Professional Practice and Innovation:

Chronic disease, geographic location and socioeconomic disadvantage as obstacles to equitable access to e-health

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Abstract
Despite recent public attention to e-health as a solution to rising healthcare costs and an ageing population, there have been relatively few studies examining the geographical pattern of e-health usage. This paper argues for an equitable approach to e-health and attention to the way in which e-health initiatives can produce locational health inequalities, particularly in socioeconomically disadvantaged areas. In this paper, we use a case study to demonstrate geographical variation in Internet accessibility, Internet status and prevalence of chronic diseases within a small district. There are significant disparities in access to health information within socioeconomically disadvantaged areas. The most vulnerable people in these areas are likely to have limited availability of, or access to Internet healthcare resources. They are also more likely to have complex chronic diseases and, therefore, be in greatest need of these resources. This case study demonstrates the importance of an equitable approach to e-health information technologies and telecommunications infrastructure.

Keywords (MeSH):
Health Services Accessibility; Internet; Telecommunications; Socioeconomic Status; Geographic Factors; Chronic Disease; Access to Health Care.

Introduction
The World Health Organization (1997: 33) has defined e-health as 'the cost-effective and secure use of information and communications technologies (ICT) in support of health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research'. E-health in Australia is associated with a number of benefits including: increased access to healthcare services and health-related information; improved ability to diagnose and track diseases; timely public health information; and expanded access to ongoing medical education and training for health workers (Wave 2009).

However, geographical place is likely to shape the effectiveness of e-health interventions due to the significant geographic variations that exist in Internet accessibility across Australian cities and towns and socioeconomic areas. This geographical distribution will drastically affect access to e-health platforms (Pickett & Pearl 2001), particularly among those from socio-economically disadvantaged regions. Given that the social determinants of health and health care quality are also geographically oriented (i.e. constantly determined in reference to a specific geographical area), there is even more reason to develop an equitable approach to e-health.

This paper explores the relationship between access to technology, socioeconomic disadvantage and the prevalence of chronic disease in a specific region, using both national and local data. We conclude that e-health initiatives must give close attention to geographical inequalities, rather than simply endorsing the common rhetoric, which assumes that the e-health solutions will address the challenges associated with poor health in socioeconomically disadvantaged areas.

e-Health: a new accessible service provision platform?

The rising cost of healthcare and health-related services has become a major health policy issue in many countries (Anderson at al. 2006). In Australia, it is estimated that the cost of healthcare will significantly increase over the next few decades, predominantly due to our ageing population. According to the National Health and Hospitals Reform Commission (2009), Australia's ageing population will put new pressures on health services while reducing the number of skilled professionals of working age. Thus, there is an imperative to seek new methods of service delivery that can reach more people with fewer resources. Varying responses have emerged regarding the best way to address rising healthcare costs from complex community interventions that attempt to prevent ill health (and thus decrease future health spending requirements). However, one of the most common solutions involves new service provision platforms such as e-health infrastructures (Cashen , Dykes and Gerber 2004). Thus, Information and Communications Technology (ICT) such as the Internet (and in particular broadband connections) have become a focus of government policy within Australia (Australian Bureau of Statistics 2006a).

There is no doubt that the application of remote monitoring via these ICTs opens new possibilities for treating patients in outpatient settings, or in situations where access to hospital beds and clinics is limited. In particular, monitoring patients with chronic conditions at home has been found to dramatically improve survival rates (Wave 2009). Internet and e-health applications are expected to be particularly useful in rural areas, providing real-time health information and diagnoses to those who cannot travel to medical appointments.

However, Curtin (2001) highlighted the notion of a 'digital divide' between particular sub-populations. For instance, people in urban areas are likely to have improved level of connectivity in comparison to their regional and remote counterparts. Curtin (2001) also demonstrated the likelihood of a division based on socioeconomic factors. This factor is likely to contribute significantly to geographic patterns of Internet connectivity, even within urban areas. For instance, a recent Australian Bureau of Statistics survey, 2005-06 Household Use of Information Technology (HUIT), revealed that only 34% of people in the bottom income quintile households had home Internet access, compared to 77% in the top income quintile. Of those households without Internet, 22% in the bottom two equivalised income quintiles attributed their lack of access to the high cost of Internet connection (ABS, 2006b).

In another Australian study, Lloyd and Bill (2004) demonstrated that a range of Internet factors including education, family composition and indigenous status affected the likelihood of having access to the Internet. They also concluded that health status itself was likely to influence Internet usage. However, according to a state government report (Queensland Health 2009), almost one fifth (17%) of the burden of disease and injury in Queensland was due to socio-economic disadvantage.

Thus, complex relationships appear to exist between Internet access, chronic disease and socioeconomic status. Both the prevalence of chronic disease and access to the Internet are likely to be influenced by socioeconomic disadvantage. It is plausible, therefore, that those who are most unwell are also least likely to access Internet e-health initiatives, but are also least likely to have the resources needed to address their health through other mechanisms. Socioeconomic disadvantage is known to be influenced by (or influence) place of residence, meaning that e-health has the potential to significantly exclude large sectors of the community and contribute to the cyclical disadvantage of particular geographic locations.

A geographical approach to e-health

Recent research from a number of disciplines is shedding light on the interrelationships between a place, the people living there and their health (Macintyre , Ellaway and Cummins 2002; Bernard et al. 2007). Because underlying geographical inequalities and social health determinants can be hidden by national and population-level data, many researchers are now using more localised methodologies to investigate the effects that specific places have on health and health disparities (Popay et al. 2003; Bernard et al. 2007). Patterns of health can vary depending on where people live and can be interpreted from a geographical perspective. Bernard et al. (2007), for example, examined the local production of health inequalities in everyday life. They argued that neighbourhood resources contained within the physical environment (e.g. physical proximity) and the social environment (e.g. informal reciprocity) can determine the availability of, and access to, health-relevant resources in a geographically defined area.

In exploring this effect of location on health, researchers have identified that the effect of place extends beyond its influence on lifestyle factors alone. For instance, compositional (the people who live there) and community (context) factors both contribute to health differentials (Macintyre, Ellaway and Cummins 2002; Travaglia et al. 2006). In their work on the nature of a healthy neighbourhood, Macintyre, Ellaway and Cummins (2002) suggested a number of material or physical infrastructure features that shaped social functioning and practices that are subsequently linked to health and wellbeing outcomes (e.g. meeting places, public facilities, open space). Travaglia and her colleagues (2006) examined the capacity of the public health workforce in New South Wales to understand the causes and effects of location-based disadvantage and the actions that could be undertaken to address health inequalities in particular areas. They argued that health initiatives should include a focus on locational disadvantage and that the public health workforce should receive geographically-oriented training. More recent studies conducted overseas (Dowler & Spencer 2007) and in Australia (Baum et al. 2006) have confirmed the complex relationships that can exist between place and health. Dowler and Spencer (2007) concluded that the concept of place-based health is under-utilised and that understanding of this relationship could inform policy-making.

Within the health sector, it is assumed that the broadband network will facilitate e-health solutions. Indeed, the potential of the Internet as a tool for empowering and enlightening patients and promoting improved self-management skills are well documented (Anderson et al. 2003; Kaplan, Everson and Lynch 2000). Improved access to broadband does provide a unique opportunity to widely disseminate e-health resources. However, this medium is unlikely to reach all of those in need of social support and self-management health information (Cashen et al. 2004).

In the context of e-health, the need for equitable access to broadband has been recognised by the Australian Government through its commitment to a national broadband network (costing $4.7 billion), which will eventually service 98% of homes and businesses across Australia. The Australian Broadband Guarantee funding program of $270.7 million over the next four years currently provides the basis for this improvement (Queensland Government 2009).

Australia has experienced substantial change over recent years in the number of people who have access to the Internet in their home. The Australian Bureau of Statistics (ABS) reported that between 2001 and 2006 there was a 28% rise in dwellings with Internet connections, rising from 35% in 2001 to 63% in 2006. During the same time, overall connectivity in the Australian Capital Territory increased from 49% to 75%, having the highest rate of Internet connectivity in Australia. In contrast, Tasmania had the lowest connectivity with 55% (up from 27% in the 2001 Census). Queensland also had relatively high levels of connectivity (64% in 2006 of which 41% were broadband), representing a rise of 30% since 2001(Australian Bureau of Statistics 2006a).

Advanced fibre optic telecommunications are now available in many metropolitan areas, but gaps exist in the infrastructure found in most outlying areas. For instance, although the Brisbane Statistical Local Areas (SLA) of Fig Tree Pocket and Mount Ommaney had Broadband connectivity rates of nearly 80%, the outer SLA of Logan (Central) Balance had less than a half of the rates (36%) and Ipswich (C) - South-West had the lowest rate of Broadband connectivity (9%) in Australia (ABS 2006a).

Despite significant advancements in telecommunications infrastructure, the question remains as to how this new health information technology will be taken up across regions. A key concern of this paper is the need for governments, universities, and other networked healthcare organisations to provide efficient and integrated e-healthcare delivery that also attends to the specific needs, assets, and capacity of local communities (i.e. e-health consumers within particular places). By viewing the e-health agenda from this geographical viewpoint, this paper emphasises the importance of an equitable geographically-based approach to e-health.

In this paper, we have supported our argument for a geographically equitable approach to e-health by providing a case study of Internet use, chronic disease prevalence, and socioeconomic status within one region. Using Geographical Information Systems[1] (GIS) software to map relevant variables, this paper gives a concrete example of why e-health interventions need to work with a framework based on the social determinants of health and be located firmly within the concept of place.

Method: the case study

We first selected the area of interest (AOI), which consisted of 20 Statistical Local Areas (SLA). The SLAs equated to the suburbs contained within the geographic and administrative boundaries of the Logan-Beaudesert health services district. Geographic Information Systems (GIS) software was used to map the three key geographical patterns: (1) Internet accessibility (2) socioeconomic status (SEIFA) and (3) prevalence of chronic diseases[2].

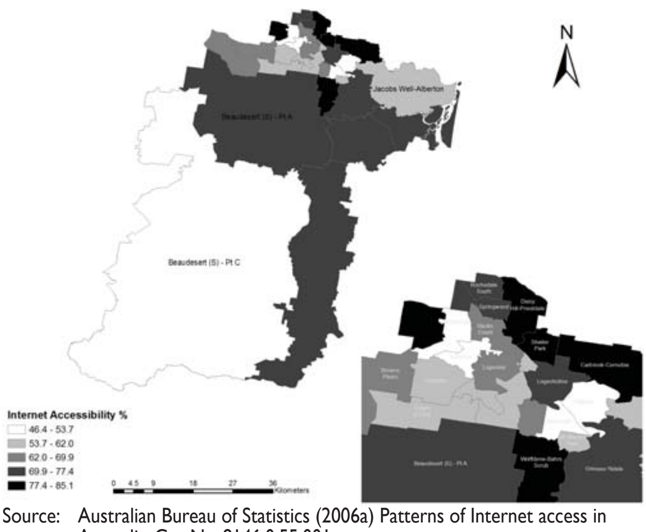
1 Geographic Information Systems (GIS) is a mapping tool that is used to visualise the geographical variations and patterns across our variables of interest.

2 The prevalence of chronic diseases was measured by the respondent's health status on chronic diseases such as arthritis and osteoporosis, cardio-vascular, cancer, diabetes, circulatory and respiratory conditions.

To map these patterns, we collected both primary and secondary data sources. The primary data included a local survey consisting of items designed to measure the presence of specific chronic diseases. Approximately 8,000 surveys were successfully delivered to randomly selected addresses within the regions of Logan and Beaudesert. After discarding undeliverable surveys, 1,004 people responded (13% response rate), which is reasonable for a self-reported mail survey. Response bias occurs when one subgroup of the population is more or less likely to participate than another (Czaja and Blair 2005). Accordingly, our sample may be subject to response bias due to minimal responses from people with low education, people with low literacy skills, those who have physical difficulties reading or writing, and those who do not have an interest in the topic

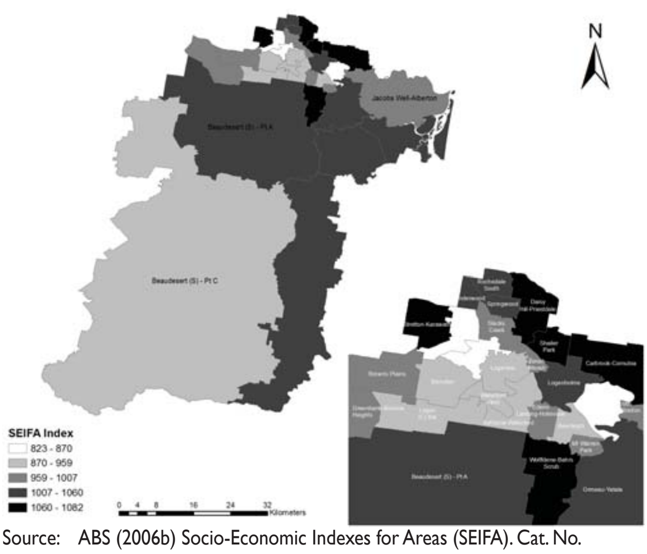
We constructed a sampling frame based on the ABS Census 2006 and sampled deliberately from all suburbs in the region to enhance representativeness. To examine any potential bias, we compared our sample to the population from all suburbs within the region. We included a wide range of questions on demography, socioeconomic and health status to enable detailed comparison. However, possible bias in this sample could arise because some household member types are underrepresented, such as males with full-time employment because data from only one member of each sample household were collected. A post-stratification survey weight method was used to weight the sample with the under-representation of other members of the households. In total, 287 variables were collected through this survey, but the variable of interest to this paper was the presence or absence of at least one diagnosed chronic medical condition. This variable was combined with data from secondary sources to examine Internet access and socioeconomic status across the region.

Secondary data were drawn from the ABS Census 2006 and Socio-Economic Indexes for Areas (SEIFA). The Census of Population and Housing is collected nationwide every five years and includes a question regarding the presence and characteristics of Internet connections at individual dwellings (Australian Bureau of Statistics 2006a). The SEIFA classification is a set of ABS indexes that measure the socioeconomic wellbeing of areas across Australia (Australian Bureau of Statistics 2006c). We obtained the SEIFA data (Cat no. 8146.0.55.001) for each SLA of the Logan- Beaudesert region by extracting the SEIFA Statistical Local Area Data Cube from the ABS. The SEIFA index is a composite index that includes, for example, household income and tertiary education levels (Australian Bureau of Statistics 2006c), where lower scores indicate more disadvantaged areas and higher scores indicate more advantaged areas. It is used widely by social researchers and policy makers for determining patterns of social disadvantage and identifying high areas of need for resource allocation (Queensland Health 2009). SEIFA is the only readily available measure of socioeconomic status at a small area level (e.g. census district or SLA) (Kennedy and Firman 2004) and is based on the assumption that the characteristics of populations or households in each area are relatively homogeneous. Internet accessibility data were obtained from the ABS Census of Population and Housing (Australian Bureau of Statistics 2006a). This variable was represented by the proportion



Source: Australian Bureau of Statistics (2006a) Patterns of Internet access in Australia. Cat. No. 8146.0.55.001.

Figure1. Proportion of dwellings with Internet Accessibility by SLAs



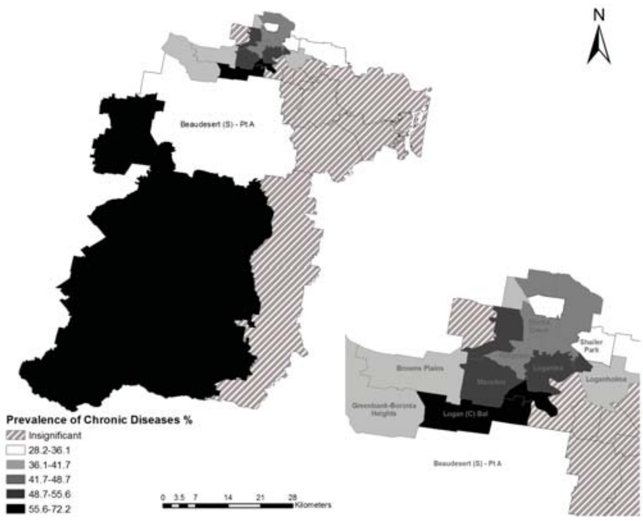
Source: ABS (2006b) Socio-Economic Indexes for Areas (SEIFA). Cat. No. 2039.0.55.001

Figure 2. SEIFA Index with Disadvantage Score

Table 1: Percentage of Internet Accessibility and Chronic Disease Prevalence in Logan-Beaudesert

STATISTICAL LOCAL AREAS	INTERNET ACCESSIBILITY^ %	SEIFA INDEX*	CHRONIC DISEASE %	TOTAL POPULATION
Beaudesert (S) - Pt A	76.0	1044	28.2	51260
Beaudesert (S) - Pt B	71.5	1035	NS*	11718
Beaudesert (S) - Pt C	52.6	959	65.7	13288
Browns Plains	69.9	1000	40.5	31450
Carbrook-Cornubia	79.6	1073	33.3	4176
Daisy Hill-Priestdale	79.2	1066	44.2	4357
Greenbank-Boronia Heights	63.9	971	40.5	8950
Kingston	53.7	1007	48.7	13303
Logan (C) Bal	58.3	954	72.2	3523
Loganholme	76.6	1056	41.7	14294
Loganlea	63.4	918	51.2	9337
Marsden	62.0	917	53	22351
Rochedale South	72.6	1047	47.1	15569
Shailer Park	81.5	1082	34.2	11985
Slacks Creek	64.2	975	47.3	11194
Springwood	74.4	1060	36.1	5885
Tanah Merah	58.6	989	55.6	1043
Underwood	73.7	1042	38.1	5145
Waterford West	56.5	920	62.2	6167
Woodridge	46.4	823	51.2	19457

Source: ^ABS (2006a), *ABS (2006b) and †Logan-Beaudesert Health Survey (2009)



Source: Logan-Beaudesert Health Survey (2009)

Figure 3. Proportion of People with Chronic Diseases in Logan-Beaudesert

of dwellings in each SLA that accessed any type of Internet resource (e.g. dial-up, wireless, broadband) as reported in the Census collection.

After converting all the data to the level of the SLA, the variables were mapped and classified using the natural break method, showing the proportion of the dwellings within each SLA that accessed any Internet (Figure 1), the SIEFA disadvantage scores for the SLA (Figure 2) and prevalence of chronic disease (i.e. people who reported one or more chronic diseases in the survey) (Figure 3).

Table 1 shows that the areas where any Internet access (e.g. broadband and dial-up) was lowest included Woodridge (46.4%), Kingston (53.7%), Logan Balance (58.3) and Waterford West (56.5). The prevalence of chronic disease also varied considerably across SLAs, from 28.2% (Beaudesert Part A) to 72.2% (Logan). As shown in Figure 2, the northern SLAs of Carbrook (33.3%), Shailer Park (34.2%) and Springwood (36.1%) showed a relatively lower rate of chronic disease whereas central Logan SLAs such as Logan Balance (72%), Kingston (48.7%), Waterford West (62.2%), Woodridge (51.2%) and Loganlea (51.2%) showed a relatively higher rate of chronic disease prevalence. Using the SEFIA index for SLAs, Figure 2 shows the areas where socioeconomic disadvantage was relatively high including Woodridge (823), Marsden (917), Loganlea (918) and Waterford West (920) whereas the areas of Shailer Park (1082), Carbrook (1072) and Daisy Hill (1066) were socioeconomically advantaged in comparison (see also Table 1).

Discussion

These data have revealed a strong trend for dwellings located within more disadvantaged neighbourhoods to be less likely to have an Internet connection than dwellings in more advantaged suburbs. In most SLAs, the same pattern[3] was evident (i.e., low Internet access, high prevalence of chronic disease and high level of disadvantage or high Internet access, low prevalence of chronic disease and low level of disadvantage).

There is no doubt that the use of the Internet has significantly increased communication, access to health information and the capacity to undertake health education in the last decade (World Health Organization 2008). However, as our data have shown, the geographical patterning of health inequalities and health outcomes is clearly linked to both the accessibility and use of health infrastructure in place

3 Only one SLA deviated slightly from this pattern, namely Tanah Merah, which is a small SLA so may be based on unreliable data.

(including e-health) and to the broader socioeconomic determinants of health. An equitable e-health approach will necessitate a new standard for e-health, ensuring that interventions attend to local geographical determinants of health rather than simply assuming that e-health initiatives will address current disparities in health.

Although e-health transcends the boundaries of space and place by being accessible from any Internet access point, it may not be able to remove the influence of the determinants of health created by geographical disadvantage. As the above case study highlights, even the basic precondition of Internet usage varies significantly in geographical terms. Further, this geographical distribution is strongly associated with the prevalence of disease and the relative disadvantage of each place.

Given that the determinants of health and healthcare quality are also geographically oriented, it is critical to embed geographical thinking into the future development of e-health initiatives. Local planning for Internet and telecommunications infrastructure must pay attention to geographical inequalities, particularly as more providers choose e-health options for service delivery. Of greatest concern is the possibility that existing health inequalities in socioeconomically disadvantaged areas may actually be exacerbated by inequitable distributions of Internet-based e-health interventions.

Conclusion

We conclude that geographical factors will influence the effectiveness of e-health strategies. In contrast to the place-based approach, existing e-health studies have typically measured their impact on a specific population, such as remote monitoring of individuals with diabetes (Jaffery & Becker 2004) or within a specific health care delivery site, such as intensive care systems (Burrell et al. 2009). Indeed, e-health infrastructures usually focus on only one tier of healthcare, such as specialist or primary care, rather than giving attention to the interrelated nature of healthcare delivery and health promotion within particular districts (Detmer 2003). Evidence about the effectiveness of e-health initiatives is, therefore, likely to be geographically confounded (i.e. conclusions may differ depending on the place within which the intervention was delivered). This potential confound has significant implications for the conclusions that can be drawn from research in this area.

The case study in this paper has confirmed that disparities exist in terms of access to health information. These disparities exist even within communities that have been labelled as socioeconomically disadvantaged. The most vulnerable people within these areas are likely to have limited availability of, or access to Internet healthcare resources. They are most likely to have chronic diseases and be in greatest need of resources.

In conclusion, e-health strategies need to be formulated to respond to the specific target population, reflecting the existing chronic disease demography and neighbourhood socioeconomic characteristics. There is little doubt that geographical determinants are likely to have significant implications for how, where, and when e-health services should be delivered in future. This study has provided a brief and useful insight into the need for a geographical approach to the policy that drives e-health initiatives in future. The e-health strategies that are developed in Australia in coming decades must address local geographical determinants of health and socio-economic disparities if they are to deliver their promised outcomes.

References

Australian Bureau of Statistics (2006a). Patterns of Internet access in Australia. Cat. No. 8146.0.55.001. Canberra, ABS.

Australian Bureau of Statistics (2006b). Household Use of Information Technology, Australia, 2005-06. Cat. No. 8146.0. Canberra, ABS.

Australian Bureau of Statistics (2006c). Socio-Economic Indexes for Areas (SEIFA). Technical Paper. Cat. No. 2039.0.55.001. Canberra, ABS.

Anderson, G., Frogner, B., Johns, R. and Reinhardt, U. (2006). Health care spending and use of information technology in OECD countries. *Health Affairs* 25(1): 819-831

Baum, S., Gallcum, Y., Haynes, M., and Han, J. H. (2006). Advantage and disadvantage across Australia's extended metropolitan regions: a typology of socioeconomic outcomes. *Urban Studies* 43 (9): 1549-1579.

Bernard, P., Charafeddine, R. Frohlich, K. L., Daniel, M., Kestens, Y., and Potvin, L. (2007). Health inequalities and place: a theoretical conception of neighbourhood. *Social Science & Medicine* 65: 1839–1852.

Burrell, A., Elliott, D., and Hansen, M. (2009) ICT in the ICU: using Web 2.0 to enhance a community of practice for intensive care physicians. *Critical Care and Resuscitation* 11: 155-159.

Cashen, M. S., Dykes, P. and Gerber, B. (2004). E-Health technology and Internet resources: barriers for vulnerable populations. *The Journal of Cardiovascular Nursing* 19(3): 209–214.

Czaja, R. and Blair, J. (2005). *Designing surveys: a guide to decisions and procedures*. London, Pine Gorge Press.

Curtin, J. (2001). *A digital divide in rural and regional Australia?* Current issues brief 1, Information and Research Services, Department of the Parliament Library, Australia.

Detmer, D. (2003) Building the national health information infrastructure for personal health, health care services, public health, and research, *BMC Medical Informatics and Decision Making* 3: 1-12.

Dowler, E. and Spencer, N. J. (2007). *Challenging health inequalities: from Acheson to choosing health*. Bristol, The Policy Press.

Jaffery J. B. and Becker B. N. (2004). Evaluation of e-Health web sites for patients with chronic kidney disease. *American Journal of Kidney Diseases* 44(1): 71-76.

Kaplan, G. A., Everson, S. A. and Lynch, J. W. (2000). The contribution of social and behavioral research to an understanding of the distribution of disease: a multilevel approach. Smedley, B. D. and Syme, S. L. (Eds). *Promoting health. Interventions strategies from social and behavioral research*. Washington, DC, National Academy Press: 37-71

Kennedy, B. and Firman, D. (2004). *Indigenous SEIFA – revealing the ecological fallacy*. 12th Biennial Conference of Australian Population Association, 15th -17th Sept, Canberra.

Lloyd, R. and Bill, A. (2004). *Australia online: how Australians are using computers and the Internet 2001.* A joint publication by the ABS and NATSEM. Canberra, Australian Census analytic.

Macintyre S., Ellaway, A., and Cummins, S. (2002). Place effects on health: how can we conceptualise, operationalise and measure them? *Social Science & Medicine* 55: 125-139.

National Health and Hospitals Reform Commission (2009*). A healthier future for all Australians. Final report of the National Health and Hospitals Reform Commission*. Canberra, Australian Government.

Pickett, K. E. and Pearl, M. (2001). Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *Journal of Epidemiology and Community Health* 55: 111-122.

Popay, J., Thomas, C., Williams, G., Bennett, S., Gatrella, A. and Bostocka, L. (2003). A proper place to live: health inequalities, agency and the normative dimensions of space. *Social Science & Medicine* 57: 55–69

Queensland Government (2009). *South East Queensland Regional Plan 2009-2031*. Brisbane, Department of Infrastructure and Planning.

Queensland Health (2009). *The health of Queenslanders: prevention of chronic disease*. Brisbane, Queensland Government.

Travaglia, J., Harris, E., Masden, L., Sainsbury, P., McDonald , J. and Gill, B. (2006). Locational disadvantage: focusing on place to improve health. Sydney, CHETRE.

Wave, V. (2009). *m-Health for development: the opportunity of mobile technology for healthcare in the developing*. United Nations Foundation and Vodafone Foundation.

World Health Organization (2008). *Strategy 2004-2007: eHealth for health-care delivery*. WHO Department of Essential Health Technologies. Available at: www.who.int/eht/ehealthHCD/ (accessed 26 November 2009)

World Health Organization (1997). The Jakarta Declaration. Geneva, WHO.

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