

Review Article

Addressing the health disadvantage of rural populations: How does epidemiological evidence inform rural health policies and research?

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Abstract

We reviewed evidence of any apparently significant 'rural-urban' health status differentials in developed countries, to determine whether such differentials are generic or nation-specific, and to explore the nature and policy implications of determinants underpinning rural-urban health variations. A comprehensive literature review of rural-urban health status differentials within Australia, New Zealand, Canada, the USA, the UK, and a variety of other western European nations was undertaken to understand the differences in life expectancy and cause-specific morbidity and mortality. While rural location plays a major role in determining the nature and level of access to and provision of health services, it does not always translate into health disadvantage. When controlling for major risk determinants, rurality per se does not necessarily lead to rural-urban disparities, but may exacerbate the effects of socio-economic disadvantage, ethnicity, poorer service availability, higher levels of personal risk and more hazardous environmental, occupational and transportation conditions. Programs to improve rural health will be most effective when based on policies which target all risk determinants collectively contributing to poor rural health outcomes. Focusing solely on 'area-based' explanations and responses to rural health problems may divert attention from more fundamental social and structural processes operating in the broader context to the detriment of rural health policy formulation and remedial effort.

KEY WORDS: developed country, health differential, health disadvantage, risk determinant, rural and remote.

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Background

During the 1990s, 'rural health' emerged as a significant concern warranting special attention by developed world governments.^{1–3} Australian governments responded to findings of poorer rural health status and evidence that mainstream health programs were failing to meet the needs of rural Australians by implementing a number of specifically 'rural' health policies and programs.^{4–6}

The full nature, extent and underpinnings of any significant rural–urban health differential remain substantially unexamined, despite the value of such evidence for rural health policy formulation.⁷ It therefore remains unclear which health status determinants derive from the intrinsic characteristics of rural locations, environments, lifestyles and occupations, and which others might be shared by urban residents with similar demographic, occupational, ethnic/racial, socioeconomic or educational backgrounds.^{8,9}

This paper reports on a comprehensive literature review of rural–urban health status differentials within Australia, New Zealand, Canada, the USA, the UK and a variety of other western European nations with the objective of: (i) ascertaining the nature of any apparently significant 'rural–urban' health status differentials; (ii) determining whether such differentials are shared across developed countries; and (iii) exploring the nature and policy implications of determinants underpinning any rural–urban health variations.

Searched literature covered the period of 1990–2007. Key search terms employed were 'rural', 'urban', 'regional', 'differential' 'difference', 'health', 'determinant', 'status' and 'socioeconomic' together with specific health conditions and priority diseases (such as cancer and cardiovascular disease).

Rural–urban health status differences

Exactly what constitutes 'rural', as opposed to 'urban', has been extensively debated elsewhere.^{10–14} Lacking a

single, standard urban–rural definition throughout the studies reviewed, the criteria and resulting delimitations used by authors were accepted as meaningful in the context of their work, regardless of their comparability with other studies.

Life expectancy differences between rural and remote area populations and those of metropolitan and major urban areas reveal a mixed picture. In Australia, life expectancies for men and women in rural areas are only marginally less than their urban counterparts, although those for remote areas are 4 years lower than urban levels.¹⁵ In New Zealand, life expectancies of rural and urban men and women vary little,¹⁶ but in Canada decrease with increasing rurality; however, this difference is only significant for men.¹⁷ In Scotland, life expectancy for men in ‘remote rural’ and ‘accessible rural’ areas was higher than in ‘large urban areas’, while women in ‘remote rural’ areas had the highest female life expectancy.¹⁸

Systematic urban–rural differences in individual conditions are far from uniformly apparent in developed countries, and certainly not apparent for all diseases and life-threatening conditions. In most developed countries, some particular health concerns, such as suicide, certain types of cancer (notably cervical, melanoma and prostate), cardiovascular disease, obesity and motor vehicle accidents, are markedly more prevalent in rural areas.^{17,19–21} Other studies show that a range of other conditions, such as breast, stomach and liver cancers, respiratory conditions, have higher incidence rates in urban populations.^{22–25} Table 1 provides a brief synopsis of the findings concerning the nature of rural–urban differentials for a selection of major health conditions.

This review shows little constancy and much variation both between and within developed societies in the relationship between health conditions and residential environment. Moreover, intra-rural health differentials can be as pronounced as those between rural and urban areas.^{69,70} Clearly, rurality *per se* does not always translate into health disadvantage.^{57,71,72}

Determinants of rural health status

Our concern now is to determine which factors are most important in explaining rural–urban health differentials, and whether these remain after controlling for critical ‘intervention’ variables such as distance, geographical isolation, the availability and accessibility of appropriate services, socioeconomic factors and ethnicity/race.^{20,73,74}

Geographical location and rural environments

Geographical location and rural environments directly influence some aspects of the health status of rural

populations. For instance, the burden of zoonoses is highest in rural areas, particularly for agricultural employees.^{75–78} In New Zealand, access to safe drinking water is sometimes poorer in small rural communities where Maori people are overrepresented.⁷⁹ In Australia, higher rates of infectious diseases among Aboriginal people in rural and remote areas have also been related to sub-standard water supplies, washing facilities and sanitation.^{80,81}

Location and the characteristics of rural ‘places’ indirectly compound problems originating from more fundamental structural or social causes.^{82,83} Access to health care is more difficult for rural residents in geographically extensive territories where services are widely dispersed at low density because of greater distances to health services and limited transport options.^{84–88} In smaller countries such as the UK, the problem of access to service for rural dwellers is less apparent, suggesting some critical distance beyond which access differentials exhibit some measurable effect on health behaviour and health outcomes.^{57,89–93}

Access to services is an important determinant of health outcomes for both ill-health treatment and preventive care. Treatment of injuries is often impeded by long distances emergency services must travel to reach and convey injured people, by restricted diagnostic capacity and by delayed treatment or incomplete surgical capabilities in rural areas.^{63,64} Lower levels of screening and delayed diagnosis for certain health problems due to poorer rural access to services also contribute to adverse health outcomes.^{94,95} Higher diabetes rates in rural areas might also indicate problems accessing primary health care, compounded by limited diagnostic and management resources.^{53,54} Rural and remote area populations have decreased chances of surviving cancer because of poorer access to detection, screening, treatment and support services.^{19,22,25}

Rural lifestyles

Rural–urban differences in the incidence of disease and illness are most likely to result from occupational hazards and personal behaviour rather than ‘rurality’.²⁵ There are particular health risks associated with rural industries and their higher exposure to chemical, biological, physical and mechanical hazards.^{21,75,96–98} Forestry and fishing have the highest death rates of all industry groups, and death rates in mining and agriculture are well above the workforce average in Australia, New Zealand and the US.^{99–102}

Lifestyles impact significantly on health literacy and patterns of health behaviour characterising rural and remote communities. Rural populations generally display a greater incidence of less healthy behaviours than those of urban areas.^{17,21,44} Sustained unhealthy

TABLE 1: *Rural–urban health differentials relating to major health conditions*

Cancer: Rural–urban differentials in the incidence and survival rates of cancer have attracted more attention than any other disease or condition. These studies reveal widespread variation in the incidence of different types of cancer according to rurality and in the extent of rural-to-urban gradients. Whereas cervical, prostate, melanoma, lip and eye cancers, for example, are commonly more prevalent in rural areas,^{22,25–27} other cancers (breast, lung, stomach, lymphoma) are more commonly associated with urban residence.^{22,24,25,28}

Mental health: There is little evidence linking prevalence of mental health disorders with rurality. In the US, for example, prevalence rates are similar in both rural and urban areas,²⁹ a finding paralleling the Australian experience and serving to confirm the findings of a number of Australian and US reports that other factors are more powerful risk factors than geographical place in relation to mental health issues.^{30–33}

Suicide: Suicide rates in Scotland exhibit some locational variability, with the highest rates among men occurring in both the most and the least densely populated areas³⁴ Among Scottish 10- to 24-year olds, however, similar rates were found in both urban and rural areas.³⁵ In Australia, the UK, Ireland, New Zealand and Canada, higher male suicide rates have been observed in rural and remote populations.^{17,36–39} By contrast, female suicide rates were similar in both rural/remote and urban populations.⁷

Circulatory diseases: Coronary heart disease and stroke patterns appear even more complex. In remote rural areas of Scotland, for example, after standardisation for age, gender and deprivation levels, the relative risk of coronary heart disease mortality was similar to that of urban areas, although the relative risk in remote areas of mortality after discharge from hospital was in fact higher.⁴⁰ In Scotland and in Northern Ireland, it has also been found that coronary heart disease mortality rates are relatively higher in urban than in rural areas.^{41,42} In the US, highest heart disease mortality rates occur in large urban areas, followed by the most rural counties of southern states.⁴³ In Canada, death rates from circulatory diseases are higher in rural areas.^{17,44} In Australia, however, the picture seems more complex, with one Australian study finding no significant difference between stroke death rates in metropolitan, rural and remote areas,¹⁵ another that rural residence is significantly associated with coronary heart disease mortality,⁴⁵ and yet a third that the effect of rurality lessened after adjusting for country of birth and socioeconomic factors.⁴⁶ By contrast, a Japanese study found that stroke mortality was higher in rural areas, particularly for women.⁴⁷

Respiratory diseases: International studies of the association between respiratory conditions and rurality also report mixed results. Scottish and Canadian studies both report lower prevalence of asthma and some respiratory symptoms associated with rural area residence.^{17,21,48} All-cause mortality in Northern Ireland was higher in urban areas, with the greatest disparities attributable to respiratory disease and lung cancer.⁴⁹ In contrast, although asthma hospitalisation and mortality rates in Australia exhibit significant regional variation, increased remoteness is associated with increased asthma-related death rates.^{50–52}

Diabetes: In the Canadian province of Québec, diabetes is reported to be more prevalent among urban than rural populations,²¹ while other Canadian studies report few significant rural–urban differences.^{17,44} In the Australian state of Victoria, no significant metropolitan, rural and remote area differences are apparent in the prevalence of diabetes, even though some rural ‘regions’ exhibit extremely high incidences, and rural populations experience higher hospital admission rates for complications of diabetes.⁵³ In the US, too, although the prevalence of diabetes is higher in rural areas, ethnic, socioeconomic and lifestyle factors are stronger risk factors than rurality.⁵⁴

Perinatal and neonatal conditions: In both Australia and the US studies, higher levels of peri- and neonatal health have been found among rural populations, although this pattern is not invariant, as urban and rural area infant mortality rates in both the US and the UK are similar.^{55–57} While both urban and rural American Indians and Alaskan natives have higher proportions of lower birthweight births than the ‘White’ population, those living in urban areas have both higher proportions of such births and also a higher neonatal death rate.⁵⁸ In Australia, Indigenous populations, dominant in remote areas, also experience a higher burden of lower birthweight and neonatal deaths than non-Indigenous populations.^{55,59} In Scotland, however, higher proportions of low birthweight births occurred in large urban areas.⁶⁰

Renal disease: Rates of end-stage renal disease (ESRD) are higher in rural parts of the US than in urban areas.⁶¹ The higher rates of ESRD occurring in Australia’s rural and remote areas clearly reflect the high incidence of this disease within their Indigenous populations.⁶²

Injury and Trauma: Lower population density is the strongest predictor of trauma death rates in developed countries.^{63,64} In Australia and Canada, such rates are notably higher in rural and remote areas, particularly for men;^{15,65} in the US, rural populations also have disproportionately higher injury mortality rates, with fatality rates more than twice those of urban areas for a variety of injuries (including accidental firearm, traumatic occupational and motor vehicle accidents).^{63,64,66} On the other hand, one Australian study has also shown that despite significantly longer pre-hospital times, and with comparable patient populations, there were no significant differences in the primary outcome measures between rural and urban patients.⁶⁷ Health outcomes following treatment for traumatic brain injury were also comparable for rural and urban areas.⁶⁸

nutrition, elevated rates of smoking, lower levels of physical activity, high alcohol consumption and psychosocial stress, often reflecting the socioeconomic disadvantage characterising many rural areas, are among the major lifestyle issues contributing to poorer rural health status.¹⁰³ People living in rural areas are also less likely to use preventive screening services, exercise regularly or wear safety belts.¹⁰⁴ This heightened risk-taking is reflected in poorer health outcomes for certain conditions, most notably injury. Some studies associate rural communities with higher levels of health-risking behaviour, such as that resulting from greater access to firearms leading to higher suicide rates.^{105,106}

Health-affecting behaviours are also embedded in relationships between individuals and organisations, communities, families and friends.⁷¹ While rural communities are frequently cited as providing support at times of need, the lack of confidentiality and anonymity inhibits some rural dwellers from seeking medical care.¹⁰⁷ For others, psychosocial determinants, such as stressful life events, sociodemographic characteristics and lifestyle behaviours were more important predictors of mental illness than remoteness *per se*.³¹

Socioeconomic characteristics

Canadian, Australian, British and American studies have shown that much of the variation in health status could be explained by socioeconomic factors conditioning the use of health services.^{108–110} With few exceptions, population groups with the worst health status, whether rural or urban, are generally also characterised by highest poverty rates and lowest levels of education.^{87,104,112,111,113} Thus, highest incidences of heart disease, diabetes, obesity, elevated blood lead levels, lower birthweight, and stomach, lung, cervical, ovarian and bladder cancers all occur in disadvantaged areas and populations,²² as do higher levels of chronic obstructive pulmonary disease, diabetes, asthma, sudden infant death syndrome, road traffic accidents and homicide.^{46,114–117} By contrast, however, rates of colorectal cancer, female breast cancer and leukaemia are higher in affluent areas.¹¹⁷

Evidence that rurality contributes to health indicators in ways over and above socioeconomic factors is not consistent.¹⁷ Several studies have found little or no rural–urban variation in health status for particular diseases and conditions after controlling for variables relating to socioeconomic status.^{31,32,72,118–121} Others have found that the effect of socioeconomic deprivation is more strongly associated than rurality with higher rates of suicide and undetermined deaths at all levels of population density and across all age groups,³⁴ and that much of the variation between rural and urban health status

could be explained by socioeconomic factors affecting the use of health services.^{108,110,122}

Race and ethnicity

Aboriginal and Torres Strait Islanders, Maori, Canadian Aboriginal people, and American Indian and Alaskan Native populations are all characterised by a higher burden of disease than non-Indigenous peoples.^{123–126} Among Australian Indigenous peoples, death rates (including higher rates of premature and post-neonatal death) are up to three times higher than those of the non-Indigenous population, and life expectancies considerably shorter. Cervical cancer death rates in Australia are higher in remote areas, but only among the Indigenous component of the population.¹²⁷ Similarly, high rates of notification for syphilis, chlamydia and salmonella in regional, and especially remote areas of Australia, might also reflect the high rates recorded in the Indigenous population, and their greater representation in remote populations.¹²⁸ Indigenous Australian coronary heart disease rates are twice those of the non-Indigenous population.⁴⁵

In the US, most racial minority groups (particularly Black Americans) have higher death rates for diabetes, HIV, infant mortality, stroke, heart disease, cancer, homicide and unintentional injuries than non-Hispanic Whites.^{129,130} Rural Black American women experience the highest heart disease mortality rates of all women in the US.⁸⁷

Poorer health differentials in remote areas reflect the higher proportion of Indigenous people in these areas.^{131–133} The relative socioeconomic disadvantage experienced by many Indigenous people exposes them to higher levels of behavioural and environmental health risk,^{123,128,134} compounded by significant problems associated with their often long distance to services, lack of transport, service affordability and availability of culturally appropriate services. Inevitably, therefore, such disadvantages are reflected in the health outcomes of many Indigenous people.

Policy implications

An understanding of the extent to which rurality contributes specifically to or merely exacerbates health determinants is vital if health policies and interventions are to effect significant improvement in rural health status.^{4,5,9} Rural health policies in developed countries are predicated upon a belief that rural health status is worse than in urban areas^{3,6} and on a perception that ‘rurality’ is somehow responsible for such worse health outcomes.

This review of recent research indicates that health status of any place is a product of more than just loca-

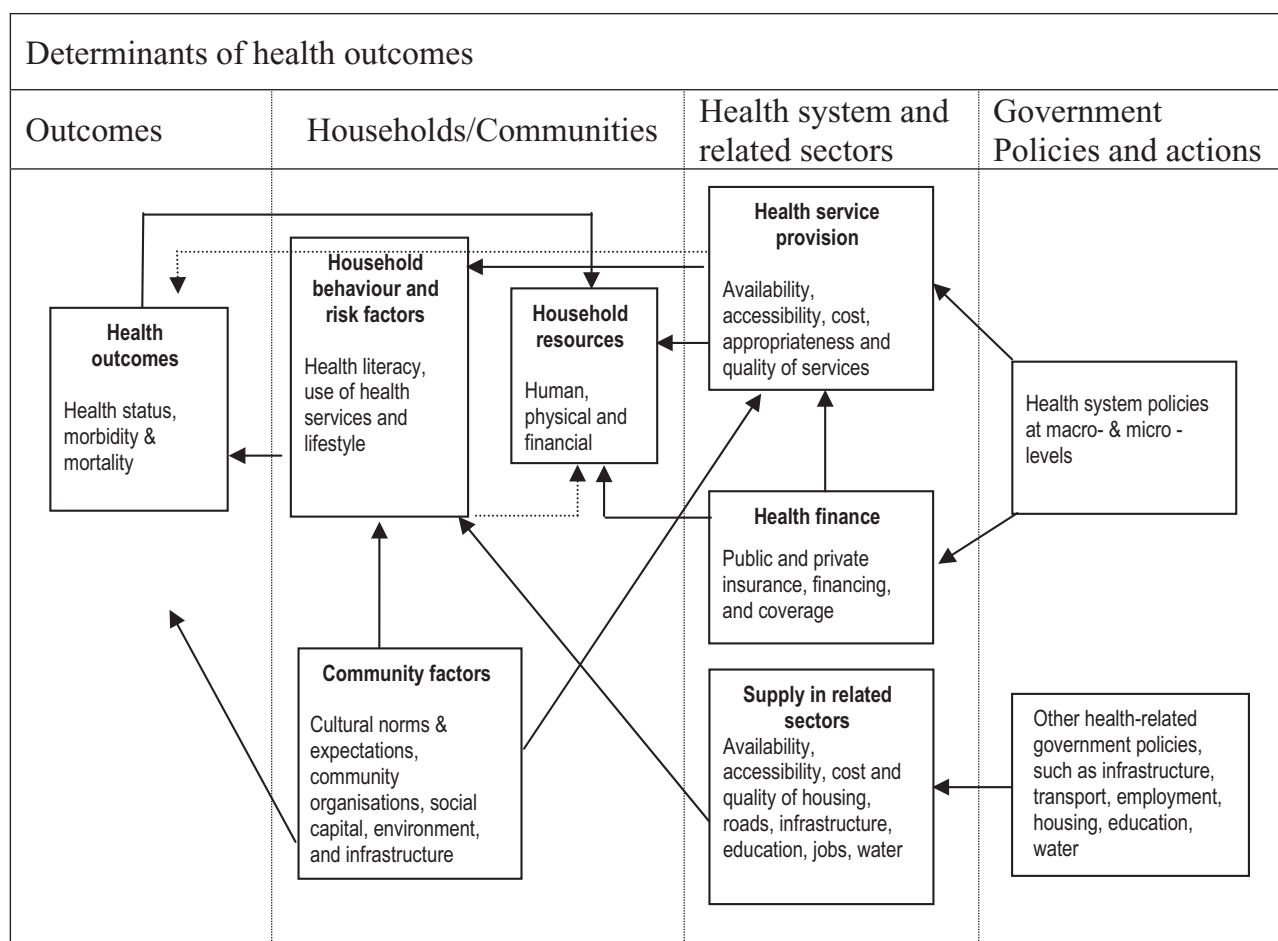


FIGURE 1: A conceptual framework for understanding health inequalities.¹³⁶

tion. Poorer outcomes for certain health conditions in many rural and remote populations are largely attributable to higher levels of socioeconomic disadvantage, ethnicity and poorer access to health services, compounded by higher levels of personal risk and more difficult environmental, occupational and transportation conditions.^{54,135} These factors in combination are likely to exacerbate disparities between the health of rural and urban residents.²⁰

Health status and outcomes reflect a wide range of interrelated household, community, health system and government policy-related determinants operating at a variety of scales (see Fig. 1).¹³⁶ So far, rural health policies have concentrated on measures to increase workforce supply in small rural and remote under-served communities,^{21,100,137-139} and improve access to health care services through innovative models of service delivery for communities, including telehealth and alternative generalist models of rural and remote health workers.^{140,141}

However, focusing solely on 'area-based' explanations and responses to rural health problems runs the

risk of diverting attention from more fundamental social and structural processes operating in the broader context and misdirecting policy formulation and remedial effort. That is, concentrating on distance and access issues for rural residents without also addressing poverty, discrimination, inequality, inequities of resource allocation must, almost inevitably, result in sub-optimal interventions. Overcoming rural health disadvantage requires at least concurrent action to improve employment opportunities, physical infrastructure provision and education. Of paramount importance is the need to recognise that no rural health policy response can be truly effective if it fails to include initiatives designed specifically to address those factors contributing to the marginalisation and socioeconomic disadvantage of Indigenous and First Nations peoples.

Unfortunately, interventions designed to improve health status are not always directed where the greatest health gains might be obtained.¹⁴² A comprehensive primary health care policy incorporating health promotion, ill-health prevention and early intervention is essential to improve rural health outcomes.¹⁴³ This

requires programs specifically designed to influence rural health literacy and health-seeking behaviour, along with targeted investments ensuring the availability of appropriate health services,¹⁴⁴ thereby facilitating the development of healthier rural communities. Basic primary health care must be locally available, coordinated, comprehensive and readily accessible to even the smallest community.¹⁴⁰

Conclusion

This literature review has highlighted the paucity of rural–urban epidemiological evidence underpinning rural and remote health policy and programs, a function of:

- Inadequate morbidity, mortality and risk determinant data^{145,146}
- The restricted focus of many studies on specific health problems and the use of broad geographical units which mask significant internal diversity and limit the applicability of research findings^{21,108,111}
- Difficulties associated with defining ‘rural’ and ‘remote’ to allow for international comparisons and the measurement of changes in health status over time⁸
- Problems of linking findings from aggregated area-based data with those based upon individual data.¹⁴⁷

Rural location undoubtedly plays a major role in determining the nature and level of service provision and access. Less well recognised is the contribution of ‘rurality’ to poorer health status by exacerbating other health determinants, such as socioeconomic status. One worthwhile research avenue might be comparative investigations into why some rural areas exhibit health disadvantage while other similar regions have health outcomes that accord with national standards. Such research would require some longitudinal investigation that controlled for antecedent risk determinants, health behaviour, service utilisation and monitored the stage at which conditions were diagnosed or received treatment.

The consequences of not going down this path will be that rural health policies and programs will continue to be based on enduring misperceptions of what is required to address health status differentials or the political need to respond to the ‘squeaky wheels’ that so often drive the policy agenda. Policy-makers are under increasing pressure to strengthen the link between evidence and policy development.¹⁴⁸ Reviewing existing research to map the extant knowledge base is the first vital stage of ensuring that there is adequate policy-relevant evidence for the formulation of appropriate responses. International comparative epidemiological studies of rural health status will assist to fill the knowledge gaps thereby identified.

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