankings were then compared with the GSAF rankings using Spearman's Rho (a mathematical technique used to determine correlations in data). The correlations were assessed at each region and state, and collectively across the three polities to ascertain the extent of correlation at all levels. This evaluation was undertaken in and for each of the seventeen regions.

Survey Results

A very high correlation was found to exist between the GSAF rankings and the rankings of the respondents in fifteen of the seventeen regions surveyed. In two regions (specifically the local government areas of Pioneer and Calliope in Queensland) there were significantly lower correlations. These lower correlations were investigated. It was found that the atypical populations that existed on the coast of Queensland (comprising of unemployed seasonal sugar workers, alternative lifestyle communities and low rent seeking pensioners) had not been taken into account by the school community respondents, who generally represented a more stable community group. Dr. Ward of the Queensland Department of Local Government and Planning experienced a similar problem in these two particular local government areas and reported his findings in a paper in 1995 (Ward 1995). After further investigation by Queensland Department of Education statistics personnel in consultation with the schools, the GSAF Scores were acknowledged as properly representing the population profiles of those regions. Further, the GSAF classification elements and the validation process itself were further scrutinised with the rigour applied to doctoral theses by independent experts in the USA and Australia. The high correlations between the model scores together with the face validity of the rankings confirmed the efficacy of the GSAF. No other national classification has been subjected to such rigorous independent validation as the GSAF.

A Geographic Application of the GSAF - Zones Of Relative Access

The GSAF was originally developed to determine the relative access disadvantage of population centres for allocating resources. However, by developing Zones of Relative Access (ZORAs), the GSAF is capable of accurately targeting specific population groupings across Australia to allow education, health and social service data to be collected and analysed in a much more relevant way to that currently available.

The GSAF utilises the ABS Collection District (CD) as the base unit for ZORAs. By clustering these CDs on the basis of their GSAF access scores it is possible to develop a ZORA. The concept of a ZORA has been developed to address the need for a spatial population unit that reflects the differing characteristics of access disadvantaged communities across Australia based on a standard ABS unit of analysis, the CD.

ZORAs provide a much more meaningful classification for targeting resources, collecting data or measuring outcomes than purely distance based boundaries generated in geographical classifications. ZORAs can be generated to determine as many classifications as are meaningful within the data sets using the data intervals. The wider the range of zones used the more sensitive the measure of relative access disadvantage. The ZORA consists of CDs clustered at the state or national level because they have the same or very similar service access scores.

The population within a ZORA will be relatively homogeneous even if they are from different geographical locations. The CDs in the ZORA have a common population profile based on the size of their population, the centre's access to services in terms of time/cost/distance and their IER scores. By clustering CDs into ZORAs in this manner it is possible to target specific population groupings. A ZORA will cluster CDs for a specific purpose. The ZORA approach, with ABS support, could complement the SLA as the unit of analysis for some specific purposes especially in determining a level of access to a specific service or level of services in rural and remote Australia.

The ZORA approach would provide a much more accurate method of targeting needs groups and for measuring the outcomes of policy initiatives in access disadvantaged locations. By establishing Zones of Relative Access using different groupings of access scores, comparisons could be made of community needs and policy outcomes at different levels of access disadvantage.

Zones of Relative Access to Primary and Secondary education have already been mapped for Queensland, Tasmania, South Australia, Western Australia and the Northern Territory to test the practicality of this proposal. ZORAs were used to compare the educational outcomes of students in the Northern Territory and successfully demonstrated that those students that were most access disadvantaged had the lowest educational achievement (except for those that have personal economic resources or can access extra financial support from government to overcome the access disadvantage, such as School of the Air Students).

Summary

This article has attempted to raise the major issues in developing a meaningful national classification of access disadvantage. The major concern of the author is with accurately quantifying the extent of the needs of the inhabitants of rural and remote population centres and their capacity to access services vital to their own and their children's futures.

There are currently three established national classifications used in Australia, for measuring geographical locations or access disadvantage. They are the former Department of Primary Industry and Energy and Department of Health and Human Services', Rural, Remote and Metropolitan Areas (RRMA) classification, the Department of Health and Ageing's Access/Remoteness Index of Australia (ARIA) that are represented as geographical classifications and the Griffith Service Access Frame (GSAF) which is a service access classification.

The continued use of geographical classifications has the potential to significantly and negatively impact on the wellbeing and life chances of many of the inhabitants or rural and remote Australia. It is time to reconsider how service access is quantified so that service providers to, and the inhabitants of rural and remote Australia can get a better method of quantifying their condition and addressing their needs. Adoption of a service access classification such as GSAF will provide the objective, reliable data and meaningful information that can inform policy making and the development of strategies to tackle access disadvantage.

References

AUSTRALIAN BUREAU OF STATISTICS (2001) "ABS Views on Remoteness". Information paper, ABS Catalogue No. 1244.0, Commonwealth Government Printer, Canberra, ACT.

AUSTRALIAN BUREAU OF STATISTICS (2001) "Outcomes of ABS Views on Remoteness Consultation", Australia. Information paper, ABS Catalogue No. 1244.0.00.001., Commonwealth Government Printer, Canberra, ACT.

DICK, R.S. (1971) "A Definition of the Central Place Hierarchy of the Darling Downs". Queensland Geographic Journal, Number 1, 1971, Queensland.

HUMPHREYS, J.S. (1988) "Social Provision and Service Delivery: Problems of Equity, Health and Health Care in Rural Australia". Geoforum, Vol. 19. Number 3: 323-338.

MORRILL, R.L. (1974) "The Spatial Organisation of Society" Duxbury Press, Massachusetts.

ROSE, A.J (1967) "Patterns of Cities", Nelson, Dai Nippon Printing Co., Hong Kong.

SCOTT, P (1964) 'The Hierarchy of Central Places in Tasmania', "The Australian Geographer", Vol. 9, Number 3, 1964

SMAILES, P.J. (1969) "Some Aspects of the South Australian Urban System", "The Australian Geographer" Vol. 11, Number 1.

TAYLOR, T. (1998) "Australian Case Study in Partnership: Rural Decline, Unstable Curriculum and Grassroots Professional Development". Journal of Inservice Education, Volume 24, No. 2.

UNIVERSITY OF ADELAIDE (1999) "Accessibility/Remoteness Index of Australia (ARIA)", Occasional Paper No. 6. Information and Research Branch, Department of Health and Aged Care and National Key centre for Social Applications of Geographical Information Systems at the University of Adelaide. Adelaide, S.A.

VICKERMAN, R.W. (1980) "Spatial Economic Behaviour." St Martins Press, New York

WARD, G. (1995) "Migration Trends in Northern Queensland: implications for planning". Paper to North Australian Statistics Workshop, Australian Bureau of Statistics and Commonwealth Department of Housing and Regional Development, Darwin, NT

Related Reading

ARUNDAL, G., GARNUAT, J and WILTON, J. (1991) "Rural, Remote and Metropolitan Regions Classification". Rural and Provincial Policy Unit, Department of Primary Industries and Energy, Canberra, ACT.

CAMERON, J.M.R. and GRIFFITH, D.A. (eds) (1992) "Education, Equity and the Crisis in the Rural Community" Papers from the Rural Education and Research Association Conference, Alice Springs 1992, Northern Territory University, Darwin.

CHRISTHALLER, W. (1933) "Die Zentralen Orte in Suddeutschland Eine Okenomisch Geographische Untersuchung uber die Gesetzmassigkeit der Verbrietung und Entwicklung der Siedlengen mid Stadtschen Funktionen". Gustav Fischer, Jena, Deutschland.

COMMONWEALTH DEPARTMENT OF HEALTH AND AGED CARE (2001) "Measuring Remoteness: Accessibility/Remoteness Index of Australia (ARIA)". Occasional Paper 14, Revised edition. Canberra, ACT.

COMMONWEALTH DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY & DEPARTMENT OF HUMAN SERVICES AND HEALTH (1994). "Rural. Remote and Metropolitan Areas Classification 1991 Census Edition" Explanatory Paper: Canberra, ACT.

FAULKNER, H.W. and FRENCH, S (1983) "Geographical Remoteness: Conceptual Measurement Problems". Paper No. 54, Bureau of Transport Economics, Canberra, ACT.

GRIFFITH, D.A. (1993) "Quantifying Access Disadvantage to Educational Services in Remote and Rural Australia", unpublished paper

GRIFFITH, D.A. (1994) "A Northern Territory Approach to Quantifying 'Access Disadvantage' to Educational Services in Remote and Rural Australia". Proceedings of the International Conference on 'Issues Affecting Rural Communities', Eds McSwan, D., and McShane, M., RERDC, James Cook University of North Queensland

GRIFFITH, D.A. and TIONG, F (1989) "Country Areas Program Mapping Exercise", Northern Territory Department of Education, Darwin, N.T.

GRIFFITH, D.A. (1993) "Using the Griffith Service Access Frame as a Planning Tool". Paper presented at James Cook University of North Queensland Social Services Seminar

GRIFFITH, D.A., PEARSE, T.J. and YICK, J. (1994) "Analysis of the Country Areas Formula". Unpublished. Northern Territory Department of Education, Darwin, N.T.

GRIFFITH, D.A. (1996) "Development of a Spatial Model to Quantify Access to Services in Rural and Remote Areas of Australia". Doctoral Thesis, Northern Territory University, Darwin, N.T.

GRIFFITH, D.A. (1998) "A Critique of the Commonwealth Department of Education, Training and Youth Affairs' Country Areas Funding Formula". Paper for the Rural Education Research and Development Seminar, James Cook University of North Queensland, Townsville, Queensland.

GRIFFITH, D.A. (1998)" A Critique of the Commonwealth Department of Primary Industries and Energy, Rural remote and Metropolitan Classification". Seminar Paper, James Cook University of North Queensland, Townsville, Queensland.

GRIFFITH D.A. (1998)"Boiling the Frog – The Dangers of Linking Efficiency Targets, Economic Rationalism and National Eduction Benchmarks to Resource Allocation and the Implications to Systems with Significant Numbers of Disadvantaged Students". Paper presented at the Australian Rural Education Research Association Conference, Adelaide, S.A.

GRIFFITH D.A., SMITH, D.K. and YICK, J. (1998) "An Analysis of Multilevel Assessment Program Reading Test Results Using the Griffith Service Access Frame Zones of Relative Access". Research Paper to the Northern Territory Department of Education Executive and the Northern Territory Board of Studies, Commonwealth Revenue Branch, NTDE, Darwin, N.T.

GRIFFITH D.A. (2000) "The Griffith Service Access Frame and the Fundamental Elements of Measuring Access Disadvantage in Australia". Paper presented to the Australian and New Zealand Population Workshop, Darwin. N.T.

HOLMES, J.H. (1988) "Remote Settlements". "The Australian Experience" Edited by Heathcote, R.C., Longman and Cheshire, Melbourne.

HUGO, G., GRIFFITH, D.A., REES, P., SMAILES, P., BADCOCK, B. and STIMPSON, R. (1997) "Rethinking the ASGC: Some Conceptual and Practical Issues". A Monograph prepared for the review of the Australian Standards Geographical Classification Project commissioned and funded by the Australian Bureau of Statistics, University of Adelaide, Adelaide, S.A.

ROUSSEAUX, K. (1993) "Rurality and Participation in Schooling" Australian Education Council, Melbourne, Victoria.

WESTERN, J. McMILLAN, J., DURRINGTON, D. (1998) "Differential Access to Higher Education: The Measurement of Socioeconomic Status, Rurality and Isolation". University of Queensland, Brisbane.